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

REPLY TO THE ATTENTION OF:
W-15J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency completed its review of the final Total Maximum Daily Loads (TMDL) for the Redwood River Watershed (RRW), including supporting documentation. The RRW is located in southwestern Minnesota. The RRW TMDLs were calculated for bacteria, total suspended solids (TSS), chlorides, and phosphorus to address the impaired aquatic recreation and aquatic life uses.

The RRW TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's two (2) bacteria, nine (9) TSS, one (1) chloride, and six (6) phosphorus TMDLs for a total of eighteen (18) TMDLs. EPA describes Minnesota's compliance with the statutory and regulatory requirements in the enclosed decision document.

EPA acknowledges Minnesota's efforts in submitting this TMDL and look forward to future submissions by the State of Minnesota. If you have any questions, please contact Mr. David Werbach of the Watersheds and Wetlands Branch at Werbach.david@epa.gov or 312-886-4242.

Sincerely,

5/11/2023

X

Tera L. Fong
Division Director, Water Division
Signed by: Environmental Protection Agency

Enclosure

cc: Mike Weckwerth, MPCA

wq-iw7-59g

TMDL: Redwood River Watershed bacteria, TSS, phosphorus and chloride TMDLs in portions of Lincoln, Yellow Medicine, Redwood, Lyon, Pipestone and Murray Counties in southwestern Minnesota
Date: 05/11/2023

DECISION DOCUMENT FOR THE REDWOOD RIVER WATERSHED TMDLS IN SOUTHWESTERN MINNESOTA

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

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body 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 water body 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 water body. 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 water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;

(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent:

The Redwood River Watershed (RRW) in southwestern Minnesota is part of the Minnesota River basin and covers parts of Lincoln, Yellow Medicine, Redwood, Lyon, Pipestone and Murray counties. The RRW is approximately 699 square miles (447,000 acres) in size and is within the Western Corn Belt Plains (WCBP) ecoregion (Section 3.0 of the final TMDL document). Surface water in the RRW generally flows in a west to east direction from the headwaters areas in the western portion of the watershed toward the east into the Minnesota River near Redwood Falls (Figure 1 of the final TMDL document).

The RRW TMDLs address two river segments impaired due to excessive bacteria, nine river segments impaired due to excessive sediment (total suspended solids (TSS)), one river segment impaired by chloride, and six lakes impaired due to excessive nutrients (specifically phosphorus) for a total of **eighteen** TMDLs (Tables 1 and 2 of this Decision Document). The Minnesota Pollution Control Agency (MPCA) also noted that previous TMDLs addressed waters in the RRW (Section 1.1 of the final TMDL document). In 2014, the Redwood River Fecal Coliform TMDL was approved by the EPA, and addressed nine segments in the RRW; in 2020, the Minnesota River and Greater Blue Earth River Basin TSS TMDLs addressed one segment in the RRW (07020006-501), and six segments are addressed under the Minnesota Statewide Mercury TMDL (2007 and subsequent revisions). A separate TMDL effort is underway by MPCA to address the river eutrophication impairment in the lowermost portion of the Redwood River (07020006-501) (Table 2 of the final TMDL document).

MPCA also noted that numerous water body impairments are not being addressed by TMDLs at this time. MPCA explained that for these segments, there were insufficient data to determine the pollutant responsible for either the fish (Index of Biotic Integrity (IBI)) or the aquatic macroinvertebrate IBI impairment, or that the impairments were due to non-pollutant causes. Section 1.1 of the final TMDL document provide additional information on those segments. MPCA indicated these impairments will continue to be reviewed, and the non-pollutant impairments will be addressed through the Watershed Restoration and Protection Strategy (WRAPS) process.

Table 1. Redwood River Watershed - River TMDLs

AUID (07020006 -###)	Water body name (description)	Designated use class	Pollutant
510	Redwood River – Coon Creek to T110 R42W S20, north line	2B, 3C	*E. coli*
521	Ramsey Creek – T113 R36W S35, west line to Redwood River	1B, 2A, 3B	*E. coli*
			Total *E. coli* TMDLs - 2

502	Redwood River –T111 R42W S33 west line to Three Mile Creek	2B,3C	TSS
503	Redwood River – Three Mile Creek to Clear Creek	2B, 3C	TSS
509	Redwood River – Clear Creek to Redwood Lake	2B, 3C	TSS
510	Redwood River – Coon Creek to T110 R42W S20, north line	2B, 3C	TSS
564*	Three Mile Creek – Headwaters to T113 R41W S33, east line	2B, 3C	TSS
565*	Three Mile Creek – T113 R41W S34, west line to T122 R41W S12, east line	2B, 3C	TSS
566*	Three Mile Creek – T112 R40W S7, west line to Redwood River	2B, 3C	TSS
567	Clear Creek - Headwaters to -95.323 44.466	2B, 3C	TSS
568	Clear Creek - -95.323 44.466 to Redwood River	2B, 3C	TSS
			Total TSS TMDLs - 9
502	Redwood River –T111 R42W S33 west line to Three Mile Creek	2B, 3C	chloride
			Total Chloride TMDLs - 1

* - Three Mile Creek Segment -504 was split into three separate segments, -564, -565, and -566 during the 2020 assessment process; one TMDL was developed for the three segments

Table 2. Redwood River Watershed - Lake TMDLs

AUID/DNR Lake ID #	Water body name	Designated use class (WCBP ecoregion)	Pollutant
41-0043-00	Benton Lake	2B, 3C	Phosphorus (Nutrients)
41-0021-01	Dead Coon Lake (Main Lake)	2B, 3C	Phosphorus (Nutrients)
42-0093-00	Goose Lake	2B, 3C	Phosphorus (Nutrients)
42-0002-00	School Grove Lake	2B, 3C	Phosphorus (Nutrients)
42-0055-00	Clear Lake	2B, 3C	Phosphorus (Nutrients)
42-0096-00	Island Lake	2B, 3C	Phosphorus (Nutrients)
			Total Lake Phosphorus TMDLs - 6

Land Use:

Land use in the RRW is fairly consistent across the watershed. The overall land use in the RRW is mainly cropland (85%), with other land uses including rangeland (3.5%), developed lands (6%), wetlands (3%) open water (1%), forest/shrub (1%), and barren lands (<1%) (Section 3.4 and Table 6 of the final TMDL document and Table 3 of this Decision Document). Table 6 of the final TMDL document also contains the information regarding land use in the individual TMDL watersheds.

MPCA noted that population in the watershed is fairly sparse, with the cities of New Ulm (population 13,362) and a portion of Marshall (population 12,432), which lie within the boundaries of the RRW, being the largest cities. MPCA determined that there are no tribal lands in the RRW (Section 3.0 of the final TMDL document).

Table 3: Land use in the Redwood River Watershed

Impaired Water body Name	Segment or Lake Id	Watershed Area [Acres]	Percent of Watershed [%]						
			Cropland	Rangeland	Developed	Forest/Shrub land	Open Water	Wetlands	Barren/Mining
Redwood River	07020006-502	197,834	69	16	8	1	3	3	< 1
Redwood River	07020006-503	329,540	75	12	7	< 1	3	3	< 1
Redwood River	07020006-509	399,297	77	10	7	< 1	2	3	< 1
Redwood River	07020006-510	148,455	69	18	6	< 1	4	2	< 1
Ramsey Creek	07020006-521	42,629	92	1	5	1	<1	1	<1
Three Mile Creek	07020006-564, 565 & 566	75,072	81	9	5	< 1	1	3	< 1
Clear Creek	07020006-567 & 568	53,232	91	< 1	5	< 1	1	2	< 1
Benton Lake	41-0073-00	28,005	56	23	6	1	11	3	< 1
Dead Coon Lake	41-0021-01	47,050	64	19	5	1	8	2	< 1
Goose Lake	42-0093-00	1,938	68	9	4	< 1	17	< 1	< 1
School Grove Lake	42-0002-00	1,740	71	< 1	4	< 1	21	3	< 1
Clear Lake	42-0055-00	391	18	44	10	< 1	21	< 1	5
Island Lake	42-0096-00	1,089	54	22	3	<1	16	5	<1
Entire Watershed	07020006	447,532	78	9	6	1	2	3	< 1

Problem Identification:

Bacteria TMDLs: Bacteria impaired segments identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the RRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of the bacteria criteria. Excessive bacteria can negatively impact recreational uses (e.g., swimming, wading, boating, fishing etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria-laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Total Suspended Solids (TSS) TMDLs: The segments identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive TSS/sediment within the water column. Water quality monitoring within the RRW indicated that these segments were not attaining their designated aquatic life uses due to high sediment measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

TSS is a measurement of the sediment and organic material that inhibits natural light from penetrating the surface water column. Excessive sediment and organic material within the water column can negatively impact fish and macroinvertebrates within the ecosystem. Excess sediment and organic material may create turbid conditions within the water column and may increase the costs of treating surface waters used for drinking water or other industrial purposes (e.g., food processing).

Excessive amounts of fine sediment in stream environments can degrade aquatic communities. Sediment can reduce spawning and rearing areas for certain fish species. Excess suspended sediment can clog the gills of fish, stress certain sensitive species by abrading their tissue, and thus reduce fish health. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species.

Excessive amounts of fine sediment also may degrade aquatic habitats, alter natural flow conditions in stream environments and add organic materials to the water column. The potential addition of fine organic materials may lead to nuisance algal blooms which can negatively impact aquatic life and recreation (e.g., swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column and limit the distribution of aquatic vegetation. Established aquatic vegetation stabilizes bottom sediments and provides important habitat areas for healthy macroinvertebrates and fish communities.

Chloride TMDL: The chloride impaired segment identified in Table 1 of this Decision Document was included on the final 2022 Minnesota 303(d) list due to excessive chloride. Water quality monitoring within the RRW indicated that this segment was not attaining its designated aquatic life uses due to high chloride measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

Low levels of chloride can be found naturally in the RRW lakes and streams. Chloride is essential for aquatic life to carry out a range of biological functions. However, high concentrations of chloride in the surrounding water can harm cellular osmotic processes in aquatic life. Excessive dissolved chlorides in the water column may stress aquatic species and prohibit the transport of needed molecules in cells of aquatic organisms. If elevated concentrations of chloride persist in the water, aquatic life such as fish, invertebrates and even some plant species may become stressed and/or die.

Excessive dissolved chloride can also alter the density of water in lake environments. Density changes can impact seasonal mixing patterns of lake waters, especially in deeper lakes. Seasonal mixing in lake environments distributes oxygen and nutrients throughout the water column and is necessary for healthy aquatic communities. Mixing pattern disruptions may also impact nutrient cycling, phytoplankton and zooplankton community composition and productivity and fish and macroinvertebrate health.

High levels of salt can also negatively affect infrastructure, vehicles, plants, soils, pets, wildlife and groundwater and drinking water supplies. MPCA acknowledged that groundwater derived drinking water is a vital resource for many Minnesotans and the potential for chlorides to contaminate shallow drinking water wells is a concern in the RRW.

Phosphorus TMDLs: The lakes identified in Table 2 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive nutrients (phosphorus). Total phosphorus, chlorophyll-*a* (chl-*a*) and Secchi depth (SD) measurements in the RRW indicated that these waters were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria. Water quality monitoring was completed throughout the RRW, and those data formed the foundation for phosphorus TMDL modeling efforts.

While phosphorus is an essential nutrient for aquatic life, elevated concentrations of phosphorus can lead to nuisance algal blooms that negatively impact aquatic life and recreation (e.g., swimming, boating, fishing, etc.). Algal decomposition can deplete dissolved oxygen levels within the water column and can stress benthic macroinvertebrates and fish. Depletion of oxygen in the water column can also lead to conditions where phosphorus is released from bottom sediments (i.e., internal loading). Also, excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish.

Priority Ranking:
MPCA's schedule for TMDL completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. MPCA has aligned TMDL priorities with the watershed approach and 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 (including the RRW) that were to be addressed by TMDLs by 2022. The waters of the RRW addressed by this TMDL report were part of the MPCA prioritization plan to meet EPA's national measure. An updated TMDL Priority Framework Report is currently under development by MPCA.

Pollutants of Concern:
The pollutants of concern are bacteria (*E. coli*), TSS, chloride, and phosphorus.

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to the RRW are:

<u>RRW Bacteria TMDLs:</u>
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are two wastewater treatment plants (WWTPs) in the RRW which contribute bacteria from treated wastewater releases (Table 27 of the final TMDL document; Table 4 of this Decision Document) to the various impaired segments. MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 4: **Minnesota NPDES facilities which contribute bacteria (*E. coli*) to impaired segments in the Redwood River Watershed**

Facility Name	Permit #	Impaired Segment	Design Flow (million gallons per day (MGD))	WLA (billions of organisms per day)
Ruthton WWTP	MNG585105	-510	0.38 MGD*	1.8
Tyler WWTP	MNG585116	-510	1.09 MGD*	5.2

* - pond systems

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. MPCA noted that there is one MS4 permittee in the bacteria-impaired segments of the RRW; the City of Redwood Falls (MS400236) which was assigned a portion of the WLA for the Ramsey Creek bacteria TMDL (-521) (Sections 3.6 and 4.3.2 of the final TMDL document and Table 10 of this Decision Document).

Concentrated Animal Feedlot Operations (CAFOs): MPCA has identified CAFOs in the RRW (Section 3.6 and Appendix E of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a water quality standard (WQS). MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the load allocation (LA) of the TMDL.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs): MPCA did not identify any CSOs or SSOs which contribute bacteria to waters of the RRW.

Stormwater runoff from permitted construction and industrial areas: MPCA determined that stormwater discharges from permitted construction and industrial dischargers do not contribute bacteria to the RRW (Section 4.3.2 of the final TMDL document).

<u>RRW TSS TMDLs:</u>

NPDES permitted facilities: NPDES permitted facilities may contribute TSS loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are ten WWTPs in the RRW which contribute TSS from treated wastewater releases (Table 5 of this Decision Document) to the segments impaired by TSS. MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 5: Minnesota NPDES facilities which contribute TSS to impaired segments of the Redwood River Watershed

Facility Name	Permit #	Impaired Segments	Design Flow (MGD)	Permitted Concentration (mg/L)	WLA (lbs/day)
ADM Corn Processing – Marshall	MN0057037	-502, -503, -509	2.64	30	661

Ghent WWTP	MNG585121	503, 509, 564/565/566	0.26*	45	97
Lynd WWTP	MNG585030	502, 503, 509	0.34*	45	128
Marshall WWTP	MN0022179	502, 503, 509	4.50	30	1126
Russell WWTP	MNG585062	502, 503, 509, 510	0.59*	45	220
Milroy WWTP	MNG585124	509, 568	0.25*	45	93
Vesta WWTP	MNG585043	503, 509	0.26	45	97
Magellan Pipeline CO LP – Marshall	MN0059838	502, 503, 509	0.72	30	180
Ruthton WWTP	MNG585105	502, 503, 509, 510	0.38*	45	142
Tyler WWTP	MNG585116	502, 503, 509, 510	1.09*	45	409

* - pond systems; flow based upon maximum permitted discharge volumes

MS4 communities: MPCA identified one entity subject to the MS4 stormwater regulations, the City of Marshall (MS400241), within the segments impaired for TSS (Figure 1 and Section 4.2.2 of the final TMDL document). The City of Marshall's MS4 contributes to several TSS-impaired segments (-502, -503, -564/565/566, and -509). MPCA calculated WLAs for each of the segments based upon the MS4 land area in each segment (Section 4.2.2 of the final TMDL document).

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the RRW must comply with the requirements of the MPCA's NPDES Stormwater Program and create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

RRW Chloride TMDL:

NPDES permitted facilities: NPDES permitted facilities may contribute chloride loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are seven WWTPs in the RRW which contribute chloride from treated wastewater releases into or upstream of Redwood River Segment -502 (Table 32 of the final TMDL document; Table 6 of this Decision Document). MPCA noted that these facilities were assigned a WLA in the TMDL based upon chloride impairment.

Table 6: Minnesota NPDES facilities which contribute chlorides to impaired segments of the Redwood River Watershed

Facility Name	Permit #	Design Flow (MGD)	WLA (lbs/day)
ADM Corn Processing – Marshall	MN0057037	2.64	5064
Lynd WWTP	MNG585030	0.34*	655
Marshall WWTP	MN0022179	4.50	8632
Russell WWTP	MNG585062	0.59*	1124
Magellan Pipeline CO LP – Marshall	MN0059838	0.72	1381
Ruthton WWTP	MNG585105	0.38*	724
Tyler WWTP	MNG585116	1.09*	2091

* - pond systems; flow based upon maximum permitted discharge volumes

MS4 communities: MPCA identified one entity subject to the MS4 stormwater regulations, the City of Marshall (MS400241), within the segment impaired for chlorides (Figure 1 and Section 4.2.2 of the final TMDL document). MPCA calculated a WLA for the segment based upon the MS4 land area in Redwood River Segment -502 (Section 4.4.2 of the final TMDL document).

Stormwater runoff from permitted construction and industrial areas: MPCA determined that stormwater discharges from permitted construction and industrial dischargers do not contribute chlorides to the RRW (Section 4.4.2 of the final TMDL document).

RRW Phosphorus TMDLs:
NPDES permitted facilities and MS4 communities: MPCA determined that there are no wastewater or MS4 dischargers in the watersheds of the impaired lakes (Section 4.5.2 of the final TMDL document).

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events, and were the only potential point sources identified by MPCA (Section 4.5.2 of the final TMDL document). These areas within an impaired lake watershed must comply with the requirements of the MPCA's NPDES Stormwater Program and create a SWPPP that summarizes how stormwater will be minimized from the site.

Nonpoint Source Identification:
The potential nonpoint sources to the RRW include:

RRW Bacteria TMDLs:
MPCA utilized data from several sources to develop an overall bacteria loading estimate for the RRW (Section 3.6.2 and Appendix A of the final TMDL document). Results of this analysis are displayed in a table (Table 19 of the final TMDL document) which indicates the greatest source of bacteria throughout the watershed is from crop runoff-surface applied manure, as well as some impacts from livestock near streams and failing septic systems. MPCA noted that Segment -510 is downstream of impaired segments already addressed in a previous TMDL (MPCA Redwood River Fecal Coliform TMDL, 2013)

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the RRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the RRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines that channelize the stormwater flows and reduce the time available for bacteria to die-off.

Unrestricted livestock access to streams: Livestock with access to streams may add bacteria directly to the surfaces waters or resuspend particles 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.

Discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of bacteria within the RRW. Septic systems generally do not discharge directly into a water body, 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.

Failing SSTS are specifically defined as systems that are failing to protect groundwater from contamination, while those 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.

Wildlife: Wildlife is a known source of bacteria in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of bacteria via contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

RRW TSS TMDLs:
MPCA identified several nonpoint sources of TSS within the RRW. Figure 4 and Table 18 of the final TMDL document provides a chart and a table showing the predominant sources of TSS in the subwatersheds varies between agricultural runoff and near-channel erosion.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the RRW. MPCA estimates of the runoff are in Table 18 of the final TMDL document. MPCA noted that rainfall on unprotected soils, especially in the spring when vegetation has not significantly grown, can dislodge soil particles and then stormwater flows may transport these particles to surface waters. Sediment inputs to surface waters can be exacerbated by tile drainage lines, which channelize the stormwater flows. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

Stream channelization and streambank erosion: MPCA explained that eroding streambanks and channelization efforts may add sediment to local surface waters. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed. Unrestricted livestock access to streams and streambank areas may lead to streambank degradation and sediment additions to stream environments.

RRW Chloride TMDL:
Natural background chloride load: Chloride is present in soils and minerals and is added to groundwater due to natural weathering processes of minerals and rock.

Snow/ice removal: Chloride may be added to waters of the RRW via the application of deicing compounds from state, county and local entities. Deicing compounds may be mobilized and transported to surface waters during stormwater runoff events (e.g., winter rain events, spring melt, etc.).

Stormwater from areas not covered under a MS4 NPDES permit: Stormwater runoff from areas outside the boundaries of MS4 areas, such as non-permitted urban, residential, commercial or industrial areas, can contribute chloride to surface waters of the RRW. Non-regulated stormwater may drain impervious surfaces and add any residual chlorides from those surfaces to surface waters.

Discharges from SSTS or unsewered communities: Septic systems are a potential source of chloride within the RRW. Septic systems generally do not discharge directly into a water body, 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 chloride contribution from these systems. Water softening systems which are in areas not connected to municipal sewer lines likely discharge to septic fields and chloride contributions from those septic systems may ultimately mix with groundwater or surface water near the septic field.

Chloride contributions from agricultural lands: Chloride may be added via use of fertilizers containing chloride anions (ex. potassium chloride) and biosolids which are spread onto agricultural areas. Chloride may be liberated from farm fields within stormwater runoff which can be exacerbated by tile drainage lines, which channelize the stormwater flows.

RRW Phosphorus TMDLs:
Figure 5 of the final TMDL document shows the calculated phosphorus loads into the impaired lakes in the RRW. Table 20 of the final TMDL document summarizes the various phosphorus source categories for the impaired lakes.

Internal loading: The release of phosphorus from lake sediments, via physical disturbance from benthic fish (i.e., rough fish (e.g., carp)), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweed, may all contribute internal phosphorus loading to the lakes of the RRW. Phosphorus may build up in the bottom waters of lakes and may be resuspended or mixed into the water column when the thermocline decreases, and the lake water mixes.

MPCA noted that for two of the lakes (School Grove Lake and Benton Lake), sediment samples were collected and analyzed for phosphorus (Section 3.6.4 and Appendix C of the final TMDL document). Both lakes were determined to have a high potential for sediment phosphorus release under certain conditions.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may lead to impairments in the RRW. 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. Phosphorus, organic material and organic-rich sediment may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay or other crops. Stormwater runoff may contribute nutrients and organic-rich sediment to surface waters from livestock manure, fertilizers, vegetation and erodible soils.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add nutrients, organic material and organic-rich sediment to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

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 RRW. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Discharges from SSTS or unsewered communities: Failing septic systems are a potential source of nutrients within the lake watersheds. Septic systems generally do not discharge directly into a water body, 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.

Wetland and Forest Sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through wetland and forested areas in the RRW. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

Wildlife: Wildlife is a known source of nutrients in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of nutrients via contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

Future Growth:
MPCA noted that the TMDL watershed is relatively sparsely populated, and that populations are likely to decline (Section 5.0 of the final TMDL document). The WLA and load allocations for the RRW TMDLs were calculated for all current and future sources. Any expansion of point or

nonpoint sources will need to comply with the respective WLA and LA values calculated in the RRW TMDLs.

The 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 water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

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

Comment:

Designated Uses:

WQS are the fundamental benchmarks by which the quality of surface waters are 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 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 Minnesota R. 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.

Minnesota R. 7050 designates uses for waters of the state. The segments addressed by the RRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use and for Class 3 for Industrial consumption (Table 1 of this Decision Document). In 2021, MPCA revised their WQS and eliminated the subcategories for Class 3 (Minnesota R. 7050.0223). The Class 2B WQS are more restrictive that the Class 3 WQS, and therefore MPCA utilized the Class 2B WQS to develop the TMDLs (Section 2.1 of the final TMDL document).

MPCA identified one water (Ramsey Creek, Segment -521) as also designated for Class 1B, domestic consumption. A bacteria TMDL was developed for Ramsey Creek. The bacteria WQS for Class 1B and Class 2B are identical, and therefore the bacteria TMDL for Ramsey Creek is consistent with the other TMDLs in the watershed (Minnesota R. 7050.0221).

The Class 2 designated use is described in Minnesota R. 7050.0140 (3):

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

Water use classifications for individual water bodies are provided in Minnesota R. 7050.0470, 7050.0425, and 7050.0430. The RRW TMDL report addresses the water bodies that do not meet the standards for Class 2 waters, or to be protective of Class 2 waters. The impaired streams and lakes in this report are classified as Class 2B (except as noted above) (Tables 1 and 2 of this Decision Document).

Standards:
Narrative Criteria:
Minnesota R. 7050.0150 (3) sets forth narrative criteria for Class 2 waters of the State:

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

Numeric criteria:
Bacteria TMDLs: The bacteria water quality standards which apply to the RRW TMDLs are:

Table 7: Bacteria Water Quality Standards Applicable to the RRW TMDLs

Parameter	Units	Water Quality Standard
E. coli [1]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 126 organisms
		No more than 10% of all samples collected during any calendar month may individually exceed 1,260 organisms

[1] = Standards apply only between April 1 and October 31

Bacteria TMDL Targets: The bacteria TMDL targets employed for the RRW bacteria TMDLs are the *E. coli* standards as stated in Table 7 of this Decision Document. The focus of the RRW TMDL is on the 126 organisms (orgs) per 100 mL (**126 orgs/100 mL**) portion of the standard.

MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the RRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

***TSS TMDLs*:** The TSS criteria provide water clarity targets for measuring suspended particles in rivers and streams.

TSS TMDL Targets: MPCA explained that the impaired waters are within the Southern River Nutrient Region, and therefore have a TSS criteria of **65 mg/L**, not to be exceeded more than 10% of the time from April to September (Section 2.2 of the final TMDL document).

Chloride TMDL: The chronic standard for chloride to protect for 2B uses is 230 mg/L**.** The chronic standard is defined in Mimi. R. 7050.0218, subp. 3.1., as *'the highest water concentration of a toxicant to which organisms can be exposed indefinitely without causing chronic toxicity.'* The 230 mg/L value is based on a 4-day exposure of aquatic organisms to chloride. The maximum (acute) standard to protect for 2B uses is 860 mg/L. The maximum standard is defined in Minn. R. 7050.0218, subp. 3.T., as *'the highest concentration of a toxicant in water to which organisms can he exposed for a brief time with zero to slight mortality.'* The 860 mg/L value is based on a 24-hour exposure of aquatic organisms to chloride. These criteria are adopted from the EPA's recommended water quality criteria for chloride. EPA believes it is reasonable to believe that by MPCA meeting its chronic chloride water quality standard (230 mg/L) the acute chloride water quality standard (860 mg/L) will be attained.

Chloride TMDL Target: The chloride TMDL target for the RRW TMDL is the chronic standard of **230 mg/L**.

***Phosphorus TMDLs*:** Numeric criteria for phosphorus, chlorophyll-*a*, and Secchi Disk depth are set forth in Minnesota R. 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the lake TMDLs are found in Table 8 of this Decision Document.

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, phosphorus, and the response variables, chl-*a* and Secchi Disk depth. MPCA anticipates that by meeting the phosphorus concentrations of shallow lake WCBP ecoregion WQS the response variables chl-*a* and SD will be attained, and the lakes will achieve the 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 enduring minimal nuisance algal blooms and exhibiting desirable water clarity.

MPCA developed separate criteria for shallow lakes (Section 2.5 of the final TMDL document). In Minnesota, shallow lakes are defined as lakes with a maximum depth of 15 feet or less, or with 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone). The lakes identified in Table 2 of this Decision Document are considered shallow lakes by MPCA (Table 3 of the final TMDL document).

Table 8: **Minnesota Eutrophication Standards for lakes within the WCBP ecoregion**

Parameter	WCBP Eutrophication Standard* (2B shallow lakes)
Total Phosphorus (µg/L)	TP < 90
Chlorophyll-a (µg/L)	chl-*a* < 30
Secchi Depth (m)	SD > 0.7

* - Summer average of all samples; applies from June 1-September 30

Nutrient TMDL Target: MPCA selected a phosphorus target of **90 µg/L** for the lakes. MPCA selected phosphorus as the appropriate target parameter to address eutrophication problem because of the interrelationships between phosphorus and chl-*a*, and phosphorus and Secchi Disk depth. Algal abundance is measured by chl-*a*, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by Secchi Disk depth. EPA finds the nutrient targets employed for the lake phosphorus TMDLs to be reasonable.

The EPA finds that the TMDL document submitted by 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 water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)).

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

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

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

Comment:

RRW Bacteria TMDLs: MPCA used the geometric mean (126 orgs/100 mL) of the *E. coli* water quality standard to calculate loading capacity values for the bacteria TMDLs. MPCA believes the geometric mean of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, which is consistent with EPA's guidance: "…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."[1] MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 orgs/100 mL) and that it expects that by attaining the 126 orgs/100 mL portion of the *E. coli* WQS the 1,260 orgs/100 mL portion of the *E. coli* WQS will also be attained (Section 2.3 of the final TMDL document). EPA finds these assumptions to be reasonable.

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 because *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" (40 C.F.R. § 130.2). To establish the loading capacities for the RRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 C.F.R. § 130.2). Therefore, a loading 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 water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the RRW. The RRW FDCs were developed using flow data generated from Hydrologic Simulation Program-Fortran (HSPF) modeling efforts at the outlet/pour point of each impaired segment as well as flow gages on several of the water bodies (Section 4.1.1 and Appendix D of the final TMDL document). MPCA focused on daily recorded flow measurements and HSPF modeled flows from approximately 2008 to 2017. HSPF hydrologic models were developed to simulate flow characteristics within the RRW and flow data focused on dates within the recreation season (April 1 to October 31). Daily stream flows were necessary to implement the load duration curve approach.

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

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[1] U.S. EPA, *The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule,"* 69 *Fed. Reg*. 67218-67243, at 67224.

concentrations.[2,3] The output of the HSPF process is a model of multiple hydrologic response units (HRUs), or subwatersheds of the overall RRW. The flow from these HRUs were transferred from nearby U.S. Geological Service (USGS) gages (Appendix D of the final TMDL document).

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the RRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* loads (number of bacteria per unit time) on the Y-axis. The RRW LDC used *E. coli* measurements in billions of bacteria per day. 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 RRW and measured *E. coli* 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 and then by a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figure 13 of the final TMDL document). Individual LDCs are found in Section 4.3.6 of the final TMDL 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 which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

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.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if

[2] HSPF User's Manual - https://water.usgs.gov/software/HSPF/code/doc/hspfhelp.zip
[3] EPA TMDL Models Webpage - https://www.epa.gov/exposure-assessment-models/tmdl-models-and-tools

exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

MPCA calculated bacteria TMDLs for the RRW and those results are found in Tables 9-10 of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (5% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA ('Watershed Load') to cover all nonpoint source contributions.

Tables 9-10 of this Decision Document report five points (the midpoints of the designated flow regime) on the loading capacity curve. However, 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 collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 9-10 of this Decision Document identify the loading capacity for the water bodies at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Tables 9-10: Bacteria (*E. coli*) TMDLs for the Redwood River Watershed are located at the end of this Decision Document in Attachment 1.

Tables 9-10 of this Decision Document show MPCA's estimates of reductions required for streams impaired due to excessive bacteria. Attaining these reduction percentage estimates under the flow conditions which the reductions are prescribed to will allow the impaired segment to meet their water quality targets. These loading reductions (i.e., the percentage reduction row in Tables 9-10) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the stream segment's water quality will return to a level where the designated uses are no longer considered impaired.

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the RRW bacteria TMDLs. The methods used for determining the TMDLs are consistent with EPA technical memos.[4]

<u>RRW TSS TMDLs:</u> MPCA used the same LDC development strategies as it did for the RRW bacteria TMDLs to calculate the loading capacities for the TSS TMDLs in the RRW. These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the RRW informing the LDC. The FDC were

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[4] U.S. Environmental Protection Agency, Office of Water, *An Approach for Using Load Duration Curves in the Development of TMDLs,* EPA-841-B-07-006, (Washington, D.C., August 2007).

transformed into LDC by multiplying individual flow values by the TSS target (65 mg/L) and then multiplying that value by a conversion factor.

MPCA calculated TSS TMDLs (Tables 11-16 of this Decision Document). The load allocations were calculated after the determination of the WLA and the MOS (5% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices) were not split among individual nonpoint contributors. Instead, load allocations were combined together into one value to cover all nonpoint source contributions. Tables 11-16 of this Decision Document report five points (i.e., the midpoints of the designated flow regime) on the loading capacity curve. However, 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 collected TSS monitoring data and allows for the estimation of load reductions necessary for attainment of the TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 11-16 of this Decision Document identify the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, EPA is approving the LDC for these TSS TMDLs.

MPCA explained that the allocations for portions of several segments are calculated as formulas rather than loads. In these segments, point source flow discharges theoretically exceed the actual instream flow. For the lowest flow regime, the WLA and LA estimates were set based on the formula of Allocation = (flow contribution from a given source) * 65 mg/L (TSS standard).

MPCA estimated load reductions needed for the TSS TMDLs to attain the TSS water quality target of 65 mg/L. These loading reductions (i.e., the percentage reduction row) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and that water quality will return to a level where the designated uses are no longer considered impaired.

Tables 11-16: TSS TMDLs in the Redwood River Watershed are located at the end of this Decision Document in Attachment 2.

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

<u>RRW Chloride TMDL:</u> MPCA used the same LDC development strategies as it did for the RRW bacteria TMDLs to calculate the loading capacities for the chloride TMDL in the RRW. These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the RRW informing the LDC. The FDC was transformed into LDC by multiplying individual flow values by the chloride target (230 mg/L) and then multiplying that value by a conversion factor.

MPCA calculated a chloride TMDL (Table 17 of this Decision Document). The load allocation was calculated after the determination of the WLA and the MOS (5% of the loading capacity). The load allocation (e.g., chloride contributions from deicing compounds) was not split among individual nonpoint contributors. Instead, load allocation was combined together into one value to cover all nonpoint source contributions. Table 17 of this Decision Document reports five points (i.e., the midpoints of the designated flow regime) on the loading capacity curve. However, 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 collected chloride monitoring data and allows for the estimation of load reductions necessary for attainment of the chloride water quality standard. Using this method, daily loads were developed based upon the flow in the water body. A loading capacity was determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 17 of this Decision Document identifies the loading capacity for the Redwood River Segment -502 at each flow regime. Although there are numeric loads for each flow regime, EPA is approving the LDC for this TMDL.

MPCA explained that the allocations for the lower flow regimes of Segment -502 are calculated as formulas rather than loads. In these flow regimes, point source flow discharges theoretically exceed the actual instream flow. For the lowest flow regimes, the WLA and LA estimates were set based on the formula of Allocation = (flow contribution from a given source) * 230 mg/L (chloride standard) (Section 4.4.1 of the final TMDL document).

MPCA estimated load reductions needed for the chloride TMDL to attain the chloride water quality target of 230 mg/L. These loading reductions (i.e., the percentage reduction row) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and that water quality will return to a level where the designated uses are no longer considered impaired.

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

Table 17: Chloride TMDL in the Redwood River Watershed is located at the end of this Decision Document in Attachment 3.

RRW Phosphorus TMDLs: MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for the lake TMDLs noted in Table 2 of this Decision Document (Section 3.6.4 and Appendix C of the final TMDL document). The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed phosphorus loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance phosphorus model that accounts for water and phosphorus inputs from tributaries, direct watershed runoff, the atmosphere, and sources internal to the lake, and outputs through the lake outlet, water loss via evaporation, and phosphorus sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows the user the choice of several different mass-balance phosphorus models for estimating loading capacity.

MPCA used the BATHTUB model to calculate the loading capacity for the lakes. The loading capacity is the maximum phosphorus load which the lake can receive over an annual period and still meet the lake nutrient WQS (Tables 18-23 of this Decision Document). Loading capacities on the annual scale (pounds per year (lbs/year)) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the lake for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

MPCA subdivided the lake loading capacities among the WLA, LA, and MOS (10% of the loading capacity) components of the TMDL (Tables 18-23 of this Decision Document). These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in each lake is typically degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Tables 18-23 of this Decision Document communicate MPCA's estimates of the reductions required for the lakes to meet the water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

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

Tables 18-23: Phosphorus TMDLs for lakes in the Redwood River Watershed are located at the end of this Decision Document in Attachment 4.

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

4. Load Allocations (LA)

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

Comment:
MPCA determined the LA calculations for each of the TMDLs based on the applicable WQS. MPCA recognized that LAs for each of the individual TMDLs addressed by the RRW TMDLs can be attributed to different nonpoint sources.

RRW Bacteria, TSS and Chloride TMDLs: The calculated LA values for the bacteria, TSS, and chloride TMDLs are applicable across all flow conditions in the RRW (Tables 9-17 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria and TSS loads to the surface waters of the RRW, including; stormwater from agricultural and feedlot areas, contributions from SSTS, contributions from upstream subwatersheds and wildlife contributions. For chorides, MPCA identified groundwater contributions, contributions from SSTS, stormwater from agricultural areas, and deicing runoff from non-MS4 areas. MPCA did not determine load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one "watershed load" LA calculation for each of the TMDLs.

RRW Phosphorus TMDLs: MPCA identified several nonpoint sources which contribute nutrient loading to the impaired lakes (Tables 18-23 of this Decision Document). These nonpoint sources included: watershed contributions from the lake's direct watershed (i.e., lakeshed loading), internal loading, contributions from SSTS and atmospheric deposition. MPCA calculated load allocation values for each of these potential nonpoint source considerations (Tables 18-23 of this Decision Document).

EPA finds MPCA's approach for calculating the LA for bacteria, TSS, chlorides, and phosphorus TMDLs to be reasonable. The 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:
RRW Bacteria TMDLs: MPCA identified two NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Tables 4 and 9-10 of this Decision Document). Both of the facilities are controlled systems (ponds) (Table 17 of the final TMDL document). The maximum daily flow was based on the maximum permitted daily discharge from the facility's secondary pond (Section 4.3.6 of the final TMDL document).

MPCA also explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but that WWTP permits are regulated for the fecal coliform effluent limit (200 orgs/100 mL 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 RRW 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.

MPCA identified the City of Redwood Falls as the only MS4 permittee discharging to bacteria impaired waters in the RRW (Section 4.3.2 of the final TMDL document). MPCA assigned a portion of the loading based upon the areal extent of the MS4 permitted portion of the watershed (0.42%). A bacteria WLA for the City of Redwood Falls (MS400236) was determined for the Ramsey Creek bacteria TMDL (-521) using (Table 10 of this Decision Document).

MPCA acknowledged the presence of CAFOs in the RRW in Section 3.6 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota R. 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) by MPCA for the RRW bacteria TMDLs. As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event, and even in the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS. MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge, and is accounted for in the LA section of the TMDL.

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

RRW TSS TMDLs: MPCA identified ten NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Tables 5 and 11-16 of this Decision Document). Seven of the facilities are controlled systems (ponds) (Table 21 of the final TMDL document), and the maximum daily flow was based on a six-inch per day discharge from the facility's secondary pond (Section 4.2.2 of the final TMDL document). Three of the facilities are mechanical dischargers, (Table 21 of the final TMDL document), and the maximum daily flow was based upon the average wet weather design flow (Section 4.2.2 of the final TMDL document). MPCA also noted in Section 4.2.2 of the final TMDL document that State rules allow a maximum TSS effluent limit of 30 mg/L for mechanical systems and 45 mg/L for pond systems, both well below the TSS in-stream criteria of 65 mg/L.

The Ruthton and Tyler WWTPs already have approved TSS WLAs as part of the Minnesota River-Great Blue Earth TMDL approved by the EPA on February 12, 2020 (https://www.pca.state.mn.us/sites/default/files/wq-iw7-47g.pdf). The WLAs in the RRW TMDL are consistent with the WLAs in the Minnesota River-Great Blue Earth TMDL. As noted in Section 1 of this Decision Document, the Minnesota River-Great Blue Earth TMDL addresses the downstream most segment of the Redwood River (-501), and contains an approved TSS WLA for the Redwood Falls WWTP.

MPCA identified the City of Marshall as the only MS4 permittee discharging to TSS impaired waters in the RRW (Section 4.2.2 of the final TMDL document). MPCA assigned a portion of the loading based upon the areal extent of the MS4 permitted portion of the watershed in each of the impacted segments. WLAs were determined for segments -502 (2.9%), -503 (1.7%), -564/565 (<0.1%) and -509 (1.4%).

MPCA identified construction and industrial stormwater contributions as necessitating a WLA (Tables 11-16 of this Decision Document). Construction and industrial stormwater contributions were combined together to a single line item in the TMDL equations (Tables 11-16 of this Decision Document). The WLA for construction and industrial stormwater was calculated based on the average percent area (0.3%) of the RRW which was covered under a NPDES/State Disposal System (SDS) Construction and Industrial Stormwater General Permit during the previous five years. The construction and industrial stormwater WLA was calculated as the percent area (0.3%) multiplied by the loading capacity (Section 4.2.2 of the final TMDL document).

Attaining the construction stormwater and industrial stormwater loads described in the RRW TSS TMDLs is the responsibility of construction and industrial site managers. Local MS4 permittees are required to have a construction stormwater ordinance at least as stringent as the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR100001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) are defined in MNR100001.

The MPCA is responsible for overseeing industrial stormwater loads which impact water quality to lakes and stream segments in the RRW. Industrial sites within lake subwatersheds are expected to comply with the requirements of the State's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). MPCA explained that if a facility owner/operator obtains coverage under the appropriate NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) are defined in MNR050000 and MNG490000.

The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA’s Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the RRW TSS TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

EPA finds the MPCA’s approach for calculating the WLA for the RRW TSS TMDLs to be reasonable and consistent with EPA guidance.

RRW Chloride TMDL: MPCA identified seven NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Tables 6 and 17 of this Decision Document). Four of the facilities are controlled systems (ponds) (Table 31 of the final TMDL document), and the maximum daily flow was based on a six-inch per day discharge from the facility’s secondary pond (Section 4.4.2 of the final TMDL document). One facility is an industrial discharger and discharge flow was based upon the maximum permitted daily discharge. The remaining facilities are mechanical dischargers (Table 31 of the final TMDL document), and the maximum daily flow was based upon the average wet weather design flow (Section 4.4.2 of the final TMDL document). The calculation of the WLAs was based upon the facility flows and the 230 mg/L chronic chloride criteria.

MPCA noted in Sections 3.6.2 and 4.4.2 and Appendix B of the final TMDL document that two facilities, the Marshall WWTP and ADM Corn Processing-Marshall, routinely exceed their chloride effluent limit. MPCA has conducted monitoring upstream and downstream of these facilities, and determined that the chloride impairment occurs downstream of these two facilities. Although these two facilities are the likely source of the chloride impairment, MPCA did assign chloride WLAs to all NPDES permitted facilities on Segment -502.

MPCA identified the City of Marshall as the only MS4 permittee discharging to the chloride impaired water in the RRW (Section 4.4.2 of the final TMDL document). MPCA assigned a portion of the loading based upon the areal extent of the MS4 permitted portion of the watershed in the impacted segment and the chloride criteria (230 mg/L). A WLA was determined for Segment -502 (2.9%). MPCA noted that the discharge from the MS4 is upstream of the Marshall WWTPADM Corn Processing-Marshall facility, and that only one chloride exceedance has occurred in the last 10 years (in January 2013).

MPCA determined that construction and industrial wastewater discharges are unlikely to contribute chlorides to the impaired segment, and therefore no WLAs were determined (WLA = 0) (Section 4.4.2 of the final TMDL document).

RRW Phosphorus TMDLs: MPCA determined that there are no point sources other than the potential impacts of construction and industrial stormwater runoff in the watershed for the impaired lakes (Section 4.4.2 of the final TMDL document). Similar to the TSS TMDLs, MPCA calculated WLAs for construction and industrial stormwater for the phosphorus TMDLs (Tables 18-23 of this Decision Document). This WLA was represented as a categorical WLA for construction and industrial stormwater. The construction and industrial stormwater allocations for the lake TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the RRW TSS TMDLs (based upon 0.3% of the watershed area). MPCA's expectations and responsibilities for overseeing construction and industrial stormwater loads for the phosphorus TMDL are the same for the TSS TMDLs.

EPA finds the MPCA's approach for calculating the WLAs for the lake phosphorus TMDLs to be reasonable and consistent with EPA guidance.

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

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
The final TMDL submittal outlines the determination of the Margin of Safety for the bacteria, TSS, chloride and phosphorus TMDLs.

RRW Bacteria, TSS and Chloride TMDLs: The RRW bacteria, TSS and chloride TMDLs incorporated a 5% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC (Sections 4.2.4, 4.3.4, and 4.4.4 of the final TMDL document). Five percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 9-17 of this Decision Document). MPCA explained that the Redwood River Basin HSPF model was calibrated and validated with 21 years of flow data from 5 stream gages. The results indicate a generally good agreement between the observed lake water quality and the model results, and therefore no additional MOS is needed. The HSPF model results are contained in Appendix D of the final TMDL document.

Challenges associated with quantifying *E. coli* loads include the dynamics and complexity of bacteria in stream environments. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the RRW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 orgs/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

As discussed in *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. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient to meet the WQS of 126 orgs/100 mL. Thus, it is more conservative to apply the State's WQS as the bacteria target value because this standard must be met at all times under all environmental conditions.

RRW Phosphorus TMDLs: For the lake phosphorus TMDLs, MPCA used an explicit MOS (Tables 18-23 of this Decision Document; Section 4.5.4 of the final TMDL document). MPCA utilized an explicit MOS of 10% to account for any uncertainties in the HSPF model (used to estimate flows used in the BATHTUB model), uncertainties in the assumptions made for estimating internal loading rates and other assumptions used for calibrating the BATHTUB modeling efforts for the lake. MPCA explained that the Redwood River Basin HSPF model was calibrated and validated with 21 years of flow data from 5 stream gages. The results indicate a generally good agreement between the observed lake water quality and the model results, and therefore no additional MOS is needed (Appendix C of the final TMDL document). The HSPF model results are contained in Appendix D of the final TMDL document.

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

7. Seasonal Variation

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

Comment:
RRW Bacteria TMDLs: Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading events, driven by stormwater runoff events aren't as frequent. Bacterial WQS need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized simulated flow data which were validated and calibrated with local flow gage data. Modeled flow measurements represented a variety of flow conditions from the recreation season. LDCs developed from these modeled flow conditions represented a range of flow conditions within the RRW and thereby accounted for seasonal variability over the recreation season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. By meeting the water quality targets during the summer months, it can reasonably be assumed that the loading capacity values will be protective of water quality during the remainder of the calendar year (November through March).

RRW TSS TMDLs: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the RRW. Sediment loading in the RRW varies depending on surface water flow, land cover and climate/season. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes. In all seasons, sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of RRW water bodies to sediment inputs may typically occur during periods of low flow. During low flow periods, sediment can accumulate within the impacted water bodies, there is less assimilative capacity within the water body, and generally sediment is not transported through the water body at the same rate it is under normal flow conditions.

Critical conditions that impact loading, or the rate that sediment is delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

RRW Chloride TMDL: Seasonal variation was considered in the chloride TMDL as described in Section 4.3.5 of the final TMDL document. MPCA explained that the RRW chloride TMDL considered chloride sources across all seasons since chloride is added to the system on a seasonal basis as well as an annual basis. Spring snowmelt and subsequent runoff contribute chloride to local water bodies during the springtime period, summer storms may contribute chlorides via stormwater runoff and continuous year round sources of chloride are present in the RRW due to contributions from WWTPs and water softening systems in areas which are not tied into municipal sanitary sewer systems. Chloride loadings to streams vary seasonally. Review of the LDC for chloride indicates that chloride impacts are greatest during lower flow regimes, likely as a result of the chloride exceedances from the ADM Corn Processing Facility-Marshall and the Marshall WWTP.

RRW Phosphorus TMDLs: Seasonal variation was considered for the lake TMDLs as described in Section 4.4.5 of the final TMDL document. The nutrient targets employed in the TMDL were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality target was designed to meet the WCBP eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

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

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

8. Reasonable Assurance

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

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

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

Comment:
The RRW bacteria, TSS, chloride and phosphorus TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 6 and 8 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired segments within the RRW. The recommendations made by MPCA will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the RRW. Mitigation practices will be implemented over the next several years. It is anticipated that staff from Soil and Water Conservation District (SWCDs) (e.g., the Redwood County SWCD, Lyon County SWCD, etc.), local Minnesota Board of Soil and Water Resources (BWSR) offices, the Redwood-Cottonwood River Control Area (RCRCA) and other local watershed groups will work together to reduce pollutant inputs to the RRW. MPCA has authored the Redwood River WRAPS document (April 2023) which provides information on the development of scientifically-supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, land- owners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies in the best places to do work.

County SWCDs, such as the Redwood County SWCD, have a history of implementation efforts in the RRW. In addition to the SWCDs, the RCRCA has been applying conservation practices in areas in the RRW and providing educational opportunities to local landowners in order to achieve sound management of natural resources since the 1980s (https://rcrca.com/). The SWCDs and the RCRCA employ various programming, such as shoreline planting programming, native plant, tree and seed planting programming, cost-share opportunities, equipment rentals and other technical services to ensure that efforts are made to improve water quality and conserve water resources in the RRW. Other county SWCDs in the RRW has similar programming efforts which locals can utilize.

The Redwood County SWCD developed the "Redwood County Comprehensive Local Water Management Plan January 2006-January 2016; Amended for 2016-2020". The plan, which is similar to plans from other nearby counties, identifies priorities for controlling erosion and improving water quality in the Redwood River watershed (https://static1.squarespace.com/static/5f9496260b685119f40c7cda/t/6021b990d4de4e02bc263682/1612822930264/Redwood+County+Comprehensive+Local+Water+Management+Plan.pdf). These watershed plans, together with the WRAPS report, provide a detailed blueprint for improving water quality in the RRW.

The RCRCA is also the lead agency for the "Lake Redwood Reclamation Project", where over 680,000 cubic yards of sediment have been removed from Lake Redwood (https://rcrca.com/lake-redwood-reclamation). Lake Redwood is near the downstream end of the Redwood River. Although Lake Redwood is not directly addressed by this TMDL (it is within Segment -502, part of the Minnesota River – Great Blue Earth TMDL), the RCRCA has been working to implement numerous activities to reduce the inflow of sediment and related pollutants into the Redwood River from sources throughout the Redwood River watershed.

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce bacteria, nutrient and sediment loading into the surface waters of the watershed. Local watershed managers would 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.

The MPCA regulates the collection, transportation, storage, processing and disposal of animal manure and other livestock operation wastes at State registered AFO facilities. The MPCA Feedlot Program implements rules governing these activities and provides assistance to counties and the livestock industry. The feedlot rules apply to most aspects of livestock waste management including the location, design, construction, operation and management of feedlots and manure handling facilities.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 C.F.R. § 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the RRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity (MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS

General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

In Section 8.2.4 of the final TMDL document, MPCA explained the efforts they will pursue to implement the chloride WLAs. MPCA noted that efforts are underway to improve the City of Marshall water treatment operations and reduce the amount of chlorides used. MPCA will also re-evaluate the NPDES permit effluent limit for ADM-Marshall to be consistent with the TMDL (Sections 4.4.2 and 6.1.4 of the final TMDL document).

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. 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. Figure 23 of the final TMDL document shows the resources spent within the RRW since 2004 (Section 6.2.3 of the final TMDL document). Over $69 million has been spent by Federal, State, local governments, and landowners.

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 Minnesota Board of Soil and Water Resources administers the Clean Water Fund and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (*http://bwsr.state.mn.us/cwf_programs*).

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment:
The final TMDL document outlines the water monitoring efforts in the RRW (Section 7 of the final TMDL document). Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., the Redwood County SWCD). The RCRCA in particular focuses considerable resources on monitoring efforts in the watershed. At a minimum, the RRW will be monitored once every 10 years as part of the MPCA's Intensive Watershed Monitoring cycle.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the RRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into water bodies of the RRW. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

Stream Monitoring:
River and stream monitoring in the RRW, has been completed by a variety of organizations (i.e., SWCDs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the RRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources, or other agencies every five to ten years during the summer season.

Lake Monitoring:
The lakes in the RRW have all been periodically monitored by volunteers and staff over the years. Monitoring for some of these locations is planned for the future in order to keep a record of the changing water quality as funding allows. Lakes are generally monitored for TP, chl-*a*, and Secchi disk transparency. MPCA expects that in-lake monitoring will continue as

implementation activities are installed across the watersheds. These monitoring activities should continue until water quality goals are met. Some tributary monitoring has been completed on the inlets to the lakes and may be important to continue as implementation activities take place throughout the subwatersheds.

The EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
The findings from the RRW TMDLs will be used to inform the selection of implementation activities as part of the Redwood River WRAPS process. The purpose of the WRAPS report is to support local watershed groups and jointly develop scientifically-supported restoration and protection strategies to be used for subsequent implementation planning.

The TMDL outlined some implementation strategies in Section 8 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the RRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The RRW WRAPS document (April 2023) includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, TSS, chloride and phosphorus to surface waters of the RRW. Additionally, MPCA referenced the Statewide Nutrient Reduction Strategy (https://www.pca.state.mn.us/water/nutrient-reduction-strategy) for focused implementation efforts targeting phosphorus nonpoint sources in RRW. The reduction goals for the bacteria, TSS, chloride and phosphorus TMDLs may be met via components of the following strategies:

RRW Bacteria TMDLs:
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 water bodies 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 amount 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 take into account 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 so as to not liberate bacteria.

Subsurface septic treatment systems: 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 RRW.

Stormwater wetland treatment systems: Constructed wetlands with the purpose of treating wastewater or stormwater inputs could be explored in selected areas of the RRW. Constructed wetland systems may be vegetated, open water, or a combination of vegetated and open water. MPCA explained that recent studies have found that the more effective constructed wetland designs employ large treatment volumes in proportion to the contributing drainage area, have open water areas between vegetated areas, have long flow paths and a resulting longer detention time, and are designed to allow few overflow events.

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 RRW.

Bioinfiltration of stormwater: Biofiltration practices rely on the transport of stormwater and watershed runoff through a medium such as sand, compost or soil. This process allows the medium to filter out sediment and therefore sediment-associated bacteria. Biofiltration/bioretention systems, are vegetated and are expected to be most effective when sized to limit overflows and designed to provide the longest flow path from inlet to outlet.

RRW TSS TMDLs:

In addition to several of the implementation activities mentioned above, MPCA identified additional controls needed for the sediment removal from surface waters:

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of sediment to the surface waters in the RRW. The reorganization of the drainage network could include the installation of drainage ditches or sediment traps to encourage particle settling during high flow events. Additionally, cover cropping, and residue management is recommended to reduce erosion and thus siltation and runoff into streams.

Reducing Livestock Access to Stream Environments: Livestock managers should be encouraged to implement measures to protect riparian areas. Managers should install exclusion fencing near stream environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing sediments to surface waters.

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the RRW. Implementation actions (e.g., planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the RRW and minimize or eliminate degradation of habitat.

RRW Chloride TMDL:
MPCA identified a limited number of implementation activities to address the chloride impairment. The focus will be on the discharges from the City of Marshall WWTP and the ADM Corn Processing Facility-Marshall. MPCA explained that the current chloride effluent limit for the ADM Corn Processing Facility -Marshall will be evaluated by MPCA for consistency with the WLA for the low flow conditions (Sections 4.4.2 and 6.1.4 of the final TMDL document).

In Section 8.2.4 of the final TMDL document, MPCA noted the ongoing activities to improve drinking water quality in the City of Marshall, and reduce the amount of water softening required by the public. MPCA explained that water softeners use sodium chloride to reduce the water hardness in drinking water. Home water softeners periodically "flush" excess chorides out of the treatment system and into the WWTP (https://www.scientificamerican.com/article/how-do-water-softeners-wo/). Removing chloride is not practicable at the municipal scale, and by developing a city-wide treatment system, Marshall plans to reduce the discharge of chlorides via a reduction in the use of home water softeners. In addition, MPCA noted that Marshall has been implementing additional BMPs regarding salt application in the city, including participating in the MPCA Smart Salting Training Program (https://www.pca.state.mn.us/business-with-us/smart-salting-training).

RRW Phosphorus TMDLs:
In addition to several of the implementation activities mentioned above, MPCA identified additional controls needed for the lakes:

Septic Field Maintenance: Septic systems are believed to be a minor source of nutrients to some of the lakes. Failing systems are expected to be identified and addressed via upgrades to those SSTS not meeting septic ordinances. MPCA explained that SSTS improvement priority should be given to those failing SSTS on lakeshore properties or those SSTS adjacent to streams within the direct watersheds for the lake. MPCA aims to greatly reduce the number of failing SSTS in the future via local septic management programs and educational opportunities. Educating the public on proper septic maintenance, finding and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the RRW.

Internal Loading Reduction Strategies: Several of the lakes have internal loading of phosphorus as a significant source. Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the RRW phosphorus TMDLs. MPCA recommends that before any strategy is put into action, an intensive technical review, to evaluate the costs and feasibility of internal load reduction options be completed (https://www.pca.state.mn.us/sites/default/files/wq-s1-98.pdf). Several options should be considered to manage internal load inputs to each of the water bodies addressed in this TMDL.

- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e. carp, bullheads, fathead minnows) populations.
- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.
- *Chemical treatment:* The addition of chemical reactants (e.g., aluminum sulfate) to lakes of the RRW in order for those reactants to permanently bind phosphorus into the lake bottom sediments. This effort could decrease phosphorus releases from sediment into the lake water column during anoxic conditions.

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

11. Public Participation

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

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
The public participation section of the TMDL submittal is found in Section 9 of the final TMDL document. Throughout the development of the RRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA worked with county and SWCD staff in the RRW to promote water quality, to gain input from landowners via surveys and interviews and to better understand the social dynamics of stakeholders in the RRW. MPCA's goal was to create civic engagement and discussion which would enhance the content of the TMDL and WRAPS. MPCA utilized a Local Work Group composed of staff from various county and state programs to discuss the TMDL development process. Several public informational meetings were held during the development of the TMDL (Table 42 of the final TMDL document).

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The public comment period was started on February 21, 2023 and concluded on March 23, 2023. No comments were received by MPCA.

The EPA finds that the TMDL document submitted by 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 water body, and the pollutant(s) of concern.

Comment:
The EPA received the final Redwood River Watershed TMDL document, submittal letter and accompanying documentation from MPCA on April 25, 2023. The transmittal letter explicitly stated that the final TMDLs referenced in Tables 1 and 2 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 C.F.R. Part 130.

The EPA finds that the TMDL transmittal letter submitted for the Redwood River Watershed TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the two (2) bacteria TMDLs, the nine (9) TSS TMDLs, the one (1) chloride TMDL and the six (6) phosphorus TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **eighteen (18) TMDLs**, addressing segments for aquatic recreational and aquatic life use impairments (Tables 1 and 2 of this Decision Document).

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

ATTACHMENTS

Attachment #1: Tables 9-10: Bacteria (*E. coli*) TMDLs for the Redwood River Watershed TMDL

Attachment #2: Tables 11-16: TSS TMDLs for the Redwood River Watershed TMDL

Attachment #3: Table 17: Chloride TMDL for the Redwood River Watershed TMDL

Attachment #4: Tables 18-23: Phosphorus TMDLs for lakes in the Redwood River Watershed TMDL

Attachment #1

Tables 9-10: Bacteria (*E. coli*) TMDLs for the Redwood River Watershed TMDL

Table 9. *E. coli* TMDL summary for Redwood River segment -510.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload Load	Ruthton WWTP (MNG585105)	2	2	2	2	2
	Tyler WWTP (MNG585116)	5	5	5	5	5
	Total WLA	**7**	**7**	**7**	**7**	7
	Total LA	**1,899**	**753**	**321**	**71**	1
MOS		**100**	**40**	**17**	**4**	**0.4**
Total load		**2,006**	**800**	**345**	**82**	**8**
Existing Concentration, Apr-Oct (org/100 mL)**		**174**				
Maximum Monthly Geometric Mean (org/100mL)**		**764**				
Overall Estimated Percent Reduction**		**73%**				

* Model simulated flow for HSPF segment -190 from April-October (2008-2017) was used to develop the flow zones and LCs for this segment.
** Water quality monitoring station(s) used to estimate reductions: S000-696.

Table 10. *E. coli* TMDL summary for Ramsey Creek segment -521.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload Load	City of Redwood Falls MS4 (MS400236)	1	0.4	0.1	0.02	0.006
	Total WLA	**1**	**0.4**	**0.1**	**0.02**	**0.006**
	Total LA	**298**	**96**	**23**	**5**	**1**
MOS		**16**	**5**	**1**	**0.3**	**0.07**
Total load		**315**	**101**	**24**	**5**	**1**
Existing Concentration, Apr-Oct (org/100 mL)**		**194**				
Maximum Monthly Geometric Mean (org/100mL)**		**318**				
Overall Estimated Percent Reduction**		**55%**				

* Model simulated flow for HSPF segment -495 from April-October (2008-2017) was used to develop the flow zones and LCs for this segment.
** Water quality monitoring station(s) used to estimate reductions: S004-387.

Attachment #2

Tables 11-16: TSS TMDLs for the Redwood River Watershed TMDL

Table 11. TSS TMDL summary for Redwood River segment -502.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload Load	ADM Corn Processing – Marshall (MN0057037)	661	661	661	661	***
	Lynd WWTP (MNG585030)	128	128	128	128	***
	Marshall WWTP (MN0022179)	1,126	1,126	1,126	1,126	***
	Russell WWTP (MNG585062)	220	220	220	220	***
	Magellan Pipeline Co LP – Marshall (MN0059838)	180	180	180	180	***
	Ruthton WWTP (MNG585105)	142	142	142	142	***
	Tyler WWTP (MNG585116)	409	409	409	409	***
	City of Marshall MS4 (MS400241)**	5,173	1,579	495	155	***
	Construction/Industrial SW	538	164	52	16	***
	Total WLA	**8,577**	**4,609**	**3,413**	**3,037**	***
	Total LA	**156,895**	**45,909**	**12,434**	**1,933**	***
MOS		**8,709**	**2,659**	**834**	**262**	**130**
Total load		**174,181**	**53,177**	**16,681**	**5,232**	**2,591**
Existing 90th percentile concentration (mg/L)******		**145**				
Overall estimated percent reduction******		**55%**				

* Model simulated flow for HSPF segment -290 (2008-2017) was used to develop the flow zones and LCs for this segment.
** The daily WLAs for the City of Marshall MS4 equate to an areal TSS loading rate of approximately 71 lbs/acre/year.
*** 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 (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
**** Water quality monitoring station(s) used to estimate reductions: S001-199, S001-203, S003-702, S009-023

Table 12. TSS TMDL summary for Redwood River segment -503.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload Load	ADM Corn Processing – Marshall (MN0057037)	661	661	661	661	***
	Ghent WWTP (MNG585121)	97	97	97	97	***
	Lynd WWTP (MNG585030)	128	128	128	128	***
	Marshall WWTP (MN0022179)	1,126	1,126	1,126	1,126	***

	Russell WWTP (MNG585062)	220	220	220	220	***
	Vesta WWTP (MNG585043)	97	97	97	97	***
	Magellan Pipeline Co LP – Marshall (MN0059838)	180	180	180	180	***
	Ruthton WWTP (MNG585105)	142	142	142	142	***
	Tyler WWTP (MNG585116)	409	409	409	409	***
	City of Marshall MS4 (MS400241)**	5,173	1,579	495	155	***
	Construction/Industrial SW	892	270	81	22	***
	Total WLA	**9,125**	**4,909**	**3,636**	**3,237**	*******
	Total LA	**265,001**	**78,147**	**21,199**	**3,632**	*******
	MOS	**14,428**	**4,371**	**1,307**	**362**	**152**
	Total load	**288,554**	**87,427**	**26,142**	**7,231**	**3,038**
Existing 90th percentile concentration (mg/L)****		********				
Overall estimated percent reduction****		**56%**				

* Model simulated flow for HSPF segment -430 (2008-2017) was used to develop the flow zones and LCs for this segment.
** The daily WLAs for the City of Marshall MS4 equate to an areal TSS loading rate of approximately 71 lbs/acre/year.
*** 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 (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
**** The impairment listing for this segment is based on Secchi Tube data (see Table 7) as no TSS data have been collected for this segment. Therefore, the midpoint TSS reduction of the upstream adjacent segment (-502; 55%) and downstream adjacent segment (-509; 57%) is recommended as the TSS load reduction goal for this segment.

Table 13. TSS TMDL summary for Redwood River segment -509.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload Load	ADM Corn Processing – Marshall (MN0057037)	661	661	661	661	***
	Ghent WWTP (MNG585121)	97	97	97	97	***
	Lynd WWTP (MNG585030)	128	128	128	128	***
	Marshall WWTP (MN0022179)	1,126	1,126	1,126	1,126	***
	Russell WWTP (MNG585062)	220	220	220	220	***
	Milroy WWTP (MNG585124)	93	93	93	93	***
	Vesta WWTP (MNG585043)	97	97	97	97	***
	Magellan Pipeline Co LP – Marshall (MN0059838)	180	180	180	180	***
	Ruthton WWTP (MNG585105)	142	142	142	142	***
	Tyler WWTP (MNG585116)	409	409	409	409	***
	City of Marshall MS4 (MS400241)**	5,173	1,579	495	155	***
	Construction/Industrial SW	1,081	340	99	25	***
	Total WLA	**9,407**	**5,072**	**3,747**	**3,333**	*******
	Total LA	**322,834**	**99,609**	**26,670**	**4,402**	*******

MOS	**17,486**	**5,510**	**1,601**	**407**	**157**
Total load	**349,727**	**110,191**	**32,018**	**8,142**	**3,149**
Existing 90th percentile concentration (mg/L)******	**150**				
Overall estimated percent reduction******	**57%**				

* Model simulated flow for HSPF segment -470 (2008-2017) was used to develop the flow zones and LCs for this segment.
** The daily WLAs for the City of Marshall MS4 equate to an areal TSS loading rate of approximately 71 lbs/acre/year.
*** 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 (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
**** Water quality monitoring station(s) used to estimate reductions: S001-679.

Table 14. TSS TMDL summary for Redwood River segment -510.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload Load	Ruthton WWTP (MNG585105)	142	142	142	142	**
	Tyler WWTP (MNG585116)	409	409	409	409	**
	Construction/Industrial SW	23	7	2	0.4	**
	Total WLA	**574**	**558**	**553**	**551**	**
	Total LA	**33,440**	**10,396**	**2,078**	**69**	**
MOS		**1,790**	**577**	**138**	**33**	**8**
Total load		**35,804**	**11,531**	**2,769**	**653**	**169**
Existing 90th percentile concentration (mg/L)***		**103**				
Overall estimated percent reduction***		**37%**				

* Model simulated flow for HSPF segment -495 (2008-2017) was used to develop the flow zones and LCs for this segment.
** 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 (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied. *** Water quality monitoring station(s) used to estimate reductions: S000-696.

Table 15. TSS TMDL summary for Three Mile Creek segments -564/-565/-566.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day				
Wasteload	Ghent WWTP (MNG585121)	97	97	97	97	97
	Construction/Industrial SW	230	51	11	3	0.7
	Total WLA	**327**	**148**	**108**	**100**	**98**
Load	**Total LA**	**70,404**	**15,591**	**3,380**	**805**	**108**
MOS		**3,723**	**828**	**184**	**48**	**11**
Total load		**74,454**	**16,567**	**3,672**	**953**	**217**
Existing 90th percentile concentration (mg/L)**		**83**				
Overall estimated percent reduction**		**22%**				

* Model simulated flow for HSPF segment -315 (2008-2017) was used to develop the flow zones and LCs for this segment.
** Water quality monitoring station(s) used to estimate reductions: S002-313.

Table 16. TSS TMDL summary for Clear Creek segments -567 and -568.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload Load	Milroy WWTP (MNG585124)	93	93	93	93	**
	Construction/Industrial SW	35	10	2	0.4	**
	Total WLA	**128**	**102**	**95**	**93**	**
	Total LA	**51,753**	**14,023**	**3,138**	**444**	**
MOS		**2,731**	**743**	**170**	**28**	**5**
Total load		**54,611**	**14,868**	**3,403**	**565**	**92**
Existing 90th percentile concentration (mg/L)* **		****				
Overall estimated percent reduction* **		**5%**				

* Model simulated flow for HSPF segment -443 (2008-2017) was used to develop the flow zones and LCs for this segment.
** 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 (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Water quality monitoring station(s) used to estimate reductions: S002-311
**** The 90th percentile flow-zone corrected monitored TSS concentration is at or below 65 mg/L and therefore a 5% load reduction is recommended to ensure the TSS standard is met. Continued monitoring in this segment will help inform if reductions beyond 5% are needed.

Attachment #3

Table 17: Chloride TMDL for the Redwood River Watershed TMDL

Table 17. Chloride TMDL summary for Redwood River segment -502.

Chloride		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		Chloride load (lbs/day)				
Wasteload Load	ADM Corn Processing – Marshall (MN0057037)	5,064	5,064	5,064	**	**
	Lynd WWTP (MNG585030)	655	655	655	**	**
	Marshall WWTP (MN0022179)	8,632	8,632	8,632	**	**
	Russell WWTP (MNG585062)	1,124	1,124	1,124	**	**
	Magellan Pipeline Co LP – Marshall (MN0059838)	1,381	1,381	1,381	**	**
	Ruthton WWTP (MNG585105)	724	724	724	**	**
	Tyler WWTP (MNG585116)	2,091	2,091	2,091	**	**
	City of Marshall MS4 (MS400241)	18,304	5,588	1,753	**	**
	Total WLA	37,975	25,259	21,424	**	**
	Total LA	547,541	153,497	34,649	**	**
MOS		30,817	9,408	2,951	926	458
Total load		616,333	188,164	59,024	18,514	9,169
Existing maximum concentration (mg/L)* **		**463**				
Overall estimated percent reduction* **		**50%**				

* Model simulated flow for HSPF segment -290 from 2008-2017 (all months) was used to develop the flow zones and loading capacities for this segment.
** 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 (230 mg/L) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Water quality monitoring station used to estimate reductions: S001-203.

Attachment #4:

Tables 18-23: Phosphorus TMDLs for lakes in the Redwood River Watershed TMDL

Table 18. Lake Benton (41-0043-00) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload Load	Construction/Industrial SW	18	0.05	18	0.05	0	0%
	Total WLA	**18**	**0.05**	**18**	**0.05**	**0**	**0%**
	Watershed runoff	5,903	16.16	3,941	10.79	1,962	33%
	SSTS	407	1.11	184	0.50	223	55%
	Atmospheric deposition	633	1.73	633	1.73	0	0%
	Internal load	11,942	32.70	4,915	13.46	7,027	59%
	Total LA	**18,885**	**51.70**	**9,673**	**26.48**	**9,212**	**49%**
MOS				**1,077**	**2.95**		
Total load		**18,903**	**51.75**	**10,768**	**29.48**	**9,212**	**43%**

* Model calibration year(s): 2002 & 2017

** Net reduction from current load to TMDL is 8,135 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 8,135 + 1,077 = 9,212 lbs/yr.

Table 19. Dead Coon Lake (Main Lake) (41-0021-01) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload Load	Construction/Industrial SW	12	0.03	12	0.03	0	0%
	Total WLA	**12**	**0.03**	**12**	**0.03**	**0**	**0%**
	Watershed runoff	3,930	10.76	3,166	8.67	764	19%
	SSTS	538	1.47	206	0.56	332	62%
	Upstream lakes (Benton)	3,213	8.80	2,083	5.70	1,130	35%
	Atmospheric deposition	131	0.36	131	0.36	0	0%
	Internal load	6,388	17.49	328	0.90	6,060	95%
	Total LA	**14,200**	**38.88**	**5,914**	**16.19**	**8,286**	**58%**
MOS				**658**	**1.80**		
Total load		**14,212**	**38.91**	**6,584**	**18.02**	**8,286**	**54%**

* Model calibration year(s): 2002, 2007 and 2017.

** Net reduction from current load to TMDL is 7,628 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 7,628 + 658 = 8,286 lbs/yr.

Table 20. Goose Lake (42-0093-00) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload Load	Construction/Industrial SW	3	0.01	3	0.01	0	0%
	Total WLA	**3**	**0.01**	**3**	**0.01**	**0**	**0%**
	Watershed runoff	961	2.63	576	1.58	385	40%
	SSTS	7	0.02	4	0.01	3	39%
	Atmospheric deposition	36	0.10	36	0.10	0	0%
	Internal load	670	1.83	251	0.69	419	63%
	Total LA	**1,674**	**4.58**	**867**	**2.38**	**807**	**48%**
MOS				**97**	**0.26**		
Total load		**1,677**	**4.59**	**967**	**2.65**	**807**	**42%**

* Model calibration year(s): 2002, 2007 and 2017.
** Net reduction from current load to TMDL is 710 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 710 + 97 = 807 lbs/yr.

Table 21. Clear Lake - Lyon County (42-0055-00) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	0.7	0.002	0.7	0.002	0.0	0%
	Total WLA	**0.7**	**0.002**	**0.7**	**0.002**	**0.0**	**0%**
Load	Watershed runoff	221.3	0.606	127.4	0.349	93.9	42%
	SSTS	9.5	0.026	6.8	0.019	2.7	28%
	Atmospheric deposition	15.7	0.043	15.7	0.043	0.0	0%
	Internal load	255.0	0.698	124.3	0.340	130.7	51%
	Total LA	**501.5**	**1.373**	**274.2**	**0.751**	**227.3**	**45%**
MOS				**30.5**	**0.084**		
Total load		**502.2**	**1.375**	**305.4**	**0.837**	**227.3**	**39%**

* Model calibration year(s): 2017 and 2018
** Net reduction from current load to TMDL is 196.8 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 196.8+ 30.5 = 227.3 lbs/yr.

Table 22. School Grove Lake (42-0002-00) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload Load	Construction/Industrial SW	4	0.01	4	0.01	0	0%
	Total WLA	**4**	**0.01**	**4**	**0.01**	**0**	**0%**
	Watershed runoff	1,142	3.13	803	2.20	339	30%
	SSTS	7	0.02	5	0.01	2	28%
	Atmospheric deposition	83	0.23	83	0.23	0	0%
	Internal load	402	1.10	366	1.00	36	9%
	Total LA	**1,634**	**4.48**	**1,257**	**3.44**	**377**	**23%**
MOS				**140**	**0.38**		
Total load		**1,638**	**4.49**	**1,401**	**3.83**	**377**	**14%**

* Model calibration year(s): 2002, 2007 and 2017.

** Net reduction from current load to TMDL is 237 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 237 + 140 = 377 lbs/yr.

Table 23. Island Lake (42-0002-00) phosphorus TMDL.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload Load	Construction/Industrial SW	2	0.005	2	0.005	0	0%
	Total WLA	**2**	**0.005**	**2**	**0.005**	**0**	**0%**
	Watershed runoff	550	1.507	287	0.785	263	48%
	SSTS	5	0.012	3	0.009	2	28%
	Atmospheric deposition	32	0.087	32	0.087	0	0%
	Internal load	86	0.237	86	0.237	0	0%
	Total LA	**673**	**1.843**	**408**	**1.118**	**265**	**39%**
MOS				**45**	**0.123**		
Total load		**675**	**1.848**	**455**	**1.246**	**265**	**33%**

* Model calibration year(s): 2017 and 2018.

** Net reduction from current load to TMDL is 220 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 220 + 45 = 265 lbs/yr.