Revised Regional Total Maximum Daily Load Evaluation of Fecal Coliform Bacteria Impairments In the Lower Mississippi River Basin in Minnesota

Final Report – January 2006

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U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

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Minnesota Pollution Control Agency

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Executive Summary

In 2002, a report titled *Regional Total Maximum Daily Study of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota* was submitted by the Minnesota Pollution Control Agency (MPCA) to the U.S. Environmental Protection Agency (EPA). The purpose of the study and report submittal was to meet requirements of the federal Clean Water Act (CWA) for 20 stream and river reaches in the Lower Mississippi and Cedar river basins that had been listed as impaired for swimming use due to fecal coliform levels that violated Minnesota water quality standards. The study described the magnitude of the problem and provided direction for improving water quality at the listed reaches, as well as in many other streams and rivers that had not been formally assessed but are believed to exhibit similar water quality conditions. The report was approved by the EPA in November 2002, although the approval was challenged by the Minnesota Center for Environmental Advocacy (MCEA). Despite the legal challenge, a wide range of efforts to reduce fecal coliform bacteria levels in the streams and rivers of the basin have been undertaken based on an implementation plan developed subsequent to the study. The 2002 TMDL report and implementation plan are at available at: *http://www.pca.state.mn.us/water/tmdl/index.html#finaltmdl*

In June of 2005, ruling on the legal challenge from the MCEA, the United States District Court for Minnesota remanded the total maximum daily load (TMDL) report to the EPA for revision "in accordance with the requirements of the CWA and the regulations set forth thereunder." Specifics of the order included the following (see Appendix B for complete court order).

- The revised TMDL shall be established at a level necessary to implement the applicable water quality standards for each reach impaired with fecal coliform contamination.
- The revised TMDL shall contain a margin of safety that accounts for lack of knowledge concerning the relationship between effluent limitations and water quality.
- The revised TMDL shall properly account for straight pipe septic systems in the wasteload allocation of the TMDL.
- The State of Minnesota is allowed 90 days from the date of entry of final judgment in this case to give pubic notice of, and to seek comment on, a proposed amended or replacement Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota. In the event that the State of Minnesota does not give public notice of such proposed TMDL within this 90-day period, within 30 days thereafter, EPA shall establish a replacement TMDL for the reaches that have been added to the 303(d) list, consistent with MPCA's representations made at oral argument on this matter.

- The existing SE TMDL shall remain in force and effect pending completion of the recalculated TMDL.

Prior to the court order, the MPCA had been working on revisions in two other areas. First, a number of stream/river reaches have been added to the impaired waters list since the original report. This revised report addresses 39 reaches. Secondly, municipal separate storm sewer systems (MS4's) and livestock facilities that are issued NPDES permits, will be included in the wasteload allocation, rather than the load allocation, portion of the TMDL.

In order to meet the provisions of the court order, the approach in this revised report is somewhat different from that taken in the original. In particular, fecal coliform loading capacities have been calculated for each individual impaired reach, and those capacities are allocated among point sources (wasteload allocation), nonpoint sources (load allocation), and a margin of safety. A loading capacity (i.e. TMDL) is the product of streamflow at each impaired reach and the monthly fecal coliform water quality standard. Five flow zones, ranging from low flow to high flow are utilized, so that the entire range of conditions are accounted for in the TMDL. The loading capacity and allocation vary by impaired reach, and by flow zone for a given reach.

Due to the nature of the court order, this revised TMDL focuses more on the fecal coliform loading capacity and general allocations necessary to meet water quality standards at individual impaired river or stream reaches, than on precise loading reductions that may be required from specific sources. Upon approval of this revised TMDL, a public process for reviewing and updating the current implementation plan, including source-specific load reduction estimates, will be initiated. It is anticipated that many of the current implementation goals and strategies will continue.

The 39 stream reaches listed as impaired for swimming designated use (primary contact recreation) under Section 303(d) of the Clean Water Act are all within the Upper Mississippi River Basin, Lower Portion, and the Cedar River Basin. These river basins are collectively referred to as the Lower Mississippi River Basin in this document.

The Lower Mississippi River Basin in southeastern Minnesota is endowed with a rich variety of landscapes and land uses. Landscapes range from the hills and bluffs of the Driftless Area ecoregion close to the Mississippi River, where land use remains relatively varied and cold-water streams frequently support trout, to the prairie landscape on the western side of the basin which is dominated by row-crop agriculture and hog production. The entire 7,266 square mile region is drained by a network of 11,556 miles of rivers and streams. These streams differ significantly in size, condition of the aquatic environment, and economic uses of the water resource.

The recreational potential offered by the region's rivers and streams is high for such activities as fishing, boating and hiking, but limited by various forms of aquatic and terrestrial habitat degradation. Water quality monitoring over several decades has shown widespread exceedances of state and federal water quality standards throughout the basin

for fecal coliform bacteria. This problem adversely affects the recreational suitability of the area's streams. The sources of this problem number in the thousands and are widely distributed over the rural, suburban, and urban landscape. Sources pertinent to fecal coliform include noncompliant residential septic systems, unprotected feedlots or manured fields, and pet waste that enter surface water through urban stormwater runoff.

1.0 INTRODUCTION AND DISCUSSION OF ASSESSMENT DATA

Section 303(d) of the Clean Water Act (CWA) provides authority for completing Total Maximum Daily Loads (TMDLs) to achieve state water quality standards and/or designated uses. A TMDL is a calculation of the maximum amount of pollutant that a water body can receive and still meet water quality standards and/or designated uses. It is the sum of the loads of a single pollutant from all contributing point and nonpoint sources. TMDLs must include the following eight elements to be approved by the U.S. Environmental Protection Agency (EPA):

The TMDL must:

1. Be designed to implement applicable water quality criteria;
2. Include a total allowable load, as well as individual waste load allocations;
3. Consider the impacts of background pollutant contributions;
4. Consider critical environmental conditions;
5. Consider seasonal environmental variations;
6. Include a margin of safety;
7. Provide opportunity for public participation; and
8. Have a reasonable assurance that the TMDL can be met.

In general, the TMDL is developed according to the following relationship:

$$TMDL = WLA + LA + MOS$$

Where:

TMDL =	Total Maximum Daily Load (may be seasonal, for critical conditions, or other constraints.)
WLA =	Waste Load Allocation (point source)
LA =	Load Allocation (nonpoint source)
MOS =	Margin of Safety (may be implicit and factored into conservative WLA or LA, or explicit.)

Sources that are part of the waste load allocation, with the exception of “straight-pipe” septic systems, are largely controlled through National Pollutant Discharge Elimination System (NPDES) permits. Load allocation sources are controlled through a variety of regulatory and non-regulatory efforts at the local, state, and federal level.

This document provides the information used to develop TMDLs for 39 impaired stream reaches on Minnesota’s 2004 303(d) list that lie within the Lower Mississippi River Basin and the Cedar River Basin within Minnesota. These reaches were listed as impaired for failure to meet their swimming designated beneficial uses due to excessive fecal coliform concentrations. Figure 1 shows these reaches, along with other impairments (e.g. turbidity), and other reaches.

The protocol for this assessment is outlined in MPCA "Listing Methodology" publications found at: http://www.pca.state.mn.us/water/tmdl/index.html#support. The applicable water body classifications and water quality standards are specified in Minnesota Rules Chapter 7050. Minn. R. ch. 7050.0407 lists water body classifications and Minn. R. ch. 7050.0222, subp. 5 lists applicable water quality standards for the impaired reaches. Assessment summary information for the 39 reaches is listed in Table 1.1. The assessment protocol includes pooling of data by month over a 10-year period. Thirty-five of the reaches had two or more months with a least five fecal coliform observations (i.e. water samples). Of these 35 reaches, the geometric mean water quality standard of 200 orgs./100ml was violated in at least two months for all but one reach, where it was violated once. Four reaches did not have any months with five or more fecal coliform observations. However, these reaches were included on the impaired waters list due to violations of the "single sample" standard of 400 or 2000 orgs./100 ml, depending on the surface water classification.

Figures 1.2 - 1.4 are graphical examples of the data used in the assessments for three of the impaired reaches. The highly variable nature of individual fecal coliform observations is apparent (i.e. the need to use logarithmic scaling). Even the geometric mean values vary a great deal between months and among sites. The 2002 TMDL report documented monthly geometric means ranging from less than 200 orgs./100ml to over 2000 orgs./100ml for the stream/river reaches assessed at that time. There are a number of reasons for this variability including weather/climate effects, differences in watershed terrain and land use, the nature and distribution of sources relative to an impaired reach, and the size and other characteristics of the stream or river. Additionally, the data used in the assessments of the 39 impaired reaches came from a variety of monitoring programs. A program more focused on storm event runoff monitoring may tend to produce data with higher fecal coliform concentrations than a program collecting samples on a set or random schedule. Nevertheless, the number of months where the water quality standard is violated (Table 1.1) and the magnitude of violations, suggest serious water quality impairments that will require substantial efforts to remedy. Completion of this revised TMDL should allow clean-up efforts already underway to continue, and may also result in new and different remediation approaches.

Ideally, sufficient data would exist to calculate current actual fecal coliform loads to compare directly to the TMDLs, which would allow for load reduction projections. However, the amount of data required for load calculations is much greater than that required for simple impairment assessment. General reduction estimates are included in the current implementation plan and will be reviewed and possibly revised following approval of this TMDL.

Figure 1.1: Lower Mississippi River Basin Water Quality Impairments

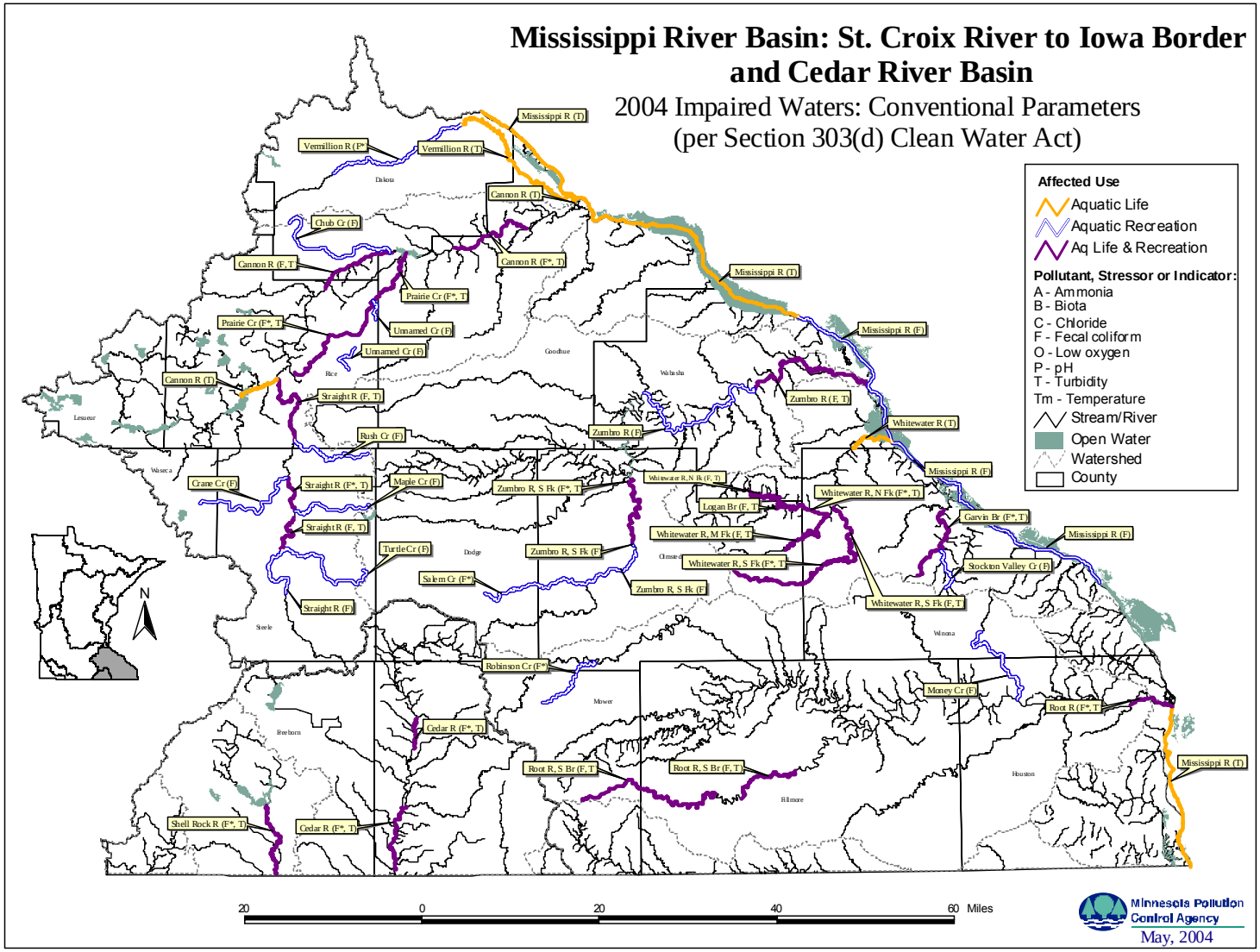


Table 1.1. Lower Mississippi Basin Impaired Reach Descriptions and Assessment Summaries

Impaired Reach	Year Listed	Assessment Unit ID	Reach Length (miles)	Monitoring Stations Used in Assessment	Obs.	# months with ≥ 5 obs.	# months exceeding geometric mean of 200 orgs./100ml	Years of Data
Vermillion River; S Br Vermillion R to the Hastings Dam	96	07040001-506	11.51	Vermillion River 2.7 (MetC), 05346000	322	8	6	85-95
Vermillion River; Below trout stream portion to South Br Vermillion R	94	07040001-507	8.96	S000-896 (VR-32.5), 05345000	84	8	3	83-93
Cannon River; Pine Cr to Belle Cr	94	07040002-502	11.29	S000-003 (CA-13)	73	8	2	83-93
Straight River; Maple Cr to Crane Cr	94	07040002-503	5.43	S000-047 (ST-18)	44	7	6	88-93
Prairie Creek; Headwaters to Cannon R (Lk Byllesby)	94	07040002-504	26.02	S001-186 (PRA-0.5), S001-197 (PRA-1.5), S001-198 (PRA-2.6)	38	2	2	89-93
Rush Creek; Headwaters to Straight R	02	07040002-505	12.41	S000-502	23	3	3	99-00
Cannon River; Northfield Dam to Lk Byllesby inlet	04	07040002-509	10.21	S001-280 (MS318), S001-582	17	0	na	98,01,02
Unnamed Creek; Headwaters to Prairie Cr	02	07040002-512	2.72	S001-240	20	3	3	97-98
Unnamed Tributary to Prairie Creek; Unnamed Cr to Unnamed Cr	02	07040002-513	4.69	S001-246	15	3	3	1998
Straight River; Rush Cr to Cannon R	02	07040002-515	12.68	S003-627	24	4	2	99-00

Impaired Reach	Year Listed	Assessment Unit ID	Reach Length (miles)	Monitoring Stations Used in Assessment	Obs.	# months with ≥ 5 obs.	# months exceeding geometric mean of 200 orgs./100ml	Years of Data
Crane Creek; Headwaters (Watkins Lk) to Straight R	02	07040002-516	15.47	S003-009	26	5	4	99-00
Straight River; CD #25 to Turtle Cr	02	07040002-517	10.45	S001-343	24	4	2	99-00
Turtle Creek; Headwaters to Straight R	02	07040002-518	16.5	S003-628	24	4	4	99-00
Maple Creek; Headwaters to Straight R	02	07040002-519	11.73	S003-011	27	5	4	99-00
Chub Creek; Headwaters to Cannon R	04	07040002-528	19.51	S001-666 (CHB23), S001-670 (CHB3), S001-668 (CHB47), S001-669 (CHBRD)	132	5	5	99-00
Straight River; Turtle Cr to Owatonna Dam	04	07040002-535	7.4	S003-015	11	0	na	00-02
Whitewater River, South Fork; Headwaters to trout stream portion	94	07040003-505	20.37	S000-288 (WWR-26)	74	8	6	83-93
Whitewater River, South Fork; trout stream portion above N Fk Whitewater R	02	07040003-512	11.24	**SWR**: not yet in STORET, from GJohnson spreadsheet	56	3	3	00-02
Whitewater River, Middle Fork; trout stream portion	02	07040003-514	12.1	**MWR**: not yet in STORET, from GJohnson spreadsheet	53	3	3	00-02
Garvin Brook; Class 1B,2A,3B portion	94	07040003-542	13.99	S000-828 (GB-4.5)	74	8	6	83-93

Impaired Reach	Year Listed	Assessment Unit ID	Reach Length (miles)	Monitoring Stations Used in Assessment	Obs.	# months with ≥ 5 obs.	# months exceeding geometric mean of 200 orgs./100ml	Years of Data
Logan Branch; End trout stream portion to North Fk Whitewater R	02	07040003-536	10.1	**LOG**: not yet in STORET, from GJohnson spreadsheet	53	3	3	00-02
Whitewater River, North Fork; Unnamed Cr to Unnamed Cr (below Class 7)	02	07040003-553	7.65	**CSP**: not yet in STORET, from GJohnson spreadsheet	53	3	3	00-02
Whitewater River, North Fk; Unnamed Cr to Mid Fk Whitewater R	96	07040003-554	10.49	05376000	30	2	1	85-93
Stockton Valley Creek; Trout stream portion to Garvin Br	02	07040003-559	6.38	**SVC**: not yet in STORET, from GJohnson spreadsheet	55	3	3	00-02
Zumbro River; West Indian Cr to Mississippi R	04	07040004-501	23.43	S000-816	10	2	2	2002
Zumbro River; Cold Cr to West Indian Cr	04	07040004-502	23.4	S000-818, S000-819, S001-905	29	2	2	2002
Salem Creek; Lower 15 miles (Class 2C portion) to South Fk Zumbro R	94	07040004-503	17.28	S001-191 (SAL-7.2), S001-206 (SAL-9.1), S001-207 (SAL-9.9)	35	3	3	89-93
Zumbro River, South Fk; Cascade Cr to Zumbro Lk	94	07040004-507	12.42	S000-268 (ZSF-5.7)	74	8	3	83-93
Zumbro River, South Fork; Silver Lk Dam to Cascade Cr	04	07040004-533	0.19	S000-334	18	3	3	2001

Impaired Reach	Year Listed	Assessment Unit ID	Reach Length (miles)	Monitoring Stations Used in Assessment	Obs.	# months with ≥ 5 obs.	# months exceeding geometric mean of 200 orgs./100ml	Years of Data
Zumbro River, South Fork; Bear Cr to Oakwood Dam	04	07040004-535	0.53	S002-032	18	3	3	2001
Zumbro River, South Fork; Salem Cr to Bear Cr	04	07040004-536	8.67	S002-033	18	3	3	2001
Root River; Thompson Cr to Mississippi R	94	07040008-501	5.73	S000-065 (RT-3)	73	8	6	83-93
Robinson Creek; Headwaters to N Br Root R	94	07040008-503	10.35	S001-138 (ROB-0.03), S001-189 (ROB-0.15), S001-190 (ROB-0.4)	53	8	5	87-93
Money Creek; End of trout stream portion to Root R	04	07040008-521	16.89	S001-820 (Zephyr), S003-623 (SS-3)	10	0	na	2002
Root River, South Branch; Canfield Cr to Willow Cr	04	07040008-555	11.37	S001-320	18	0	na	99-02
Root River, South Branch; Headwaters to Class 1B,2A,3B	04	07040008-586	25.22	S001-318, S001-539, S001-945	32	3	3	99-01
Cedar River; Rose Cr to Woodbury Cr	98	07080201-501	10.25	S000-136 (CD-10)	62	8	4	86-94
Cedar River; Roberts Cr to Upper Austin Dam	98	07080201-502	4.84	S000-137 (CD-24)	63	8	4	86-94
Shell Rock River; Albert Lea Lk to Goose Cr	94	07080202-501	11.83	S000-084 (SR-1.2)	75	8	8	83-93

Figure 1.2. Assessment Data for Straight River; Maple Creek to Crane Creek (AUID: 07040002-503)

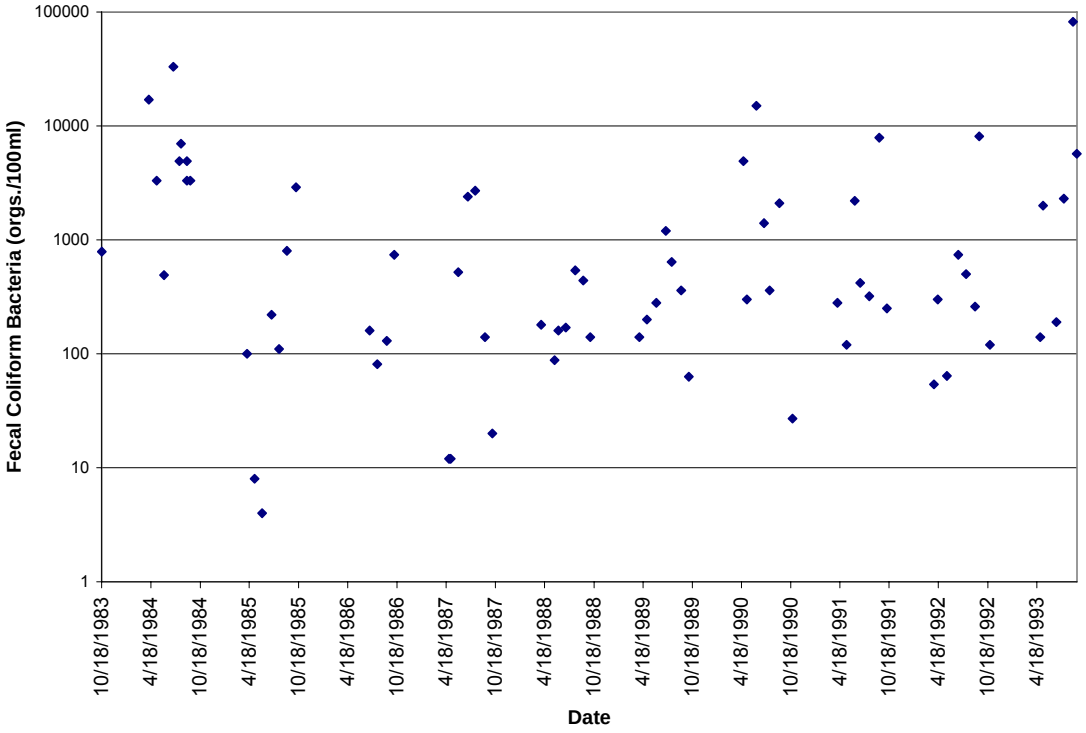


Figure 1.3. Assessment Data for Logan Branch Whitewater River (AUID: 07040003-536)

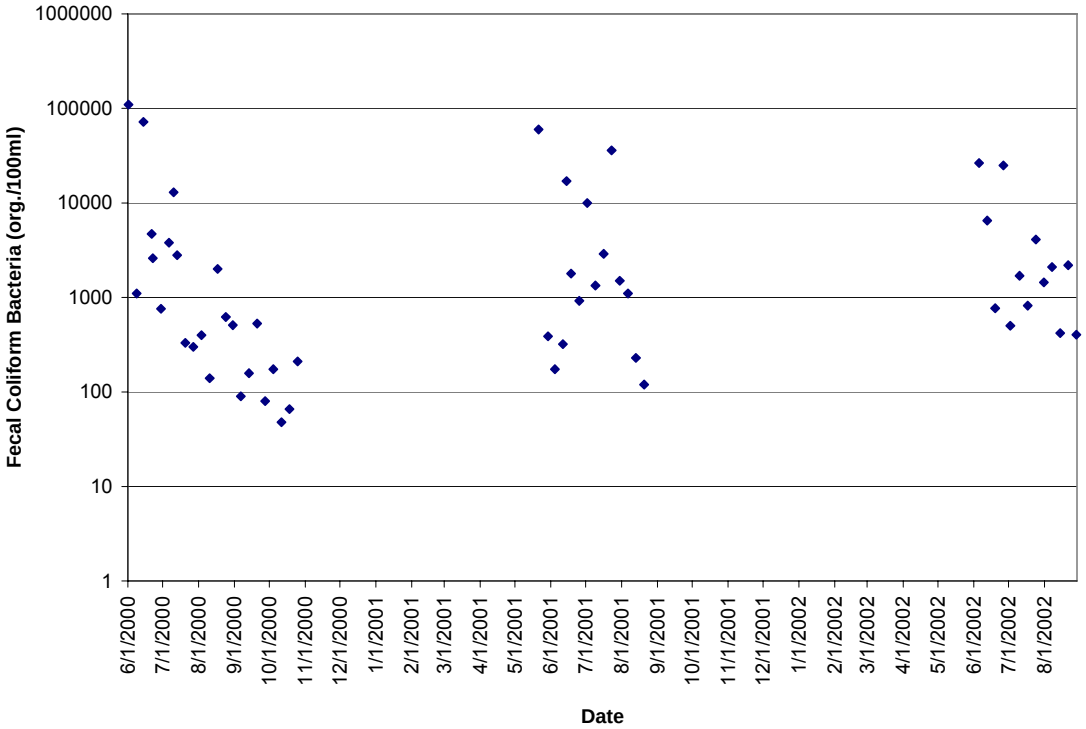
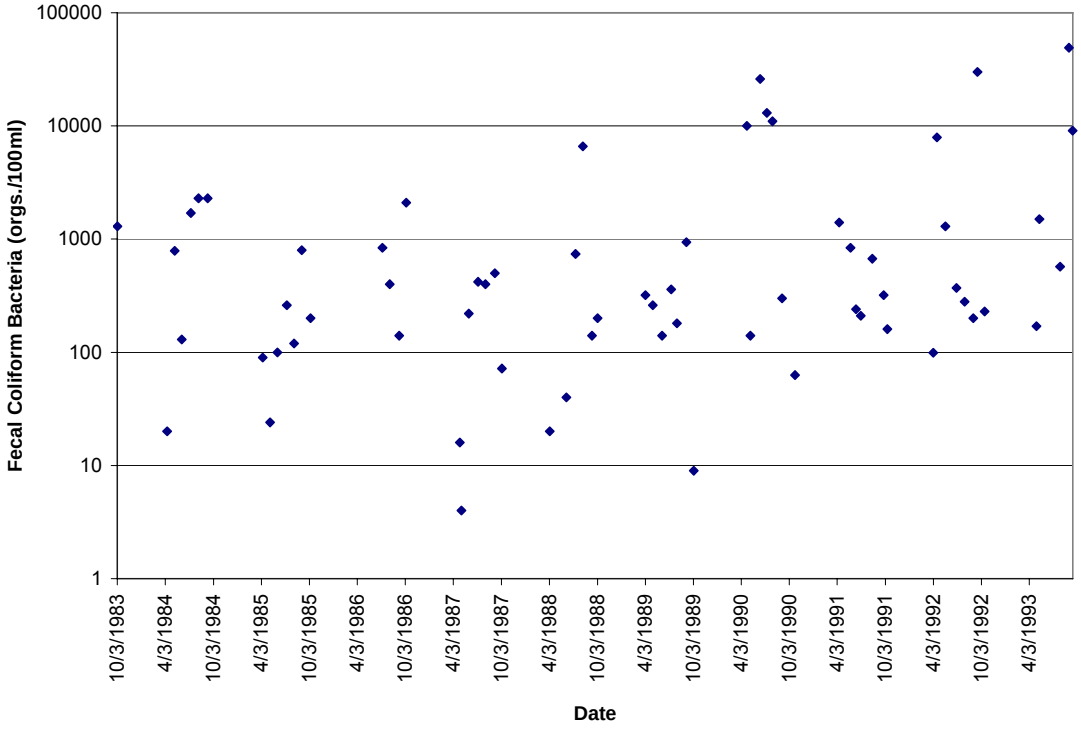


Figure 1.4. Assessment Data for Root River; Thompson Creek to Mississippi River (AUID: 07040008-501**)**



2.0 BASIN CHARACTERISTICS:

The Lower Mississippi River Basin, which includes the Cedar River Basin for planning purposes, is located in southeastern Minnesota. It includes all or part of 17 counties and has 12 major watersheds covering about 7,266 square miles (4,650,100 acres). Land use is diverse. On the western side, lands are primarily cultivated, while the eastern landscapes are dominated by steep forested hill slopes. About two-thirds of the land in the basin is under cultivation, while about 13 percent is forested. Roughly 17 percent of the land use is open or pasture lands. Major agricultural crops include corn, soybeans, and hay. Animal production includes dairy and beef cattle, hogs, sheep and lambs. The total human population of the basin is estimated to be 638,020. Of this total, 77 percent is urban and 23 percent is rural. Major population centers include the southern metropolitan area of Dakota County, in addition to Austin, Albert Lea, Faribault, Owatonna, Rochester, Red Wing, and Winona. These and other urban areas are experiencing rapid population growth and commercial development. Substantial variation among impaired reach watersheds is apparent (Table 2.1). The percent of cultivated land, for example, ranges from less than 50 percent to over 90 percent. Urban and rural developed land comprises between 10 percent and over 30 percent of the South Zumbro and Vermillion watersheds, respectively, but only a few percent of the rest of the watersheds.

Limestone bluffs, springs, caves, and numerous trout streams abound in the eastern basin, where steep topography and erosive soils increase the potential for pollutant runoff and sedimentation of streams. Sinkholes and disappearing streams highlight the close connection between surface water and ground water in this part of the basin. The presence of fractured limestone bedrock lying close below the land surface, which is often referred to as karst topography,[1] presents a widespread risk of ground water contamination in the eastern basin. In the southwestern basin, Mississippi tributaries emerge as small streams out of a prairie landscape once rich in wetlands, but now extensively drained to support a productive agriculture. Further to the north, in the western Cannon River Watershed, remnants of the Big Woods hardwood forest intermingle with mixed crop and livestock farming in a rolling terrain interspersed with lakes and wetlands.

[1] Karst is a geologic term used to describe a landscape created over soluble rock with efficient underground drainage. The underlying rock dissolves over time as surface water percolates through the soil and carbon dioxide from the air and from biological activity in the soil combine with the water. The water and carbon dioxide chemically form a weak carbonic acid that reacts with calcite and dolomite, causing the rock to dissolve slowly to produce joints and cracks.

Table 2.1 Land Use/Land Cover for Lower Mississippi Basin Impaired Reach Watersheds

Impaired Reach (indentation indicates subwatershed) Cult. = Cultivated	Drainage Area (mi^2)	Land Use/Land Cover Percentage					
		Cult.	Grass	Forest	Water/ Wetland	Residential, Urban, Industrial	Other
Cannon River; Pine Cr to Belle Cr	1,386	70	10	12	4	4	
(Prairie Creek; Headwaters to Cannon R (Lk Byllesby))	80	76	10	11	<1	3	
(Unnamed Creek; Headwaters to Prairie Cr)	17	84	11	3	<1	2	
(Unnamed Tributary to Prairie Creek; Unnamed Cr to Unnamed Cr)	13	84	11	3	<1	2	
(Chub Creek; Headwaters to Cannon R)	64	48	31	15	2	4	
Cannon River; Northfield Dam to Lk Byllesby inlet	957	72	10	8	5	5	
Straight River; Rush Cr to Cannon R	461	80	7	6	2	5	
(Rush Creek; Headwaters to Straight R)	22	89	3	6	<1	2	
(Crane Creek; Headwaters (Watkins Lk) to Straight R)	106	81	7	4	4	4	
Straight River; Maple Cr to Crane Cr	252	82	7	5	1	5	
(Maple Creek; Headwaters to Straight R)	38	77	11	5	<1	7	
Straight River; Turtle Cr to Owatonna Dam	204	83	7	5	1	4	
(Turtle Creek; Headwaters to Straight R)	44	82	9	6	1	2	
Straight River; CD #25 to Turtle Cr	135	87	6	4	1	2	
Root River; Thompson Cr to Mississippi R	1,660	60	15	22	<1	3	
(Robinson Creek; Headwaters to N Br Root R)	17	92	5	2	<1	2	
(Money Creek; End of trout stream portion to Root R)	77	36	18	44	<1	2	
Root River, South Branch; Canfield Cr to Willow Cr	143	76	9	13	<1	2	
Root River, South Branch; Headwaters to Class 1B,2A,3B	61	84	8	6	<1	2	
Whitewater River, Middle Fork; trout stream portion	54	69	18	10	<1	2	
Whitewater River, South Fork; trout stream portion above N Fk Whitewater R	93	64	16	15	<1	5	
(Whitewater River, South Fork; Headwaters to trout stream portion)	55	67	18	8	<1	7	
Whitewater River, North Fk; Unnamed Cr to Mid Fk Whitewater R	104	70	17	9	<1	3	
(Logan Branch; End trout stream portion to North Fk Whitewater R)	17	68	23	7	<1	2	
(Whitewater River, North Fork; Unnamed Cr to Unnamed Cr (below Class 7))	20	76	12	10	<1	2	
Garvin Brook; Class 1B,2A,3B portion	49	46	14	37	<1	3	
Stockton Valley Creek; Trout stream portion to Garvin Br	20	48	15	34	<1	2	

Impaired Reach	Drainage Area (mi^2)	Land Use/Land Cover Percentage					
		Cult.	Grass	Forest	Water/ Wetland	Residential, Urban, Industrial	Other
Zumbro River; West Indian Creek to Mississippi River	1,488	67	12	11	<1	5	4
Zumbro River; Cold Cr to West Indian Cr	1,401	67	13	9	<1	6	5
Zumbro River, South Fk; Cascade Cr to Zumbro Lk	349	57	20	8	<1	13	2
Zumbro River, South Fork; Silver Lk Dam to Cascade Cr	260	62	20	7	<1	10	
Zumbro River, South Fork; Bear Cr to Oakwood Dam	239	62	20	8	<1	9	
Zumbro River, South Fork; Salem Cr to Bear Cr	157	68	18	7	<1	6	
Salem Creek; Lower 15 miles (Class 2C portion) to South Fk Zumbro R	62	80	12	5	<1	3	
Cedar River; Rose Cr to Woodbury Cr	544	87	5	4	1	4	
Cedar River; Roberts Cr to Upper Austin Dam	185	89	4	4	<1	3	
Shell Rock River; Albert Lea Lk to Goose Cr	195	76	9	5	4	5	
Vermillion River; S Br Vermillion R to the Hastings Dam	273	52	9	8	4	26	
Vermillion River; Below trout stream portion to South Br Vermillion R	142	43	9	7	9	32	

3.0 DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND ASSESSMENT PROCEDURES

All waters of Minnesota are assigned classes, based on their suitability for the following beneficial uses:

1. Domestic consumption
2. Aquatic life and recreation
3. Industrial consumption
4. Agriculture and wildlife
5. Aesthetic enjoyment and navigation
6. Other uses
7. Limited resource value

All surface waters of the state that are not specifically listed in Chapter 7050 and are not wetlands, which includes most lakes and streams in Minnesota, are classified as Class 2B, 3B, 4A, 4B, 5 and 6 waters. (Minn. R. ch. 7050.0430).

According to Minn. R. ch. 7050.0407, the designated beneficial use for the different use classes is as follows:

> Class 1B: For domestic consumption following approved disinfection, such as simple chlorination or its equivalent.
> Class 2A: Aquatic life support refers to cold water sport or commercial fish and associated aquatic life, and their habitats. Recreation support refers to aquatic recreation of all kinds, including bathing, for which the waters may be usable. Class 2A also is protected as a source of drinking water.
> Class 2B: Aquatic life support refers to cool or warm water sport and commercial fish and associated aquatic life. Recreation support refers to aquatic recreation of all kinds, including bathing.
> Class 2C: Aquatic life support and recreation includes boating and other forms of recreation for which the water may be suitable (i.e., swimming). Class 2C waters may also support indigenous aquatic life, but not necessarily sport or commercial fish.
> Class 3B: General industrial purposes, except for food processing, with only a moderate degree of treatment. Similar to Class 1D waters of the state used for domestic consumption.

Relative to the fecal coliform standard, all of the waters covered in this report are assigned either Class 2A, 2B, or 2C.

3.1 Applicable Minnesota Water Quality Standards

Minn. R. ch. 7050.0222 subp. 4 and 5, fecal coliform water quality standard for class 2B and 2C waters states that fecal coliforms shall not exceed 200 organisms per 100 milliliters

as a geometric mean[2] of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 2,000 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Minn. R. ch. 7050.0222, subp. 2, for Class 2A waters, states that fecal coliforms shall not exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 400 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Minn. R. ch 7050.0221 subp. 2, describes water quality standards for Class 1B waters. Such waters shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the Unites States Environmental Protection Agency (US EPA) as contained in Code of Federal Regulations, title 40, part 141, subparts B and G, and part 143, (1992); except that the bacteriological standards shall not apply.

This TMDL study focuses on 200 organisms/100 ml monthly geometric mean as an environmental endpoint for impaired reaches. Establishing TMDLs to meet the geometric mean of 200 organisms/100mL rather than the no exceedance of either 400 or 2000 (depending on use classification) organisms per 100 mL in more than 10% of single samples is consistent with EPA's recent promulgation of water quality criteria for coastal recreational waters. The preamble of the coastal recreational water rule states: *"the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation"* (EPA, 2004). The same source-reduction measures that are required to attain compliance with the "chronic" standard also will lead to attainment of compliance with the "acute" standard of 2000 or 400 organisms/100ml cited above. The TMDL requires compliance with both parts of the standard.

3.2 Impairment Assessment

Impairment assessment is based on the procedures found at:
http://www.pca.state.mn.us/water/tmdl/index.html#support

> For support of swimming and recreation, the fecal coliform methodology (303(d) listing) is as follows: Data are aggregated over a ten-year period by month and by reach. If the geometric mean of at least five samples for each appropriate month (all years combined) exceeded 200 organisms per 100 ml, that reach was placed on the 1998 303(d) list. In addition, if at least 10 percent of the entire data set for a reach during the ten-year period exceeded 2000 (or 400) organisms per 100 ml,

[2] The term **geometric mean** is used throughout this report to describe fecal coliform data. This statistical function is appropriate for summarizing the central tendency of environmental data that is not normally distributed (Helsel and Hirsch, 1991), which is the case for the fecal coliform data.

then that reach was also placed on the list. The methodology focuses on monthly analysis of the 200 organisms/100 ml standard and brings in the aspect that stream reaches showing a minimum threshold number of high individual values have impaired use and are included on the list.

Tables 1.1 provides summary information on the data used to determine the impairment status of the 39 stream/river reaches included in this report.

3.3: MPCA Non-degradation Policy

Non-degradation is an important component of water quality standards in Minnesota. MPCA policy distinguishes non-degradation for all waters from non-degradation for Outstanding Resource Value Waters (ORVW), as follows:

Minn. R. ch. 7050.0185, subp. 1, Non-degradation for All Waters. The potential capacity of the water to assimilate additional wastes and the beneficial uses inherent in water resources are valuable public resources. It is the policy of the state of Minnesota to protect all waters from significant degradation from point and nonpoint sources and wetland alterations, and to maintain existing water uses, aquatic and wetland habitats, and the level of water quality necessary to protect these uses.

Minn. R. ch. 7050.0180, subp. 1-2. The agency recognizes that the maintenance of existing high quality in some waters of outstanding resource value to the state is essential to their function as exceptional recreational, cultural aesthetic, or scientific resources. To preserve the value of these special waters, the agency will prohibit or stringently control new or expanded discharges from either point or nonpoint sources to outstanding resource value waters. In the Lower Mississippi River Basin, the following water body is designated ORVW: Cannon River from the northern city limits of Faribault to its confluence with the Mississippi River. Both of the Cannon River impaired reaches included in this report fall under the ORVW designation.

4.0 DESCRIPTION OF FECAL COLIFORM BACTERIA AND ITS SOURCES

Certain types of bacteria pose a potential health risk to those who come into contact with surface water. These bacteria come from a variety of sources, including agricultural runoff, inadequately treated domestic sewage, and even wildlife. Some of these bacteria may cause disease. Other potential pathogens (disease-causing agents) from these sources include viruses, protozoa, and worms. Perhaps of greatest concern are bacteria from human feces.

The limitations of available monitoring tools make it difficult to determine whether bacterial contamination in a water body is from human or animal sources. It is, however, possible to determine whether the bacteria originated in the intestinal tract of a mammal. These kinds of bacteria are called fecal coliforms. If fecal coliform bacteria levels exceed state water quality standards, it's an indication that fecal matter is entering the stream in quantities that pose a potential threat to public health.

There are many types of fecal coliform bacteria, and not all of them cause disease in humans, but where there are coliform bacteria there may be pathogens of concern. Thus, widespread violation of the fecal coliform standard in the Lower Mississippi River Basin indicates serious pollution and a possible health *concern*, but it doesn't necessarily mean there is an immediate health *threat* in any particular area.

Bacterial contamination of surface and ground water by antibiotic-resistant micro-organisms has been expressed as a public concern in southeastern Minnesota; however, this issue has not been widely studied and is not addressed in this report. Further work is needed in this area.

The relationship between land use and fecal coliform concentrations found in streams is complex, involving both pollutant transport and rate of survival in different types of aquatic environments. Intensive sampling at several of the sites listed above in southeastern Minnesota shows a strongly positive correlation between stream flow, precipitation, and fecal coliform bacteria concentrations. In the Vermillion River watershed, storm-event samples often showed concentrations in the thousands of organisms per 100 milliliters, far above non-storm-event samples. A study of the Straight River watershed divided sources into continuous (failing individual sewage treatment systems, unsewered communities, industrial and institutional sources, wastewater treatment facilities) and weather-driven (feedlot runoff, manured fields, urban stormwater categories). The study hypothesized that when precipitation and stream flows are high, the influence of continuous sources is overshadowed by weather-driven sources, which generate extremely high fecal coliform concentrations. However, during drought, low-flow conditions continuous sources can generate high concentrations of fecal coliform, the study indicated. Besides precipitation and flow, factors such as temperature, livestock management practices, wildlife activity, fecal deposit age, and channel and bank storage also affect bacterial concentrations in runoff (Baxter-Potter and Gilliland, 1988).

Several studies have found a strong correlation between livestock grazing and fecal coliform levels in streams running through pastures. Several samples taken in the Grindstone River in the St. Croix River Basin, downstream of cattle observed to be in the stream, were found to contain a geometric mean of 11,000 organisms/100 ml, with individual samples ranging as high as 110,000/100ml. However, carefully managed grazing can be beneficial to stream water quality. A study of southeastern Minnesota streams by Sovell, et. al., found that fecal coliform, as well as turbidity, were consistently higher at continuously grazed sites than at rotationally grazed sites where cattle exposure to the stream corridor was greatly reduced. This study and several others indicate that sediment-embededness, turbidity, and fecal coliform concentrations are positively related. Fine sediment particles in the streambed can serve as a substrate harboring fecal coliform bacteria. "Extended survival of fecal bacteria in sediment can obscure the source and extent of fecal contamination in agricultural settings," (Howell et. al., 1996).

Hydrogeologic features in southeastern Minnesota may favor the survival of fecal coliform bacteria. Cold ground water, shaded streams, and sinkholes may protect fecal coliform from light, heat, drying, and predation (MPCA 1999). Sampling in the South Branch of the Root River watershed showed concentrations of up to 2,000 organisms/100 ml coming from springs, pointing to a strong connection between surface water and ground water (Fillmore County 1999 & 2000). The presence of fecal coliform bacteria has been detected in private well water in southeastern Minnesota. However, many such detections have been traced to problems of well construction, wellhead management, or flooding, not from widespread contamination of the deeper aquifers used for drinking water. One study from Kentucky showed that rainfall on well-structured soil with a sod surface could generate fecal coliform contamination of the shallow ground water through preferential flow (McMurry *et. al*., 1998).

Finally, fecal coliform survival appears to be shortened through exposure to sunlight. This is purported to be the reason why, at several sampling sites downstream of reservoirs, fecal coliform concentrations were markedly lower than at monitoring sites upstream of the reservoirs. This has been demonstrated at Lake Byllesby on the Cannon River and the Silver Creek Reservoir on the South Branch of the Zumbro River in Rochester.

Despite the complexity of the relationship between sources and in-stream concentrations of fecal coliform, the following can be considered major source categories:

Wastewater Treatment Facilities

The great majority of the urban population in the Lower Mississippi River basin is served by centralized sewage treatment, which includes disinfection at the final treatment stage. All permitted wastewater treatment facilities are required to monitor their effluent

to ensure that concentrations of specific pollutants remain within levels specified in the discharge permit. Effluent limits require that fecal coliform concentrations remain below 200 organisms per 100 milliliters from April 1 through October 31. This is accomplished through disinfection of the wastewater at the final treatment stage, through chlorination or equivalent processes. The MPCA regularly reviews the Discharge Monitoring Reports from wastewater treatment facilities to determine whether permit violations have occurred. The previous TMDL study found relatively few violations. This was confirmed in a review of information for 2004 and 2005.

Emergency bypasses at wastewater treatment facilities are an occasional source of bacteria and other pollutants. These bypasses are also referred to as sanitary sewer overflows (SSO's). Wastewater treatment plants and sanitary sewer systems are designed to handle at least 100 gallons of water per person per day, as well as the additional flow generated by commercial and industrial establishments. If the amount of water entering a system exceeds the design capacity of the system, some of the untreated wastewater is discharged to the environment. This event is called a bypass because the wastewater has bypassed part or all of the treatment process. Efforts to minimize or eliminate wastewater bypasses are managed through the NPDES program.

As part of the previous TMDL, wastewater treatment facility reports for 2001 were examined to identify cities where one or more bypasses had occurred. In calendar year 2001, 24 cities in the Lower Mississippi River Basin reported one or more bypasses. Most of these cities (21) experienced bypasses one or two times. These were judged to be isolated occurrences triggered by extreme rainfall events, particularly flooding that occurred early in May and June. As such, bypasses are not expected to reoccur at these facilities unless caused by extreme weather and flooding.

For three of the cities, bypasses occurred three or more times, signifying structural problems that needs to be corrected. The most common structural problem contributing to wastewater bypasses is inflow and infiltration into the wastewater collection system. This problem can be compounded by limited hydraulic capacity at the wastewater treatment facility. Based on these criteria, three cities were considered to have a chronic bypass problem: Claremont, Kasson, and West Concord. Each of these cities has upgraded their wastewater treatment facilities since 2001 and no longer have chronic bypass problems. A review of information for 2004 and 2005 revealed no facilities with chronic bypass issues.

No facilities in the basin are known to currently have combined storm and sanitary sewer systems, which may lead to combined sewer overflow (CSO) discharges to surface waters. The City of Red Wing on the Mississippi River did correct such interconnections several years ago.

Livestock Facilities with NPDES Permits

The MPCA currently uses the federal definition of a Concentrated Animal Feeding Operations (CAFO) in its regulation of animal feedlots. In Minnesota, the following types of livestock facilities are issued, and must operate under, a National Pollutant Discharge Elimination System (NPDES) permit: a) all federally defined (CAFOs), some of which are under 1000 animal units in size; and b) all CAFOs and non-CAFOs which have 1000 or more animal units.

There are presently 137 livestock facilities or feedlots operating under NPDES permits in the Lower Mississippi River Basin of Minnesota; 103 within the impaired reach watersheds covered in this report. These feedlots must be designed to totally contain runoff, and manure management planning requirements are more stringent than for smaller feedlots. In accordance with the State of Minnesota's agreement with EPA, CAFO's with state-issued General NPDES permits must be inspected twice during every five year permitting cycle and CAFO's with state issued Individual NPDES permits are inspected annually.

The vast majority of livestock facilities in the Lower Mississippi River Basin in Minnesota are not CAFO's subject to NPDES permit requirements. Nevertheless, they are subject to state feedlot rules which include provisions for registration, inspection, permitting, and upgrading. Much of this work is accomplished through delegation of authority from the state to county government.

Individual Sewage Treatment Systems

Of the rural population of the Lower Mississippi River basin, an estimated 65,314 – or 44 percent – have inadequate treatment of their household wastewater. This includes individual residences and unsewered communities, both incorporated and unincorporated. Nonconforming septic systems are considered to be an important source of fecal coliform bacteria, particularly during periods of low precipitation and runoff when this continuous source may dominate fecal coliform loads. Unsewered or undersewered communities include older individual systems that are generally failing, and/or collection systems that discharge directly to surface water. This may result in locally high concentations of wastewater contaminants in surface water, including fecal coliform bacteria, in locations close to population centers where risk of exposure is relatively high.

The court decision leading to this revised TMDL included the following language related to septic systems that discharge directly to surface waters:

"MCEA describes a straight pipe septic system as a system of disposing untreated sewage directly via a pipe to rivers, lakes, drain tiles, or ditches. Such systems are illegal pursuant to Minnesota Statute. Minn. Stat. §§ 115.55 and 115.56."

The MPCA concurs that these are illegal and un-permitted systems, and would expand the definition slightly to include partially treated, as well as untreated, sewage. The majority of these systems likely have some form of rudimentary settling which may provide partial, but inadequate, treatment. The Minnesota Rules Chapter 7080 definition of septic systems posing an imminent threat to public health or safety includes "surface or surface water discharges and sewage backup into a dwelling or other establishment." Straight pipe septic systems clearly meet this definition.

An MPCA evaluation for the Minnesota River Basin suggests that improper Individual Sewage Treatment Systems (ISTS) may be responsible for approximately 74 fecal coliform bacteria organisms per 100 milliliter sample within larger rivers. [3] However, transport and survival of fecal coliform bacteria are not well understood, particularly as they are affected by the interaction of surface and ground water flows in the karst geology found throughout the Lower Mississippi Basin.

Livestock Manure

Runoff from livestock feedlots, pastures, and land application areas has the potential to be a significant source of fecal coliform bacteria and other pollutants. There is considerable spatial variation in the type and density of livestock across the basin.

Swine accounts for the major share of livestock animal units in several counties in the west and south-central part of the basin: Freeborn, Mower, Steele, and Waseca Counties. Swine facilities tend to confine livestock under a roof, with a pit for liquid manure beneath a slated floor. Thus, feedlot runoff tends not to be a common occurrence with most facilities, but land application of manure can be a major source of nonpoint pollution runoff. Liquid swine manure is commonly incorporated into the soil during, or shortly after, land application. This greatly reduces the pollution for bacteria runoff

Dairy and beef cattle predominate livestock numbers in the eastern and, especially, the southeastern counties, including Wabasha, Winona, Fillmore, Goodhue, Houston, and Olmsted Counties. The majority of cattle operations are relatively small, with open feedlots, presenting the potential for polluted runoff much of the year. Considerable grazing of cattle still occurs in the eastern basin. Where over-grazing occurs, serious erosion and manure runoff can result. This includes grazing of woodland, which can result in severe erosion. However, properly managed pasture can increase infiltration of precipitation into the soil profile, reducing runoff and improving water quality.
In Dakota, Rice, and Dodge Counties, livestock are about evenly divided between swine and cattle. For a number of reasons, cattle manure is generally less likely to be incorporated into the soil than swine manure. Manure that is not incorporated has a higher potential for runoff.

[3] David Morrison, "Contributions from Septic Systems and Undersewered Communities," presented at Bacteria in the Minnesota River , Mankato, Minnesota, Feb 16, 1999

Rice, Steele, Dodge, and Olmsted counties have a significant amount of poultry production, accounting for around 10% of the total animal units in these counties. While there is little runoff potential from the enclosed poultry facilities themselves, open stockpiling of poultry manure is a common practice. These stockpiles, as well as land application areas, are potential sources of bacteria runoff.

Urban and Rural Stormwater

Untreated stormwater from cities, small towns, and rural residential or commercial areas can be a source for many pollutants including fecal coliform bacteria and associated pathogens. Fecal coliform concentrations in urban runoff can be as great or greater than those found in cropland runoff, and feedlot runoff (USEPA 2001). Sources of fecal coliform in urban and residential stormwater include pet and wildlife waste that can be directly conveyed to streams and rivers via impervious surfaces and storm sewer systems. Newer urban development often includes stormwater treatment in the form of such practices as sedimentation basins, infiltration areas, and vegetated filter strips. Several communities within the watersheds of the impaired reaches included in this report are required to obtain Municipal Separate Storm Sewer System (MS4) permits. These permits require a range of actions that will ultimately reduce the impact of stormwater from these communities on downstream water bodies. Smaller communities or even rural residences not covered under MS4 permits may still need to take action to reduce stormwater, and associated bacteria, runoff.

5.0 LOAD ALLOCATIONS (LA), WASTELOAD ALLOCATIONS (WLA), and MARGINS OF SAFETY (MOS)

5.1 Approach to Allocations Needed to Satisfy the TMDLs

The TMDLs developed for the 39 reaches in this report consist of three main components; WLA, LA, and MOS as defined in section 1.0. The WLA includes four sub-categories: permitted wastewater treatment facilities; communities subject to Stormwater MS4 NPDES permit requirements; livestock facilities requiring NPDES permits, and "straight pipe" septic systems. The LA, reported as a single category includes manure runoff from farm fields, pastures, and smaller non-NPDES-permitted feedlots, runoff from smaller non-MS4 communities, and fecal coliform contributions from wildlife. The LA includes land-applied manure from livestock facilities requiring NPDES permits, provided the manure is applied in accordance with the permit. The third component, MOS, is the part of the allocation that accounts for uncertainty that the allocations will result in attainment of water quality standards.

The three TMDL components (WLA, LA, and MOS) were calculated as total monthly loads of fecal coliform organisms. Two different approaches were evaluated for expressing the monthly fecal coliform loads: 1) the number of fecal coliform organisms per month for each month from April to October; and 2) the number of fecal coliform organisms per month for a each of series of five flow zones ranging from low flow to high flow. Respectively, these are referred to as the monthly approach and the duration curve approach. Both approaches utilize long-term flow records from 14 current and historical U.S. Geological Survey gage stations located throughout the Lower Mississippi basin (Appendix A). Flow values from the most appropriate USGS site were normalized for the contributing drainage areas of each of the 39 impaired reaches.

One advantage of the monthly approach is its direct correspondence to the monthly period of the fecal coliform standard as it is written in Minnesota water quality rules. A second advantage may be the potential for easier communication to the public. However, this approach required selecting specific flows to represent each month. While monthly "average" flows can be calculated from any given period of record, they do not represent the full range of monthly flows that may be observed over many years. Allocations based on average monthly flows will ensure that water quality standards are achieved at or above the average flow, but not at lower flows. If a minimum monthly flow is chosen, allocations set to achieve standards for this volume of water will be overprotective at all higher flows, raising question about attainability of the allocations, particularly at higher flows where fecal coliform loads are dominated by surface runoff.

To overcome the apparent arbitrariness involved in making decisions on monthly flow values, and in concurrence with USEPA recommendations (Appendix D), the duration curve approach was chosen. Under this approach, allocations for each listed stream reach are developed for the full range of flows experienced during the April 1 – Oct 31 period of the fecal coliform standard. By adjusting the wasteload allocation, load

allocation and margin of safety to a range of five discrete flow intervals at each reach, a closer correspondence is obtained between the (flow-specific) loading capacity and the TMDL components (WLA + LA + MOS), at the range of flow conditions experienced historically at each site. This approach also makes it possible to relate fecal coliform sources to allocations more specifically. For example, continuous discharges such as failing ISTS will be more prominent at lower flows, and manure runoff will be more prominent at higher flows. This kind of distinction is easier to make with the duration curve approach than with a monthly approach.

A more complete presentation of the two different approaches for expressing fecal coliform load is provided in Appendix A. In particular, Figure A-4 provides an example (for the Vermillion River) of the relationship between monthly flows and flow zones, and how the complete range of monthly flows is encompassed in the five flow zones.

The fecal coliform loading expression utilized for the TMDLs contained in this report is *organisms per month,* which are shown for each of a range of five flow intervals at each impaired reach. For a given impaired reach, flow-specific loading capacities were obtained by multiplying the median flow of each of five flow zones by the geometric mean water quality criterion of 200 organisms per 100 ml. This generally produces loading capacities in the trillions of organisms per month (tera- or T-org/month).

For each impaired reach and flow condition, the total loading capacity (TMDL) was divided into its component wasteload allocation, load allocation, and margin of safety (MOS). The process was as follows:

WASTELOAD ALLOCATION

- Wastewater treatment facility (WWTF) allocations were calculated by multiplying wet-weather design flows for all facilities in an impaired reach watershed by the permitted discharge limit (200 organisms per 100ml) that applies to all WWTFs. As long as WWTFs discharge at or below this permit limit, they will not cause violations of the fecal coliform water quality standard regardless of their fecal coliform load.
- A number of smaller NPDES-permitted WWTF's are stabilization ponds systems. Unlike the larger (and some smaller) mechanical treatment systems which have continuous discharges, pond systems typically discharge over a 1-2 week period in the spring and in the fall. Because the discharge volumes from these pond systems are small, and to provide an extra margin of safety in the event they needed to discharge outside of the spring or fall window, the WWTF wasteload allocation assumed that these facilities could discharge for an entire month under any flow conditions.
- Straight-pipe septic systems are illegal and un-permitted, and as such are assigned a zero wasteload allocation.
- Since wet-weather design flows represent a "maximum" flow for a facility, the WWTF allocations are conservative in that they are substantially greater than what is actually required.

- For two of the impaired reaches (Vermillion and Shell Rock Rivers) WWTF design flows exceed minimum stream flow for the low and dry flow zones. For the lower reach of the Vermillion, this also occurred for the low flow zone when MOS was considered. Of course, actual WWTF flow can never exceed stream flow as it is a component of stream flow. To account for these three unique situations only, the wasteload and load allocations are expressed as an equation rather than an absolute number. That equation is simply:

  Allocation = (flow contribution from a given source) **X (**200 orgs./100ml.)

  In essence, this amounts to assigning a concentration-based limit to MS4 communities and nonpoint source load allocation sources. While this might be seen as quite stringent, these sources tend not to be significant contributors under dry and low flow conditions. The contribution of fecal coliform from straight-pipe septic systems could be substantial under these conditions; however these systems are still assigned a zero allocation, as are livestock facilities with NPDES permits.
- Livestock facilities that have been issued NPDES permits are assigned a zero wasteload allocation. This is consistent with the conditions of the permits, which allow no pollutant discharge from the livestock housing facilities and associated site. Discharge of fecal coliform from fields where manure has been land applied may occur at times. Such discharges are covered under the load allocation portion of the TMDLs, provided the manure is applied in accordance with the permit.
- The WWTF allocation and MOS were subtracted from the total loading capacity. The remaining capacity was divided between municipal separate storm sewer system (MS4) permits (wasteload allocation) and all nonpoint sources (load allocation) based on the percentage of land in an impaired reach watershed covered by MS4 permits. For example, if 10% of an impaired reach watershed is covered by one or more MS4 permits, 10% of the remaining capacity is allocated to those permits. In addition to being a practical way to allocate between MS4 permits and all other nonpoint sources, it is also equitable from the standpoint of rural and urban fecal coliform sources being held to the same “standard.”

MARGIN OF SAFETY

- Margins of safety (MOS) were calculated based on the difference between the median flow and minimum flow in each zone as described in appendix A. For the low flow zone, this reflects the lowest monthly April-October flow observed over the past 30 years (or period of record if less than 30 years) at the specific USGS site used to develop allocations for each impaired reach.
- The purpose of the MOS is to account for uncertainty that the allocations will result in attainment of water quality standards. Because the allocations are a direct function of monthly flow, accounting for potential flow variability is the appropriate way to address the MOS. This is done within each of 5 flow zones.

As stated above, the absolute minimum monthly flows over long periods of record at the USGS gage sites define the MOS for the low flow zone.

LOAD ALLOCATION

- Once the WLA and MOS were determined for a given reach and flow zone, the remaining loading capacity was considered load allocation. The load allocation includes nonpoint pollution sources that are not subject to NPDES permit requirements, as well as "natural background" sources such as wildlife. The nonpoint pollution sources are largely related to livestock production, inadequate human wastewater treatment, and municipal stormwater systems. Portions of the latter two sources, straight-pipe septic systems and communities covered by MS4 NPDES permits, are included in the wasteload allocation.

5.2 TMDL Allocations for Individual Impaired Reaches

5.21 Cannon River, Pine Creek to Belle Creek (AUID: 07040002-502)

The 11-mile reach of the Cannon River from Pine Creek to Belle Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 1,386 square miles. This represents over 90% of the entire Cannon River watershed. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (70%), but exhibits a relatively high percentage water and wetlands (4%) which are located primarily in the western portion of the Cannon River watershed upstream of the confluence with the Straight River. The watershed includes 14 communities and a highway rest area served by permitted wastewater treatment facilities (Table 5.21A); and 32 livestock facilities that have been issued NPDES permits (Table 5.21B). Approximately 24,000 acres, or 3% of the watershed, will require coverage under MS4 permits. This includes the cities of Faribault, Owatonna, Northfield, and Waseca (Table 5.21C). An additional 1% of the watershed area contains smaller towns and rural residences.

Table 5.21D describes the monthly fecal coliform loading capacities for this reach of the Cannon River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities for five flow zones were developed using flow data from the USGS gage site on the Cannon River at Welch as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations. It is possible that Lake Byllesby, as well as other lakes and wetlands in the upper Cannon watershed, function to reduce downstream bacteria loading. As such, some focus on sources downstream of Lake Byllesby may lead to greater water quality improvements on the impaired reach.

Table 5.21A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Cannon Falls WWTP	MN0022993	0.92	0.21
Dennison WWTP	MN0022195	0.029	0.01
Ellendale WWTP	MN0041564	0.1003	0.02
Elysian WWTP	MN0041114	0.0186	0.004
Faribault WWTP	MN0030121	7	1.59
Geneva WWTP	MN0021008	0.069	0.02
Kilkenny WWTP	MNG580084	0.0228	0.01
Lonsdale WWTP	MN0031241	0.2418	0.05
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002

Medford WWTP	MN0024112	0.09	0.02
Morristown WWTP	MN0025895	0.21	0.05
Nerstrand WWTP	MN0065668	0.042	0.01
Northfield WWTP	MN0024368	5.2	1.18
Owatonna WWTP	MN0051284	5	1.14
Waterville WWTP	MN0025208	0.271	0.06
Totals		19.22	4.37

Table 5.21B. Livestock Facilities with NPDES Permits

Facility	**ID Number**	**Description**
Matthew Hanson Farm	131-104880	3,300 Swine - 55 lbs. or More
Fern Peterson Farm	049-73087	100,000 Turkeys
Hovel Farms - Sec 33	049-82020	2,600 Swine - 55 lbs. or More
Randall S Rauk Farm	049-50008	3,300 Swine - 55 lbs. or More
Scott Gustafson Farm	049-50005	4,440 Swine - 55 lbs. or More
Tim and Marvin D Donkers Farm	049-72775	2,800 Swine - 55 lbs. or More
Gibbs Farms Inc	079-80335	4,000 Swine - 55 lbs. or More
Koppelman Farm's Inc	079-50006	3,300 Swine - 55 lbs. or More
MN Dak Farms	079-66313	2,500 Swine - 55 lbs. or More
Eastgate Farms - Sec 32 - Main	131-93622	99,000 Turkeys
Jennie-O Turkey Store - Lakeview	131-93683	211,800 Chickens - broilers,
Jennie-O Turkey Store - Valleyview	131-50007	78,000 Turkeys
Kent Holden Farm	131-93843	4,730 Swine - 55 lbs. or More
Jennie-O Turkey Store - Hillcrest Farm	131-50006	144,000 Turkeys
Ahlman Hog Farm Sec 11	147-50002	4,000 Swine - 55 lbs. or More
Heers Family Farm	147-50006	4,000 Swine - 55 lbs. or More
Jennie-O Turkey Store - Merton Farm	147-50008	144,000 Turkeys
Steven Jaster Farm	147-50005	4,000 Swine - 55 lbs. or More
Charles Zimmerman Farm - Sec 15	131-93142	230,000 Chickens - broilers,
Holden Farms - Fallbro - Sec 17	131-93606	216,000 Chickens - broilers,
Holden Farms Inc - Fallingbrook Facility	131-50005	60,000 Turkeys
P & J Products Co - Site III	131-50004	73,500 Turkeys
Bruce Peterson Farm - Sec 34	131-93620	2,280 Swine – 55 lbs. or More + some beef and dairy
Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More
Brian J Kosel Farm - Sec 23	147-92323	2,720 Swine - 55 lbs. or More
Jennie-O Turkey Store - Deerfield Farm	147-50007	144,000 Turkeys
Wingspan LLP	161-50012	7,200 Swine - 55 lbs. or More
Woodville Pork	161-50011	2,400 Swine – 55 lbs. or More 1,800 Swine – under 55 lbs.

Table 5.21C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Faribault	20,818	Designated by rule; > 10,000 population
Owatonna	22,434	Designated by rule; > 10,000 population
Northfield	17,147	Designated by rule; > 10,000 population
Waseca	8,493	Designated by rule; > 10,000 population and within ½ mile of an impaired water (Clear Lake)

Table 5.21D. Monthly Fecal Coliform Loading Capacities and Allocations - Cannon River, Pine Creek to Belle Creek (AUID: 07040002-502)

Drainage Area (square miles): 1,386 USGS gage used to develop flow zones and loading capacities: Cannon River at Welch % MS4 Urban: 3% Total WWTF Flow (mgd): 19.2238	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	395.39	143.11	66.89	31.63	14.55
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4.37	4.37	4.37	4.37	4.37
Communities Subject to MS4 NPDES Requirements	6.86	2.52	1.12	0.39	0.15
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	247.07	90.61	40.16	14.14	5.42
Margin of Safety	137.10	45.62	21.25	12.73	4.61
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.1%	3.1%	6.5%	13.8%	30.0%
Communities Subject to MS4 NPDES Requirements	1.7%	1.8%	1.7%	1.2%	1.0%
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	62.5%	63.3%	60.0%	44.7%	37.3%
Margin of Safety	34.7%	31.9%	31.8%	40.2%	31.7%

5.22 Prairie Creek, Headwaters to Cannon River (Lake Byllesby) (AUID: 07040002-504)

The entire 26-mile length of Prairie Creek, a tributary of the Cannon River that flows into Lake Byllesby near Cannon Falls, was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 80 square miles, encompassing land in both Rice and Goodhue counties. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (76%). The watershed includes one community (Dennison) served by a permitted wastewater treatment facility (Table 5.22A); and five livestock facilities that have been issued NPDES permits (Table 5.22B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.22C).

Table 5.22D describes the monthly fecal coliform loading capacities for Prairie Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities for five flow zones were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.22A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Dennison WWTP	MN0022195	0.029	0.01

Table 5.22B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Charles Zimmerman Farm - Sec 15	131-93142	230,000 Chickens - broilers,
Holden Farms - Fallbro - Sec 17	131-93606	216,000 Chickens - broilers,
Holden Farms Inc - Fallingbrook Facility	131-50005	60,000 Turkeys
P & J Products Co - Site III	131-50004	73,500 Turkeys
Bruce Peterson Farm - Sec 34	131-93620	2,280 Swine – 55 lbs. or More + some beef and dairy

Table 5.22C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.22D. Monthly Fecal Coliform Loading Capacities and Allocations - Prairie Creek, Headwaters to Cannon River (Lake Byllesby) (AUID: 07040002-504)

Drainage Area (square miles): 80 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.029	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	29.65	13.31	6.22	2.36	0.87
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.01	0.01	0.01	0.01	0.01
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	22.10	8.41	4.06	1.11	0.41
Margin of Safety	7.54	4.89	2.15	1.24	0.45
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.1%	0.3%	0.8%
Communities Subject to MS4 NPDES Requirements	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	74.5%	63.2%	65.3%	47.2%	47.5%
Margin of Safety	25.4%	36.7%	34.6%	52.5%	51.7%

5.23 Unnamed Creek, Headwaters to Prairie Creek (AUID: 07040002-512)

Prairie Creek, a tributary of the Cannon River that flows into Lake Byllesby near Cannon Falls, was added to the Section 303(d) Clean Water Act impaired waters list in 1994. This 3-mile unnamed tributary to Prairie Creek was added to the list in 2002. The primary source of data that led to this listing was a fecal coliform special study conducted by the MPCA in 1997 and 1998 (Markus, 1999). Figure 1.1 shows two unnamed tributaries to Prairie Creek; this tributary is north (closer to Lake Byllesby) of the other, and straddles the Rice/Goodhue county line.

The drainage area to the downstream end of this impaired reach is 17 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (84%). The watershed includes one community (Dennison) served by a permitted wastewater treatment facility (Table 5.23A); but no livestock facilities have been issued NPDES permits (Table 5.23B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.23C).

Table 5.23D describes the monthly fecal coliform loading capacities for this Unnamed Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.23A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Dennison WWTP	MN0022195	0.029	0.01

Table 5.23B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.23C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.23D. Monthly Fecal Coliform Loading Capacities and Allocations - Unnamed Creek, Headwaters to Prairie Creek (AUID: 07040002-512)

Drainage Area (square miles): 17 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.029	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	6.53	2.93	1.37	0.52	0.19
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.01	0.01	0.01	0.01	0.01
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	4.86	1.84	0.89	0.24	0.08
Margin of Safety	1.66	1.08	0.47	0.27	0.10
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.1%	0.2%	0.5%	1.3%	3.5%
Communities Subject to MS4 NPDES Requirements	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	74.5%	62.9%	65.2%	46.8%	43.9%
Margin of Safety	25.4%	36.9%	34.3%	51.9%	52.6%

5.24 Unnamed Tributary, Headwaters to Prairie Creek (AUID: 07040002-513)

Prairie Creek, a tributary of the Cannon River that flows into Lake Byllesby near Cannon Falls, was added to the Section 303(d) Clean Water Act impaired waters list in 1994. This 5-mile unnamed tributary to Prairie Creek was added to the list in 2002. The primary source of data that led to this listing was a fecal coliform special study conducted by the MPCA in 1997 and 1998 (Markus, 1999). Figure 1.1 shows two unnamed tributaries to Prairie Creek; this tributary is south (further from Lake Byllesby) of the other, and lies completely in Rice County.

The drainage area to the downstream end of this impaired reach is 13 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (84%). The watershed contains no communities served by permitted wastewater treatment facilities (Table 5.24A) or livestock facilities that have been issued NPDES permits (Table 5.24B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.24C).

Table 5.24D describes the monthly fecal coliform loading capacities for this Unnamed Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.24A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.24B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.24C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.24D. Monthly Fecal Coliform Loading Capacities and Allocations - Unnamed Tributary, Headwaters to Prairie Creek (AUID: 07040002-513)

Drainage Area (square miles): 13 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	4.66	2.09	0.98	0.37	0.14
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	3.47	1.32	0.64	0.18	0.07
Margin of Safety	1.19	0.77	0.34	0.19	0.07
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	74.5%	63.2%	65.3%	48.6%	50.0%
Margin of Safety	25.5%	36.8%	34.7%	51.4%	50.0%

5.25 Chub Creek, Headwaters to Cannon River (Lake Byllesby) (AUID: 07040002-528)

The entire 20-mile length of Chub Creek, a tributary of the Cannon River with the confluence just at the upstream end of Lake Byllesby, was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was monitoring carried out by Dakota County in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 64 square miles, all of which falls within Dakota County. Land use in the watershed upstream of the impairment (Table 2.1) about one-half cultivated, but includes a high percentage of grassland (31%) and forest (15%) for this part of the state. The watershed contains no communities served by permitted wastewater treatment facilities (Table 5.25A) and no livestock facilities that have been issued NPDES permits (Table 5.25B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.25C).

Table 5.25D describes the monthly fecal coliform loading capacities for Chub Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.25A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.25B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.25C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.25D. Monthly Fecal Coliform Loading Capacities and Allocations - Chub Creek, Headwaters to Cannon River (Lake Byllesby) (AUID: 07040002-528)

Drainage Area (square miles): 64 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	23.79	10.68	4.99	1.90	0.70
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	17.74	6.76	3.27	0.91	0.34
Margin of Safety	6.05	3.92	1.72	0.99	0.36
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	74.6%	63.3%	65.5%	47.9%	48.6%
Margin of Safety	25.4%	36.7%	34.5%	52.1%	51.4%

5.26 Cannon River, Northfield Dam to Lake Byllesby Inlet (AUID: 07040002-509)

The 10-mile reach of the Cannon River from the Northfield dam to the inlet of Lake Byllesby was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership in 1998, 2001, and 2002

The drainage area to the downstream end of this impaired reach is 957 square miles. This represents about two-thirds of the entire Cannon River watershed. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (72%), but exhibits the highest percentage water and wetlands (5%) among the impaired reach watersheds included in this report. These lakes and wetlands are located primarily in the western portion of the Cannon River watershed upstream of the confluence with the Straight River. The watershed includes 11 communities and a highway rest area served by permitted wastewater treatment facilities (Table 5.26A); and 21 livestock facilities that have been issued NPDES permits (Table 5.26B). Approximately 24,000 acres, or 4% of the watershed, will require coverage under MS4 permits. This includes the cities of Faribault, Owatonna, Northfield, and Waseca (Table 5.26C). An additional 1% of the watershed area contains smaller towns and rural residences.

Table 5.26D describes the monthly fecal coliform loading capacities for this reach of the Cannon River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Cannon River near Welch as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.26A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ellendale WWTP	MN0041564	0.1003	0.02
Elysian WWTP	MN0041114	0.0186	0.004
Faribault WWTP	MN0030121	7	1.59
Geneva WWTP	MN0021008	0.069	0.02
Kilkenny WWTP	MNG580084	0.0228	0.01
Lonsdale WWTP	MN0031241	0.2418	0.05
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002
Medford WWTP	MN0024112	0.09	0.02
Morristown WWTP	MN0025895	0.21	0.05
Northfield WWTP	MN0024368	5.2	1.18
Owatonna WWTP	MN0051284	5	1.14

Waterville WWTP	MN0025208	0.271	0.06
Totals		18.23	4.14

Table 5.26B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Gibbs Farms Inc	079-80335	4,000 Swine - 55 lbs. or More
Koppelman Farm's Inc	079-50006	3,300 Swine - 55 lbs. or More
MN Dak Farms	079-66313	2,500 Swine - 55 lbs. or More
Eastgate Farms - Sec 32 - Main	131-93622	99,000 Turkeys
Jennie-O Turkey Store - Lakeview	131-93683	211,800 Chickens - broilers,
Jennie-O Turkey Store - Valleyview	131-50007	78,000 Turkeys
Kent Holden Farm	131-93843	4,730 Swine - 55 lbs. or More
Jennie-O Turkey Store - Hillcrest Farm	131-50006	144,000 Turkeys
Ahlman Hog Farm Sec 11	147-50002	4,000 Swine - 55 lbs. or More
Heers Family Farm	147-50006	4,000 Swine - 55 lbs. or More
Jennie-O Turkey Store - Merton Farm	147-50008	144,000 Turkeys
Steven Jaster Farm	147-50005	4,000 Swine - 55 lbs. or More
Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More
Brian J Kosel Farm - Sec 23	147-92323	2,720 Swine - 55 lbs. or More
Jennie-O Turkey Store - Deerfield Farm	147-50007	144,000 Turkeys
Wingspan LLP	161-50012	7,200 Swine - 55 lbs. or More
Woodville Pork	161-50011	2,400 Swine – 55 lbs. or More 1,800 Swine – under 55 lbs.

Table 5.26C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Faribault	20,818	Designated by rule; > 10,000 population
Owatonna	22,434	Designated by rule; > 10,000 population
Northfield	17,147	Designated by rule; > 10,000 population
Waseca	8,493	Designated by rule; > 10,000 population and within ½ mile of an impaired water (Clear Lake)

Table 5.26D. Monthly Fecal Coliform Loading Capacities and Allocations - Cannon River, Northfield Dam to Lake Byllesby Inlet (AUID: 07040002-509)

Drainage Area (square miles): 957 USGS gage used to develop flow zones and loading capacities: Cannon River at Welch % MS4 Urban: 4% Total WWTF Design Flow (mgd): 18.2328	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	273.01	98.81	46.19	21.84	10.05
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4.14	4.14	4.14	4.14	4.14
Communities Subject to MS4 NPDES Requirements	6.82	2.47	1.07	0.35	0.11
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	167.38	60.70	26.31	8.56	2.62
Margin of Safety	94.67	31.50	14.67	8.79	3.18
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.5%	4.2%	9.0%	19.0%	41.2%
Communities Subject to MS4 NPDES Requirements	2.5%	2.5%	2.3%	1.6%	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	61.3%	61.4%	57.0%	39.2%	26.1%
Margin of Safety	34.7%	31.9%	31.8%	40.2%	31.6%

5.27 Straight River, Rush Creek to Cannon River (AUID: 07040002-515)

The 13-mile reach of the Straight River from Rush Creek to the Cannon River was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 461 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (80%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed includes five communities and a highway rest area served by permitted wastewater treatment facilities (Table 5.27A); and 14 livestock facilities that have been issued NPDES permits (Table 5.27B). Approximately 11,000 acres, or 4% of the watershed, will require coverage under MS4 permits. This includes the City of Owatonna, and about 40% of the City of Faribault (Table 5.27C). Stormwater from the remainder of Faribault enters the Cannon River downstream of the confluence with the Straight. An additional 1% of the watershed area contains smaller towns and rural residences.

Table 5.27D describes the monthly fecal coliform loading capacities for this reach of the Straight River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the other allocations.

Table 5.27A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ellendale WWTP	MN0041564	0.1003	0.02
Faribault WWTP	MN0030121	7	1.59
Geneva WWTP	MN0021008	0.069	0.02
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002
Medford WWTP	MN0024112	0.09	0.02
Owatonna WWTP	MN0051284	5	1.14
Totals		12.27	2.79

Table 5.27B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Jennie-O Turkey Store - Hillcrest Farm	131-50006	144,000 Turkeys
Ahlman Hog Farm Sec 11	147-50002	4,000 Swine - 55 lbs. or More
Heers Family Farm	147-50006	4,000 Swine - 55 lbs. or More
Jennie-O Turkey Store - Merton Farm	147-50008	144,000 Turkeys
Steven Jaster Farm	147-50005	4,000 Swine - 55 lbs. or More

Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More
Brian J Kosel Farm - Sec 23	147-92323	2,720 Swine - 55 lbs. or More
Jennie-O Turkey Store - Deerfield Farm	147-50007	144,000 Turkeys
Wingspan LLP	161-50012	7,200 Swine - 55 lbs. or More
Woodville Pork	161-50011	2,400 Swine – 55 lbs. or More 1,800 Swine – under 55 lbs.

Table 5.27C. Municipal Separate Storm Sewer System (MS4) Communities

Community	**Population Estimate**	**Category**
Faribault	20,818	Designated by rule; > 10,000 population
Owatonna	22,434	Designated by rule; > 10,000 population

Table 5.27D. Monthly Fecal Coliform Loading Capacities and Allocations - Straight River, Rush Creek to Cannon River (AUID: 07040002-515)

Drainage Area (square miles): 461 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 4% Total WWTF Design Flow (mgd): 12.2686	Flow Zone				
	High	Moist	Mid	Dry	*Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	171.86	77.15	36.03	13.70	5.06
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	2.79	2.79	2.79	2.79	2.79
Communities Subject to MS4 NPDES Requirements	4.84	1.78	0.80	0.14	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	120.52	44.27	19.99	3.60	0.00
Margin of Safety	43.72	28.32	12.45	7.17	2.27
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.6%	3.6%	7.7%	20.3%	55.1%
Communities Subject to MS4 NPDES Requirements	2.8%	2.3%	2.2%	1.1%	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	70.1%	57.4%	55.5%	26.3%	0.0%
Margin of Safety	25.4%	36.7%	34.6%	52.3%	44.9%
*note - WWTF design flow exceeded minimum low flow; see section 5.1 for description of approach to allocation					

5.28 Rush Creek, Headwaters to Straight River (AUID: 07040002-505)

The 12-mile reach of Rush Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 22 square miles, all of which falls in Rice County. Cultivated land accounts for 89% of the watershed upstream of the impaired reach, a figure which is second highest among all impaired reach watersheds included in this report (Table 2.1). The watershed has no communities served by permitted wastewater treatment facilities (Table 5.28A), and no livestock facilities that have been issued NPDES permits (Table 5.28B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.28C).

Table 5.28D describes the monthly fecal coliform loading capacities for Rush Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.28A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.28B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.28C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.28D. Monthly Fecal Coliform Loading Capacities and Allocations - Rush Creek, Headwaters to Straight River (AUID: 07040002-505)

Drainage Area (square miles): 22 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	8.35	3.75	1.75	0.67	0.25
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	6.22	2.37	1.14	0.32	0.12
Margin of Safety	2.13	1.38	0.61	0.35	0.13
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	74.5%	63.2%	65.1%	47.8%	48.0%
Margin of Safety	25.5%	36.8%	34.9%	52.2%	52.0%

5.29 Crane Creek, Headwaters to Straight River (AUID: 07040002-516)

The 16-mile reach of Crane Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 106 square miles, including land in Waseca and Steele counties. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (81%), much of which has surface (ditches) and subsurface (tile) drainage. A good portion of Crane Creek itself is a drainage ditch. The watershed has no communities served by permitted wastewater treatment facilities (Table 5.29A), but contains four livestock facilities that have been issued NPDES permits (Table 5.29B). Approximately 3,000 acres of the City of Waseca, or 5% of the watershed, will require coverage under an MS4 permit (Table 5.29C). Unlike it's stormwater, wastewater from the City of Waseca is discharged to the Minnesota River Basin. An additional 1% of the watershed area contains smaller towns and rural residences.

Table 5.29D describes the monthly fecal coliform loading capacities for Crane Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were derived using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.29A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.29B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Brian J Kosel Farm - Sec 23	147-92323	2,720 Swine - 55 lbs. or More
Jennie-O Turkey Store - Deerfield Farm	147-50007	144,000 Turkeys
Wingspan LLP	161-50012	7,200 Swine - 55 lbs. or More
Woodville Pork	161-50011	2,400 Swine – 55 lbs. or More 1,800 Swine – under 55 lbs.

Table 5.29C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Waseca	8,493	Designated by rule; > 10,000 population and within ½ mile of an impaired water (Clear Lake)

Table 5.29D. Monthly Fecal Coliform Loading Capacities and Allocations - Crane Creek, Headwaters to Straight River (AUID: 07040002-516)

Drainage Area (square miles): 106 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 5% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	39.38	17.68	8.26	3.14	1.16
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	1.37	0.52	0.25	0.07	0.03
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	27.99	10.67	5.16	1.43	0.53
Margin of Safety	10.02	6.49	2.85	1.64	0.60
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	3.5%	3.0%	3.1%	2.2%	2.3%
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	71.1%	60.3%	62.4%	45.5%	46.0%
Margin of Safety	25.4%	36.7%	34.5%	52.2%	51.7%

5.30 Straight River, Maple Creek to Crane Creek (AUID: 07040002-503)

The 5-mile reach of the Straight River from Maple Creek to Crane Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program, although more recent monitoring was conducted by the MPCA and Cannon River Watershed Partnership.

The drainage area to the downstream end of this impaired reach is 252 square miles, almost all of which is within Steele County. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (82%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed includes three communities and a highway rest area served by permitted wastewater treatment facilities (Table 5.30A), and five livestock facilities that have been issued NPDES permits (Table 5.30B). Approximately 8,000 acres of the City of Owatonna, or 5% of the watershed, will require coverage under MS4 permits (Table 5.30C).

Table 5.30D describes the monthly fecal coliform loading capacities for this reach of the Straight River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.30A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ellendale WWTP	MN0041564	0.1003	0.02
Geneva WWTP	MN0021008	0.069	0.02
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002
Owatonna WWTP	MN0051284	5	1.14
Totals		5.18	1.18

Table 5.30B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More

Table 5.30C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Owatonna	22,434	Designated by rule; > 10,000 population

Table 5.30D. Monthly Fecal Coliform Loading Capacities and Allocations - Straight River, Maple Creek to Crane Creek (AUID: 07040002-503)

Drainage Area (square miles): 252					
USGS gage used to develop flow zones and loading capacities: Straight River near Faribault					
% MS4 Urban: 5%					
Total WWTF Design Flow (mgd): 5.1786	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	93.99	42.19	19.71	7.49	2.77
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.18	1.18	1.18	1.18	1.18
Communities Subject to MS4 NPDES Requirements	3.46	1.28	0.59	0.12	0.01
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	65.45	24.24	11.14	2.27	0.16
Margin of Safety	23.91	15.49	6.81	3.92	1.43
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.3%	2.8%	6.0%	15.7%	42.5%
Communities Subject to MS4 NPDES Requirements	3.7%	3.0%	3.0%	1.6%	0.3%
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	69.6%	57.5%	56.5%	30.4%	5.6%
Margin of Safety	25.4%	36.7%	34.6%	52.3%	51.6%

5.31 Maple Creek, Headwaters to Straight River (AUID: 07040002-519)

The 12-mile reach of Maple Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 38 square miles, lying completely in Steele County. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (81%), although it has a higher percentage of grassland (11%) than any other Straight River subwatershed. The watershed has no communities served by permitted wastewater treatment facilities (Table 5.31A) and no livestock facilities that have been issued NPDES permits (Table 5.31B). Approximately 3,600 acres (roughly 45% of the City of Owatonna), or 15% of the watershed, will require coverage under a MS4 permit (Table 5.31C).

Table 5.31D describes the monthly fecal coliform loading capacities for Maple Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacity was derived using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.31A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.31B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.31C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Owatonna	22,434	Designated by rule; > 10,000 population

Table 5.31D. Monthly Fecal Coliform Loading Capacities and Allocations - Maple Creek, Headwaters to Straight River (AUID: 07040002-519)

Drainage Area (square miles): 38 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 15% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	14.36	6.45	3.01	1.14	0.42
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	1.58	0.60	0.29	0.08	0.03
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	9.13	3.48	1.68	0.46	0.17
Margin of Safety	3.65	2.37	1.04	0.60	0.22
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	11.0%	9.4%	9.7%	7.0%	7.0%
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	63.5%	53.9%	55.8%	40.4%	40.6%
Margin of Safety	25.4%	36.7%	34.6%	52.6%	52.4%

5.32 Straight River, Turtle Creek to Owatonna Dam (AUID: 07040002-535)

The 7-mile reach of the Straight River was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was monitoring work carried out by Steele County Environmental Services in 2000-2002.

The drainage area to the downstream end of this impaired reach is 204 square miles, almost all of which is within Steele County. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (83%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed has two small communities and a highway rest area with permitted facilities contributing wastewater to the impaired reach (Table 5.32A); and contains five livestock facilities that have been issued NPDES permits (Table 5.32B). Approximately 2,700 acres (roughly 1/3 of the City of Owatonna), or 2% of the watershed, will require coverage under a MS4 permit (Table 5.32C).

Table 5.32D describes the monthly fecal coliform loading capacities for this reach of the Straight River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were derived using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.32A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ellendale WWTP	MN0041564	0.1003	0.02
Geneva WWTP	MN0021008	0.069	0.02
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002
Totals		0.18	0.042

Table 5.32B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More

Table 5.32C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Owatonna	22,434	Designated by rule; > 10,000 population

Table 5.32D. Monthly Fecal Coliform Loading Capacities and Allocations - Straight River, Turtle Creek to Owatonna Dam (AUID: 07040002-535)

Drainage Area (square miles): 204 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 2% Total WWTF Design Flow (mgd): 0.1786	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	76.05	34.14	15.94	6.06	2.24
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.04	0.04	0.04	0.04	0.04
Communities Subject to MS4 NPDES Requirements	1.17	0.45	0.21	0.06	0.02
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	55.49	21.12	10.17	2.79	1.03
Margin of Safety	19.35	12.53	5.51	3.17	1.15
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.1%	0.1%	0.3%	0.7%	1.8%
Communities Subject to MS4 NPDES Requirements	1.5%	1.3%	1.3%	1.0%	1.0%
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	73.0%	61.9%	63.8%	46.0%	45.9%
Margin of Safety	25.4%	36.7%	34.6%	52.3%	51.3%

5.33 Turtle Creek, Headwaters to Straight River (AUID: 07040002-518)

The 17-mile reach of Turtle Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 44 square miles, all of which falls in Steele County. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (82%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed has no communities served by wastewater treatment facilities (Table 5.33A), but contains two livestock facilities that have been issued NPDES permits (Table 5.33B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.33C).

Table 5.33D describes the monthly fecal coliform loading capacities for Turtle Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacity was derived using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations

Table 5.33A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.33B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Jeff Ptacek Farm - Sec 36	147-92217	4,000 Swine - 55 lbs. or More
Shane & Rod Wagner Farm - Sec 15	147-92127	4,400 Swine - 55 lbs. or More

Table 5.33C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.33D. Monthly Fecal Coliform Loading Capacities and Allocations - Turtle Creek, Headwaters to Straight River (AUID: 07040002-518)

Drainage Area (square miles): 44 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	16.41	7.37	3.44	1.31	0.48
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	12.23	4.67	2.25	0.63	0.23
Margin of Safety	4.18	2.70	1.19	0.68	0.25
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	74.5%	63.4%	65.4%	48.1%	47.9%
Margin of Safety	25.5%	36.6%	34.6%	51.9%	52.1%

5.34 Straight River, County Ditch 25 to Turtle Creek (AUID: 07040002-517)

The 10-mile reach of the Straight River was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was monitoring work carried out by the Cannon River Watershed Partnership and MPCA in 1999 and 2000.

The drainage area to the downstream end of this impaired reach is 135 square miles, almost all of which is within Steele County. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (87%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed has two small communities and a highway rest area with permitted facilities contributing wastewater to the impaired reach (Table 5.34A); and contains three livestock facilities that have been issued NPDES permits (Table 5.34B). At the present time, none of the watershed requires coverage under an MS4 permit (Table 5.34C). A prominent feature in the upper portion of this watershed is the large "Straight River Marsh" wetland restoration project.

Table 5.34D describes the monthly fecal coliform loading capacities for this reach of the Straight River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were derived using flow data from the USGS gage site on the Straight River near Faribault as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.34A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ellendale WWTP	MN0041564	0.1003	0.02
Geneva WWTP	MN0021008	0.069	0.02
MNDOT Straight River Rest Area	MN0049514	0.0093	0.002
Totals		0.18	0.042

Table 5.34B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Chad Johnson Farm	047-102279	3,120 Swine - 55 lbs. or More
Brian Waage Farm	147-50003	4,000 Swine - 55 lbs. or More
J&K Farms LLC	147-92330	4,800 Swine - 55 lbs. or More

Table 5.34C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.34D. Monthly Fecal Coliform Loading Capacities and Allocations - Straight River, County Ditch 25 to Turtle Creek (AUID: 07040002-517)

Drainage Area (square miles): 135 USGS gage used to develop flow zones and loading capacities: Straight River near Faribault % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.1786	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	50.27	22.57	10.54	4.01	1.48
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.04	0.04	0.04	0.04	0.04
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	37.44	14.25	6.86	1.87	0.68
Margin of Safety	12.79	8.28	3.64	2.10	0.76
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.1%	0.2%	0.4%	1.0%	2.7%
Communities Subject to MS4 NPDES Requirements	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	74.5%	63.1%	65.1%	46.6%	45.9%
Margin of Safety	25.4%	36.7%	34.5%	52.4%	51.4%

5.35 Root River, Thompson Creek to the Mississippi River (AUID: 07040008-501)

The 6-mile reach of the Root River from Thompson Creek to the Mississippi was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 1,660 square miles (the entire Root River watershed). Even in this large of a watershed, pollution sources in the uppermost portions of the watershed can influence water quality near the mouth. Land use (Table 2.1) is primarily a mix of cultivated land, forest, and grassland. The watershed includes 17 communities and 2 highway rest areas served by permitted wastewater treatment facilities (Table 5.35A); and 19 livestock facilities that have been issued NPDES permits (Table 5.35B). There are no communities that will require coverage under MS4 permits at this time (Table 5.35C).

Table 5.35D describes the monthly fecal coliform loading capacities for this reach of the Cannon River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed for five flow zones using flow data from the USGS gage site on the Root River near Houston as described in Appendix A. Flows from the wastewater treatment facilities in the watershed are small relative to river flows, even during drier time periods. As such, the wasteload allocations provided to these facilities is relatively small. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.35A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Canton WWTP	MN0023001	0.065	0.01
Chatfield WWTP	MN0021857	0.2725	0.06
Dexter WWTP	MN0023183	0.0454	0.01
Grand Meadow WWTP	MN0023558	0.12	0.03
Haven Hutterian Brethren	MNG580071	0.0112	0.003
Hokah WWTP	MN0021458	0.1	0.02
Houston WWTP	MN0023736	0.25	0.06
Lanesboro WWTP	MN0020044	0.096	0.02
MNDOT Enterprise Rest Area	MN0048844	0.0026	0.001
MNDOT High Forest Rest Area	MN0044377	0.0033	0.001
Mabel WWTP	MN0020877	0.136	0.03
Ostrander WWTP	MN0024449	0.0394	0.01
Peterson WWTP	MN0024490	0.025	0.01
Preston WWTP	MN0020745	0.317	0.07
Racine WWTP	MN0024554	0.039	0.01
Rushford WWTP	MN0024678	0.15	0.03
Spring Valley WWTP	MN0051934	0.936	0.21
Stewartville WWTP	MN0020681	1.111	0.25
Wykoff WWTP	MN0020826	0.049	0.01
Totals		3.77	0.86

Table 5.35B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Allen & Kevin Marzolf Farm - Sec 30	045-90428	4,000 Swine - 55 lbs. or More
Helen Anderson Farm - Sec 36	045-91101	1,196 Other Cattle
Hellickson Farms	045-63730	3,300 Swine - 55 lbs. or More
Jennie-O Turkey Store - Benson Farm	045-50004	63,700 Turkeys
Jennie-O Turkey Store - Chatfield Farm	045-50003	107,841 Turkeys
Jennie-O Turkey Store - Fay Farm	045-50002	63,600 Turkeys
Marzolf Farm	045-60160	4,000 Swine - 55 lbs. or More
Palmer Growout Farm - Sec 14	045-101381	107,841 Turkeys
Palmer Growout Farm - Sec 8	045-101373	63,000 Turkeys
Palmer Growout Farm - Sec 8 NW	045-101374	63,700 Turkeys
Paul Schmidt Farm - Sec 20	045-90124	4,000 Swine - 55 lbs. or More
Ridge Land Farm	045-50001	4,000 Swine - 55 lbs. or More
John Oehlke Pork Farm	099-83512	3,600 Swine - 55 lbs. or More
Larson Products Inc - Sec 5	099-61683	60,000 Turkeys
Vance Larson Farm 1	099-95037	68,000 Turkeys
Lo-Mill Farms	109-79271	2,800 Swine - 55 lbs. or More
Jennie-O Turkey Store - Lingenfelter	169-50005	69,750 Turkeys
Smith Farms of Rushford Inc	169-50001	4,150 Swine - 55 lbs. or More
Smith Farms of Rushford LLP	169-102822	3,600 Swine - 55 lbs. or More

Table 5.35C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.35D. Monthly Fecal Coliform Loading Capacities and Allocations - Root River, Thompson Creek to the Mississippi River (AUID: 07040008-501)

Drainage Area (square miles): 1,660					
USGS gage used to develop flow zones and loading capacities: Root River near Houston					
% MS4 Urban: 0%					
Total WWTF Design Flow (mgd): 3.7684	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	413.07	201.09	132.33	88.11	55.45
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.86	0.86	0.86	0.86	0.86
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	329.40	155.76	113.32	63.96	40.65
Margin of Safety	82.81	44.47	18.15	23.29	13.94
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.2%	0.4%	0.6%	1.0%	1.5%
Communities Subject to MS4 NPDES Requirements	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	79.7%	77.5%	85.6%	72.6%	73.3%
Margin of Safety	20.0%	22.1%	13.7%	26.4%	25.1%

5.36 Robinson Creek, Headwaters to North Branch Root River (AUID: 07040008-503)

Robinson Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 17 square miles. Most of which falls within Mower County, although the confluence with the North Branch Root River is in Olmsted County. Land use in the watershed upstream of the impairment (Table 2.1) is 92% cultivated, highest of all impaired stream and river reaches included in this report. The watershed contains no communities served by permitted wastewater treatment facilities (Table 5.36A); and no livestock facilities that have been issued NPDES permits (Table 5.36B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.36C).

Table 5.36D describes the monthly fecal coliform loading capacities for Robinson Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the South Fork Zumbro River at Rochester as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.36A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.36B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.36C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.36D. Monthly Fecal Coliform Loading Capacities and Allocations - Robinson Creek, Headwaters to North Branch Root River (AUID: 07040008-503)

Drainage Area (square miles): 17 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	5.93	2.64	1.42	0.81	0.29
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	4.72	1.80	1.15	0.49	0.16
Margin of Safety	1.21	0.84	0.27	0.32	0.13
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	79.6%	68.2%	81.0%	60.5%	55.2%
Margin of Safety	20.4%	31.8%	19.0%	39.5%	44.8%

5.37 Money Creek; End of Trout Stream portion to Root River (AUID: 07040008-521)

Money Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was a special study conducted by the Winona County Environmental Services Department.

The drainage area to the downstream end of this impaired reach is 77 square miles, all of which falls within Winona County. Land use in the watershed upstream of the impairment (Table 2.1) is a mix of forest (44%), cultivated land, and grassland. The percentage of cultivated land (36%) is the lowest of all the impaired stream and river reaches included in the report. The watershed contains no communities served by permitted wastewater treatment facilities (Table 5.37A) and no livestock facilities that have been issued NPDES permits (Table 5.37B). At the present time, none of the watershed requires coverage under a MS4 permit (Table 5.37C).

Table 5.37D describes the monthly fecal coliform loading capacities for Money Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the Rush Creek near Rushford as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.37A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.37B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.37C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.37D. Monthly Fecal Coliform Loading Capacities and Allocations - Money Creek, End of Trout Stream portion to Root River (AUID: 07040008-521)

Drainage Area (square miles): 77 USGS gage used to develop flow zones and loading capacities: Rush Creek near Rushford % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	7.66	4.99	3.81	3.25	2.72
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	6.10	4.14	3.55	2.95	2.42
Margin of Safety	1.56	0.85	0.26	0.30	0.30
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.0%	0.0%	0.0%	0.0%
Communities Subject to MS4 NPDES Requirements	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	79.6%	83.0%	93.2%	90.8%	89.0%
Margin of Safety	20.4%	17.0%	6.8%	9.2%	11.0%

5.38 South Branch Root River, Canfield Creek to Willow Creek (AUID: 07040008-555)

The 11-mile reach of the South Branch Root River from Canfield Creek to Willow Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was the locally-led South Branch Root River watershed project.

The drainage area to the downstream end of this impaired reach is 143 square miles. This watershed includes land in Mower and Fillmore counties and encompasses Forestville/Mystery Cave State Park. Land use (Table 2.1) is dominated by cultivated land (76%), but includes substantial areas of forest and grassland. The watershed includes one community (Ostrander) served by a permitted wastewater treatment facility (Table 5.38A), and three livestock facilities that have been issued NPDES permits (Table 5.38B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.38C).

Table 5.38D describes the monthly fecal coliform loading capacities for this reach of the South Branch Root River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the South Fork Root River near Houston as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.38A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ostrander WWTP	MN0024449	0.0394	0.01

Table 5.38B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Hellickson Farms	045-63730	3,300 Swine - 55 lbs. or More
Paul Schmidt Farm - Sec 20	045-90124	4,000 Swine - 55 lbs. or More
Ridge Land Farm	045-50001	4,000 Swine - 55 lbs. or More

Table 5.38C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.38D. Monthly Fecal Coliform Loading Capacities and Allocations - South Branch Root River, Canfield Creek to Willow Creek (AUID: 07040008-555)

Drainage Area (square miles): 143 USGS gage used to develop flow zones and loading capacities: South Fork Root River near Houston % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.0394	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	23.16	12.77	9.48	7.10	5.59
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.01	0.01	0.01	0.01	0.01
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	18.00	10.54	8.61	5.98	4.61
Margin of Safety	5.15	2.22	0.86	1.11	0.97
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.0%	0.1%	0.1%	0.1%	0.2%
Communities Subject to MS4 NPDES Requirements	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	77.7%	82.5%	90.8%	84.2%	82.5%
Margin of Safety	22.2%	17.4%	9.1%	15.6%	17.4%

5.39 South Branch Root River, Headwaters to Class 1B, 2A, 3B (AUID: 07040008-586)

The 10-mile reach of the South Branch Root River from it's headwaters to the Class 1B, 2A, 3B section was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was the locally-led South Branch Root River watershed project.

The drainage area to the downstream end of this impaired reach is 61 square miles. This watershed includes land in Mower and Fillmore counties and encompasses Forestville/Mystery Cave State Park. Land use (Table 2.1) is dominated by cultivated land (84%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed includes one community (Ostrander) served by a wastewater treatment facility (Table 5.39A); and no livestock facilities that have been issued NPDES permits (Table 5.39B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.39C).

Table 5.39D describes the monthly fecal coliform loading capacities for this reach of the South Branch Root River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the South Fork Root River near Houston as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.39A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Ostrander WWTP	MN0024449	0.0394	0.01

Table 5.39B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.39C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.39D. Monthly Fecal Coliform Loading Capacities and Allocations - South Branch Root River, Headwaters to Class 1B, 2A, 3B (AUID: 07040008-586)

Drainage Area (square miles): 61 USGS gage used to develop flow zones and loading capacities: South Fork Root River near Houston % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.0394	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	9.86	5.43	4.03	3.02	2.38
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.01	0.01	0.01	0.01	0.01
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	7.66	4.48	3.65	2.54	1.96
Margin of Safety	2.19	0.94	0.37	0.47	0.41
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.1%	0.2%	0.2%	0.3%	0.4%
Communities Subject to MS4 NPDES Requirements	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	77.7%	82.5%	90.6%	84.1%	82.4%
Margin of Safety	22.2%	17.3%	9.2%	15.6%	17.2%

5.40 Whitewater River, Middle Fork; trout stream portion (AUID: 07040003-514)

The 12-mile reach of the Middle Fork Whitewater River was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was a 2000-2002 cooperative monitoring efforts involving the Whitewater River watershed project and Winona State University.

The drainage area to the downstream end of this impaired reach is 54 square miles in Olmsted and Winona counties. Land use (Table 2.1) is primarily cultivated (69%), but includes substantial areas of grassland and forest. The watershed does not contain any communities served by permitted wastewater treatment systems (Table 5.40A). One livestock facility is covered under and NPDES permit (Table 5.40B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.40C).

Table 5.40D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the South Fork Whitewater River near Altura as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.40A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.40B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Holden Farms Inc.	169-60300	3,200 Swine - 55 lbs. or More

Table 5.40C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.40D. Monthly Fecal Coliform Loading Capacities and Allocations - Whitewater River, Middle Fork; trout stream portion (AUID: 07040003-514)

Drainage Area (square miles): 54 USGS gage used to develop flow zones and loading capacities: South Fork Whitewater near Altura % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	6.74	3.27	2.04	1.46	1.14
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	4.95	2.35	1.77	1.27	0.92
Margin of Safety	1.79	0.92	0.27	0.19	0.22
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	73%	72%	87%	87%	81%
Margin of Safety	27%	28%	13%	13%	19%

5.41 Whitewater River, South Fork; trout stream portion above North Fork Whitewater River (AUID: 07040003-512)

The 11-mile reach of the South Fork Whitewater River was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was a 2000-2002 cooperative monitoring efforts involving the Whitewater River watershed project and Winona State University.

The drainage area to the downstream end of this impaired reach is 93 square miles in Olmsted and Winona counties. Land use (Table 2.1) is primarily cultivated (64%), but includes substantial areas of grassland and forest. The watershed contains three communities served by permitted wastewater treatment systems (Table 5.41A); and two livestock facilities that have been issued NPDES permits (Table 5.41B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.41C).

Table 5.41D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the South Fork Whitewater River near Altura as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.41A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Altura WWTP	MN0021831	0.2693	0.06
Utica WWTP	MNG580069	0.04	0.01
Whitewater River Pollution Control Facility	MN0046868	1.12	0.25
Totals		1.43	0.32

Table 5.41B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Gar-Lin Dairy Site 1	109-82692	918 Mature Dairy Cows
Daley Farms of Lewiston LLP	169-50002	1,426 Mature Dairy Cows

Table 5.41C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.41D. Monthly Fecal Coliform Loading Capacities and Allocations - Whitewater River, South Fork; trout stream portion above North Fork Whitewater River (AUID: 07040003-512)

Drainage Area (square miles): 93 USGS gage used to develop flow zones and loading capacities: South Fork Whitewater near Altura % MS4 Urban: 0% Total WWTF Design Flow (mgd): 1.4293	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	11.68	5.66	3.53	2.53	1.98
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.32	0.32	0.32	0.32	0.32
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	8.25	3.74	2.75	1.88	1.28
Margin of Safety	3.11	1.60	0.46	0.33	0.38
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	3%	6%	9%	13%	16%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	71%	66%	78%	74%	64%
Margin of Safety	27%	28%	13%	13%	19%

5.42 Whitewater River, South Fork; headwaters to trout stream portion (AUID: 07040003-505)

The 20-mile reach of the South Fork Whitewater River was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 55 square miles in Olmsted and Winona counties. Land use (Table 2.1) is primarily cultivated (64%), but includes substantial areas of grassland and forest. The watershed contains one community (St. Charles) served by a permitted wastewater treatment facility (Table 5.42A), and one livestock facility that has been issued a NPDES permit (Table 5.42B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.42C).

Table 5.42D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the South Fork Whitewater River near Altura as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.42A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Whitewater River Pollution Control Facility	MN0046868	1.12	0.25

Table 5.42B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Gar-Lin Dairy Site 1	109-82692	918 Mature Dairy Cows

Table 5.42C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.42D. Monthly Fecal Coliform Loading Capacities and Allocations - Whitewater River, South Fork; headwaters to trout stream portion (AUID: 07040003-505)

Drainage Area (square miles): 55 USGS gage used to develop flow zones and loading capacities: South Fork Whitewater near Altura % MS4 Urban: 0% Total WWTF Design Flow (mgd): 1.12	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	6.93	3.36	2.10	1.50	1.18
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.25	0.25	0.25	0.25	0.25
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	4.84	2.16	1.57	1.05	0.71
Margin of Safety	1.84	0.95	0.28	0.20	0.22
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4%	8%	12%	17%	22%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	70%	64%	75%	70%	60%
Margin of Safety	27%	28%	13%	13%	19%

5.43 Whitewater River, North Fork; unnamed creek to Middle Fork Whitewater River (AUID: 07040003-554)

The 10-mile reach of the North Fork Whitewater River was added to the Section 303(d) Clean Water Act impaired waters list in 1996. The primary source of data that led to this listing was USGS monitoring from 1985 to 1993.

The drainage area to the downstream end of this impaired reach is 104 square miles, including land in Olmsted, Winona, and Wabasha counties. Land use (Table 2.1) is primarily cultivated (70%), but includes substantial areas of grassland and forest. The watershed contains one community served by a permitted wastewater treatment facility (Table 5.43A); and no livestock facilities that have been issued NPDES permits (Table 5.43B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.43C).

Table 5.43D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the North Fork Whitewater River near Elba as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.43A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Plainview-Elgin Sanitary District WWTP	MN0055361	1.421	0.32

Table 5.43B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.43C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.43D. Monthly Fecal Coliform Loading Capacities and Allocations - Whitewater River, North Fork; unnamed creek to Middle Fork Whitewater River (AUID: 07040003-554)

Drainage Area (square miles): 104 USGS gage used to develop flow zones and loading capacities: Norht Fork Whitewater near Elba % MS4 Urban: 0% Total WWTF Design Flow (mgd): 1.421	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	18.25	8.42	5.69	4.40	2.70
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.32	0.32	0.32	0.32	0.32
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	13.31	6.31	4.92	2.89	1.72
Margin of Safety	4.62	1.79	0.45	1.19	0.66
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	2%	4%	6%	7%	12%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	73%	75%	86%	66%	64%
Margin of Safety	25%	21%	8%	27%	24%

5.44 Logan Branch; End trout stream portion to North Fork Whitewater River (AUID: 07040003-536)

The 10-mile reach of the Logan Branch was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was the locally-led Whitewater River watershed project.

The drainage area to the downstream end of this impaired reach is 17 square miles, all in Olmsted County. Land use (Table 2.1) is primarily cultivated (68%), but includes substantial areas of grassland and forest. The watershed has no communities served by permitted wastewater treatment facilities (Table 5.44A) and no livestock facilities have been issued NPDES permits (Table 5.44B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.44C).

Table 5.44D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River system to achieve water quality standards, as well as the component wasteload allocation, load allocation, and margin of safety. The loading capacities were derived using historic flow data from a USGS gage site on the North Fork Whitewater River near Elba as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.44A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.44B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.44C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.44D. Monthly Fecal Coliform Loading Capacities and Allocations - Logan Branch; End trout stream portion to North Fork Whitewater River (AUID: 07040003-536)

Drainage Area (square miles): 17 USGS gage used to develop flow zones and loading capacities: North Fork Whitewater near Elba % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	3.01	1.39	0.94	0.73	0.45
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	2.25	1.09	0.87	0.53	0.34
Margin of Safety	0.76	0.30	0.07	0.20	0.11
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	75%	78%	93%	73%	76%
Margin of Safety	25%	22%	7%	27%	24%

5.45 Whitewater River, North Fork; Unnamed Creek to Unnamed Creek (AUID: 07040003-553)

The 8-mile reach of the North Fork Whitewater River was added to the Section 303(d) Clean Water Act impaired waters list in 2002. The primary source of data that led to this listing was a 2000-2002 cooperative monitoring efforts involving the Whitewater River watershed project and Winona State University.

The drainage area to the downstream end of this impaired reach is 20 square miles, including land in Olmsted and Wabasha counties. Land use (Table 2.1) is primarily cultivated (76%), but includes substantial areas of grassland and forest. The watershed has no communities served by permitted wastewater treatment facilities (Table 5.45A), and no livestock facilities have been issued NPDES permits (Table 5.45B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.45C).

Table 5.45D describes the monthly fecal coliform loading capacities for this reach of the Whitewater River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were derived using historic flow data from a USGS gage site on the North Fork Whitewater River near Elba as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.45A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.45B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.45C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.45D. Monthly Fecal Coliform Loading Capacities and Allocations - Whitewater River, North Fork; Unnamed Creek to Unnamed Creek (AUID: 07040003-553)

Drainage Area (square miles): 20 USGS gage used to develop flow zones and loading capacities: North Fork Whitewater near Elba % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	3.49	1.61	1.09	0.84	0.52
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	2.61	1.27	1.00	0.61	0.39
Margin of Safety	0.88	0.34	0.09	0.23	0.13
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	75%	79%	92%	73%	75%
Margin of Safety	25%	21%	8%	27%	25%

5.46 Garvin Brook; Class 1B, 2A,3B portion (AUID: 07040003-542)

The 14-mile reach of Garvin Brook was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 49 square miles, all in Winona County. Land use (Table 2.1) is just under 50% cultivated, and nearly 40% forested (the second highest among watersheds included in this report). The watershed contains one community (Stockton) served by a permitted wastewater treatment facility (Table 5.46A). There are no livestock facilities requiring NPDES permits (Table 5.46B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.46C).

Table 5.46D describes the monthly fecal coliform loading capacities for this reach of Garvin Brook to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on Garvin Brook near Minnesota City as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.46A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Stockton WWTP	MNG580079	0.07	0.02

Table 5.46B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.46C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.46D. Monthly Fecal Coliform Loading Capacities and Allocations - Garvin Brook; Class 1B, 2A,3B portion (AUID: 07040003-542)

Drainage Area (square miles): 49 USGS gage used to develop flow zones and loading capacities: Garvin Brook near Minnesota City % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.07	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	7.55	5.84	5.22	4.85	3.56
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.02	0.02	0.02	0.02	0.02
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	6.28	5.53	5.13	3.95	3.20
Margin of Safety	1.25	0.29	0.07	0.88	0.34
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.2%	0.3%	0.3%	0.3%	0.4%
Communities Subject to MS4 NPDES Requirements	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	83.2%	94.8%	98.4%	81.5%	90.0%
Margin of Safety	16.6%	5.0%	1.3%	18.1%	9.6%

5.47 Stockton Valley Creek; Trout stream portion to Garvin Brook (AUID: 07040003-559)

Garvin Brook was added to the Section 303(d) Clean Water Act impaired waters list in 1994. This 6-mile reach of Stockton Valley Creek, a tributary to Garvin Brook, was added to the list in 2002. The primary source of data that led to this listing was a 2000-2002 cooperative monitoring effort between Winona State University and the MPCA.

The drainage area to the downstream end of this impaired reach is 20 square miles, all in Winona County. Land use (Table 2.1) is less than 50% cultivated (third lowest of all watersheds included in this report), with the remainder forest and grassland. The watershed contains no communities served by permitted wastewater treatment facilities (Table 5.47A); and no livestock facilities have been issued NPDES permits (Table 5.47B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.47C).

Table 5.47D describes the monthly fecal coliform loading capacities for this reach of Stockton Valley Creek to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on Straight Valley Creek near Rollingstone as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.47A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.47B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.47C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.47D. Monthly Fecal Coliform Loading Capacities and Allocations - Stockton Valley Creek; Trout stream portion to Garvin Brook (AUID: 07040003-559)

Drainage Area (square miles): 20 USGS gage used to develop flow zones and loading capacities: Straight Valley Creek near Rollingstone % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	2.20	1.41	1.10	0.95	0.68
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	1.95	1.22	1.05	0.78	0.56
Margin of Safety	0.25	0.19	0.05	0.17	0.12
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	89%	87%	95%	82%	82%
Margin of Safety	11%	13%	5%	18%	18%

5.48 Zumbro River; West Indian Creek to Mississippi River (AUID: 07040004-501)

The 23-mile reach of the Zumbro River from West Indian Creek to the Mississippi River was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was a special study carried out by MPCA in 2002.

The drainage area to the downstream end of this impaired reach is 1,488 square miles (the entire Zumbro River watershed). Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (67%), but exhibits substantial areas of forest and grassland, particularly in the eastern portion. The watershed includes 21 communities served by permitted wastewater treatment facilities (Table 5.48A), and 36 livestock facilities that have been issued NPDES permits (Table 5.48B). Approximately 26,000 acres, or 3% of the watershed, will require coverage under MS4 permits. This includes the City of Rochester and adjacent township areas (Table 5.48C). An additional 2% of the watershed area contains smaller towns and rural residences.

Table 5.48D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the Zumbro River at Kellogg as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.48A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Bellechester WWTP	MN0022764	0.0245	0.01
Byron WWTP	MN0049239	0.52	0.12
Camp Victory WWTP	MN0067032	0.03	0.01
Claremont WWTP	MN0022187	0.076	0.02
Dodge Center WWTP	MN0021016	0.973	0.22
Goodhue WWTP	MN0020958	0.0999	0.02
Hallmark Terrace Inc	MNG580070	0.018	0.004
Hammond WWTP	MN0066940	0.02971	0.01
Hayfield WWTP	MN0023612	0.41	0.09
Kasson WWTP	MN0050725	0.84	0.19
Kellogg WWTP	MNG580027	0.06	0.01
Kenyon WWTP	MN0021628	0.357	0.08
Mantorville WWTP	MN0021059	0.0621	0.01
Mazeppa WWTP	MN0046752	0.0723	0.02
Pine Island WWTP	MN0024511	0.665	0.15

Rochester WWTP/Water Reclamation Plant	MN0024619	19.1	4.34
Wanamingo WWTP	MN0022209	0.458	0.10
West Concord WWTP	MN0025241	0.095	0.02
Zumbro Falls WWTP	MN0051004	0.0297	0.01
Zumbro Ridge Estates Mobile Home Park	MN0038661	0.025	0.01
Zumbrota WWTP	MN0025330	0.807	0.18
Totals		24.75221	5.620303

Table 5.48B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Craig and Caryl Bendix Farm - Sec 10	039-81804	3,000 Swine - 55 lbs. or More
Craig and Caryl Benedix Farm	039-81805	3,000 Swine - 55 lbs. or More
Craig and Caryl Benedix Farm - Sec 4	039-81794	3,300 Swine - 55 lbs. or More
Daley Farms - Pine Island	039-81902	1,050 Mature Dairy Cows
Durst Bros Dairy - Site I	039-50010	1,286 Mature Dairy Cows
Grandview Hogs of Dodge Center LLP	039-50005	2,554 Swine - 55 lbs. or More
Hutton Farms Inc	039-50002	250,000 Chickens - broilers,
Jennie-O Turkey Store - Claremont East	039-50006	100,000 Turkeys
Jennie-O Turkey Store - Claremont West	039-50008	60,000 Turkeys
Ripley Dairy LLP	039-81909	2,115 Mature Dairy Cows
Toden Farms - Milton Yard	039-81850	1,298 Other Cattle
Toquam Hogs - Barn 2	039-81920	3,920 Swine - 55 lbs. or More
VZ Hogs LLP	039-50004	4,980 Swine - 55 lbs. or More
Wilbert Kern Farm	039-80286	4,300 Swine - 55 lbs. or More
Belvidere Group Partners Farm	049-72978	4,000 Swine - 55 lbs. or More
Bombay Dairy Company Farm	049-72726	710 Mature Dairy Cows
Darvin J Amundson Farm	049-72585	2,500 Swine - 55 lbs. or More
Donnie L Dohrn Farm	049-73262	1,075 Other Cattle
Gene Knott Farm	049-72619	4,000 Swine - 55 lbs. or More
Knott Farms	049-50007	4,000 Swine - 55 lbs. or More
Kohlnhofer Farms Inc - Site I	049-50002	4,000 Swine - 55 lbs. or More
Kohlnhofer Farms Inc - Site III	049-50004	4,500 Swine - 55 lbs. or More
Mike Kohlnhofer Farm	049-72976	4,500 Swine - 55 lbs. or More
Minnesota Family Farms Coop	049-50001	3,050 Swine - 55 lbs. or More
Jerome Foods Inc 3	109-78747	343,000 Turkeys
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More
Schoenfelder Farms 10	109-79242	1,980 Other Cattle, 6,900 Swine
Schoenfelder Farms LLP - Roch	109-87100	2,280 Other Cattle, 5,915 Swine
David C Johnson Farm	131-50001	3,750 Swine - 55 lbs. or More
Jon W Brower Farm Sec 36	147-61682	4,000 Swine - 55 lbs. or More
Shane Wagner Farm - Sec 23	147-92125	3,000 Swine - 55 lbs. or More
Dan & Matt Arendt Farm	157-94002	3,300 Swine - 55 lbs. or More
Gary Lehnertz Farm	157-86816	730 Mature Dairy Cows
McNallan Dairy	157-94000	710 Mature Dairy Cows
Kenneth Schumacher Farm	157-86651	1,013 Animal Units; cattle, heifers, and calves

Table 5.48C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

Table 5.48D. Monthly Fecal Coliform Loading Capacities and Allocations - Zumbro River; West Indian Creek to Mississippi River (AUID: 07040004-501)

Drainage Area (square miles): 1,488 USGS gage used to develop flow zones and loading capacities: Zumbro River at Kellogg % MS4 Urban: 3% Total WWTF Design Flow (mgd): 24.75221	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	383.01	187.37	106.91	73.11	48.69
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	5.62	5.62	5.62	5.62	5.62
Communities Subject to MS4 NPDES Requirements	7.31	3.40	2.35	1.38	1.05
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	262.72	122.09	84.54	49.57	37.92
Margin of Safety	107.36	56.26	14.40	16.54	4.10
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1%	3%	5%	8%	12%
Communities Subject to MS4 NPDES Requirements	2%	2%	2%	2%	2%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	69%	65%	79%	68%	78%
Margin of Safety	28%	30%	13%	23%	8%

5.49 Zumbro River; Cold Creek to West Indian Creek (AUID: 07040004-502)

The 23-mile reach of the Zumbro River from Cold Creek to West Indian Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was a special study carried out by MPCA in 2002.

The drainage area to the downstream end of this impaired reach is 1,401 square miles, roughly 95% of the entire Zumbro River watershed. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (67%), but exhibits substantial areas of forest and grassland, particularly in the eastern portion. The watershed includes 20 communities served by permitted wastewater treatment facilities (Table 5.49A), and 34 livestock facilities that have been issued NPDES permits (Table 5.49B). Approximately 26,000 acres, or 3% of the watershed, will require coverage under MS4 permits. This includes the City of Rochester and adjacent township areas (Table 5.49C). An additional 2% of the watershed area contains smaller towns and rural residences.

Table 5.49D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using historic flow data from a USGS gage site on the Zumbro River at Kellogg as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.49A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Bellechester WWTP	MN0022764	0.0245	0.01
Byron WWTP	MN0049239	0.52	0.12
Camp Victory WWTP	MN0067032	0.03	0.01
Claremont WWTP	MN0022187	0.076	0.02
Dodge Center WWTP	MN0021016	0.973	0.22
Goodhue WWTP	MN0020958	0.0999	0.02
Hallmark Terrace Inc	MNG580070	0.018	0.004
Hammond WWTP	MN0066940	0.02971	0.01
Hayfield WWTP	MN0023612	0.41	0.09
Kasson WWTP	MN0050725	0.84	0.19
Kenyon WWTP	MN0021628	0.357	0.08
Mantorville WWTP	MN0021059	0.0621	0.01
Mazeppa WWTP	MN0046752	0.0723	0.02
Pine Island WWTP	MN0024511	0.665	0.15
Rochester WWTP/Water Reclamation Plant	MN0024619	19.1	4.34
Wanamingo WWTP	MN0022209	0.458	0.10

West Concord WWTP	MN0025241	0.095	0.02
Zumbro Falls WWTP	MN0051004	0.0297	0.01
Zumbro Ridge Estates Mobile Home Park	MN0038661	0.025	0.01
Zumbrota WWTP	MN0025330	0.807	0.18
Totals		24.69	5.61

Table 5.49B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Craig and Caryl Bendix Farm - Sec 10	039-81804	3,000 Swine - 55 lbs. or More
Craig and Caryl Benedix Farm	039-81805	3,000 Swine - 55 lbs. or More
Craig and Caryl Benedix Farm - Sec 4	039-81794	3,300 Swine - 55 lbs. or More
Daley Farms - Pine Island	039-81902	1,050 Mature Dairy Cows
Durst Bros Dairy - Site I	039-50010	1,286 Mature Dairy Cows
Grandview Hogs of Dodge Center LLP	039-50005	2,554 Swine - 55 lbs. or More
Hutton Farms Inc	039-50002	250,000 Chickens - broilers,
Jennie-O Turkey Store - Claremont East	039-50006	100,000 Turkeys
Jennie-O Turkey Store - Claremont West	039-50008	60,000 Turkeys
Ripley Dairy LLP	039-81909	2,115 Mature Dairy Cows
Toden Farms - Milton Yard	039-81850	1,298 Other Cattle
Toquam Hogs - Barn 2	039-81920	3,920 Swine - 55 lbs. or More
VZ Hogs LLP	039-50004	4,980 Swine - 55 lbs. or More
Wilbert Kern Farm	039-80286	4,300 Swine - 55 lbs. or More
Belvidere Group Partners Farm	049-72978	4,000 Swine - 55 lbs. or More
Bombay Dairy Company Farm	049-72726	710 Mature Dairy Cows
Darvin J Amundson Farm	049-72585	2,500 Swine - 55 lbs. or More
Donnie L Dohrn Farm	049-73262	1,075 Other Cattle
Gene Knott Farm	049-72619	4,000 Swine - 55 lbs. or More
Knott Farms	049-50007	4,000 Swine - 55 lbs. or More
Kohlnhofer Farms Inc - Site I	049-50002	4,000 Swine - 55 lbs. or More
Kohlnhofer Farms Inc - Site III	049-50004	4,500 Swine - 55 lbs. or More
Mike Kohlnhofer Farm	049-72976	4,500 Swine - 55 lbs. or More
Minnesota Family Farms Coop	049-50001	3,050 Swine - 55 lbs. or More
Jerome Foods Inc 3	109-78747	343,000 Turkeys
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More
Schoenfelder Farms 10	109-79242	1,980 Other Cattle, 6,900 Sw
Schoenfelder Farms LLP - Roch	109-87100	2,280 Other Cattle, 5,915 Sw
David C Johnson Farm	131-50001	3,750 Swine - 55 lbs. or More
Jon W Brower Farm Sec 36	147-61682	4,000 Swine - 55 lbs. or More
Shane Wagner Farm - Sec 23	147-92125	3,000 Swine - 55 lbs. or More
Dan & Matt Arendt Farm	157-94002	3,300 Swine - 55 lbs. or More
Kenneth Schumacher Farm	157-86651	1,013 Animal Units; cattle, heifers, and calves

Table 5.49C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

Table 5.49D. Monthly Fecal Coliform Loading Capacities and Allocations - Zumbro River; Cold Creek to West Indian Creek (AUID: 07040004-502)

Drainage Area (square miles): 1,401 USGS gage used to develop flow zones and loading capacities: Zumbro River at Kellogg % MS4 Urban: 3% Total WWTF Design Flow (mgd): 24.69221	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	360.62	176.42	100.66	68.83	45.84
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	5.61	5.61	5.61	5.61	5.61
Communities Subject to MS4 NPDES Requirements	7.30	3.39	2.34	1.37	1.05
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	246.63	114.46	79.15	46.27	35.33
Margin of Safety	101.09	52.97	13.56	15.58	3.86
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	2%	3%	6%	8%	12%
Communities Subject to MS4 NPDES Requirements	2%	2%	2%	2%	2%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	68%	65%	79%	67%	77%
Margin of Safety	28%	30%	13%	23%	8%

5.50 South Fork Zumbro River; Cascade Creek to Lake Zumbro (AUID: 07040004-507)

The 12-mile reach of the South Fork Zumbro River from Cascade Creek to Lake Zumbro was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 349 square miles. Land use in the watershed upstream of the impairment (Table 2.1) includes 57% cultivated land, 20% grassland, and 13% urban/industrial. The watershed includes three communities served by permitted wastewater treatment facilities (Table 5.50A), and five livestock facilities that have been issued NPDES permits (Table 5.50B). Approximately 26,000 acres, or 12% of the watershed, will require coverage under MS4 permits. This includes the City of Rochester and adjacent township areas (Table 5.50C).

Table 5.50D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Zumbro River at Rochester. The City of Rochester WWTF combined with the relatively high percentage of MS4 area result in large wasteload allocations. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.50A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Hallmark Terrace Inc	MNG580070	0.018	0.004
Rochester WWTP/Water Reclamation Plant	MN0024619	19.1	4.34
Zumbro Ridge Estates Mobile Home Park	MN0038661	0.025	0.01
Totals		19.14	4.35

Table 5.50B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Jerome Foods Inc 3	109-78747	343,000 Turkeys
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More
Schoenfelder Farms 10	109-79242	1,980 Other Cattle, 6,900 Sw
Schoenfelder Farms LLP - Roch	109-87100	2,280 Other Cattle, 5,915 Sw

Table 5.50C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

Table 5.50D. Monthly Fecal Coliform Loading Capacities and Allocations - South Fork Zumbro River; Cascade Creek to Lake Zumbro (AUID: 07040004-507)

Drainage Area (square miles): 349 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 12% Total WWTF Design Flow (mgd): 19.143	Flow Zone				
	High	Moist	Mid	Dry	Low*
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	121.66	54.27	29.21	16.70	6.00
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4.35	4.35	4.35	4.35	4.35
Communities Subject to MS4 NPDES Requirements	10.68	3.76	2.23	0.67	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	81.84	28.84	17.08	5.17	0.00
Margin of Safety	24.80	17.32	5.55	6.51	1.65
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4%	8%	15%	26%	73%
Communities Subject to MS4 NPDES Requirements	9%	7%	8%	4%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	67%	53%	58%	31%	0%
Margin of Safety	20%	32%	19%	39%	27%
*note - WWTF design flow exceeded minimum flow; see section 5.1 for description of approach to allocation					

5.51 South Fork Zumbro River; Silver Lake Dam to Cascade Creek (AUID: 07040004-533)

The 0.2-mile reach of the South Fork Zumbro River from Cascade Creek to Lake Zumbro was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was a special study conducted by the MPCA in 2001.

The drainage area to the downstream end of this impaired reach is 260 square miles. Land use in the watershed upstream of the impairment (Table 2.1) includes 62% cultivated land, 20% grassland, and 10% urban/industrial The watershed does not include any permitted wastewater treatment facility discharges (Table 5.51A), but does contain five livestock facilities that have been issued NPDES permits (Table 5.51B). Approximately 13,000 acres, or 8% of the watershed, will require coverage under MS4 permits. This includes portions of the City of Rochester and adjacent township areas (Table 5.51C).

Table 5.51D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Zumbro River at Rochester as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.51A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.51B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Jerome Foods Inc 3	109-78747	343,000 Turkeys
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More
Schoenfelder Farms 10	109-79242	1,980 Other Cattle, 6,900 Sw
Schoenfelder Farms LLP - Roch	109-87100	2,280 Other Cattle, 5,915 Sw

Table 5.51C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

Table 5.51D. Monthly Fecal Coliform Loading Capacities and Allocations - South Fork Zumbro River; Silver Lake Dam to Cascade Creek (AUID: 07040004-533)

Drainage Area (square miles): 260 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 8% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	90.63	40.43	21.76	12.43	4.47
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	5.74	2.19	1.40	0.60	0.20
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	66.42	25.34	16.22	6.98	2.32
Margin of Safety	18.47	12.91	4.14	4.85	1.95
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	6%	5%	6%	5%	4%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	73%	63%	75%	56%	52%
Margin of Safety	20%	32%	19%	39%	44%

5.52 South Fork Zumbro River; Bear Creek to Oakwood Dam (AUID: 07040004-535)

The 0.5-mile reach of the South Fork Zumbro River from Bear Creek to Oakwood Dam was added to the Section 303(d) Clean Water Act impaired waters list in 2004. Oakwood Dam is no longer present; the location is approximately the upper end of Silver Lake. The primary source of data that led to this listing was a special study conducted by the MPCA in 2001.

The drainage area to the downstream end of this impaired reach is 239 square miles. Land use in the watershed upstream of the impairment (Table 2.1) includes 62% cultivated land, 20% grassland, and 9% urban/industrial The watershed does not include any permitted wastewater treatment facility discharges (Table 5.52A), but does contain five livestock facilities that have been issued NPDES permits (Table 5.52B). Approximately 12,000 acres, or 8% of the watershed, will require coverage under MS4 permits. This includes portions of the City of Rochester and adjacent township areas (Table 5.52C).

Table 5.52D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Zumbro River at Rochester as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.52A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.52B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Jerome Foods Inc 3	109-78747	343,000 Turkeys
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More
Schoenfelder Farms 10	109-79242	1,980 Other Cattle, 6,900 Sw
Schoenfelder Farms LLP - Roch	109-87100	2,280 Other Cattle, 5,915 Sw

Table 5.52C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

5.52D. Monthly Fecal Coliform Loading Capacities and Allocations - South Fork Zumbro River; Bear Creek to Oakwood Dam (AUID: 07040004-535)

Drainage Area (square miles): 239 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 8% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	83.37	37.18	20.01	11.44	4.10
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	5.17	1.97	1.26	0.54	0.18
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	61.20	23.34	14.94	6.44	2.12
Margin of Safety	17.00	11.87	3.81	4.45	1.80
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	6%	5%	6%	5%	4%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	73%	63%	75%	56%	52%
Margin of Safety	20%	32%	19%	39%	44%

5.53 South Fork Zumbro River; Salem Creek to Bear Creek (AUID: 07040004-536)

The 9-mile reach of the South Fork Zumbro River from Salem Creek to Bear Creek was added to the Section 303(d) Clean Water Act impaired waters list in 2004. The primary source of data that led to this listing was a special study conducted by the MPCA in 2001.

The drainage area to the downstream end of this impaired reach is 157 square miles. Land use in the watershed upstream of the impairment (Table 2.1) includes 68% cultivated land, 18% grassland, and 6% urban/industrial. The watershed does not include any permitted wastewater treatment facility discharges (Table 5.53A), but does contain two livestock facilities that have been issued NPDES permits (Table 5.53B). Approximately 4,000 acres, or 4% of the watershed, will require coverage under MS4 permits. This includes portions of the City of Rochester and adjacent township areas (Table 5.53C).

Table 5.53D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Zumbro River at Rochester as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.53A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.53B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Manco of FMT Inc	109-50005	3,000 Swine - 55 lbs. or More
Manco of FMT Inc 2	109-82696	3,000 Swine - 55 lbs. or More

Table 5.53C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
City of Rochester and surrounding townships	98,064	Mandatory

5.53D. Monthly Fecal Coliform Loading Capacities and Allocations - South Fork Zumbro River; Salem Creek to Bear Creek (AUID: 07040004-536)

Drainage Area (square miles): 157 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 4% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	54.78	24.43	13.15	7.51	2.69
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	1.80	0.68	0.44	0.19	0.06
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	41.82	15.94	10.21	4.40	1.45
Margin of Safety	11.16	7.81	2.49	2.92	1.18
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	3%	3%	3%	3%	2%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	76%	65%	78%	59%	54%
Margin of Safety	20%	32%	19%	39%	44%

5.54 Salem Creek; lower 15 miles; class 2C portion to South Fork Zumbro River (AUID: 07040004-503)

The 17-mile reach of Salem Creek to the confluence with the South Fork Zumbro River was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 62 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (80%), and contains just 3% rural and suburban residential/commercial. The watershed does not include any permitted wastewater treatment facility discharges (Table 5.54A) or livestock facilities that have been issued NPDES permits (Table 5.54B). There are no communities that will require coverage under MS4 permits at this time (Table 5.54C).

Table 5.54D describes the monthly fecal coliform loading capacities for this reach of the Zumbro River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Zumbro River at Rochester as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.54A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
none			

Table 5.54B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.54C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

5.54D. Monthly Fecal Coliform Loading Capacities and Allocations - Salem Creek; lower 15 miles; class 2C portion to South Fork Zumbro River (AUID: 07040004-503)

Drainage Area (square miles): 62 USGS gage used to develop flow zones and loading capacities: South Fork Zumbro River at Rochester % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	21.73	9.69	5.22	2.98	1.07
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	17.30	6.59	4.23	1.82	0.60
Margin of Safety	4.43	3.10	0.99	1.16	0.47
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Load Allocation	80%	68%	81%	61%	56%
Margin of Safety	20%	32%	19%	39%	44%

5.55 Cedar River, Rose Creek to Woodbury Creek (AUID: 07080201-501)

The 10-mile reach of the Cedar River from Rose Creek to Woodbury Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1998. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 544 square miles. This represents most of the Cedar River watershed in Minnesota and includes portions of Mower, Freeborn, and Steele counties. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (87%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed includes 10 communities served by permitted wastewater treatment facilities (Table 5.55A); and 13 livestock facilities that have been issued NPDES permits (Table 5.55B). Approximately 7,000 acres of the City of Austin, or 2% of the watershed, will require coverage under MS4 permits (Table 5.55C). An additional 2% of the watershed area contains smaller towns and rural residences.

Table 5.55D describes the monthly fecal coliform loading capacities for this reach of the Cedar River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Cedar River near Austin as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations

Table 5.55A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Lansing Township WWT Improvements	MN0063461	0.026	0.006
Blooming Prairie WWTP	MN0021822	0.899	0.20
Brownsdale WWTP	MN0022934	0.184	0.04
Elkton WWTP	MNG580013	0.017	0.004
Hollandale WWTP	MN0048992	0.0427	0.01
Austin WWTP	MN0022683	8.475	1.92
Oakland Sanitary District WWTP	MN0040631	0.0121	0.003
Sargeant WWTP	MN0021601	0.0106	0.002
Waltham WWTP	MN0025186	0.027	0.01
Rose Creek WWTP	MNG580072	0.065	0.01
Totals		9.76	2.22

Table 5.55B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Roland Kittleson Farm	039-50003	3,600 Swine - 55 lbs. or More

Dennis Magnuson & MHF Free Co - Sec 35	047-96992	11,500 Swine - 55 lbs. or More
Dennis Magnuson Farm	047-50008	8,350 Swine - 55 lbs. or More
Dennis Magnuson Farm - Sec 35 NE	047-96991	14,780 Swine Under 55 lbs.
Hanson Hog Farm	047-96951	3,000 Swine - 55 lbs. or More
Natural Pork Production II LLP - Austin	047-50005	3,830 Swine - 55 lbs. or More
North Farm	047-50007	8,350 Swine - 55 lbs. or More
Bob Bartel Farm Sec 22	099-60649	4,800 Swine - 55 lbs. or More
Geo A Hormel & Co Farm	099-83267	6,000 Swine - 55 lbs. or More
John Nielsen Farm - Site 2	099-93981	3,600 Swine - 55 lbs. or More
Paul Meany Farm - Sec 15	099-50001	3,840 Swine - 55 lbs. or More
Yunker Farms	099-83464	4,000 Swine - 55 lbs. or More
MJC Farms	147-50001	3,180 Swine - 55 lbs. or More

Table 5.55C. Municipal Separate Storm Sewer System (MS4) Communities

Community	**Population Estimate**	**Category**
Austin	23,314	Designated by rule; > 10,000 population

Table 5.55D. Monthly Fecal Coliform Loading Capacities and Allocations - Cedar River, Rose Creek to Woodbury Creek (AUID: 07080201-501)

Drainage Area (square miles): 544					
USGS gage used to develop flow zones and loading capacities: Cedar River near Austin					
% MS4 Urban: 2%					
Total WWTF Design Flow (mgd): 9.7584					
	Flow Zones				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	195.38	73.42	34.36	17.30	9.45
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	2.22	2.22	2.22	2.22	2.22
Communities Subject to MS4 NPDES Requirements	2.92	0.88	0.47	0.18	0.08
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	143.88	43.16	23.13	8.80	4.17
Margin of Safety	46.36	27.17	8.54	6.11	2.98
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	1.1%	3.0%	6.4%	12.8%	23.4%
Communities Subject to MS4 NPDES Requirements	1.5%	1.2%	1.4%	1.0%	0.9%
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	73.6%	58.8%	67.3%	50.8%	44.1%
Margin of Safety	23.7%	37.0%	24.9%	35.3%	31.5%

5.56 Cedar River, Roberts Creek to Upper Austin Dam (AUID: 07080201-502)

The 5-mile reach of the Cedar River from Roberts Creek to the Upper Austin Dam was added to the Section 303(d) Clean Water Act impaired waters list in 1998. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 185 square miles. This represents about 1/3 of the entire Cedar River watershed in Minnesota and includes portions of Mower, Freeborn, and Steele counties. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (89%), much of which has surface (ditches) and subsurface (tile) drainage. The watershed includes 3 communities served by permitted wastewater treatment facilities (Table 5.56A); and 3 livestock facilities that have been issued NPDES permits (Table 5.56B). There are no communities that will require coverage under a MS4 permit at this time (Table 5.56C), although 3% of the watershed consists of small towns and rural residential land.

Table 5.56D describes the monthly fecal coliform loading capacities for this reach of the Cedar River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Cedar River near Austin as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations

Table 5.56A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Lansing Township WWT Improvements	MN0063461	0.026	0.006
Blooming Prairie WWTP	MN0021822	0.899	0.20
Waltham WWTP	MN0025186	0.027	0.01
Totals		0.95	0.22

Table 5.56B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
Roland Kittleson Farm	039-50003	3,600 Swine - 55 lbs. or More
Bob Bartel Farm Sec 22	099-60649	4,800 Swine - 55 lbs. or More
MJC Farms	147-50001	3,180 Swine - 55 lbs. or More

Table 5.56C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
none		

Table 5.56D. Monthly Fecal Coliform Loading Capacities and Allocations - Cedar River, Roberts Creek to Upper Austin Dam (AUID: 07080201-502)

Drainage Area (square miles): 185 USGS gage used to develop flow zones and loading capacities: Cedar River near Austin % MS4 Urban: 0% Total WWTF Design Flow (mgd): 0.952	Flow Zone				
	High	Moist	Mid	Dry	Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	66.38	24.95	11.67	5.88	3.21
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.22	0.22	0.22	0.22	0.22
Communities Subject to MS4 NPDES Requirements	0.00	0.00	0.00	0.00	0.00
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Load Allocation	50.41	15.50	8.55	3.58	1.98
Margin of Safety	15.75	9.23	2.90	2.08	1.01
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0.3%	0.9%	1.9%	3.7%	6.7%
Communities Subject to MS4 NPDES Requirements	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	75.9%	62.1%	73.3%	60.9%	61.8%
Margin of Safety	23.7%	37.0%	24.9%	35.4%	31.5%

5.57 Shell Rock River; Albert Lea Lake to Goose Creek (AUID: 07080202-501)

The 12-mile reach of the Shell Rock River from Albert Lea Lake to Goose Creek was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 195 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is dominated by cultivated land (76%), but compared to the other impaired reach watersheds in the basin, exhibits a relatively high percentage of water and wetlands. The watershed includes 4 communities and a state park served by permitted wastewater treatment facilities (Table 5.57A). No livestock facilities that have been issued NPDES permits are located in the watershed (Table 5.57B). Approximately 8,000 acres of the City of Albert Lea, or 6% of the watershed, will require coverage under MS4 permits (Table 5.57C).

Table 5.57D describes the monthly fecal coliform loading capacities for this reach of the Shell Rock River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Shell Rock River near Northwood, IA as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations. It is possible that Albert Lea Lake functions to reduce downstream bacteria loading. As such, some focus on sources downstream of Albert Lea Lake may lead to greater water quality improvements on the impaired river reach.

Table 5.57A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	Facility Class
Clarks Grove WWTP	MNG580067	0.1164	0.026
Albert Lea WWTP	MN0041092	18.38	4.17
Glenville WWTP	MN0021245	0.13	0.03
Hayward WWTP	MN0041122	0.045	0.010
MDNR Myre Big Island State Park	MN0033740	0.01	0.002
Totals		18.68	4.24

Table 5.57B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.57C. Municipal Separate Storm Sewer System (MS4) Communities

Community	Population Estimate	Category
Albert Lea	18,356	mandatory

Table 5.57D. Monthly Fecal Coliform Loading Capacities and Allocations - Shell Rock River; Albert Lea Lake to Goose Creek (AUID: 07080202-501)

Drainage Area (square miles): 195 USGS gage used to develop flow zones and loading capacities: Shell Rock River near Northwood, IA % MS4 Urban: 6% Total WWTF Design Flow (mgd): 18.6814	Flow Zone				
	High	Moist	Mid	*Dry	*Low
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	56.33	25.28	11.55	3.88	1.63
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	4.24	4.24	4.24	*	*
Communities Subject to MS4 NPDES Requirements	2.70	0.72	0.25	*	*
Livestock Facilities Requiring NPDES Permits	0	0	0	0.00	0.00
"Straight Pipe" Septic Systems	0	0	0	0.00	0.00
Load Allocation	39.39	10.47	3.60	*	*
Margin of Safety	9.99	9.85	3.46	na	na
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	7.5%	16.8%	36.7%	*	*
Communities Subject to MS4 NPDES Requirements	4.8%	2.8%	2.1%	*	*
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	69.9%	41.4%	31.2%	*	*
Margin of Safety	17.7%	39.0%	30.0%	na	na
*note - WWTF design flow exceeded dry and low flow; Allocation = (flow contribution from source) X (200 orgs./100ml.); see Sect. 5.1					

5.58 Vermillion River; South Br. Vermillion River to the Hastings Dam (AUID: 07040001-506)

The 12-mile reach of the Vermillion River from the confluence with the South Branch to the Hastings Dam was added to the Section 303(d) Clean Water Act impaired waters list in 1996. The primary source of data that led to this listing was the Metropolitan Council water monitoring program.

The drainage area to the downstream end of this impaired reach is 273 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is just over 50% cultivated, and 26% residential, urban, and industrial. The balance is grassland, forest, water and wetland. The watershed includes four communities served by permitted wastewater treatment facilities (Table 5.58A), including the very large Empire facility. No livestock facilities that have been issued NPDES permits are located in the watershed (Table 5.58B). Approximately 32,000 acres, or 18% of the watershed, will require coverage under MS4 permits. This includes portions of a number of Twin Cities suburban communities, as well as some of the City of Hastings (Table 5.58C).

Table 5.58D describes the monthly fecal coliform loading capacities for this reach of the Vermillion River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Vermillion River near Empire as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.58A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Elko/New Market WWTP	MN0056219	0.98	0.22
Hampton WWTP	MN0021946	0.101	0.02
Met Council - Empire WWTP	MN0045845	28.61	6.50
Vermillion		0.054	0.01
Totals		29.745	6.75

Table 5.58B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.58C. Municipal Separate Storm Sewer System (MS4) Communities

Community	**Population Estimate**	**Category**
Portions of the following communities fall within the impaired reach watershed:		
Apple Valley		mandatory
Burnsville		mandatory
Eagan		mandatory
Farmington		mandatory
Hastings		Designated by rule; > 10,000 population
Inver Grove Heights		mandatory
Lakeville		mandatory
Rosemount		mandatory
Empire Townsip		mandatory

Table 5.58D. Monthly Fecal Coliform Loading Capacities and Allocations - Vermillion River; South Br. Vermillion River to the Hastings Dam (AUID: 07040001-506)

Drainage Area (square miles): 273 USGS gage used to develop flow zones and loading capacities: Vermillion River near Empire % MS4 Urban: 18% Total WWTF Design Flow (mgd): 29.745	Flow Zone				
	High	Moist	Mid	Dry	Low*
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	66.71	32.50	19.74	11.75	6.98
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	6.75	6.75	6.75	6.75	*
Communities Subject to MS4 NPDES Requirements	8.62	3.09	1.57	0.30	*
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0.00
"Straight Pipe" Septic Systems	0	0	0	0	0.00
Load Allocation	38.41	13.76	7.02	1.32	*
Margin of Safety	12.93	8.90	4.39	3.38	na
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	10.1%	20.8%	34.2%	57.4%	*
Communities Subject to MS4 NPDES Requirements	12.9%	9.5%	8.0%	2.5%	*
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	57.6%	42.3%	35.6%	11.3%	*
Margin of Safety	19.4%	27.4%	22.2%	28.8%	na
* note - WWTF design flow exceeded low flow minus MOS; Allocation = (flow contribution from source) X (200 orgs./100ml.); see Sect. 5.1					

5.59 Vermillion River; Below trout stream portion to South Br. Vermillion River (AUID: 07040001-507)

The 9-mile reach of the Vermillion River below the trout stream portions to the South Branch of the Vermillion River was added to the Section 303(d) Clean Water Act impaired waters list in 1994. The primary source of data that led to this listing was the MPCA Milestone long-term monitoring program.

The drainage area to the downstream end of this impaired reach is 142 square miles. Land use in the watershed upstream of the impairment (Table 2.1) is the most urban/suburban (33%) of impaired reach watershed covered in this report, although there is still a significant amount (42%) of cultivated land. The watershed includes two communities served by permitted wastewater treatment facilities (Table 5.59A), including the very large Empire facility. No livestock facilities that have been issued NPDES permits are located in the watershed (Table 5.59B). Approximately 26,000 acres, or 28% of the watershed, will require coverage under MS4 permits. This includes portions of a number of Twin Cities suburban communities, as well as some of the City of Hastings (Table 5.59C).

Table 5.59D describes the monthly fecal coliform loading capacities for this reach of the Vermillion River to achieve water quality standards, as well as the component wasteload allocations, load allocations, and margins of safety. The loading capacities were developed using flow data from the USGS gage site on the Vermillion River near Empire as described in Appendix A. Substantial reductions in fecal coliform loading from straight-pipe septic systems, and a variety of nonpoint sources will likely be required to meet the allocations.

Table 5.59A. Wastewater Treatment Facilities

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Elko/New Market WWTP	MN0056219	0.98	0.22
Met Council - Empire WWTP	MN0045845	28.61	6.50
Totals		29.59	6.72

Table 5.59B. Livestock Facilities with NPDES Permits

Facility	ID Number	Description
none		

Table 5.59C. Municipal Separate Storm Sewer System (MS4) Communities

Community	**Population Estimate**	**Category**
Portions of the following communities fall within the impaired reach watershed:		
Apple Valley		mandatory
Burnsville		mandatory
Eagan		mandatory
Farmington		mandatory
Inver Grove Heights		mandatory
Lakeville		mandatory
Rosemount		mandatory
Empire Township		mandatory

5.59D. Monthly Fecal Coliform Loading Capacities and Allocations - Vermillion River; Below trout stream portion to South Br. Vermillion River (AUID: 07040001-507)

Drainage Area (square miles): 142 USGS gage used to develop flow zones and loading capacities: Vermillion River near Empire % MS4 Urban: 28% Total WWTF Design Flow (mgd): 29.59	Flow Zone				
	High	Moist	Mid	Dry*	Low*
	values expressed as trillion organisms per month (tera- or T-org./month)				
TOTAL MONTHLY LOADING CAPACITY	34.79	16.95	10.29	6.13	3.64
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	6.72	6.72	6.72	*	*
Communities Subject to MS4 NPDES Requirements	5.99	1.57	0.36	*	*
Livestock Facilities Requiring NPDES Permits	0	0	0	0.00	0.00
"Straight Pipe" Septic Systems	0	0	0	0.00	0.00
Load Allocation	15.34	4.02	0.92	*	*
Margin of Safety	6.74	4.64	2.29	na	na
	values expressed as percent of total month loading capacity				
TOTAL MONTHLY LOADING CAPACITY	100%	100%	100%	100%	100%
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	19.3%	39.6%	65.3%	*	*
Communities Subject to MS4 NPDES Requirements	17.2%	9.3%	3.5%	*	*
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	44.1%	23.7%	9.0%	*	*
Margin of Safety	19.4%	27.4%	22.3%	na	na
*note - WWTF design flow exceeded dry and low flow; Allocation = (flow contribution from source) X (200 orgs./100ml.); see Sect. 5.1					

5.3 Impacts of Growth on Allocations

Straight-Pipe Septic Systems

As a result of state and local rules, ordinances, and programs, the number of straight pipe septic systems will decrease over time. Because these systems constitute illegal discharges, they are not provided a load allocation for any of the impaired reaches covered in this report. As such, other elements of the TMDL allocation will not change as these systems are eliminated.

Wastewater Treatment Facilities

Flows at some wastewater treatment facilities are likely to increase over time with increases in the populations they serve. As long as current fecal coliform discharge limits are met at these facilities, however, such increases will not impact the allocation provided to other sources. This is because increased flows from wastewater treatment facilities add to the overall loading capacity by increasing river flows.

Municipal Separate Storm Sewer Systems

Expansion of some or all of the current MS4 communities in the basin is likely to take place. The City of Rochester, for example, predicts a 30-50% growth in population by 2030. Seventeen of the 39 impaired reach watersheds covered in this report contain at least a portion of a community required to have MS4 permit coverage. As expansion of these communities occurs, MS4 wasteload allocations may also need to be increased. If this occurs, the nonpoint source load allocation will need to be reduced proportionally. This makes sense, because expansion of urban areas effectively reduces the amount of agricultural and other land which contributes nonpoint source runoff.

Livestock

Along with humans, the other major source of fecal coliform in the basin is livestock. While there have been changes in the sizes and types of facilities, there do not appear to be clear trends in overall livestock numbers. With changes in facility size and type, a continuing shift in focus from the facilities themselves to land application practices may be warranted in the future. If growth in livestock numbers does occur, newer regulations for facility location and construction, manure storage design, and land application practices should help mitigate potential increases in fecal coliform loading to the streams and rivers of the basin.

For the reasons discussed above, no explicit adjustments were made to the waste load or load allocations to account for human or livestock population growth. The MPCA will monitor population growth, urban expansion, and changes in agriculture, and reopen the TMDLs covered in this report if and when adjustments to allocations may be required.

6.0 MARGIN OF SAFETY

Under section 303(d) of the Clean Water Act, a "margin of safety" (MOS) is required as part of a TMDL. The purpose of the MOS is to account for uncertainty that the allocations will result in attainment of water quality standards. For the 39 impaired reaches covered in this report, an explicit margin of safety is provided for each of the flow periods for each listed reach. As described in section 5 and Appendix A of this document, the MOS is based on the difference between the loading capacity as calculated at the mid-point of each of the five flow ranges, and the loading capacity calculated at the minimum flow in each zone. Given that the loading capacity is typically much less at the minimum flow of a zone as compared to the mid-point, a substantial MOS is provided. The MOS ensures that allocations will not exceed the load associated with the minimum flow in each zone. Because the allocations are a direct function of monthly flow, accounting for potential flow variability is the appropriate way to address the MOS. The minimum monthly flows over long periods of record at the USGS gage sites define the MOS for the low flow zone.

7.0 SEASONAL VARIATION

The flow duration approach utilized in this TMDL captures the full range of flow conditions over the April-October period when the fecal coliform water quality standard applies. Appendix A includes figures depicting the relationship between months (seasons) and the five flow zones for which wasteload allocations, load allocations, and margins of safety were calculated. In particular, Figure A-4 provides an example (for the Vermillion River) of the relationship between monthly flows and flow zones, and how the complete range of monthly flows is encompassed in the five flow zones.

8.0: MONITORING PLAN

8.1: Goals of the Monitoring Plan

The goal of this monitoring plan is to determine the effectiveness of the source reduction strategies that are implemented to attain water quality standards and designated uses. Even after these TMDLs are approved, the impaired reaches will effectively remain listed, as category 4A waters, until water quality standards for fecal coliform are met. Category 4A indicates that the waters are impaired but no longer need a TMDL.

8.2: Monitoring Activities, Schedule, and Responsibility

The MPCA maintains 10 long-term Minnesota Milestone sites in the basin. Grab sample monitoring at these stations occurs every three years at a frequency of once a month in order to collect a total of 16 samples over a five-year period. These sites will be

monitored in 2006. Seven are tributary sites and three are main stem Mississippi River sites.

A water quality assessment (305b), based on monitoring data collected within the previous ten years at these and other sites (maintained by Met Council, Corps of Engineers, etc.), is scheduled for 2009 and at five-year intervals thereafter. This baseline monitoring system will be used to assess whether streams of the basin are in full support, partial support, or nonsupport of designated water uses, based on concentrations of fecal coliform bacteria and other parameters.

A monitoring system for the Regional Fecal Coliform TMDL also will be used to evaluate progress in ambient water quality. This has a basinwide and targeted watershed component.

The basinwide component consists of a repetition of intensive monitoring of fecal coliform bacteria concentrations at Minnesota Milestone sites that took place in 1997/1998. This monitoring was conducted five times per month during the recreational use season, with monthly geometric means calculated to determine whether the standard of 200 org./100 ml was being exceeded or not. This will be repeated in 2007/2008 as part of the implementation plan.

In addition, targeted watersheds will be monitored in 2008/2009. In addition to comparing geometric monthly means from both time periods, a comparison will be made of samples taken at lower flows during dry weather periods, when continuous sources such as ISTS are believed to dominate fecal coliform loadings. This will be done in the following watersheds: Prairie Creek, Straight River, Vermillion River, Whitewater River, South Branch Root River, and Cedar River watersheds.

The MPCA will be responsible for implementing this monitoring plan, with assistance from partners in the target watersheds listed above.

9.0 IMPLEMENTATION

9.1: Current Implementation through Basinwide Source Reduction Strategies:

Directly pertinent to this project, BALMM (Basin Alliance for the Lower Mississippi in Minnesota) has embraced a basinwide goal of achieving water quality standards for fecal coliform bacteria. BALMM participants have developed detailed action strategies in the following areas to work toward this water quality goal:

- Feedlot Runoff Reduction: This strategy is being implemented in several ways. For feedlots of 300 animal units and smaller, the BALMM strategy consists mainly of maximizing participation in the Open Lot Agreement. This feature of state feedlot rules provides a framework for eligible producers to

phase into compliance by October 2005, achieve a 50 percent reduction in runoff and, by October 2010, achieve full compliance with runoff rules. Section 319 grants have been obtained to support participation in this program in the following counties: Dodge, Fillmore, Goodhue, Houston, Mower, Olmsted, Rice, Wabasha, and Winona. The projects are designed to provide counties with technical, educational and financial support to enroll 90 percent of eligible livestock farmers in the Open Lot Agreement, and ensure that effective feedlot fixes are designed and implemented. An estimated 2,200 farmers have been enrolled to date. Farmers also will be informed of manure management record-keeping and planning requirements, and of resources available to assist in these activities. Other counties in the basin are pursuing the same objectives using their own and other resources.

- Residential Wastewater Treatment. The BALMM strategy for Individual Sewage Treatment Systems (ISTS) calls for increasing the percentage of the population with properly functioning systems. This strategy is being implemented through several Section 319 grants. The projects address the impact of human sources of bacteria through a combination of education, technical assistance, and financial assistance to owners of failing ISTS. To this end, the BALMM, the Southeast Minnesota Water Resources Board, the Cannon River Watershed Partnership, and the University of Minnesota Extension Service have formed a partnership that will involve 12 of the 14 counties in the basin. The goal is to double the average rate at which ISTS classified as Imminent Public Health Threats (straight-pipes) are being corrected through local efforts across the basin, from 300 to 600 per year. By 2012, a sustained effort of this magnitude should achieve the target source reduction of 65 percent, cited in the original Regional Fecal Coliform TMDL. Both individual residents and unsewered communities will be addressed through the project. Additional funding has been sought to help to initiate county-based revolving loan programs to help to assist ISTS repairs, and to cost-share engineering studies needed to evaluate the feasibility of alternative community wastewater treatment options. Fillmore County is participating in a state-sponsored pilot project whose purpose is to identify and correct straight-pipe septics within 10 years. Lessons learned from this project will be shared with other counties in the basin.

- Accelerated Adoption of Rotational Grazing – This BALMM Strategy is being implemented in part through Section 319 grants. By assisting producers in the writing of managed rotational grazing plans, the projects will increase estimated acreage of this practice from 7,500 to almost 20,000 acres. It will also train local resource managers to continue helping beef and dairy farmers to convert from conventional to rotational grazing, with the goal of the latter becoming the dominant pasture management practice in the region.

Manure Management Planning – New feedlot rules require that manure management plans be developed for any feedlots that need a permit. These include the following categories of feedlots:

- Those with more than 300 animal units that are planning new construction or expansion;
- There is a pollution hazard that has not been corrected through the Open Lot Agreement;
- Feedlot has been designated as a CAFO (more than 1000 animal units or direct man-made conveyance to waters)
- Feedlot has more than 300 animal units and is applying manure in sensitive areas, including: a) soil P levels exceeding 120/150 ppm Olsen/Bray, or half those values within 300 feet of public waters; b) vulnerable drinking water supply management areas; or c) slopes exceeding 6 percent within 300 feet of waters.

The development of manure management plans for these feedlots should result in at least half the volume of manure in the basin being subject to manure management planning by 2005. This percentage will continue to increase thereafter. Practices that reduce fecal coliform runoff will be promoted for manure management plans within the project area, and may be required for CAFOs. The MPCA conducts annual inspections of NPDES permittees. This will include inspections of manure application records and manure management plans. For feedlots with 300 to 999 animal units, with interim permits or construction permits, counties are responsible for inspections of manure application records and manure management plans. Funding to support technical assistance and to provide producer incentives will be sought to maximize producer adoption of manure management plans.

- Landscape Buffer Initiative: This BALMM strategy includes as areas targeted for grass buffers agricultural fields that have been designated for manure application. The Conservation Reserve Enhancement Program (CREP) provides federal and state funding for 51,000 acres of conservation easements. These include riparian buffers which can play a crucial role in reducing polluted runoff from fields where manure is applied.
- Conservation Tillage Strategy: Conservation tillage is a cost-effective way to reduce field runoff. Where manure is applied to cropland, the need for prompt incorporation must be balanced against the need to maintain surface residue cover for erosion control. With support from a Section 319 Grant, the University of Minnesota in spring 2002 published a document entitled, “Tillage Best Management Practices for Water Quality Protection in Southeastern Minnesota.” This publication is being used to promote conservation tillage in the context of manure management to reduce field runoff.
- Urban Stormwater: BALMM Strategy 4A, page 102-103, Basin Plan Scoping Document, describes a comprehensive strategy for stormwater runoff control in the basin.

- Municipal Wastewater Treatment: All permitted facilities are required to disinfect wastewater effluent to meet discharge standards. Biosolids management requirements are designed to minimize the potential for runoff to surface water or infiltration into ground water of pollutants, including fecal coliform bacteria. In addition to these standard measures, the MPCA has identified facilities where sewage bypasses following storm events are a recurring problem. These are: Claremont, Kasson, and West Concord - all in the Middle Fork Zumbro River watershed. These facilities have been upgraded and no longer experience chronic bypass problems.

9.2: Review and Revision of Current Implementation Plan:

Upon approval of this revised TMDL study, the MPCA will review and update the current Implementation Plan. This process of review and update will include additional data analysis, as well as input from the public and other stakeholders. Key elements of this process will include:

- Additional reach-by-reach data analysis to help define the magnitude and timing of needed fecal coliform reductions, and the specific sources that will need to make these reductions. Local stakeholder involvement will be critical as most reductions will likely need to come from "load allocation" sources where local programs and watershed projects have a greater influence that state-level regulation. A proposal is being considered by the Southeast Minnesota Water Resources Board (SEMWRB) whereby Local Water Plans could be amended to reflect targets established as part of the TMDL implementation plan.
- State and local level planning to address "straight-pipe" septic systems, which are now considered point sources. The proposal being considered by the SEMWRB would convene a work team that will develop recommendations by June 2006. This team would draw on the experience of the three counties currently involved in a pilot project to inventory, and require compliance of, septic systems that pose an imminent threat to public health or safety. All "straight-pipe" septic systems fall into this category.
- A process to ensure that Stormwater Pollution Prevention Plans (SWPPPs), as required by Municipal Separate Storm Sewer System (MS4) permits, contain appropriate provisions to address fecal coliform bacteria impairments. A team that would operate in parallel to the one addressing "straight-pipe" septic systems is also being proposed. The new State Stormwater Manual, found at (http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html) will be an important resource for this work.
- The establishment of specific goals, with timelines and progress report dates, for the ultimate elimination of "straight-pipe" septic systems, and the improvement of open feedlots with pollution hazards as required by state feedlot rules.

10.0 REASONABLE ASSURANCE

10.1 Evidence of BMP Implementability

The source-reduction strategies listed above have been shown to be efficacious in reducing pathogen transport and survival, and to be capable of widespread adoption by land owners and local resource managers.

- Feedlot runoff controls – these are evaluated by professional engineers through the Feedlot Evaluation Model referenced in Minn. R. ch. 7080. These rules are implemented by MPCA staff and by local staff of counties via a delegation agreement with the Agency. All counties except one (Olmsted) in the basin are so delegated. Olmsted County Extension is implementing certain facets of the new feedlot rules – Registration and Certification for the Open Lot Agreement.
- Individual Sewage Treatment Systems – ISTS with proper drain fields provide virtually complete treatment of fecal coliform bacteria. Straight-pipe septics discharge untreated wastewater to surface water. Acceptable designs are described in Minn. R. ch. 7020. All counties in the basin are delegated to implement these rules, which require conformance with state standards for new construction and disclosure of the state of the ISTS when property transfers ownership. Several counties require ISTS upgrades at property transfer.
- Municipal Wastewater Disinfection – Disinfection with chlorine or ultraviolet radiation is required of all NPDES permittees. In pond systems, which must meet the same fecal coliform discharge limit as other wastewater treatment systems, disinfection is generally passive with sunlight providing the ultraviolet radiation.
- Land Application of Manure – Buffer strips, immediate incorporation, and maintenance of surface residue have been demonstrated to reduce manure and pathogen runoff (Environmental Quality Board, General Environmental Impact Statement for Feedlots). The new state feedlots rules (Minn. R. ch. 7020) require manure application record-keeping and manure management planning, with the exact requirements differing according to size of operation and pollution risk of application, based on method, time and place of application.
- Erosion Control and Sediment Reduction – Conservation tillage and riparian buffer strips have been demonstrated to be effective in reducing sediment delivery to streams. Since embedded sediment can serve as a substrate for fecal coliform survival, reduction of sediment sources is considered an effective measure for controlling fecal coliform bacteria in streams.
- Planned Rotational Grazing: Sovell, et. al. 2000, demonstrated that rotational grazing, in contrast to conventional grazing, significantly reduces both

sedimentation and fecal coliform concentrations in water downstream of study sites in southeastern Minnesota.

- Urban Stormwater Management: Practices such as runoff detention, infiltration, and street sweeping have been shown to be effective in reducing urban runoff and associated pollutants. Twenty-six MS4 communities in the basin will be required to have a Phase II Stormwater Management Plan.

10.2 Non-Regulatory, Regulatory, and Incentive-Based Approaches

The above implementation strategies are included in the BALMM Basin Plan Scoping Document and are in the process of being implemented, often with support from federal grants. Several of the strategies build upon a solid foundation of state rules (feedlots, manure management, ISTS, stormwater, and municipal wastewater and biosolids) and county-delegated programs as a delivery system for technical and financial support and rule enforcement. Others will be pursued through strictly voluntary programs, such as promotion of buffers, rotational grazing, and conservation tillage. In the latter cases, BALMM strategies work through local delivery systems for technical and financial assistance, and are based on effective inter-agency collaboration. For these reasons, there is a high degree of "reasonable assurance" that source reduction strategies for this TMDL will be implemented within the near to mid-term future – the BALMM Basin Plan Scoping Document, on which all the strategies are based, calls for full implementation by 2010.

11.0 PUBLIC PARTICIPATION

11.1 Description of Public Participation Processes

Opportunity for public participation in developing the Revised TMDL will be afforded through a 30-day public comment period extending from Sept. 12 – Oct. 12, 2005. An extensive list of local and state level stakeholders were informed by a public notice mailing. A news release was issued to major media in the state. The public also was notified through an announcement in the State Register. The Revised TMDL was posted on the MPCA web site. The MPCA will provide responses to all written comments received before the close of the public notice period. These responses will be included in the Appendix.

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APPENDIX A: Loading Capacity Determination

APPENDIX B: U.S. District Court Decision

APPENDIX C: Letter from USEPA

APPENDIX D: E-mail from USEPA

APPENDIX E: Responses to Comments Received During Public Notice Period

APPENDIX A

Loading Capacity Determination

Under the current regulatory framework for development of TMDLs, calculation of the loading capacity for impaired segments identified on the §303(d) list is an important first step. EPA's current regulation defines loading capacity as *"the greatest amount of loading that a water can receive without violating water quality standards"*. The loading capacity provides a reference, which helps guide pollutant reduction efforts needed to bring a water into compliance with standards.

By definition, TMDLs are the sum of the allocations plus a *"margin of safety" [40 CFR §130.2(i)]*. Allocations are defined as the portion of a receiving water's loading capacity that is allocated to point or nonpoint sources and natural background. The Clean Water Act (CWA) §303(d) also states: *"such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations"*.

SEASONAL VARIATION

Basic hydrology represents a logical starting point to consider seasonal variation. Water resource planners have utilized stream flow data for years to support a variety of activities from development of public water supplies to fisheries management and flood control. A network of river gaging stations and published data obtained from their operation supports these water resource management efforts *(Leopold, 1994)*. Information on river flows across the United States is readily available from the U.S. Geological Survey (USGS).

Due to the wide range of variability that occurs in stream flows, hydrologists have long been interested in knowing seasonal patterns, as well as the percentage of days in a year when given flows occur. Seasonal flow patterns and the TMDL process are implicitly connected. A traditional load is the product of flow, concentration, and a conversion factor. Thus, analysis of flow patterns plays a major role when considering seasonal variation in TMDL development.

Seasonal Flow Patterns

An example of seasonal flow patterns using monthly statistics for the Mississippi River at Winona is shown in Figure A-1. Flow is expressed as a unit area rate, i.e. cubic feet per second (cfs) per square mile. Unit area rates are determined by dividing the drainage area at the gage into the flow. A unit area measure enables a consistent way to compare flows from watersheds and subwatersheds of different sizes.

Monthly flow information in Figure A-1 is displayed using *"box and whisker"* plots. This format allows analysis of general patterns by conveying information about distribution of the data for each month. The top of the *"whisker"* is the 90th percentile, i.e. ninety percent of all reported flows are at or below that level. The *"box"* depicts the 75th percentile (top) and the 25th percentile (bottom). Half of all observed values fall within this range. The line through the *"box"* is the median (or 50th percentile), while the bottom of the *"whisker"* represents the 10th percentile.

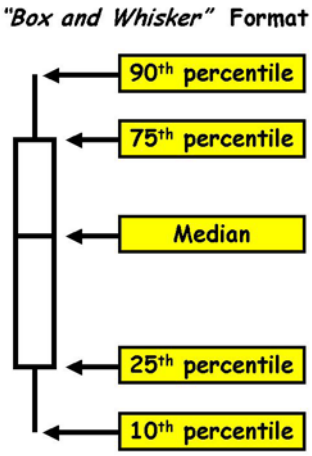
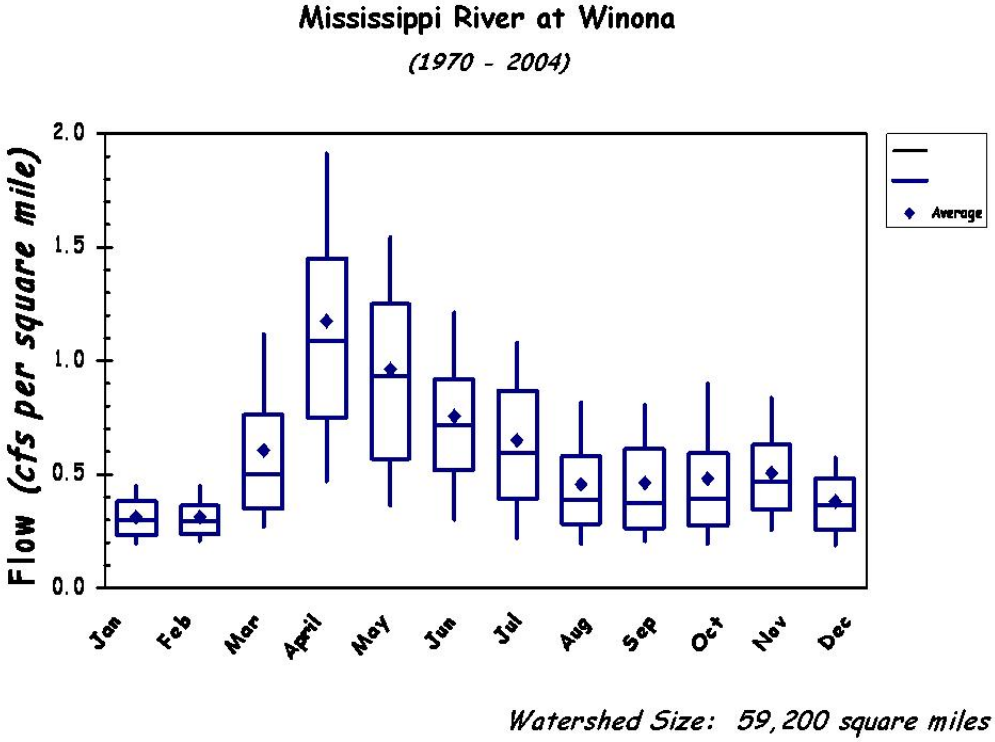


Figure A-1. Mississippi River Seasonal Flow Patterns

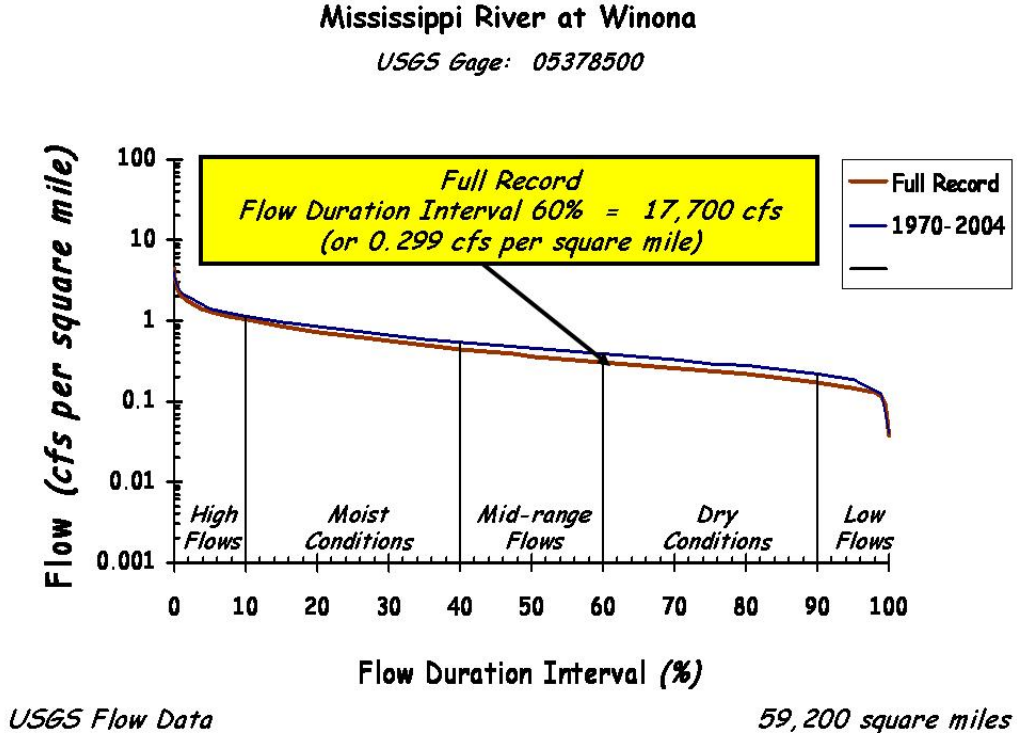


Seasonal variation in flow is a key part of TMDL development for two reasons. First, monthly loads are directly proportional to flows (i.e. load equals flow times concentration times a conversion factor). Second, water quality parameters are often related to stream flow rates. For instance, sediment concentrations typically increase with rising flows as a result of factors such as channel scour from higher velocities. Other parameters, such as chloride, may be more concentrated at low flows and more diluted by increased water volumes at higher flows.

Flow Duration Curves

Another way to view seasonal variation is through the use of flow duration curves. Duration curves describe the percentage of time during which specified flows are equaled or exceeded *(Leopold, 1994)*. Flow duration analysis looks at the cumulative frequency of historic flow data over a specified period. Duration analysis results in a curve, which relates flow values to the percent of time those values have been met or exceeded. Thus, the full range of stream flows is considered. Low flows are exceeded a majority of the time, whereas floods are exceeded infrequently. A typical curve runs from high to low along the x-axis, as illustrated in Figure A-2 for the Mississippi River.

Figure A-2. Mississippi River Flow Duration Curve

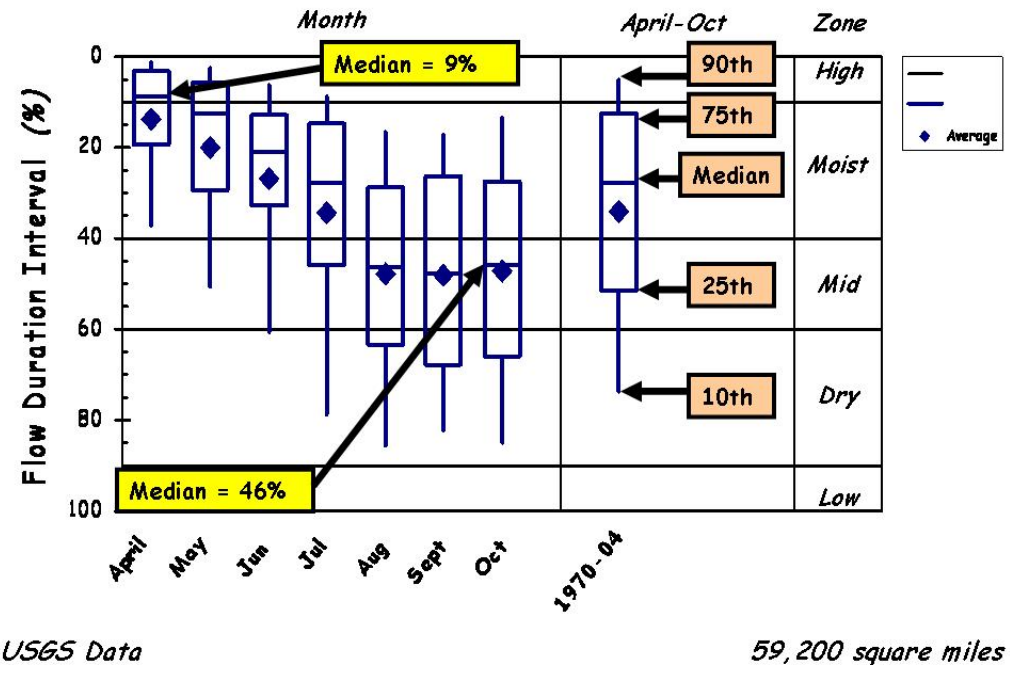


Flow duration curve development typically uses daily average discharge rates, which are sorted from the highest value to the lowest *(Figure A-2)*. Using this convention, flow duration intervals are expressed as a percentage, with zero corresponding to the highest stream discharge in the record (i.e. flood conditions) and 100 to the lowest (i.e. drought conditions). Thus, a flow duration interval of sixty associated with a stream discharge of 17,700 cubic feet per second (cfs) implies that sixty percent of all observed stream discharge values equal or exceed 17,700 cfs *(or 0.299 cfs per square mile)*.

Flow duration curve intervals can be grouped into several broad categories or zones. These zones provide additional insight about conditions and patterns associated with the impairment. A common way to look at the duration curve is by dividing it into five zones, as illustrated in Figure A-2: one representing *high flows (0-10%)*, another for *moist conditions (10-40%)*, one covering *mid-range flows (40-60%)*, another for *dry conditions (60-90%)*, and one representing *low flows (90-100%)*.

A duration curve framework provides another way to view seasonal variation. Figure A-3 illustrates monthly flow data expressed as duration curve intervals for the Mississippi River at Winona. As described earlier, the *"box and whisker"* format allows analysis of general patterns by conveying information on the distribution of the data.

Figure A-3. Mississippi River Monthly Variation



For example, April flows for the Mississippi River at Winona and its tributaries are typically in the high and moist zones (median flow around 9%). Accordingly, consideration of seasonal variation in TMDL development and implementation planning to address water quality concerns in April would focus on source areas typical of these conditions. For this region, moist conditions in April generally reflect more saturated soil conditions, when upland sources such as cultivated fields exert a greater influence on stream flow and water quality.

Conversely, August and September flows generally fall in the mid-range zone (median flow around 46%). Flows from tributary rivers, such as the Vermillion, Cannon, and Zumbro, are even lower, typically falling into the dry zone during these months. This shifts TMDL development and implementation planning to source areas representative of these conditions. For these tributaries to the Mississippi River, source assessment and implementation planning might focus on wastewater treatment plant discharges or activities that have a direct influence on streamside riparian areas (e.g. straight pipes and livestock access).

LOADING CAPACITY

The loading capacity for these TMDLs must consider Minnesota's water quality standard, specifically the monthly geometric mean of 200 organisms per 100 milliliters (mL) between April 1 and October 31. These TMDLs are being established to meet the geometric mean of 200 organisms per 100mL, rather than the no exceedence in more than ten percent of single samples of either 400 or 2000 (depending on use classification). This is consistent with material in EPA's recent promulgation of water quality criteria for coastal recreational waters.

The preamble of the coastal recreational water rule states: *"the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation"* (EPA, 2004). Thus, the rule provides a context for multi-value bacteria criteria with respect to Clean Water Act implementation programs, such as TMDLs and NPDES permit requirements. This context is to meet the geometric mean criteria for bacterial indicators, such as E. coli, enterococci, or fecal coliform.

Typically, loads are expressed as chemical mass per time, such as pounds per day or tons per year. The loading capacity of a stream is determined using:

- the water quality criterion or target value; and
- a design flow for the receiving water.

Minnesota's water quality criterion for fecal coliform is expressed as a monthly geometric mean of organisms per 100 milliliters *(org/100mL)*. Based on the criterion, the appropriate expression of loads in this TMDL is organisms per month. Table A-1 describes an approach used in TMDL development to calculate bacteria loads, which includes needed conversion factors.

Table A-1. Calculation of Bacteria Loads

Load *(org/month)* = Concentration *(org/100mL)* * Flow *(cfs)* * Factor			
multiply by **3785.2** *to convert*	mL per gallon	→	org / 100 gallon
divide by **100** *to convert*		→	org / gallon
multiply by **7.48** *to convert*	gallon per ft^3	→	org / ft^3
multiply by **86,400** *to convert*	seconds per day	→	ft^3 / day
multiply by **30** *to convert*	days per month	→	ft^3 / month
multiply by **733,880,632** *to convert*	**(org/100mL) * ft^3 / sec**	→	**org / month**

The factor *"733,880,632"* is needed to convert the units of organisms per 100 milliliters and cubic feet per second to organisms per month. Loading capacities calculated in this manner result in extremely large numbers (i.e. numbers of organisms in the billions, trillions, or quadrillions per month). In order to avoid the difficulties of communicating information associated with large counts (e.g. macro numbers of microorganisms), loading capacities are expressed as trillion organisms per month (tera- or T-org/month), similar to computer abbreviations of MB for megabytes, GB for gigabytes, or TB for terabytes.

Consistent with characteristics of the numeric water quality criterion, monthly mean flows can be used to identify loading capacities. This approach offers a way to develop a quantitative analysis of seasonal variation indicative of the monthly target in the water quality standards (i.e. larger loads in months with higher flows and smaller loads in months with lower flows).

A network of flow gages in southeast Minnesota has been operated by the USGS. Relative differences in flows between months and between sites can be illustrated by comparing data from these gages. Table A-2 summarizes individual monthly mean flow values using USGS data collected from 1974 to 2004 for the Vermillion River near Empire. Summary statistics for each month of the recreation season (April – October) are included at the bottom of Table A-2, expressed as unit area flow rates (e.g. cubic feet per second / square mile).

Table A-2. Vermillion River Monthly Mean Flows

		Month						
		Apr	May	June	July	Aug	Sept	Oct
Individual Monthly Mean Flows *(cfs)*	1974	96.2	54.2	77.0	27.7	25.6	19.6	20.7
	1975	168.6	117.1	140.5	62.4	46.7	39.1	30.8
	1976	71.0	37.3	25.5	16.9	14.3	14.6	14.9
	1977	35.2	29.3	25.7	27.7	24.5	27.6	33.2
	1978	60.2	46.6	50.2	77.1	33.4	52.2	26.9
	1979	123.8	58.8	48.5	36.8	73.8	77.3	45.1
	1980	82.2	42.2	67.4	26.3	32.6	46.9	39.0
	1981	37.5	36.9	31.8	33.5	58.6	37.1	33.8
	1982	102.2	75.8	47.2	30.0	24.9	37.4	42.7
	1983	244.4	194.2	93.9	67.5	46.8	42.7	45.6
	1984	136.3	128.8	103.8	80.6	104.7	51.5	86.3
	1985	117.4	66.3	46.9	31.9	33.7	39.2	87.9
	1986	194.8	223.3	123.9	104.1	65.1	210.3	135.3
	1987	46.8	40.2	27.4	63.6	60.2	33.0	30.6
	1988	40.1	58.9	23.0	16.0	17.4	18.0	17.7
	1989	91.6	64.5	38.3	27.0	25.2	24.3	20.6
	1990	36.3	53.1	100.5	65.3	39.2	27.5	31.4
	1991	45.8	108.9	57.8	28.8	25.0	36.8	33.7
	1992	101.6	58.0	70.9	146.4	61.8	313.0	125.6
	1993	193.6	158.8	289.7	202.5	179.5	131.2	94.0
	1994	98.3	96.5	135.5	63.9	56.4	101.2	160.4
	1995	123.1	107.5	125.5	74.2	67.0	44.1	66.7
	1996	134.6	94.8	95.4	52.9	41.8	38.4	65.1
	1997	132.8	77.4	64.8	257.7	234.1	157.1	116.9
	1998	281.3	169.2	269.3	236.5	145.3	88.3	92.8
	1999	212.9	198.5	111.0	130.7	82.1	61.8	46.8
	2000	63.6	74.4	102.7	146.7	60.5	49.0	44.0
	2001	336.6	147.0	137.3	51.1	39.6	39.9	44.9
	2002	94.4	76.2	199.9	83.7	188.6	165.1	263.1
	2003	102.2	181.2	72.9	62.1	35.2	37.9	43.0
	2004	65.8	86.5	131.2	68.8	45.4	85.3	55.2
Summary Statistics *(cfs/sq.mi.)*	Maximum	2.609	1.731	2.246	1.998	1.815	2.426	2.040
	Average	0.918	0.741	0.734	0.600	0.497	0.537	0.499
	Median	0.788	0.591	0.597	0.493	0.362	0.331	0.348
	25^{th} Percentile	0.502	0.435	0.371	0.240	0.256	0.287	0.251
	10^{th} Percentile	0.311	0.312	0.212	0.210	0.193	0.188	0.160
	Minimum	0.273	0.227	0.178	0.124	0.111	0.113	0.115

Table A-3 continues the analysis using median values (e.g. half the monthly average values are above the median; half are below) to illustrate relative differences between months and between sites. Flow duration curves can also be developed using individual monthly average values (as opposed to daily average flows). Duration curve intervals based on this method using the median value in Table A-3 are presented for each site, as an indicator of relative monthly flow conditions (e.g. moist, mid-range, dry).

Table A-3. Monthly Average Flow Summary

Gage	Area	Stat	Month						
			Apr	May	June	July	Aug	Sept	Oct
Vermillion River near Empire	129	UAF[1]	0.788	0.591	0.597	0.493	0.362	0.331	0.348
		FDI[2]	28%	40%	39%	50%	64%	69%	67%
Straight River near Faribault	442	UAF[1]	1.197	0.840	0.754	0.473	0.237	0.230	0.247
		FDI[2]	23%	35%	39%	54%	72%	73%	71%
Cannon River at Welch	1,340	UAF[1]	0.731	0.513	0.507	0.405	0.204	0.191	0.168
		FDI[2]	24%	37%	38%	44%	64%	66%	73%
N.F. Whitewater River near Elba	101	UAF[1]	0.476	0.366	0.439	0.446	0.389	0.352	0.333
		FDI[2]	34%	54%	39%	38%	46%	57%	62%
S.F. Whitewater River near Altura	76.8	UAF[1]	0.384	0.243	0.412	0.385	0.224	0.208	0.202
		FDI[2]	31%	54%	26%	29%	60%	67%	68%
Garvin Brook near Minnesota City	46	UAF[1]	0.790	0.781	0.733	0.756	0.713	0.699	0.704
		FDI[2]	32%	37%	49%	43%	61%	63%	62%
S.F. Zumbro at Rochester	303	UAF[1]	1.099	0.800	0.755	0.585	0.385	0.410	0.345
		FDI[2]	25%	36%	38%	49%	68%	66%	73%
Zumbro River at Kellogg	1,400	UAF[1]	0.765	0.596	0.502	0.466	0.464	0.468	0.380
		FDI[2]	31%	41%	47%	55%	56%	55%	68%
Rush Creek near Rushford	132	UAF[1]	0.368	0.329	0.392	0.364	0.309	0.317	0.305
		FDI[2]	40%	55%	33%	41%	63%	59%	64%
Root River near Houston	1,250	UAF[1]	0.807	0.562	0.726	0.546	0.491	0.422	0.375
		FDI[2]	26%	46%	33%	49%	57%	66%	72%
S.F. Root River near Houston	275	UAF[1]	0.524	0.456	0.483	0.460	0.446	0.413	0.382
		FDI[2]	38%	48%	43%	47%	52%	59%	65%
Cedar River near Austin	399	UAF[1]	0.888	0.576	0.659	0.440	0.248	0.243	0.247
		FDI[2]	26%	40%	35%	49%	69%	70%	69%
Shell Rock River near Northwood, IA	300	UAF[1]	1.011	0.600	0.595	0.410	0.160	0.126	0.141
		FDI[2]	22%	35%	36%	49%	71%	77%	74%

Notes on Stat: [1] UAF: median monthly average unit area flow *(cfs per square mile)*
[2] FDI: flow duration interval *(%)*

As seen in Table A-3, seasonal patterns reflect generally higher flows in April with a transition to lower flows in summer months. However, interannual variation is another factor to consider when identifying loading capacities. Average values for the same month can vary as a result of weather conditions (e.g. an unusually dry April or an abnormally wet August), as shown in Table A-2 for the Vermillion River.

Two approaches for identifying loading capacities are considered. The monthly approach specifies a loading capacity for each month between April and October on every impaired segment. The duration curve framework uses a frequency distribution based on all individual months over the same period. Loading capacities are identified for each duration curve zone on every impaired segment.

Monthly Approach

One possible way to determine a design flow for each month is to first look at patterns and general tendencies, then identify an appropriate return period. For instance, water quality-based permits for dissolved oxygen and biochemical oxygen demand (BOD) have long used the *"7Q10"* (i.e. the seven-day average low flow that occurs once every ten years). This is a very conservative approach because nine out of ten years, water levels will be above the seven-day average low flow. Other water quality-based return intervals used in include values such as the *"4Q3"* (i.e. four-day average low flow that occurs once every three years) for chronic toxicity.

The summary statistics in Table A-2 includes an array of possible return intervals *(expressed as unit area flows)*, which could be considered in establishing loading capacities for the Vermillion River near Empire. This same information is displayed in Figure A-4 using duration curve intervals.

Figure A-4. Vermillion River Monthly Variation

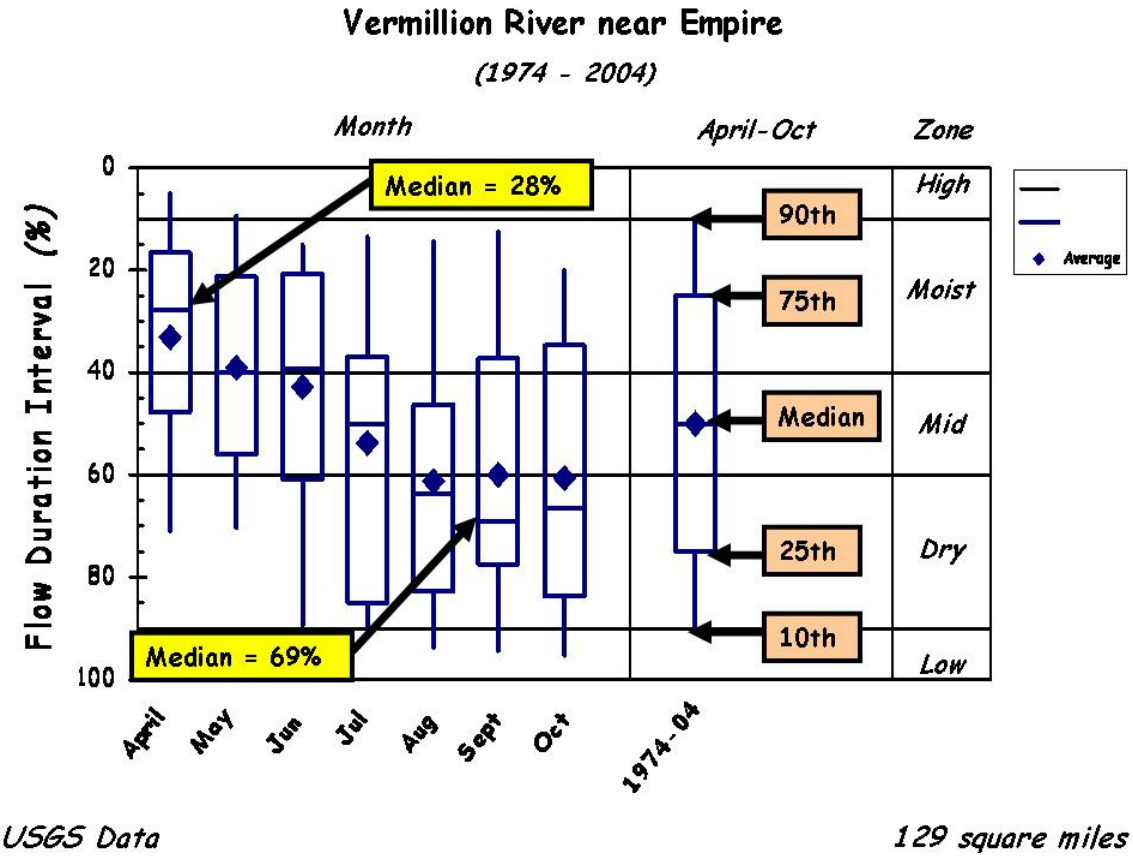


Table A-4 takes the analysis to the next step, using a four-year return interval (e.g. *"Monthly-Q4"* or 25th percentile) to identify monthly loading capacities for sites where long term flow data exists. Target amounts available for waste load and load allocations, which meet water quality standards, can be specified for each month.

A *"margin of safety"*, as required by the CWA §303(d), can also be identified for each month. For example, allocations could be established so as to not exceed the load associated with the ten-year return period (e.g. *"Monthly-Q10"* or 10th percentile). In this case, each monthly *"margin of safety"*, which accounts for uncertainty, is the difference between the four-year and the ten-year return periods (graphically, this corresponds to the length of each bottom *"whisker"* in Figure A-4).

Table A-4. Monthly Loading Capacity Summary

Site	Area	Stat	Month						
			Apr	May	June	July	Aug	Sept	Oct
Vermillion River near Empire	129	UAF[1]	0.502	0.435	0.371	0.240	0.256	0.287	0.251
		FDI[2]	48%	56%	61%	85%	83%	77%	84%
		LC[3]	9.50	8.23	7.03	4.55	4.84	5.43	4.74
Straight River near Faribault	442	UAF[1]	0.531	0.537	0.424	0.277	0.150	0.106	0.121
		FDI[2]	50%	50%	57%	68%	81%	88%	86%
		LC[3]	34.42	34.84	27.52	17.99	9.74	6.89	7.85
Cannon River at Welch	1,340	UAF[1]	0.348	0.259	0.254	0.152	0.126	0.097	0.100
		FDI[2]	48%	57%	57%	75%	82%	89%	88%
		LC[3]	68.52	50.90	49.91	29.91	24.78	19.14	19.74
S.F. Zumbro River at Rochester	303	UAF[1]	0.578	0.547	0.414	0.463	0.274	0.221	0.223
		FDI[2]	50%	52%	66%	60%	82%	88%	87%
		LC[3]	25.71	24.31	18.41	20.57	12.20	9.81	9.91
Root River near Houston	1,250	UAF[1]	0.497	0.441	0.415	0.375	0.301	0.288	0.298
		FDI[2]	56%	65%	66%	72%	84%	86%	85%
		LC[3]	91.23	80.82	76.09	68.76	55.24	52.81	54.74
Cedar River near Austin	399	UAF[1]	0.438	0.364	0.300	0.219	0.168	0.164	0.150
		FDI[2]	49%	56%	63%	74%	85%	86%	88%
		LC[3]	25.63	21.35	17.59	12.83	9.86	9.63	8.80

Notes on Stat: [1] UAF: Unit area flow *(cfs per square mile)*
[2] FDI: Flow duration interval *(%)*
[3] LC: Loading capacity *(tera- or T-org per month)*

Using the monthly approach to identify loading capacities raises a key issue, notably selection of an appropriate return interval. Resolution of this issue may involve a lengthy debate focused on risk management decisions. Furthermore, communicating this form of technical information to those ultimately responsible for implementation presents a major challenge.

Duration Curve Framework

An alternative approach that can also be used to reflect seasonal variation is the use of duration curve zones. Table A-5 uses duration curve zones to identify the same loading capacity information. Loading capacities are organized in a way that reflect actual flow conditions for any given month; a major factor in load calculations. Seasonal variation is also considered in Table A-5 by highlighting the zone most indicative of flows for each month. Finally, a connection to potential implementation efforts is built into the duration curve framework by identifying opportunities, which can best address water quality concerns in each zone.

Table A-5. Duration Curve Loading Capacity Framework

	Duration Curve Zone *(Loading Capacity expressed as T-org/month)*				
	High	**Moist**	**Mid**	**Dry**	**Low**
Vermillion River near Empire	31.6	15.4	9.34	5.56	3.30
Straight River near Faribault	165	74.0	34.6	13.1	4.86
Seasonal Considerations *[most likely zone(s) by month]*		***April***			
		May			
			June		
			July		
				August	
				September	
			October		
Implementation Opportunities	***Long-term CSO plans***				***Municipal NPDES***
		On-site wastewater management			
		Pasture management & riparian protection			
	Urban storm water management				
	Open lot agreements				
	Manure management				

Where active USGS gages exist, flow and loading capacity calculations are relatively straightforward. Historic data is used to ensure an adequate number of wet and dry years are considered in the duration curve analysis. Table A-6 identifies active gaging sites that coincide with listed streams. Similar to the monthly approach, target amounts available for load and waste load allocations, which meet water quality standards, can be specified for each zone.

Table A-6. Loading Capacities for Gaged Streams

Gage ID		Area ($mi.^2$)	Duration Curve Zone (Loading Capacity expressed as T-org/month)				
			High	Moist	Mid	Dry	Low
05345000	Vermillion River near Empire	129	31.6	15.4	9.34	5.56	3.30
05353800	Straight River near Faribault	442	165	74.0	34.6	13.1	4.86
05355200	Cannon River at Welch	1,340	382.3	138.4	64.67	30.58	14.07
05372995	S.F. Zumbro River at Rochester	303	105.7	47.1	25.38	14.50	5.21
05374900	Zumbro River at Kellogg	1,400	360.4	176.3	100.59	68.79	45.81
05376000	N.F. Whitewater near Elba	101	17.7	8.2	5.51	4.27	2.62
05376500	S.F. Whitewater near Altura	76.8	9.7	4.7	2.93	2.09	1.64
05378235	Garvin Brook near Minn. City	46	7.1	5.5	4.92	4.57	3.35
05384500	Rush Creek near Rushford	132	13.2	8.6	6.56	5.60	4.68
05385000	Root River near Houston	1,250	311	151	100	66.4	41.75
05385500	S.B. Root River near Houston	275	44.6	24.6	18.23	13.67	10.75
05457000	Cedar River near Austin	399	143.3	53.8	25.19	12.69	6.93
05459000	Shell Rock River near Northwood	300	86.6	38.9	17.75	5.96	2.50

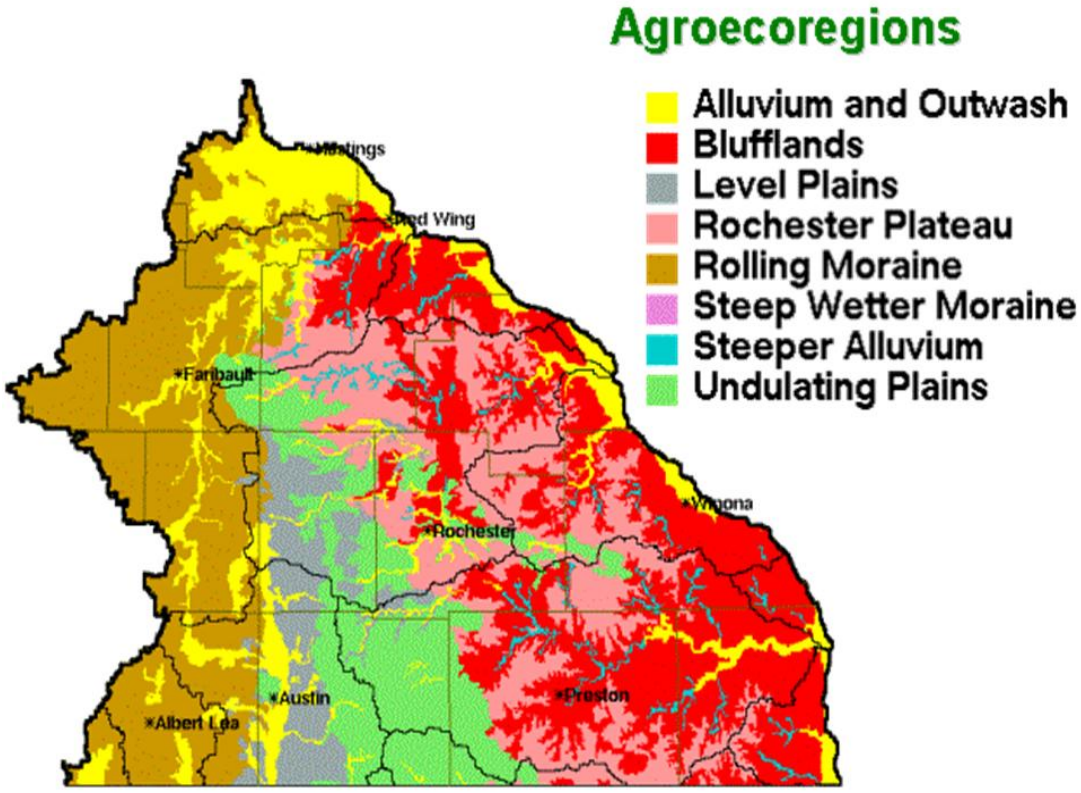
A *"margin of safety"* can also be identified for each zone. For example, allocations can be established so as to not exceed the load associated with the minimum flow for each zone. In this case, each zone *"margin of safety"*, which accounts for uncertainty, is the difference between the central point and the right-hand boundary.

Use of unit area flow rates, expressed as cubic feet per second (cfs) per square mile, allow loading capacities to be identified at different points in the watershed. In each case, the loading capacity is the product of the unit area flow, the drainage area (expressed as square miles), the water quality target (e.g. the geometric means E. Coli criterion), and the conversion factor.

A number of segments included in this watershed-scale TMDL do not have active USGS gaging sites. Flows and loading capacities must be estimated based on historic information. Generally, these segments are associated with tributaries that flow into larger gaged streams (e.g. Maple Creek, Turtle Creek, into the Straight River, etc).

Watershed characteristics, such as land use and land form can be used to guide flow estimation on ungaged segments. Agroecoregions developed by the University of Minnesota, shown in Figure A-5, have been used to help identify a corresponding gage most appropriate to develop flow estimates for ungaged, impaired segments. Thus, the unit area duration curves derived from flow information collected at the long term gaged sites are used for ungaged sites in the same representative area. Table A-7 summarizes stream gage information used for each impaired segment.

Figure A-5. Southeast Minnesota Agroecoregions



*(**See University of Minnesota Web Site**:*
http://www.soils.umn.edu/research/seminn/doc/agecoregionnew.html*)*

Table A-7a. SE Regional Bacteria Loading Capacities -- Stream Gages Used

Segment ID	Stream Name	Area ($mi.^2$)	USGS Gage Used for Segment	
			Gage ID	Gage Name
07040001-507	Vermillion River	142.2	05345000	Vermillion River near Empire
07040001-506	Vermillion River	272.7	05345000	Vermillion River near Empire
07040002-518	Turtle Creek	44.0	05353800	Straight River near Faribault
07040002-519	Maple Creek	38.5	05353800	Straight River near Faribault
07040002-516	Crane Creek	105.6	05353800	Straight River near Faribault
07040002-505	Rush Creek	22.4	05353800	Straight River near Faribault
07040002-517	Straight River	134.8	05353800	Straight River near Faribault
07040002-535	Straight River	203.9	05353800	Straight River near Faribault
07040002-503	Straight River	252.0	05353800	Straight River near Faribault
07040002-515	Straight River	460.8	05353800	Straight River near Faribault
07040002-528	Chub Creek	63.8	05353800	Straight River near Faribault
07040002-504	Prairie Creek	79.5	05353800	Straight River near Faribault
07040002-512	Unnamed Creek	17.5	05353800	Straight River near Faribault
07040002-513	Unnamed Prairie Trib	12.5	05353800	Straight River near Faribault
07040002-509	Cannon River	957.0	05355200	Cannon River at Welch
07040002-502	Cannon River	1,386	05355200	Cannon River at Welch

Table A-7b. SE Regional Bacteria Loading Capacities – Stream Gages Used

Segment ID	Stream Name	Area ($mi.^2$)	USGS Gage Used for Segment	
			Gage ID	Gage Name
07040003-505	SF Whitewater	55.0	05376500	S.F. Whitewater near Altura
07040003-512	SF Whitewater	92.7	05376500	S.F. Whitewater near Altura
07040003-514	MF Whitewater	53.5	05376500	S.F. Whitewater near Altura
07040003-536	Logan Branch	17.2	05376000	N.F. Whitewater near Elba
07040003-553	NF Whitewater	19.9	05376000	N.F. Whitewater near Elba
07040003-554	NF Whitewater	104.2	05376000	N.F. Whitewater near Elba
07040003-559	Stockton Valley	19.9	05378300	Straight Valley Creek near Rollingstone
07040003-542	Garvin Brook	48.8	05378235	Garvin Brook near Minnesota City
07040004-503	Salem Creek	62.3	05372995	S.F. Zumbro River at Rochester
07040004-536	S.F. Zumbro	157.0	05372995	S.F. Zumbro River at Rochester
07040004-535	S.F. Zumbro	239.0	05372995	S.F. Zumbro River at Rochester
07040004-533	S.F. Zumbro	259.8	05372995	S.F. Zumbro River at Rochester
07040004-507	S.F. Zumbro	348.8	05372995	S.F. Zumbro River at Rochester
07040004-502	Zumbro River	1,401	05374900	Zumbro River at Kellogg
07040004-501	Zumbro River	1,488	05374900	Zumbro River at Kellogg
07040008-503	Robinson Creek	17.0	05372995	S.F. Zumbro River at Rochester
07040008-521	Money Creek	76.6	05384500	Rush Creek near Rushford
07040008-586	S.B. Root River	60.8	05385500	S.B. Root River near Houston
07040008-555	S.B. Root River	142.9	05385500	S.B. Root River near Houston
07040008-501	Root River	1,660	05385000	Root River near Houston
07080201-502	Cedar River	184.9	05457000	Cedar River near Austin
07080201-501	Cedar River	544.2	05457000	Cedar River near Austin
07080202-501	Shell Rock River	195.2	05459000	Shell Rock River near Northwood

SUMMARY

Two methods have been considered to identify loading capacities for the Southeast Minnesota Regional Fecal Coliform TMDL: the monthly approach and the duration curve framework. Each method uses stream discharge information from USGS sites located within the Region to determine unit area flow rates, which form the basis for identifying loading capacities.

The monthly approach accounts for seasonal variation through a direct connection to Minnesota's water quality criterion for fecal coliform. However, the monthly approach also has major drawbacks. Disadvantages include issues associated with interannual variation, as well as the challenge of effectively connecting with implementation efforts needed to meet water quality standards. The duration curve framework addresses both concerns. Table A-8 summarizes the loading capacities for each impaired segment included in this TMDL using the duration curve framework.

Table A-8. SE Regional Bacteria Loading Capacities -- Duration Curve Framework

Segment ID	Stream Name	Area ($mi.^2$)	Duration Curve Zone (Loading Capacity expressed as T-org/month)				
			High	Moist	Mid	Dry	Low
07040001-507	Vermillion River	142.2	34.79	16.95	10.29	6.13	3.64
07040001-506	Vermillion River	272.7	66.71	32.50	19.74	11.75	6.98
07040002-518	Turtle Creek	44.0	16.41	7.37	3.44	1.31	0.48
07040002-519	Maple Creek	38.5	14.36	6.45	3.01	1.14	0.42
07040002-516	Crane Creek	105.6	39.38	17.68	8.26	3.14	1.16
07040002-505	Rush Creek	22.4	8.35	3.75	1.75	0.67	0.25
07040002-517	Straight River	134.8	50.27	22.57	10.54	4.01	1.48
07040002-535	Straight River	203.9	76.05	34.14	15.94	6.06	2.24
07040002-503	Straight River	252.0	93.99	42.19	19.71	7.49	2.77
07040002-515	Straight River	460.8	171.86	77.15	36.03	13.70	5.06
07040002-528	Chub Creek	63.8	23.79	10.68	4.99	1.90	0.70
07040002-504	Prairie Creek	79.5	29.65	13.31	6.22	2.36	0.87
07040002-512	Unnamed Creek	17.5	6.53	2.93	1.37	0.52	0.19
07040002-513	Unnamed Prairie Trib	12.5	4.66	2.09	0.98	0.37	0.14
07040002-509	Cannon River	957.0	273.01	98.81	46.19	21.84	10.05
07040002-502	Cannon River	1,386	395.39	143.11	66.89	31.63	14.55
07040003-505	S.F. Whitewater River	55.0	6.93	3.36	2.10	1.50	1.18
07040003-512	S.F. Whitewater River	92.7	11.68	5.66	3.53	2.53	1.98
07040003-514	M.F. Whitewater River	53.5	6.74	3.27	2.04	1.46	1.14
07040003-536	Logan Branch	17.2	3.01	1.39	0.94	0.73	0.45
07040003-553	N.F. Whitewater River	19.9	3.49	1.61	1.09	0.84	0.52
07040003-554	N.F. Whitewater River	104.2	18.25	8.42	5.69	4.40	2.70
07040003-559	Stockton Valley Creek	19.9	2.20	1.41	1.10	0.95	0.68
07040003-542	Garvin Brook	48.8	7.55	5.84	5.22	4.85	3.56
07040004-503	Salem Creek	62.3	21.73	9.69	5.22	2.98	1.07
07040004-536	S.F. Zumbro River	157.0	54.77	24.43	13.15	7.52	2.70
07040004-535	S.F. Zumbro River	239.0	83.36	37.19	20.02	11.44	4.11
07040004-533	S.F. Zumbro River	259.8	90.63	40.43	21.76	12.44	4.47
07040004-507	S.F. Zumbro River	348.8	121.66	54.27	29.21	16.69	6.00
07040004-502	Zumbro River	1,401	360.62	176.42	100.66	68.83	45.84
07040004-501	Zumbro River	1,488	383.01	187.37	106.91	73.11	48.69
07040008-503	Robinson Creek	17.0	5.93	2.64	1.42	0.81	0.29
07040008-521	Money Creek	76.6	7.66	4.99	3.81	3.25	2.72
07040008-586	S.B. Root River	60.8	9.86	5.43	4.03	3.02	2.38
07040008-555	S.B. Root River	142.9	23.16	12.77	9.48	7.10	5.59
07040008-501	Root River	1,660	413.07	201.09	132.33	88.11	55.45
07080201-502	Cedar River	184.9	66.38	24.95	11.67	5.88	3.21
07080201-501	Cedar River	544.2	195.38	73.42	34.36	17.30	9.45
07080202-501	Shell Rock River	195.2	56.33	25.28	11.55	3.88	1.63

TMDL Framework

The duration curve approach is the preferred method used to identify loading capacities for §303(d) listed segments included in the SE Minnesota Regional Bacteria TMDL. The duration curve framework considers seasonal variation and addresses difficult issues associated with the monthly approach (e.g. specifying recurrence intervals). The duration curve framework also allows targets to be presented in a way that connects with implementation efforts.

Table A-9 summarizes the TMDL framework using the duration curve approach, showing the TMDL (equivalent to the loading capacity), the *"margin of safety"*, and the amount available for allocations (both load and wasteload).

Table A-9a. SE Regional Bacteria TMDL Framework -- Duration Curve Method

Segment ID	Stream Name	Area ($mi.^2$)		Duration Curve Zone (*Loading Capacity expressed as T-org/month*)				
				High	Moist	Mid	Dry	Low
07040001-507	Vermillion River	142.2	TMDL	34.79	16.95	10.29	6.13	3.64
			MOS	6.74	4.64	2.29	0.31	0.18
			Allocation	28.05	12.31	8.00	5.82	3.46
07040001-506	Vermillion River	272.7	TMDL	66.71	32.50	19.74	11.75	6.98
			MOS	12.93	8.90	4.39	3.38	0.35
			Allocation	53.78	23.60	15.35	8.37	6.63

Table A-9b. SE Regional Bacteria TMDL Framework -- Duration Curve Method

Segment ID	Stream Name	Area ($mi.^2$)		Duration Curve Zone (Loading Capacity expressed as T-org/month)				
				High	Moist	Mid	Dry	Low
07040002-518	Turtle Creek	44.0	TMDL	16.41	7.37	3.44	1.31	0.48
			MOS	4.18	2.70	1.19	0.68	0.25
			Allocation	12.23	4.67	2.25	0.63	0.23
07040002-519	Maple Creek	38.5	TMDL	14.36	6.45	3.01	1.14	0.42
			MOS	3.65	2.37	1.04	0.60	0.22
			Allocation	10.71	4.08	1.97	0.54	0.20
07040002-516	Crane Creek	105.6	TMDL	39.38	17.68	8.26	3.14	1.16
			MOS	10.02	6.49	2.85	1.64	0.60
			Allocation	29.36	11.19	5.41	1.50	0.56
07040002-505	Rush Creek	22.4	TMDL	8.35	3.75	1.75	0.67	0.25
			MOS	2.13	1.38	0.61	0.35	0.13
			Allocation	6.23	2.37	1.14	0.32	0.12
07040002-517	Straight River	134.8	TMDL	50.27	22.57	10.54	4.01	1.48
			MOS	12.79	8.28	3.64	2.10	0.76
			Allocation	37.48	14.29	6.90	1.91	0.72
07040002-535	Straight River	203.9	TMDL	76.05	34.14	15.94	6.06	2.24
			MOS	19.35	12.53	5.51	3.17	1.15
			Allocation	56.70	21.61	10.43	2.89	1.09
07040002-503	Straight River	252.0	TMDL	93.99	42.19	19.71	7.49	2.77
			MOS	23.91	15.49	6.81	3.92	1.43
			Allocation	70.08	26.70	12.90	3.57	1.34
07040002-515	Straight River	460.8	TMDL	171.86	77.15	36.03	13.70	5.06
			MOS	43.72	28.32	12.45	7.17	0.25
			Allocation	128.14	48.83	23.58	6.53	4.81
07040002-528	Chub Creek	63.8	TMDL	23.79	10.68	4.99	1.90	0.70
			MOS	6.05	3.92	1.72	0.99	0.36
			Allocation	17.74	6.76	3.27	0.91	0.34
07040002-504	Prairie Creek	79.5	TMDL	29.65	13.31	6.22	2.36	0.87
			MOS	7.54	4.89	2.15	1.24	0.45
			Allocation	22.11	8.42	4.07	1.12	0.42
07040002-512	Unnamed Creek	17.5	TMDL	6.53	2.93	1.37	0.52	0.19
			MOS	1.66	1.08	0.47	0.27	0.10
			Allocation	4.87	1.85	0.90	0.25	0.09
07040002-513	Unnamed Prairie Trib	12.5	TMDL	4.66	2.09	0.98	0.37	0.14
			MOS	1.19	0.77	0.34	0.19	0.07
			Allocation	3.47	1.32	0.64	0.18	0.07
07040002-509	Cannon River	957.0	TMDL	273.01	98.81	46.19	21.84	10.05
			MOS	94.67	31.50	14.67	8.79	3.18
			Allocation	178.34	67.31	31.52	13.05	6.87
07040002-502	Cannon River	1,386	TMDL	395.39	143.11	66.89	31.63	14.55
			MOS	137.10	45.62	21.25	12.73	4.61
			Allocation	258.29	97.49	45.64	18.90	9.94

Table A-9c. SE Regional Bacteria TMDL Framework -- Duration Curve Method

Segment ID	Stream Name	Area ($mi.^2$)		Duration Curve Zone (Loading Capacity expressed as T-org/month)				
				High	Moist	Mid	Dry	Low
07040003-505	S.F. Whitewater River	55.0	TMDL	6.93	3.36	2.10	1.50	1.18
			MOS	1.84	0.95	0.28	0.20	0.22
			Allocation	5.09	2.41	1.82	1.30	0.96
07040003-512	S.F. Whitewater River	92.7	TMDL	11.68	5.66	3.53	2.53	1.98
			MOS	3.11	1.60	0.46	0.33	0.38
			Allocation	8.57	4.06	3.07	2.20	1.60
07040003-514	M.F. Whitewater River	53.5	TMDL	6.74	3.27	2.04	1.46	1.14
			MOS	1.79	0.92	0.27	0.19	0.22
			Allocation	4.95	2.35	1.77	1.27	0.92
07040003-552	Logan Branch	17.2	TMDL	3.01	1.39	0.94	0.73	0.45
			MOS	0.76	0.30	0.07	0.20	0.11
			Allocation	2.25	1.09	0.87	0.53	0.34
07040003-553	N.F. Whitewater River	19.9	TMDL	3.49	1.61	1.09	0.84	0.52
			MOS	0.88	0.34	0.09	0.23	0.13
			Allocation	2.61	1.27	1.00	0.61	0.39
07040003-554	N.F. Whitewater River	104.2	TMDL	18.25	8.42	5.69	4.40	2.70
			MOS	4.62	1.79	0.45	1.19	0.66
			Allocation	13.63	6.63	5.24	3.21	2.04
07040003-559	Stockton Valley Creek	19.9	TMDL	2.20	1.41	1.10	0.95	0.68
			MOS	0.25	0.19	0.05	0.17	0.12
			Allocation	1.95	1.22	1.05	0.78	0.56
07040003-542	Garvin Brook	48.8	TMDL	7.55	5.84	5.22	4.85	3.56
			MOS	1.25	0.29	0.07	0.88	0.34
			Allocation	6.30	5.55	5.15	3.97	3.22
07040004-503	Salem Creek	62.3	TMDL	21.73	9.69	5.22	2.98	1.07
			MOS	4.43	3.10	0.99	1.16	0.47
			Allocation	17.30	6.59	4.23	1.82	0.60
07040004-536	S.F. Zumbro River	157.0	TMDL	54.77	24.43	13.15	7.52	2.70
			MOS	11.16	7.80	2.50	2.93	1.18
			Allocation	43.61	16.63	10.65	4.59	1.52
07040004-535	S.F. Zumbro River	239.0	TMDL	83.36	37.19	20.02	11.44	4.11
			MOS	16.99	11.87	3.80	4.46	1.80
			Allocation	66.37	25.32	16.22	6.98	2.31
07040004-533	S.F. Zumbro River	259.8	TMDL	90.63	40.43	21.76	12.44	4.47
			MOS	18.47	12.91	4.14	4.85	1.95
			Allocation	72.16	27.52	17.62	7.59	2.52
07040004-507	S.F. Zumbro River	348.8	TMDL	121.66	54.27	29.21	16.69	6.00
			MOS	24.80	17.33	5.55	6.50	1.65
			Allocation	96.86	36.94	23.66	10.19	4.35
07040004-502	Zumbro River	1,401	TMDL	360.62	176.42	100.66	68.83	45.84
			MOS	101.09	52.97	13.56	15.58	3.86
			Allocation	259.53	123.45	87.10	53.25	41.98
07040004-501	Zumbro River	1,488	TMDL	383.01	187.37	106.91	73.11	48.69
			MOS	107.36	56.26	14.40	16.54	4.10
			Allocation	275.65	131.11	92.51	56.57	44.59

Table A-9d. SE Regional Bacteria TMDL Framework -- Duration Curve Method

Segment ID	Stream Name	Area ($mi.^2$)		Duration Curve Zone (Loading Capacity expressed as T-org/month)				
				High	Moist	Mid	Dry	Low
07040008-503	Robinson Creek	17.0	TMDL	5.93	2.64	1.42	0.81	0.29
			MOS	1.21	0.84	0.27	0.32	0.13
			Allocation	4.72	1.80	1.15	0.49	0.16
07040008-521	Money Creek	76.6	TMDL	7.66	4.99	3.81	3.25	2.72
			MOS	1.56	0.85	0.26	0.30	0.30
			Allocation	6.10	4.14	3.55	2.95	2.42
07040008-555	S.B. Root River	60.8	TMDL	9.86	5.43	4.03	3.02	2.38
			MOS	2.19	0.94	0.37	0.47	0.41
			Allocation	7.67	4.49	3.66	2.55	1.97
07040008-586	S.B. Root River	142.9	TMDL	23.16	12.77	9.48	7.10	5.59
			MOS	5.15	2.22	0.86	1.11	0.97
			Allocation	18.01	10.55	8.62	5.99	4.62
07040008-501	Root River	1,660	TMDL	413.07	201.09	132.33	88.11	55.45
			MOS	82.81	44.47	18.15	23.29	13.94
			Allocation	330.26	156.62	114.18	64.82	41.51
07080201-501	Cedar River	184.9	TMDL	66.38	24.95	11.67	5.88	3.21
			MOS	15.75	9.23	2.90	2.08	1.01
			Allocation	50.63	15.72	8.77	3.80	2.20
07080201-502	Cedar River	544.2	TMDL	195.38	73.42	34.36	17.30	9.45
			MOS	46.36	27.17	8.54	6.11	2.98
			Allocation	149.02	46.25	25.82	11.19	6.47
07080202-501	Shell Rock River	195.2	TMDL	56.33	25.28	11.55	3.88	1.63
			MOS	9.99	9.85	3.46	0.19	0.08
			Allocation	46.34	15.43	8.09	3.69	1.55

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA

Minnesota Center for Environmental Advocacy,

Plaintiff,

v.

United States Environmental Protection Agency; Stephen L. Johnson, in his official capacity as Administrator of the United States Environmental Protection Agency; Environmental Protection Agency, sued as United States Environmental Protection Agency, Region 5; and Bharat Mathur, in his official capacity as Acting Regional Administrator of the United States Environmental Protection Agency,

Defendants,

v.

Minnesota Pollution Control Agency (MPCA),

Intervenor Defendant.

Civil No. 03-5450 (DWF/SRN)

MEMORANDUM OPINION AND ORDER

Janette K. Brimmer, Esq., Minnesota Center for Environmental Advocacy; and Paula Duggan Vraa, Esq., Rider Bennett LLP, counsel for Plaintiff.

Daniel W. Pinkston, Esq., United States Department of Justice; and Friedrich A. P. Siekert, Assistant United States Attorney, United States Attorney's Office, counsel for Defendants.

Robert B. Roche, Assistant Attorney General, Minnesota Attorney General's Office, counsel for Intervenor Defendant.

Introduction

The above-entitled matter is before the undersigned United States District Judge pursuant to the Motion for Summary Judgment brought by Plaintiff Minnesota Center for Environmental Advocacy ("MCEA"). In its Complaint, MCEA alleges that the Environmental Protection Agency's ("EPA") approval of Minnesota's Regional Maximum Daily Load Evaluation of Fecal Coliform Bacteria Impairments for twenty polluted waterways in southeastern Minnesota (the "SE TMDL") violates the Clean Water Act, 33 U.S.C. § 1313 ("CWA") and its applicable regulations. In essence, MCEA seeks a reversal of EPA's approval of the SE TMDL and requests that the SE TMDL be remanded to EPA for recalculation of the TMDL. For the reasons set forth below, MCEA's motion is granted in part and denied in part as moot. The SE TMDL is remanded to EPA for reconsideration consistent with this Order.

Background

I. Clean Water Act Framework

Congress enacted the CWA, 33 U.S.C. § 1251, *et seq*., to "restore and maintain the chemical, physical, and biological integrity of the nation's waters" by eliminating the discharge of pollutants into those waters. 33 U.S.C. § 1251(a). In order to attain this mission, the CWA requires states to establish water quality standards that are sufficient to "protect the public health or welfare, enhance the quality of water and serve the purposes of this chapter." 33 U.S.C. § 1313(c)(2)(A). The state water quality standards must be established taking into consideration the value of the standards for "public

water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation." *Id.* Minnesota has promulgated water quality standards as enunciated in Minnesota Rules, chapter 7050.

The CWA requires states to identify and prioritize the waters within the state that, despite the implementation of technical pollution controls, do not meet the state water quality standards. *Missouri Soybean Ass'n v. United States Envtl. Prot. Agency*, 289 F.3d 509, 511 (8th Cir. 2002) (citing 33 U.S.C. § 1313(d)). These waters are called water quality limited segments ("WQLSs").

Once the WQLSs are identified, the state must rank the identified waters based on the severity of the pollution and the use of the waters. 33 U.S.C. § 1313(d). Based on this ranking, the state must develop a total maximum daily load ("TMDL") for the pollutants identified by EPA for each WQLS. *See Sierra Club, North Star Chapter v. Browner*, 843 F. Supp. 1304, 1307 (D. Minn. 1993) (describing TMDL procedure). The TMDL "shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." 33 U.S.C. § 1313(d)(1)(C). The TMDL sets the maximum allowable load allocation of a pollutant to a waterbody so that water quality standards will not be exceeded. 40 C.F.R. § 130.2(i). The TMDL includes three elements: (1) pollution from nonpoint sources or background sources ("load allocations" ("LA")) (40 C.F.R. § 130.2(g)); (2) the amount of pollution from specific point sources ("wasteload allocations" ("WLA")) (40 C.F.R. § 130.2(h)); and (3) the margin of safety (40 C.F.R. § 130.7(c)).

The state then must submit a list of identified WQLSs and TMDLs to the EPA "from time to time" for review. 33 U.S.C. § 1313(d)(2). This list is known as the "Section 303(d) list." The EPA reviews the Section 303(d) list and makes a decision to either approve or disapprove the list within 30 days of submission. 33 U.S.C. § 1313(d)(2). If EPA approves the list, it is added to the state planning process. If EPA disapproves the list, EPA must develop its own TMDL necessary to implement the water quality standards for impaired waters within 30 days of the disapproval. 33 U.S.C. § 1313(d)(2). EPA also requires that states subject their TMDL for public review prior to submission to EPA. 40 C.F.R. § 130.7(c)(1)(ii).

II. The SE TMDL

Minnesota's section 303(d) list for 1998 identified 20 water segments in the larger Lower Mississippi River Basin (the "Basin")[1] that were impaired because they were undisputedly in violation of the water quality standard for fecal coliform bacteria.[2] The 20 impaired "reaches" include: the Cannon River (two reaches); the Cedar River (two reaches); the Mississippi River (three reaches); Garvin

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[1] The Lower Mississippi River Basin is comprised of the Upper Mississippi River Basin, lower portion, and the Cedar-Des Moines River Basin, both located in southeastern Minnesota.

[2] Fecal coliform bacteria pollution results from runoff from manured fields, feedlots, failing septic systems, stormwater discharge, and other sources. Minnesota follows the national fecal coliform standards. Minnesota Rules § 7050.0222, subp. 4 and 5, set forth the fecal coliform water quality standards for the waters at issue here as: "[n]ot to exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 400 organisms per 100 milliliters. The standard applies only between April 1 and October 31." Minn. R. 7050.0222. The "geometric mean" referred to is the nth root of the product of n numbers, *e.g.*, $(y1 * y2 * y3 * y4 * y5)^{(1/5)}$. *See* Plaintiff's Memorandum in Support of Motion for Summary Judgment at 5; Defendants' Memorandum in Response to Plaintiff's Motion for Summary Judgment at 10; *see also* Eric W. Weisstein, "Geometric Mean," from MathWorld–A Wolfram Web Resource, at http://mathworld.wolfram.com/GeometricMean.html (last visited June 17, 2005).

Brook; Prairie Creek; Robinson Creek; the Root River (two reaches); Salem Creek; the Shell Rock River; the Straight River; the Vermillion River (two reaches); the Whitewater River (two reaches); and the Zumbro River.

In developing the SE TMDL, the Minnesota Pollution Control Agency ("MPCA") analyzed 2,300 water samples collected from 1997-2001 at 113 monitoring stations throughout the Basin. (AR 00128.) MPCA made basinwide determinations of the extent of fecal coliform concentrations by calculating the median of the geometric mean of fecal coliform concentration for seven watersheds for which they had sampling data. By using this method, MPCA determined that the basinwide median fecal coliform concentration in May would be 401 organisms/100 mL, and the median concentration for June through September would be 485 organisms/100 mL.[3] Based on these figures, MPCA concluded that a 65 percent reduction of fecal coliform bacteria pollution was necessary basinwide to meet water quality standards.

The SE TMDL further proposed a phased implementation approach:

> The Regional Fecal Coliform TMDL uses a phased approach to cope with uncertainty while breaking the challenge of achieving water quality standards into manageable, achievable segments scheduled in logical sequence. Phase one includes three parts: 1) The first part calls for a 65 percent source reduction applied basinwide to bring the standard of 200 org/100 mL. 2) The second part of phase one calls for supplemental efforts in four watersheds where the watershed median exceeds the basinwide median to a significant degree. 3) The third part calls for intensive monitoring at all impaired reach sites in 2006 and 2007 to determine progress toward meeting the standard. This monitoring will be conducted five times per month April to October, the period when the fecal coliform standard applies.

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[3] MPCA noted that it analyzed May data separately from June-September data "to reflect seasonal differences in weather, stream flow, fecal coliform sources, and processes that deliver fecal coliform to streams." (AR 00144-145.)

> A phase two TMDL implementation plan will be developed for watersheds where progress toward meeting the standard is deemed insufficient based on the intensive water quality monitoring in 2006 and 2007 described above. Phase two will include watershed-specific source-reduction targets chosen to achieve water quality standards. It will also include a monitoring plan to determine progress toward meeting the fecal coliform water quality standard.
>
> Additional phases will be developed as needed until all reaches meet the standard. If it is anticipated that reaches where the level of impairment is close to the basinwide median will meet the standard within 10 years, and that additional time will be required for reaches where impairment levels are considerably higher than the basinwide median.

(AR 00094-95.)

In Summer 2002, MPCA published a "Public Notice of Intent to Approve Total Maximum Daily Load Study" along with the draft SE TMDL. On August 12, 2002, MCEA submitted comments by letter to MPCA criticizing the SE TMDL and requested a contested case hearing. (AR 000401-415.) Among other criticisms, MCEA objected to MPCA's regional homogenization of the pollutant level data and to MPCA's using the median figures for the entire basin to calculate the TMDL rather than the geometric means of individual impaired reaches. MCEA forwarded its comments to EPA on August 16, 2002. (AR 00390-400.)

MCEA also contested the SE TMDL when it was brought for final approval at MPCA's Citizens Board Meeting on October 22, 2002. Despite MCEA's objections, MPCA denied MCEA's request for a contested case hearing and issued its Findings of Fact, Conclusions of Law, and Order on October 24, 2002. MPCA then submitted the SE TMDL and its conclusions to EPA for review. On November 13, 2003, EPA approved the final SE TMDL.

III. History of this Litigation

MCEA filed its Complaint in this matter on October 1, 2003. MCEA contends that EPA's approval of the SE TMDL is legally in error in that the TMDL fails to meet the requirements of the CWA, EPA regulations, and EPA guidance documents that require that TMDLs for each impaired water must return the water body to meeting water quality standards. MCEA asserts that the SE TMDL is arbitrary and unreasonable in that it is not based on actual evidence of impairment of the stream reaches in question, but rather was calculated based on basinwide figures. MCEA also asserts that the SE TMDL does not contain a margin of safety as required by the CWA and EPA regulation. Finally, MCEA contends that the SE TMDL improperly includes point sources as nonpoint sources in the load allocation.

MCEA filed this Motion for Summary Judgment on February 10, 2005. MCEA requested "an order reversing EPA's approval of the [SE TMDL] . . . and an order remanding the TMDL to EPA for recalculation of the TMDL for each impaired stream reach and with an adequate margin of safety." Plaintiff's Motion for Summary Judgment at 2. Prior to responding to MCEA's Motion for Summary Judgment, EPA filed a Motion for Voluntary Remand and to Stay Briefing Schedule to the Court based on MPCA's representations that MPCA intended to prepare a revised TMDL to be made available for review and comment by approximately July 1, 2005. The Court denied EPA's Motion, finding that it was untimely and that it would not necessarily resolve the dispute among the parties.

Here, EPA and MPCA do not object to an order remanding EPA's decision approving the SE TMDL. At oral argument on this matter, counsel for MPCA represented that it is going to redo the TMDL in line with many of MCEA's requests. For instance, counsel for MPCA asserted that rather

than calculating a basinwide degree of impairment, it plans to do a reach-by-reach TMDL, and that MPCA would not use seasonal averages to compute the TMDL. Further, counsel for MPCA asserted that it intended to use the geometric mean of each individual reach to determine the TMDL.

Discussion

I. Standard of Review

Summary judgment is proper if there are no disputed issues of material fact and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c). The court must view the evidence and the inferences that may be reasonably drawn from the evidence in the light most favorable to the nonmoving party. *Enter. Bank v. Magna Bank of Missouri*, 92 F.3d 743, 747 (8th Cir. 1996). However, as the Supreme Court has stated, "[s]ummary judgment procedure is properly regarded not as a disfavored procedural shortcut, but rather as an integral part of the Federal Rules as a whole, which are designed 'to secure the just, speedy, and inexpensive determination of every action.'" *Celotex Corp. v. Catrett*, 477 U.S. 317, 327 (1986) (quoting Fed. R. Civ. P. 1).

The moving party bears the burden of showing that there is no genuine issue of material fact and that it is entitled to judgment as a matter of law. *Enter. Bank*, 92 F.3d at 747. The nonmoving party must demonstrate the existence of specific facts in the record which create a genuine issue for trial. *Krenik v. County of Le Sueur*, 47 F.3d 953, 957 (8th Cir. 1995). A party opposing a properly supported motion for summary judgment may not rest upon mere allegations or denials, but must set forth specific facts showing that there is a genuine issue for trial. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 256 (1986); *Krenik*, 47 F.3d at 957.

At issue here is the Court's review of the EPA's approval of the SE TMDL. Judicial review of an administrative decision is governed by the Administrative Procedures Act, 5 U.S.C. § 706. The Court's review of an agency decision is limited to whether the agency's decision is "arbitrary, capricious, and an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). Agency decisions are given a "high degree of deference." *Voyageurs National Park Ass'n v. Norton*, 381 F.3d 759, 763 (8th Cir. 2004) (quoting *Sierra Club v. Envtl. Prot. Agency*, 252 F.3d 943, 947 (8th Cir. 2001)). The Court reviews whether the agency's decision was "based on consideration of the relevant factors and whether there has been a clear error of judgment." *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971).

II. Calculation Methods

MCEA asserts that EPA's approval of the SE TMDL was legally in error because the CWA requires that TMDLs be set for each impaired stream segment, not on a watershed or basinwide basis. In addition, MCEA objects to MPCA's calculation of the mean impairment levels in the SE TMDL over a four-month seasonal basis, rather than determining an impairment level for each individual month. EPA asserts that neither the CWA nor EPA's implementing regulations prohibit watershed-based TMDLs. As to the seasonal averaging, EPA asserts that MPCA separated May data from June through September data "to reflect seasonal differences in weather, stream flow, and fecal coliform sources." (AR at 00130.)

As noted above, a TMDL for an impaired reach is to be "established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and

water quality." 33 U.S.C. § 1313(d)(1)(C). The Court agrees with EPA that neither the CWA nor EPA's regulations necessarily prohibit a watershed or basinwide TMDL. However, the TMDL must be established at a level necessary to ensure that the applicable water quality standards are met in each of the impaired waters for which the TMDL is prepared, in compliance with the CWA's mandate. *See id.* Here, EPA concedes that the CWA requires the state to establish pollutant loads in a TMDL at a level necessary to return each impaired water to its applicable water quality standards. Defendants' Memorandum in Response to Plaintiff's Motion for Summary Judgment at 24. Further, EPA acknowledges that "a uniform reduction of fecal coliform sources of 65 percent may be insufficient to lead to attainment of the fecal coliform [water quality standards] for each segment in the Basin." *Id*. at 26. The Court finds that to the extent that EPA approved a TMDL that was not set to achieve water quality standards for each impaired reach, whether that TMDL was developed on a basinwide, watershed, or individual basis, EPA was clearly in error.

Similarly, the Court agrees with MCEA that a phased calculation that is not designed to return impaired segments to water quality standards is not in accordance with law. As noted above, by the explicit terms of the CWA, the TMDL must be "established at a level necessary to implement the applicable water quality standards . . . ." 33 U.S.C. § 1313(d)(1)(C). MCEA is correct in asserting that EPA and MPCA cannot classify its action as an "interim" or phased approach in order to get around the fact that the current calculations included in the SE TMDL are insufficient to return the impaired waterways to meeting water quality standards. *See, e.g., Chlorine Chemistry Council v. EPA*, 206 F.3d 1286, 1291 (D.C. Cir. 2000).

EPA and MPCA have represented to the Court that MPCA will establish individual load allocation targets for each of the listed impaired reaches in its revised TMDL, and that it will use the geometric mean rather than the median of geometric means in its calculations. Furthermore, MPCA represented at oral argument on this matter that it would not use a seasonal average approach in developing the TMDL. In reliance on EPA's and MPCA's representations, the Court need not issue further guidance on these points.

III. Margin of Safety

MCEA also challenges the margin of safety set forth in the SE TMDL. However, the Court agrees with EPA that MCEA's challenges are specific to the SE TMDL and may not be at issue when the MPCA issues its revised TMDL using the appropriate calculation measures to ensure that water quality standards are met. Thus, the Court finds that MCEA's Motion for Summary Judgment is moot in this regard. Nevertheless, the Court reminds EPA and MPCA that it must comply with the statutory and regulatory mandate to establish a margin of safety that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. 33 U.S.C. § 1313(d)(1)(C).

IV. Wasteload Allocation

Finally, MCEA contends that the SE TMDL improperly excludes straight pipe septic systems, municipal storm sewer systems, and concentrated animal feeding operations from the wasteload allocation. Consistent with recent EPA guidance, EPA now acknowledges that municipal storm sewer systems and concentrated animal feeding operations should be included in the wasteload allocation, not the load allocation, of the TMDL. However, EPA asserts that straight pipe septic systems need not be treated as point sources and thus that they need not be included in the wasteload allocation.

MCEA describes a straight pipe septic system as a system of disposing untreated sewage directly via a pipe to rivers, lakes, drain tiles, or ditches. Such systems are illegal pursuant to Minnesota Statute. Minn. Stat. §§ 115.55 and 115.56. In approving the classification of straight pipe septic systems as nonpoint sources, EPA relied on MPCA's policy decision that the wasteload allocation only be composed of point source discharges that are subject to effluent limits contained in NPDES permits. (AR at 00298.) Because straight pipe septic systems are illegal, they are not subject to permitting through NPDES permits. *Id.* Thus, MPCA did not include them as point source discharges under the wasteload allocation. *Id.*

The Court finds that EPA's approval of the TMDL with straight pipe septic systems as nonpoint sources was in error. By definition, a point source includes a "pipe." 33 U.S.C. § 1362(14). A pipe is a pipe, and the straight pipe septic system should be considered a point source and thus incorporated into the wasteload allocation.

Conclusion

Based on the Court's review of the parties submissions, the administrative record in this proceeding, and the representations made by the parties at oral argument on this matter, **IT IS HEREBY ORDERED THAT:**

1. Plaintiff Minnesota Center for Environmental Advocacy's Motion for Summary Judgment [Doc. No. 44] is **GRANTED IN PART** and **DENIED IN PART AS MOOT**.

2. This matter is remanded to the Defendant United States Environmental Protection Agency for recalculation of the Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in

the Lower Mississippi River Basin in Minnesota in accordance with the requirements of the CWA and the regulations set forth thereunder.

3. The revised TMDL shall be established at a level necessary to implement the applicable water quality standards for each reach impaired with fecal coliform contamination.

4. The revised TMDL shall contain a margin of safety that accounts for lack of knowledge concerning the relationship between effluent limitations and water quality.

5. The revised TMDL shall properly account for straight pipe septic systems in the wasteload allocation of the TMDL.

6. The State of Minnesota is allowed 90 days from the date of entry of final judgment in this case to give public notice of, and to seek comment on, a proposed amended or replacement Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota. In the event that the State of Minnesota does not give public notice of such proposed TMDL within this 90-day period, within 30 days thereafter, EPA shall establish a replacement TMDL for the reaches that were addressed in the SE TMDL, and including any additional reaches that have been added to the 303(d) list, consistent with MPCA's representations made at oral argument on this matter. Once the proposed TMDL has been approved by EPA, or once EPA has established its own TMDL, either by proceeding as described in the previous paragraph or as a result of EPA's disapproval of the proposed TMDL pursuant to 33 U.S.C. § 1313(d)(2), EPA's November 13, 2002, approval of the SE TMDL will be deemed vacated.

7. The existing SE TMDL shall remain in force and effect pending completion of the recalculated TMDL.

LET JUDGMENT BE ENTERED ACCORDINGLY.

Dated: June 23, 2005

s/Donovan W. Frank
DONOVAN W. FRANK
Judge of United States District Court

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

REPLY TO THE ATTENTION OF:

WW-16J

JUL 14 2005

Faye Sleeper, Director
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Slepper:

On June 23, 2005, Judge Donovan Frank issued a decision remanding the EPA's 2002 approval of the Minnesota Pollution Control Agency (MPCA) fecal coliform TMDL for the Lower Mississippi River basin. The Regional TMDL addressed 20 segments in the basin, for waters impaired by fecal coliform. The remand requires MPCA to public notice a revised TMDL by September 21, 2005. If this deadline is not met EPA must establish a TMDL by October 21, 2005. The existing TMDL is in effect until then.

We believe the impact of this decision is limited and should require little if any change in current approaches to TMDL development being utilized in Region 5 States. States have raised questions concerning the impacts of this decision on TMDL development and the intent of this letter is to address those concerns.

I encourage you to read the entire decision, which is enclosed, and I would like to point out a few of the more significant aspects of the decision.

- Watershed TMDLs: The Court agreed with EPA that neither the CWA or EPA regulations prohibit the use of a watershed TMDL. The Court went on to say that we must assure that such TMDLs are "... established at a level necessary to ensure that the applicable water quality standards are met in each of the impaired waters for which the TMDL is prepared ...". Preparation and approval of watershed TMDLs may therefore continue. The decision simply clarifies that a watershed TMDL must be set at a level that will meet standards in all impaired segments in the watershed.

- Phased or interim TMDLs: Although neither EPA or MPCA characterized the TMDL as a phased or interim TMDL (the TMDL did include a phased implementation effort), the Plaintiff had asserted that this was the case. The Court stated that phased or interim approaches intended to meet some interim standard cannot be used as a mechanism to avoid calculating a TMDL at a level necessary to meet the water quality standards. As the Region has stated in the past, this means that the implementation efforts can be phased, but not the TMDL allocations themselves.

- Calculation methodology: The Plaintiff alleged that the method used to calculate the TMDL (i.e., using the median of the geometric mean and seasonal averaging), was not an valid approach to TMDL development. EPA and MPCA had already agreed to revise the TMDL using the geometric mean and avoid seasonal averaging. Based on this the Court did not issue further guidance on the calculation methodology.

- Margin of Safety: The Court ruled that in light of MPCA's intent to revise the TMDL the Plaintiff's challenge regarding MOS was moot. However, the Court reminded EPA and MPCA "...that it must comply with the statutory and regulatory mandate to establish a margin of safety that takes into account any lack of knowledge ...."

- WLA: The final issue from the decision is in regard to straight-pipe septics. The Court held that straight pipes are point sources under the Clean Water Act, and therefore need waste load allocations (WLA). The Region had asserted that these are part of the failing septic source category and are illegal under the NPDES program and therefore should be included in the LA. Based on this decision, however, future TMDLs should clearly define "failing septic", and include a separate category for "straight-pipes"in the WLA. The WLA for these sources should be set at 0.

These were the main issues addressed by the Court. The Region believes, based on our knowledge of the TMDL development approaches currently used by the States, that the decision provides valuable guidance and clarification but has limited impact on our approach to TMDL development and approval. Other than the straight-pipe issue, the decision addresses the need for a clear and complete description of how the TMDL will meet WQSs in the impaired reaches, and the need for a complete administrative record supporting the State's TMDL calculations. Our expectation is that you will make the necessary adjustments to your TMDL development process consistent with the guidelines established through this decision. We will adjust our review and approval process consistent with the decision and may be requesting more information from the states during our review of draft and final TMDLs.

If you have any technical questions please contact Julianne Socha at (312) 886-4436, or for legal questions please contact Craig Melodia at (312) 353-8870.

Sincerely,

Wendy L Mel

For Kevin M. Pierard, Chief
Watersheds and Wetlands Branch

Enclosures

-----Original Message-----
From: Haire.Michael@epamail.epa.gov
[mailto:Haire.Michael@epamail.epa.gov]
Sent: Thursday, August 25, 2005 1:51 PM
To: Sleeper, Faye
Cc: Brasier.Francoise@epamail.epa.gov; Goodin.John@epamail.epa.gov; Cleland.Bruce@epamail.epa.gov; curtin.james@epamail.epa.gov; Pierard.Kevin@epamail.epa.gov; Melgin.Wendy@epamail.epa.gov
Subject: Concurrence Memo concerning the analytical approach for the Southeast Regional Fecal TMDL

Faye, John Goodin asked that I forward this email to you

This is follow-up to the conference call last Thursday (8/18) between you, Michael Haire, Kevin Pierard, Wendy Melgin, and Bruce Cleland to discuss the revised Southeast Regional Bacteria TMDL. The primary focus of the discussion was to agree on the approach the State will use to develop the loading capacity, which forms the basis of the TMDL, allocations, and margin of safety.

Two possible methods have been considered for identifying fecal loading capacities: (1) the direct monthly approach (DMA), and (2) the monthly aggregated duration (MAD) curve framework. Both methods are developed using monthly stream discharge information from USGS sites located in southeast Minnesota.

In order to be consistent with the specific language contained in the State water quality standards, we all agree that the TMDL should be formulated to reflect projected monthly fecal values. We believe that both of these approaches will accomplish this objective. The DMA approach specifies a loading capacity for each month between April and October on every impaired segment. The MAD framework uses a frequency distribution based on all individual months over the same period. Loading capacities are identified for each duration curve zone on every impaired segment.

As discussed, the DMA approach has several major drawbacks. Disadvantages include issues associated with interannual variation, where monthly mean flows in any given month (e.g. April, May, etc) may vary by an order of magnitude. Resolution of this issue involves a risk management debate on appropriate return intervals to identify a design flow for use in the loading capacity calculation.

The MAD curve framework addresses concerns with interannual variation. Loading capacities are identified in a way that reflects actual flow conditions for any given month. Because the MAD curve framework is developed using monthly mean flow information, there is a direct connection to the language in the water quality standard for fecal coliform bacteria. For all these reasons, we believe that the MAD curve framework is the preferred method to identify loading capacities for the revised TMDL.

Please don’t hesitate to contact me, if you would like to discuss this further.

John

APPENDIX E. RESPONSE TO COMMENT LETTERS

December 30, 2005

Barbara Clark
Hartley Clark
216 Nevada
Northfield, MN 55057

Winnifred Alberg
Alan Alberg
11125 Kane Trail
Northfield, MN 55057

Dear Mr. and Mrs. Clark and Mr. and Mrs. Alberg,

Thank you for your October 11, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each of these letters, and made changes to the report based on the comments. The report will be presented to the MPCA Board January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

The third paragraph of your letter includes the following statement: "…..scientists from the University of Minnesota, in their 2001 Generic Environmental Impact Statement, report that there is not enough acreage in Southern Minnesota to spread the manure produced by animals in CAFOs already permitted in 2001." We respectfully disagree with this statement. Page iv of the Executive Summary of the Technical Work Paper Impacts of Animal Agriculture on Water Quality from the GEIS lists nine counties where "additional expansion of animal agriculture may be risky" based on the availability of cropland for land application of manure. None of the nine counties listed fall within the Lower Mississippi River Basin in Minnesota. The Technical Work paper does note that Rice and Winona counties have limited additional cropland for manure application, but that rates (amounts) of manure nitrogen and phosphorus application are low. As such, the report suggests (page vii) that policy efforts to reduce nitrate levels in surface and ground waters should focus more on fertilizer than on manure in southeastern Minnesota. It is also important to note that while rates of manure application are very important in terms of nitrogen and phosphorus; methods, timing, and avoidance of sensitive areas are probably more important with respect to fecal coliform.

Your comment letter offers the following actions to provide reasonable assurance that the TMDL can be met:

1. Have a moratorium on permitting CAFOs in the Cannon River watershed
2. Test the run-off from large feedlot operations for fecal coliform and other pollutants
3. CAFO farmers who have been found to violate their spreading plans should not be re-permitted until they comply.

Upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas such as the ones you suggest can be considered as part of this process. We will endeavor to make this an open process with opportunities for individual citizens, as well as organizations such as the Cannon River Watershed Partnership, to participate.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Kris Sigford
Water Quality Program Director
Minnesota Center for Environmental Advocacy
26 E. Exchange Street, Suite 206
St. Paul, MN 55101

Dear Ms. Sigford,

Thank you for your October 12, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each of these letters, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

Your comment letter requested a public informational meeting. After discussing with you that this was the only such request received, we agreed that a meeting between MPCA and MCEA alone would be sufficient. This meeting was held on November 21, 20005 and is summarized in a series of e-mail messages compiled by Faye Sleeper. In our responses, we have attempted to reflect the discussion at that meeting as it clarified or expanded on your original comment letter.

Comment 1. Magnitude of needed reductions:

Although different TMDL loading goals are set for different flow regimes, the monitoring data are not summarized by reach or by flow regime. Therefore, there are no estimates of the percent reduction needed in each impaired reach to achieve the TMDL load goal. These estimates should be a link to the implementation plan. The desired approach to achieving the water quality standard in one watershed would be different if a 20% reduction were needed compared to a 95% reduction in fecal coliform loading. As the TMDL report is now, the flow data from each reach are used in calculating the TMDL for each reach, under each flow regime. But the fecal coliform concentrations were not used to calculate current conditions to be compared to the water quality loading goals. An analysis of the monitoring data at each listed reach should be completed that compares in-stream monitoring data with the TMDL load goals at each reach. After this is completed, the implementation approach can be tailored to address the needs of each watershed.

Response to Comment 1:

The MPCA agrees that further analysis of fecal coliform data for the impaired reaches will be useful. However, the USEPA has advised that such analysis is not a required part of an approvable TMDL. In addition, the short time required for revision of the TMDL did not allow for the type of stakeholder input on implementation that we believe is necessary.

Upon approval of this revised TMDL study, the MPCA will review and update the current Implementation Plan. This process of review and update will include additional data analysis, as well as input from the public and other stakeholders. Key elements of this process will include:

- Additional reach-by-reach data analysis to help define the magnitude and timing of needed fecal coliform reductions, and the specific sources that will need to make these reductions. Local stakeholder involvement will be critical as most reductions will likely need to come from "load allocation" sources where local programs and watershed projects have a greater influence that state-level regulation. A proposal is being considered by the Southeast Minnesota Water Resources Board (SEMWRB) whereby Local Water Plans could be amended to reflect targets established as part of the TMDL implementation plan.
- State and local level planning to address "straight-pipe" septic systems, which are now considered point sources. The proposal being considered by the SEMWRB would convene a work team that will develop recommendations by June 2006. This team would draw on the experience of the three counties currently involved in a pilot project to inventory, and require compliance of, septic systems that pose an imminent threat to public health or safety. All "straight-pipe" septic systems fall into this category.
- A process to ensure that Stormwater Pollution Prevention Plans (SWPPPs), as required by Municipal Separate Storm Sewer System (MS4) permits, contain appropriate provisions to address fecal coliform bacteria impairments. A team that would operate in parallel to the one addressing "straight-pipe" septic systems is also being proposed. The new State Stormwater Manual, found at (http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html) will be an important resource for this work.
- The establishment of specific goals, with timelines and progress report dates, for the ultimate elimination of "straight-pipe" septic systems, and the improvement of open feedlots with pollution hazards as required by state feedlot rules.
- An updating of the current monitoring plan to ensure that the effectiveness of implementation activities will be tracked. The revised TMDL document describes basin-scale monitoring in 2007/2008 and targeted watershed monitoring in 2008/2009.

As the review and updating of the current implementation plan is taking place over the next year, it is important to remember that a wide range of activities outlined in the current implementation plan continue. These activities are clearly addressing fecal coliform impairments, although perhaps not at the speed many would like to see.

Comment 2. Timing of needed reductions:

In addition to using the flow duration analysis to estimate the magnitude of the reductions necessary, it should also be used to determine the timing of the needed reductions. Existing monitoring data from each site should be analyzed to determine during which flow regimes(s) the fecal coliform standard was violated. Such an analysis is vital in determining which sources/source categories are contributing to the violations at various flows. This analysis was not completed for this TMDL report.

The existing implementation plan for the earlier version of this TMDL is complete, but is based on flawed targets (levels of reduction needed) and covers only 20 of the 39 impaired reaches included in this revised TMDL. Since the implementation plan has already been written for this TMDL, an evaluation of the timing of needed reductions should be completed in the TMDL report.

Response to Comment 2:

See response to comment 1. As part of the implementation plan review and update, MPCA will prepare tables similar to Table A-5 of Appendix A of the revised TMDL study for each of the impaired reaches. This table links the flow regimes (or zones) to both calendar months and to implementation opportunities for specific fecal coliform sources. It is important to note that most sources have the potential to impact water quality over a range of months and flow conditions.

Comment 3. Sources needing to reduce:

Closely related to this timing issue is identification of needed reductions in load by source category, a necessary component of the TMDL that is entirely lacking.

The approach taken in this TMDL of distinguishing among flow regimes in the TMDL goals is appropriate if it is used to determine when the violations are occurring, how extreme the violations are, and the sources of excessive loads, and then used to link that information to the implementation plan. If the flow duration approach is not used to target the problems, then there is no point in separating the TMDLs by flow regime.

Response to Comment 3:

See responses to comments 1 and 2, particularly the reference to Table A-5 of Appendix A of the revised TMDL study.

Comment 4. Margin of Safety:

The revised TMDL has an explicitly calculated Margin of Safety (MOS). Allowable loads were calculated at the center point of each flow regime (the TMDL) and at the transition point between flow regimes; the MOS was calculated as the difference between these two loads. These flow regimes categories are subjective, in that there are not true discrete flow categories, but rather a continuum of flow conditions. However, due to uncertainties in the data and in the modeling approach, even when a MOS is explicitly calculated, it is often based on subjective boundaries. Since the approach used to calculate the TMDL is based on those flow categories, then the use of the flow categories to calculate the MOS is appropriate.

Response to Comment 4:

The MPCA agrees with this comment.

Comment 5. Chronic vs. acute standard:

The impaired water listing of these stream reaches was based on violations of both the geometric mean and the single sample standards. The TMDL report should thus address both types of violations, but does not. Clarification in the TMDL is needed as to how and whether single sample maximum values are addressed in an approach aimed at only the geometric mean.

Response to comment 5:

The revised TMDL document contains the following narrative addressing the issue of the chronic versus acute portions of the standard.

This TMDL study focuses on 200 organisms/100 ml monthly geometric mean as an environmental endpoint for impaired reaches. Establishing TMDLs to meet the geometric mean of 200 organisms/100mL rather than the no exceedance of either 400 or 2000 (depending on use classification) organisms per 100 mL in more than 10% of single samples is consistent with EPA's recent promulgation of water quality criteria for coastal recreational waters. The preamble of the coastal recreational water rule states: "the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation" (EPA, 2004). The same source-reduction measures that are required to attain compliance with the "chronic" standard also will lead to attainment of compliance with the "acute" standard of 2000 or 400 organisms/100ml cited above. The TMDL requires compliance with both parts of the standard.

In an attempt to further address the comment, the relationship between the two parts of the standard was tested using data for all the impaired reaches included in the revised TMDL document. For the 39 impaired reaches addressed in the revised TMDL document, there were at total of 157 months with at least five fecal coliform observations. For these months, percent exceedance ("acute" portion of standard) was compared to geometric mean ("chronic" portion of

standard); with the results shown in Figure 1. The r-squared value is about 0.62 and the y-intercept of a geometric mean of 200 orgs./100ml is about 10.5%. This suggests that on average, the two portions of the standard are reasonably well linked, and that the exceedance thresholds are roughly equivalent.

Table 1 provided further comparison. For 99 (63%) of the 157 months with at least five fecal coliform observations, both portions of the standard are exceeded. For 24 (15%) of the months, both portions of the standard are not exceeded. For 24 (15%) of the months, the geometric mean portion of the standard is exceeded, but not the percent exceedance portion. Finally, for 10 (6%) of the months, the geometric mean portions of the standard is not exceeded, but the percent exceedance portion is. In summary, this means that for 93% of the months, the geometric mean portion of the standard is as protective, or more protective, than the percent exceedance portion.

The MPCA feels that the results of this analysis, combined with USEPA guidance from the coastal recreational water rule, support the decision to focus the TMDL on the geometric mean portion of the water quality standard. In addition, all of the TMDLs established in the document include a margin of safety that applies to both portions of the water quality standard.

Figure 1. Relationship between percent exceedance and geometric mean portions of fecal coliform standard

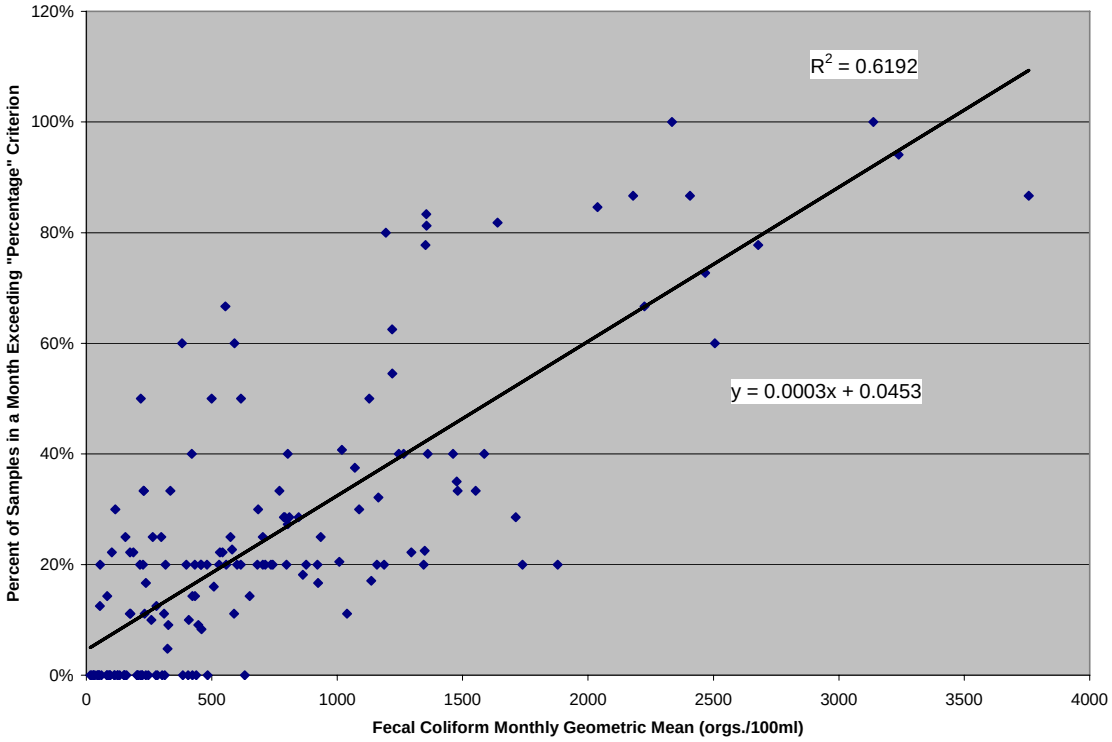

Table 1. Summary of relationship between percent exceedance and geometric mean portions of fecal coliform standard

	Months Meeting Geometric Mean Criterion	Months Exceeding Geometric Mean Criterion
Months Exceeding 10% Criterion	10 (6%)	99 (63%)
Months Meeting 10% Criterion	24 (15%)	24 (15%)

Comment 6: Petition for Public Informational Meeting:

MCEA respectfully requests that the MPCA hold a public informational meeting on the revised TMDL, with the objective of resolving and clarifying the following issues;

- The magnitude of fecal coliform reduction needed for each impaired reach covered by the TMDL, by flow regime;
- The timing of the needed reductions;

- The key contributing sources for each listed reach during the critical flow periods, and how much load reduction is needed, by source and source category, to meet the target endpoints for each reach at these critical times; and
- Whether violations of the acute fecal coliform standard will be addressed by the revised TMDL.

Response to Comment 6:

After discussing with you that this was the only such request received, we agreed that a meeting between MPCA and MCEA alone would be sufficient. This meeting was held on November 21, 20005 and is summarized in a series of e-mail messages compiled by Faye Sleeper. In the responses provided in this letter, we have attempted to reflect the discussion at that meeting as it clarified or expanded on your original comment letter.

As previously noted, upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas and approaches can be considered as part of this process. We will endeavor to make this an open process with many opportunities for participation by citizens and organizations such as the Minnesota Center for Environmental Advocacy.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Pam Kichler
Administrative Assistant
Mississippi Headwaters Board
Cass County Courthouse
PO Box 3000
Walker, MN 56484-3000

Dear Ms. Kichler,

Thank you for your October 11, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

As you note in the letter, the portion of the Mississippi River basin covered in the draft document is not within the jurisdiction of the Mississippi Headwaters Board. The mailing list we used for the public notice was quite extensive as we wanted to be sure to inform all groups and individuals that might have an interest. We apologize if this created any confusion for the Headwaters Board.

We appreciate your supportive statement in the letter. We agree that the Mississippi River is indeed our national treasure.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Frank Pafko
Chief Environmental Officer
Minnesota Department of Transportation
395 John Ireland Boulevard, MS 620
St. Paul, MN 55155-1899

Dear Mr. Pafko,

Thank you for your October 11, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota*. Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

Comment 1: REST AREA WASTELOAD ALLOCATIONS

The draft TMDL proposes to assign wasteload allocations (WLAs) for numerous wastewater treatment facilities including three Mn/DOT rest areas. The allocations assigned for the Mn/DOT facilities included bacteria values for 0.00 t-organisms/month. This could be interpreted as zero discharge. You explained that in the case of the Mn/DOT facilities the 0.00 limit resulted from rounding very small values, and that no additional restrictions to the current limit in the discharge permits was intended as a result of the TMDL. We suggest that this be clarified in the TMDL document.

Response to Comment 1:

Corrections to the wasteload allocations have been made so that actual values rather than zeros are provided.

Comment 2: CHLORINATION OR UV TREATMENT REQUIREMENT

The TMDL discussion about municipal wastewater treatment states (page 118) “Disinfection with Chlorine or ultraviolet radiation is required for all NPDES permittees.” It appears that the small Mn/DOT rest areas are lumped with other permitted municipal wastewater treatment facilities, and so this condition would appear to apply. As we discussed, there are certain types of facilities for which this disinfection requirement would not make sense. Because of the size and type of facilities at the rest areas, we do not think it is practical or appropriate for this

condition to apply. As such we suggest the statement be modified in the TMDL to reflect that is does not apply to all facilities.

Response to Comment 2:

As you correctly note, stabilization pond wastewater treatment systems generally do not use chlorination or artificial ultraviolet lighting. However, UV radiation from sunlight contributes to disinfection in pond systems, which must meet the same fecal coliform discharge limit as other wastewater treatment systems. We have modified the document to better reflect the differences in wastewater treatment methods.

Comments 3: 0.00 WLA

Several of the wasteload allocations are subdivided into various flow zones. In several instances values of 0.00 (t-bacteria/month) are assigned to various groups of dischargers. For example (page 112) the south Metro MS4s are assigned a cumulative value of 0.00 for the low and dry flow zones. This zero discharge is not realistic as stormwater flows can and do result during these low flow periods. The TMDL should be modified throughout to reflect this reality.

Response to Comment 3:

Although the potential for urban stormwater discharges of fecal coliform and other pollutants is much reduced during dry periods, you correctly note that such discharges may still occur. In "older" parts of MS4 communities where volume reduction techniques such as infiltration basins are not in place, even a small amount of rainfall on impervious surfaces results in runoff. As such, for the three reaches in question on the Vermillion and Shell Rock Rivers, adjustments to the wasteload allocation have been made to account for this potential discharge.

Comment 4: STATE HIGHWAYS AS A SOURCE OF FECAL BACTERIA

In comparison to other sources of fecal coliform bacteria, contributions from state highways and facilities are insignificant. Any potential sources of bacteria would most likely come from wildlife congregation areas such as stormwater ponds and wetlands. Ironically, current laws and regulations encourage the preservation of wetlands within the highway right of way, and also often require the construction of stormwater ponds and wetland on and adjacent to our facilities. In addition, the draft Minnesota stormwater manual indicates that these same wetlands and stormwater ponds provide a high degree of bacteria removal. As such, it is not clear what, if any, expectations there are for bacteria control at transportation facilities, some of which are subject to MS4 permit requirements.

Response to Comment 4:

Stormwater ponds, wetlands, and bridges (i.e. bird nesting) have the potential to attract wildlife, so in theory could be localized sources of bacteria produced by these wildlife. On balance, however, ponds and wetlands that help control runoff from road surfaces and right-of-way areas likely have a net positive effect on bacteria transport to surface waters. In general, fecal coliform bacteria die off quite rapidly once they leave their host and enter the environment. Therefore any practice which retains, or slows the movement of, contaminated stormwater, facilitates the die-off of bacteria.

In terms of expectations for bacteria control at transportation facilities, currently employed practices (ponding, vegetative buffering, infiltration in some cases) which address multiple pollutants will likely continue to be the norm for some time. Following approval of the revised TMDL document, the MPCA will update the current implementation plan for fecal coliform impairments in the Lower Mississippi Basin. It is possible that this updating process could produce some expectations more specific to bacteria control at transportation facilities. For example, there might be further refinement of recommendations to discourage heavy wildlife usage. For example, under current recommendations for stormwater ponds, a "safety bench" promotes the growth of aquatic vegetation around a pond, which can discourage use by geese.

Comment 5: WLA AMONG MS4s

The draft TMDL, for a given stream segment, assigns a single WLA value for the MS4s as a group. It is not clear how these group allocations will be divided among the various MS4 permittees. The document should address how this will be conducted.

Response to Comment 5:

The MS4 wasteload allocations included in this document cover only communities – cities; and portions of counties/townships. Other MS4 permittees (hospitals, prisons, highway departments, universities) are not addressed separately. Stormwater management for these types of permittees is often integrated with that of the community in which they are located.

There are cases where several different MS4 communities are located within the contributing drainage area of an impaired reach. As you note, the MS4 wasteload allocations in these situations cover the group of communities. As part of the implementation plan update mentioned in the response to comment 4, more details will be provided about individual MS4 communities. To the extent that "dividing up" the MS4 wasteload allocation is warranted, this will likely be done based on the relative land area covered by each community.

As previously noted, upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas will also be considered as part of this process. We will endeavor to make this an open process with many opportunities for participation by citizens and organizations.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Angela Organ
52407 227th Avenue
Pine Island, MN 55963

Dear Ms. Organ,

Thank you for your September 20, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota*. Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

Your comment letter offers the following suggestions relative to improving water quality in southeastern Minnesota:

1. Manure management plans for all-sized agricultural facilities must be phosphorus based.
2. In Karst-sensitive regions, there should be no manure application done in the fall of the year, as per University of Minnesota recommendations.

With respect to the first suggestion, the MPCA has been moving in the direction of requiring manure management plans that consider phosphorus. Beginning January 1, 2006, livestock facilities down to a size of 300 animal units must have such plans. In the future, Minnesota feedlot rules may be amended to address smaller facilities.

With respect to the second suggestion, It is our understanding that University of Minnesota recommendations for Karst-sensitive regions address nitrogen fertilizer (e.g. anhydrous ammonia), but not manure. In fact, given that there tends to be less rain, fall is probably the best time for manure application in terms of minimizing runoff potential.

Upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas such as the ones you suggest can be considered as part of this process. We will endeavor to make this an open process with opportunities for individual citizens, as well as organizations such as the Zumbro Watershed Partnership, to participate.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Barb Huberty
Environmental and Regulatory Affairs Coordinator
Rochester Public Works Department
201 4th Street SE, Room 108
Rochester, MN 55904

Dear Ms. Huberty,

Thank you for your September 20, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

Comment 1: Some clarification should be added regarding why you separate the terms Urban and Residential (p. 25).

Response to Comment 1:

The purpose was to attempt to draw a distinction between truly urban areas (especially those covered by MS4 permits) and small town or rural residential areas. This has been clarified.

Comment 2: The 2nd -4th paragraphs in Section 5.1 are confusing.

Response to Comment 2:

An attempt has been made to more clearly describe the approach outlined in these paragraphs.

Comment 3: As an MS4 permittee, we will need to evaluate our SWPPPs to bring them in sync with approved TMDLS. RE: urban contributions, would wildlife waste (particularly geese) fit under the Waste Load Allocation or the Load Allocation.

Response to Comment 3:

Pollutants from MS4 areas are generally considered part of the Waste Load Allocation, regardless of the source. This is particularly true where the basic infrastructure of the MS4 permittee (buildings, roads, storm sewer systems, etc.) facilitates conveyance of the pollutants. In addition, there are established practices that can help minimize waste from urban wildlife such as geese and pigeons entering surface waters.

Comment 4: It would be helpful to have a comparison of the number of urbanized acres in Rochester and the three surrounding townships that are MS4 permittees so that we know our proportional share of the WLA that we are each responsible for.

Response to Comment 4:

Based on the 2000 Census map for the Rochester urban area (http://www.pca.state.mn.us/publications/maps/sw-rochester.pdf), there are 25,768 acres of urban area in Rochester and four surrounding townships that is subject to MS4 permitting requirements. The following table provides a breakdown.

Unit of Government	**Acres**	**Percent of Total**
City of Rochester	18,457	72
Cascade Township	2,420	9
Haverhill Township	277	1
Marion Township	3,097	12
Rochester Township	1,517	6
Total	**25,768**	**100**

As you are aware, there are multiple impaired Zumbro River reaches in the Rochester area and downstream. Because each reach has a different contributing drainage area, the acreages and percentages will vary. Following approval of the TMDL report by USEPA, the MPCA will facilitate a public process to review and revise the current TMDL implementation plan. This process will include more reach-specific characterization of fecal coliform sources as well as strategies to reduce contributions from these sources.

Comment 5: It would also be helpful to have maps produced for each drainage area you reference so that our position in each watershed is clear and so that the termini of the impaired reaches is clearer.

Response to Comment 5:

The MPCA will complete these maps as part of the implementation plan work described in the response to comment 4.

Comment 6: Some explanation regarding the relationship between loading capacity (for the WLA) and mass loading (as can be determined by actual monitoring) would be helpful, since at some future date one can expect that metrics for pollutant reduction success will involve monitoring.

Response to Comment 6:

Unlike point sources that exhibit relatively stable flow rates and fairly predictable fecal coliform concentrations, and also have systems in place for regular monitoring, it is quite difficult to

measure actual nonpoint source loading of fecal coliform, particularly in urban settings. So, while loading capacities can be calculated based on stream flows and numeric water quality standards, describing exactly how much a particular source or geographic area (e.g. a MS4 community) is contributing to, or causing, a loading capacity to be exceeded, is not easily done. Over time, as MPCA's impaired waters and stormwater programs more fully mature, such information should become more available. In the interim, MS4 communities and the MPCA might draw on existing scientific literature to provide at least rough estimates of urban fecal coliform loading. In addition, MS4 communities may consider developing or expanding an urban stormwater montoring program to address fecal coliform bacteria. Municipal wastewater treatment facilities may be able to provide laboratory and other assistance for such programs.

Comment 7: Table 5.49D should be for Cold Creek to West Indian Creek

Response to Comment 7:

This change has been made.

As previously noted, upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas will also be considered as part of this process. We will endeavor to make this an open process with many opportunities for participation by citizens and organizations.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Brandon Schafer
Schafer Farms Inc.
Goodhue, MN

Dear Mr. Schafer,

Thank you for your October 5, 2005 comment e-mail on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made some changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for their review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

Comment 1: **Page 24…Confined Animal Feeding Operations**

This program leaves the impression that there is no inspection of feedlots under 1000 a.u. In fact most counties in the watershed are delegated to implement the Minnesota Chapter 7020 feedlot rules, which require the county to locate, register and inspect feedlots less than 1000 a.u. according to the delegated agreement between the county and the state.

Annual reports are filed with the state on progress relating to inspections, permitting and remediation. The success that counties have implementing upgrades on open feedlots less than 1000 a.u. will determine agricultures contributed to the coliform.

Response to Comment 1:

We agree with your comment. This section of the TMDL report has been modified to reflect the fact that inspections of smaller non-NPDES facilities does occur.

Comment 2: Page 25-Livestock Manure

The second paragraph in this section should be amended to add the following. "The immediate incorporation of manure on fields poses little risk to non point pollution run-off."

In the second paragraph land application of cattle manure is not addressed.

Finally turkeys are prevalent in some of watersheds but not mentioned in this text.

Response to Comment 2:

This section has been revised to address these comments.

Upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas such will be considered as part of this process. We will endeavor to make this an open process with many opportunities for participation by interested citizens and organizations.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

December 30, 2005

Richard Biske
Blufflands Conservation Coordinator
The Nature Conservancy
Weaver Dunes Preserve
80 County Road 84
Kellogg, MN 55945

Dear Mr. Biske,

Thank you for your September 29, 2005 comment letter on the *Draft Revised Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota.* Yours was one of eight comment letters received during the public notice period. We have responded in writing to each letter, and made changes to the report based on the comments. The report will be presented to the MPCA Board on January 23, 2006 for a decision on submittal to the U.S. Environmental Protection Agency (USEPA) for review and approval. You should receive notice of the board item, including an updated version of the report, the week of January 16th.

We appreciate the offer of the Nature Conservancy to "assist with the implementation of a targeted conservation strategy that improves the watershed as a whole." The nature of water quality impairments in the Lower Mississippi River Basin are such that a broad scope of efforts from citizens, government, and organizations such as yours will be necessary.

Upon approval of the revised TMDL by USEPA, a public process for reviewing and updating the current implementation plan will be initiated. It is anticipated that many of the current implementation goals and strategies will continue. However, new ideas such as the ones you suggest can be considered as part of this process. We will endeavor to make this an open process with many opportunities for participation by citizens and organizations such as the Nature Conservancy.

Sincerely,

Lee W. Ganske
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904