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

JAN - 8 2014

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final bacteria Total Maximum Daily Loads (TMDLs) for the Cottonwood River Watershed, including support documentation and follow up information. The Cottonwood River Watershed is located in southwestern Minnesota in Brown, Cottonwood, Lyon, Murray and Redwood Counties. The TMDLs address aquatic recreation use impairments and limited resource value water use impairments due to bacteria (fecal coliform).

EPA has determined that the Cottonwood River Watershed 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 eight bacteria TMDLs, addressing aquatic recreation use and limited resource value water use impairments. 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 efforts 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: Celine Lyman, MPCA
Mark Hanson, MPCA

wq-iw7-20g

TMDL: Cottonwood River Fecal Coliform TMDL, in Brown, Cottonwood, Lyon, Murray, & Redwood Counties, Minnesota
Date: January 8, 2014

DECISION DOCUMENT FOR THE COTTONWOOD RIVER FECAL COLIFORM TMDL, 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 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 Cottonwood River originates near Balaton (Lyon County), Minnesota in the southwestern part of the state. The Cottonwood River flows for approximately 150 miles eastward to the Minnesota River. The Cottonwood River joins the Minnesota River near New Ulm (Brown County), Minnesota. The Cottonwood River watershed (approximately 840,200 acres) drains portions of Brown, Cottonwood, Lyon, Murray and Redwood counties. There are 15 incorporated communities in the watershed including: New Ulm, Sleepy Eye, Springfield, and Tracey. There are seven unincorporated communities within the Cottonwood River watershed. The watershed is composed mainly of agricultural lands and a small percentage of urban areas. The estimated total population of the Cottonwood River watershed is approximately 23,114 people.

MPCA identified eight segments which exceed Minnesota bacteria water quality standards (WQS) (Table 1 of this Decision Document). Seven of the eight segments were designated as impaired for aquatic recreation by bacteria exceedances and one segment (Lone Tree Creek, 07020008-524) was designated as a limited resource value water 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.

Table 1: Impaired Segments Addressed by the Cottonwood River Bacteria TMDLs

Reach name	Reach Description	River ID #	Affected designated use	Pollutant or stressor
Cottonwood River	Judicial Ditch 30 to Minnesota River	07020008-501	Aquatic recreation	Bacteria (fecal coliform)
Cottonwood River	Plum Creek to Dutch Charlie Creek	07020008-504	Aquatic recreation	Bacteria (fecal coliform)
Cottonwood River	Coal Mine Creek to Sleepy Eye Creek	07020008-508	Aquatic recreation	Bacteria (fecal coliform)
Sleepy Eye Creek	Headwaters to Cottonwood River	07020008-512	Aquatic recreation	Bacteria (fecal coliform)
Meadow Creek	Headwaters to Cottonwood River	07020008-515	Aquatic recreation	Bacteria (fecal coliform)
Plum Creek	Headwaters to Cottonwood River	07020008-516	Aquatic recreation	Bacteria (fecal coliform)
Dutch Charlie Creek	Headwaters to Cottonwood River	07020008-517	Aquatic recreation	Bacteria (fecal coliform)
Lone Tree Creek	T109 R39W S7, west line to Cottonwood River	07020008-524	Limited resource value water	Bacteria (fecal coliform)

Land Use:

The Cottonwood River watershed encompasses approximately 840,200 acres within southwestern Minnesota. The majority of the land use within the Cottonwood River watershed is agricultural (Table 2

of this Decision Document). Different land uses and their respective percentages of land area are described in Table 2 of this Decision Document.

Table 2: Land use within the Cottonwood River watershed

Land Use	Acres	Percentage
Cultivated Land	738,911.72	87.95%
Deciduous Forest	24,935.13	2.97%
Grassland	49,045.81	5.84%
Residential/Urban	17,767.81	2.11%
Open Water & Wetlands	9,194.52	1.09%
Other	337.82	0.04%
Totals	**840,192.81**	**100.00%**

Problem Identification:
MPCA identified eight 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.

Priority Ranking:
The Cottonwood 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.

Pollutant of Concern:
Aquatic recreational use: The pollutant of concern for aquatic recreational use impairment was fecal coliform which is an indicator of the presence of pathogenic bacteria.

Limited resource value use: The pollutant of concern for the 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 Cottonwood River watershed are described in detail below.

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 fifteen municipal wastewater treatment plants (WWTPs) in the Cottonwood River watershed (Table 3 of this Decision Document).

Table 3: WWTP facilities within the Cottonwood River watershed

Subwatershed	River ID Number	WWTP	System Type	Permit Number
Lower Cottonwood	07020008-501	Sleepy Eye WWTP	Pond	MNG580041
Upper Cottonwood	07020008-504	Balaton WWTP	Pond	MN0020559
Upper Cottonwood	07020008-504	Garvin WWTP	Pond	MNG580101
Upper Cottonwood	07020008-504	Revere WWTP	Pond	MNG580114
Upper Cottonwood	07020008-504	Walnut Grow WWTP	Continuous Discharge	MN0021776
Middle Cottonwood	07020008-508	Sanborn WWTP	Pond	MN0024805
Middle Cottonwood	07020008-508	Springfield WWTP	Continuous Discharge	MN0024953
Sleepy Eye Creek	07020008-512	Clements WWTP	Pond	MN0023043
Sleepy Eye Creek	07020008-512	Lucan WWTP	Pond	MN0031348
Sleepy Eye Creek	07020008-512	Wabasso WWTP	Continuous Discharge	MN0025151
Sleepy Eye Creek	07020008-512	Wanda WWTP	Pond	MN0020524
Dutch Charley Creek	07020008-517	Lamberton WWTP	Pond	MN0023922
Dutch Charley Creek	07020008-517	Storden WWTP	Pond	MN0052248
Dutch Charley Creek	07020008-517	Westbrook WWTP	Pond	MN0025232
Lone Tree Creek	07020008-524	Tracy WWTP - N	Pond	MN0021725
Lone Tree Creek	07020008-524	Tracy WWTP - S	Pond	MN0021725

Twelve of the fifteen WWTPs use pond systems to periodically discharge treated wastewater into surface waters in the Cottonwood 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 three WWTPs use continuous discharge systems. Each facility is required to meet Minnesota state discharge limits for *E. coli* (200 cfu/100 mL as a monthly geometric mean 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 Cottonwood River watershed which received a portion of the wasteload allocation (WLA).

- Marshall MS4 community (MS400241) within the Meadow Creek subwatershed (07020008-515)
- New Ulm MS4 community (MS400228) within the Cotton River subwatershed (07020008-501)

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 Operation (CAFO): There are thirty-nine (39) identified animal feedlot operations within the Cottonwood River watershed (Table 4 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 Cottonwood River watershed TMDLs.

Table 4: CAFO permits within the Cottonwood River TMDL

Reach Name	Subwatershed	Name	CAFO Permit #
Cottonwood River	07020008-501	Gilland Feedlot Inc.	127-50088
		Mark Schwartz Farm	015-50008
		Tim Schieffert Farm	015-50002
		Mark Schwartz Farm	015-82452
		Tim Schieffert Farm	015-71684
Cottonwood River	07020008-504	Randy Tholen Farm	083-80220
		Ronald Scott Farm	083-50029
		Sanmarbo Farms Inc.	083-50003
		Gregory Lanoue Farm	083-50002
		Richard Vronman Farm	083-50030
Cottonwood River	07020008-508	Sandy Rivers Hutterian Brethen	127-65964
		Cory Huiras	015-50005
		Four Seasons Dairy	015-95051
		Schwartz Brothers Farm	015-71727
		Glen Graff Farm	033-50011
		Dry Creek Ranch	033-98098
Sleepy Eye Creek	07020008-512	Andrew Schiller Farm	127-50051
		Brian Timm Farm	127-50091
		Kodet Farms	127-50042
		Paul Meidl Farm	127-50074
		Kurt Kratz Farm	015-82460
		Lindeman & Wells Inc.	015-50013
		Lindeman & Wells Inc.	015-72338
		Richard Trebesch Farm	015-50009
		Richard Trebesch Farm	015-71783
		Scott Helget Farm	015-71726
		Tom Anderson Farm	015-60703
		Trent Moe	015-71671
		Tom Anderson Farm	015-71688
Meadow Creek	07020008-515	Virgil M. Johnson Farm	083-50024
		Donald J. Delanghe Farm 1	083-87103
		Donald J. Delanghe Farm 1	083-87104
Plum Creek	07020008-516	Port Transitions	083-50007
Dutch Charlie Creek	07020008-517	Reid Miller Farm	033-50001
		Fox Feedlot Inc.	033-60187
		W S Feeders Inc.	033-97997
		Great Plains Family Farms Inc.	101-50005
		Sheteck 5 & 6 Farm	101-88989
Lone Tree Creek	07020008-524	Generation Pork	127-50063

Nonpoint Source Identification: The potential nonpoint sources to the Cottonwood River watershed are described in detail below.

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.

Unsewered communities: Unsewered communities may add bacteria to the Cottonwood River watershed from subsurface sewage treatment systems (SSTS) and stormwater in communities that are not regulated under an MS4 permit. Some of the unsewered communities have been updated in recent years to Midsize Subsurface Sewage Treatment System (MSTS). A MSTS typically addresses the sewage needs of a cluster of residents (between 5,000 and 10,000 gallons per day). Effluents from subsurface sewage treatment systems may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events.

Failing subsurface septic treatment systems (SSTS): Failing septic systems are a potential source of bacteria within the Cottonwood River watershed. 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 (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. MPCA estimated that there are approximately 3,944 SSTS within the Cottonwood River watershed and 1,852 SSTS of the 3,944 SSTS were projected to be failing SSTS (approx. 46%).

Straight pipe septic systems: 'Straight pipe' septic systems are also a potential source of bacteria within the Cottonwood River watershed. Straight pipe systems may contribute bacteria via direct discharge to the surface waters of the watershed. MPCA estimated that 761 SSTS of the 3,994 SSTS (approx. 19%) are straight-pipe systems and are threats to public health. Straight pipe discharges from septics 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.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the Cottonwood 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.

Livestock operations with fewer than 1,000 animal units are not required to attain an NPDES permit. MPCA has estimated approximately, 134,000 total animal units in the Cottonwood River watershed within livestock facilities that do not require permits (pages 34-35 and Table 4.03 of the final TMDL document).

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria directly to the surface 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.

Wildlife: Deer, geese, ducks, raccoons, turkeys, and other animals are recognized as potential contributors of bacteria to the Cottonwood River watershed.

Future Growth:
Significant development is not expected in the Cottonwood River watershed. The land use within the watershed is primarily agricultural and according to MPCA is expected to remain agricultural for the foreseeable future. The WLA and LA for the Cottonwood River bacteria 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 Cottonwood River bacteria TMDLs.

The overall population in the Cottonwood River watershed averaged a loss of approximately 4 % over the past decade. The number of livestock and other animals within the watershed was 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 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.

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 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. Seven of eight segments in the Cottonwood 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 Cottonwood River watershed are:

- Cottonwood River (0702008-501, 0702008-504, 0702008-508) for aquatic recreation impairments;
- Dutch Charlie Creek (0702008-517) for aquatic recreation impairment;
- Meadow Creek (0702008-515) for aquatic recreation impairment;
- Plum Creek (0702008-516) for aquatic recreation impairment; and
- Sleepy Eye Creek (0702008-512) for aquatic recreation impairment.

The Lone Tree Creek segment (07020008-524) was identified by MPCA as 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).

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 bacteria water quality standards which apply to the segments of the Cottonwood River watershed are:

Table 5: 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 fecal coliform water quality target values are stated in Table 5 of this Decision Document for both the geometric mean portion (chronic) and the daily maximum portion (acute), and are applicable from April 1st through October 31st. However, the focus of this TMDL is on 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.

Fecal coliform criteria were used rather than *E. coli*, because the latter criteria were approved during the development of the Cottonwood River TMDL, and much of the data available during the development of the Cottonwood River TMDL were fecal coliform water quality data. When the state revised its standards, a paired comparison study determined *E. coli* to fecal coliform relationships. The results indicated that 126 cfu/100mL of *E. coli* was comparable to 200 cfu/100 mL fecal coliform, and that 1,260 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 mean, 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 Cottonwood River watershed. The geometric mean must be calculated from at least five samples collected within a 30-day period. Based on probability and data distribution, if samples are representative of varying hydrologic conditions, then achieving a geometric mean of 200 cfu/100mL is also expected to result in no more than 10% of individual samples exceeding the 2000 cfu/100mL single sample standard (Section 3.4 of the final TMDL document). MPCA stated that while the TMDL will focus on the geometric mean portion of the water quality standard, compliance is required with both parts of the water quality standard.

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 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 Cottonwood River watershed based on the water quality standards and water quality target values. The Load Duration Curve (LDC) approach was selected by MPCA to calculate TMDLs for bacteria. The LDC approach assigns loadings based on flow.

Fecal coliform TMDLs calculated within the Cottonwood River watershed TMDL were calculated to attain the water quality standard of **200 cfu/100 mL** for all of the aquatic recreational impaired reaches (i.e., -501, 504, -508, -512, -515, -516 and -517). The limited value resource impaired reach (-524) was calculated to attain 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 Cottonwood 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 Cottonwood 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 Cottonwood River watershed, MPCA expressed the total maximum daily load values in organisms per day (org/day).

MPCA used the LDC method to analyze loadings at selected sites within the watershed. Continuous flow data were collected from a nearby USGS streamflow gage (USGS #05317000) on the Cottonwood River near New Ulm, Minnesota. The flow data collected from this streamflow gage focused on dates within the recreation season (April 1 – October 31). Dates outside of the recreation season were excluded from the flow record.

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 Cottonwood River (#05317000) 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 (#05317000)
$A_{ungaged}$	= Drainage area of the ungaged location
A_{gaged}	= Drainage area of the gaged location (#05317000)

In this procedure, the drainage area of each monitoring station (or impaired segment) was divided by the drainage area of USGS gage #05317000. The flows for each of the stations were then calculated by multiplying the USGS gage #05317000 flows by the drainage area ratios. Additional flows were added to certain locations to account for WWTPs that discharge upstream and are not directly accounted for using the drainage area weighting method.

Flow duration curves (FDC) were created for each of the impaired reaches in the Cottonwood River watershed. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at the USGS flow gage in New Ulm, 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. LDCs for the Cottonwood River watershed TMDLs have flow duration interval (percentage of time flow exceeded) on the X-axis and fecal coliform loads (billion of organisms per day) on the Y-axis. The Cottonwood River watershed LDCs used fecal coliform measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow location and the flow conditions observed at that location.

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 determined for the following flow conditions: high flow (> 1,300 cubic feet per second (cfs)), moist flow (273-1300 cfs), mid-range flow (113-272 cfs), dry flow (24-112 cfs) and low flow (<24 cfs) (Table 5.01 of the final TMDL document). Allocation values for each flow regime are developed for the full range of flows in a particular reach for the period of April 1 to October 31.

MPCA completed water quality monitoring in the Cottonwood River watershed basin from 1997-2006 to monitor the concentration of fecal coliform at specific sampling points within the watershed. 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 LDC generated by flow duration and discharge. 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 exceedances 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 BMP that will reduce stormwater runoff and consequently bacteria loading into surface waters.

When allocating the total loading capacity for a specific reach in the Cottonwood River watershed, the sum of all of the reaches contributing (i.e., the upstream headwater areas) to that specific reach was included as part of the summation of that reach's loading capacity. TMDLs were calculated for each flow regime in each of the eight impaired reaches in the Cottonwood 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, multiplied by a conversion factor to equal the allowable maximum daily load in units of billions of organisms per day.

After the TMDL was determined, load apportionments were allocated to the WLA, LA and MOS. The portion of the load that was assigned to WWTPs 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 discharge estimate. For those WWTPs with ponds, the effluent volume equivalent to six inches per day drawdown in the pond system was used to calculate the potential daily discharge estimate. MPCA assumed 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 which had multiple WWTPs upstream of their outlet, MPCA summed daily discharges of those facilities upstream.

The WWTP WLAs 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, in the Lower Cottonwood subwatershed (07020008-501) the percent of land use covered under the New Ulm MS4 permit (MS400228) is 0.287 percent of the subwatershed. Therefore, 0.287 percent of the remaining capacity was assigned to the New Ulm MS4 permit for the Lower Cottonwood subwatershed.

Some of the MS4 WLAs and LAs for specific subwatersheds covered in the Cottonwood River bacteria TMDLs (Table 6 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 Cottonwood River watershed (Section 5.2.1 of the TMDL).

The loading capacities for the low flow regime are 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 #05317000) 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.

Table 6: Bacteria TMDLs for the Cottonwood River Watershed

Flow Regime TMDL analysis 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 %
Meadow Creek (07020008-515)					
Reach Description: Headwaters of Meadow Creek to Cottonwood River					
Bacteria TMDL (billions of bacteria/day)	**753.80**	**200.90**	**63.50**	**19.90**	**5.40**
Wasteload Allocation (WLA): Total	1.30	0.30	0.10	0.00	0.00
MS4 Community: Marshall (MS400241)	1.30	0.30	0.10	<0.1	<0.1
Load Allocation (LA)	470.50	98.40	40.50	8.30	0.30
Margin Of Safety (MOS)	282.00	102.20	22.90	11.60	5.10
Lone Tree Creek (07020008-524)					
Reach Description: T109 R39W S7, westline to Cottonwood River					
Bacteria TMDL (billions of bacteria/day)	**948.27**	**252.67**	**79.97**	**25.07**	**6.80**
Wasteload Allocation (WLA): Total	2.271	2.271	2.271	2.271	2.271
WWTP: Tracy (M0049654)	2.271	2.271	2.271	2.271	2.271
Load Allocation (LA)	591.30	121.90	48.90	8.20	* [1]
Margin Of Safety (MOS)	354.70	128.50	28.80	14.60	*Implicit*
Plum Creek (07020008-516)					
Reach Description: Headwaters of Plum Creek to Cottonwood River					
Bacteria TMDL (billions of bacteria/day)	**687.00**	**183.10**	**57.80**	**18.20**	**5.00**
Wasteload Allocation (WLA): Total	0.00	0.00	0.00	0.00	0.00
Load Allocation (LA)	430.00	90.00	37.00	7.60	0.30
Margin Of Safety (MOS)	257.00	93.10	20.80	10.60	4.70
Dutch Charley Creek (07020008-517)					
Reach Description: Highwater Creek to Cottonwood River					
Bacteria TMDL (billions of bacteria/day)	**1607.55**	**428.55**	**135.65**	**42.75**	**3.05**
Wasteload Allocation (WLA): Total	3.05	3.05	3.05	3.05	3.05
WWTP: Lamberton (MN0023922)	1.514	1.514	1.514	1.514	1.514
WWTP: Storden (MN00522248)	0.397	0.397	0.397	0.397	0.397
WWTP: Westbrook (MN0025232)	1.136	1.136	1.136	1.136	1.136
Load Allocation (LA)	1003.20	207.60	83.80	14.90	* [1]
Margin Of Safety (MOS)	601.30	217.90	48.80	24.80	*Implicit*
Cottonwood River (07020008-504)					
Reach Description: Plum Creek to Dutch Charley Creek					
Bacteria TMDL (billions of bacteria/day)	**3468.40**	**924.40**	**292.20**	**91.80**	**25.00**
Wasteload Allocation (WLA): Total	7.80	6.80	6.60	6.50	6.50
WWTP: Balaton (MN0020559)	0.930	0.930	0.930	0.930	0.930
WWTP: Garvin (MNG580101)	1.630	1.630	1.630	1.630	1.630
WWTP: Revere (MNG580114)	0.140	0.140	0.140	0.140	0.140
WWTP: Walnut Grove (MN0021776)	1.510	1.510	1.510	1.510	1.510
Upstream WWTP contributions	2.290	2.290	2.290	2.290	2.290
Upstream MS4 Community Contribution (Marshall MS4 in subwatershed Meadow Creek (07020008-515))	1.30	0.30	0.10	<0.1	* [1]

Load Allocation (LA)	2163.10	447.50	180.40	31.90	* [1]
Margin Of Safety (MOS)	1297.50	470.10	105.20	53.40	*Implicit*
Cottonwood River (07020008-508)					
Reach Description: Coal Mine Creek to Sleepy Eye Creek					
Bacteria TMDL (billions of bacteria/day)	**6832.70**	**1820.80**	**575.70**	**180.90**	**49.34**
Wasteload Allocation (WLA): Total	17.00	16.00	15.80	15.70	15.70
WWTP: Sanborn (MN0024805)	5.905	5.905	5.905	5.905	5.905
WWTP: Springfield (MN0024953)	0.424	0.424	0.424	0.424	0.424
Upstream WWTP contributions	9.371	9.371	9.371	9.371	9.371
Upstream MS4 Community Contribution (Marshall MS4 in subwatershed Meadow Creek (07020008-515))	1.30	0.30	0.10	<0.1	* [1]
Load Allocation (LA)	4260.00	878.90	352.70	59.90	* [1]
Margin Of Safety (MOS)	2555.70	925.90	207.20	105.30	*Implicit*
Sleepy Eye Creek (07020008-512)					
Reach Description: Sleepy Eye Creek Headwaters to Cottonwood River					
Bacteria TMDL (billions of bacteria/day)	**2114.98**	**563.68**	**178.28**	**55.98**	**15.30**
Wasteload Allocation (WLA): Total	1.38	1.38	1.38	1.38	1.38
WWTP: Clements (MN0023043)	0.189	0.189	0.189	0.189	0.189
WWTP: Lucan (MN0031348)	0.212	0.212	0.212	0.212	0.212
WWTP: Wabasso (MN0025151)	0.852	0.852	0.852	0.852	0.852
WWTP: Wanda (MN0020524)	0.126	0.126	0.126	0.126	0.126
Load Allocation (LA)	1322.40	275.60	112.70	22.00	* [1]
Margin Of Safety (MOS)	791.20	286.70	64.20	32.60	*Implicit*
Cottonwood River (07020008-501)					
Reach Description: Judicial Ditch 30 to Minnesota River					
Bacteria TMDL (billions of bacteria/day)	**10161.50**	**2708.00**	**856.10**	**269.20**	**73.40**
Wasteload Allocation (WLA): Total	40.60	26.20	23.90	22.70	22.40
WWTP: Sleepy Eye (MNG580041)	5.30	5.30	5.30	5.30	5.30
Upstream WWTP contributions	17.10	17.10	17.10	17.10	17.10
MS4 Community: *New Ulm (MS400228)*	16.90	3.50	1.40	0.30	* [1]
Upstream MS4 Community Contribution (Marshall MS4 in subwatershed Meadow Creek (07020008-515))	1.30	0.30	0.10	<0.1	* [1]
Load Allocation (LA)	6319.50	1304.60	524.00	89.90	* [1]
Margin Of Safety (MOS)	3801.40	1377.20	308.20	156.60	*Implicit*

* [1] = WLA for low flow zones is expressed as an equation rather than an absolute number and calculated by multiplying the design flow of the WWTP by the water quality standard (200 cfu/100 mL or 1,000 cfu/100 mL)

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:

(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 7 in this Decision Document summarizes the estimated reductions needed in each reach and by calendar month.

Table 7: MPCA estimated percent reductions for fecal coliform by reach and month, based on monitoring data and sample size cited

Segment Description	Monitoring Information (years monitored)	April	May	June	July	August	September	October
Cottonwood River (07020008-501) : JD 30 to Minnesota River **	1997 - 2006 at 2 sites (n = 78)	S000-139: IND* & S001-918: IND*	S000-139: 0% & S001-918: 0%	S000-139: 0% & S001-918: 87.48%	S000-139: 0% & S001-918: 0%	S000-139: 0% & S001-918: IND*	S000-139: 29.58% & S001-918: IND*	S000-139: 0% & S001-918: IND*
Cottonwood River (07020008-504) : Plum Creek to Dutch Charlie Creek	1997 - 2006 (n = 51)	IND*	0%	80.82%	72.97%	37.50%	38.84%	IND*
Cottonwood River (07020008-508) : Coal Mine Creek to Sleepy Eye Creek	1997 - 2006 (n = 52)	IND*	0%	81.46%	65.22%	85.90%	72.11%	IND*
Sleepy Eye Creek (07020008-512) : Headwaters to Cottonwood River	2000 - 2006 (n = 33)	IND*	0%	43.02%	70.01%	81.41%	54.02%	IND*
Meadow Creek (07020008-515) : Headwaters to Cottonwood River	1997 - 1999, 2007 (n = 55)	0%	21.26%	80.73%	34.43%	55.46%	50.37%	81.41%
Plum Creek (07020008-516) : Headwaters to Cottonwood River	1997 - 2006 (n = 50)	IND*	0%	88.37%	85.80%	72.60%	55.16%	IND*
Dutch Charlie Creek (07020008-517) : Highwater Creek to Cottonwood River	1997 & 2007 (n = 38)	0%	0%	0%	0%	0%	19.02%	43.50%
Lone Tree Creek (07020008-524) : T109 R39W S7, west line to Cottonwood River	1997 & 2007 (n = 43)	0%	0%	0%	57.54%	60.63%	43.02%	72.75%

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 (S000-139 and S001-918). Where results differ between these two stations by month, both results are listed for each station.

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

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. Load allocations were recognized as originating from many diverse nonpoint sources including; urban stormwater and 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, and wildlife and pet sources. 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.

The implementation strategies outlined by MPCA in the Cottonwood River bacteria TMDLs will aid local partners in determining appropriate mitigation strategies for these nonpoint source inputs. Additional sources of information which may be called upon by MPCA to aid in setting mitigation strategies, are field observations made during the collection of water quality monitoring data in 1997-2006. These observations (ex. land use, housing density, location of livestock facilities and proximity to sampling locations) may assist watershed managers in identifying potential nonpoint sources of bacteria. EPA finds the MPCA's approach for calculating the LA 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

[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.

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:
WLA were assigned to WWTPs and MS4 communities within the Cottonwood River watershed. 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 the AUID 07020008-524 subwatershed). 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).

MS4 WLA calculations were made based on the MS4 jurisdictional land within the subwatershed. There are two MS4 communities within the Cottonwood River watershed. The MS4 permit associated with the New Ulm community (MS400228) near the outlet point of the watershed (subwatershed 07020008-501) and the Marshall community (MS400241) near the headwaters of the watershed (subwatershed 07020008-515). Each of these communities received a WLA in the calculation of the TMDL for its subwatershed.

CAFO facilities are present in the Cottonwood River watershed (Table 4 of this Decision Document). CAFO facilities were not given a WLA (WLA = 0 cfu/100 mL). CAFOs and other feedlots are 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).

Straight pipe septic systems are illegal. Straight-pipe septic systems in the Cottonwood River watershed were assigned a '0' WLA (WLA = 0 cfu/100 mL).

EPA finds the MPCA's approach for calculating the WLA for the Cottonwood River bacteria TMDLs to be reasonable.

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:
MPCA provided both explicit and implicit MOS in the Cottonwood 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 LDCs 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 WLAs for WWTFs 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 has 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 waters 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 MOS for the Cottonwood River watershed 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 fecal coliform. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. As stated 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 enough to meet the WQS of 200 cfu/100 mL and 2,000 cfu/100mL for Class 2B waters and 1,000 cfu/100 mL and 2,000 cfu/100 mL for Class 7 waters.

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:
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 water quality standards (*E. coli*) need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized flow measurements from a USGS streamflow gage in New Ulm, Minnesota. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the Cottonwood River watershed and thereby accounted for seasonal variability over the recreation season. TMDL loads were based on sampling that occurred during the recreational season in 1997-2006.

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).

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 Cottonwood River bacteria TMDLs provide reasonable assurance that actions identified in the implementation strategy, as discussed in the TMDL document in Section 10, will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the Cottonwood River watershed. 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 Cottonwood River watershed. Implementation practices will be implemented over the next several years. The local work group of Redwood Cottonwood Rivers Control Area (RCRCA) is composed of: RCRCA technical staff, county representatives, personnel from local Soil and Water Conservation Districts (SWCD), personnel from Natural Resources and Conservation Services (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 Cottonwood 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 and nutrient 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 Cottonwood River watershed. MPCA oversees all regulated MS4 entities (ex. the cities of Marshall & New Ulm) in stormwater management accounting activities. Both MS4 communities in the Cottonwood 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 owners or operators/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 already undertaken, and outline any changes within the SWPPP from the previous year.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. Local watershed partners may apply for funding support through the 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.

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 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. Members of the RCRCA work group will continue to monitor water quality in the Cottonwood 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). Additional monitoring locations within the Cottonwood River watershed may be added to the RCRCA's monitoring responsibilities at that time. The effectiveness of implementation activities will be reevaluated every five years. Modifications to the implementation plan will be evaluated by the RCRCA technical committee.

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results will provide understanding of the success or failure of BMPs systems designed to reduce bacteria loading into the surface waters of the watershed. Local watershed managers will be able to reflect on the progress of the various pollutant removal strategies and will have the opportunity to change course if observed progress is unsatisfactory. Bacteria (*E. coli*) monitoring will be completed annually every five years to evaluate the implementation plan's efficiency.

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 focus of the implementation strategy will be on the reduction of bacteria inputs to surface waters of the Cottonwood River watershed. Local partners will bear the responsibility for managing public lands and waters within the Cottonwood River watershed. MPCA explained that it expects that members of the RCRCA work group will bear the responsibility of working with local stakeholders on BMPs and other implementation efforts.

Members of the RCRCA work group and other contributing stakeholders will be tasked with finding creative adaptive management strategies to meet changing water quality conditions within the watershed. Bacteria inputs occur over all flow conditions. Therefore, it is necessary to employ a variety of stormwater reduction strategies to limit flow and bacteria transport to surface waters (Table 9.01 of the final TMDL document).

Agency partners who participate in the RCRCA work group have received federal Clean Water Act Section 319 funding to implement BMPs for improving water quality. Some of those BMPs include: installation of stream buffers, stream stabilization projects, alternative field tile drains/intakes, grassed waterway projects, and the installation of sediment catch basins. Other methods to reduce the direct conveyance of bacteria to surface waterbodies include the following strategies.

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 and sediment 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 ensure that minimal 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/nutrient management plans: Developing manure management plans to 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.

Sediment reduction practices: Installation of BMPs designed to reduce sediment transport via stormwater will limit the input of bacteria into surface waters. BMPs that intercept stormwater runoff, filter sediments from stormwater, and reroute stormwater, will aid in the reduction of sediment and manure transport via stormwater.

Wastewater treatment facilities: More frequent inspections and maintenance on existing facilities will ensure compliance with NPDES permits. Additionally, disinfection practices (chlorine or ultraviolet radiation) will reduce bacteria inputs from treated wastewater.

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 Cottonwood River watershed.

Urban stormwater: Transitioning unsewered urban areas to areas serviced by storm and sanitary sewers will aid in the reduction of bacteria inputs into surface waters in the Cottonwood River watershed. Installing urban stormwater BMPs to reduce stormwater flows from urban environments will reduce bacteria inputs in the watershed.

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 is found in Section 11 of the final TMDL document. The RCRCA work group hosted 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 granted those in attendance 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 Cottonwood River watershed during the development of the TMDL. These parties also contributed to the development of the implementation discussion within the final TMDL document.

The draft TMDL was posted online by MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period was started on April 25, 2011 and ended on May 25, 2011. 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 adding additional clarifying language to the TMDL document and thoroughly responding to each question and comment provided. The details of these responses are found in Appendix E of the final TMDL submittal. 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 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 waterbody, and the pollutant(s) of concern.

Comment:
The EPA received the final Cottonwood River bacteria TMDL document, submittal letter and accompanying documentation from MPCA on November 4, 2013. The transmittal letter explicitly stated that the final TMDLs for bacteria were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. Those TMDLs include;

- Cottonwood River (0702008-501, 0702008-504, 0702008-508);
- Dutch Charlie Creek (0702008-517);
- Lone Tree Creek (0702008-524);

- Meadow Creek (0702008-515);
- Plum Creek (0702008-516); and
- Sleepy Eye Creek (0702008-512).

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 CFR 130.

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

13. Conclusion

After a full and complete review, the EPA finds that the Cottonwood River bacteria TMDLs satisfy all of the elements of approvable TMDLs. This approval is for **eight (8)** TMDLs, addressing five water bodies for recreational use impairments and one water body for impairments to a limited resource value water. Those TMDLs include;

- Cottonwood River (3 segments: 0702008-501, 0702008-504, 0702008-508) for aquatic recreation impairments;
- Sleepy Eye Creek (1 segment: 0702008-512) for aquatic recreation impairment;
- Meadow Creek (1 segment: 0702008-515) for aquatic recreation impairment;
- Plum Creek (1 segment: 0702008-516) for aquatic recreation impairment;
- Dutch Charlie Creek (1 segment: 0702008-517) for aquatic recreation impairment; and
- Lone Tree Creek (1 segment: 0702008-524) 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.