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

JAN 2 1 2014

REPLY TO THE ATTENTION OF:

WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Redwood River Watershed, including supporting documentation and follow up information. The TMDLs address Aquatic Recreation Use impairments due to bacteria (fecal coliform) for the following waterbodies: Redwood River (Assessment Unit ID Numbers 07020006-501, -502A, -502B, -505, -509; Clear Creek (-506), Threemile Creek (-504), and Coon Creek (-511) (13-0027). A TMDL was also completed to address bacteria impairment in a limited resource value water (Tyler Creek -512).

The TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's nine (9) TMDLs for bacteria. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

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

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Mark Hanson, MPCA
Celine Lyman, MPCA

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

REPLY TO THE ATTENTION OF:
WW-16J

October 23, 2023

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has reviewed the email and attachment sent from the Minnesota Pollution Control Agency (MPCA) on September 5, 2023, regarding an error to the Redwood River fecal coliform Total Maximum Daily Load (TMDL). EPA approved the Redwood River Fecal Coliform TMDL on January 21, 2014. EPA has corrected the error for the fecal coliform TMDL assigned to the Redwood River segment (07020006-501) in a revised Redwood River fecal coliform Decision Document.

A copy of the revised Decision Document is enclosed for your records. If you have any questions, please contact Mr. David Werbach, at 312-886-4242 or werbach.david@epa.gov or Mr. Paul Proto, at 312-353-8657 or proto.paul@epa.gov.

Sincerely,

10/23/2023

X David Pfeifer

Signed by: DAVID PFEIFER
David Pfeifer
Chief, Watersheds and Wetlands Branch

(Enclosures)

cc: Andrea Plevan, MPCA
Michael Weckwerth, MPCA

TMDL: Redwood River, Lincoln, Lyon, Murray, Pipestone, Yellow Knife counties, Minnesota
Date: October 23, 2023 (revised)

DECISION DOCUMENT FOR REDWOOD RIVER FECAL COLIFORM TMDL

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

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment

impairments; chlorophyll-a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent:

The Redwood River is located in southwest Minnesota and drains to the Minnesota River basin. The Redwood River watershed is approximately 451,250 acres (i.e. 705.1 square miles) and transects six counties. The river runs approximately125 river miles and originates in Pipestone County then flows east-northeast through Murray, Lincoln, Lyon, and Yellow Medicine County, then discharges to the Minnesota River in Redwood County. The elevation of the watershed ranges from 1993 to 824 feet over approximately 50 linear miles, and river slope ranges from 4 to 24 feet per mile. There are 11 incorporated and three unincorporated communities in the watershed (Figure 2.01 in the TMDL). The dominant land use is agriculture; 85.5% of the land is cultivated, 7.3 % is grassland, and 2% is water and wetlands, and the remaining uses include forest, farmsteads, and developed areas (Section 2.3 of the TMDL). Urban land use comprises less than 1% of the watershed. The estimated total population in the watershed is 21,081 people, with a majority living in the City of Marshall and the rest are dispersed throughout the watershed (Section 2.1 of the TMDL).

MPCA identified nine segments which exceed Minnesota bacteria water quality standards (WQS) (Table 1 of this Decision Document). Eight of the nine segments were designated as impaired for aquatic recreation by bacteria exceedances and one limited resource value water, Tyler Creek (07020006-512), was designated as impaired by bacteria. All impaired segments were negatively influenced by bacteria exceedances and MPCA identified these segments based on the water quality monitoring data for these locations exceeding the numeric water quality standard for fecal coliform

Dominant soils in the watershed are glacial till and moraine overlaid on bedrock, with wetland and marsh soils with poorer drainage in the Redwood River headwaters. The average precipitation in the watershed is 26.6 inches per year, falling mostly in April to October. Flows are greatest during spring runoff and lowest in summer and fall months, according to data recorded at the City of Marshall (USGS gage 05315000) and Redwood Falls (USGS gage 05316500).

Table 1. Nine segments addressed in the Redwood River Fecal Coliform TMDL.

Reach name	Reach Description	River ID #	Affected designated use	Year Listed	Pollutant or stressor
Redwood R.	Ramsey Creek to MN River	07020006-501*	Aquatic Recreation	1994	Bacteria (Fecal coliform)
Redwood R.	Clear Creek to Redwood Lake	07020006-509	Aquatic Recreation	2006	Bacteria (Fecal coliform)
Clear Creek	Headwaters to Redwood R.	07020006-506	Aquatic Recreation	2008	Bacteria (Fecal coliform)
Redwood R.	T111 R42 W S33 west line to Threemile C.	07020006-502A	Aquatic Recreation	2004	Bacteria (Fecal coliform)
Redwood R.	T111 R42 W S33 west line to Threemile C.	07020006-502AB	Aquatic Recreation	2004	Bacteria (Fecal coliform)
Threemile Creek	Headwaters to Redwood R.	07020006-504	Aquatic Recreation	2006	Bacteria (Fecal coliform)

Reach name	Reach Description	River ID #	Affected designated use	Year Listed	Pollutant or stressor
Redwood R.	Headwaters to Coon Creek	07020006-505	Aquatic Recreation	2008	Bacteria (Fecal coliform)
Coon Creek	Lake Benton to Redwood R.	07020006-511	Aquatic Recreation	2008	Bacteria (Fecal coliform)
Tyler Creek (aka Judicial Ditch 12)	Headwaters to Redwood R.	07020006-512	Limited Resource Value Water	2010	Bacteria (Fecal coliform)

* = TMDL for the Redwood River (Ramsey Creek to Minnesota River segment) (07020006-501) revised October 23, 2023

Problem Identification:
MPCA identified nine segments which exceed WQS for bacteria. Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating 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. Fecal coliform and (*Escherichia coli* (*E. coli*)) are typically used as indicators of the presence of bacteria. Redwood Cottonwood Rivers Control Area (RCRA) collected fecal coliform measurements at each segment and found exceedances of the fecal coliform criteria from June to September (Table 3.02 in the TMDL).

Priority Ranking:
The Redwood River bacteria TMDLs were given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Priority is implied by the target dates for TMDL development and completion. TMDL development for these segments was scheduled to begin in 2004, 2007, and 2009 and to be completed by 2012.

Pollutant of Concern:
The pollutant of concern for the aquatic recreation and limited resource value use impairment was fecal coliform, which is an indicator of the presence of pathogenic bacteria.

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

National Pollutant Discharge Elimination System (NPDES) permit holders: NPDES permitted facilities may contribute pollutant loads (bacteria) to surface waters through facility discharges of treated wastewater. Permitted facilities discharge treated wastewater according to their NPDES permit. MPCA identified eight municipal wastewater treatment plants (WWTP) in the Redwood River watershed (Table 2 of this Decision Document, and Section 4.2.1 of the TMDL).

Table 2. WWTF in the Redwood River Watershed

WWTF	System Type	Permit No.	Sub-watershed	County	(2000-2006) Mean FC Discharge (org/day)[1]	Load at Standard (org/day)
Ghent WWTP	Pond	MN0039730	Three Mile Creek	Lyon	7.47E+06	1.59E+09
Lynd WWTP	Pond	MNG580030	Middle Redwood	Lyon	7.54E+06	1.55E+09
Marshall WWTP	Cont. Discharge	MN0022179	Middle Redwood	Lyon	3.38E+09	1.95E+10
Milroy WWTP	Pond	MN0041211	Clear Creek	Redwood	7.95E+07	8.20E+07
Russell WWTP	Pond	MNG580062	Middle Redwood	Lyon	2.33E+07	3.30E+08
Ruthon WWTP	Pond	MN0049654	Upper Redwood	Pipestone	8.60E+07	4.36E+08
Tyler WWTP	Pond	MN0022039	Tyler Creek	Lincoln	7.47E+08	1.06E+09
Vesta WWTP	Pond	MNG580043	Lower Redwood	Redwood	6.37E+06	1.24E+08

[1]MPCA 2000-2006 Discharge Monitoring Report Data

[2]United States Census 2000

Seven of the eight WWTP use pond systems to periodically discharge treated wastewater into surface waters in the Redwood River watershed. The pond systems are allowed two discharges between April 1 to June 30 and September 1 to December 15. These discharges generally coincide with high flow events within the watershed or during times when recreational use is expected to be limited. The remaining WWTP (Marshall WWTP) is a continuous discharge system. Each facility is required to meet Minnesota state discharge limits for fecal coliform (200 cfu/100 mL as a monthly geometric mean value) or equivalent *E. coli* value. To meet state standards the WWTPs incorporate disinfection in the final treatment stage via chlorination or an equivalent process.

Municipal Separate Storm Sewer Systems (MS4): Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. There are two MS4 communities in the Redwood River watershed which received a wasteload allocation (WLA);

- Redwood Falls (MS400236) within the Ramsey Creek subwatershed (07020006-501)
- Marshall MS4 community (MS400241) within the Threemile Creek subwatershed (07020006-502A) (Section 4.2.1 of the TMDL).

Wastewater Bypasses- MPCA describes wastewater bypasses as emergency discharges from a municipal wastewater system. The discharges contain either partially or untreated human sewage from waste water treatment facilities. Conditions for bypasses are detailed in the facility's NPDES permit and Minn. R. 7001.1090 (Section 4.2.1 of the TMDL).

Concentrated Animal Feeding Operations (CAFOs): MPCA identified 11 animal feedlot operations within the Redwood River watershed (Table 3 of this Decision Document). By rule, CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs generate manure which may be spread onto fields. Runoff from fields with spread manure from CAFOs can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Tile-lined fields and channelized ditches enable pollutants to move into surface waters. Runoff from manure spread onto fields in accordance with federal and state

requirements is unregulated as a nonpoint source, and is included as a portion of the load allocation (LA) for the Redwood River watershed TMDLs (Section 4.2.2 of the TMDL).

Table 3. CAFO permits within the Redwood River TMDL

Reach Name	Subwatershed	Name	CAFO Permit #
Redwood River	07020006-501	Alpha Acres	127-50018
Redwood River	07020006-509	Charles and Glen Rohlik Farm	127-5503
		Andrew Schiller Farm-Vesta Site	127-50087
		Bruce Meier Farm	127-50004
Clear Creek	07020006-506	Jim Tauer Farm	083-65820
Redwood River (including and below City of Marshall)	07020006-502A	N/A	N/A
Redwood River (excluding and above City of Marshall)	07020006-502B	N/A	N/A
Threemile Creek	07020006-504	Grandview Farms Inc	083-60023
		Dieken Inc	083-50016
		Robert Buysee Farm	083-89076
Redwood River	07020006-505	Norgaard Family Farms	081-87296
Tyler Creek	07020006-512	Donald L. Buhl Farm	081-50002
Coon Creek	07020006-511	David & Karen Keifer Farm	083-50005

Nonpoint Source Identification: The potential nonpoint sources to the Redwood River watershed are:

Urban runoff: Runoff from urban areas (urban, residential, commercial or industrial land uses) can contribute various pollutants, including bacteria to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce pollutants to surface waters. Potential urban sources of bacteria can also include wildlife or pet wastes (Section 4.2.1 of the TMDL).

Unsewered communities: Unsewered communities may add bacteria to the Redwood River watershed from subsurface sewage treatment systems (SSTS) and stormwater in unsewered communities that are not regulated under an MS4 permit. Effluents from SSTS, if not properly designed or maintained, may leach into groundwater or pond at the surface; ponded water on the ground presents a health risk to local residents and can also result in pollutant releases to the watershed if the ponded effluent drains to a nearby water body. Bacteria loadings can also be delivered to surface waters in communities via stormwater runoff. Stormwater may be collected in storm sewers and conveyed to nearby surface waters, or stormwater may run across the ground and drain into water bodies. Stormwater often can contain fairly high levels of bacteria. If there are failing SSTSs or MSTSs in the area, it is even more likely that stormwater running off from community areas to surface waters would contribute bacteria loadings. MPCA estimated that approximately 350 residents of the Redwood River watershed live in unsewered communities (Page 33 of the final TMDL document).

Subsurface septic treatment systems (SSTS): Failing SSTS are a potential source of bacteria within the Redwood River watershed. In 2008, the SSTS were upgraded in the City of Florence, and other upgrades are planned in Seaforth and Green Valley. Effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events (Section 4.2.1 of the TMDL).

Age, construction and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems. It is likely that those systems sited closer to the surface waters are more likely to contribute bacteria than those systems sited further away from the surface waters. MPCA estimated the number of SSTS as the number of systems reported in a county weighted by the area of each county within the watershed. This assumes that the SSTS have equal spatial distribution across the County area. Using this method, MPCA estimated approximately 1,948 SSTS are within the Redwood River watershed. Of those 1,051 SSTS were projected by County reports to be failing SSTS, and 334 SSTS are projected to be imminent threats to public health (i.e., straight pipe systems). Straight pipe systems may contribute bacteria via direct discharge to the surface waters of the watershed. Straight pipe discharges from septic systems into the streams are illegal but are suspected to be a large contributor of bacteria, especially when high counts at low flow are observed. Septic systems with illegal straight pipe connection to tiling or stormwater drainage systems within the Cottonwood River watershed are likely, but their contribution of bacteria is unknown (Section 4.2.1 of the TMDL).

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands and unpermitted livestock facilities may contain significant amounts of bacteria which may lead to impairments in the Redwood River watershed. Manure spread onto fields is often a source of pollutants, and can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Tile lined fields and channelized ditches enable bacteria and other pollutants to move more efficiently into surface waters (Section 4.2.2 of the TMDL).

Livestock operations with fewer than 1000 animal units are not required to obtain an NPDES permit. In the Redwood River Watershed, MPCA estimated that 70,000 total animal units exist within multiple livestock facilities that are not required to obtain an NPDES permit (page 35 and Table 4.03 of the final TMDL).

Unrestricted livestock access to streams: Livestock with access to stream environments 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. This potential nonpoint bacteria source should mainly be an issue for smaller animal feeding operations (e.g. Animal Feeding Operations (AFOs)) as CAFO permits prohibit direct livestock access to streams (Section 4.2.2 of the TMDL).

Pets and Wildlife: Fecal matter from pets and wildlife contributes bacteria to surface waters when delivered via overland flow, or excretion occurs in or adjacent to water. The number of pets calculated for the watershed using data from the American Veterinary Medical Association (AVMA) and US census data estimated a total of 10,874 pets in the watershed. Deer, geese, ducks, raccoons, turkeys, and other animals are recognized as potential contributors of bacteria to the Redwood River watershed. Data from Minnesota Department of Natural Resources Farmland Wildlife Population and Research Group were used to estimate wildlife populations for deer, pheasants, turkeys, ducks, and geese (Section 4.2.3 and 4.2.4 of the TMDL).

Future Growth: According to 2000 US Census data, the population declined by 5% in the Redwood River watershed. The number of livestock and other animals within the watershed is projected to remain relatively unchanged. For the purposes of this TMDL, MS4 community land areas were increased by 10% to account for future development. MS4 values were purposely overestimated to account for

development in the MS4 communities. MPCA will monitor population growth, urban expansion, changes in agricultural practices and livestock animal units, and may reopen the TMDL if and when adjustments are deemed necessary (Section 5.2.4 of the TMDL).

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

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

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

Comment:

Designated Uses:

Minnesota Rule Chapter 7050 designates uses for waters of the state. Eight of the nine segments in the Redwood River watershed are designated as Class 2B and 2C waters for aquatic recreation use (boating, swimming, fishing etc.). The Class 2 aquatic recreation designated use is described in Minnesota Rule 7050.0140 (3):

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

Class 2 designated waters within the Redwood River watershed are;

- Redwood River (07020006-501, -502A, -502B, -505, -509)
- Clear Creek (07020006-506)
- Threemile Creek (07020006-504)
- Coon Creek (07020006-511)

The Tyler Creek segment (07020006-512) is designated by MPCA as a Class 7 limited resource value water. Class 7 waters are typically low-flow streams or ditches which are protected; to allow secondary

body contact, to preserve groundwater use as a potable water supply, and to protect the aesthetic qualities of the water. MPCA completes use attainability analyses (UAAs) on Class 7 water bodies to determine whether Clean Water Act goals of "fishable and swimmable" waters are achievable. As part of the multiple use classification system, MPCA recognizes that Class 7 waters also are protected for industrial consumption (Class 3C), agriculture and livestock uses (Class 4A and 4B), aesthetic enjoyment and navigation (Class 5) and other uses (Class 6) (Section 3.1 of the TMDL).

Numeric Criteria:

Water quality standards are the fundamental benchmarks by which the quality of surface waters is measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes (MS) Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as are necessary and feasible to protect the environment and health of the citizens of the state is vested with the MPCA. Through adoption of WQS into Minnesota's administrative rules (principally Chapters 7050 and 7052), MPCA has identified designated uses to be protected in each of its drainage basins and the criteria necessary to protect these uses. The water quality criteria that are applicable to the Redwood River watershed are stated in Table 4 of this Decision Document and apply from April 1st through October 31st (Section 3.2 of the TMDL).

Table 4. Applicable Water Quality Standards for *E. coli* and Fecal Coliform.

Description		Fecal Coliform	*E. coli*
Chronic	***Class 2B :*** Geometric Mean of not less than 5 samples within 1 calendar month	200 organisms / 100 mL	126 organisms / 100 mL
Acute	***Class 2B :*** 10 % of all samples taken during 1 calendar month shall not exceed	2,000 organisms / 100 mL	1,260 organisms / 100 mL
Chronic	***Class 7 :*** Geometric Mean of not less than 5 samples within 1 calendar month	1,000 organisms / 100 mL	630 organisms / 100 mL
Acute	***Class 7 :*** 10 % of all samples taken during 1 calendar month shall not exceed	2,000 organisms / 100 mL	1,260 organisms / 100 mL

Target:

The target used to develop the TMDL allocations is the chronic fecal coliform water quality target of 200 cfu/100mL for Class 2B waters and the chronic fecal coliform water quality target of 1,000 cfu/100mL for Class 7 waters. These water quality criteria are applicable from April 1st through October 31st.

Fecal coliform criteria were used rather than *E. coli,* because the latter criteria were approved during the development of the Redwood River TMDL, and much of the data available were for fecal coliform criteria. When the state revised its standards, a paired comparison study determined *E. coli* to fecal coliform relationships. The results indicated that 126 cfu/100 ml of *E.coli* was comparable to 200 cfu/100 ml fecal coliform, and that 1260 cfu/100 ml of *E. coli* was comparable to 2000 cfu/100 ml for fecal coliform. Thus, based on MPCA's paired comparison study, TMDL allocations developed to meet 200 cfu/100 ml fecal coliform geometric means would be expected to also meet *E. coli* geometric mean criteria.

MPCA believes that utilizing the chronic water quality target will result in the greatest bacteria reductions within the Redwood River watershed. The geometric mean must be calculated from at least

five samples taken in a single month. Based on probability and data distribution, if samples are representative of varying hydrologic conditions, then achieving a geometric mean of 200 cfu/100 ml is also expected to have no more than 10% of individual samples exceeding the 2000 cfu/100 ml single sample standard (Section 3.4 of the TMDL).

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

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

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

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

Comment: MPCA determined the loading capacities for the impaired water bodies in the Redwood River watershed based on the water quality standards and water quality target values. MPCA used the Load Duration Curve (LDC) approach to calculate TMDLs for bacteria. The LDC approach assigns load capacities that are based on flow.

Fecal coliform TMDLs calculated within the Redwood River watershed TMDL were calculated toward the water quality standard of **200 cfu/100 mL** for all of the aquatic recreational impaired reaches (i.e., -501, -502A, -502B, -504, -505, -506, -509, and -511). The limited value resource impaired reach (-512) was calculated toward the water quality standard of **1,000 cfu/100 mL**.

MPCA believes by setting the bacteria TMDLs to the geometric mean (200 cfu/100 mL for Class 2B waters and 1,000 cfu/100mL for Class 7 waters) the impaired water body will attain its designated aquatic recreational use (Section 2 of this Decision Document). EPA finds this assumption to be

reasonable since the allocations of the bacteria TMDLs addressed in the Redwood River watershed TMDLs are calculated to meet the WQS of 200 cfu/100 mL or 1,000 cfu/100mL on any given day across all flow conditions observed during the study period within the watershed. Thus, when the TMDL is implemented and achieved, fecal coliform concentrations in the impaired segments should not exceed 200 cfu/100 mL or 1,000 cfu/100mL on any given day. Therefore, implicitly the fecal coliform concentrations in the impaired segments should not exceed the upper limit of 2,000 cfu/100 mL for fecal coliform in Class 2B and Class 7 waters.

MPCA determined the loading capacities for the impaired reaches within the Redwood River watershed based on the fecal coliform water quality target values. Loading capacities are usually expressed as a mass per time (e.g. pounds per day). For fecal coliform, however, mass is not always an appropriate measure because fecal coliform measurements are normally expressed in terms of organism counts or colony forming units (cfu). For the TMDLs in the Redwood River watershed, MPCA expressed the total maximum daily load values in organisms per day (org/day).

MPCA used the LDC method to calculate loadings at selected sites within the watershed. Continuous flow data were collected from two nearby USGS streamflow gages, the first (USGS #05316500) gage is located near the outlet of the Redwood River near Redwood Falls, and the second (USGS # 05215000) is also on Redwood River but upstream of the City of Marshall. Flow data from 1940-2006 was collected from this streamflow gage. Dates outside of the recreation season (April 1st – October 31st) were excluded from the flow record for the load allocation analyses.

To calculate the flows applicable to each TMDL segment, subwatersheds with larger or smaller drainage areas than the USGS gage's drainage area were assigned scaled flow values based upon the ratio of the sampling location's drainage area and the drainage area of the USGS gage. These were estimated using the observed flows available at the USGS gage on the Redwood River (#05316500) and drainage area weighting using the following equation:

$$Q_{ungaged} = (A_{ungaged} / A_{gaged}) * Q_{gaged}$$

Where,

$Q_{ungaged}$	= Flow at the ungaged location
Q_{gaged}	= Flow at surrogate USGS gage station (#05316500)
$A_{ungaged}$	= Drainage area of the ungaged location
A_{gaged}	= Drainage area of the gaged location (#05316500)

In this procedure, the drainage area of each monitoring station (or impaired segment) was divided by the drainage area of USGS gage #05316500. The flows for each of the stations were then calculated by multiplying the USGS gage #05316500 flows by the drainage area ratios. Additional flows were added to certain locations to account for WWTF that discharge upstream and are not directly accounted for using the drainage area weighting method (Section 5.1 of the TMDL).

Flow duration curves (FDC) were created for each of impaired reaches in the Redwood River watershed. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at the USGS flow gage in Redwood Falls, Minnesota. FDC graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the water quality target (200 cfu/ 100 mL) and then by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the Redwood River watershed TMDLs, have flow duration interval (percentage

of time flow exceeded) on the X-axis and fecal coliform concentrations (billion of organisms per day) on the Y-axis. The Redwood River watershed LDCs used fecal coliform measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL for the respective flow conditions observed at that location (Appendix B of the TMDL).

To determine discrete TMDL values, rather than just the continuous TMDL of the LDC graph, the LDC plots were subdivided into five flow regimes; high flows, moist conditions, mid-range flows, dry conditions, and low flows. High flows are exceeded 0 – 10 % of the time, moist conditions are exceeded 10 – 40 % of the time, mid-range flows are exceeded 40 – 60 % of the time, dry conditions are exceeded 60 – 90 % of the time and low flows are exceeded 90 – 100 % of the time. Flow regimes were defined by the following flow conditions: high flow (> 551 cubic feet per second (cfs)), moist flow (98-551 cfs), mid-range flow (44-97 cfs), dry flow (6.8-43 cfs) and low flow (<6.8 cfs). The mid-range values for each flow regime were determined for each reach and used to calculate the load for each reach in each flow regime. For example the mid-range flows in each flow regime at the USGS gage # 05316500 were: 944 cfs for high flow, 212 cfs for moist flow, 65 cfs for mid-range flow, 21 cfs for dry flow, and 3.3 cfs for low flow (Table 5.01 of the final TMDL document). Allocation values for each flow regime in each reach were calculated based on mid-range values for each flow regime.

MPCA completed water quality monitoring in the Redwood River watershed basin from 1997-2006 to monitor the concentration of fecal coliform at specific sampling points within the watershed (Figure 3.03 of the final TMDL). Fecal coliform values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC. These LDCs are found in Appendix B of the final TMDL document.

The LDC plots, showing the individual sampling loads and the LDC, display under what flow conditions water quality exceedances occur. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions. 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 (Appendix B of the final TMDL document).

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 loads are significant during storm events, implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters.

When allocating the total loading capacity for a specific reach in the Redwood River watershed, the sum of all of the reaches contributing (i.e., the up watershed reaches) to that specific downstream reach was included as part of that reach's loading capacity. TMDLs were calculated for each flow regime in each of the nine impaired reaches in the Redwood River watershed. The TMDLs were then divided among the WLA, LA and the margin of safety (MOS). The calculation of the loading capacity for each flow regime was made by multiplying the median flow value for that flow regime (measured in cubic feet per second (cfs)) by the fecal coliform target (200 cfu/100 mL for Class 2B waters or 1,000 cfu/100 mL for Class 7 waters) and then by a conversion factor. For example, the TMDL calculation for a "mid-range" flow would be the flow at the 50^{th} percentile, the mid-point of the mid-range flow regime (40^{th} – 60^{th} percentiles), multiplied by the fecal coliform water quality target value, and multiplied by a conversion factor to equal the allowable maximum daily load in units of billions of organisms per day (Section 5.1 of the TMDL).

After the TMDL was determined for each reach, loads were allocated to the WLA, LA and MOS. The portion of the load that was assigned to WWTP within the basin was determined from the potential daily discharge for each facility. For continuous discharge facilities, the average wet weather design flow was used to calculate the potential daily load. For those WWTP with ponds, the maximum flow volumes were multiplied by the permitted discharge limit to calculate the potential daily load. MPCA's method assumes that the WLA for a given WWTP will be the same under all flow regimes (ex. high flow, moist flow etc.) since its allocation is based on the volume it is permitted to discharge. For subwatersheds with multiple WWTPs upstream of their outlet, the daily discharges of those upstream facilities were summed and included in the TMDL for the downstream subwatershed.

The WWTP WLA's were calculated first and subtracted from the loading capacity. The remaining capacity was assigned to MS4 stormwater permits, provided there were MS4 communities within that particular subwatershed, and nonpoint source contributions (load allocations). The determination of load assigned to MS4 permits was made by the percentage of land covered under the permit in the subwatershed. For example, if the land area covered by an MS4 permit was 10 acres in a 100 acre subwatershed, then 10% of the loading capacity was assigned to the MS4.

Some of the MS4 WLAs and LAs for specific subwatersheds covered in the Redwood River bacteria TMDLs (Table 5 of this Decision Document) received a concentration based load instead of an absolute load. The loading capacities for the low flow regimes in these instances were determined as the expected flow multiplied by the 200 cfu/100 ml criteria. MPCA stated that a concentration based allocation to MS4s and nonpoint sources in low flow conditions was reasonable since MS4 communities and nonpoint sources are not expected to contribute to surface waters during low flow conditions in the Redwood River watershed (Section 5.2.1 of the TMDL).

The TMDL loading capacity of the low flow regime is typically small. The MOS calculated for the low flow regime is a relatively large proportion of the loading capacity (Table 6 of this Decision Document). The discrepancy in load between the loading capacity and the MOS is mostly due to the flow monitoring data used for these sites. The USGS station (USGS #05316500) reported zero to near-zero flows over the long-term flow record for this gage. For most of the reaches, the MOS takes up nearly all of the allocation capacity, after the assignment of WLA for that particular reach.

Table 6 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The load duration curve 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. Table 6 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

The reduction from current conditions needed to meet the bacteria water quality standards was estimated for each reach, where data were sufficient. The reductions were calculated from the geometric mean of fecal coliform observed in each reach. The calculation used was:

Percent reduction = (observed geometric mean – 200 cfu per 100 ml) / observed geometric mean)

MPCA states that these estimated reductions needed are intended to be approximate, and does not account for variability in flow and bacteria itself can be a highly variable parameter. The estimates are intended to give a relative magnitude of reductions needed across the nine reaches (Section 5.3 of the TMDL). Table 6 in this decision document summarizes the estimated reductions needed in each reach and by calendar month.

EPA concurs with the data analysis and LDC approach utilized by MPCA in their calculation of wasteload allocations, load allocations and the margin of safety for the Redwood River bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

Table 5. Bacteria TMDLs for the Redwood River Watershed

TMDL for fecal coliform (billions of bacteria/day)	**High**	**Moist Conditions**	**Mid-Range Flows**	**Dry Conditions**	**Low Flows**
Duration Interval	0 - 10 %	10 - 40 %	40 - 60 %	60 - 90 %	90 - 100 %
Coon Creek (07020006-511)					
Reach Description: Lake Benton to Redwood River					
Bacteria TMDL (billions of bacteria/day)	**291.1**	**58.2**	**14.9**	**4.8**	**0.6**
Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	168.7	25.4	9.7	1.8	0.0
Margin Of Safety (MOS)	122.4	32.8	5.2	3.0	0.6
Tyler Creek (07020006-512)					
Reach Description: Tyler Creek Headwaters to Redwood River					
Bacteria TMDL (billions of bacteria/day)	**775.4**	**155.1**	**39.8**	**12.7**	**1.6**
Wasteload Allocation (WLA): Total	1.32	1.32	1.32	1.32	1.32
WWTP: Tyler (MN002203949654)	1.32	1.32	1.32	1.32	1.32

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

Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	448.0	66.3	24.5	3.4	* [1]
Margin Of Safety (MOS)	326.1	87.5	13.9	8.0	Implicit
Redwood River (07020006-505)					
Reach Description: Headwaters to Coon Creek					
Bacteria TMDL (billions of bacteria/day)	**694.7**	**138.9**	**35.6**	**11.4**	**1.5**
Wasteload Allocation (WLA): Total	1.7	1.7	1.7	1.7	* [1]
WWTF: Ruthton (M0049654)	0.39	0.39	0.39	0.39	* [1]
Upstream WWTF contributions	1.31	1.31	1.31	1.31	* [1]
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	400.9	58.9	21.4	2.6	* [1]
Margin Of Safety (MOS)	292.1	78.4	12.5	7.1	Implicit
Threemile Creek (07020006-504)					
Reach Description: Headwaters to Redwood Creek					
Bacteria TMDL (billions of bacteria/day)	**893.1**	**198.8**	**61.5**	**18.9**	**3.0**
Wasteload Allocation (WLA): Total	0.30	0.30	0.30	0.30	0.30
WWTF: Ghent (MN0039730)	0.30	0.30	0.30	0.30	0.30
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	520.4	91.5	39.5	6.1	* [1]
Margin Of Safety (MOS)	372.4	107.0	21.8	12.6	Implicit
Redwood River (07020006-502B)					
Reach Description: T111 R42W S33 west line to Threemile Creek (excluding and above Marshall)					
Bacteria TMDL (billions of bacteria/day)	**783.7**	**156.7**	**40.2**	**12.9**	**1.6**
Wasteload Allocation (WLA): Total	2.7	2.7	2.7	2.7	* [1]
WWTF: Russell (MNG580062)	0.64	0.64	0.64	0.64	0.64
WWTF: Lynd (MNG580030)	0.35	0.35	0.35	0.35	0.35
Upstream WWTF contributions	1.7	1.7	1.7	1.7	* [1]
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	451.5	65.6	23.4	2.1	* [1]
Margin Of Safety (MOS)	329.6	88.4	14.1	8.0	Implicit
Redwood River (07020006-502A)					
Reach Description: T111 R42W S33 west line to Threemile Creek (including and below Marshall)					
Bacteria TMDL (billions of bacteria/day)	**876**	**175.2**	**44.9**	**14.4**	**1.8**
Wasteload Allocation (WLA): Total	50.3	37.9	36.8	* [1]	* [1]
WWTF: Marshall (MN0022179)	34.07	34.07	* [1]	* [1]	* [1]
Upstream WWTF contributions	2.7	2.7	* [1]	* [1]	* [1]
MS4 Communities: Marshall (MS400241)	13.5	1.1	* [1]	* [1]	* [1]
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	457.4	38.5	* [1]	* [1]	* [1]
Margin Of Safety (MOS)	368.3	98.8	Implicit	Implicit	Implicit
Clear Creek (07020006-506)					

Reach Description: Headwaters to Redwood River					
Bacteria TMDL (billions of bacteria/day)	**611.0**	**136.0**	**42.1**	**13.0**	**2.1**
Wasteload Allocation (WLA) Total	0.3	0.3	0.3	0.3	0.3
WWTF: Milroy (MN0041211)	0.3	0.3	0.3	0.3	0.3
MS4 Communities	0.0	0.0	0.0	0.0	0.0
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	356.0	62.6	26.9	4.1	* [1]
Margin Of Safety (MOS)	254.8	73.2	14.9	8.6	Implicit
Redwood River (07020006-509)					
Reach Description: Clear Creek to Redwood Lake					
Bacteria TMDL (billions of bacteria/day)	**4615.7**	**1027.5**	**318.0**	**97.9**	**15.7**
Wasteload Allocation (WLA) Total	72.4	43.3	39.53	37.6	* [1]
WWTF: Vesta (MNG580043)	0.27	0.27	0.27	* [1]	* [1]
Upstream WWTF contributions	37.33	37.33	37.33	* [1]	* [1]
MS4 Communities: Redwood Falls (MS400236) and upstream contributions	34.8	5.7	2.2	* [1]	* [1]
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	2618.6	431.3	165.7	* [1]	* [1]
Margin Of Safety (MOS)	1924.8	552.9	112.5	Implicit	Implicit
Redwood River (07020006-501)					
Reach Description: Ramsey Creek to Minnesota River					
Bacteria TMDL (billions of bacteria/day)	**5165.8**	**1149.9**	**355.9**	**109.5**	**17.5**
Wasteload Allocation (WLA) Total	84.0	45.3	40.6	37.6	* [1]
Upstream WWTF contributions	37.6	37.6	37.6	37.6	* [1]
MS4 Communities: Redwood Falls (MS400236) and upstream contributions	46.4	7.7	3.0	* [1]	* [1]
Livestock facilities requiring NPDES permits	0.0	0.0	0.0	0.0	0.0
Straight Pipe Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation (LA)	2734.9	479.8	185.9	* [1]	* [1]
Margin of Safety (MOS)	2346.9	624.8	129.4	Implicit	Implicit

* [1] = WLA for low flow zones is expressed as an equation rather than an absolute number and calculated by multiplying the expected flow in the reach by the water quality standard (200 cfu/100 mL or 1,000 cfu/100 mL). LA for some low flow zones are also expressed using this equation.

Table 6. MPCA estimated percent reductions for fecal coliform by reach and month.

Percent reductions for fecal coliform by assessment reach and by month		*April*	*May*	*June*	*July*	*August*	*September*	*October*
Coon Creek (07020006-511): Lake Benton to Redwood River	***Monitored 1997-2006; n=81***	IND*	0%	13%	25%	64%	73%	IND*
Tyler Creek (07020006-512):Tyler Creek Headwaters to Redwood River	***Monitored 1999; n=25***	IND*	0%	30%	25%	4%	0%	IND*
Redwood River (07020006-505): Headwaters to Coon Creek**	***Monitored 1999-2006; n=52***	IND*	0%	80% (S000-696); 55% (S003-703)	44% (S000-696); 47%(S003-703)	IND* (S000-696); 0% (S003-703)	IND* (S000-696); 38% (S003-703)	IND*
Threemile Creek (07020006-504): Headwaters to Redwood Creek	***Monitored 1999-2006; n=43***	IND*	0%	84%	49%	62%	57%	IND*
Redwood River (07020006-502B): T111 R42W S33 west line to Threemile Creek (above Marshall)	***Monitored 1999; n=25***	IND*	0%	13%	18%	0%	0%	IND*
Redwood River (07020006-502A): T111 R42W S33 west line to Threemile Creek (including and below Marshall)	***Monitored 1999; n=25***	IND*	0%	58%	70%	60%	61%	IND*
Clear Creek (07020006-506): Headwaters to Redwood River	***Monitored 1999-2006; n=42***	IND*	0%	79%	2%	45%	53%	IND*
Redwood River (07020006-509): Clear Creek to Redwood Lake	***Monitored 1999-2006; n=70***	IND*	0%	44%	37%	19%	23%	IND*
Redwood River (07020006-501): Ramsey Creek to Minnesota River	***Monitored 1997-2006; n=81***	IND*	0%	0%	0%	0%	0%	10%

*IND=Insufficient data were available to estimate a percent reduction for this month in this reach
**Water quality in this reach was assessed at two stations (RRUS S000-696 and RUSSELL S0003-703). Where results differ between these two stations by month, both results are listed for each station.

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

4. Load Allocations (LAs)

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

Comment: MPCA identified several nonpoint sources in this TMDL report including; stormwater from non-permitted MS4 communities, unsewered communities, nonpoint source inputs from SSTS, stormwater runoff from agricultural land uses, livestock with access to stream environments, wildlife and pet sources. The load allocation was determined as the remaining loading capacity after WLA and MOS were assigned.

MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value that represents each of the sources. This method was used because the LDC analysis does not allow the specific load from each non-point source to be calculated, but does identify when high loads of bacteria occur across the flow regime, and for each TMDL reach. Still, the aggregate load allocation, and information about when high loads occur or do not occur can be coupled with MPCA's demonstrated knowledge of the watershed to help managers act to address bacteria loads from non-point sources (Section 5.2.2 of the TMDL).

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

5. Wasteload Allocations (WLAs)

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

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

Comment:

Wasteload Allocations (WLA): MPCA identified the following point sources: eight WWTFs, two MS4s, and eleven CAFOs, which all require NPDES permits. A WLA was assigned to each of these facilities as shown in Table 5 of this decision document.

The WWTP allocations were calculated based on the type of treatment facility (continuous discharge or pond system). Continuous discharge WWTP WLAs were determined by multiplying wet-weather design flows by the permitted discharge limit (200 cfu/100 mL). For pond systems, the WLAs were calculated by multiplying the maximum design flows by the permitted discharge limit (200 cfu/100 mL or 1,000 cfu/100 mL for Tyler Creek (07020006-512)). WWTPs which utilize stabilization ponds were assumed to discharge over a 1-2 week period in the spring and in the fall. The discharge windows generally coincide with high flow events, periods where recreational use is limited, or times outside of April 1 to October 31 (out of season for the WQS). Design flow identifies the maximum discharge a facility can process and is most likely to occur during wet weather when flows to the plant are greatest. Therefore the WLA for WWTF's have an inherent MOS for the lower flow zones, as it is not likely the WWTF's would discharge at maximum design flow on a daily basis (Section 5.2.1 of the TMDL).

The two MS4's identified in the Redwood River watershed were City of Marshall (MS400241) and Redwood Falls (MS400236), and both received a WLA. The WLA for these MS4's was assigned based on the proportion of the land area subject to an MS4 within a subwatershed. For example, if 10% of the watershed was comprised of land area subject to an MS4 permit, then 10% of the loading capacity was assigned to that source. The contributions of MS4s to downstream subwatersheds were also accounted for by calculating the land area subject to an MS4 permit for the drainage area at the downstream point, and then assigning that percentage of the loading capacity to the MS4 for the downstream subwatershed.

CAFO facilities were given a WLA of 0.0 cfu per100 mL) (Table 3 in this decision document). CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). Runoff due to field application of manure is considered a nonpoint source by the EPA and is considered as a load allocation, as long as the field application is in accordance with federal and state requirements. Feedlots that do not require an NPDES permit because they are below 1000 animal units per operation are included in the load allocation (Section 5.0 of the TMDL).

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

6. Margin of Safety (MOS)

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

Comment:
MPCA provided both explicit and implicit MOS in the Redwood River Watershed TMDL. An explicit MOS was applied to a majority of flow zones in each reach. The explicit MOS was determined as the difference between the loading capacity at a mid-point within a flow zone and the load capacity at the minimum flow of a flow zone. This method provides a MOS that applies to the different flow zones, which is a reasonable approach for this TMDL given that the LDC's illustrate there is a basic relation to flow and bacteria loading in these impaired reaches (Appendix B of the final TMDL).

In lower flow zones, where an explicit MOS was not provided, an implicit MOS is provided. As mentioned in section 5 of this decision document, the method used to calculate WLA's for WWTF's provides an implicit MOS for those sources in lower flow zones. In addition, groundwater flows comprise a larger majority of flow volume during the low flow periods, and groundwater can reasonably be assumed to not contribute a high bacteria load (Section 6.0 of the TMDL). The implicit MOS is the result of conservative assumptions built into the calculation of the TMDL allocations based on the limitations placed on permitted dischargers under low flow conditions. Under low flow conditions, permitted dischargers must discharge below the water quality target concentration and are expected to meet the goals of the TMDL allocations. Discharging below the water quality target concentration provides additional loading capacity under low flow conditions.

The U.S. EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the sixth criterion.

7. Seasonal Variation

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

Comment:
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, are not as frequent. Bacterial water quality standards (*E. coli*) WQS need to be met from April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized flow measurements from two USGS streamflow gages in Redwood Falls, and City of Marshall, Minnesota. These flow measurements were collected over a variety of flow conditions observed during the recreation season from 1940-2006. LDCs developed from these flow records represented a range of flow conditions within the Redwood River watershed and thereby accounted for seasonal variability of bacterial loads over the recreation season. Fecal coliform data were collected over a variety of spring, summer, and fall conditions and ranged from approximately 50-350 cfu/100ml. Capturing a range of conditions helped identify when bacterial loads were highest.

Typically the highest values for fecal coliform occurred in these dry months. Thus critical conditions for bacteria 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) (Section 7.0 of the TMDL).

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

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the 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 Redwood River Watershed TMDLs were developed for waters impaired by both point and nonpoint sources. Section 10 of the TMDL discusses reasonable assurance that the LA for nonpoint sources will be met. The following factors provide reasonable assurance: recommended BMPs have demonstrated success improving water quality, and both regulatory and non-regulatory incentive based programs exist and promote implementation.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the Redwood River watershed. Implementation practices will be implemented over the next several years. The Redwood Cottonwood Rivers Control Association (RCRCA) is a non-regulatory agency with a mission to protect and enhance the Redwood and Cottonwood Rivers. The RCRCA is the lead for TMDL implementation and will work with local and state agencies to evaluate implementation. The RCRCA is composed of: RCRCA technical staff, county representatives, personnel from local Soil and Water Conservation Districts (SWCD), personnel from the Natural Resources Conservation Service (NRCS), and personnel from the Minnesota Department of Natural Resources (MN-DNR). MPCA anticipates that members of the RCRCA work group will monitor and evaluate the success or failure of BMP systems designed to reduce bacteria loading into 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 effluent 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.

MPCA is responsible for applying federal and state regulations to protect and enhance water quality within the Redwood River watershed. MPCA oversees all regulated MS4 entities in stormwater management accounting activities. The MS4 communities in the Redwood River watershed are MS4 communities. MS4 NPDES/SDS permits require regulated municipalities to implement BMPs to reduce pollutants in stormwater runoff to the Maximum Extent Practicable (MEP). All permittees of regulated MS4 communities are required to satisfy the requirements of the MS4 general permit. The MS4 general permit requires the permittee to develop a Stormwater Pollution Prevention Plan (SWPPP) which addresses all permit requirements, including the following six minimum control measures:

- Public education and outreach;
- Public participation;
- Illicit Discharge Detection and Elimination (IDDE) Program;
- Construction-site runoff controls;
- Post-construction runoff controls; and
- Pollution prevention and municipal good housekeeping measures.

A SWPPP is a management plan that describes the MS4 permittee's activities for managing stormwater within their jurisdiction or regulated area. In the event a TMDL study has been completed, approved by EPA prior to the effective date of the general permit, and assigns a wasteload allocation to an MS4 permittee, that permittee must document the WLA in their application and provide an outline of the best management practices to be implemented in the current permit term to address any needed reduction in loading from the MS4.

MPCA requires applicants to submit their application materials and SWPPP document to MPCA for review. Prior to extension of coverage under the general permit, all application materials are placed on 30-day public notice by the MPCA, to ensure adequate opportunity for the public to comment on each permittee's stormwater management program. Upon extension of coverage by the MPCA, the permittees are to implement the activities described within their SWPPP, and submit annual reports to MPCA by June 30 of each year. These reports document the implementation activities which have been completed within the previous year, analyze implementation activities undertaken, and outline any changes within the SWPPP from the previous year.

Bacteria from stormwater runoff from agricultural areas will be minimized by feedlot controls. Feedlot controls are reviewed for accordance with Minn. R. ch. 7020 by MPCA officials. The TMDL also cites studies that demonstrated success with rotational grazing and methods for land-applied manure to reduce bacteria and sedimentation.

Bacteria from SSTS can be minimized by implementing acceptable designs, which are described in Minnesota Rule Ch. 7080. Each county has delegated authority to implement SSTS rules to ensure efficient treatment of bacteria. System upgrades will help to reduce the bacteria loads from failing septic systems. At the time the TMDL was being developed, SSTS upgrades were planned for the City of Florence, Green Valley, and Seaforth.

Various funding mechanisms can support the recommendations made in the TMDL. Local watershed partners may apply for funds from State of Minnesota grants programs. Grants under the Clean Water Legacy Act (CWLA) and funding through the Clean Water Partnership program are two of the main funding outlets which support implementation efforts. The RCRCA may also explore the funding mechanisms provided through the federal Clean Water Act Section 319 grant program which provides cost share dollars to implement voluntary activities in the watershed (Section 10 of the TMDL).

The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements to jointly use technical, educational, and financial resources. MPCA expects the implementation plans to be developed within a year of TMDL approval.

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

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are some of the implementing programs for ensuring effluent limits are consistent with the TMDL.

The U.S. EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment:
Section 8 of the final TMDL document outlines water monitoring efforts by the RCRCA work group. Much of the data for the TMDL study are from monitoring conducted under the Redwood River Clean Water Project (RRCWP) work which was funded by Phase I and Phase II Clean Water Partnership grants in 1989 and 1994 respectively. Members of the RCRCA work group will continue to monitor water quality in the Redwood River basin on an annual basis. The TMDL derived Implementation Plan, developed within one year of the approval of the final TMDL document, will include a detailed monitoring plan and quality assurance project plan (QAPP). The effectiveness of implementation activities could be reevaluated every five years, using data collected by RCRCA to estimate monthly geometric means every five years.

The U.S. EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
Section 9 of the TMDL describes implementation options to address non-point sources of bacteria. The implementation options in the final TMDL report will also be supported by a watershed wide approach developed by RCRCA in 1993 as part of its diagnostic study, and the implementation plan that will be completed by MPCA a year after TMDL approval. The implementation plan will be developed by a stakeholder advisory committee which will identify the best BMPs to address sources observed in the TMDL. These recommendations will be done on the sub-watershed scale and will identify costs and potential funding sources.

Table 9.01 identifies what sources of bacteria are contributing under different flow conditions (e.g., SSTS, WWTF, Wastewater bypass, feedlots, agricultural runoff, and urban runoff). This information along with the LDC's, which show when bacterial loads are greatest, can identify where to prioritize implementation. For instance, the highest loads were observed during moist flows in Clear Creek, and so SSTS upgrades, and pasture, feedlot, and manure management would be applicable to address the high loads. In Section 9.2 of the TMDL, MPCA recommended the general implementation practices that would address the sources contributing during flow zones that had the highest observed *E. coli.* These included pasture and management plans, nutrient management plans, and feedlot runoff controls. MPCA estimated it would cost $25,000,000 or approximately $350 per animal unit in the watershed to implement manure and feedlot management practices in place for animal agricultural activities (Page 93 of the final TMDL). Sediment control practices that intercept runoff and filter sediments before entering surface water systems were a recommended practice, along with upgrades and improvements to sewage

treatment systems. Upgrades to SSTS would reduce the bacteria loads throughout the Redwood River Watershed. MPCA estimated a cost of $7,000,000 to upgrade failing septic systems in the watershed.

The U.S. EPA finds that this criterion has been adequately addressed.

11. Public Participation

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

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

Comment:
The public participation section is found in Section 11 of the final TMDL document. The RCRCA work group hosted four public meetings in Redwood Falls, Minnesota in 2008. During these public meetings, the RCRCA work group provided stakeholders with project updates, information on the TMDL development process, and the opportunity to provide feedback.

Local, state and federal agencies were involved in the public participation process. Representatives from the city of Redwood Falls, county board members, members from the local SWCDs, NRCS, MN-DNR, MPCA, Minnesota Board of Water and Soil Resources (MN-BWSR), Minnesota Soybean Growers Association, Minnesota Corn Growers Association, Minnesota State Cattleman's Association, the Minnesota Farm Bureau, and the Minnesota Pork Producer Organization, all contributed to the public participation process. Representatives from these organizations provided insight into the political, economic, and natural resource aspects impacting the Redwood River watershed during the development of the TMDL.

The draft TMDL was posted online by MPCA at (http://www.pca.state.mn.us/water/tmdl) as well as by RCRCA at http://www.rcrca.com/TMDL_info.htm. The 30-day public comment period began April 25, 2011 and ended May 25, 2011. The period was publicized in Minnesota's April 25, 2011 state register and in an MPCA news release, copies of which were included in the TMDL submittal received by EPA on November 4, 2013.

MPCA received four public comments during the public notice period. Comments were submitted by the Minnesota Corn Growers Association (MCGA), the Minnesota State Cattlemen's Association (MSCA), the Minnesota Pork Producers Association (MPPA) and one comment from a citizen. The commenters requested further information on bacteria source discussions within the TMDL and asked

the MPCA to consider the findings of a bacteria study conducted by Dr. Michael Sadowsky in the Minnesota River basin. MPCA adequately answered the comments presented by these groups by clarifying methods used, statements made, and data sources used in the TMDL document. MPCA responded to each question and comment provided (Appendix E of the TMDL). MPCA submitted all of the public comments and responses in the final TMDL submittal packet received by the EPA on November 4, 2013.

Following the public notice period, MPCA received two petitions to hold a contested case hearing on the basis that the TMDL did not consider natural background bacteria (*E. coli*) levels besides those from wildlife. The Petitioners requested that MPCA consider other natural background sources that were discussed in Dr. Sadowsky's study. MPCA consulted with Dr. Sadowsky on the implications of his study to the Redwood/Cottonwood River TMDLs and incorporated the study by reference into the TMDL. MPCA reviewed the petition and denied the contested case requests. MPCA's justification for the denial of the contested case requests is found within a MPCA *Findings of Fact, Conclusions of Law and Order* document signed on October 1, 2013. This document is a part of the Administrative Record for this TMDL decision. MPCA provided a copy of the Findings of Fact document in its final TMDL submittal on November 4, 2013.

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

12. Submittal Letter

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

Comment: On November 4, 2013, EPA received a submittal letter dated October 23, 2012 signed by Rebecca J. Flood, MPCA Assistant Commissioner, addressed to Tinka Hyde, U.S. EPA Region 5, Water Division Director. The submittal letter identified that the Redwood River Watershed TMDL was being submitted for final approval by U.S. EPA under Section 303(d) of the Clean Water Act. The locations of the waterbodies were provided in the supporting documentation.

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

13. Conclusion

After a full and complete review, the US EPA finds that this TMDL for fecal coliform for Redwood River meets all of the required elements of an approvable TMDL. This approval is for **nine (9)** TMDLs, addressing seven water bodies for aquatic recreational use impairments and one water body for impairments to a limited resource value water. Those TMDLs include:

- Redwood River (07020006-501, -502A, -502B, -505, -509) for aquatic recreation impairment;
- Clear Creek (07020006-506) for aquatic recreation impairment;
- Threemile Creek (07020006-504) for aquatic recreation impairment;
- Coon Creek (07020006-511) for aquatic recreation impairment; and
- Tyler Creek (1 segment: 0702006-512) for impairment to a limited resource value water.

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

TMDL errata sheet, August 2023

Redwood River Fecal Coliform Total Maximum Daily Load Report, October 2013

A recent review of the Redwood River Fecal Coliform Total Maximum Daily Load Report from October of 2013 has discovered arithmetic errors in one of the allocation tables. The table in question is Table 5.3.1D (see below) located on page 54 of the report (PDF page 72). The table displays loading capacities, allocations, and margins of safety at five different flow zones for Redwood River Reach 07020006-501. When added together, the individual allocations and margins of safety do not equal the total daily loading capacity values for the High, Moist, and Mid flow zones. Following internal review and discussion, the MPCA believes the approved total daily loading capacities in the table are accurate and consistent with the water quality standard, which at the time of the TMDL was 200 cfu/100 ml. MPCA also believes the approved WLAs and MOS in the table are accurate, although there are also arithmetic errors in the "MOS percent of total daily loading capacity" in the table.

Table 5.3.1D: Daily Fecal Coliform Loading Capacities and Allocations – Redwood River; Ramsey Creek to Minnesota River (AUID: 07020006-501)

Drainage area for listed reach (sq mi): 705.1
Flow gage used: Redwood River near Redwood Falls - USGS 05316500
Land Area MS4 Urban (%): 1.56
Total WWTF Flow (mgd): 4.964**

	Flow Zone				
	High	Moist	Mid	Dry	Low
	Billion organisms per day				
TOTAL DAILY LOADING CAPACITY	5165.8	1149.9	355.9	109.5	17.5
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	37.6	37.6	37.6	37.6	*
Communities Subject to MS4 NPDES Requirements	46.4	7.7	3.0	*	*
Livestock Facilities Requiring NPDES Permits	0.0	0.0	0.0	0.0	0.0
"Straight Pipe" Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation	2784.3	628.2	237.2	*	*
Margin of Safety	2346.9	624.8	129.4	*Implicit*	*Implicit*
	Percent of total daily loading capacity				
TOTAL DAILY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.7%	3.3%	10.6%	34.3%	214.5%
Communities Subject to MS4 NPDES Requirements	0.9%	0.7%	0.8%	*	*
Livestock Facilities Requiring NPDES Permits	0.0%	0.0%	0.0%	0.0%	0.0%
"Straight Pipe" Septic Systems	0.0%	0.0%	0.0%	0.0%	0.0%
Load Allocation	56.7%	42.3%	53.2%	*	*
Margin of Safety	41.7%	53.8%	35.4%	*Implicit*	*Implicit*

* See Section 5.2 ** Includes WWTF in upstream reaches that drain to this TMDL section

To correct the arithmetic errors, MPCA reduced the daily load allocations for the High, Moist, and Mid flow zones in Table 5.3.1D to be consistent with the total daily loading capacities. This is a conservative and protective approach to correcting this issue. The corrected table is shown below with highlighted cells indicating the changed values. These TMDL corrections were entered into the MPCA's Tempo database in July 2023.

Drainage area for listed reach (sq mi):	705.1
Flow gage used:	Redwood River near Redwood Falls - USGS 05316500
Land Area MS4 Urban (%):	1.56
Total WWTF Flow (mgd):	4.964**

	Flow Zone				
	High	Moist	Mid	Dry	Low
	Billion organisms per day				
TOTAL DAILY LOADING CAPACITY	5165.8	1149.9	355.9	109.5	17.5
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	37.6	37.6	37.6	37.6	*
Communities Subject to MS4 NPDES Requirements	46.4	7.7	3.0	*	*
Livestock Facilities Requiring NPDES Permits	0.0	0.0	0.0	0.0	0.0
"Straight Pipe" Septic Systems	0.0	0.0	0.0	0.0	0.0
Load Allocation	2734.9	479.8	185.9	*	*
Margin of Safety	2346.9	624.8	129.4	*Implicit*	*Implicit*
	Percent of total daily loading capacity				
TOTAL DAILY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.7%	3.3%	10.6%	34.3%	214.5%
Communities Subject to MS4 NPDES Requirements	0.9%	0.7%	0.8%	*	*
Livestock Facilities Requiring NPDES Permits	0.0%	0.0%	0.0%	0.0%	0.0%
"Straight Pipe" Septic Systems	0.0%	0.0%	0.0%	0.0%	0.0%
Load Allocation	52.9%	41.7%	52.2%	*	*
Margin of Safety	45.4%	54.3%	36.4%	*Implicit*	*Implicit*

* See Section 5.2 ** Includes WWTF in upstream reaches that drain to this TMDL section