Fecal Coliform and Turbidity TMDL Assessment for the Rock River Watershed

Submitted by:

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February 2008

Minnesota State University, Mankato
Water Resources Center
Publication No. 07-01

Acknowledgements

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Waterbody ID	Rock River: Elk Creek to MN/IA Border	Fecal Coliform	10170204-501	Page #:
	Rock River: Elk Creek to MN/IA Border	Turbidity	10170204-501	
	Rock River: Champepadan Creek to Elk Creek	Turbidity	10170204-509	4
	Elk Creek: Headwaters to Rock River	Turbidity	10170204-519	
Location	The Rock River watershed is located in the southwest corner of Minnesota and is a tributary to the Missouri River Basin. The Rock River originates in Pipestone County and flows south through Rock County into Iowa. The drainage area of the impaired watershed also includes portions of Nobles and Murray counties.			3
303(d) Listing Information	The MPCA's projected schedule for TMDL completions, as indicated on Minnesota's 303(d) impaired waters list, implicitly reflects Minnesota's priority ranking of this TMDL. The project was scheduled to begin in 2006 and be completed in 2011. The stream reach impaired for turbidity and fecal coliform stretches from south of the city of Luverne to the Minnesota/Iowa border (listed in 2002, 1994 respectively). This reach watershed encompasses 355,625 acres or 556 square miles. Two upstream reaches are also impaired for turbidity. The first reach is Elk Creek: Headwaters to Rock River, a 41,151 acre watershed located across portions of western Rock County and eastern Nobles County (listed in 2006). The second reach, Rock River: Champepadan Creek to Elk Creek drains 276,845 acres from portions of Murray, Nobles, Pipestone and Rock counties (listed in 2006).			2, 3, 4
Impairment / TMDL Pollutant(s) of Concern	Turbidity and Fecal coliform			3
Impaired Beneficial Use(s)	The applicable water body classifications and water quality standards are specified in Minnesota Rules Chapter 7050. Minnesota Rules Chapter 7050.0407 lists water body classifications and Chapter 7050.2222 subp. 5 list applicable water quality standards for the impaired reaches for Aquatic Recreation and Aquatic Life.			11, 41
Applicable Water Quality Standards/ Numeric Targets	**FECAL:** Minnesota Rules Chapter 7050 provides the water quality standards for Minnesota waters. The rules are as follows for Class 2B surface waters for fecal coliform bacteria: The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. Fecal coliform organisms not 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 2000 organisms per 100 milliliters. The standard applies only between April 1 and October 31.			11, 12, 14, 17, 42, 55
	TURBIDITY: The rules for Class 2B surface waters for turbidity: The numerical and narrative water quality standards in parts 7050.0221 to 7050.0227 prescribe the qualities or properties of the waters of the state that are necessary for the designated public uses and benefits. If the standards in this part are exceeded, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, or injurious with respect to designated uses or established classes of the waters of the state. The numeric criteria for turbidity, based on stream classification. There are three impaired reaches that are classified as Class 2B streams and have a turbidity standard of 25 NTU.			

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Loading Capacity (expressed as daily load)	**FECAL:** Flow regimes were determined for high, moist, mid-range, dry and low flow conditions. The mid-range flow value for each flow regime was then used to calculate the total monthly loading capacity (TMLC). Thus, for the "high flow" regime, the loading capacity is based on the monthly flow value at the 5th percentile. The flow used to determine loading capacity for each flow regime was multiplied by a conversion factor of 146,776,126,400. Fecal coliform TMDLs are expressed in both monthly and maximum daily terms. This is to ensure that both the monthly geometric mean and upper tenth percentile portions of the water quality standard are addressed. All maximum daily loading capacity and allocation values are set at a third the monthly loading capacity. In conceptual terms, three days of bacteria loads that approach the maximum daily capacities will "use up" most of the monthly capacity. A greater percentage of days would be considered dry; however the majority of bacterial loading to streams occurs during wet conditions.	36, 37, 45, 47, 48
	TURBIDITY: Flow regimes were determined for high, moist, mid-range, dry and low flow conditions. The mid-range flow value for each flow regime was then used to calculate the total daily loading capacity (TDLC). Thus, for the "high flow" regime, the TDLC is based on the monthly flow value at the 5th percentile. How to convert flow and concentration to load: 1. Determine the median flow value for each flow regime. 2. Calculate the TSS equivalent of 25 NTU. 3. For each flow regime, calculate the total liters per day Flow (cubic feet per second) x 28.31 (cubic feet in one liter) x 86,400 (seconds in one day). 4. For each flow regime, calculate total mg of TSS: TSS surrogate (74 mg/l) x total liters. 5. For each flow regime, calculate total tons TSS per day: Total mg TSS/907,184,740 (the number of mg in one ton). Flow x TSS Surrogate x 28.31 x 86,400 907,184,740=Total Daily Tons TSS Daily flows multiplied by the surrogate TSS value results in a load duration curve. The majority of TSS load does occur during the April through June period, as this is the period when higher flow usually occurred.	

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	Source	Permit #	Individual Daily WLA	Page #
Wasteload Allocation Fecal Coliform Rock River: Elk Creek to MN/IA border	**CAFOs**			34, 39, 40
	Gary Rodrigue-Hoffman Site	105-100160	0	
	Kyle Van Dyke	105-107749	0	
	Donald DeKam Farm	105-50001	0	
	GPFF Inc - Whitetail Run	105-50004	0	
	Verlyn DeKam Farm	105-50008	0	
	Mark Knips Farm	105-92736	0	
	Rick Bullerman Farm	105-92829	0	
	John & Joe Wieneke Farm	105-92976	0	
	Mark Knips Farm	105-93047	0	
	Pig City	117-109160	0	
	Spronk Brothers III	117-50001	0	
	Jeff & Debra Brockberg Farm	117-50005	0	
	New Horizon Farms-Hillview E	117-50013	0	
	East River Farms	117-60142	0	
	Todd Van Essen Farm	117-85163	0	
	Leon Kracht Farm	117-85455	0	
	Ken Winsel Farm	117-85586	0	
	Charla Hunter Farm	117-85608	0	
	G&A Farms Inc	133-105980	0	
	Overgaard Pork	133-109460	0	
	Knutson Feedlots	133-84234	0	
	Kracht Hill Farm	133-84246	0	
	Binford Farms	133-84257	0	
	Craig Stegenga Farm	133-84820	0	
		TOTAL	0	
	Source	**Permit #**	**Individual Daily WLA**	**Page #**
	WWTF			38, 39, 40
	Chandler	MN0039748	0.012	
	Edgerton	MNG580011	0.028	
	Hardwick	MN0039713	0.012	
	Holland	MN0021270	0.007	
	Leota	MN0063941	0.012	
	Luverne	MN0020141	0.114	
	Magnolia	MN0025712	0.019	
	Woodstock	MN0065200	0.007	
		TOTAL	0.211	
	Source	**Permit #**	**Individual Daily WLA**	**Page #**
	Straight-Pipe Septics			38, 39, 40
	Illegal Discharges	NA	0	
		TOTAL	0	
Wasteload Allocation Turbidity Rock River: Elk Creek to MN/IA border	**Source**	**Permit #**	**Individual WLA**	**Page #**
	WWTF and Industrial with discharge limits			49, 50, 52
	Chandler	MN0039748	0.59	
	Edgerton	MNG580011	0.27	
	Hardwick	MN0039713	0.11	
	Holland	MN0021270	0.02	
	Leota	MN0063941	0.12	
	Luverne	MN0020141	0.38	
	Magnolia	MN0025712	0.19	
	Woodstock	MN0065200	0.07	
	Agri-Energy	MN0065033	0.02	
		TOTAL	1.75	

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Wasteload Allocation Turbidity Rock River: Elk Creek to MN/IA border continued	**Source**		**Individual WLA**	**Page #**
	Construction Stormwater			50, 51, 52
	High		1.14	
	Moist		0.37	
	Mid		0.17	
	Dry		0.07	
	Low		0.01	
	Source		**Individual WLA**	**Page #**
	Industrial Stormwater			50, 51, 52
	High		0.57	
	Moist		0.18	
	Mid		0.09	
	Dry		0.03	
	Low		0.01	
Wasteload Allocation Turbidity Rock River: Champedadan Creek to Elk Creek	**Source**	**Permit #**	**Individual WLA**	**Page #**
	WWTF and Industrial with discharge limits			49, 50, 52
	Chandler	MN0039748	0.59	
	Edgerton	MNG580011	0.27	
	Hardwick	MN0039713	0.11	
	Holland	MN0021270	0.02	
	Leota	MN0063941	0.12	
	Luverne	MN0020141	0.38	
	Woodstock	MN0065200	0.07	
		TOTAL	1.55	
	Source		**Individual WLA**	**Page #**
	Construction Stormwater			50, 51, 52
	High		0.88	
	Moist		0.29	
	Mid		0.13	
	Dry		0.05	
	Low		0.009	
	Source		**Individual WLA**	**Page #**
	Industrial Stormwater			50, 51, 52
	High		0.44	
	Moist		0.14	
	Mid		0.07	
	Dry		0.03	
	Low		0.005	
Wasteload Allocation Turbidity Elk Creek: Headwaters to Rock River	**Source**		**Individual WLA**	**Page #**
	WWTF and Industrial with discharge limits			49, 50, 53
	Magnolia	MN0025712	0.18	
		TOTAL	0.18	
	Source		**Individual WLA**	**Page #**
	Construction Stormwater			50, 51, 53
	High		0.13	
	Moist		0.04	
	Mid		0.02	
	Dry		0.008	
	Low		0.002	
	Source		**Individual WLA**	**Page #**
	Industrial Stormwater			50, 51, 53
	High		0.07	
	Moist		0.02	
	Mid		0.01	
	Dry		0.004	
	Low		0.001	

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Load Allocation Fecal Coliform Rock River: Elk Creek to MN/IA border	**Source**	**Individual LA**	**Page #**
	High	30.18	40
	Moist	11.92	
	Mid	6.95	
	Dry	2.19	
	Low	0.90	
Load Allocation Turbidity Rock River: Elk Creek to MN/IA border	**Source**	**Individual LA**	**Page #**
	High	111.91	51, 52
	Moist	36.32	
	Mid	16.77	
	Dry	6.61	
	Low	1.39	
Load Allocation Turbidity Rock River: Champedadan Creek to Elk Creek	**Source**	**Individual LA**	**Page #**
	High	86.93	51, 52
	Moist	28.09	
	Mid	12.86	
	Dry	4.95	
	Low	0.9	
Load Allocation Turbidity Elk Creek: Headwaters to Rock River	**Source**	**Individual LA**	**Page #**
	High	12.97	51, 53
	Moist	4.23	
	Mid	1.96	
	Dry	0.79	
	Low	0.18	
Margin of Safety	Because the allocations are a direct function of monthly flow, accounting for potential flow variability is the appropriate way to address the MOS explicitly for the fecal coliform and turbidity impairments. This is done within each of five flow zones. The MOS was determined as the difference between the median flow and minimum flow in each zone.		37, 38, 48, 49
Seasonal Variation	**FECAL:** Monitoring data show an apparent relationship between season and fecal coliform bacteria concentration. Typically the highest bacterial concentrations are found in the summer and early fall. In the spring, concentrations are typically lower, despite the fact that significant manure application occurs during this time and that fields have little crop canopy to protect against water erosion. **TURBIDITY:** The majority of TSS load does occur during the April through June period, as this is the period when higher flow usually occurred. In both seasonal categories, nearly an identical nineteen percent of samples exceeded the daily loading capacity. It should be noted that when stormflow samples are removed from the dataset only seven percent of samples from the July through March period exceeded the loading capacity.		15, 16, 55, 56, 57
Reasonable Assurance	The source reduction strategies detailed in the implementation plan section have been shown to be effective in reducing pathogen transport/survival and reducing turbidity. Many of the goals outlined in this TMDL study run parallel to objectives outlined in the local Water Plans. Various program and funding sources will be used to implement measures that will be detailed in an implementation plan to be completed. Through existing permit programs, turbidity and fecal coliform impairments are being addressed and monitored. In the future, it can be assumed that this will continue.		64
Monitoring	A detailed monitoring plan will be included in the Implementation Plan to be completed. Currently, there are monitoring efforts in the watershed.		59
Implementation	A summary of potential management measures was included. More detail will be provided in the implementation plan.		60, 62, 63
Public Participation	A group of local state and federal officials have been meeting on a bimonthly basis to receive TMDL updates and will lead the development of the implementation plan. There have been several news releases and newspaper articles about the project.		65, 66, Appendix C and D
	Public Comment period:	December 31, 2007-January 31, 2008	
	Meeting location:	Edgerton, Minnesota and Luverne, Minnesota	
	Comment received?	Yes	

Executive Summary

The Clean Water Act, Section 303(d), requires that every two years, States publish a list of streams and lakes that do not meet water quality standards. Waters placed on the list are considered “impaired”, leading to the requirement of a Total Maximum Daily Load (TMDL). TMDL assessments determine the maximum amount of pollutant a stream can receive, while maintaining water quality standards. A TMDL is divided into a wasteload allocation (point sources), load allocation (non-point sources and natural background) and a margin of safety.

The state agency responsible for listing waters in Minnesota is the Minnesota Pollution Control Agency (MPCA). In 1994, the MPCA determined the Rock River, Elk Creek to Minnesota/Iowa border (Assessment ID: 10170204-501), was impaired for fecal coliform. In 2002, the MPCA further listed this reach as impaired for turbidity. In 2006, two additional upstream reaches, Rock River, Champepadan Creek to Elk Creek (10170204-509) and Elk Creek, Headwaters to Rock River (10170204-519) were listed as impaired for turbidity. Thus, the following report provides TMDL assessments for one fecal coliform and three turbidity impaired reaches.

The Rock River is located in the southwest corner of Minnesota and is a tributary to the Missouri River Basin. The Rock River originates in Pipestone County and flows south through Rock County into Iowa. The watershed encompasses 365,625 acres, including portions of Nobles and Murray counties. The watershed contains portions of fifteen communities, Luverne the largest, with a population of 4,617. The population of the impaired watershed is 10,942, with 34 percent living in rural areas. Agricultural land use comprises nearly 95 percent of the landscape, with corn and soybeans as the primary crop types. The watershed includes 684 feedlots, with an estimated 151,222 animal units. Swine, beef and dairy are the primary livestock types.

Fecal coliform levels in the Rock River exceeded water quality standards during the months of August and September. To meet water quality standards, fecal coliform levels will need to be decreased up to 60% during these months. The highest levels were found during and after storm runoff. Concentrations of fecal coliform bacteria were an average of ten times higher during storm runoff than during dry periods.

Turbidity was found to be the most excessive in Rock River following storm runoff and high flow periods. During high flow periods, reductions of up to 68 percent will be required to meet turbidity standards. Turbidity levels during mid-range and low flows are at or near the water quality standard.

The TMDL study used a flow duration curve approach to determine pollutant loading capacity for each impaired reach under a variety of flow regimes. The duration curves were used to determine general allocations necessary to meet water quality standards for each of the three impaired stream reaches.

A population source inventory and delivery ratios were used to estimate primary contributing sources of fecal coliform bacteria. This analysis indicated that cattle with access to streams, feedlots without runoff controls, field applied manure and inadequately functioning septic systems are likely the primary contributors of fecal coliform contamination. For turbidity, load duration curves and water quality data indicate the primary sources to be soil erosion in the riparian zone from livestock, streambank erosion/slumping, upland soil loss from row cropland and algae growth.

The report describes the above sources and dynamics in more detail. The report also describes applicable water quality standards for fecal coliform bacteria and turbidity, source inventories, TMDL development and allocations, future monitoring activities and suggested implementation strategies.

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Acronyms

AU – Animal Unit
BWSR Board of Water and Soil Resources
CFU – Colony Forming Units
CWA – Clean Water Act
DNR – Department of Natural Resources
FC – Fecal Coliform
ISTS – Individual Sewage Treatment System
LA – Load Allocation
MG – Milligram
MG/L – Milligrams Per Liter
ML – Milliliter
MN - Minnesota
MOS – Margin of Safety
MPCA – Minnesota Pollution Control Agency
MS4 – Municipal Separate Storm Sewer System Permit
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resources Conservation Service
NTU - Nephelometric Turbidity Unit
ORG/100 ML – Organisms Per 100 Milliliters
RC – Reserve Capacity
RRW – Rock River Watershed
SWCD – Soil and Water Conservation District
TDLC – Total Daily Loading Capacity
TMDL – Total Maximum Daily Load
TMLC – Total Monthly Loading Capacity
TSS – Total Suspended Solids
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USGS – United States Geological Survey
WLA – Waste Load Allocation
WWTF – Wastewater Treatment Facility

Section 1.0 – Introduction

1.1 Purpose

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 their designated uses. The TMDL process establishes the allowable loadings of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. TMDLs provide States a basis for determining the pollutant reductions necessary from both point and nonpoint sources to restore and maintain the quality of their water resources.

A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. Section 303(d) of the CWA and its implementing regulations (40 C.F.R. § 130.7) require states to identify waters that do not or will not meet applicable water quality standards and to establish TMDLs for pollutants that are causing non-attainment of water quality standards.

Water quality standards are set by States, Territories, and Tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use.

A TMDL needs to account for seasonal variation and must include a margin of safety (MOS). The MOS is a safety factor that accounts for any lack of knowledge concerning the relationship between effluent limitations and water quality. Also, a TMDL must specify pollutant load allocations among sources. The total of all allocations, including wasteload allocations (WLA) for point sources, load allocations (LA) for nonpoint sources (including natural background), and the MOS (if explicitly defined) cannot exceed the maximum allowable pollutant load:

$$\textbf{TMDL} = \text{sum}\textbf{WLAs} + \text{sum}\textbf{LAs} + \textbf{MOS} + \textbf{RC*}$$

* The MPCA also requires “Reserve Capacity” (RC) which is an allocation for future growth be addressed in the TMDL.

A TMDL study identifies all sources of the pollutant and determines how much each source must reduce its contribution in order to meet the quality standard. The sum of all contributions must be less than the maximum daily load.

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.

1.2 Priority Ranking

The Minnesota Pollution Control Agency (MPCA) projected schedule for TMDL completions, as indicated on Minnesota's 303(d) impaired waters list, implicitly reflects Minnesota's priority ranking of this TMDL. The project was scheduled to begin in 2006 and be completed in 2011. Ranking criteria for scheduling TMDL projects include, but are not limited to: impairment impacts on public health and aquatic life; public value of the impaired water resource; likelihood of completing the TMDL in an expedient manner, including a strong base of existing data and restorability of the waterbody; technical capability and willingness locally to assist with the TMDL; and appropriate sequencing of TMDLs within a watershed or basin.

1.3 Criteria Used for Listing

The criteria used for determining stream reach impairments are outlined in the MPCA document, Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment – 305(b) Report and 303(d) List), January 2004. The applicable water body classifications and water quality standards are specified in Minnesota Rules Chapter 7050. Minnesota Rules Chapter 7050.0407 lists water body classifications and Chapter 7050.2222 subp. 5 lists applicable water quality standards for the impaired reaches.

Fecal coliform (FC) assessment protocol includes pooling of data by month over a ten-year period. A geometric mean is then calculated for each month, April through October, with a minimum of five samples used for each monthly calculation.

There are two scenarios when a stream reach will qualify to be listed as impaired. If any monthly geometric mean value exceeds 200 organisms per 100 ml the stream qualifies to be listed as impaired. The other scenario involves combining the entire ten-year data set and assessing the percent of samples that exceed 2,000 organisms per 100 ml. If more than ten percent of the samples exceed 2,000 org/100ml, the stream qualifies as listing as impaired.

Turbidity assessment protocol also includes pooling of data over a ten-year period and requires a minimum of twenty samples. The surface water standard for turbidity is 25 nephelometric turbidity units (NTUs). For assessment purposes, a stream is listed as impaired if at least three observations or 10% of observations exceed 25 NTUs. Transparency and total suspended solids samples may also be used as a surrogate for the turbidity standard. A transparency reading of 20 cm or TSS sample of 66 mg/L (Ecoregion based surrogate standard) is considered equivalent to the 25 NTU turbidity standard. If there are two or more parameters observed in a single day, the hierarchy of consideration is turbidity, then transparency, then total suspended solids.

Section 2.0 – Background Information

2.1 TMDL Study Area Overview

This report includes the TMDL for one fecal coliform and three turbidity impaired stream reaches in the Rock River Watershed (RRW).

The RRW is located in the southwest corner of Minnesota (see Figure 2.1a) and is a tributary to the Missouri River Basin. The Rock River originates in Pipestone County and flows south through Rock County into Iowa. The drainage area of the impaired watershed also includes portions of Nobles and Murray counties.

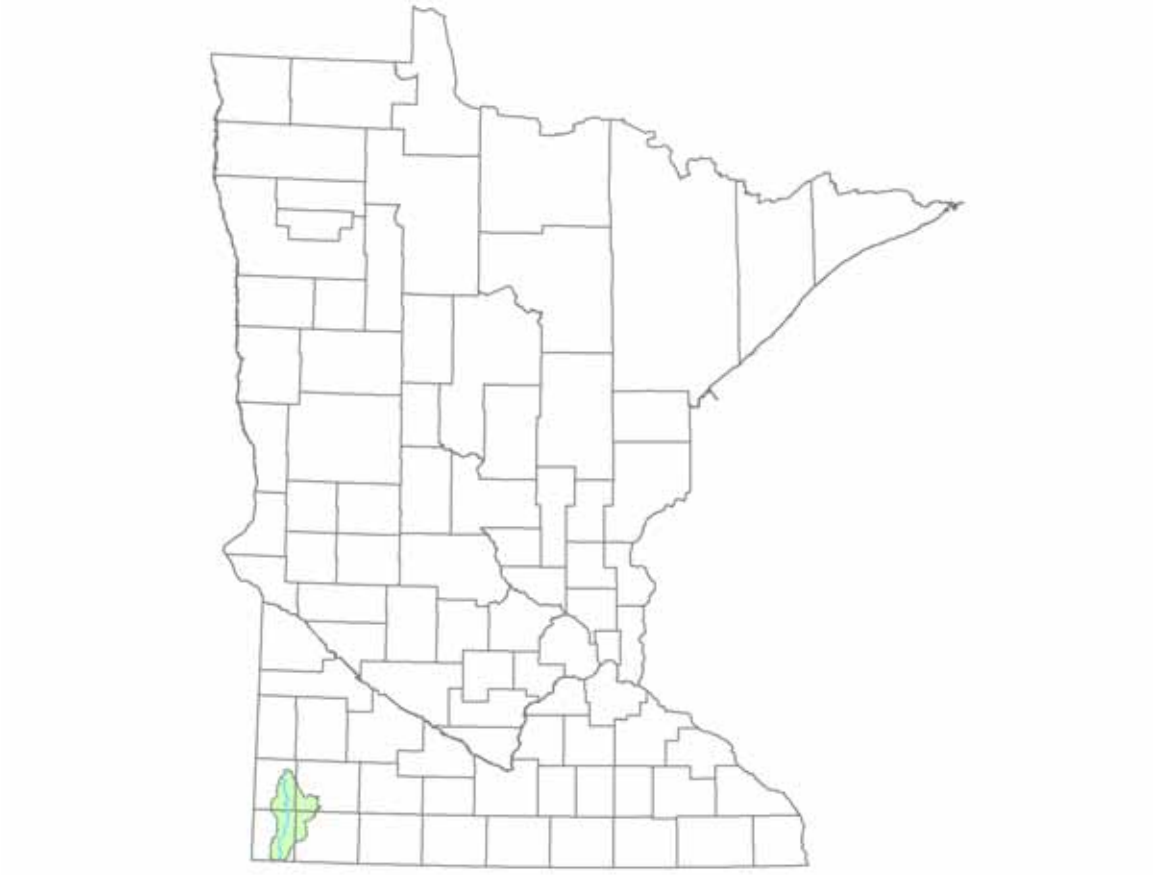

Figure 2.1a – Location of Rock River Watershed

A summary of the impaired reaches is presented in Table 2.1. Locations of the impaired reaches and contributing upstream watersheds are shown in Figure 2.1b. The stream reach impaired for turbidity and fecal coliform stretches from south of the city of Luverne to the Minnesota/Iowa border. This reach watershed encompasses 355,625 acres or 556 square miles. Two upstream reaches are also impaired for turbidity. The first reach is Elk Creek: Headwaters to Rock River, a 41,151 acre watershed located across portions of western Rock County and eastern Nobles County. The second reach, Rock River: Champepadan Creek to Elk Creek drains 276,845 acres from portions of Murray, Nobles, Pipestone and Rock counties.

Table 2.1 - Impaired Stream Reaches

Stream Name	Description	Parameter	Year Listed	MPCA River Assessment ID
Rock River	Elk Creek to Minnesota/Iowa Border	Turbidity	2002	10170204-501
Rock River	Elk Creek to Minnesota/Iowa Border	Fecal Coliform	1994	10170204-501
Rock River	Champepadan Creek to Elk Creek	Turbidity	2006	10170204-509
Elk Creek	Headwaters to Rock River	Turbidity	2006	10170204-519

Overall, the RRW is a gently rolling landscape with occasional rock outcroppings. On average, RRW receives approximately 28 inches of precipitation annually. Based on 2000 landuse statistics, approximately 95 percent of the landuse is agricultural. As of the 2003 MPCA feedlot inventory, there were 684 feedlots containing 151,222 animal units in the watershed. A majority of livestock includes dairy, beef, swine and poultry.

The population of the impaired portion of RRW is estimated at 10,942 and contains portions of twelve incorporated communities and three unincorporated communities. The urban population is estimated at 7,186 residents. An estimated 3,756 residents live in rural areas and utilize individual septic systems for their waste sewage treatment, equating to roughly 1,450 rural septic systems.

Recreational uses of the Rock River include fishing, swimming and canoeing. In addition, the corridor of the Rock River provides wildlife habitat, and as such is utilized by hunters and bird watchers.

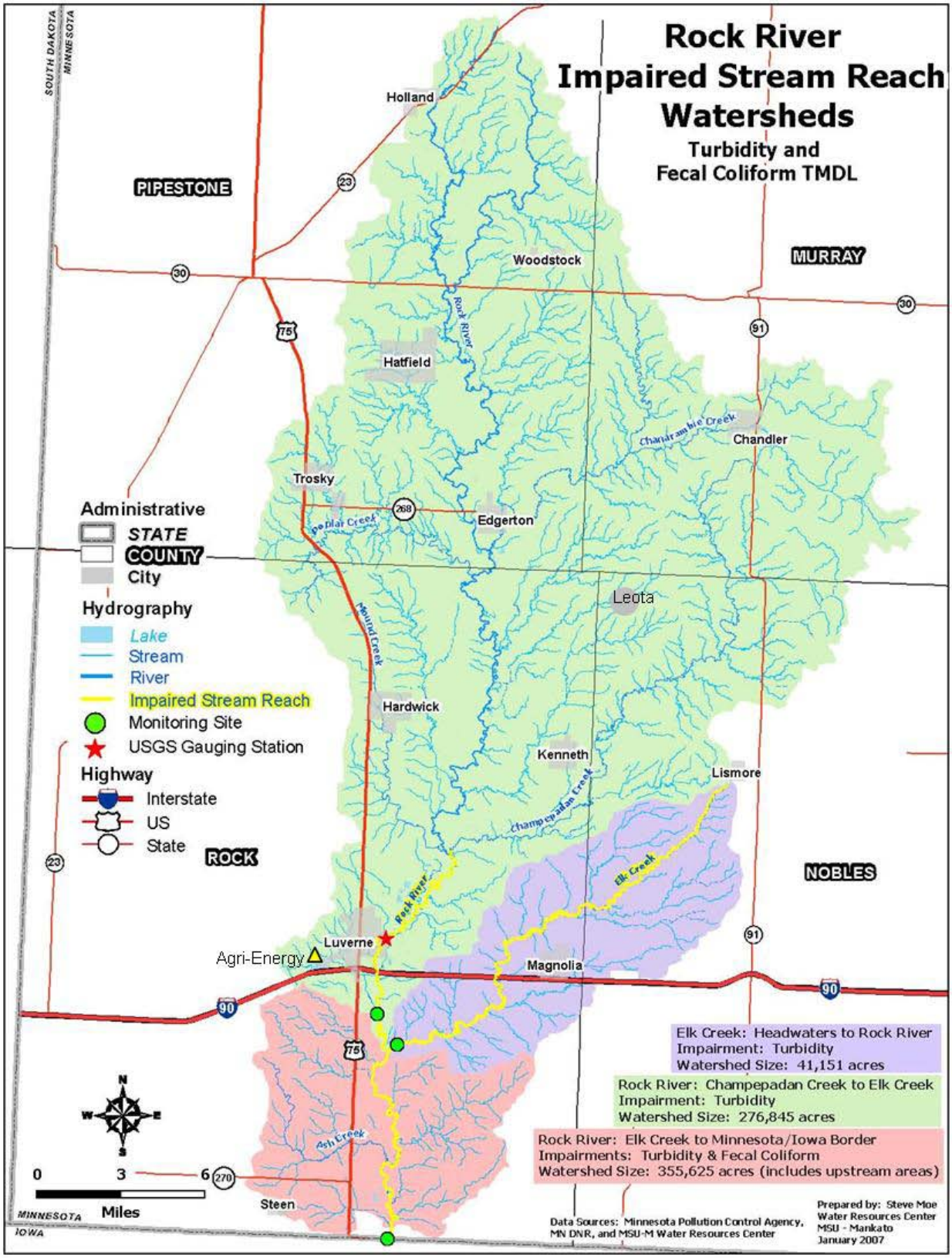

Figure 2.1b – Rock River Watershed – Impaired Reaches

2.2 Land Use and Cover (2000)

The RRW is dominated by cultivated land at nearly 76.7 percent. Pasture and hay lands account for another 18.6 percent. The only other land use and cover categories above one percent are wetlands at 1.7 percent and forest at 1.2 percent. It should be noted that conservation easement lands, such as those enrolled in Wildlife Management Areas and the Conservation Reserve Program, are not included in the landuse inventory. These easement lands cover an estimated 5,400 acres, or 1.5 percent of the watershed landscape. Figure 2.2a present a summary of landuse and cover data for the watershed. Figure 2.2b is a map displaying the landuse data.

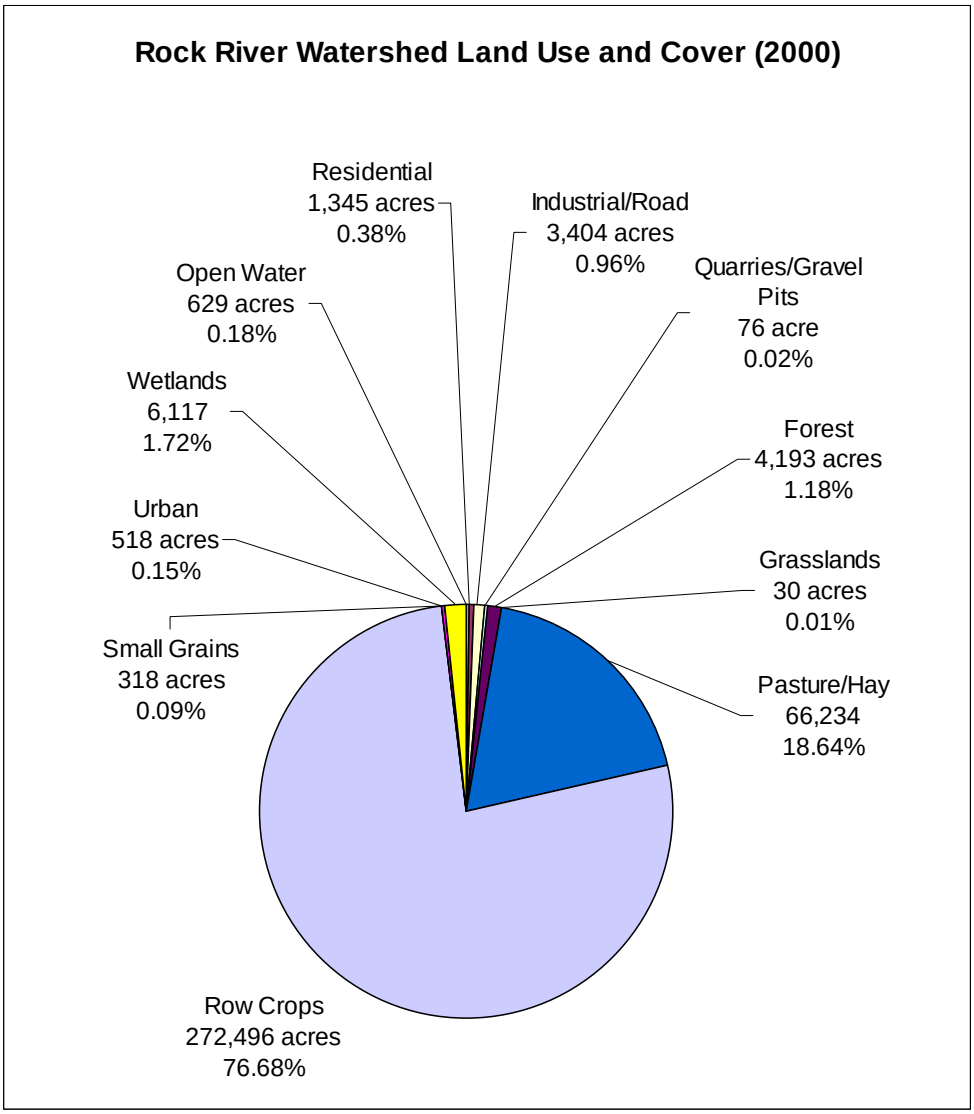

Figure 2.2a – Rock River Watershed Landuse (2000)

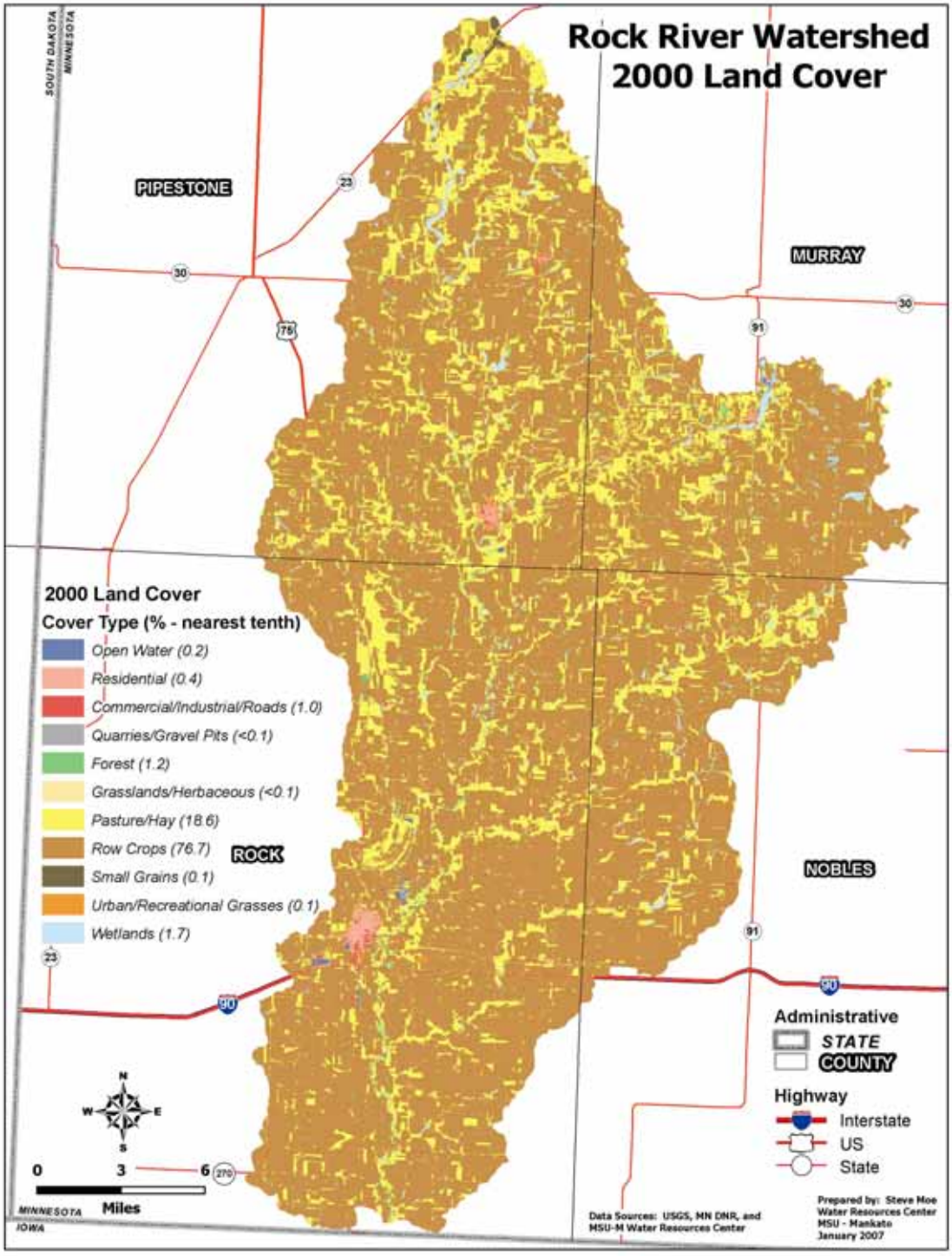

Figure 2.2b – Rock River Watershed Landuse (2000)

2.3 Temperature

Figure 2.3 presents the average monthly high, low and mean temperatures at Luverne, Minnesota. Ice out conditions in the Rock River typically occur between the end of March and early April. Temperatures reach peak levels during July/August and then gradually decline. Monitoring data indicate that temperature has an association with bacterial levels in surface waters, with warmer stream water having higher bacterial levels.

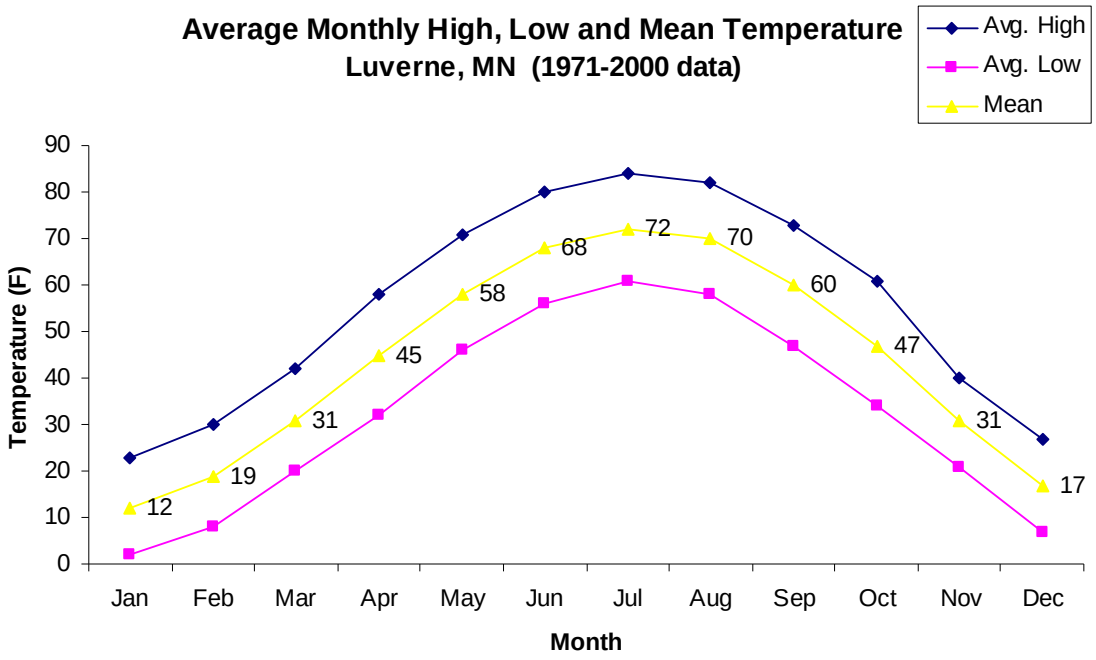

Figure 2.3 – Average Monthly Temperature by Month

2.4 Precipitation

Based on precipitation values used from Luverne, Minnesota, the watershed averages 27.7 inches of precipitation annually. The monitoring season months of April through October represent 79 percent of the annual average precipitation with a total of 21.8 inches. Figure 2.4 presents the average monthly precipitation values for Luverne, MN.

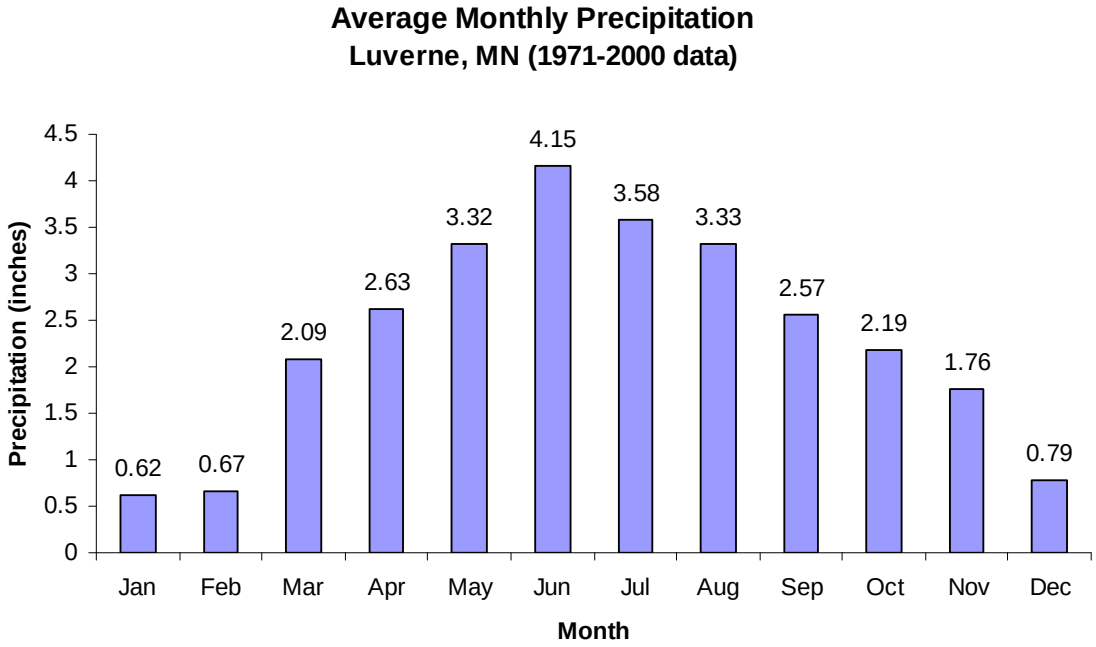

Figure 2.4 - Precipitation Data for Luverne, MN (1971-2000)

Review of monitoring data collected from the Rock River and other streams in southern Minnesota show a strong relationship between pollutant loading and rainfall intensity. The highest bacterial concentrations and turbidity values of any particular year are usually associated with the highest intensity precipitation events. This is especially true during the spring when agricultural fields are not protected by crop canopy. Crop canopy significantly reduces rainfall runoff and associated soil erosion and pollutant movement.

2.5 Stream Flow Characteristics

Figure 2.5 displays the mean monthly flow for the Rock River at Luverne (USGS/DNR gage # 06483000) for the months of April through October. These are the months when the majority of flow occurs and thus when most water quality samples are collected. On average, the month with the highest flow volume is April, due to the combination of snowmelt and overland runoff. June, the month with the greatest precipitation totals, has the second highest mean monthly flow.

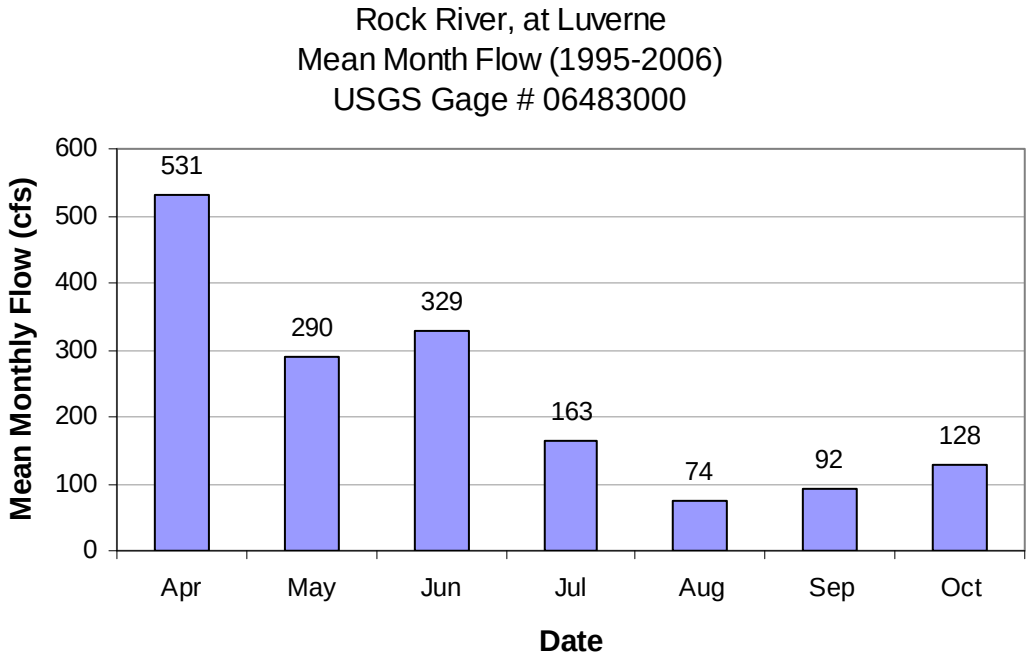

Figure 2.5 – Mean Monthly Flow for Rock River, at Luverne (1995-2006)

2.6 Topeka Shiner: Endangered Fish Species

Topeka shiners are found in the Missouri River drainage – therefore, their presence in Minnesota is limited to the extreme southwestern portions of the state, which includes the Rock River. Topeka shiners prefer prairie stream headwater areas because these smaller streams tend to have cooler temperatures and good water quality. Topeka shiners, however, occupy a variety of habitats, including runs, pools, and backwater areas of various river orders. Larger rivers, although not the primary staging and resting areas for Topeka shiners, serve as critical migration routes that allow the exchange of genetic material and repopulation of areas that periodically run dry. An important characteristic of good quality Topeka shiner habitat is the availability of clean gravel or sand substrates with vegetated banks of grasses and forbs. High turbidity levels in the Rock River are associated with higher turbidity levels in the tributaries. As a result, increased sedimentation has occurred and Topeka shiner habitat has become more limited.

Declines in Topeka shiner numbers have occurred throughout nearly all of its range – thus it is listed as an Endangered Species. The Minnesota population of Topeka shiners is in better condition than those found in other states. An examination of watershed-level activities points to a variety of conclusions about why the species has declined. The TMDLs for turbidity contained in this report, when achieved, will help maintain and improve spawning habitat for the Topeka shiner in the Rock River.

Section 3.0 – Fecal Coliform Standards and Impairment Assessment

3.1 Description of Fecal Coliform Bacteria

Fecal coliform bacteria are a bacteria group that are found in the intestines of warm-blooded mammals. While usually not harmful themselves, fecal coliforms are considered an indicator of the presence of other disease causing bacteria, viruses, and/or protozoans.

Fecal coliform bacteria are passed through the fecal excrement of humans, livestock and wildlife. These bacteria can enter waterways through direct discharge of waste from mammals and birds, from agricultural and urban stormwater runoff and from poorly or untreated human sewage. Agricultural practices, such as spreading manure during wet periods, and allowing livestock uncontrolled access to streams, can contribute high levels of fecal coliform bacteria. Wildlife can also be a contributor of fecal coliform bacteria, especially during low flow conditions.

In addition to bacteria and other pathogens, human and animal waste contain high levels of other pollutants such as phosphorus, nitrogen, and oxygen demanding organic material. Additionally, some of the same soil erosion processes and delivery pathways that lead to sediment pollution of streams and rivers also contribute to human and animal waste entering the water. As such, efforts to contain sewage and animal waste, and to control soil erosion and sedimentation, result in better overall water quality.

3.2 Applicable Minnesota Water Quality Standards – Class 2B Waters

Minnesota Rules Chapter 7050 provides the water quality standards for bacterial concentrations in Minnesota waters. The rules are as follows for Class 2B surface waters. The impaired reaches the Rock River, Elk Creek to Minnesota/Iowa border (Assessment ID: 10170204-501) is a Class 2B water.

The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable.

Fecal coliform organisms not 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 2000 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Table 3.2 summarizes the fecal coliform bacteria standards for all classes of water in Minnesota.

Table 3.2 – Minnesota Surface Water Standards for Fecal Coliform Bacteria

Use Class	Standard No. of Organisms Per 100 mL of Water		Applicable Season	Use
	Monthly Geometric Mean*	10% of Samples Maximum**		Body Contact
2A, trout streams and lakes	200	400	April 1 - October 31	Primary
2Bd, 2B, 2C, non-trout (warm) waters	200	2000	April 1 - October 31	Primary
2D, wetlands	200	2000	April 1 - October 31	Primary, if the use is suitable
7, limited resource value waters	1000	2000	May 1 - October 31	Secondary

* Not to be exceeded as the geometric mean of not less than 5 samples in a calendar month.

** Not to be exceeded by 10% of all samples taken in a calendar month, individually.

Source: Guidance Manual for Assessing the Quality of Minnesota Surface Waters: For the Determination of Impairment. 305(b) Report and 303(d) List

3.3 Change in Standard from Fecal Coliform to *E*. coli

In 2007, the MPCA proposed changing the bacterial water quality standard from fecal coliform to *E*. coli bacteria. As of August 2007, the proposal was in an official comment period. Paired comparison studies of fecal coliform and *E*. coli bacteria conducted by the MPCA have shown on average 63 percent of fecal coliform bacteria to be *E*. coli. The current fecal coliform standard of 200 org/100 ml would be roughly equivalent to 126 *E*. coli bacteria per 100 ml. Therefore, to adapt the fecal coliform TMDL allocations based on future *E*. coli standards would require a simple multiplication factor of 0.63.

More information of the proposed rule change can be found at the MPCA webpage: *http://www.pca.state.mn.us/water/standards/rulechange.html*

3.4 Impairment Assessment: Fecal Coliform Data

The majority of bacterial sampling from the Rock River has occurred at a site located on the Minnesota/Iowa border (STORET ID# S000-097) as part of the MPCA Milestone Monitoring Program. This program was designed to collect water quality data at designated rivers over many decades. The data are used to obtain a long-term understanding of river health in Minnesota. The program was initiated in 1953 by the Water Pollution Control Commission. In 1967, the MPCA took over the program, which now includes more than 80 monitoring sites. The Rock River at the Minnesota/Iowa Border became part of this program in 1964. Since 1964, the Rock River as been sampled for fecal coliform and/or *E*. coli bacteria. From 1964 through 2004, a total of 189 fecal coliform samples were collected from the Rock River. Between 1985 through 2006, a total of 32 *E*. coli samples were collected.

In addition to the MPCA samples, the Iowa Department of Natural Resources also collected 22 fecal coliform and *E*. coli samples at the Minnesota/Iowa site in 2002 and 2003 as part of the Big Sioux River fecal coliform TMDL.

3.5 Utilization of *E*.coli Data

To strengthen the data set, *E*. coli samples were also included for analytical purposes. From 1985 through 2004, the MPCA collected both fecal coliform and *E*. coli samples from the Rock River. In 2006, the MPCA sampling program replaced fecal coliform with *E*. coli sampling. Using the paired samples from 1985 through 2004, a linear equation was created to convert *E*. coli concentrations into fecal coliform concentrations for the 2006 sample set. As shown in Figure 3.5, there is a strong relationship between fecal coliform and *E*. coli samples (R^2 = .945).

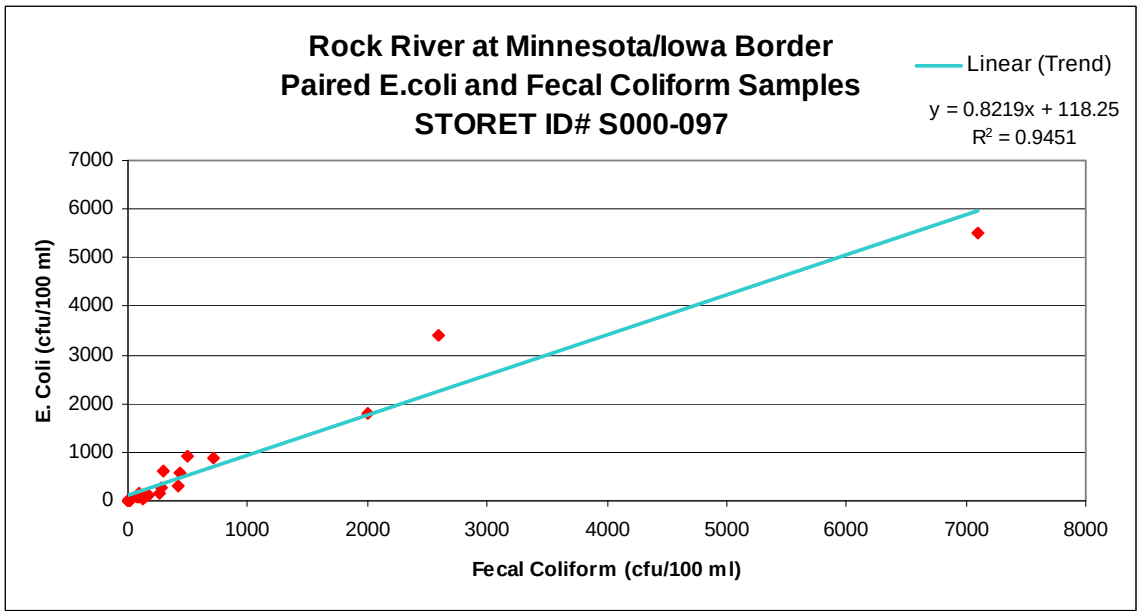

Figure 3.5 – Fecal Coliform and E. coli Paired Samples

3.6 Monthly Fecal Coliform Concentrations in the Rock River

The criteria used for determining fecal coliform impairments are described in Section 1.3. The procedure involves calculating monthly geometric means for the months of April through October, using the prior ten-year period of water quality data. Forty samples were used to calculate monthly geometric means from 1997 through 2006. Figure 3.6a displays the monthly geometric means from April through October, which shows an exceedance of the standard for August and September. Although the Rock River was first listed as impaired in 1994, the data indicate the Rock River continues to qualify as impaired based on recent monitoring data.

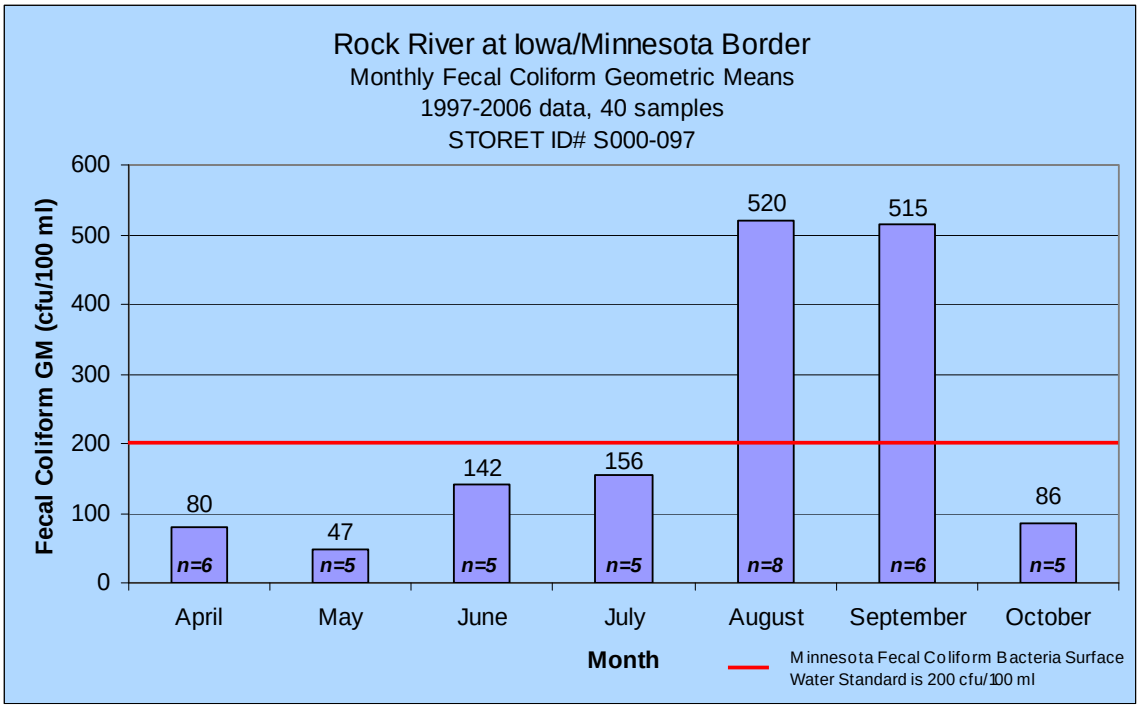

Figure 3.6a – Rock River Monthly Fecal Coliform Geometric Means

In order to determine percent reduction needed to meet the water quality standard, a simple equation is used and shown below.

$$\frac{\text{monthly geomean-water quality standard}}{\text{water quality standard}} = \text{percent reduction}$$

The monthly geomean calculated show that August and September exceeded the water quality standard. August's geomean using eight samples was 520 cfu. Using the equation above, the percent reduction needed to meet the water quality standard is 62 percent. For September, there were six samples collected and the geomean was 515 cfu. a reduction of 63 percent is needed to meet the water quality standard.

Another method of displaying sample data is to plot the water samples based on flow. Figure 3.6b illustrates this concept. This load duration curve was developed by using flow data from the USGS/DNR gaging station #06483000 at Luverne and water quality data from the Minnesota/Iowa monitoring station (STORET ID# S000-097). The figure shows the daily loading capacity over the flow record (1995 through 2006) along with the 40 samples collected in the period. For each sample, the fecal coliform bacteria concentration was multiplied by the daily flow value to compute a daily load. Values that lie above the load duration curve represent samples that exceed 200 cfu. The data shows that using a geomean based on four flow categories revealed greater exceedances of the water quality standard at the highest and higher flow categories.

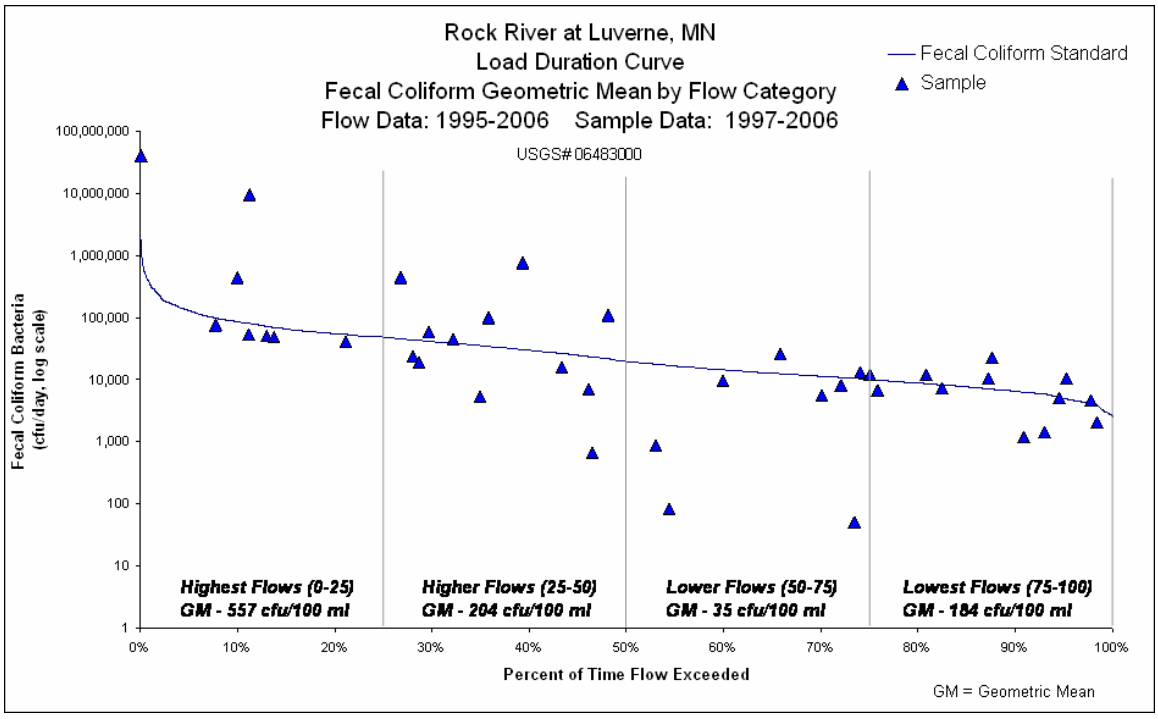

Figure 3.6b – Rock River Fecal Coliform Load Duration Curve

3.7 Fecal Coliform and Precipitation

Fecal coliform bacteria concentrations in the Rock River are highest after precipitation events, regardless of the time of year. Review of precipitation and monitoring data from 1997 through 2006 indicate the highest bacterial concentrations occurred during or within a few days of high precipitation. For example, of the forty samples collected from the Rock River between 1997 and 2006, six samples exceeded 1000 cfu/100 ml. Each of these samples was collected within three days of at least 0.5 inches of precipitation. Samples collected after precipitation events (greater than 0.5 inches within previous three days) had a geometric mean of 898 cfu/100 ml. Samples collected during dry periods had a geometric mean of 97 cfu/100 ml.

3.8 Geographic Scope of Impairment

The geographic scope of fecal coliform impairment upstream of the impaired segment is unknown, as bacterial monitoring has only been conducted at the Iowa/Minnesota border. However, described later in this report, the most likely sources of bacterial contamination are livestock manure and inadequately functioning septic systems. As these sources are distributed fairly evenly across the watershed, and the fact that landuse varies little, it is assumed that bacterial concentrations across the watershed would be similar. It should also be noted that the majority (>90%) of rivers and streams with adequate monitoring data in southern Minnesota qualify as impaired for fecal coliform bacteria.

3.9 Seasonality

Monitoring data show an apparent relationship between season and fecal coliform bacteria concentration. Typically, the highest bacterial concentrations are found in the summer and early fall. In the spring, concentrations are typically lower, despite the fact that significant manure application occurs from October through March and that fields have little crop canopy to protect against water erosion.

The apparent seasonality of fecal coliform bacteria concentrations appears to be associated strongly with stream water temperature. Seasonal changes in landuse, such as timing of manure application, appear to have little correlation with seasonality of bacterial concentrations. Fecal coliform bacteria are the most productive at temperatures similar to their origination environment in animal intestines. Therefore, fecal coliform bacteria are at their highest concentrations during warmer temperatures, possibly due to reproduction in numbers. However, at lower temperatures it is probable the metabolism of organisms slow, therefore prolonging their existence (Chapelle, 2001; Cullimore, 1993). Thus, while bacterial concentrations may be lower during colder periods, survival rates are increased.

Review of fecal coliform concentration and stream water temperature show the apparent relationship. Of non-storm event samples, 33 percent exceeded 200 cfu/100 ml when water temperature was above twenty degrees Celsius, as opposed to 8 percent in colder water samples. Figure 3.9 presents the monthly fecal coliform geometric means for the Rock River when storm samples have been removed from the dataset.

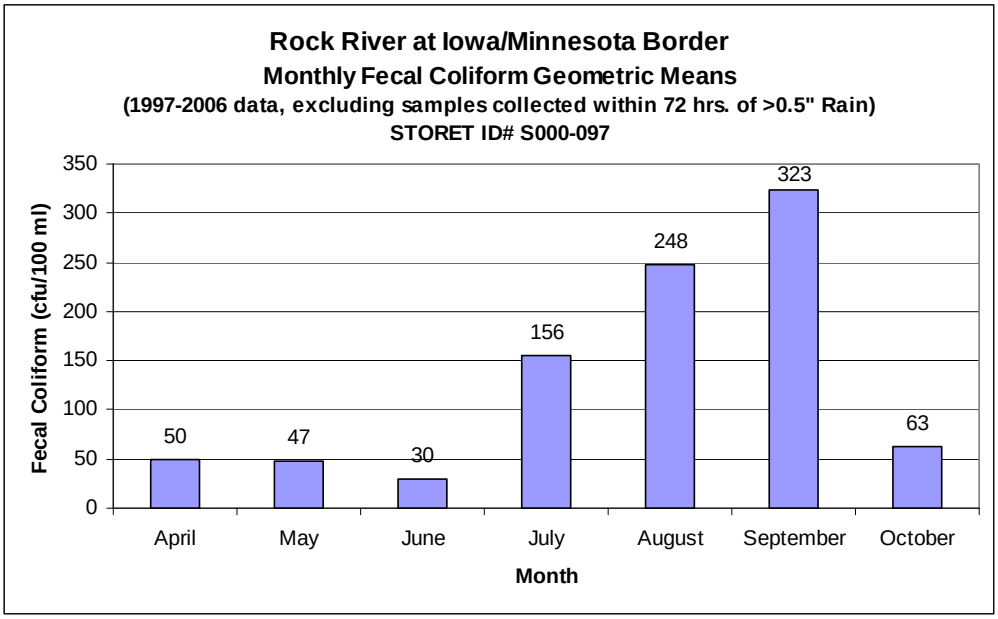

Figure 3.9 – Fecal Coliform GM by Month, Excluding Storm Samples

It should be noted the higher bacterial concentrations during the summer/fall months may also be associated with greater nutrient and algae concentrations at that time of year. Nutrients and algae may support bacterial growth and therefore temperature may be a

secondary factor. Changes in livestock management, such as greater access of cattle to streams may be another factor in higher bacterial concentrations.

3.10 Trends in Fecal Coliform Surface Water Quality

Figure 3.10 presents the long-term fecal coliform geometric means by decade for the Rock River, based on 189 samples. The data indicate that a significant reduction in bacterial concentration occurred from the 1960's to the 1970's. Since the 1970's, there has been a very gradual decrease in bacterial concentrations.

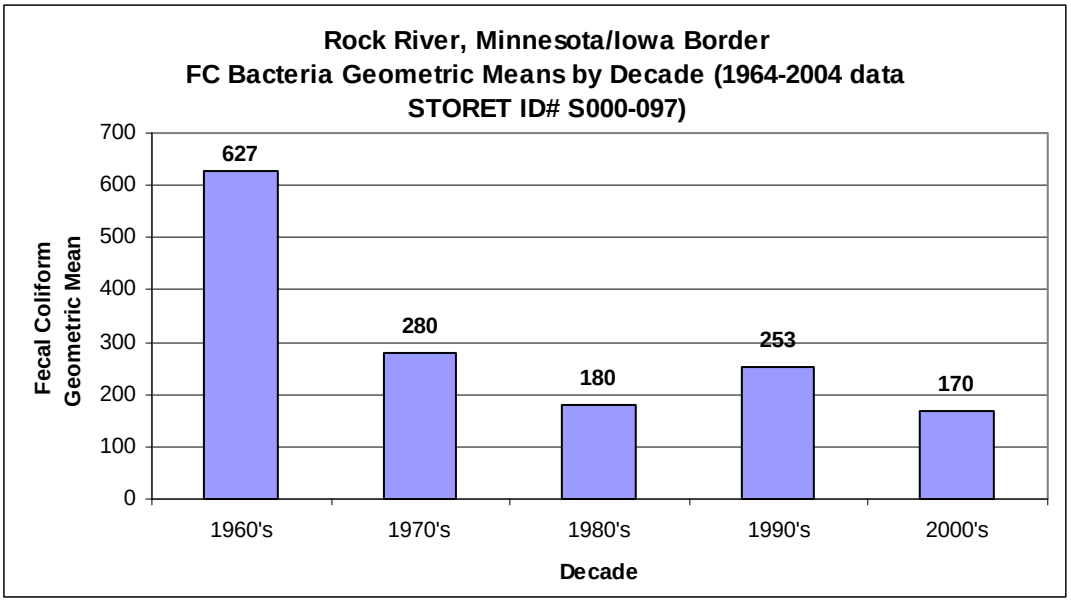

Figure 3.10 – Rock River at Minnesota/Iowa Border -Fecal Coliform GM by Decade

3.11 TMDL Endpoints

TMDL endpoints will meet the 200 cfu/100 ml "chronic" standard and 2000 "acute" standard for fecal coliform bacteria. Section 6.0 outlines the process used to determine monthly and daily TMDL allocations for each of the impaired streams. This process involved using long-term flow data from a USGS flow gaging station and incorporating the two numeric water quality standards for fecal coliform bacteria.

The first numerical standard is that streams will have a monthly geometric mean below 200 cfu/100 ml. This standard was incorporated to calculate the monthly loading capacity and allocations. The second numerical standard is that no more than ten percent of samples may exceed 2,000 cfu/100 ml and was used to calculate the daily loading capacity and allocations. Daily loading capacity and allocations were determined as one third the monthly loading capacity and allocations. This relates to the 2,000 numerical standard being a factor of ten times the 200 numerical standard. Neither the monthly or daily loading capacities (nor individual allocations) may be exceeded.

Section 4.0 – Potential Source Inventory for Fecal Coliform

4.1 Humans

Human waste can be a significant source of fecal coliform contamination during low flow periods. Contamination from individual sewage treatments systems that are not functioning properly can allow untreated or partially treated sewage into waterways. Emergency bypasses from wastewater treatment facilities are an occasional source of bacteria and pollutants. A high priority should be placed on preventing human waste from entering waterways, as human pathogens are often found to be highly communicable.

4.1.1 Human Populations

The 2000 census data indicate the impaired portion of RRW has an estimated population of 10,942. Approximately 66% of the population lives in urban areas, versus 34% rural. The watershed contains all or part of 12 cities and three unincorporated communities. Figure 4.1.1 provides population statistics, city locations, and rural density information for the RRW.

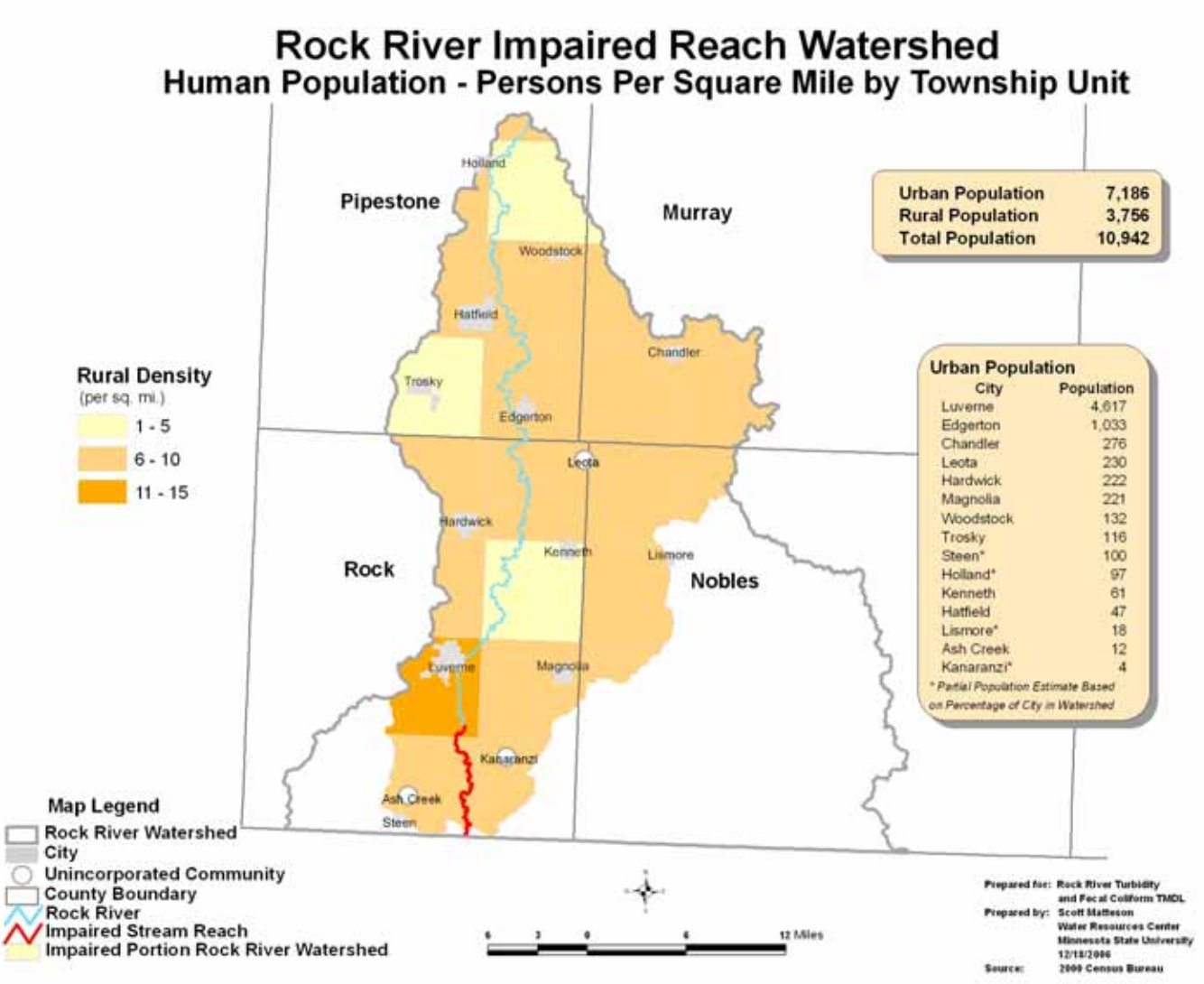

Figure 4.1.1 – Rock River Watershed Human Population – Persons Per Square Mile

4.1.2 Noncompliant Individual Sewage Treatment Systems (ISTS) and Unsewered Communities

Based on county inventories, an estimated 72 percent of Individual Sewage Treatment Systems (ISTS) in the Rock River impaired watershed are allowing inadequately treated wastewater into waterways. These systems are often connected directly into county tile drainage which outlet into the nearest ditch or stream. They systems are often called "straight pipe" systems. These systems are illegal, un-permitted systems pursuant to Minnesota Rules Chapter 7080. Under Minnesota statutes, a straight pipe discharge that has no soil treatment is an "imminent threat to public health or safety" (ITPHS) and when discovered, must be upgraded to acceptable standards within ten months.

In addition, the unincorporated communities of Ash Creek and Kanaranzi and the incorporated community of Trosky are currently unsewered. The representative counties are continually working with the individual residents to consider an ISTS. At least half of the homes in all three communities have an ISTS. Figure 4.1.2 present information on noncompliant systems and unsewered communities in the watershed.

Overall, there are an estimated 1,084 “straight pipe” systems in the watershed. These estimates are highly subjective however, as the method of inventorying varies from one county to the next. The estimates were obtained from county Environmental Services offices.

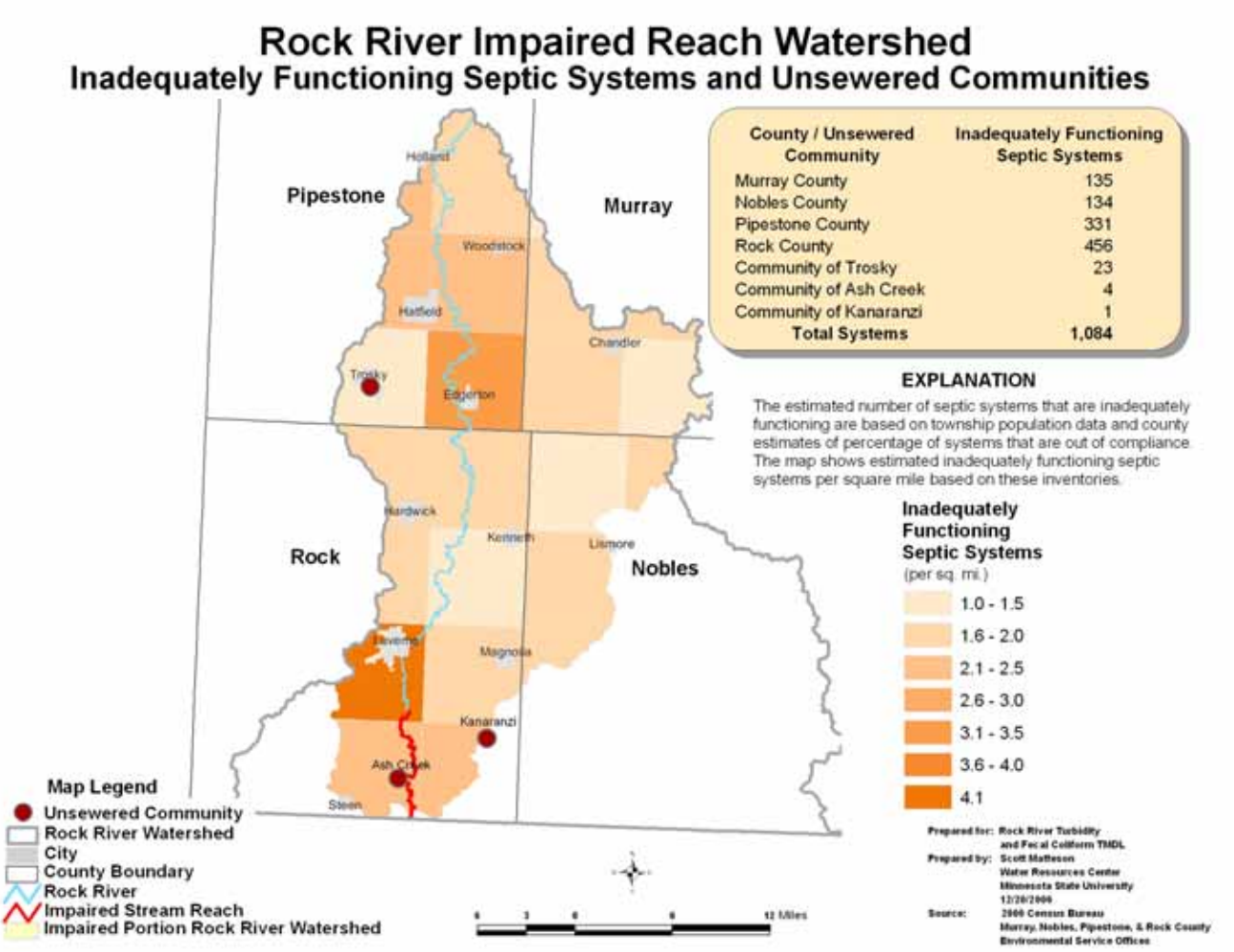

Figure 4.1.2 – Rock River Watershed – ITPHS Systems and Unsewered Communities

4.1.3 MS4 Communities – Stormwater

Pursuant to the TMDL allocation process, cities with populations greater than 5000 are to be provided a wasteload allocation for stormwater discharges. The communities are required to have Municipal Separate Storm Sewer System Permit (MS4) stormwater permits. However, there are no permitted MS4 communities in the Rock River Watershed at time. The City of Luverne is near the 5,000 threshold however, and if ever required to have a MS4 permit, a TMDL revision may be needed for the wasteload allocation.

4.1.4 Municipal Wastewater Treatment Facility Bypasses

Municipal bypasses are legal emergency discharges of partially or untreated human sewage from waste water treatment facilities. Municipal bypasses usually occur during periods of heavy precipitation, when treatment facilities become overloaded. Municipal bypasses typically last from a few hours to a few days. From 2002 through 2006, there was only one reported bypass in the watershed, by the City of Woodstock on March 31, 2006 after 3.5 inches of precipitation.

4.1.5 Municipal Wastewater Treatment Facility Violations

Municipal wastewater treatment facilities (WWTF) are required to test fecal coliform bacteria levels in effluent on a weekly basis. Facilities report a geometric mean fecal coliform level for each month, April through October. The geometric mean for all samples collected in a month must not exceed 200 cfu/100 ml fecal coliform bacteria. Exceedance of the 200 cfu/100 ml limit is considered a WWTF violation.

From 2002 through 2004, the City of Hatfield had 29 violations. Hatfield is in the process of planning a new treatment system for 2007. The only other communities with violations were Edgerton and Holland, each with two over the five-year period.

4.2 Livestock

Runoff from land with manure application, pastures and feedlots has the potential to be a significant source of fecal coliform bacteria and other pollutants. Based on population inventories and the assessment procedures outlined in Section 5.1, nearly 99% of the fecal matter produced (not what is delivered to waterways) in RRW is from livestock manure. Of the fecal matter produced by livestock, the majority is applied to cropland as fertilizer. An estimated 58 percent is incorporated manure and 13 percent is field surface applied manure. Approximately 26 percent of livestock manure (mostly beef), remains on pasture lands. An estimated 2 percent of livestock manure remains in feedlots or on stockpiles without runoff controls.

Based on county feedlot inventories, there are 684 feedlots in the watershed with 151,222 animal units. Swine is the dominant livestock, followed by beef and dairy operations. Figure 4.2 displays the location of inventoried feedlots in the watershed and animal unit density by minor watershed. The majority of these facilities are confined operations with little runoff to surface water. However, there are a number of open feedlots, some of which have pollution problems and pose a risk of fecal contamination. In portions of the watershed, runoff from these feedlots may be a significant source of fecal coliform contamination during periods of heavy precipitation. According to county feedlot officers and MPCA reports, most feedlots store and manage manure adequately to avoid runoff problems.

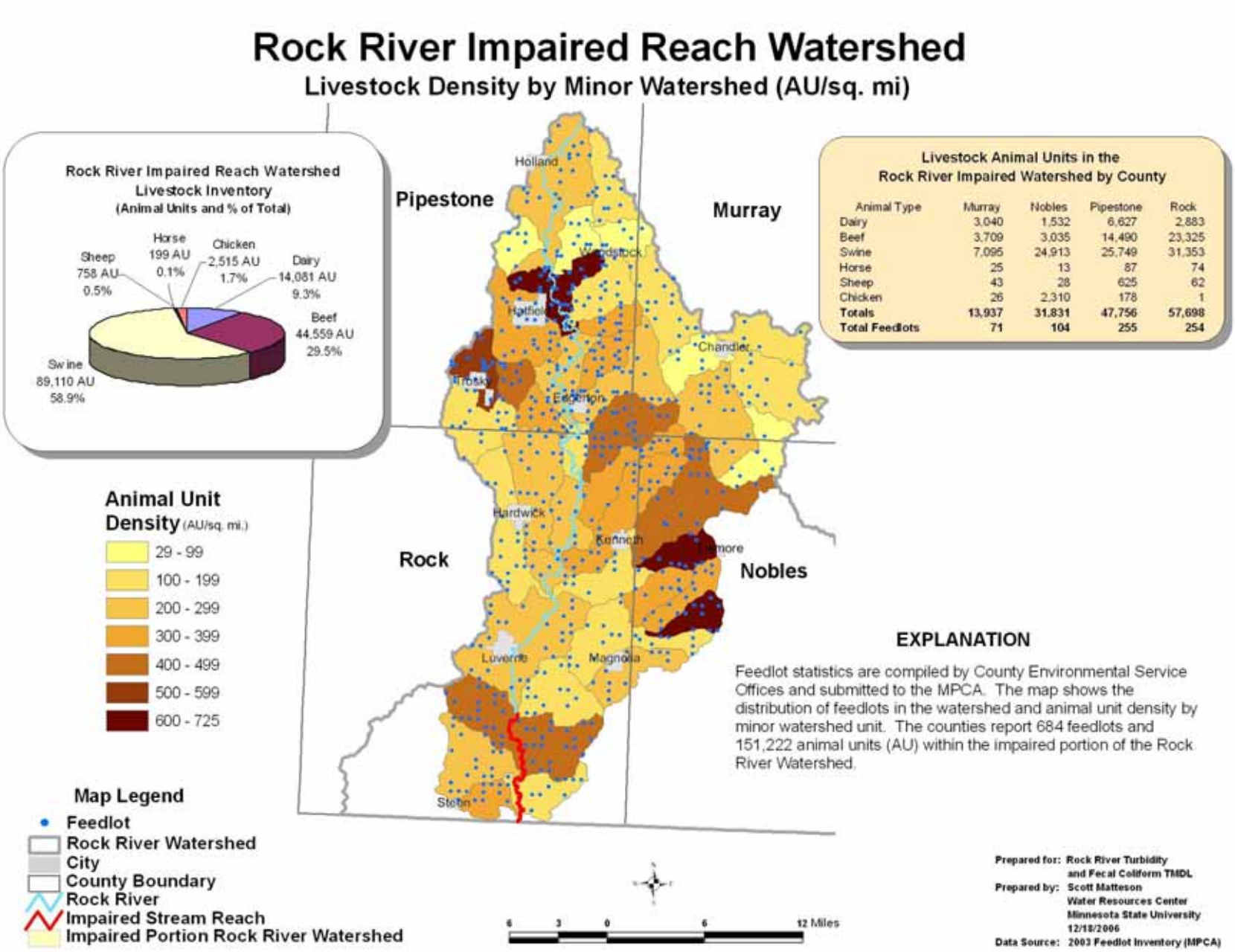

Figure 4.2 – Rock River Watershed Livestock Inventory and Animal Unit Density

Field applied livestock manure accounts for an estimated 71 percent of the fecal material available in the watershed. As such, it has the potential of being a significant source of contamination to waterways. There are three potential pathways of fecal coliform transport from fields with applied manure to waterways; 1) overland runoff, 2) open tile intakes, and 3) macropores/preferential flow.

4.2.1 Overland Runoff and Open Tile Intakes

During storm events, runoff of fecal coliform bacteria from fields with applied manure can occur by direct surface runoff to waterways or indirectly through field tile open intakes. To help address manure runoff concerns, manure application rules were put into place in Minnesota state rule 7020 (Table 4.2.1). This rule requires a setback of 300 feet for surface applied manure from streams, ditches and open tile intakes. The setback of manure application for incorporated fields is 25 feet from streams and ditches and 0 feet from open intakes. The Minnesota statutes represent the minimum setbacks for manure. Counties may develop ordinances with setback rules that are more restrictive.

The effectiveness of current setbacks for applied manure related to bacterial contamination is largely unknown. Setback distances are primarily based on research involving nutrients (phosphorus), not bacterial transport. It is unclear whether current setbacks for surface applied and incorporated manure are appropriate for preventing bacterial transport to tile drainage systems. According to county and state feedlot officers, it is also difficult to monitor whether setback distances are being observed.

Table 4.2.1 - Manure Application Rules for Minnesota

Manure Application – Minimum setbacks near waters (counties can be more restrictive than state Rule 7020)

	Surface Application	**Incorporation within 24 hrs.**
Lake, stream	300'*	25'**
Wetlands (10+ ac.)	300'*	25'**
Ditches (w/o berms)	300'*	25'**
Open tile intakes	300'	0'
Well, quarry	50'	50'
Sinkhole (w/o berms)		
Downslope	50'	50'
Upslope	300'	50'

*100' vegetated buffer can be used instead of 300' setback for non-winter applications (50' buffer for wetlands/ditches)

**no long-term phosphorus buildup within 300'

4.2.2 Macropores/Preferential Flow

Transport of fecal coliform bacteria and associated pathogens may be enhanced by field tile systems. The retardation and retention of bacteria in soils is apparently less effective than previously believed, primarily due to preferential flow processes, which can aid in the rapid transport of bacteria from manure application (Smith et al, 1998; Geohring et al, 1999). Field studies in various locations across the United States have shown significant transport of fecal coliform bacteria to tile drainage through soil macropores. Beven and Germann (1982) outlined the main processes, which contribute to the formation of macropores in natural soils:

- Pores formed by soil fauna such as earthworms, insects, moles and gophers.
- Cracks and fissures formed during the shrinkage of clay soils and freeze/thaw cycles.
- Pores formed by plant roots.
- Natural soil pipes that form due to erosive action of subsurface flows.

In Minnesota, there has been limited research on macropores and bacterial transport. The most significant research in Minnesota related to assessing fecal coliform transport to tile drainage was two separate studies conducted by Gyles Randall at the University of Minnesota Southern Experiment Station in Waseca. The first study (Randall, 2000) conducted from 1995-1997 involved collection of tile water samples from a series of thirteen and a half by fifteen meter plots that had received moldboard incorporation of fall applied dairy manure. The following spring samples were collected within three days of precipitation events that caused significant drainage. The study found 100% of samples to test positive for fecal coliform bacteria, yet *E.* coli was only detected in five of the 30 samples over the three-year period. Fecal coliform concentrations were implied to be low and the authors speculated that significant winter die-off may have occurred.

The second study, (Randall, 2003) involved spring tile monitoring of fall applied (2002/2003) injected swine manure. The study involved comparing field plots with applied manure vs. urea treatments. The authors found the number of fecal coliform bacteria to be similar in both urea-treated and manure treated plots. They suggested organisms did not survive over winter in the added manure and that levels seen during the six-week drainage sampling period were probably background concentrations.

Studies from other parts of the country have shown that the transport of fecal bacteria under conditions of ideal matrix flow is inversely related to particle size. Soil consisting of primarily silt and clay particles are very effective in physically filtering bacterial cells under conditions of matrix flow. However, column and field experiments have indicated that macropore flow is the dominant transport pathway for fecal bacteria. Therefore, soils more susceptible to shrinking or cracking, such as clays, could be less effective than sandy soils in terms of limiting bacterial transport (Jamieson, 2002).

Management strategies to reduce bacterial transport include tillage methods that disrupt preferential flow pathways. Methods of preventing preferential flow may be at odds with other strategies intended to mitigate other environmental impacts. For example, tillage

methods that disrupt preferential flow may cause increased soil erosion and nutrient losses when compared to no till and conservation tillage.

4.2.3 Pastureland

Approximately 26 percent of livestock manure in the watershed is potentially deposited to pastureland. Based on review of county livestock inventories, an estimated 60 percent of beef and 25 percent of dairy operations utilize pastureland. Based on GIS analysis, 78 percent of pastureland in the watershed is within 1000 feet of a waterway. Unfenced pastureland, where cattle have direct access to waterways, poses the greatest risk of fecal coliform contamination.

4.3 Pets

The American Veterinary Medical Association estimates there are 0.66 cats and 0.58 dogs per household in the United States. Based on an average household of 2.52 people, this equates to 2,781 cats and 2,444 dogs in the watershed. High densities of pets in isolated areas can lead to bacterial contamination of waterways; however, pets are normally a minor contributor of fecal coliform bacteria contamination at a watershed scale.

4.4 Wildlife and Natural Background

Deer, pheasant, Canada goose and wild turkey density estimates were obtained from the Minnesota Department of Natural Resources – Wildlife Section.

Deer density is estimated annually by the DNR for each hunting permit area. The average deer density in the RRW is 4 deer per square mile or 2,223 deer.

Pheasant population estimates were provided for each county in the watershed, based on estimates made in August of each year. There is an average of 50 pheasants per mile. This equates to an estimated 27,783 pheasants in the RRW. The DNR report that April populations are about one-fourth August estimates.

Canada goose populations are estimated by DNR classified Ecoregion. Estimates are based on 2001-2004 data for the Prairie Ecoregion, where the RRW is located. The DNR estimates a density of four and a half geese per square mile or 2,476 geese in RRW. The DNR estimate is for the resident geese population, not including migrating geese in the fall. Migrating geese in the fall season can concentrate in lakes and wetlands, contributing large quantities of fecal waste. Geese are one of the largest wildlife sources of fecal contamination, simply because they are found directly on waterways.

The DNR bases wild turkey population estimates on harvest. Similar to deer densities, turkey estimates are based on permitted hunting areas. The mean wild turkey density in the RRW is 1.09 per square mile. However, like other wildlife, they are not equally

distributed, instead clumping towards forested areas. The RRW has an estimated wild turkey population of 666.

Population estimates and monitoring data suggest that wildlife normally are not a significant contributor of fecal coliform bacteria contamination in the watershed. Conditions when wildlife can be a significant source include isolated areas of high density and during low flow/drought conditions.

Section 5.0 – Estimates of Primary Sources of Fecal Coliform Contamination in the Rock River Watershed

This section details the process that was used to estimate the primary sources of fecal coliform contamination in the Rock River impaired watershed. This procedure is for implementation planning purposes and has no bearing on the TMDL allocations or regulatory implications.

5.1 Population Inventories

The first step in estimating the likely major sources of fecal coliform bacteria in the Rock River impaired reach watershed was to assemble population inventories for each potential source. Table 5.1 summarizes the population information that is described in greater detail in Section 4.0. The table below provides population statistics for humans, livestock and wildlife.

Table 5.1 – Rock River Watershed Human and Animal Populations

Humans (2000 Census data)	
Urban Population	7,186
Rural Population	3,756
Total Population	10,942

Pets (American Vet. Association)	
Cats	2,781
Dogs	2,444

Livestock (2003 feedlot inventory)	
Dairy	14,081 Animal Units (AU)
Beef	44,559 AU
Swine	89,110 AU
Chicken	2,515 AU
Horse	199 AU
Sheep	758 AU

Wildlife (DNR-Wildlife Division)	
Canada Geese	2,476
Wild Turkeys	666
Pheasants	27,783
Deer	2,223

5.2 Estimated Fecal Coliform Bacteria Available for Potential Runoff

Table 5.2 displays the FC producers, amount of FC per producer and the source of the information. Figure 5.2a presents the percent of total FC produced per day by each animal type. Figure 5.2b shows the same information when animal types are categorized by source group (human, pets, wildlife and livestock). The amount of fecal coliform (FC) produced daily by each animal type was obtained from a variety of sources, which are all recommended in the Environmental Protection Agency's (EPA) guidance document

Protocol for Developing Pathogen TMDLs. Total FC produced by each animal type is calculated by multiplying the population figure by the daily FC produced per individual or animal unit. Note that the below table and graphs represent the total FC available, not the amount delivered to surface waters.

Table 5.2 – Population and Total Estimated Fecal Coliform Produced by Animal Type

Animal Type	Animal Units	Individuals	FC Produced per Individual or AU Per Day	Total FC Available	Source (Daily FC Production)
Dairy	14,081		7.20E+10	1.01E+15	ASAE**, 1998
Beef	44,559		1.30E+11	5.79E+15	ASAE, 1998
Swine	89,110		8.00E+10	7.13E+15	ASAE, 1998
Chicken	2,515		3.40E+10	8.55E+13	ASAE, 1998
Turkey	0		6.20E+09	0.00E+00	ASAE, 1998
Horse	199		4.20E+08	8.36E+10	ASAE, 1998
Sheep	758		2.00E+11	1.52E+14	ASAE, 1998
Humans		10,727	2.00E+09	2.15E+13	Metcalf and Eddy, 1991
Cats		2,781	5.00E+09	1.39E+13	Horsley and Witten, 1996
Dogs		2,444	5.00E+09	1.22E+13	Horsley and Witten, 1996
Deer		2,223	5.00E+08	1.11E+12	Interpolated from Metcalf and Eddy, 1991
Canada Geese		2,476	1.04E+07	2.58E+10	Alderisio and DeLuca, 1999
Wild Turkey		666	9.50E+07	6.33E+10	turkey value used
Pheasants		27,783	5.20E+06	1.44E+11	1/2 geese value used
Other Wildlife*				1.11E+12	

* Unknown, estimated to be roughly the equivalent of the fecal coliform produced by the deer population.

** American Society of Agricultural Engineers

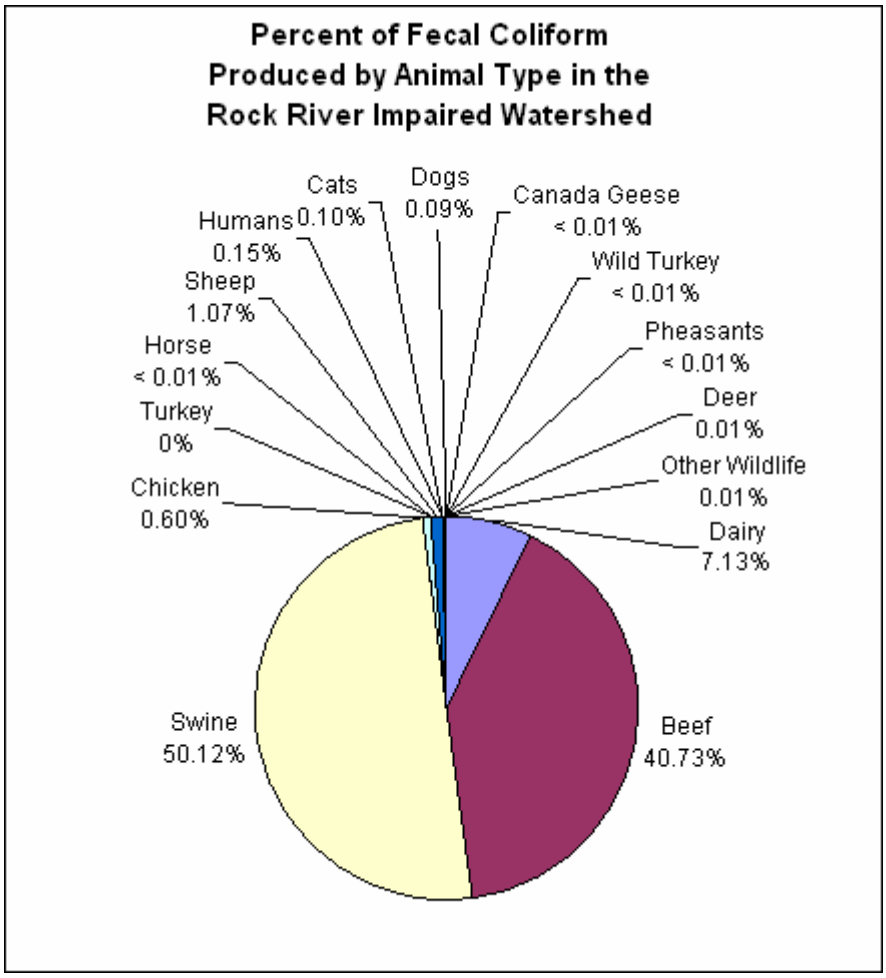

Figure 5.2a – Estimated Fecal Coliform Bacteria Produced by Humans and Animals

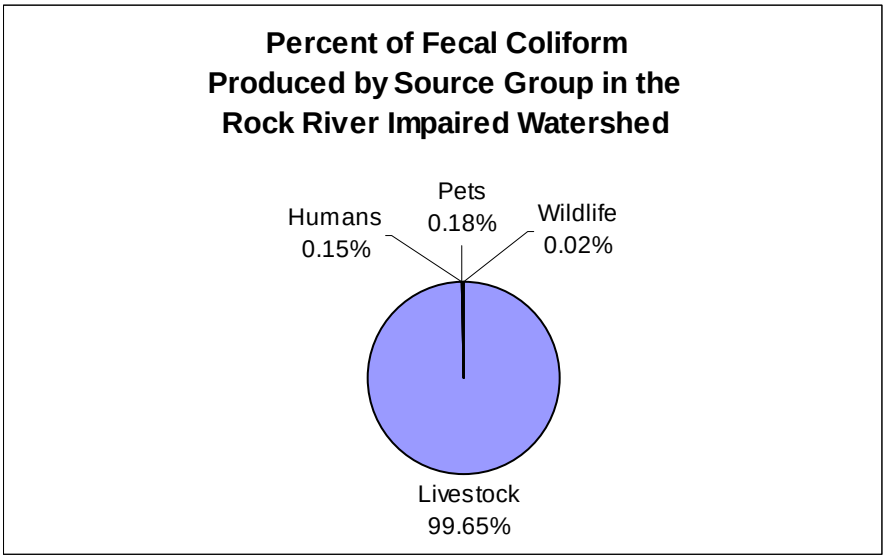

Figure 5.2b – Estimated Fecal Coliform Produced by Source Category

5.3 Potential Fecal Coliform Sources by Application Type / Method

Next, the total fecal coliform produced by each animal type is categorized by application type/method. For humans, this meant calculating the number of people that had adequately treated and inadequately treated wastewater for both rural and urban populations. For livestock, assumptions were derived from the Generic Environmental Impact Statement (GEIS) on Animal Agriculture, prepared by the Minnesota Environmental Quality Board. This document provides general guidelines on how and where livestock manure is applied to farmland in Minnesota. Slight modifications were made for swine assumptions; changing incorporated swine manure from 80 percent to 95 percent and surface applied swine manure from 20 percent to 5 percent. These modifications reflect a continual shift from surface applied to incorporated swine manure based on county feedlot officials. Table 5.3 provides the assumptions used and resulting categories.

Table 5.3 - Assumptions Used to Calculate the FC Produced by Different Sources

Category	Source	Assumptions*	Animal Units or Individuals
Livestock	Pastures within 1000 ft. of a Waterway (78 percent)	19.5% Dairy Manure 48.6% Beef Manure 1% Horse, Sheep, etc. Manure	2,746 Dairy AU 20,854 Beef AU 10 Horse, Sheep, etc. AU
	Pasture greater than 1000 ft from a Waterway (22 percent)	5.5% Dairy Manure 13.2% Beef Manure	774 Dairy AU 5,882 Beef AU
	Feedlots or Manure Stockpiles without Runoff Controls	1% Dairy Manure 5% Beef Manure 1% Chicken Manure	141 Dairy AU 2,228 Beef AU 25 Chicken AU
	Surface Applied Manure	37% Dairy Manure 17.5% Beef Manure 5% Swine Manure 49.5% Horse, Sheep, etc. Manure 49.5% Chicken Manure	5,210 Dairy AU 7,798 Beef AU 4,456 Swine AU 474 Horse, Sheep, etc. AU 1,245 Chicken AU
	Incorporated Manure	37% Dairy Manure 17.5% Beef Manure 95% Swine Manure 49.5% Horse, Sheep, etc. Manure 49.5% Chicken Manure	5,210 Dairy AU 7,798 Beef AU 84,655 Swine AU 474 Horse, Sheep, etc. AU 1,245 Chicken AU
Human	Inadequately Treated Wastewater	26.20% of Human	2,810 Humans
	Adequately Treated Rural Wastewater Municipal Wastewater Treatment Facilities	9.49% of Humans 64.31% of Humans	1,018 Humans 6,899 Humans
Pets	Cats Dogs	100% of Cats 100% of Dogs	2,781 Cats 2,444 Dogs
Wildlife	Canada Geese (resident population) Deer Wild Turkey Pheasants Other Wildlife	100% of Canada Geese 100% of Deer 100% of Wild Turkey 100% of Pheasant Unknown (est. as deer pop.)	2,476 Canada Geese 2,223 Deer 666 Wild Turkey 27,783 Pheasant Unknown (est. as deer pop.)

* Assumptions used for livestock were derived from information contained in the *Generic Environmental Impact Statement on Animal Agriculture* prepared by the Minnesota Environmental Quality Board and GIS analysis.

Figure 5.3 displays the source/application type for fecal coliform in the RRW. The data indicate most fecal material is applied to agricultural land. Again, note that the figure

represents the estimated fecal coliform bacteria produced by source and application type, not the fecal coliform that is actually delivered to surface water.

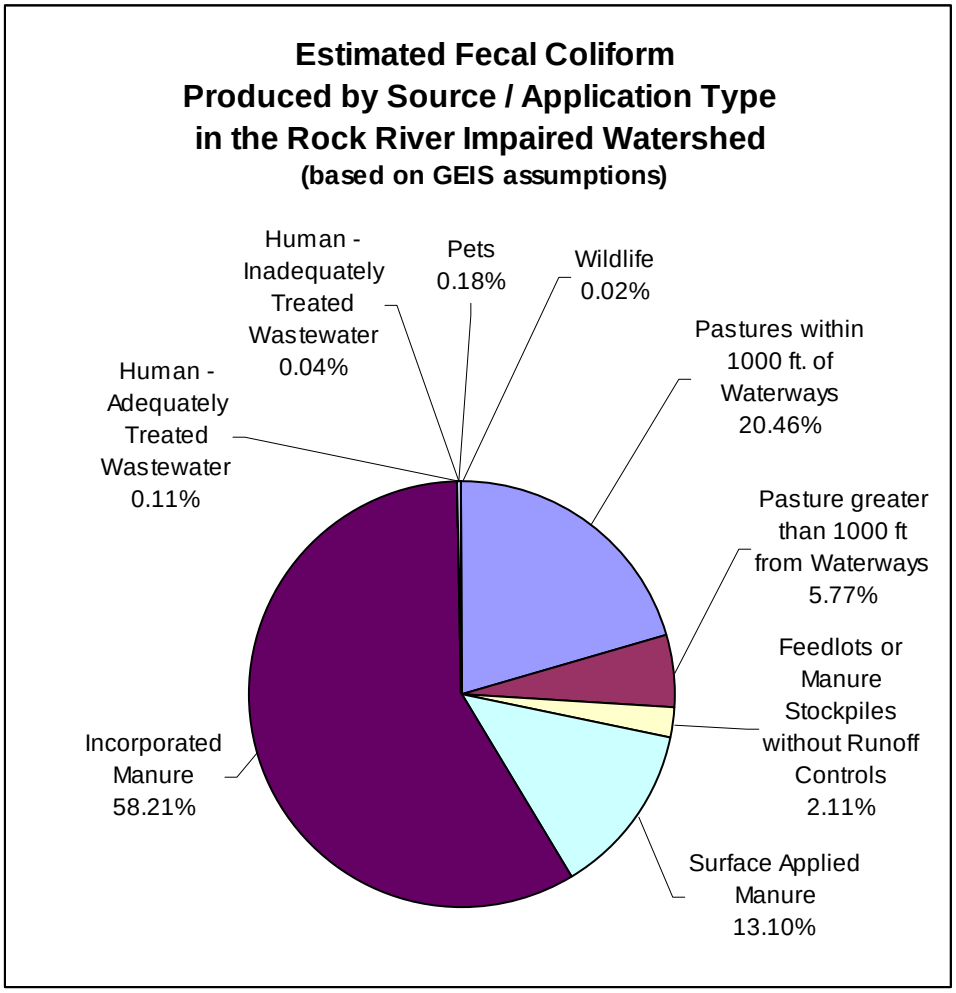

Figure 5.3 – Estimated Fecal Coliform Produced by Source/Application Type

5.4 Delivery Assumptions

To estimate the primary sources of fecal coliform bacteria contamination in the Rock River impaired watershed, the delivery ratios from Table 5.4 were used. The ratios were obtained from Appendix C of the Regional TMDL Evaluation of Fecal Coliform Bacteria Impairments in the Lower Mississippi River Basin in Minnesota, 2002 (revised 2006). The delivery ratios are based on expert opinions and should be considered in relative rather then absolute terms. Thus, while one percent of surface applied manure was assumed to be delivered to waterways during wet conditions, only 0.1 percent of incorporated manure was considered delivered. Straight pipe septic systems were given the highest delivery ratio, at 8 percent.

Table 5.4 – Delivery Assumptions

Category	Source	Wet Conditions	Dry Conditions
Livestock	Pastures within 1000 ft. of Waterways	1.0%	0.1%
	Pasture greater than 1000 ft from Waterways	0.1%	0.0%
	Feedlots or Manure Stockpiles without Runoff Controls	4.0%	0.0%
	Surface Applied Manure	1.0%	0.0%
	Incorporated Manure	0.1%	0.0%
Human	Inadequately Treated Wastewater	8.0%	8.0%
Pets	Cats/Dogs	0.1%	0.0%
Wildlife	Canada Geese (resident population)	4.0%	4.0%
	Other Wildlife	1.0%	1.0%

5.5 Target Areas for Fecal Coliform Bacteria

Delivery ratios used in Section 5.4 come with a degree of uncertainty. The amount of fecal material delivered from any one source will vary depending on numerous factors. Because of this uncertainty, it is difficult to accurately determine the percentage contribution of bacterial contamination from each source. Instead, categories were used to list the sources of bacterial contamination in the impaired stream reaches. Table 5.5 presents the likely major sources of bacterial loading RRW during wet and dry conditions. Wet conditions are defined as those during and following precipitation events that cause overland flow. Dry conditions are when overland flow is not occurring. A greater percentage of days would be considered dry; however, the majority of bacterial loading to streams occurs during wet conditions. Categories were defined as less than five percent being a low contributor, five to twenty percent a moderate contributor and greater than twenty percent a high contributor.

Table 5.5 – Target Areas for Fecal Coliform Reduction in Rock River Watershed

Category	Source	Wet Conditions	Dry Conditions
Livestock	Pastures within 1000 ft. of Waterways	High Contributor	High Contributor
	Pasture greater than 1000 ft from Waterways	Low Contributor	Low Contributor
	Feedlots or Manure Stockpiles without Runoff Controls	Moderate Contributor	Low Contributor
	Surface Applied Manure	High Contributor	Low Contributor
	Incorporated Manure	Moderate Contributor	Low Contributor
Human	Inadequately Treated Wastewater	Low Contributor	Moderate Contributor
Pets		Low Contributor	Low Contributor
Wildlife		Low Contributor	Low Contributor

Section 6.0 – Fecal Coliform TMDL Development for the Rock River Watershed

6.1 Description of Impaired Watershed - Rock River; Elk Creek to Minnesota/Iowa Border

This 11.8 mile reach of Rock River extends from the Minnesota/Iowa border upstream to the confluence with Elk Creek and encompasses 355,625 acres. The stream reach was placed on the impaired waters list in 1994. As mentioned previously, this stream segment was listed based on monitoring conducted as part of the MPCA Milestone Monitoring Program. Figure 2.1b displays the impaired stream reach and its watershed.

Data used for assessing the Rock River was collected from 1985 through 1994. The data showed that fecal coliform concentrations exceeded the water quality standard in May (302 cfu/100ml) and September (830 cfu/100ml). These were the only two months with adequate sample collection for impaired waters listing purposes (geometric mean based on a minimum of five monthly samples over previous ten years).

The impaired stream reach receives wastewater treatment facility discharge from nine communities. Holland and Luverne are continuous discharge facilities. The communities of Chandler, Edgerton, Hardwick, Leota, Magnolia and Woodstock utilize treatment ponds that can discharge from April 1 to June 15 and September 15 to December 15. The community of Kenneth utilizes a community drainfield that is non-discharging. Lismore and Steen, two communities located partially in the watershed, discharge effluent outside the watershed boundary. The community of Hatfield is currently constructing a new treatment system, which should be complete by December 2007. This system will be a non-discharging system. There are three unsewered communities that lie at least partially in the watershed, Ash Creek (unicorporated), Kanaranzi (unincorporated) and Trosky (incorporated). Approximately 3,756 individuals live in rural areas.

Based on county estimates, 75 percent of the rural wastewater septic systems are inadequately functioning. This equates to approximately 1,084 illegally discharging systems in the watershed.

The impaired watershed has approximately 684 feedlots with 151,222 animal units based on 2003 feedlot inventory data. The watershed also includes 24 livestock facilities that have been issued NPDES permits (Table 6.1). Dairy, beef and swine represent 98 percent of the animal units in the watershed.

Table 6.1 – Feedlots with NPDES Permits in the Rock River Watershed

Registration Number	Feedlot Name	County	Animal Number and Type	Animal Units
105-100160	Gary Rodrigue - Hoffman Site	Nobles	3,000 Swine - 55 lbs. or More	900
105-107749	Kyle Van Dyke Section 3	Nobles	950 Mature Dairy Cows	950
105-50001	Donald DeKam Farm - Sec 2	Nobles	4,000 Swine - 55 lbs. or More	1,225
105-50004	GPFF Inc - Whitetail Run	Nobles	3,282 Swine - 55 lbs. or More	1,313
105-50008	Verlyn DeKam Farm	Nobles	8,510 Swine - 55 lbs. or More	2,553
105-92736	Mark Knips Farm Sec 29	Nobles	3,440 Swine - 55 lbs. or More	1,142
105-92829	Rick Bullerman Farm - Sec 25	Nobles	3,200 Swine - 55 lbs. or More	960
105-92976	John & Joe Wieneke Farm - Sec 27	Nobles	1,250 Other Cattle	1,883
105-93047	Mark Knips Farm Sec 31	Nobles	1,491 Other Cattle	1,499
117-109160	Pig City	Pipestone	4,800 Swine - 55 lbs. or More	1,440
117-50001	Spronk Brothers III - Hollyhock	Pipestone	4,800 Swine - 55 lbs. or More	1,440
117-50005	Jeff & Debra Brockberg Farm	Pipestone	6,020 Swine - 55 lbs. or More	1,806
117-50013	New Horizon Farms - Hillview East	Pipestone	3,975 Swine - 55 lbs. or More	1,193
117-60142	East River Farms	Pipestone	6,000 Swine - 55 lbs. or More	1,920
117-85163	Todd Van Essen Farm	Pipestone	1,000 Other Cattle	820
117-85455	Leon Kracht Farm	Pipestone	3,300 Swine - 55 lbs. or More	990
117-85586	Ken Winsel Farm Sec 22	Pipestone	3,900 Swine - 55 lbs. or More	1,170
117-85608	Charla Hunter Farm - Sec 14	Pipestone	3,200 Swine - 55 lbs. or More	960
133-105980	G&A Farms Inc	Rock	3,300 Swine - 55 lbs. or More	990
133-109460	Overgaard Pork - Site 2	Rock	3,000 Swine - 55 lbs. or More	900
133-84234	Knutson Feedlots	Rock	3,500 Other Cattle	3,500
133-84246	Kracht Hill Farm	Rock	3,200 Swine - 55 lbs. or More	960
133-84257	Binford Farms Sec 4	Rock	2,100 Other Cattle	2,125
133-84820	Craig Stegenga Farm	Rock	4,800 Swine - 55 lbs. or More	1,580

6.2 Components of a TMDL

A Total Maximum Daily Load consists of four components: Wasteload Allocation (WLA), Load Allocation (LA), Margin of Safety (MOS) and Reserve Capacity (RC). For fecal coliform TMDLs:

- Wasteload Allocation (Point Sources)
  - Permitted Wastewater Treatment Facilities
  - Livestock Facilities requiring NPDES permits
  - “Straight Pipe” septic systems
  - MS4 Stormwater Communities
- Load Allocation (Non-Point Sources)
  - Manure runoff from farm fields and pastures (NPDES and non-NPDES)
  - Non NPDES Permitted Feedlots
    - Runoff from non-MS4 Communities
  - Wildlife
- Margin of Safety
  - (Accounts for uncertainty that allocations will results in attainment of water quality standards)
- Reserve Capacity
  - Allocation for Future Growth

TMDLs can be developed using any approach approved by the EPA. In Minnesota, the MPCA recommends the use of the "Duration Curve" approach for developing TMDLs. Sections 6.3 through 6.7 describe the steps used in development of the TMDL.

6.3 Compilation of Flow Data

The duration curve approach uses flow monitoring data from the Rock River United States Geological Survey (USGS)/ Minnesota Department of Natural Resources (DNR) gaging site, located near Luverne, Minnesota (10 miles from the Minnesota/Iowa border). This gaging station has the USGS ID# 0648300. The site was selected, as it is the only site with significant flow data over the prior ten-year period. The drainage area for the site represents 75 percent of the impaired watershed drainage area.

The site was originally established in 1911 and daily data is available for a few years. In 1972, the site was established as a flood-warning gage by the USGS. Therefore, only two flow measurements were made per year to assure the upper flow values were being estimated properly. From 1995 through 1997, the USGS conducted more frequent flow measurements and were able to develop adequate rating curves for the estimation of daily flow values. In the fall of 1997, the USGS discontinued the gaging station. In the summer of 1998, the DNR began rigorous flow monitoring of the site, which continues as of 2007. For purposes of this TMDL, mean flow values were obtained for April through October, using available data from 1995 through 2006. The April through October period was selected as this corresponds with the fecal coliform standard. Table 6.3 presents the monthly mean flow values for months with adequate flow data.

Table 6.3 - Rock River at Luverne USGS/DNR# 06483000, Monthly Mean Flows, cfs (95-06)

	Monthly Mean Flow						
Year	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**
1995							444
1996	156	268	468	107	90	135	133
1997	1,186	353	246	264	69	37	
1998				112	63	39	201
1999	672	418	340	326	62	55	32
2000	109	231	323	129	45	17	29
2001	1,547	488	408	252	84	50	41
2002	159	121	84	24	85	28	91
2003	196	199	145	122	39	76	37
2004	121	182	547	210	87	125	25
2005	213	187	425	153	79	353	285
2006	951	449	300	90	110	92	88

6.4 Development of Flow Duration Curve

The resulting 74 monthly flow values were then sorted by flow volume, from highest to lowest to develop a flow duration curve. Figure 6.4 displays the flow duration curve for the Rock River gaging station (#06483000). The chart depicts the percentage of time any

particular flow is exceeded. For example, a flow of 468 cfs was exceeded by 10 percent of monthly flow values, thus flows at or above 468 represent "high flow" conditions. A value of 37 cfs was exceeded by 90 percent of monthly flow values, so flows below 37 cfs represent "low flow" conditions.

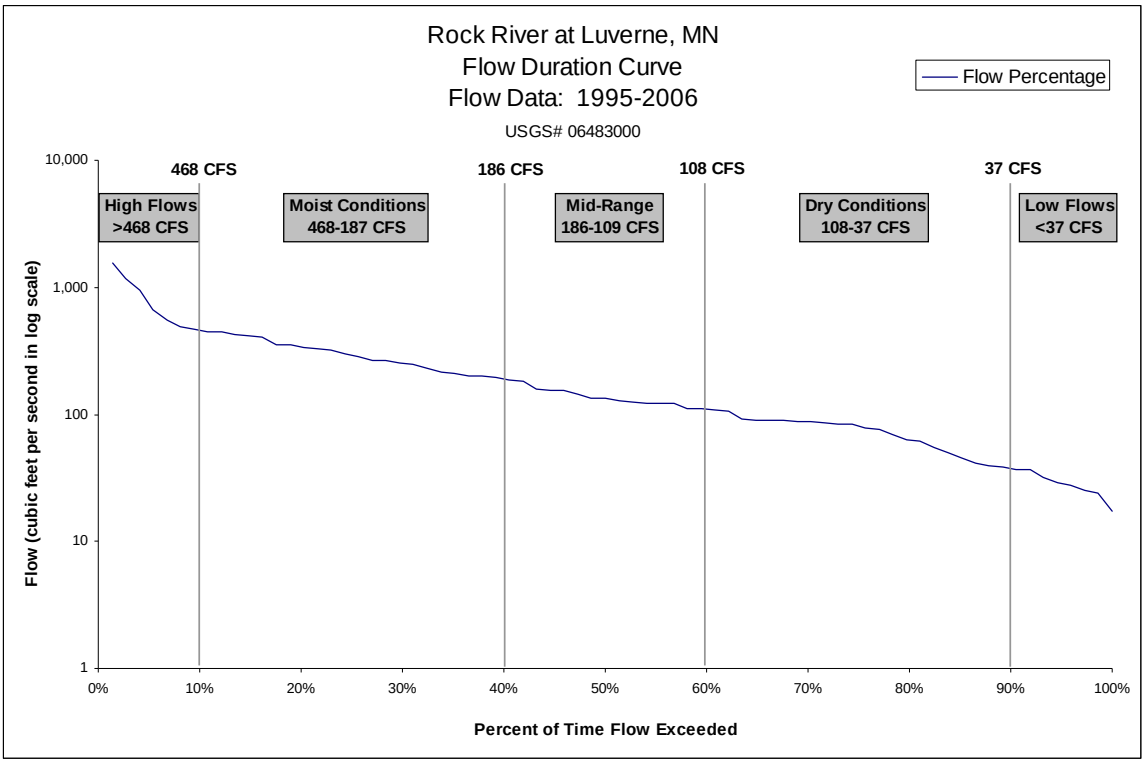

Figure 6.4 - Rock River Flow Duration* Curve *(1995-2006 monthly mean flows)

6.5 Determine Loading Capacity (Maximum amount of Fecal Coliform)

Flow regimes were determined for high, moist, mid-range, dry, and low flow conditions. The mid-range flow value for each flow regime was then used to calculate the total monthly loading capacity (TMLC). Thus, for the "high flow" regime, the loading capacity is based on the monthly flow value at the 5th percentile. Table 6.5 presents the flow regimes that were determined for the Rock River gaging station (#06483000), along with the flow value used to calculate the TMLC.

Table 6.5 - Flow Categories for Rock River (cubic feet per second)

Flow Condition	Percent of Time Flow Exceeded	Flow Range	Flow Used to Calculate Total Monthly Loading Capacity
High	0-10%	>468	672
Moist	10-40%	187-467	285
Mid	40-60%	109-186	133
Dry	60-90%	37-109	79
Low	90-100%	<37	29

The flow used to determine loading capacity for each flow regime was multiplied by a conversion factor of 146,776,126,400. This conversion factor is defined by the following equation:

Load Capacity (org/month) = Concentration (org/100mL) *X* Flow (cfs) *X* (200 cfu/100ml)
Multiply by 3,785.2 to convert mL per gallon to cfu/100 gallons
Divide by 100 to convert to cfu/gallon
Multiply by 7.48 to convert gallon per ft^3 to org/ft^3
Multiply by 86,400 to convert seconds per day to $ft^{3/}$day
Multiply by 30 to convert day per month to $ft^{3/}$month
Multiply by the water quality standard of 200 cfu/100 ml
Load Capacity (cfu/month) = 733,880,632 *X* Flow

6.6 Determination of Margin of Safety

Next, a margin of safety (MOS) was determined for each flow regime. 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 five flow zones. The MOS was determined as the difference between the median flow and minimum flow in each zone. For example, the MOS for the high flow zone is the 100th percentile flow value subtracted from the 95th percentile flow value. The resulting value was converted to a load and used as the MOS. The values that were used to calculate the TMLC and MOS are presented in Figure 6.6.

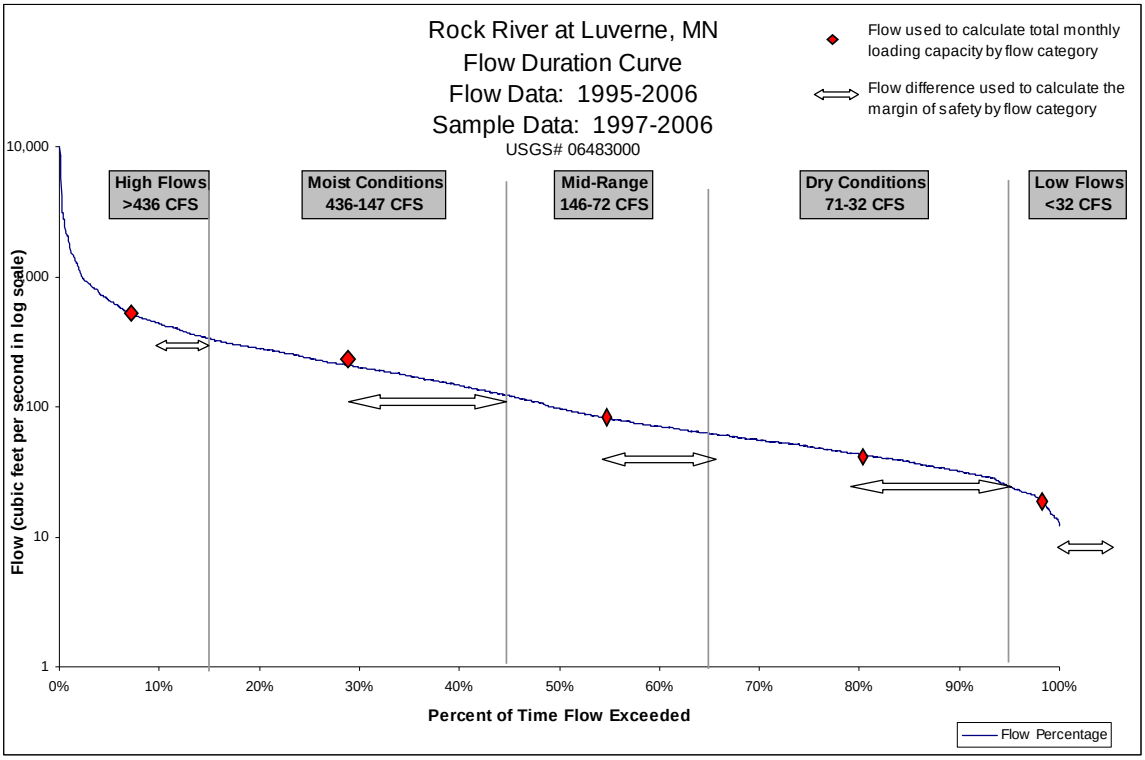

Figure 6.6 - Rock River Flow Duration Curve with TMLC and MOS

Table 6.6 presents the TMLC, MOS and TMDL allocations for the Rock River near Luverne. The TMLC minus the MOS results in the available wasteload and load allocations. The values expressed are in total organisms per month. For each of the five flow regimes, the monthly flow volume was multiplied by the water quality standard of 200 cfu/100 mL. This produces loading capacities in the trillions of organisms per month (T-org/month).

Table 6.6 - TMDL and MOS for Rock River, Luverne, MN

Flow Zone	TMLC*	MOS*	Allocation*
High	98.6	29.9	68.8
Moist	41.8	14.4	27.5
Mid	19.5	3.3	16.2
Dry	11.6	6.2	5.4
Low	4.3	1.8	2.5

* Values expressed as trillion organisms per month

At this point in the process, we have determined a TMLC and MOS for the five different flow regimes. However, this computation is for the USGS site at Luverne, which represents only 75 percent of the drainage area of the impaired reach. To determine the loading capacity of the impaired reach a conversion factor of 1.33 was applied to the TMLC, TMDL and MOS from Table 6.6. This conversion factor is used to calculate the expected flow values at the impaired stream reach based on the additional drainage area.

The next step was to split the TMDL into a wasteload allocation and load allocation.

6.7 Split the TMDL into a Wasteload Allocation and Load Allocation

WASTELOAD ALLOCATION

Luverne and Holland – Direct Discharge Facilities

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 cfu per 100 ml) 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.

Hardwick, Edgerton, Chandler, Woodstock, Magnolia and Leota – Pond Systems

There are six NPDES-permitted WWTF's that are stabilization pond 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 fall. Because the discharge volumes from these pond systems are small, and to provide an extra margin of safety in the event they need 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 condition.

Hatfield

This community was first issued an NPDES permit in 1977. More recently, this facility's permit expired in 2004. At the time, city officials were working towards designing and incorporating a new system. Hatfield acquired USDA funds to assist with the project. The new system is in its final construction stages, with an expected completion date of October 30th, 2007. Once the facility is operational, the NPDES permit will be terminated because it will be a non-discharging system. As such, Hatfield was not allocated a 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. Table 6.7 presents the wasteload allocation for all wastewater facilities in the Rock River impaired watershed.

Design Flow for WWTF X 200 cfu/100 ml = WWTF Wasteload Allocation

Table 6.7 - Wasteload Allocation for Rock River WWTFs

Name/Location	Permit Number	Design Flow (mgd)	WLA (t-orgs./mo.)
Chandler	MN0039748	0.16	0.037
Edgerton	MNG580011	0.37	0.083
Hardwick	MN0039713	0.15	0.035
Holland	MN0021270	0.10	0.022
Leota	MN0063941	0.16	0.037
Luverne	MN0020141	1.50	0.341
Magnolia	MN0025712	0.26	0.058
Woodstock	MN0065200	0.09	0.021
Totals		**2.79**	**0.63**

Straight Pipe Systems

- Straight-pipe septic systems are illegal and un-permitted, and as such are assigned a zero wasteload allocation.

NPDES Livestock Facilities

- 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 requirements.

LOAD ALLOCATION

- Once the WLA and MOS were determined for a given reach and flow zone, the remaining loading capacity was considered the 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 non-permitted stormwater systems.

6.8 Calculate Daily Maximum Loads

Table 6.8 presents the monthly and daily FC loading capacities and allocations for the Rock River. Fecal coliform TMDLs are expressed in both monthly and maximum daily terms. This is to ensure that both the monthly geometric mean and upper tenth percentile portions of the water quality standard are addressed. All maximum daily loading capacity and allocation values are set at a third the monthly loading capacity and allocation values based on the following rationale:

The upper tenth percentile criterion is ten times the geometric mean criterion (2000 cfu per 100ml = upper 10 tenth percentile; 200 cfu per 100ml = geometric mean). Thus, assuming average daily loading capacities and allocations are 1/30th of the monthly values, ten times the average daily values could be allocated as maximum daily loading capacities and allocations under the upper tenth percentile standard. In mathematical terms the maximum daily value = ten x 1/30th of the monthly value = 10/30th or a third of the monthly value.

It is important to note that neither the daily or monthly loading capacities should be violated. In conceptual terms, three days of bacteria loads that approach the maximum daily capacities will "use up" most of the monthly capacity.

Table 6.8 - Monthly/Daily FC Loading Capacities and Allocations for the Rock River

Drainage Area (square miles): 556										
Total WWTF Design Flow (mgd): 2.82	Flow Zone									
	High		Moist		Mid		Dry		Low	
	Monthly	Daily	Monthly	Daily	Monthly	Daily	Monthly	Daily	Monthly	Daily
	values expressed as trillion organisms per month/day									
TOTAL MONTHLY/DAILY LOADING CAPACITY	130.80	43.60	55.48	18.49	25.89	8.63	15.38	5.13	5.64	1.88
Wasteload Allocation										
Permitted Wastewater Treatment Facilities	0.63	0.21	0.63	0.21	0.63	0.21	0.63	0.21	0.63	0.21
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	90.54	30.18	35.77	11.92	20.84	6.95	6.57	2.19	2.69	0.90
Margin of Safety	39.63	13.21	19.08	6.36	4.42	1.47	8.18	2.73	2.32	0.77
	values expressed as percent of total monthly/daily loading capacity									
TOTAL MONTHLY/DAILY LOADING CAPACITY	100%		100%		100%		100%		100%	
Wasteload Allocation										
Permitted Wastewater Treatment Facilities	0.5%		1.1%		2.4%		4.1%		11.2%	
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	69.2%		64.5%		80.5%		42.7%		47.7%	
Margin of Safety	30.3%		34.4%		17.1%		53.2%		41.1%	

6.9 Impacts of Growth on Allocations and Need for Reserve Capacity

As a result of population growth and movement, changes in the agricultural sector, and other land use changes in the Rock River impaired watershed, sources and pathways of bacteria to surface waters will not remain constant over time. The potential impact of these changes on specific bacteria sources are discussed below.

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.

Livestock

Along with humans, the other major source of fecal coliform in the watershed 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 Rock River and its tributaries.

For the reasons discussed above, no explicit adjustments were made to the waste load or load allocations, and no reserve capacity was added, 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.

Section 7.0 – Turbidity Standards and Impairment Assessment

7.1 Description of Turbidity

Turbidity is the measurement of water clarity. Turbidity is caused by soil particles, algae, dissolved salts and other organic materials that scatter light in the water column making the water appear cloudy. Turbidity is detrimental as excessive levels can harm aquatic life. Aquatic organisms can have trouble finding food, gill function can be affected and spawning beds may become covered.

7.2 Applicable Minnesota Water Quality Standards – Class 2B Waters

The turbidity water quality standard in Minnesota is addressed in Minn. Rules Chapter 7050.0220. The chapter states:

"The numerical and narrative water quality standards in parts 7050.0221 to 7050.0227 prescribe the qualities or properties of the waters of the state that are necessary for the designated public uses and benefits. If the standards in this part are exceeded, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, or injurious with respect to designated uses or established classes of the waters of the state."

The numeric criteria for turbidity, based on stream classification, is provided in Table 7.2. There are three impaired reaches that are classified as Class 2B streams and have a turbidity standard of 25 NTU. The impaired reaches are:

- Rock River, Elk Creek to Minnesota/Iowa border (10170204-501)
- Rock River, Champepadan Creek to Elk Creek (10170204-509)
- Elk Creek, Headwaters to Rock River (10170204-519)

Table 7.2 – Minnesota Turbidity Standards by Stream Classification

Class	Description	Turbidity (NTUs)
1B	drinking water	10
2A	cold water fishery, all recreation	10
2B	cool & warm water fishery, all recreation	25
2C	indigenous fish, most recreation	25

7.3 Impairment Assessment: Turbidity

To assess a stream, there must be a minimum of twenty samples over the prior ten-year period; in this TMDL, data was used from 1997-2006. For a water body to be listed as impaired for turbidity, at least three observations and ten percent of observations must be in violation of the turbidity standard. The assessment process also allows for use of transparency and total suspended solids data if adequate turbidity data is not available. According to the MPCA, Total Suspended Solids (TSS) values selected as surrogate thresholds are 58 and 66 mg/L in the Western Corn Belt Plains Ecoregion and Northern Glaciated Plains Ecoregion, respectively. Most of the Rock River watershed is located in

the Northern Glaciated Plains Ecoregion. The use of transparency tube data is also an acceptable surrogate, with the threshold of 20 cm.

There were a total of 53 turbidity, 37 transparency and 51 total suspended solids samples collected from 1997-2006. In 2006, the MPCA revised the listing criteria to accept volunteer transparency monitoring data for the assessment of streams and lakes. In 2006, with the use of transparency data, two additional stream segments became classified as impaired for turbidity; Rock River; Champepadan Creek to Elk Creek (10170204-509) and Elk Creek; Headwaters to Rock River (10170204-519). Volunteers collected 69 transparency tube readings from both sites in 1999, 2000, 2002, 2003 and 2005. Table 7.3 provides of summary of water quality data collected from the three impaired stream reaches. The data indicate each reach to be well above the assessment criteria.

Table 7.3 – Summary of Turbidity, Transparency and TSS Samples for Impaired Reaches

	Stream Name	Rock River	Rock River	Elk Creek
	Description	Elk Creek to Minnesota/Iowa Border	Champepadan Creek to Elk Creek	Headwaters to Rock River
	Assessment Unit ID	10170204-501	10170204-509	10170204-519
Turbidity	Number Turbidity Observations	53		
	Percent Observations >25 NTU	***51%***		
	Range, NTU	6 - 190	No Data	No Data
	Mean, NTU	40		
	Median, NTU	26		
Transparency	Number T-tube Observations	37	69	69
	Percent Observations <20 cm	***19%***	***90%***	***96%***
	Range, cm	7 - 98	4 - 26	4 - 22
	Mean, cm	34	13	12
	Median, cm	26	13	12
Total Suspended Solids	Number TSS Observations	51		
	Percent Observations >66 mg/l	***28%***		
	Range, mg/l	5 - 490	No Data	No Data
	Mean, mg/l	64		
	Median, mg/l	33		

Section 8.0 – Turbidity TMDL Development for the Rock River Watershed

The following section describes the development process for three turbidity TMDLs in the Rock River Watershed.

8.1 Description of Impaired Reaches

The Rock River; Elk Creek to Minnesota/Iowa border was placed on the 303(d) impaired waters list in 2002 based on monitoring data collected by the MPCA. This reach is also listed as impaired for fecal coliform bacteria. Figure 2.1b displays the location of this impairment and its contributing 355,626 acre drainage area.

In 2006, two additional reaches were added to the 303(d) list of impaired waters. These sites were listed based on the results of transparency tube volunteer monitoring data. Elk Creek, Headwaters to Rock River is a 41,151 acre watershed located across portions of eastern Rock County and western Nobles County. Rock River, Champepadan Creek to Elk Creek drains 276,845 acres from portions of Murray, Nobles, Pipestone and Rock counties. Figure 2.1b present these impaired reaches along with the contributing drainage areas.

8.2 Components of Turbidity TMDLs

Turbidity TMDLs consists of four components: Wasteload Allocation (WLA), Load Allocation (LA), Margin of Safety (MOS) and Reserve Capacity (RC).

WLA = Waste Load Allocation, which is the sum of all point sources, including:
- Permitted Wastewater Treatment Facilities (NPDES)
- Construction Stormwater (NPDES)
- Industrial Stormwater (NPDES)

LA = Load Allocation, which is the sum of all nonpoint sources, including;
- Runoff from Row Cropland
- Feedlots with Pollution Hazards
- Livestock in Riparian Zone
- Impervious Surfaces
- In-stream Sources

MOS = Margin of Safety (may be implicit and factored into conservative WLA or LA, or explicit.)

RC = Reserve Capacity (Allocation for Future Growth)

As with the fecal coliform TMDL, the “Duration Curve” approach was utilized to address the turbidity TMDLs. This process involved the following steps: compiling the flow data, producing a flow duration curve, calculating the TSS surrogate for the Rock River and determine loading capacity and allocations.

There is a need to identify, evaluate, and select the type/method of analysis to be used in quantifying the source loads and allocations for TMDLs. The duration curve model was chosen for this project because of available data, watershed characteristics, minor urban influence, consultant experience and guidance and ease of application. Also, duration curves are well-tested, widely used, and acceptable to the EPA. The MPCA recommends using the simplest model that includes all the important processes affecting water quality as along as integrity is not comprised.

8.3 Compilation of Flow Data

As with the fecal coliform TMDL, the duration curve approach for turbidity involved using flow monitoring data from the Rock River USGS/DNR gaging site (*#06483000),* located at Luverne, Minnesota. This USGS/DNR site is located in within ten miles of the impaired reaches. (See Figure 2.1b) Unlike the fecal coliform duration curve, which used monthly mean flow values, turbidity TMDL duration curves require daily mean flow values. A total of 2,825 daily flow values were compiled for the flow record, which spanned from 1995 through 2006.

8.4 Development of Flow Duration Curve

The daily flow values were then sorted by flow volume, from highest to lowest to develop a flow duration curve. Figure 8.4 displays the flow duration curve for the Rock River USGS gage #06483000. As expected, this duration curve is very similar to the fecal coliform monthly duration curve, with the ends of the curve becoming more pronounced due to the use of daily values rather than monthly averages (Figure 6.4).

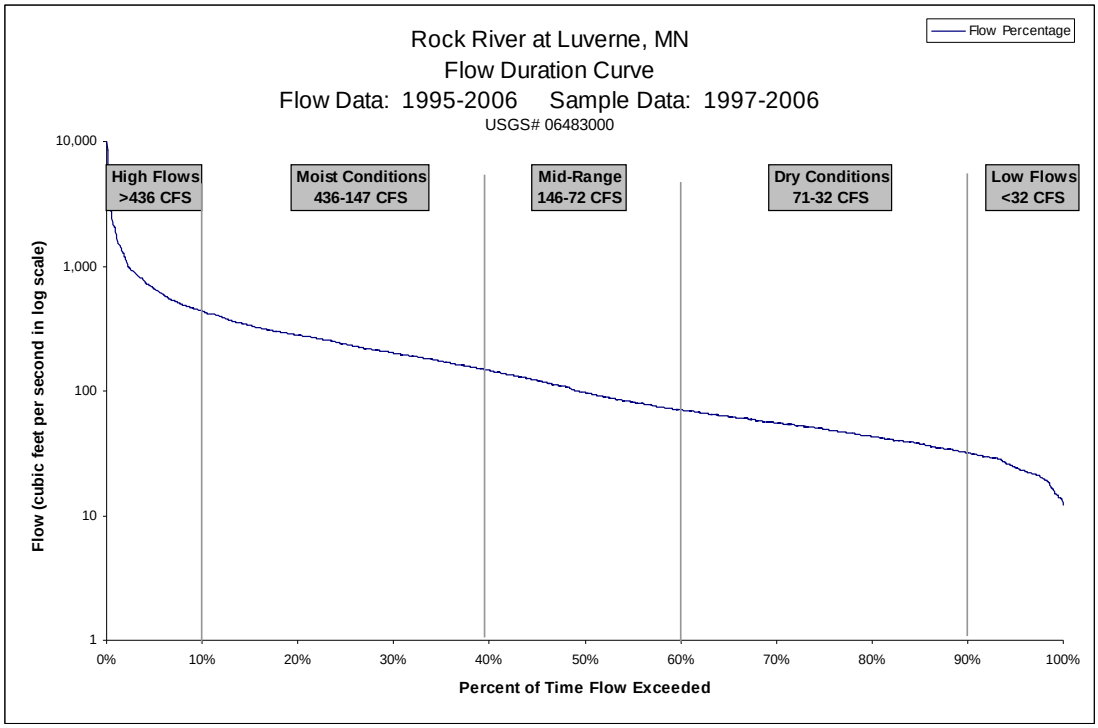

Figure 8.4 - Flow Duration Curve for Rock River, at Luverne (USGS/DNR gage # - 06483000)

8.5 Calculation of TSS Equivalent for Turbidity Standard

As turbidity is a dimensionless unit, loading allocations, capacities and reductions are commonly based on a surrogate parameter, total suspended solids (TSS). TSS is the measurement of sediment and organic matter in a sample and is often used to calculate loading allocations and capacities.

As described in Section 7.3, protocol used for listed streams allows for use of TSS data when adequate turbidity data is not available. The protocol suggests TSS values of 58 mg/L in the Western Corn Belt Plains Ecoregion and 66 mg/L in the Northern Glaciated Plains Ecoregion, is assumed to be equivalent to 25 NTU. Most of the Rock River watershed is located in the Northern Glaciated Plains Ecoregion.

In reality, the relationship between turbidity and total suspended solids varies in streams across Minnesota. Even different segments of the same stream can have varying relationships of TSS to turbidity. The relationship of turbidity and TSS will depend on contributing water sources and landscape features. Sediment particle size and type will also often change from one portion of a stream to other, which can impact the relationship of turbidity and TSS. To account for this issue, the MPCA recommends that stream specific relationships of turbidity and TSS be made for each stream undergoing a TMDL (when adequate data exists). In the Rock River watershed, the MPCA monitoring site, located at the Minnesota /Iowa border had ample data to use the stream specific relationship. The watershed does remain fairly uniform from headwaters to the monitoring station so this relationship should be fairly constant throughout the watershed.

To determine the TSS equivalent to the turbidity standard of 25 NTU, paired turbidity and TSS samples collected from the Minnesota/Iowa monitoring station (STORET ID S000-097) were compiled using data from 1962 through 2006. Based on criteria recommended by the MPCA, only sample sets with a turbidity value of 40 NTU or below and TSS values of 10 mg/L or above were used for the analysis. Review of turbidity data revealed varying methods of laboratory and field turbidity analysis. Following MPCA criteria, only accepted turbidity methods and types were used for the analysis. A total of 68 paired turbidity/TSS samples met these criteria. A regression analysis was completed as shown in Figure 8.5. Using the regression line equation, a TSS concentration of 74 mg/l was determined to be the surrogate value to the 25 NTU turbidity standard.

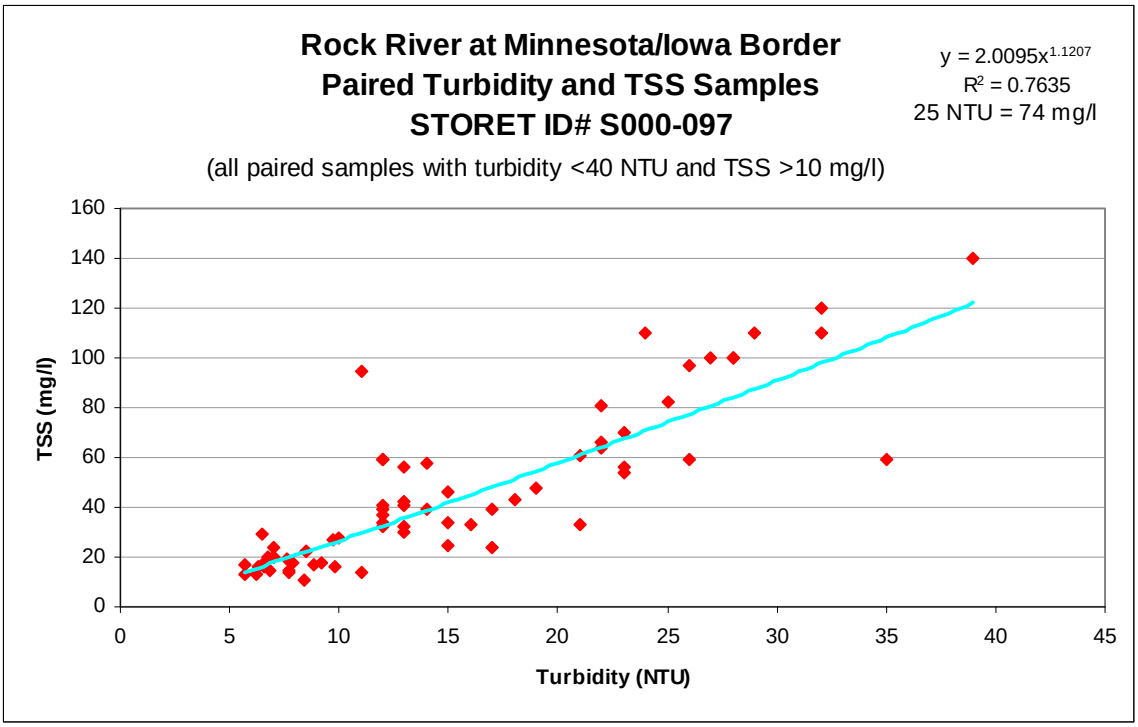

Figure 8.5 – Paired Turbidity/TSS Samples at the Rock River, Minnesota/Iowa Border Site

8.6 Determining Loading Capacity (Maximum amount of Pollutant)

Flow regimes were determined for high, moist, mid-range, dry, and low flow conditions. The mid-range flow value for each flow regime was then used to calculate the total daily loading capacity (TDLC). Thus, for the "high flow" regime, the TDLC is based on the monthly flow value at the 5th percentile. Table 8.6 presents the flow regimes and the flow value used to calculate the TDLC.

Table 8.6 - Flow Categories for Rock River

Flow Condition	Percent of Time Flow Exceeded	Flow Range (cfs)	Flow Used to Calculate Total Daily Loading Capacity (cfs)
High	0-10%	>436	654
Moist	10-40%	147-436	237
Mid	40-60%	72-146	97
Dry	60-90%	32-71	49
Low	90-100%	<32	24

Next, the TDLC for each flow regime was multiplied by the Rock River TSS surrogate standard of 74 mg/L, which is converted in tons of TSS per day using the following equation:

How to convert flow and concentration to load

1. Determine the median flow value for each flow regime.
2. Calculate the TSS equivalent of 25 NTU.
3. For each flow regime, calculate the total liters per day:
   Flow (cubic feet per second) x 28.31 (cubic feet in one liter) x 86,400 (seconds in one day).
4. For each flow regime, calculate total mg of TSS:
   TSS surrogate (74 mg/l) x total liters.
5. For each flow regime, calculate total tons TSS per day:
   Total mg TSS/907,184,740 (the number of mg in one ton).

Flow x TSS Surrogate x 28.31 x 86,400
907,184,740 = Total Daily Tons TSS

Daily flows multiplied by the surrogate TSS value results in a load duration curve. Figure 8.6 presents the load duration curve for the Rock River near Luverne. The chart shows the TDLC for each of the five flow regimes. The loading capacity varies from 4.8 tons per day during low flow conditions, up to 130.5 tons per day during high flow conditions.

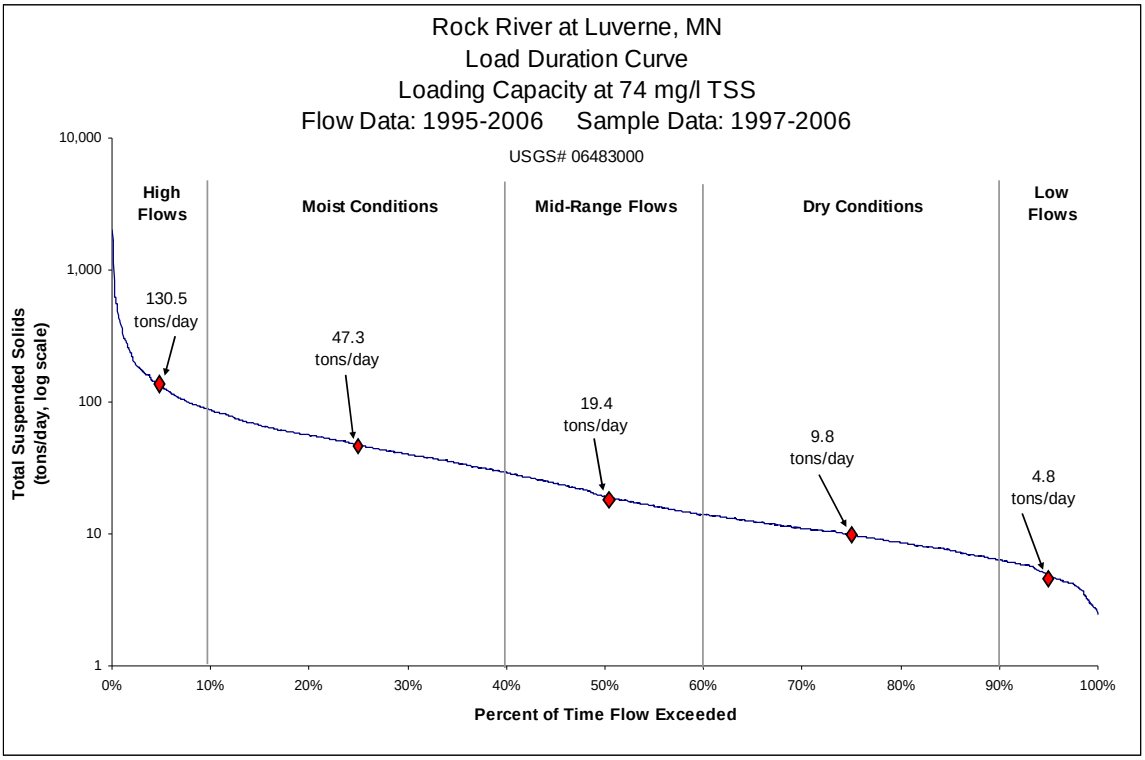

Figure 8.6 – TDLC by Flow Regime for Rock River, at Luverne (USGS/DNR gage # - 06483000)

8.7 Determining Margin of Safety

Next, a Margin of Safety (MOS) was determined for each flow regime. The purpose of the MOS is to account for uncertainty that the allocations will result in attainment of water quality standards. The MOS was determined as the difference between the median

flow and minimum flow in each zone. For example, the MOS for the high flow zone is the 95th percentile flow value subtracted from the 100th percentile flow value. The resulting value was converted to a load and used as the MOS.

8.8 TDLC, MOS and TMDL Allocations for Rock River near Luverne

Table 8.8 presents the TDLC, MOS and TMDL allocations for the Rock River near Luverne. The TDLC minus the MOS results in the available wasteload and load allocations. The values expressed are in tons of TSS per day.

Table 8.8 – TMDL, MOS and TDLC for the Rock River, near Luverne

Flow Zone	TDLC (tons TSS/day)	MOS (tons TSS/day)	Allocation (tons TSS/day)
High	130.5	43.5	87.0
Moist	47.3	18.2	29.1
Mid	19.4	5.2	14.2
Dry	9.8	3.4	6.4
Low	4.8	2.4	2.4

8.9 Calculating the TDLC, MOS and TMDL Allocations for the Impaired Reaches

Sections 8.3 through 8.8 describe the creation of a turbidity TMDL for the Rock River DNR/USGS gaging station (#06483000) at Luverne. A watershed conversation factor was applied to account for the impaired reaches located downstream and upstream of the USGS/DNR gage #6583000. For example, the Rock River impaired reach watershed at Minnesota/Iowa border encompasses 355,625 acres, while the upstream DNR/USGS station encompasses only 268,160 acres. To estimate flow for the downstream-impaired reach, a conversion factor of 1.3262 (132.62 percent) was multiplied by the flow values at the DNR/USGS site. Table 8.9 provides the total size of each turbidity impaired watershed, and the conversion factor that was used.

Table 8.9 – Conversion Factors Used to Calculate TDLC for Impaired Reaches

Impaired Reach Name	Assessment Unit ID	Acreage	Sq. Mi.	Watershed Conv. Factor
Rock River, nr. Luverne USGS Station (#06483000)		268,160	419	100.00%
Rock River: Elk Creek to Minnesota/Iowa Border	10170204-501	355,625	556	132.62%
Rock River: Champepadan Creek to Elk Creek	10170204-509	276,845	433	103.24%
Elk Creek: Headwaters to Rock River	10170204-519	41,151	64	15.35%

8.10 Split the TMDL into a Wasteload Allocation and Load Allocation

WASTELOAD ALLOCATION

NPDES Municipal Wastewater Treatment Facilities (WWTF)

- Through permit requirements, WWTP may be allocated a concentration and or load based TSS effluent discharge limit. This TSS limit was then converted into tons per day TSS Table 8.10 provides the tons per day TSS discharge permitted to

each of the facilities in the Rock River Watershed for each of the three turbidity impaired watersheds. To account for potential growth/expansion impacts, a reserve capacity of an additional 50 percent was added to each NPDES wasteload allocation.

Table 8.10 – Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS

Name	Permit Number	Wasteload Allocation (Tons Per Day TSS)	Wasteload Allocation, with Reserve Capacity (Tons Per Day TSS)
Chandler	MN0039748	0.3939	0.5908
Edgerton	MNG580011	0.1773	0.2659
Hardwick	MN0039713	0.0748	0.1122
Holland	MN0021270	0.0157	0.0236
Leota	MN0063941	0.0787	0.1181
Luverne	MN0020141	0.2510	0.3765
Magnolia	MN0025712	0.1233	0.1850
Woodstock	MN0065200	0.0433	0.0650
Agri-Energy	MN0065033	0.0101	0.0151
Totals		**1.1681**	**1.7521**

NPDES Industrial and Construction Discharges and Stormwater

- Agri-Energy, located near Luverne, was the only industrial facility with a TSS effluent limit (see Table 8.10). The facility has a TSS concentration limit of 30 mg/L and maximum design flow of .09 million gallons per day. This equates to a limit of .01 tons per day. This industrial wasteload allocation was utilized with the municipal WWTF allocations in Tables 8.11a and 8.11b, which presents the TDLC. This facility lies outside the Elk Creek impaired watershed therefore is not included in the Table 8.11c.

- There are fourteen operations with construction stormwater permits in the impaired watershed. The wasteload allocation was determined based on estimated percentage of land in the impaired reach watersheds. The estimates are based on the number of disturbed acres divided by the total acreage of the watershed. Estimates as of 2007 are that 0.14 percent has disturbed land from construction practices. This current loading is representative of the typical loading in the watershed. To account for future growth (reserve capacity), allocations in the TMDL were rounded to one percent, which is considered a de minimus allocation. De minimus is defined as a load that is less than 1 percent of the TMDL and a load that is difficult to quantify. Construction storm water activities are considered in compliance with provisions of the TMDL if they obtain a Construction General Permit under the NPDES program and properly select, install and maintain all BMPs required under the permit, or meet local construction stormwater requirements if they are more restrictive than requirements of the State General Permit.

- There are five (including Agri-Energy) industrial stormwater permits in the impaired watershed. The wasteload allocation was determined based on estimated percentage of land in the impaired reach watersheds affected by industrial activities. The estimates are based on the number of disturbed acres divided by the total acreage of the watershed. In 2007, 0.03 percent of the watershed had disturbed land. To account for future growth (reserve capacity), allocations in the TMDL were rounded to a half percent. Under all flow regimes, industrial stormwater is allocated less than one percent of the total loading capacity, otherwise known as a de minimus wasteload allocation. De minimus is defined as a load that is less than 1 percent of the TMDL and a load that is difficult to quantify. Industrial storm water activities are considered in compliance with provisions of the TMDL if they obtain an industrial stormwater general permit or General Sand and Gravel general permit (MNG49) under the NPDES program and properly select, install and maintain all BMPs required under the permit.

- When applicable, permitted MS4 communities are also allocated a portion of the loading capacity based on percentage of land coverage in the impaired watershed. As of 2007, the Rock River Watershed had no MS4 permitted communities, although Luverne is near the threshold of being classified as such. As of the 2000 census, Luverne had a population of 4,617, just below the criteria of 5,000 to be classified as a MS4 community. According to Census Bureau estimates, the population of Luverne has declined every year since 2005. The most recent estimate, for July 1, 2005, places the population at 4,459. In communication with the city of Luverne administrator, the projected population estimate is to continue slowly declining. As such, no wasteload allocation is provided to Luverne at this time.

LOAD ALLOCATION

- Once the WLA and MOS were determined for a given reach and flow zone, the remaining loading capacity was considered the load allocation. The load allocation includes nonpoint pollution sources that are not subject to NPDES permit requirements, as well as “background” sources, such as natural soil erosion from stream channel and upland areas. The load allocation also includes runoff from agricultural lands and non-NPDES stormwater runoff.

8.11 Turbidity TMDLs for Rock River Watershed

Tables 8.11a, 8.11b and 8.11c present the wasteload and load allocations for the three turbidity-impaired reaches. The tables provide allocations in tons per day and also in percent of total loading capacity.

Table 8.11a – TSS Total Daily Loading Capacities and Allocations – Rock River: Elk Creek to Minnesota/Iowa Border

Rock River: Elk Creek to Minnesota/Iowa Border AU ID: 10170204-501 Watershed Area: 355,625 acres / 556 sq. mi.	Flow Zone High Flows	Moist Conditions	Mid-Range Flows	Dry Conditions	Low Flows
	values expressed as tons TSS/day				
Total Daily Loading Capacity	173.05	62.71	25.67	12.97	6.35
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	1.76	1.76	1.76	1.76	1.76
Construction Stormwater (NPDES)	1.14	0.37	0.17	0.07	0.01
Industrial Stormwater (NPDES)	0.57	0.18	0.09	0.03	0.01
Wasteload Allocation Total	3.46	2.31	2.02	1.86	1.78
Load Allocation	111.91	36.32	16.77	6.61	1.39
MOS	57.68	24.08	6.88	4.50	3.18
	value expressed as percentage of total daily loading capacity				
Total Daily Loading Capacity	100%	100%	100%	100%	100%
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	1.02%	2.81%	6.86%	13.57%	27.72%
Construction Stormwater (NPDES)	0.66%	0.59%	0.66%	0.52%	0.22%
Industrial Stormwater (NPDES)	0.33%	0.29%	0.33%	0.26%	0.11%
Wasteload Allocation Total	2.00%	3.69%	7.85%	14.35%	28.05%
Load Allocation	64.67%	57.91%	65.35%	50.96%	21.87%
MOS	33.33%	38.40%	26.80%	34.70%	50.08%

Table 8.11b – TSS Total Daily Loading Capacities and Allocations – Rock River: Champepadan Creek to Elk Creek

Rock River: Champepadan Creek to Elk Creek AU ID: 10170204-509 Watershed Area: 276,845 acres / 433 sq. mi.	Flow Zone High Flows	Moist Conditions	Mid-Range Flows	Dry Conditions	Low Flows
	values expressed as tons TSS/day				
Total Daily Loading Capacity	134.710	48.820	19.980	10.090	4.940
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	1.560	1.560	1.560	1.560	1.560
Construction Stormwater (NPDES)	0.883	0.285	0.131	0.050	0.009
Industrial Stormwater (NPDES)	0.441	0.143	0.065	0.025	0.005
Wasteload Allocation Total	2.884	1.988	1.756	1.635	1.574
Load Allocation	86.926	28.092	12.864	4.955	0.896
MOS	44.900	18.740	5.360	3.500	2.470
	value expressed as percentage of total daily loading capacity				
Total Daily Loading Capacity	100%	100%	100%	100%	100%
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	1.16%	3.20%	7.81%	15.46%	31.58%
Construction Stormwater (NPDES)	0.66%	0.58%	0.65%	0.50%	0.18%
Industrial Stormwater (NPDES)	0.33%	0.29%	0.33%	0.25%	0.09%
Wasteload Allocation Total	2.14%	4.07%	8.79%	16.21%	31.86%
Load Allocation	64.53%	57.54%	64.38%	49.10%	18.14%
MOS	33.33%	38.39%	26.83%	34.69%	50.00%

Table 8.11c – TSS Total Daily Loading Capacities and Allocations – Elk Creek: Headwaters to Rock River

Elk Creek: Headwaters to Rock River AU ID: 10170204-519 Watershed Area: 41,151 acres / 64 sq. mi.	Flow Zone High Flows	Moist Conditions	Mid-Range Flows	Dry Conditions	Low Flows
	values expressed as tons TSS/day				
Total Daily Loading Capacity	20.020	7.260	2.970	1.500	0.730
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	0.180	0.180	0.180	0.180	0.180
Construction Stormwater (NPDES)	0.132	0.043	0.020	0.008	0.002
Industrial Stormwater (NPDES)	0.066	0.021	0.010	0.004	0.001
Wasteload Allocation Total	0.378	0.244	0.210	0.192	0.183
Load Allocation	12.972	4.226	1.960	0.788	0.177
MOS	6.670	2.790	0.800	0.520	0.370
	value expressed as percentage of total daily loading capacity				
Total Daily Loading Capacity	100%	100%	100%	100%	100%
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	0.90%	2.48%	6.06%	12.00%	24.66%
Construction Stormwater (NPDES)	0.66%	0.59%	0.67%	0.53%	0.25%
Industrial Stormwater (NPDES)	0.33%	0.30%	0.34%	0.27%	0.12%
Wasteload Allocation Total	1.89%	3.37%	7.07%	12.80%	25.03%
Load Allocation	64.80%	58.20%	66.00%	52.53%	24.29%
MOS	33.32%	38.43%	26.94%	34.67%	50.68%

8.12 Impacts of Growth on Allocations

Potential changes in population and landuse over time in the Rock River watershed could result in changing sources of excess turbidity. Discussion on how these changes may impact TMDL allocations are discussed below.

Wasteload Allocations

Monthly TSS discharge limits for facilities with NPDES permits typically are from 30 to 45 mg/l. Weekly TSS discharge limits for NPDES facilities are typically from 45 to 65 mg/l. As discussed previously, the TSS equivalent to 25 NTU in the Rock River is approximately 74 mg/l. While new facilities may add increased sediment loading to the system, they would also add additional water. As long as facilities continue to meet existing and new effluent limits, point sources would continue to have minimal impact on the turbidity of receiving waters.

Load Allocations

The amount of land in agricultural land use in the Rock River Watershed is likely to remain fairly consistent over the next two decades. The watershed is comprised primarily of row crops (corn and soybeans) and pasture and hay land. While the majority of the landscape is likely to remain in an agricultural landuse, it is possible a shift from pasture/hay land to row crop could occur. While this could occur, this shift would likely not affect loading capacity of the stream. This is due to the loading capacity being based on long-term flow values, and slight shifts in landuse would likely not substantially increase or decrease annual flows.

Section 9 – Turbidity Assessment for the Rock River Watershed

The following section details the most recent ten-year period of TSS loading and necessary reductions by varying flow conditions. The presentation of data also attempts to provide a general sense of the magnitude, timing and sources of TSS.

9.1 TSS Loading

Figure 9.1 presents TSS samples plotted on a load duration curve using flow data from the USGS/DNR gaging station #06483000 at Luverne and water quality data from the Minnesota/Iowa monitoring station (STORET ID# S000-097). The figure shows the daily loading capacity over the flow record (1995 through 2006) along with the 42 samples collected in the period. For each sample, the TSS concentration was multiplied by the daily flow value to compute a daily load in tons of TSS. Values that lie above the load duration curve represent samples that exceed 74 mg/L. The data show that exceedances of the TSS surrogate of 74 mg/L is more likely to occur at higher flow rates. Less than ten percent of the samples (2 of 21) exceeded 74 mg/L when flows were less than the 50th percentile flow value (97cfs). Nearly 29 percent of samples exceeded the criteria when flows exceeded 97 cfs.

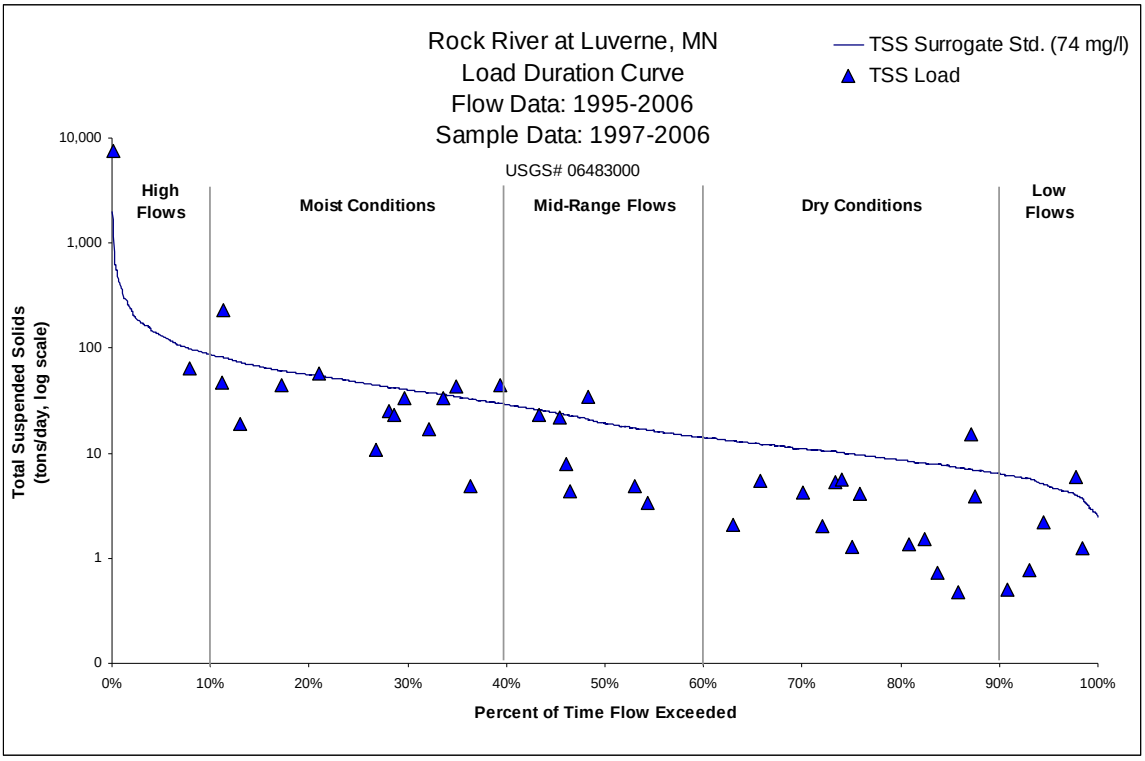

Figure 9.1 – Loading Duration Curve for Rock River

9.2 Necessary Load Reductions

Figure 9.2 compares the 90th percentile TSS load for four flow regimes compared to a loading capacity at the mid-point of the flow regime to obtain reductions. The number of flow regimes was reduced to four, to allow for more samples per category and more accurate calculations of reductions required. The difference between the loading capacity and 90th percentile of sampled loads produced an estimated percent reduction in TSS that will be needed for the Rock River to be removed from the impaired waters list (i.e. fewer than ten percent of samples may exceed 25 NTU). The data indicate that the greatest reductions in TSS load will need to occur during higher flow periods. These would be the periods when stream water velocity would be greatest, and likely the amount of overland runoff and in-channel erosion is greatest. Even though there were limited samples collected, this analysis does correspond with local observations. It should be noted, however, the reductions are merely an estimate.

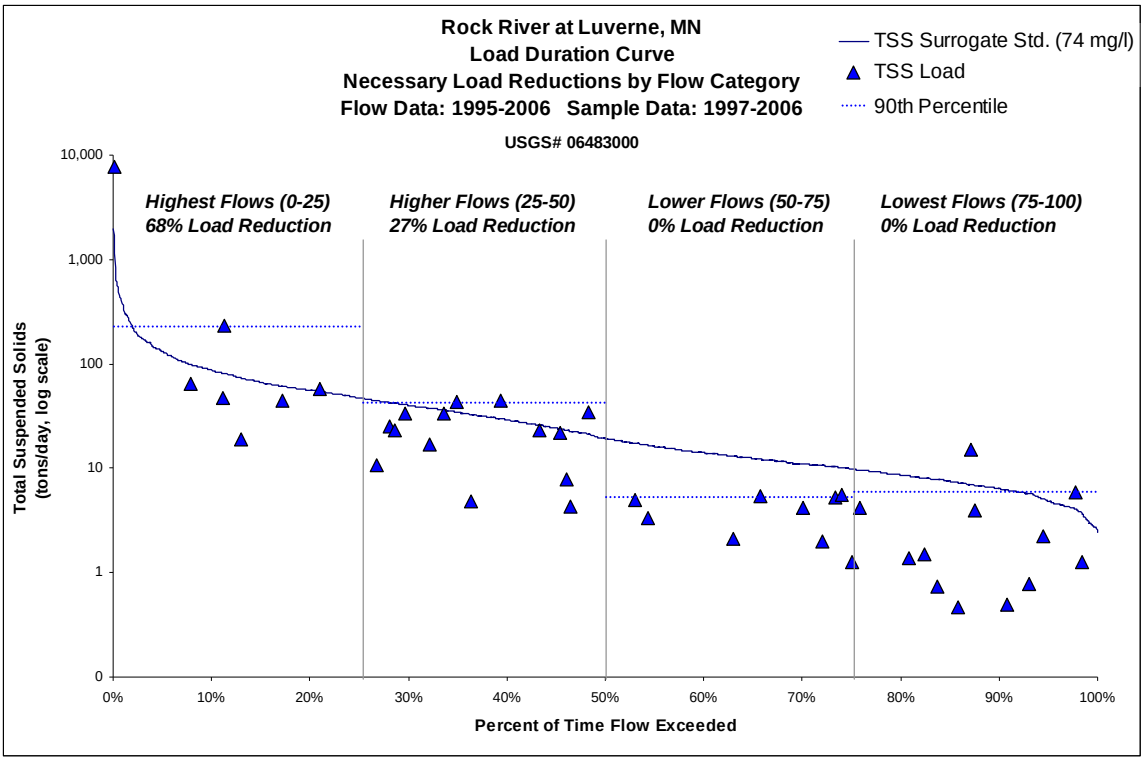

Figure 9.2 – Necessary Load Reductions by Flow Category

9.3 Potential Sources of TSS

Sources of TSS and turbidity in stream settings are often categorized as external and internal sources. External sources include point and non-point contributors. External point contributors would include municipal and industrial wastewater facility discharges. Examples of external non-point sources would include runoff from agricultural lands and stormwater from nonpermitted communities. Internal sources would include streambed load movement and bank slumping. Internal processes can also include growth and decay of algae and other plant material in the channel or water column.

To help assess the sources of TSS loading, flow data from the USGS/DNR gaging station (#06483000) was run through a hydrograph separation program called HYSEP. This program takes the entire flow record and for each day calculates the amount of flow that is base flow and storm flow. Storm flow is runoff that occurs from the landscape rapidly, from either precipitation or snowmelt periods. For each of the 42 samples, the percentage of storm flow was calculated. Figure 9.3a shows that based on HYSEP output, four of the 42 samples collected since 1995 occurred when storm flow exceeded fifty percent. Each of these samples exceeded the daily load limit. The data indicate that when storm samples are removed from the dataset, the remaining samples that exceed standards are closer to meeting the loading capacity.

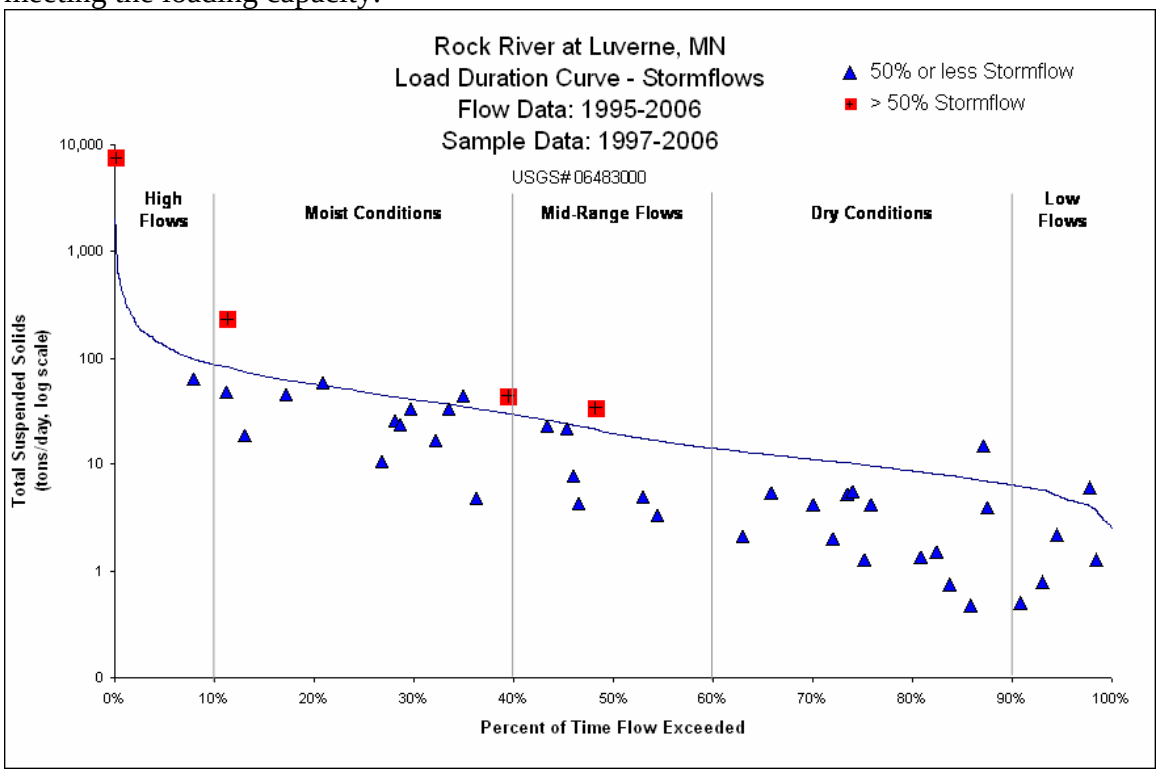

Figure 9.3a – Load Duration Curve with Stormflow Samples for the Rock River

Figure 9.3b shows the TSS samples plotted on a load duration curve for the Rock River, categorized by two separate seasons, April through June and July through March. In many streams in southern Minnesota, the highest TSS concentrations and loads are observed in the April through June period. This period often receives the majority of yearly runoff from a combination of snowmelt runoff and higher rainfall totals. The lack of crop canopy during this period leads to higher runoff rates from the agricultural lands. Figure 9.3b does show that the majority of TSS load does occur during the April through June period, as this is the period when higher flow usually occurred. In both seasonal categories, nearly an identical nineteen percent of samples exceeded the daily loading capacity. It should be noted that when stormflow samples are removed from the dataset only seven percent of samples from the July through March period exceeded the loading capacity. Based on this analysis, it can be assumed that higher flows are causing turbid conditions from overland runoff.

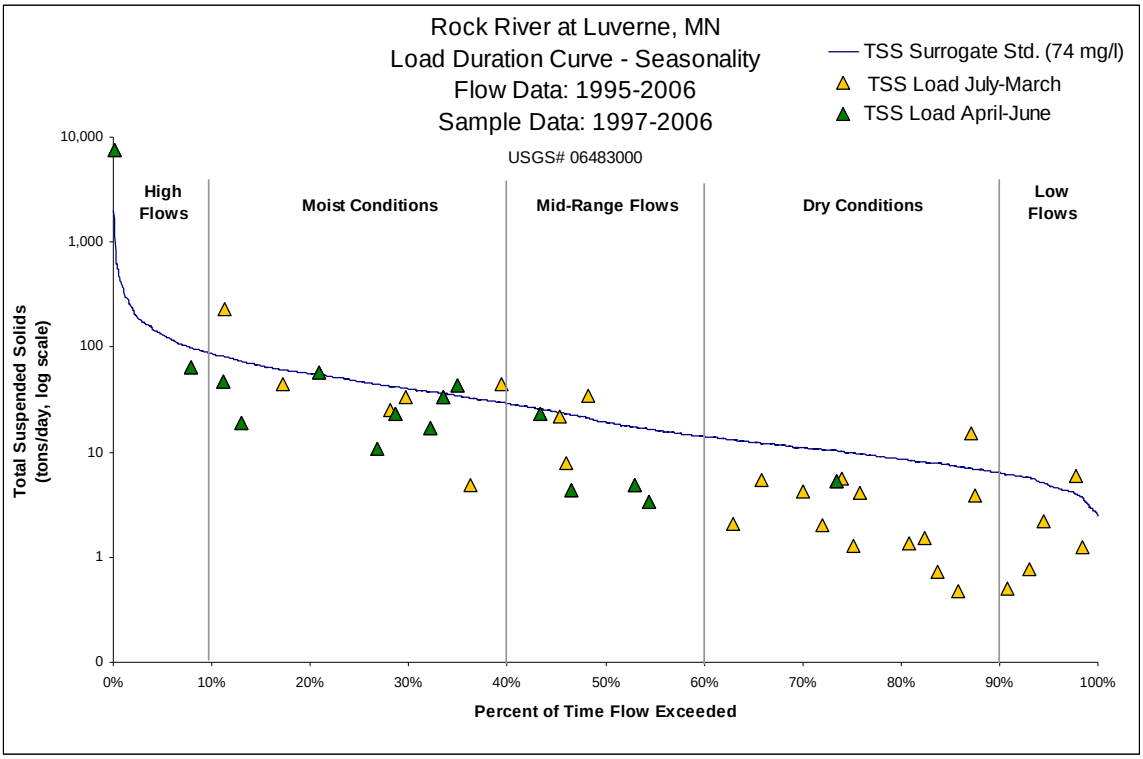

Figure 9.3b – Load Duration Curve with Stormflow Samples by Season for Rock River

Overall, the major sources of excessive turbidity in the Rock River during snowmelt/storm runoff and higher flows is streambank erosion and upland soil loss. High turbidity during drier conditions and low flow is likely related to algae growth and livestock with access to the riparian zone.

9.4 Geographic Scope of Impairment

Determining the geographic scope of impairment is best accomplished through comparing monitoring data from several locations across a watershed. At this time monitoring data exists only for three locations in the watershed and assessment of geographic scope of impairment is limited. However, since similar land use and cover exists across the watershed, it is expected that upper portions of these impaired watersheds would also exceed listing criteria.

The watershed characteristic that usually has a strong influence on sediment loading is slope. Monitoring data from watershed diagnostic studies indicate that steeply sloped lands are associated with higher sediment loading. Steeply sloped areas where erosion is most susceptible include row crop agricultural lands, ravines and streambanks. Figure 9.4 presents the slope characteristics for the Rock River watershed. Much of the steepest sloped land is located in the northern portions of the watershed. County officials report that much of the agricultural land in these portions of the watershed are in pasture, which has significantly less erosion potential than row crops.

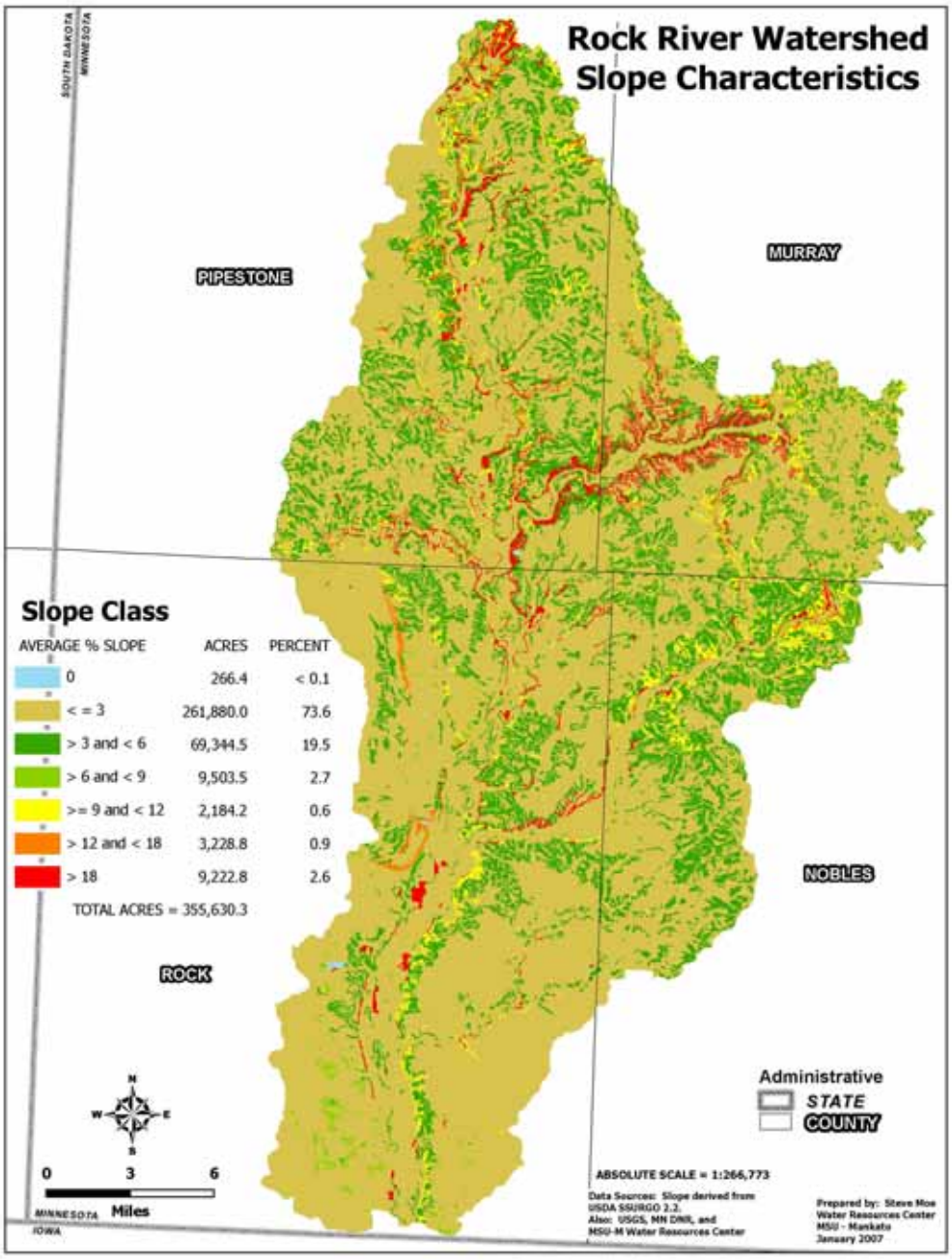

Figure 9.4 – Slope Characteristics of the Rock River Watershed

Section 10.0 – Monitoring Plan

Water quality monitoring of the Rock River will be needed to assess if reductions in fecal coliform bacteria and turbidity are being achieved. This monitoring will rely on monitoring conducted by the MPCA and the four counties.

Long term monitoring as part of the MPCA Milestone Monitoring Program occurs at the Rock River station at the Minnesota and Iowa border (STORET ID# S000-097). The Milestone Program consists of monitoring trends in water quality from over 80 streams in Minnesota. The Milestone Program tests each of Minnesota's ten basins twice in a five-year period. Stream water is tested for a variety of parameters, including turbidity, total suspended solids and *E.* coli. Samples are collected monthly for one year, beginning in October and running through September. This monitoring is next scheduled for the Rock River in 2009.

In 2007, a partnership between the City of Luverne, Rock County and Rock county Rural Water System began monitoring at five locations along the Rock River in Rock County. Four of these sites are sampled once monthly, April through September. Samples are analyzed for several parameters, including total suspended solids, transparency tube and *E.* coli bacteria. This monitoring will continue annually, and should assist county staff in targeting implementation activities to specific portions of the watershed. Rock County also collected samples at the DNR/USGS gaging site #06483000. Twenty-five samples were collected from March to September. Water quality data from this site will be combined with DNR/USGS flow values to compute annual parameter loading and yields for the watershed. Analytical costs for this monitoring are paid through Clean Water Legacy funding (MPCA). Monitoring after 2007 will be dependant on available funding.

Section 11.0 – Implementation Activities

This section provides general implementation strategies targeted towards reduction of fecal coliform bacteria and turbidity. Following approval of the Rock River TMDL study a more detailed implementation plan will be developed. As fecal coliform and turbidity have several sources and pathways, several of the suggestions have the common goal of addressing both pollutants.

11.1 Feedlot Runoff Reduction

State rules for feedlot runoff control will reduce, but not eliminate, bacteria transport to waters from open lots by October 2010. At that time, the bacteria contributions from open lot runoff will need to be reassessed. The Environmental Quality Incentive Program (EQIP) assists feedlots that have a high risk for runoff problems. This cost share funding typically goes for high cost fixes, such as manure storage basins. Financial assistance for low cost fixes such as gutters, diversions, filter strips is usually provided through State Cost Share funding from the Board of Soil and Water Resources (BWSR). Soil and Water Conservation Districts receive between $10,000 to $20,000 from BWSR each year for cost share practices (terraces, diversions, sediment control basin, feedlot runoff structures, etc). When this funding is spread between these various cost share practices, funding is expended quickly. Implementation strategies that target runoff reduction from feedlots will continue to rely on EQIP and the State Cost-Share program.

11.2 Manure Management Planning

Feedlot rules require manure management plans be developed for any feedlots that are required a permit. Manure management plans are an important step in minimizing pathogen transport from manure applied lands. Principles of manure management plans include: (from Developing a Manure Management Plan, Busch, Busman, and Nesse, 2002)

- Know your crop nutrient needs. Before applying manure or fertilizer determine what amounts of nutrients are needed based on realistic yield goals, previous crop, and soil testing.
- Know your manure. Based on laboratory analysis, method of application, and estimates of availability, determine how much nutrients will provide the crop.
- Determine proper rate of manure application. Based on crop needs and nutrients available from the manure, determine optimum rate of application.
- Apply manure uniformly on fields at planned rates. Calibrate spreader to insure correct application rates.
- Keep records of manure application. Record application rates, nutrient content of manure, and fields where manure was applied.
- Rotate manure applications among available fields. Applying manure to the same fields year after year may lead to high soil phosphorus levels that do not improve yields and pose a threat to water quality.

11.3 Non-Conforming Septic Systems

According to county estimates, 72 percent of ISTS in the watershed are non-conforming systems that can contribute fecal coliform bacteria to the Rock River. County staff estimate the number of non-complaint systems based on the number of permitted systems. There is a need for a more thorough inventorying of septic system status for the majority of the watershed. Current administrative funding does not adequately allow for proper inventorying or educational activities related to septic systems. It is recommended that funding be increased or that additional funding be obtained through available grant opportunities.

While most homeowners may be willing to upgrade non-conforming systems, a major deterrent can be cost. As a means to help homeowners pay for new systems, many counties offer a Revolving Load Fund. SWCD offices also provide low interest loans through the Ag BMP program. These programs typically offer loans over a five-year period at three percent interest.

11.4 Pasture Management

Pasture management includes exclusion of livestock from streams and use of rotational grazing.

Livestock with access to streams pose a major risk of contaminating waters through direct deposit of fecal material in the stream or along the banks. Livestock can also cause instability of streambanks, which leads to greater turbidity during higher flows. Exclusion of livestock through fencing will be an important step in reducing fecal coliform bacteria and turbidity in the Rock River.

Rotational grazing involves using only one portion of a pasture at a time. Pastures are divided into paddocks, and livestock are moved from one paddock to another before forage is overgrazed. This type of grazing decreases soil erosion potential, requires minimal fertilizers and pesticides, and decreases the amount of fecal coliform and nutrient runoff. As livestock are moved frequently, forage is able to survive. This vegetation, as opposed to bare soil, allows for higher water infiltration, thus reducing runoff losses.

The MDA has recently released a document on managing grazing in stream corridors that provides additional information on pasture management.
http://www.mda.state.mn.us/news/publications/animals/livestockproduction/grazing.pdf

11.5 Vegetative Practices

Vegetative practices include wetland restorations, filter strips, riparian buffers and grassed waterways. These practices minimize bacteria and sediment runoff from agricultural lands through increased infiltration and decreased pollutant transport.

Wetland Restorations
Wetlands are natural swamps, bogs, sloughs, potholes or marshes that have saturated soils and water loving plants. Wetlands are important as they provide wildlife habitat and serve as natural filter for agricultural and urban runoff. They also remove nutrients, pesticides and bacteria from surface waters and can act as efficient, low cost sewage and animal waste treatment practices. Wetlands slow overland flow and store runoff water, which reduces both soil erosion and flooding downstream.

Filter Strips
Filter strips are strips of grass and trees and/or shrubs that slow water flow and cause contaminants like sediment, chemicals and nutrients to collect in vegetation. The nutrients and chemicals are then used by the vegetated filter strips, rather then entering water supplies and water bodies. Filter strips are often constructed along ditches, thus moving row crop operations farther from the stream.

Riparian Buffers
Riparian buffers are also strips of grass, trees and or shrubs that slow water flow and prevent contaminants like sediment, chemical and nutrients from reaches streams and lakes. Riparian buffers are created in and along the cultivated floodplain and along the mainstem of streams.

Grassed Waterways
A grassed waterway is where a natural drainage way is graded and shaped to form a smooth, bowl shaped channel. This area is seeded to sod-forming grasses. Runoff water that flows down the drainage way flows across the grass rather than tearing away soil and forming a larger gully. An outlet is often installed to stabilize the waterway and prevent a new gully from forming. The grass cover protects the drainage way from gully erosion and can act as a filter to absorb some of the chemicals and nutrients in the runoff water.

11.6 Structural Practices

Water and sediment control basins, terraces, diversions and grade control structures are all structural practices that help reduce runoff and thus reduce soil erosion.

Terraces
Terraces break long slopes into shorter ones. As water makes its way down a hill, terraces serve as small dams to intercept water and guide it to an outlet. There are two types of terraces – storage terraces and gradient terraces. Storage terraces collect water and store it until it can infiltrate into the ground or be released through a stable outlet. Gradient terraces are designed as a channel to slow runoff water and carry it to a stable outlet like a grassed waterway. Terraces can be effective at reducing overland runoff that carry sediment and nutrients.

Water and Sediment Control Basins
A water and sediment control basin is an embankment that is built across a depressional area of concentrated water runoff to act similar to a terrace. These basins trap sediment and water running off farmland above the structure. These structures help reduce gully erosion by controlling water flow within a drainage area. Spacing for water and sediment control basins depends on the land slope, tillage and management system.

Diversions
A diversion is much like a terrace, but its purpose is to direct or divert runoff from an area. A diversion is often built at the base of a slope to divert runoff away from bottom lands. A diversion may also be used to divert runoff flows away from a feedlot, or to collect and direct water to a pond. Diversions help reduce soil erosion on lowlands by catching runoff water and preventing it from reaching farmland below.

Grade Control Structures
A grade control structure is a dam, embankment or other structure built across a grassed waterway or existing gully control. The structure drops water from one stabilized grade to another and prevents overfall gullies (i.e. sediment) from advancing up a slope. Grassed, non-eroding waterways made possible with grade control structure give better water quality, can be crossed with equipment, and look better than non-stabilized gullies. Grade control structures can also be used to store water, which provides a water source and habitat for wildlife.

Section 12.0 – Reasonable Assurance

As a requirement of TMDL studies, reasonable assurance must be provided demonstrating the ability to reach and maintain water quality endpoints. The source reduction strategies detailed in Section 11.0 have been shown to be effective in reducing pathogen transport/survival and reducing turbidity. These strategies are capable of widespread adoption by landowners and local resource managers.

Many of the goals outlined in this TMDL study run parallel to objectives outlined in the Murray, Nobles, Pipestone and Rock County Water Plans. These county plans have the same goal of removing streams from the 303(d) Impaired Waters List. These plans provide watershed specific strategies for addressing water quality issues. In addition, the commitment and support from the local governmental units will ensure that this TMDL project is carried successfully through implementation.

Various program and funding sources will be used to implement measures that will be detailed in an implementation plan to be completed in the year following approval of this TMDL. Funding sources include a mixture of state and federal programs, such as the Environmental Quality Incentive Program, Conservation Reserve Program and Clean Water Legacy funding. Local officials agree there is a need for additional BMPs and through implementation; water quality improvement can be realized.

Through existing permit programs, turbidity and fecal coliform impairments are being addressed and monitored. In the future, it can be assumed that this will continue.

Section 13.0 – Public Participation

Public participation opportunities were provided during the project in the form of a public open house, new releases and a project newsletter. At the onset of the project, the Rock River Technical Committee was formed that served an advisory and review role for the project. This group was comprised of staff from the following groups:

- City of Luverne
- Minnesota Department of Natural Resources
- Minnesota Pollution Control Agency
- Murray County Planning and Zoning
- Nobles County Environmental Services and SWCD
- Natural Resources Conservation Service
- Pipestone County Planning and Zoning and SWCD
- Rock County Land Management Office and SWCD
- Rock County Rural Water System
- Water Resources Center, MN State University, Mankato
- US Fish and Wildlife Service

The Technical Committee met every two months beginning in November 2006. The committee assisted with reviewing the project workplan, outreach materials and the draft TMDL report. Key findings were discussed and input was gathered from the group.

Public outreach for this project also included the following activities:

Dec. 2006	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Jan. 2007	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Feb. 2007	Two news releases were developed and submitted to all the newspapers in and near the watershed. The first news release described the TMDL process and impaired waters. The second news release explained the Rock River TMDL and the impairments for fecal coliform and turbidity. The Daily Globe newspaper, with a distribution of 9,327, printed an article on the project. Rock County Star Herald, a distribution of 2,570, also printed an article on the project.
Feb. 2007	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Mar. 2007	Rock County Rural Water published article in newsletter, distributed to approximately 750 residents.

Mar. 2007	Rock River TMDL presentation given at the annual Rock County Rural Water meeting in Luverne, attended by about 50 watershed residents.
Mar. 2007	Rock River TMDL PowerPoint presentation given at the annual Rock County Township meeting by Rock County Land Management office.
Mar. 2007	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Jun. 2007	Tour of Rock River Watershed by Technical Committee members given to EPA project managers.
Jun. 2007	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Aug. 2007	Rock County LMO provided information at the Rock County Fair.
Oct. 2007	Rock County LMO sent newsletters to approximately 1,000 landowners in the county. TMDL information and project updates were included.
Jan. 2008	A four-page newsletter detailing the project was sent to landowners and homeowners in the watershed (estimated 4,000 newsletters)
Jan. 2008	Public comment period (December 31, 2007-January 31, 2008) Public notice was sent to 108 individuals. A press release was sent to local and state media outlets.
Jan. 2008	Two public meetings: Thursday, January 24, 2008 in Edgerton and Luverne. Three newspapers reported on the meeting: The Daily Globe newspaper, with a distribution of 9,327; Rock County Star Herald, a distribution of 2,570; and the Edgerton Enterprise with a distribution of 1,780. MPCA feedlot update and a TMDL publication highlighted the project.
Jan. 2008	Personalized letters were sent to agricultural groups, targeted individuals, and environmental groups requesting attendance at the public meetings and participation on the Advisory Committee.

There have been several publications about the project. A copy of newsletter articles, news releases, meeting announcements, newspaper articles and meeting materials is included in Appendix C.

Appendix

Appendix A: References

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Appendix B: Water Quality Data

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
10/30/06			*25.8*		*20*	MPCA
09/27/06			*85.3*		*580*	MPCA
09/13/06	*> 60*	*12*	*27.7*		*200*	MPCA
08/28/06	*55*	*9.6*	*52*		*150*	MPCA
08/09/06			*43*		*1100*	MPCA
07/24/06	*60*	*14*	*19.5*		*78*	MPCA
07/18/06	*34*	*14*	*7.7*		*37*	MPCA
06/22/06			*128*		*1100*	MPCA
06/07/06	*37*	*33*	*21*		*140*	MPCA
05/23/06			*27.5*		*40*	MPCA
05/15/06	*80*	*19*	*19.5*		*22*	MPCA
04/27/06			*9.1*		*22*	MPCA
04/19/06	*24*	*48*	*52.8*		*44*	MPCA
03/07/06		*180*	*161*			MPCA
02/01/06		*160*	*107*			MPCA
11/02/05	*65*	*11*	*43.6*			MPCA
10/12/05	*19*	*54*	*61*			MPCA
09/08/04	*28*	*41*	*29.7*	*260*	*160*	MPCA
08/25/04	*20*	*32*	*20.6*	*140*	*64*	MPCA
07/21/04	*20*	*68*	*54.9*			MPCA
06/27/04	*17*	*78*	*60.9*			MPCA
06/27/04						MPCA
05/23/04	*23*	*68*	*53.7*			MPCA
04/26/04	*65*	*14*	*18.7*	*8*	*8*	MPCA
04/26/04				*< 4*	*< 4*	MPCA
03/28/04		*120*	*89.5*			MPCA
02/02/04		*9.6*	*8.2*			MPCA
02/02/04						MPCA
12/15/03		7		90	70	Iowa DNR
11/17/03		7		30	30	Iowa DNR
11/11/03		*4.8*	*8.4*			MPCA
10/21/03	*98*	*6*	*6*	*72*	*64*	MPCA
10/21/03				*< 4*	*< 4*	MPCA
10/20/03		10		50	50	Iowa DNR
09/15/03		110		5100	5000	Iowa DNR
08/27/03				440	400	Iowa DNR
08/18/03		42		660	240	Iowa DNR
07/14/03		44		110	110	Iowa DNR
06/16/03		66		120	110	Iowa DNR
05/19/03		41		90	90	Iowa DNR
04/14/03		21		10	10	Iowa DNR
03/17/03		430		120	81	Iowa DNR
11/18/02		12		*Non-detect	*Non-detect	Iowa DNR
10/14/02		25		60	60	Iowa DNR
09/16/02		32		200	170	Iowa DNR

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
08/22/02		210		22000	22000	Iowa DNR
08/19/02		110		230	170	Iowa DNR
07/15/02		25		110	110	Iowa DNR
06/17/02		38		*Non-detect	*Non-detect	Iowa DNR
05/20/02		15		*Non-detect	*Non-detect	Iowa DNR
04/15/02		93		30	20	Iowa DNR
03/18/02		13		*Non-detect	*Non-detect	Iowa DNR
09/18/01	*22*	*33*	*19*	*420*	*300*	MPCA
08/27/01	*27*	*28*	*12.1*	*100*	*75*	MPCA
07/10/01	*20*	*61*	*29*	*280*	*250*	MPCA
06/06/01			*6.5*	*2000*	*1800*	MPCA
06/05/01						MPCA
06/05/01	*52*	*18*				MPCA
06/05/01						MPCA
05/14/01	*29*	*43*	*11.72*	*130*	*33*	MPCA
04/24/01						MPCA
04/24/01	*7*	*490*	*124*	*7100*	*5500*	MPCA
04/24/01						MPCA
03/27/01		*56*	*23*			MPCA
01/24/01						MPCA
01/24/01		*15*	*6.8*			MPCA
01/24/01						MPCA
11/21/00		*16*	*9.8*			MPCA
10/25/00						MPCA
10/25/00	*30*	*160*	*50*	*300*	*600*	MPCA
10/25/00						MPCA
09/14/99	*22*		*24*			MPCA
08/11/99	*44*		*8*			MPCA
07/14/99	*24*		*25*			MPCA
06/09/99	*23*		*20*			MPCA
05/26/99	*26*		*31*			MPCA
04/29/99	*13*		*54*			MPCA
03/26/99	*18*		*34*			MPCA
02/03/99			*7.7*			MPCA
11/17/98	*7*		*21.8*			MPCA
10/22/98	*21*					MPCA
09/25/97	*21*		*26*			MPCA
08/05/97	*29*		*19*			MPCA
07/23/97	*12*		*77*			MPCA
06/18/97	*43*		*8.5*			MPCA
05/29/97	*50*		*10*			MPCA
04/15/97			*46*			MPCA

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
04/01/97			190			MPCA
11/07/96			22			MPCA
10/22/96			19			MPCA
09/20/94		29		250		MPCA
09/01/94		46		350		MPCA
07/12/94		60		830		MPCA
06/28/94		100		1500		MPCA
05/23/94		51		99		MPCA
05/02/94		300		4400		MPCA
03/08/94		100		340		MPCA
01/04/94		7.4		190		MPCA
10/27/93		12		36		MPCA
09/25/91		57		4800		MPCA
08/13/91		130		380		MPCA
07/02/91		160		220		MPCA
06/11/91		150		770		MPCA
05/22/91		87		660		MPCA
04/09/91		13		8		MPCA
03/26/91		27		32		MPCA
01/15/91		39		< 9		MPCA
10/23/90		12		350		MPCA
09/07/88		53		360		MPCA
08/10/88		30		230		MPCA
07/07/88		49		510		MPCA
06/08/88		68		270		MPCA
05/25/88		29		88		MPCA
04/06/88		130		24		MPCA
03/09/88		440		40		MPCA
01/06/88		4		4		MPCA
10/07/87		8		76		MPCA
09/09/85		210		2600	3400	MPCA
08/07/85		61		500	900	MPCA
07/10/85		77		720	880	MPCA
06/05/85		220		440	560	MPCA
05/08/85		120		100	140	MPCA
04/10/85		59		170	120	MPCA
03/11/85		800				MPCA
01/09/85		8.1				MPCA
09/21/82		60		1700		MPCA
08/24/82		68		490		MPCA
07/27/82		120		1300		MPCA
06/22/82		74		460		MPCA

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
05/25/82		19		490		MPCA
04/27/82		48		< 20		MPCA
03/10/82		22		50		MPCA
01/06/82		12		50		MPCA
10/06/81		22		490		MPCA
01/29/81		3.2	1.6	20		MPCA
02/12/80						MPCA
09/19/77		24	17	170		MPCA
08/16/77		185	94	240000		MPCA
07/18/77		110	29	700		MPCA
06/20/77		59	35	1700		MPCA
05/17/77		20	7	40		MPCA
04/19/77		27	9.7	170		MPCA
03/14/77		420	200	4600		MPCA
02/15/77		6.8	5.3	50		MPCA
12/20/76		3.6	9	20		MPCA
11/22/76		4.4	7.6	20		MPCA
10/25/76		34	15	80		MPCA
09/27/76		39	12	790		MPCA
08/17/76		66	22	490		MPCA
07/20/76		140	39	1300		MPCA
06/22/76		14	11	170		MPCA
05/24/76		22	8.5	50		MPCA
04/27/76		17	5.7	< 20		MPCA
03/18/76		170	88	490		MPCA
02/19/76		25	15	220		MPCA
01/21/76		4.4	3.4	< 20		MPCA
12/17/75		1.6	5	20		MPCA
11/19/75		19	7.6	50		MPCA
10/21/75		11	8.4	330		MPCA
09/22/75		17	8.8	1300		MPCA
08/25/75		43	18	35000		MPCA
07/14/75		34	12	< 20		MPCA
06/16/75		56	13	1300		MPCA
05/20/75		29	6.5	< 20		MPCA
04/15/75		220	63	330		MPCA
03/20/75		24	7	< 20		MPCA
02/19/75		18	7.9	< 20		MPCA
01/29/75		59	12	80		MPCA
12/17/74		6.4	8	170		MPCA
11/13/74		5.6	4.4	110		MPCA
10/02/74		20	6.7	490		MPCA

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
09/04/74		32	12	330		MPCA
08/06/74		41	13	110		MPCA
07/02/74		82	25	460		MPCA
06/04/74		95	11	170		MPCA
05/07/74		20	7	310		MPCA
04/10/74		37	12	20		MPCA
03/13/74		8	18	130		MPCA
02/13/74		10	3.6	20		MPCA
01/09/74		1.2	2.8	130		MPCA
12/28/73		10	3.4	80		MPCA
11/16/73		4	4.5	330		MPCA
10/24/73		39	14	490		MPCA
09/20/73			15	80		MPCA
08/30/73		70	23	490		MPCA
07/26/73		58	14	130		MPCA
06/28/73		97	26	130		MPCA
05/30/73		59	12	50		MPCA
04/19/73		81	22	70		MPCA
03/22/73		54	23	130		MPCA
02/21/73		3	2.8	5400		MPCA
01/10/73		5	3.3	< 20		MPCA
12/28/72		4	3.3	20		MPCA
11/21/72		13	5.7	330		MPCA
10/25/72		13	6.2	230		MPCA
09/27/72		100	28	490		MPCA
08/24/72		1200	35	140		MPCA
07/27/72		120	32	17000		MPCA
06/27/72		110	24	230		MPCA
05/31/72		270	55	4900		MPCA
04/13/72		28	10	80		MPCA
11/05/71		22	8.5	7000		MPCA
10/13/71		46	15	< 20		MPCA
09/02/71		64	22	230		MPCA
08/10/71		110	32	330		MPCA
07/13/71		190	48	4900		MPCA
06/08/71		370	82	7900		MPCA
04/07/71		100	27	50		MPCA
03/10/71		42	13	1700		MPCA
02/17/71		10	5.4	3300		MPCA
01/06/71		8	4.5	2400		MPCA
12/02/70		16	6.3	2200		MPCA
10/28/70		32	13			MPCA

Station Name ROCK RIVER BR ON STATELINE RD 10 MI S OF LUVERNE
STORET ID S000-097

Sample Date	Transparency (cm)	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 ml)	E. Coli (cfu/100 ml)	Date Source
10/14/70		39	17	4900		MPCA
09/15/70		310	12	1300		MPCA
08/18/70		100	28	170		MPCA
07/21/70		120	45	2400		MPCA
06/16/70		510	99	92000		MPCA
05/12/70		41	12	< 20		MPCA
02/04/70		5	3.3	50		MPCA
01/07/70		4	0.5	130		MPCA
12/03/69		16	6.6	50		MPCA
10/29/69		18	6.6	110		MPCA
10/08/69		30	13	1400		MPCA
09/09/69		61	21	130		MPCA
08/05/69		59	26	80		MPCA
07/08/69		1400	83	23000		MPCA
06/11/69		48	19	490		MPCA
04/29/69		18	9.2	130		MPCA
04/02/69		15	7.7	330		MPCA
02/05/69		6	3.1	2200		MPCA
01/08/69		2	5.2	1100		MPCA
12/04/68		18	7.8	210		MPCA
11/06/68		27	28	3500		MPCA
10/09/68		49	54	3300		MPCA
09/17/68		37	35	790		MPCA
08/13/68		81	84	1300		MPCA
07/17/68		130	110	3300		MPCA
05/18/68		1300	680	490000		MPCA
04/23/68		64	60	80		MPCA
03/05/68		9	13	< 20		MPCA
01/16/68		23	13	1100		MPCA
10/24/67		24	19	170		MPCA
08/29/67		84	10	270		MPCA
07/12/67		140	100	3300		MPCA
08/09/65		75	75	< 200		MPCA
07/13/65		87	35	700		MPCA
05/18/65		180	120	1100		MPCA
11/17/64		30	15	< 200		MPCA
08/13/64		9.2	11	500		MPCA
07/06/64		130	75	1300		MPCA
06/09/64		62	26	800		MPCA
04/28/64		60	40	200		MPCA
07/22/63		80	35			MPCA
05/07/63		72	20			MPCA
03/27/63		180	110			MPCA
09/18/62		32	23			MPCA

Station Name	ELK CK 3 MI SE OF LUVERNE, MN	ROCK RIVER AT CSAH 16 BR 2 MI S OF LUVERNE, MN
STORET ID	S001-360	S001-359
Sample Date	**Transparency (cm)**	**Transparency (cm)**
9/27/2005	7	5
9/15/2005	9	8
9/11/2005	10	10
9/4/2005	12	12
8/28/2005	11	14
8/21/2005	12	12
8/14/2005	14	13
8/8/2005	12	11
7/28/2005	13	8
7/15/2005	11	13
6/26/2005	10	12
6/15/2005	9	10
6/13/2005	11	14
6/5/2005	12	15
5/29/2005	12	18
5/22/2005	11	18
5/14/2005	17	16
5/7/2005	18	22
9/21/2003	8	9
9/13/2003	4	4
9/1/2003	11	9
8/31/2003	11	8
8/23/2003	13	10
8/17/2003	12	10
7/27/2003	10	16
7/15/2003	12	12
7/7/2003	15	9
6/29/2003	12	6
6/21/2003	16	8
6/14/2003	14	12
6/10/2003	12	12
6/1/2003	17	17
5/26/2003	16	17
5/19/2003	22	18
9/15/2002	13	9
9/4/2002	15	8
8/26/2002	9	8
8/19/2002	11	6
8/4/2002	10	9
7/27/2002	12	9
7/22/2002	14	12
7/14/2002	10	16
7/9/2002	10	15
7/2/2002	9	16

Station Name	ELK CK 3 MI SE OF LUVERNE, MN	ROCK RIVER AT CSAH 16 BR 2 MI S OF LUVERNE, MN
STORET ID	S001-360	S001-359
Sample Date	**Transparency (cm)**	**Transparency (cm)**
6/24/2002	9	13
6/16/2002	10	13
6/2/2002	9	17
5/27/2002	13	21
5/13/2002	17	26
5/5/2002	18	24
9/23/2000	16	26
9/18/2000	14	19
9/11/2000	12	14
9/5/2000	13	13
8/28/2000	17	11
8/21/2000	18	10
8/7/2000	8	11
7/31/2000	15	14
7/23/2000	20	26
7/16/2000	10	13
7/10/2000	11	7
7/4/2000	20	14
6/27/2000	18	15
6/19/2000	16	25
9/25/1999	11	14
9/12/1999	11	14
9/7/1999	11	13
8/30/1999	9	11
8/29/1999	7	14

Appendix C: Public Participation

DEC 2006

sharing and educational incentives. We expect our county allocation to be around $200,000.

LMO NEWS

Doug Bos

WHAT IS A TMDL?

You may have seen the acronym TMDL in print lately. TMDL stands for Total Maximum Daily Load and is describing the total amount of a pollutant that is allowed in a body of water according to the Federal Clean Water Act of 1972.

How does this affect Rock County? Parts of the Rock River and some of its tributaries such as the Elk Creek by Magnolia and the Champepadan Creek south of Kenneth have been listed as having pollutants that exceed the allowed amounts. The pollutants that exceed the federal limits or impairments in these streams range from E-coli Bacteria, ammonia, turbidity (basically suspended sediment), and mercury.

The Federal Clean Water Act requires the State to develop a plan to correct these stretches of stream that exceed the federal limit. On a local level we will be working on a plan to assess where these pollutants are coming from and how much is coming from each source. A plan to implement ways to bring the streams within the allowed levels of pollutants will be the next step to correcting the problem. There will be State and Federal dollars available to provide cost share for implementing ways of correcting the problem.

As we start this process we will have public meeting to solicit input. We hope that you will find time to help shape the future programs focused on correcting these TMDL problems. If you have any questions, please call our office at 507-283-8862 ext. 3.

JAN 2007

allocation of $100,000 for the first round of scoring and ranking that will end January 28th. Producers in the Rock River Watershed should definitely inquire into the program especially if the land they are farming is in the Well Head Protection Area for the City of Luverne, or Rock County Rural Water Well Head Protection Areas. These Well Head Protection Areas are sensitive features and applicants in those areas will receive priority for funding.

EQIP provides cost share assistance for structural practices and incentive payments for non structural practices. Our office staff will provide the technical design work. Producers can apply for financial assistance if a professional engineer needs to be hired for more complex designs.

LMO NEWS

Eric Hartman

I hope that you all had a very pleasant Christmas Holiday and that your New Year has been kicked off on a positive note. I know that I am looking forward, as we start this year, with some of my usual resolutions. I am hoping that 2007 may provide a few less of those challenges that 2006 offered for many, or even all of us, especially those involving energy costs, and that some of this disheartening "global tension" can diminish. I wish for your 2007 to be a most rewarding and prosperous year.

I just wanted to provide a little follow up we are going to become more familiar with in the months to come. Doug Bos provided an excellent snapshot in last month's newsletter, and since this is going to be an ongoing process, I wanted to make sure that we keep it in the public eye by raising the issue again. The two key terms are **Impaired Waters** and **TMDL's**. What does Impaired Waters mean? Simply put, what makes a body of water impaired is some sort of pollutant, designated by the Federal Environmental Protection Agency. These impairments are tied to federal standards linking back to the Federal Clean Water Act of 1972. What does TMDL mean? This stands for Total Maximum Daily Load. This simply means how much of a given pollutant a body of water can tolerate before it will not meet the standards of the Clean Water Act. What does this mean to us here in Rock County? We have the lower reaches of the Rock River that have been designated as Impaired Waters as the limits of some various pollutants are exceeding the limits of the Clean Water Act. What types of problem pollutants are present? The key problems that have been found, thus placing this portion of the Rock River on the Impaired Waters list is as follows: a) ammonia; b) fecal coliform bacteria; c) mercury; and d) turbidity (suspended sediment). What does this really mean? Impaired waters did not really seem to come to the forefront, in Minnesota, at least until some issues involving the expansion of urban development for the two communities of Annandale and Maple Plain. As a result of the requirements of the Clean Water Act and the Impaired Waters listings, the future development and expansion of these two communities has been placed on hold. We are in the beginning stages of our TMDL process, as our ultimate goal is to address and reduce these pollutants, and have the Rock River removed from the Impaired Waters list. This process will require involvement by us all. As Doug wrote in the last edition, we will have public involvement to draw some input. There will be programs developed to correct these problems and there will be state and federal monies to provide some cost share to help out, and we are not going to solve all of the problems overnight, either. We hope that you will take some time to help steer this process as it is for future generations to come.

USF & W RIVER EXCLUSION PROJECT

Justin Decker

The U.S. Fish & Wildlife Service is currently looking for landowners in Rock County who are interested in being part of a river exclusion project. USF & W is interested in increasing the quality of the Topeka Shiner habitat in the Rock River and its tributaries. They are proposing to cost-share watering systems along with setting up fencing to prohibit livestock from entering the stream or river. These areas could also be combined with EQIP to set up a rotational grazing program to further enhance the forage return on pastured areas along these streams in the Rock River Watershed. Interested land owners/renters should contact the Rock County Land Management Office to get more information.

CREP II

Justin Decker

The Conservation Reserve Enhancement Program is in its final year of sign-up. The program has had some success here in Rock County thanks to landowners interested in options for retiring poor crop production acres. These areas are along surface water, as well as in the Well Head Protection Area, and were not producing adequate returns in comparison to the yearly input costs. Theses landowners were also aware of the long term benefits this program has on water quality for the citizens of Rock County as well as the benefits to fish and wildlife habitat. With the high market prices we've seen this past year, its tough to look at conservation as a way of improving individual operations. However, trouble areas that are prone to poor production because of flooding, for example, don't care what the markets do! If the area doesn't produce a worthwhile crop, the input costs could outweigh the returns – even with high market prices. If you have an area in your farm that you would like to see a proposal for, please call or stop in the Land Management Office and put me to work. The proposal costs you nothing and will allow you to accurately compare your input dollars and yield returns to the incentive dollars given for CREP (or CRP) on any specific area.

FEB 07

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

Our office is now in the process of accepting applications for the 2007 EQIP program. This year's priorities for funding will be for prescribed grazing, animal waste treatment, and structural practices treating Highly Erodible Lands (HEL). Rock County has received an initial allocation of $100,000 for the first round of scoring and ranking that will end January 28th. We will continue to accept applications after that date and approve contracts as additional funding is available. So far we have taken almost $400,000 in applications. It is unlikely that we will be able to fund that many applications this year but producers can apply now and try for next year's allocation. Producers in the Rock River Watershed should definitely inquire into the program especially if the land they are farming is in the Well Head Protection Area for the City of Luverne, or Rock County Rural Water Well Head Protection Areas. These Well Head Protection Areas contain sensitive features and applicants in those areas will receive priority for funding.

EQIP provides cost share assistance for structural practices and incentive payments for non structural practices. Our office staff will provide the technical design work. Producers can apply for financial assistance if a professional engineer needs to be hired for more complex designs.

LMO NEWS

Doug Bos

THE ROCK RIVER = IMPAIRED

The Rock River is on a growing list of polluted rivers in Minnesota according to the Minnesota Pollution Control Agency (MPCA). Water samples collected from the Rock River indicate the river does not meet state standards for water quality. The river has high concentrations of fecal coliform bacteria, an indicator of contamination from human sewage, livestock manure and wildlife. The Rock River also exceeds state water quality limits for turbidity, a measure of water clarity. Turbidity is the result of sediment, debris, nutrients, and plant matter entering the river.

To improve water quality, a Total Maximum Daily Load (TMDL) study is being developed for the Rock River. A TMDL study assesses the sources of pollution in the watershed to develop a strategy for improving the water quality. In essence, a TMDL is the calculation of the maximum amount of pollutant that a water body can receive and still meet water quality standards.

The Water Resources Center at Minnesota State University, Mankato is conducting the TMDL study with the assistance from staff at Rock, Nobles, Pipestone and Murray counties and the MPCA, to help identify the sources of pollution and find possible solutions. This TMDL study is funded by the Environmental Protection Agency.

A TMDL becomes necessary when water quality sampling shows a stream or lake exceeding water quality standards. As the state agency responsible for monitoring and enforcing water quality rules, MPCA assesses stream and lake data every two years to determine if the required standards are met. Any stream or lake not meeting water standards is classified as impaired. A stream or lake listed as impaired is required within 15 years to develop a TMDL plan.

TMDLs are part of a nationwide effort under the Federal Clean Water Act to identify and clean up pollution in streams, rivers and lakes. The Clean Water Act requires states to adopt water quality standards, assess the waters, and report impairments every two years. The federal Clean Water Act also requires the MPCA to conduct a TMDL study for each impairment. Rivers and streams may have several TMDLs, each one determining the limit for a different impairment. A TMDL study identifies both point and nonpoint sources of each pollutant. Monitoring results and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met.

The Rock River TMDL plan for fecal coliform bacteria and turbidity will be completed by the fall of 2007. Once the TMDL plan is approved by MPCA and EPA, funds will be available to assist in clean up efforts. For more information, call the Rock County Land Mgt at 507-283-8862 Ext 3.

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MONDAY
February 26, 2007
Worthington, Minnesota

...aily Globe

Area wrestlers compete for
spots at state ...
See Page B1

Repairing a watershed

Study being conducted on Rock River's high turbidity, bacteria levels

BY JULIE BUNTJER
DAILY GLOBE

LUVERNE — While the water in the Rock River may not be visible today because of the snow and ice, officials with the Minnesota Pollution Control Agency and Mankato-based Water Resources Center are concerned about what's flowing under the surface.

The Rock River made the impaired waters list for exceeding state standards for ammonia, fecal coliform bacteria and turbidity levels. It is among 60 lakes, rivers or streams statewide now being studied by MPCA and WRC, the agencies tasked with writing a Total Maximum Daily Load (TMDL) plan for the project.

With funding from the Environmental Protection Agency (EPA), WRC project coordinator Scott Matteson said the TMDL project will detail what is causing the high turbidity and levels of fecal coliform bacteria, and suggest ways in which landowners in the watershed can work to correct the issues. Because higher-than-normal ammonia levels were only present one year in the 10 years of data analyzed in the study, Matteson said the MPCA is working to get that segment of the project de-listed.

"TMDL defines how much of the pollutant can be in the water from point and non-point sources," Matteson said. "It's almost like a permit of how much can be in and still meet state water quality standards."

Once a lake, river or stream is placed on the impaired waters list, Matteson said the EPA requires the state to complete a TMDL study within 15 years. In Minnesota, the MPCA is responsible for ensuring the studies are completed.

Effects of impairment

Kelli Daberkow, watershed project manager with the MPCA's Marshall office, said the impairments in the Rock River "aren't extremely off the wall."

See RIVER, Page A5

RIVER: To...

from Page **A1**

"It's pretty typical for agriculture communities to see those kinds of ratios," Daberkow said. "Fecal coliform is more of an issue in Rock County just for the fact that you have a lot of pastures."

Daberkow said high levels of fecal coliform is a health threat, especially to people who may utilize the river for recreational use such as swimming. As for turbidity, there is no threat to humans — although it can impact fish, habitat and aesthetics.

"You don't really want to be swimming in a stream that's chocolate brown or pea green," Daberkow said.

Among the fish affected by high turbidity is the Topeka Shiner, considered an endangered species, and Daberkow said plant life in the water can also be affected if levels of sediment or algae block sunlight from streaming through the water.

Septic systems a culprit

Matteson said much of his time to date has been spent analyzing data from water quality samples. Hampering his efforts is the limited amount of data available — only 26 water quality samples have been taken from the Rock River over the course of the past 10 years.

Despite the limited number of samples, Matteson said data has revealed the streams have been affected by non-point source pollution, meaning the pollutants are entering the river in small amounts, but from a variety of locations. That information has led him to identify at least a couple of predominant sources for the pollution — outdated septic systems and feedlot run-off.

"We've got about 1,100 septic systems that are not in compliance," Matteson said.

Those septic systems are located within the 355,000-acre watershed that includes portions of Rock, Nobles, Murray and Pipestone counties.

"It's usually a mixture of septic systems or manure when it's applied too close to the stream and you get a rain event that washes it in," he added. "Tile drainage also (can pollute streams), and some feedlots have problems, too. Another major source would be cattle having access to the streams."

Study may lead to funding

Once the MPCA and WRC complete the TMDL study on the Rock River this fall, it makes possible potential funding to begin working on projects to help reduce contamination in the river. Daberkow said it would likely take one and a half to two years before funding would be received.

"Getting upgrades to the septic system, that's an easy one to take on," Matteson said.

Most of the communities within the watershed have already completed septic upgrades, with Hatfield — which had 29 violations for improperly discharging effluent — planning to complete a septic system upgrade this year.

"Once that's complete, we really don't have any problem with incorporated communities," he said, adding that work would remain to get farms and rural home septics upgraded.

Additional work would likely be to get livestock producers to implement Best Management Practices (BMPs) in their operation relating to manure application.

"There may be incentives or cost-sharing on certain Best Management Practices," Daberkow said.

More information on the TMDL study in the Rock River watershed will be presented at 2:30 p.m. March 15 at Sharkee's Bar & Grill, 705 S. Kniss Ave., Luverne.

Minnesota Pollution Control deems Rock Ri

High concentrations of fecal coliform bacteria indicates human sewage, livesto

The Rock River is on a growing list of polluted rivers in Minnesota, according to the Minnesota Pollution Control Agency (MPCA).

Water samples collected from the Rock River indicate the river does not meet state standards for water quality.

The river has high concentrations of fecal coliform bacteria, an indicator of contamination from human sewage, livestock manure and wildlife.

The Rock River also exceeds state water quality limits for turbidity, a measure of water clarity. Turbidity is the result of sediment, debris, nutrients, and plant matter entering the river.

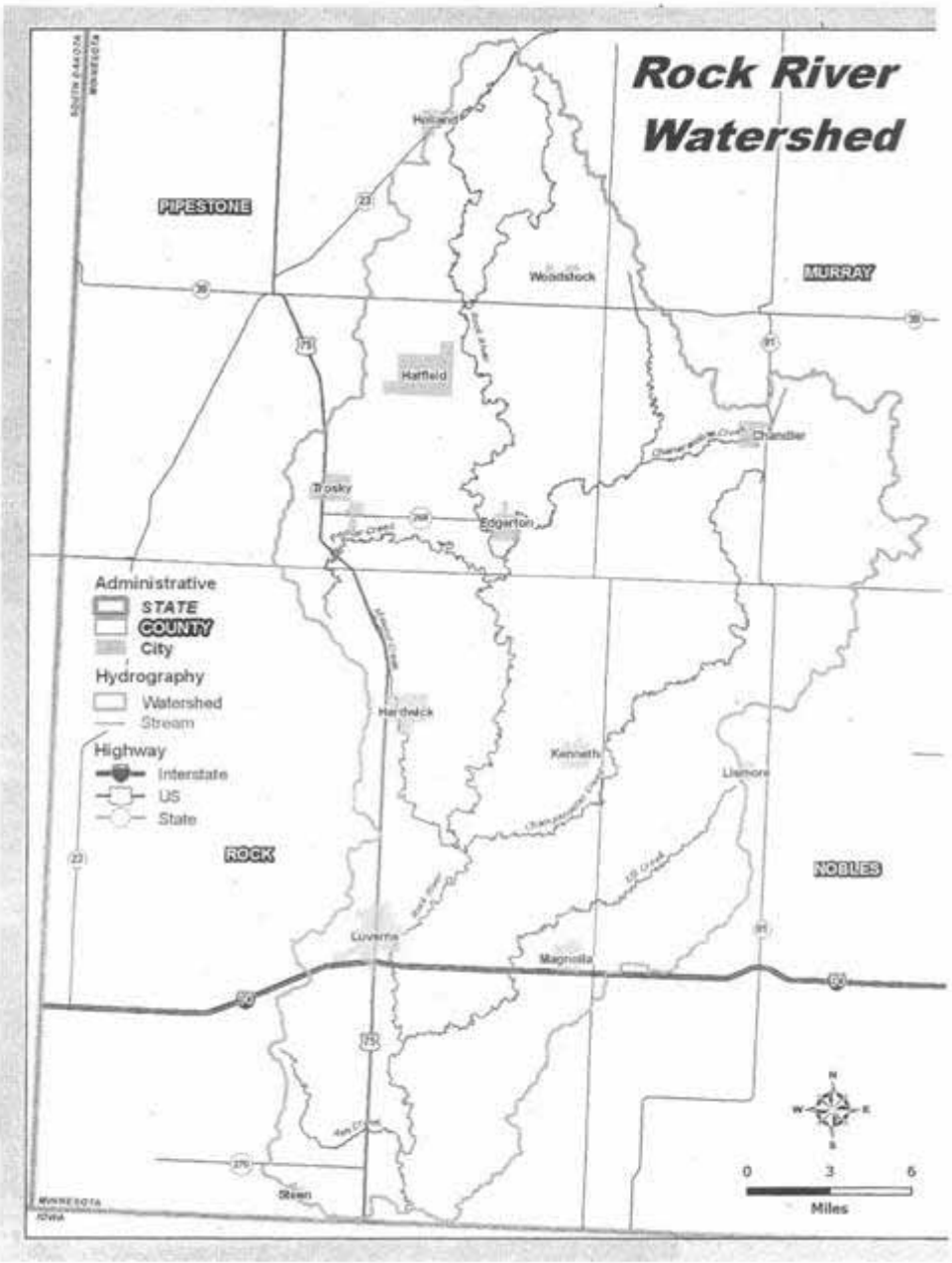
To improve water quality, a Total Maximum Daily Load (TMDL) study is being developed for the Rock River. A TMDL study assesses the sources of pollution in the watershed to develop a strategy for improving the water quality.

In essence, a TMDL is the calculation of the maximum amount of pollutant that a waterbody can receive and still meet water quality standards.

The Water Resources Center at Minnesota State University, Mankato is conducting the TMDL study with the assistance from staff at Rock, Nobles, Pipestone and Murray counties and the MPCA, to help identify the sources of pollution and find possible solutions.

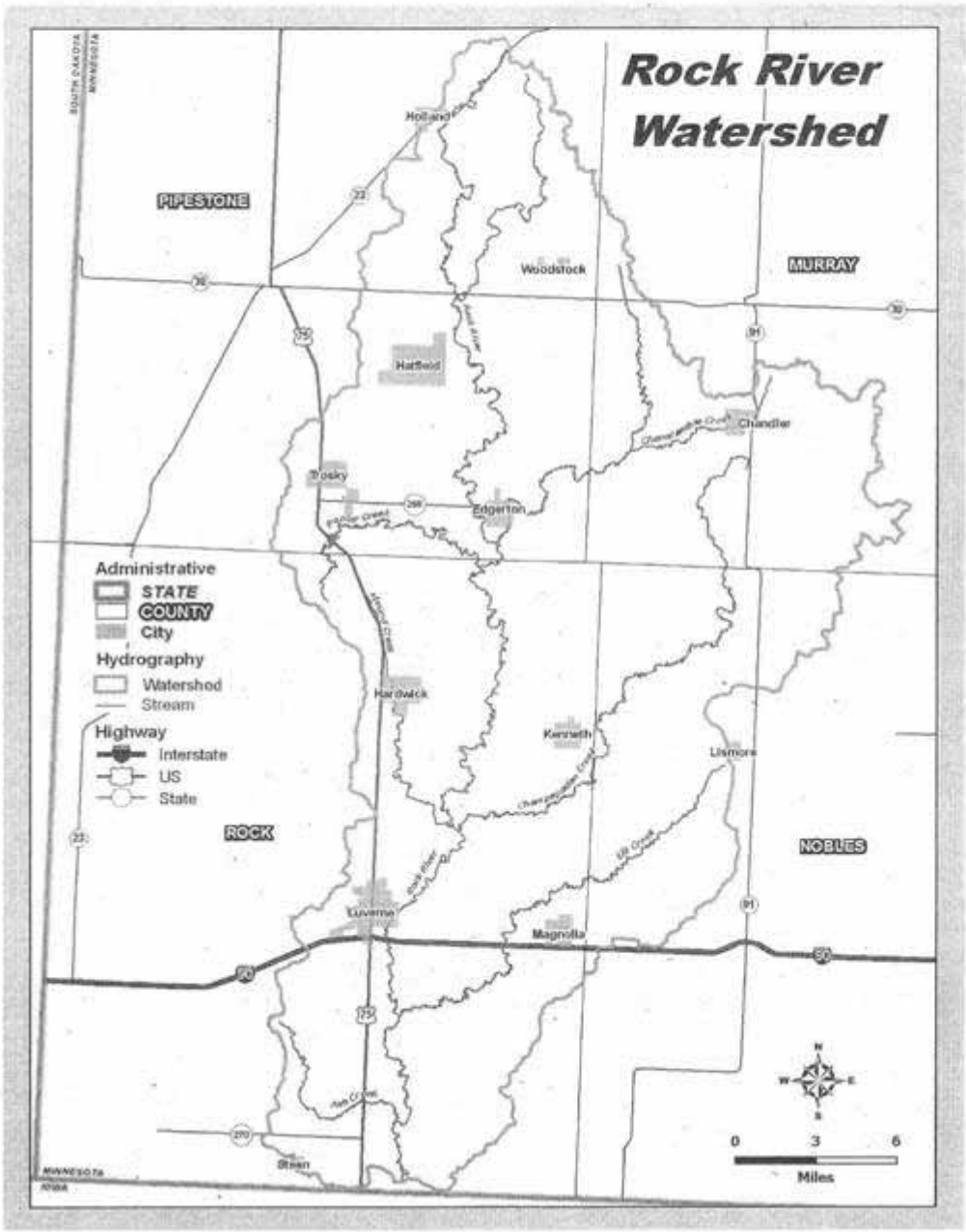
This TMDL study is funded by the Environmental Protection Agency.

A TMDL becomes necessary when water quality sampling shows a stream or lake exceeding water quality



Pollution Control deems Rock River 'impaired'

ıs of fecal coliform bacteria indicates human sewage, livestock manure and wildlife



standards.

As the state agency responsible for monitoring and enforcing water quality rules, MPCA assesses stream and lake data every two years to determine if the required standards are met.

Any stream or lake not meeting water standards is classified as impaired. A stream or lake listed as impaired is required within 15 years to develop a TMDL plan.

TMDLs are part of a nationwide effort under the Federal Clean Water Act to identify and clean up pollution in streams, rivers and lakes.

The Clean Water Act requires states to adopt water quality standards, assess the waters, and report impairments every two years.

The federal Clean Water Act also requires the MPCA to conduct a TMDL study for each impairment.

Rivers and streams may have several TMDLs, each one determining the limit for a different impairment. A TMDL study identifies both point and nonpoint sources of each pollutant.

Monitoring results and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met.

The Rock River TMDL plan for fecal coliform bacteria and turbidity will be completed by the fall of 2007.

Once the TMDL plan is approved by both MPCA and EPA, funds will be available to assist in clean up efforts.

For more information, call the Rock County Land Management at 507-283-8862 ext. 3.

Rock River is impaired, So, what's the problem?

Learn more about Total Maximum Daily Load by attending a meeting at 2:30 p.m. Thursday, March 15, in Sharkee's, Luverne

The Rock River is contaminated with high levels of fecal coliform bacteria and exceeds limits for stream turbidity, a measure of water clarity.

According to a recently initiated project funded by the Environmental Protection Agency (EPA) the Rock River exceeds state standards for both fecal coliform bacteria and turbidity. This has led to the requirement that a Total Maximum Daily Load (TMDL) be developed for the river.

A TMDL identifies sources of each pollutant that fails to meet water quality standards. Water quality sampling and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met.

This TMDL project is being conducted by the Water Resources Center (WRC) at Minnesota State University, Mankato. Staff from Rock, Nobles, Pipestone and Murray counties and the Minnesota Pollution Control Agency (MPCA) are also assisting to identify sources of pollution and assess possible solutions.

Fecal coliform bacteria

Fecal coliform bacteria is present in the feces of all warm-blooded animals. The bacteria itself is usually not harmful, but high concentrations can indicate the presence of other harmful bacteria, viruses and/or parasites. Examples include the pathogenic strain of E. coli that is often linked to foodborne illnesses, as well as giardia and cryptosporidium. Recreational contact, especially swimming is not recommended when high concentrations of fecal coliform bacteria are present.

According to Scott Matteson, WRC project coordinator, the monitoring results collected by the MPCA, show the highest concentrations of fecal coliform during the warmer summer months.

Matteson also stated that precipitation can have a significant effect on concentrations found in the river. "Fecal coliform concentrations usually spike during or immediately following runoff from heavy rains," said Matteson.

The project is working to identify the major sources of fecal contamination in the river. The most likely sources include illegally discharging septic systems, runoff from manured fields, feedlots, storm sewers and wildlife.

Turbidity

Turbidity is a measurement of water clarity. A decrease in water clarity is caused by suspended and dissolved matter such as clay, silt, organic matter, algae and color.

Turbidity is recognized as an indicator of water quality. Increased turbidity levels limit light penetration and inhibit healthy plant growth. High turbidity can make it difficult for aquatic organisms to find food, affect gill functions and cause spawning habitat to become covered.

Monitoring results indicate the Rock River is well above turbidity limits set for TMDL criteria.

According to Matteson, "MPCA requires a TMDL to be developed when at least 10 percent of the samples exceed water quality standards. In the Rock River, 48 percent of the samples collected exceeded standards."

Sources of increased turbidity levels include erosion from fields or construction sites, urban runoff from precipitation, eroding stream banks, bottom feeders such as carp and excessive algal growth.

The TMDL will assess which of these are the largest contributors and develop solutions for improving water clarity in the Rock River.

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The Pipeliner

The Newsletter of the
Rock County
Rural Water District

541 150th Ave. Luverne, MN 56156 507-283-8886
www.rcrwd.com

March 2007

Rock County
Rural Water District's

Annual Meeting

Thursday, March 15, 2007

1:30 p.m.

Sharkee's (southeast door)

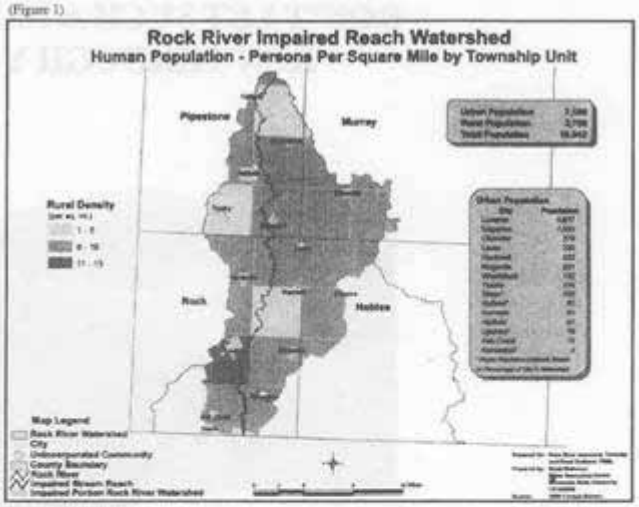
Fill your free cup with fresh coffee & your mind with knowledge.

This year's agenda includes the election of two new Directors, one to represent the Beaver Creek/Sprigwater area and one to represent the Luverne/Mound Township area. There will also be a review of the 2006 Water System Statistics, the presentaiton of the 2006 Auditor's Report, and a Lewis and Clark update. A door prize drawing will put cash and gifts into some of the lucky customer's pockets. If you cannot attend the meeting but would like to vote, you may recieve a proxy ballot by calling the RCRW office (507) 283-8886. This year a special meeting providing information about the Rock River TMDL study will be presented by Scott Mattson form the University of Minnesota, Mankato. A lunch will follow the meeting.

What's a "TMDL" anyway?

A TMDL is an acronym for Total Maximum Daily Loading. This term is applied to what contaminants are potentially able to be discharged into a lake, stream, or river. In our case the Rock River watershed is the focus. (Figure 1) As you can see, the Rock River watershed extends into four counties: Pipestone, Murray, Nobles, and Rock. The TMDL objective is to categorize the various types of potential pollutants, their location, and based on estimated calculations, their potential impact to the water quality of the river.

(Figure 1)

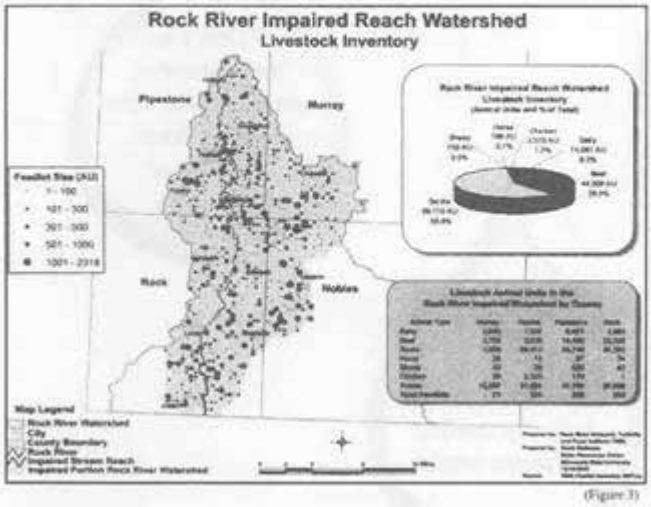


The Rock River is currently listed as exceeding water quality limits of ammonia, fecal coliform bacteria, and turbidity. For these reasons the Rock River is considered a relatively high priority for a TMDL study. EPA has granted funds to the Minnesota State University Water Resources Center to conduct a Rock River TMDL study. Recently local informal meetings have been held under the direction of the University's Scott Matteson and Minnesota Pollution Control Agency's Mark Hanson and Kelli Daberkow.

Rock River Watershed Population Inventories

Humans (2000 Census data)		Livestock (03 feedlot inventory)		Wildlife (DNR)	
Urban Population	7,186	Dairy	14,081 AU	Canada Geese	2,476
Rural Population	3,756	Beef	44,559 AU	Wild Turkeys	666
Total Population	10,942	Swine	89,110 AU	Pheasants	27,783
		Chicken	2,515 AU	Deer	2,223
Pets (American Vet. Ass.)		Horse	199 AU		
Cats	2,781	Sheep	758 AU		
Dogs	2,444				

Figure 2



(Figure 3)

The first step of the TMDL study is to pull together data that has been compiled with regard to human, livestock, and wildlife numbers. (Figure 2) This data is currently being analyzed for accuracy. The draft estimate of human population in the watershed is categorized in Figure 1. The draft estimate of livestock population, location, and size of operation is also being developed. (Figure 3)

If you are interested in learning more about the Rock River TMDL, make sure you attend the March 15th meeting following the Rock County Rural Water Annual Meeting. Scott and Kelli will be there with more information about the Rock River TMDL study plan. If you are concerned about the Rock River quality and willing to get involved, the TMDL team is looking for people who may want to serve on a public interest committee.

MAR 07

LMO NEWS

Eric Hartman

It is kind of hard to believe that just a little over a week ago we were digging out of the largest snow drops for quite a few years. Now we have the repercussions of the rapid snowmelt to contend with. Water, water everywhere!

I have one key item I want to bring up as part of our portion of the Rock County Ag Newsletter for this month. My co-worker, Doug Bos, has provided some more information, this month, involving TMDL's and Impaired Waters. Keeping this in mind, I will be very brief with my contribution.

This point was brought up to me just last week, as it has been quite some time since we have placed this information in the newsletter. Rock County does have a program that provides **Cost Share Funding** for **Well Sealing**. If you are interested in obtaining these funds for a well that has recently been sealed, or one that you are planning on have sealed, please contact our office and ask to have your name placed on our list, as well as the requirements involved in being eligible for this program. The funds available amount to up to 50 percent of the cost of sealing the well, or a maximum of $300, whichever is the lesser amount.

ROCK RIVER = IMPAIRED, WHAT'S THE PROBLEM?

Doug Bos

The Rock River is contaminated with high levels fecal coliform bacteria and exceeds limits for stream turbidity, a measure of water clarity. According to a recently initiated project funded by the Environmental Protection Agency (EPA) the Rock River exceeds state standards for both fecal coliform bacteria and turbidity. This has led to the requirement that a Total Maximum Daily Load (TMDL) be developed for the river.

A TMDL identifies sources of each pollutant that fails to meet water quality standards. Water quality sampling and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met.

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FECAL COLIFORM BACTERIA

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According to Scott Matteson, WRC project coordinator, the monitoring results collected by the MPCA, show the highest concentrations of fecal coliform during the warmer summer months. Matteson also stated that precipitation can have a significant effect on concentrations found in the river. "Fecal coliform concentrations usually spike during or immediately following runoff from heavy rains," said Matteson.

The project is working to identify the major sources of fecal contamination in the river. The most likely sources include illegally discharging septic systems, runoff from manured fields, feedlots, storm sewers and wildlife.

TURBIDITY

Turbidity is a measurement of water clarity. A decrease in water clarity is caused by suspended and dissolved matter such as clay, silt, organic matter, algae and color. Turbidity is recognized as an indicator of water quality... Increased turbidity levels limit light penetration and inhibit healthy plant growth. High turbidity can make it difficult for aquatic organisms to find food, affect gill functions and cause spawning habitat to become covered.

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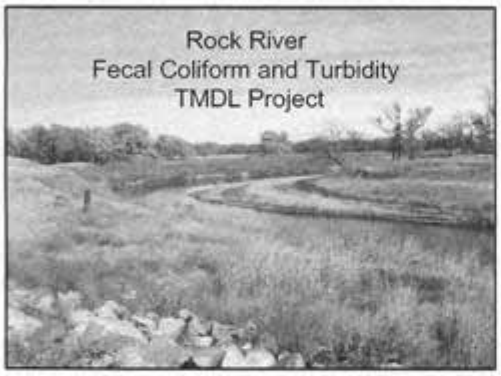
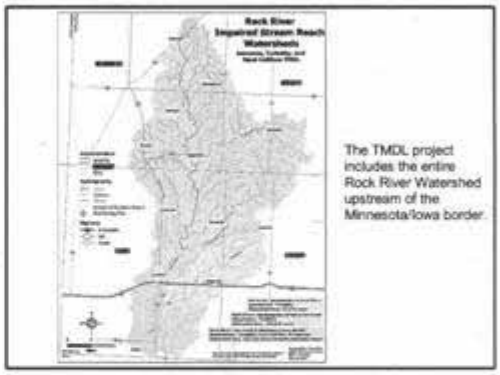
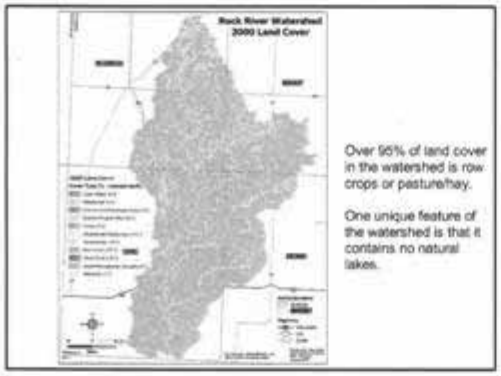
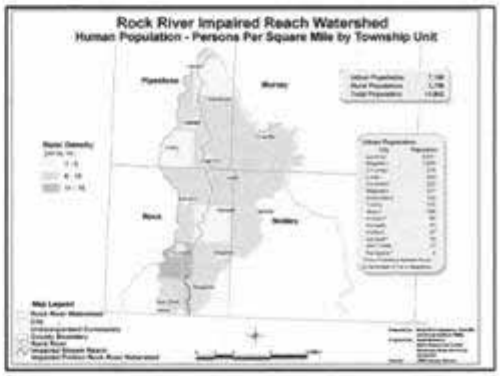
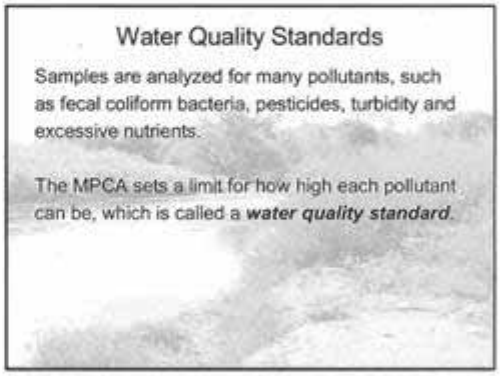
Presentation for 03-15-07 public meeting











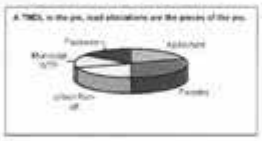
Impaired Streams

When a portion of a stream or river exceeds these standards, the stream is listed as an ***Impaired Water***.

This leads to the requirement of a ***Total Maximum Daily Load (TMDL)***. A TMDL is required for each impaired water.

What is a TMDL?

"Total Maximum Daily Load" is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources." - US EPA



What is fecal coliform bacteria?

Fecal coliform bacteria live in the digestive tract of warm-blood animals (humans, pets, farm animals, and wildlife) and are excreted in the feces.

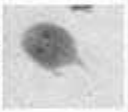
Why is it a concern?

Fecal coliform bacteria themselves are usually not harmful, but they can indicate the presence of waterborne pathogens.

Examples of Waterborne Pathogens

Giardia

A microscopic protozoan parasite that lives in the intestine of people and animals. There are approximately 970 to 1550* cases of giardiasis reported to the MN Department of Health each year.



Cryptosporidium

- Cryptosporidiosis (often called "Crypto") is a diarrheal disease caused by the protozoan parasite *Cryptosporidium* spp. Approximately 90-240* cases of Crypto are diagnosed in Minnesota each year.

* statistics reflect reported foodborne and waterborne sicknesses

Source: MN Department of Health

Water Quality Standard

- No month shall have a geometric mean above 200 org/100ml.

  The standard applies to April through October. A minimum of five samples is needed to calculate a geometric mean.

- Not more than 10% of individual values may exceed 2000 org/100 ml.

Where is the Rock River Impaired for Fecal Coliform?

What levels of fecal coliform are found in the Rock River?

Monitoring data for fecal coliform have only been collected from one site in the watershed, the Rock River at the Minnesota/Iowa border.

The only month with adequate sample collection for assessment purposes was August. August had a geometric mean of 626 cfu/100 ml.

Of the 26 samples collected, 42% exceeded 200 cfu/100 ml and 12% exceeded 2000 cfu/100 ml.

Sources of fecal coliform bacteria in the Rock River Watershed

Septic Systems and Unsewered Communities

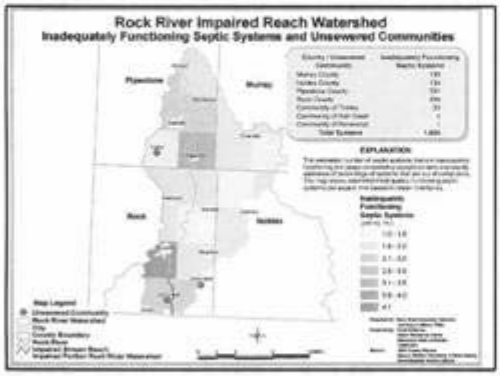
Based on county estimates, approximately 72% of the individual septic systems in Rock River Watershed are an imminent threat to public health or safety. This equates to an estimated 1,080 systems that disharge partially or untreated sewage to streams.

Surface discharge from non-compliant septic system that would be considered an ITPHS.

The communities of Trosky, Ash Creek and Kanaranzi are unsewered. Some homes and businesses in these communities also may have inadequate wastewater treatment.

Typical Septic System

Rock River Impaired Reach Watershed
Inadequately Functioning Septic Systems and Unsewered Communities



Wastewater Treatment Plants

Municipal wastewater treatment plants are required to monitor their effluent and meet a discharge limit of 200 organisms/100 ml fecal coliform concentration.

Wastewater Treatment Plant Violations and Bypasses

(2002-2006)

Violations

Hatfield – 29, treatment system planned for 2007
Edgerton – 2 in 2006
Holland – 2 in 2004, 1 in 2005

Bypasses

Woodstock, March 31, 2006 was the only reported bypass. This was following 3.5" of precipitation.

Stormwater Runoff

Fecal coliform bacteria and other pollutant concentrations in urban runoff can be as great or greater than those found in cropland, grazed pasture, and feedlot runoff (USEPA, 2001).

Open Feedlots

The majority of the 684 livestock facilities are confined operations with little runoff to surface water. Still, there is a significant number of open feedlots, some of which have pollution problems and pose a risk of fecal contamination.

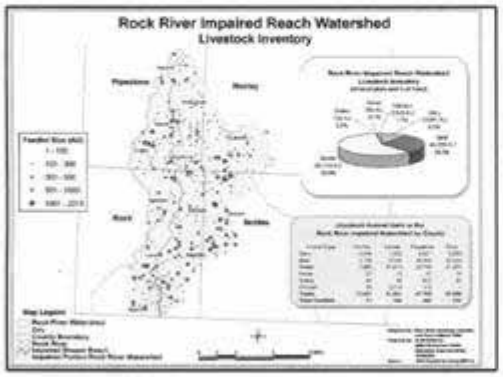
Open Feedlots with pollution problems

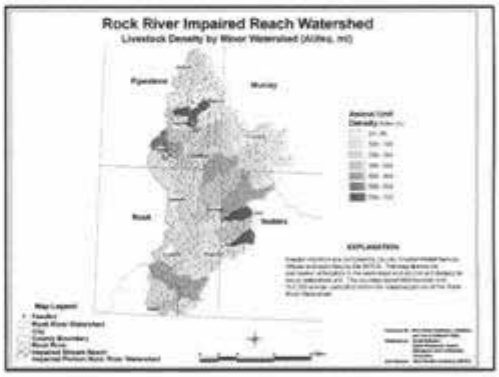
Land Application of Manure

Land application of manure can be a major source of fecal contamination. The significance of this source depends on how the manure application is managed, the rate and time of application, observance of setbacks from surface water, timely incorporation to avoid major runoff following a rain, residue management, and other practices.

Injected Manure

Surface Applied Manure





Over-grazed Pasture

Heavy grazing can compact soil, deplete plant growth, and produce bare spots that are prone to erosion and can carry fecal material into waterways.

Wildlife & Pets

Wildlife and pets can also contribute to bacterial contamination (e.g. Canada geese, deer, wild turkeys, pheasants, as well as dogs and cats).

What is turbidity?

Turbidity is the measurement of water clarity. It is measured in units called nephelometric turbidity units (NTUs). The greater the turbidity, the less the water clarity.

Turbidity

Turbidity is closely associated with two other stream measurements, total suspended solids (TSS) and transparency. These measurements can be used with turbidity data is not available.

TSS is a measurement of the amount of sediment and organic matter present in a water sample.

Transparency is a visual assessment of how far down into the water you can see using a "transparency tube".

Why is it a concern?

High turbidity/TSS and low transparency levels limit light penetration and inhibit healthy plant growth on the stream bottom. It also makes it difficult for aquatic organisms to find food, can effect gill functions and elevated amounts of sediment can cause spawning habitat to become covered.

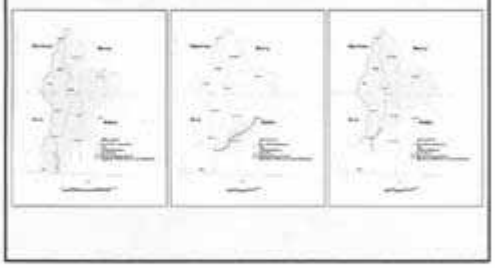
Surface Water Standards

Turbidity – Not more than 10% of samples shall exceed 25 NTU's.

TSS – Not more than 10% of samples shall exceed 66 mg/L.

Transparency – Not more than 10% of samples shall be under 20 cm.

Where is the Rock River Impaired for Turbidity?

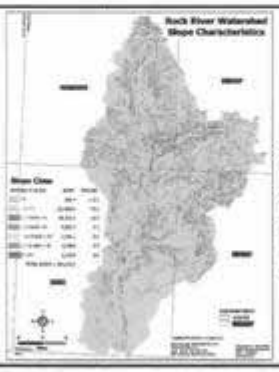


What levels of turbidity are found in the Rock River?

Sources of turbidity in the Rock River Watershed

- Suspended silt from soil erosion after storms.
- Stream channel erosion.
- Suspended organic matter, such as bacteria, plankton, plant material, etc.

There are 10,034 acres of highly erodible land in the watershed. 63% of this land is in pasture or hay and 31% in a row crop land cover.



Slope percentage is often a indicator of where significant soil erosion is occurring in a watershed. Depending on land cover, slopes above 12% often deliver the highest sediment loads to streams

Next Steps

- Develop fecal coliform and turbidity load allocations for each impaired stream reach.
- Provide draft TMDL review and a comment period by September 2007.
- After the EPA approves the TMDLs there is one year period for an implementation plan to be written.

Presentation for 03-15-07 public meeting

For More Information Contact:

Scott Matteson
Water Resources Center
Minnesota State University, Mankato
184 Trafton Science Center South
Mankato, MN 56001

507-389-5338 or scott.matteson@mnsu.edu

Here is an article that was in the Star Herald after I presented at the Township Officers Meeting.

March 20, 2007

WHEN IT'S "SOMETHING IN THE WATER," WE SHOULD ALL CARE

The Rock River is polluted, according to the Minnesota Pollution Control Agency. Specifically, the river is polluted with high concentrations of fecal coliform bacteria < an indicator of contamination from human sewage, livestock manure and wildlife. Beyond that, the Rock River also exceeds the limits of turbidity, a measure of water clarity. To improve both these pollution marks, the Water Resources Center at Minnesota State University, Mankato is conducting a Total Maximum Daily Load study on the Rock River. The initial reasons for the study may sound worse than what the river's actual condition is. The samples used to determine a need for the study were taken during one month, so this final study will bring the whole story out. We may find the Rock River de-listed as impaired. We should be glad to have this study underway because good water quality is good for all of us. Sources of the pollution (or that the river isn't as polluted as initial tests showed) could be outcomes of the TMDL study. Turbidity is a new term to many of us. Farming too close to riverbanks can cause more turbidity, as does overgrowth of algae. The MPCA requires a TMDL plan when at least 10 percent of the samples exceed water quality standards. In the Rock River, 48 percent of the samples exceeded turbidity standards. While big livestock producers get the brunt of criticism, small operations with open feedlots can have runoff issues that cause even more pollution. Septic systems of rural homeowners can be fecal pollution sources as well. People can get ill if they swim in polluted waters, but beyond that, it's also important to remember that humans are at the top of the food chain, and a healthy water supply equals healthy people. After all, fish can't spawn in water with high turbidity. This TMDL study will be completed by the fall of 2007. Until then, we should all take care that we are being responsible residents of the Rock River area. The local Land Management Office, 283-8862, is a helpful and reliable resource for questions dealing with land use of any kind.


Rock River TMDL Watershed Tour
Jasper
Hardwick
Kenneth
Luverne
Magnolia
Beaver Creek
Hills
Steen
A
B
C
D
E
F
G
H
I
J
K
L
M
0 1 2 4 6 8 10 12 14 16
Miles

Rock River Watershed Tour, Rock County

A. **Feedlot:** Producer has 290 Cattle on site, has a runoff issue, plans on using Feedlot Cost Share Dollars to make a correction that will be designed by Joint Powers Engineering.

B. **Unincorporated City of Ash Creek:** Small village with about ½ of the residences with non-compliant septic systems. Also 2 junk yards that are in the process of cleaning up that do not have permits.

C. **Sampling Point:** Sampling point of the Rock River along the State Line between Iowa and Minnesota.

D. **Pasture:** Producer is working on creating a grazing plan; also a neighboring site that has been overgrazed, increasing the potential problem of soil erosion.

E. **Stream Bank Erosion and Stabilization:** Land owner has worked with USFW to stabilize stretches of stream bank but there are many more miles of stream bank sloughing off into the stream.

F. **Rural Water Wells:** Rock County Rural Water serves approximately 2300 people, has 13 wells, all in the area of the Rock River. The USGS has done an interconnect study and found that a substantial amount of water from the river enters the aquifer and exits the aquifer back to the Rock River.

G. **Cattle Feedlot:** Formerly an open lot this feedlot operator chose to go with total confinement and this building is called a monoslope.

H. **Stream bank Stabilization & Open lot Feedlot:** Eroding banks along the river used to be armored with concrete before the DNR enforced no concrete can be used unless covered with natural rock. (this greatly increased the cost) Also livestock producer created a clean water diversion and grass filtering to prevent runoff contaminating the river.

I. **Gravel Pit:** The Rock River valley has many deposits of gravel which are currently being mined in approximately 6 pits.

J. **Blue Mound:** Interesting topography and geology created by the outcroppings of Sioux Quartzite.

K. **Topeka Shiner:** This site is a Topeka shiner sample site on the Mound Creek.

L. **Cattle Feedlot:** This larger feedlot used cost share and Joint Powers Engineering to design a grass treatment filter strip to treat the runoff. (Farm ground to the south of the Hwy is flooded frequently and the owner was looking at some type of conservation program to enroll the ground).

M. **City of Leota:** See describtion

Bos, Douglas - Luverne, MN

From: Wayne Smith [wsmith@co.nobles.mn.us]
Sent: Monday, June 11, 2007 10:01 AM
To: Bos, Douglas - Luverne, MN
Subject: Leota

Hi Doug-
The Village of Leota is an unincorporated community of 500 people in NW Nobles County. Working together they have established a Community Sewer Board and a Community Water Board. Several years ago they received funding for a new sewer system. Every home has it own septic tank and that drains to the community ponds for treatment. Their drinking water supply management area has been identified by MDH and they are actively working at coming up with a WHP plan. Both project have truly been grass root projects, people working together to do what is best for the community with out the benefit (or hindrance) of a City Council or other local unit of government. They have done an excellent job of bring their residents into compliance with septic rules; unfortunately most of the farms surrounding the community are still out of compliance. My estimate for farms in Leota Township would be 80-85 percent.
I am sorry I will not be able to make it today.
Wayne-

—June 07

Stay eligible for Farm Program Benefits by reviewing your **Highly Erodible Lands (HEL)** Conservation Compliance plan. If you are making changes to your tillage and planting operations, or have erosion concerns our office will need to revise your plan.

CONSTRUCTION ACTIVITIES

Our office has completed layout of 9 construction projects this spring. This year we tried a new approach by having land owners seed construction sites to small grains. The landowners are being reimbursed $80 per acre for the area where the conservation practice is to be installed. This funding is through the Rock County Soil and Water Conservation District. The advantage is to allow more time for our layout and design and to attract more competitive bids from contractors who are more available at the time the small grains are harvested than any time of the year. Our objective is to complete all practices by Sept 15th and then get ready for the fall construction season.

The Natural Resources Conservation Service Cultural Resource person will be taking a tour in Rock County June 28th. He will be investigating some of our proposed construction sites for impacts to cultural resources. Rock County was mapped by surveyors in the mid-19th century and the resulting maps produced from that survey identified locations of Native American settlements, tanneries, fur trading posts, maple sugar camps, trails, roads, and river crossings. Very interesting stuff! All of this information is confidential and accessed only through requests through NRCS's Public Information Officer.

LMO NEWS

Doug Bos

TMDL UPDATE

We have been working on developing a TMDL Assessment plan for the Rock River. Once we have this done it will be reviewed by the EPA and be placed on public notice. After the review and public notice a TMDL Implementation plan will need to be developed. This Implementation plan is the "how to" plan. It will outline what we need to do to correct the impairments of the Rock River. To develop this plan we are encouraging as much public input as possible. We will be contacting organizations and individuals that have a stake in this process and welcome any persons that would be interested in serving on a TMDL committee.

Each year we are required to inspect a percentage of our feedlots that are due for re-registration. With the process of the TMDL we are focusing on feedlots that are in the Rock River watershed. We are assisting these producers by ensuring their compliance with the State feedlot rules and also focusing on nutrient management planning. By being proactive these producers will be doing their part in improving water quality. If you have any questions or concerns please feel free to contact our office.

October 2007

NRCS NEWS

Kurt Halfmann

NRCS' EQIP -- LANDOWNER'S BEST BET FOR FUTURE

For those involved in agriculture, it's a busy time of the year—so much to do, so much to wrap-up. Even though you're busy, this might be the best time to take a moment and start planning for your future a bit. Your future in EQIP, that is.

Details, rules and language of the new Farm Bill are still being finalized. No one knows when the final draft will be written or made into law. Chances are you have issues on your farm that need solving today, not tomorrow. Not next year. You may have erosion, water quality concerns, or nutrient management issues. Maybe you have a cattle operation that needs some updates or new practices.

While much of what the new Farm Bill holds for payments or caps or loans is undecided, one thing NRCS is sure of right now is USDA's Environmental Quality Incentives Program. EQIP has been around since 1996 and since then has grown in popularity with increased funding levels. It's NRCS' principal program for delivering conservation in Rock County. EQIP supports the needs of livestock operations and ag operations without livestock.

Rock County has prioritized the Drinking Water Supply Management Areas of the Rural Water system and City of Luverne, and the TMDL listed reaches of the Rock River for funding. Last year our office allocated over $400,000 for projects in the county.

EQIP cost-share rates cover a wide range of conservation practices—from conservation tillage to Comprehensive Nutrient Management Plans, terraces, grassed waterways, water and sediment control basins, shelterbelts, watering facilities and fencing for live stock—EQIP has nearly everything Rock County operations may need to solve the resource problems they face. EQIP and other NRCS cost-share programs can make operations environmentally sound and sustainable for the long haul. Producers can expect a sign up for EQIP late fall 2007.

LMO NEWS

UPDATE ON ROCK RIVER'S TMDL PROCESS

Doug Bos

The Land Management staff has been meeting bimonthly with Mankato State University, Pipestone, Murray, and Nobles counties, City of Luverne, Rock County Rural Water, MPCA, NRCS, and DNR to develop a TMDL assessment plan. The draft TMDL Assessment Plan is being reviewed and will be submitted to EPA for approval. We will then have a public meeting to accept input on the assessment plan and start the development of a TMDL Implementation Plan. If you remember from earlier newsletters the Rock River is listed for turbidity (floating sediment), Fecal Coliform (e-coli bacteria) and mercury impairments.

The public meeting will be an opportunity to comment on the TMDL assessment plan and we will also be looking for persons willing to be part of the development of the TMDL implementation plan. An implementation plan spells out what we need to do to correct the impairments of the Rock River. This plan could have an impact on many different issues ranging from future developments (businesses or industry) in the City of Luverne, septic systems, feedlots, and manure application in the Rock River Watershed. **This will be an opportunity to be part of the development of the implementation plan.** We will be sending out a separate newsletter to further explain and announce the meeting date and time. If you have questions before, please contact our office at 507-283-8862 ext. 3.

2008 TREE PLANTINGS

Justin Decker

Tree orders for spring 2008 plantings are being taken right now. We have several different species of deciduous trees and shrubs as well as a variety of evergreens to choose from. Trees can enhance your property, increase privacy, reduce or eliminate sown buildup on driveways and around buildings, and are a great habitat for a variety of wildlife. Call the Land Management Office and we can discuss your plans and give you a plan map along with a cost estimate for your project. The Soil and Water Conservation District offer 50 percent cost-share (maximum of $800 per project) on the trees and matting if they are planted by the our staff. Call or stop in before November 15th to place your order from the following list of available trees.

DECIDUOUS TREES
Red Oak
White Oak
Bur Oak
Paper Birch
Hybrid Willow
False Indigo
Little Leaf Linden
Silver Maple
Sugar Maple
Norway Maple
Hackberry
Cottonwood

EVERGREEN TREES
Eastern Red Cedar
Black Hills Spruce
Colorado Blue Spruce
Ponderosa Pine

SHRUBS
Redosier Dogwood
Honeyrose Honeysuckle
Late Bloom Lilac
Common Lilac
Amur Maple
American Plum
American Cranberry Bush

Rock River Watershed
TMDL NEWSLETTER

Fall 2007

WHAT IS A TOTAL MAXIMUM DAILY LOAD (TMDL)?

Every two years the state of Minnesota publishes a list of "impaired" waters that do not meet water quality standards. Once a river or lake is put on the list, a Total Maximum Daily Load (TMDL) study is required. The Rock River is listed for both fecal coliform bacteria and turbidity impairments. In 2006, the Water Resources Center at Minnesota State University, Mankato (MSUM) secured a U.S. Environmental Protection Agency grant to conduct a TMDL on the Rock River Watershed.

According to the federal Clean Water Act, the TMDL is a calculation of the maximum amount of pollutant that a stream or lake can receive and still meet water quality standards.

We can boil down the TMDL process into three major elements:

- **Evaluating** the water quality problems,
- **Determining** the pollutant sources that caused the problems,
- **Developing** a plan for correcting the problems. This plan is a tool for implementing measures to meet water quality standards.

Rock River near Luverne

Rock River TMDL Overview

In 1994, the Minnesota Pollution Control Agency (MPCA) determined the Rock River was impaired for fecal coliform bacteria at the Minnesota/Iowa border. MPCA also added turbidity in 2002. In 2006, two additional sites between the MN/Iowa border and Luverne were listed for turbidity.

The Water Resources Center at MSUM is working with staff from local, state and federal agencies to identify sources of pollution and assess possible solutions.

A TMDL implementation plan will be developed once the study is complete. The plan will provide strategies for implementation of practical management measures needed for the Rock River to meet water quality standards.

Citizen participation is an important component of the TMDL process. **We are seeking public input to help develop the implementation plan.**

Ultimately, the goal of the project is to secure funding to incorporate practices to reduce fecal coliform bacteria and turbidity numbers. Residents will have an opportunity to receive cost-share and low-interest loans to help protect, improve and restore water quality in the Rock River.

Project Summary

What? - A water quality project to clean up the Rock River.
Where? - Rock River Watershed
When? - The project started in late 2006 and will be completed in 2008.
Why? - The Minnesota Pollution Control Agency has deemed the Rock River impaired for recreation and aquatic life. Fecal coliform bacteria and turbidity are the primary impairments.
How? - Data was gathered and analyzed by Minnesota State University, Mankato and put into report. The draft report can be found at: http://www.pca.state.mn.us/water/tmdl/index.html
Who? - A group of local, state and federal personnel have been meeting assisting with the report.
Why should you care? - You live in this watershed and this is your river. We need your input in writing a plan to clean up the river. Ultimately, the goal is to receive money to assist with the Rock River clean up.

FECAL COLIFORM BACTERIA

This is a group of bacteria that passes through the fecal excrement of humans, livestock and wildlife. These bacteria live in the digestive tract of warm-blooded animals and aid in the digestion of food.

Fecal coliform bacteria are usually not harmful themselves, but indicate the presence of other disease-causing bacteria. Testing directly for pathogens can be difficult, expensive and even hazardous. High fecal coliform concentrations indicate a likelihood that the river is polluted with disease causing bacteria and viruses.

Sources of Fecal Coliform Bacteria

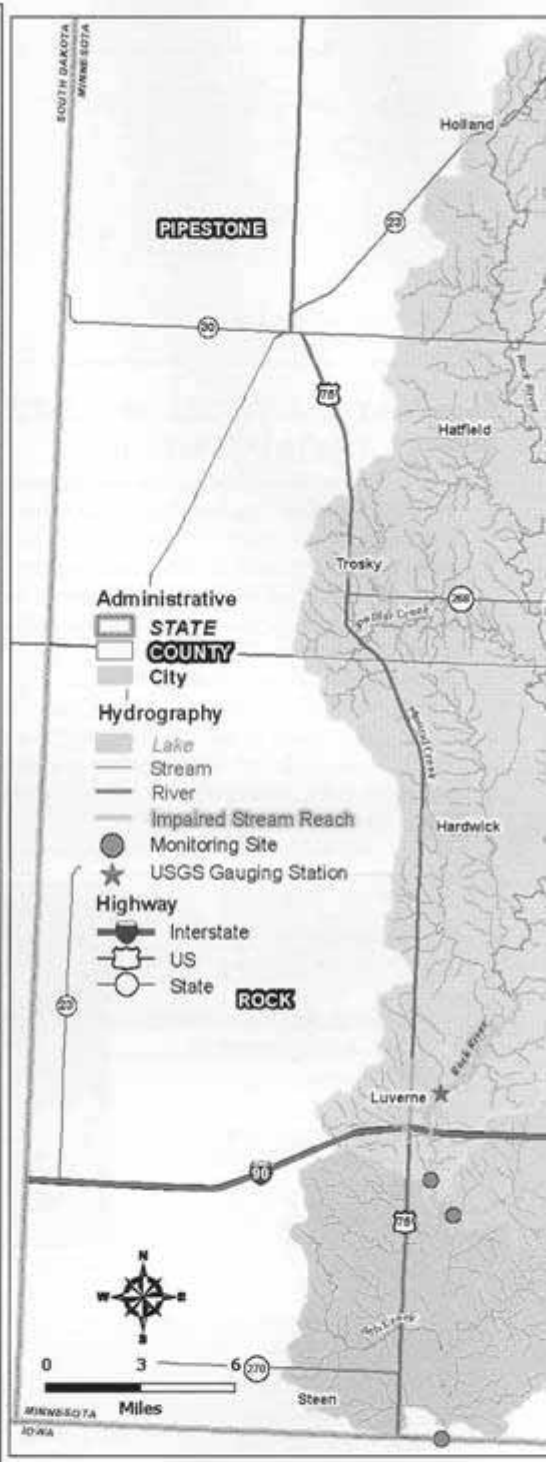
- Enter rivers through direct discharge of waste from mammals and birds, from runoff, and from untreated human sewage.
- In aquatic environments fecal coliform bacteria indicate the water has been contaminated with the fecal matter of humans or animals.
- Septic systems that are out of compliance can allow untreated human waste to flow into nearby streams and lakes.
- Agricultural practices such as allowing animal wastes to wash into nearby streams during the rainy season, spreading manure and fertilizer during rainy periods, and allowing livestock watering in streams can all contribute to fecal coliform contamination.
- In urban areas, runoff from roads, parking lots, and yards can carry animal waste to streams through stormwater systems.
- Wildlife also may be a source of bacteria; however in most locations the contribution is relatively minor.

Septic systems that illegally discharge to the river are a source of fecal contamination.

Cattle with access to streams are another source of contamination.

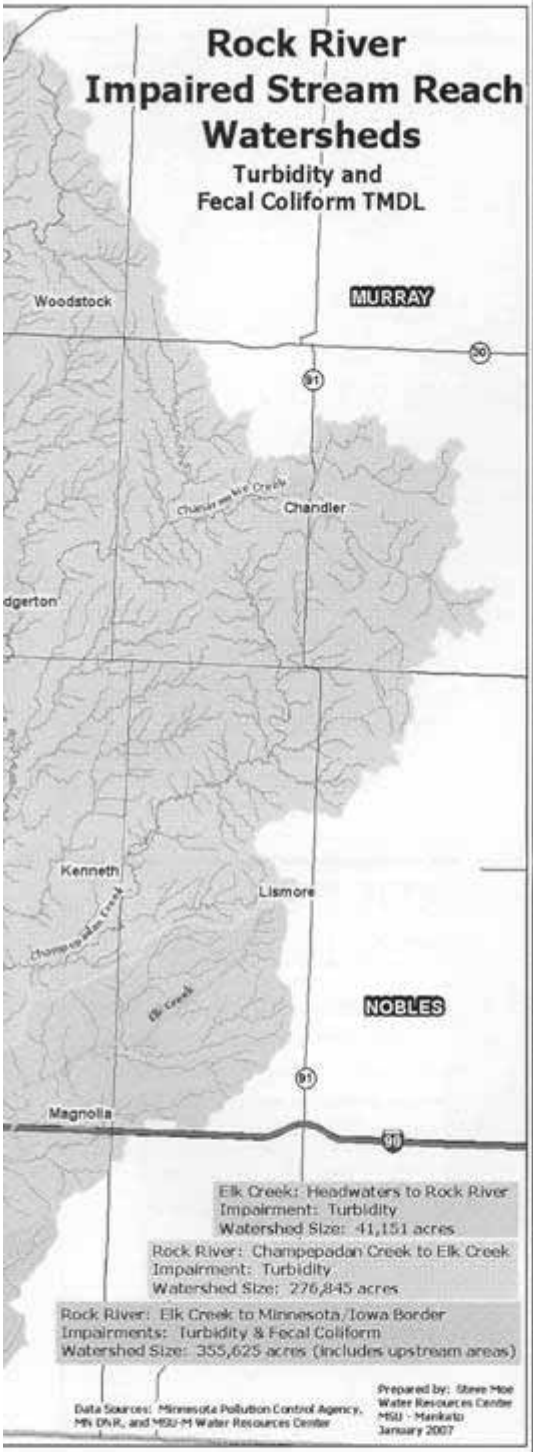
Concerns of Fecal Coliform Bacteria

- Once in a stream, lake or other waterbody, bacteria can infect humans through contaminated fish, skin contact, or ingestion of water.
- Bacteria can settle out of water into bottom sediments, where they can persist and even multiply for weeks or months in the warm, dark, moist and organically-rich conditions. When the sediments are stirred up, the bacteria become re-suspended in the water.
- Some waterborne pathogenic diseases include ear infections, dysentery, typhoid fever, viral and bacterial gastroenteritis, and hepatitis A.
- The presence of fecal coliform tends to affect humans more than it does aquatic creatures, though not exclusively.
- Escheria coli (*E. coli*) is the most common strain of fecal coliform bacteria. Some strains of *E. coli* can cause severe illness.
- Swimming should not be allowed if the level of fecal coliform bacteria reaches 200 organisms per 100 milliliters of water.
- In the Rock River, the water quality standard for fecal coliform was exceeded during the months of August and September.
- The highest concentrations of fecal coliform bacteria were found during and after rain events.



Rock River Watershe

City of Luverne
Minnesota Department of Natural Resources
Minnesota Pollution Control Agency
Murray Co. Environmental Services and SWCD
Natural Resources Conservation Service
Nobles Co. Environmental Services and SWCD



d Technical Committee

Pipestone County Planning and Zoning and SWCD
Rock County Land Management Office and SWCD
Rock County Rural Water System
WRC, MN State University, Mankato
US Fish and Wildlife Service

TURBIDITY

Turbidity is a measurement of water clarity. Turbidity is caused by soil particles, algae, dissolved salts and other organic materials that scatter light in the water column making the water appear cloudy or turbid.

Turbidity itself is not a major human health concern, but underlines a diverse list of water quality problems. Turbidity is linked to the look of the water and therefore the public's perception of water quality. People generally prefer water of high clarity for recreation and consumption. Excessive levels can harm aquatic life, hide recreational hazards and harbor high concentrations of bacteria and viruses.

Sources of Turbidity

- Soil erosion including from fields, construction sites, etc.
- Wastewater and septic system discharge
- Urban runoff
- Eroding stream banks and gullies
- Large numbers of bottom feeders (such as carp), which stir up bottom sediments
- Excessive algal growth
- Decaying plants and animals
- Flooding and high flow rates (stream bank erosion)

Soil erosion from fields after heavy rains is one source of turbidity in the Rock River.

Concerns of Turbidity

- Turbidity limits light penetration and hinders photosynthesis, thereby altering the composition and distribution of aquatic plant communities.
- Turbidity is detrimental as excessive levels can harm aquatic life. Aquatic organisms can have trouble finding food, gill function can be affected and spawning beds may become covered.
- Excessive fine sediment can fill the small spaces between the river bed gravel and reduce suitable habitat for many benthic invertebrates (e.g. mayflies, stoneflies, and mussels) and spawning fish.
- Sediment absorbs solar energy, raising water temperatures and reducing the amount of dissolved oxygen.
- Sediment also carries nutrients, particularly phosphorus and toxic substances, such as PCBs and mercury. There may be released in the environment after sediment settles in the river bed.
- Turbid water may be composed of organic and/or inorganic constituents. Organic particles may increase the possibility for waterborne disease.
- High turbid waters may be hazardous to the welfare of swimmers and boaters. Turbidity may obscure potentially dangerous obstructions such as boulders and logs.
- The water quality standard for turbidity is 25 NTU.
- Fifty percent of the water samples collected from Rock River (1997-2006) exceeded the standard. This was most common after rain events.

Rock County Land Management Office
311 W. Gabrielson Road
Luverne, MN 56156

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MANKATO, MN 56001

Pollution is Threatening the Rock River

TMDL PUBLIC OPEN HOUSE

Join us Thursday, January 24th, 2008 to learn about water quality concerns in the Rock River. We will be discussing the sources of the pollution and possible solutions. **This is your opportunity to provide input**.

Location: Edgerton Ambulance Garage
Address: 1000 South Main, Edgerton
Open House: 2:30 p.m.
Presentation: 3:00 - 4:00 p.m.

Location: Rock County Family Services Bldg.
Address: 2 Roundwind Road, Luverne
Open House: 6:30 p.m.
Presentation: 7:00 – 8:00 p.m.

The Rock River TMDL report can be found at::
www.pca.state.mn.us/water/tmdl/index.html

This newsletter is sponsored by the Rock River TMDL Project for Fecal Coliform and Turbidity. This publication is funded through U.S. Environmental Protection program from the Water Resources Center, Minnesota State University Mankato (MSUM). MSUM is an equal opportunity organization and employer. Questions and comments can be directed to:
Scott Matteson at 507-389-5338 or E-Mail: scott.matteson@mnsu.edu
184 Trafton Science Center S; Mankato, MN 56001

Minnesota Pollution Control Agency

January 2008

WaterFront Bulletin

Water Restoration and Protection: Headlines and Deadlines

WaterFront is a web-based bulletin featuring updates on impaired waters, watershed project funding and water restoration and protection activities underway throughout the state. *WaterFront* is published to share information with internal MPCA staff and external watershed partners.

In this issue

WATER QUALITY RULES

MPCA Citizens' Board Adopts Rule Revisions

The Minnesota Pollution Control Agency Citizens' Board recently adopted amendments to the state's water quality rules. Rules affected include the following.

1. Amended, Chapter 7050: Water Quality Standards for Protection of Waters of the State
2. Added, Chapter 7053: Effluent Limits and Treatment Requirements for Discharges to Water of the State
3. Repealed, Chapter 7056, Parts 0010 and 0040: Classification for Use and Standards for Select Reaches of the Mississippi River and its Stream Tributaries
4. Repealed, Chapter 7065, Parts 0010 and 0260: Specific Effluent Limits for Select Watersheds

For more information on the rule revisions, visit the MPCA web site at http://www.pca.state.mn.us/water/standards/rulechange.html.

PROJECT UPDATES

Rock River Fecal Coliform and Turbidity TMDL

The public comment period for the Rock River Fecal Coliform and Turbidity TMDL is December 31, 2007 through January 31, 2008. There is one impaired reach for aquatic recreation and life and three reaches impaired for aquatic life that are addressed in this TMDL. The Rock River is located in southwest Minnesota and drains into Iowa where the Rock River joins the Big Sioux River and eventually the Missouri River. The assessment was completed by Minnesota State University-Mankato Water Resources Center. There has been an active local involvement in the completion of this TMDL. For the draft report, please visit http://www.pca.state.mn.us/water/tmdl/project-rockriver.html

Daberkow, Kelli

From: Bos, Douglas - Luverne, MN [Douglas.Bos@mn.nacdnet.net]
Sent: Monday, January 07, 2008 11:38 AM
To: alais@cityofluverne.org; chansen@co.murray.mn.us; Daberkow, Kelli; dcook@iw.net; Gehrke, Arlyn; Hartman, Eric; Justin.Decker@mn.nacdnet.net; Krier, Kyle; kurt.halfmann@mn.usda.gov; Edward.Lenz@mn.nacdnet.net; Matteson, Scott K; Smith, Wayne; Tom.Kresko@dnr.state.mn.us
Cc: Daberkow, Kelli
Subject: TMDL meeting notice


Suggestions for Improving the ...

Invite to Open House II-Stake...

To TMDL members,

Attached you will find a suggestion page for input and an invite for those organizations in your county that would have an interest in the water quality of the Rock River. Here are the organizations that I am sending to in Rock County. To Nobles, Murray, Pipestone, you may have others that we don't in Rock County.

Rock County Cattleman's

Rock County Pork Producers

Rock County Dairy Association

Rock County Corn and Soybean Producers

Rock County Pheasant Forever

Rock County Turkey Federation

Beaver Creek Sportsman's

Brandenburg Foundation

Rock County Farm Bureau

Blue Mound State Park

Townships in the watershed,

I am sending a copy of the TMDL Public Open House Flyer (from MSU), a Suggestion Page and an invite to each organization. You can adapt any of them if you prefer a different wording.

Thanks,
Doug Bos, Assistant Director
Rock County SWCD/Land Management
507/283-8862 ext 3
Fax 507/283-5006

Rock County Land Management Office

311 West Gabrielson Road Ste 5
Luverne, MN 56156
24 hour Fax: (507) 283-5006

Soil & Water (507) 283-8862 **Zoning** **Ag Inspection** **Environmental** **Transfer Station** (507) 283-5005

MEMO

TO: Rock River Stakeholder Organizations

RE: Impairments of the Rock River

The Rock River has been listed on the EPA 303(d) list as an impaired stream because it exceeds the Federal water quality standards for fecal coliform and turbidity. EPA requires an assessment to be developed that addresses the Total Maximum Daily Load (TMDL) of pollutants. Rock, Nobles, Pipestone, and Murray Counties, in partnership with Mankato State University and MPCA, have developed a TMDL assessment. It's on the web at http://www.pca.state.mn.us/water/tmdl/project-rockriver.html. The next step is to write an implementation plan. The implementation plan will spell out activities that can be done to correct these impairments of the Rock River.

We would like your input on developing the implementation plan over the next few months. The implementation plan is a long-range plan that will address many land use issues ranging from land application of manure, overgrazing pastures, failing septic systems, and soil erosion.

On **January 24**, there are two public meetings scheduled in Edgerton and Luverne for the general public to learn and comment on the Rock River TMDL assessment. These meetings will provide you with valuable background information that will be used in subsequent meetings**. It would be very beneficial for you to attend one of these meetings**. The Edgerton meeting will be at the ambulance garage, 1000 S. Main, starting with an informal open house at 2:30 p.m. followed by a presentation at 3 p.m. The Luverne meeting will be at the Rock County Family Services building, 2 Roundwind Road, with an open house at 6:30 p.m. and presentation at 7 p.m.

Your organization has a stake in future land use concerns in the watershed of the Rock River. If you are unable to attend the public meeting or are not interested in providing input for the implementation plan, please let me know. Thank you in advance for your interest and we look forward to seeing and/or meeting you on the 24th.

Enclosed you will find an input form you may bring to the meeting or send in if you are unable to attend. Also enclosed is a newsletter with more information about the project.

Sincerely,

Doug Bos, Asst Director
Rock County SWCD/Land Management Office

Suggestions for Improving the Rock River
By addressing fecal coliform bacteria and turbidity

Coliform Bacteria-
Causes can include feedlot runoff, non-compliant septic systems, improper land application of manure, cattle in streams and wildlife.

Turbidity-
Causes can include soil erosion from fields, urban runoff from precipitation, and stream bank erosion.

Possible solutions & programs;

-High residue crop farming, i.e. -no-till, strip-till, minimum till.
-Conservation practice structures, i.e. –sediment basins, terraces, waterways.
-Grass buffers along streams and watercourses.
-Rain gardens and storm water retention ponds to absorb storm water in cities.
-Stream bank stabilization and diversion structures.
-Pasture management i.e. -stream crossings, rotational grazing, exclusion fencing.
-Feedlot runoff control structures.
-Nutrient management and planning for manure application.
-Septic replacement program.

Your input is valuable to developing a comprehensive implementation plan! Please list any ideas, choices and/or other suggestions that will decrease the bacteria and turbidity in the Rock River. (Please use the back of this form if needed.)

☐ Or, we do not wish to be part of the Implementation Plan process but would like to be on the mailing list for public meetings and notices.

Name: _____
Agency/Group representing: _____
Address: _____
_____

NOBLES SOIL & WATER CONSERVATION DISTRICT

TO: Rock River Stakeholder Organizations

RE: Impairments of the Rock River (Please view newsletter for watershed boundaries.)

The Rock River has been listed on the EPA 303(d) list as an impaired stream because it exceeds the Federal water quality standards for fecal coliform and turbidity. EPA requires an assessment to be developed that addresses the Total Maximum Daily Load (TMDL) of pollutants. Rock, Nobles, Pipestone, and Murray Counties, in partnership with Mankato State University and MPCA, have developed a TMDL assessment. It's on the web at http://www.pca.state.mn.us/water/tmdl/project-rockriver.html. The next step is to write an implementation plan. The implementation plan will spell out activities that can be done to correct these impairments of the Rock River.

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Your organization or government unit has a stake in future land use concerns in the watershed of the Rock River. If you are unable to attend the public meeting or are not interested in providing input for the implementation plan, please let me know. Thank you in advance for your interest and we look forward to seeing and/or meeting you on the 24th.

Enclosed you will find an input form you may bring to the meeting or send in if you are unable to attend. Also enclosed is a newsletter with more information about the project.

Sincerely,

Edward Lenz
Technical Coordinator
Nobles SWCD
(507) 376-9150 ext. 117

NOBLES SOIL AND WATER CONSERVATION DISTRICT
1567 McMillan Street, Suite #3
Worthington, MN 56187
Telephone: (507) 376-9150 Fax: (507) 372-7751
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NOBLES SOIL & WATER CONSERVATION DISTRICT

Suggestions for Improving the Rock River
By addressing fecal coliform bacteria and turbidity

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Possible solutions & programs;

-High residue crop farming, i.e. -no-till, strip-till, minimum till.
-Conservation practice structures, i.e. –sediment basins, terraces, waterways.
-Grass buffers along streams and watercourses.
-Rain gardens and storm water retention ponds to absorb storm water in cities.
-Stream bank stabilization and diversion structures.
-Pasture management i.e. -stream crossings, rotational grazing, exclusion fencing.
-Feedlot runoff control structures.
-Nutrient management and planning for manure application.
-Septic replacement program.

Your input is valuable to developing a comprehensive implementation plan! Please list any ideas, choices and/or other suggestions that will decrease the bacteria and turbidity in the Rock River. (Please use the back of this form if needed.)

If you do not wish to be part of the Implementation Plan process but would like to be on the mailing list for public meetings and notices, please fill out your information and send it to the Nobles SWCD.

Name: _____
Agency/Group representing: _____
Address: _____
_____

NOBLES SOIL AND WATER CONSERVATION DISTRICT
1567 McMillan Street, Suite #3
Worthington, MN 56187
Telephone: (507) 376-9150 Fax: (507) 372-7751
An Equal Opportunity Employer

Nobles County mailing,

January 2008

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Nobles County Public Works Dept.
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Worthington, MN 56187

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Lismore, MN 56155

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Fulda, MN 56131

Kevin Norskog
Kanaranzi-Little Rock Watershed
PO Box 327
Adrian, MN 56110

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Nobles Planning And Zoning
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Lismore, Mn 56155

Gerald Erstad
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Farmers Union
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Lakes Association
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Worthington, MN 56187

Jim McGowan
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Lynn Darling
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Rushmore, MN 56168

Vern Suedkamp
Nobles SWCD Board
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Adrian, MN 56110

MURRAY COUNTY
ENVIRONMENTAL SERVICES OFFICE

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Water Resources Administrator

JEAN CHRISTOFFELS
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Zoning Administrator

LAURIE HILL
lhill@co.murray.mn.us
Secretary

MEMO

TO: Rock River Stakeholder Organizations

RE: Impairments of the Rock River

The Rock River has been listed on the EPA 303(d) list as an impaired stream because it exceeds the Federal water quality standards for fecal coliform and turbidity. EPA requires an assessment to be developed that addresses the Total Maximum Daily Load (TMDL) of pollutants. Rock, Nobles, Pipestone, and Murray Counties, in partnership with Mankato State University and MPCA, have developed a TMDL assessment. It's on the web at http://www.pca.state.mn.us/water/tmdl/project-rockriver.html. The next step is to write an implementation plan. The implementation plan will spell out activities that can be done to correct these impairments of the Rock River.

We would like your input on developing the implementation plan over the next few months. The implementation plan is a long-range plan that will address many land use issues ranging from land application of manure, overgrazing pastures, failing septic systems, and soil erosion.

On **January 24**, there are two public meetings scheduled in Edgerton and Luverne for the general public to learn and comment on the Rock River TMDL assessment. These meetings will provide you with valuable background information that will be used in subsequent meetings. **It would be very beneficial for you to attend one of these meetings**. The Edgerton meeting will be at the ambulance garage, 1000 S. Main, starting with an informal open house at 2:30 p.m. followed by a presentation at 3 p.m. The Luverne meeting will be at the Rock County Family Services building, 2 Roundwind Road, with an open house at 6:30 p.m. and presentation at 7 p.m.

Your organization has a stake in future land use concerns in the watershed of the Rock River. If you are unable to attend the public meeting or are not interested in providing input for the implementation plan, please let me know. Thank you in advance for your interest and we look forward to seeing and/or meeting you on the 24th.

Enclosed you will find an input form you may bring to the meeting or send in if you are unable to attend. Also enclosed is a newsletter with more information about the project.

Sincerely,

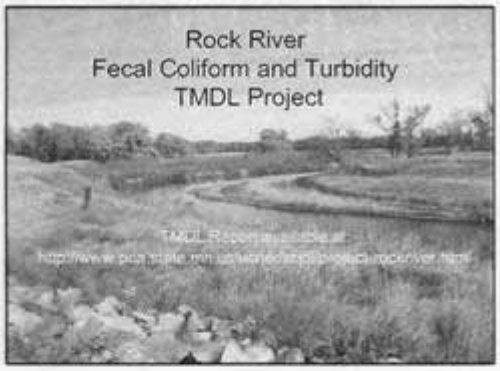
Chris Hansen –Water Resources Administrator

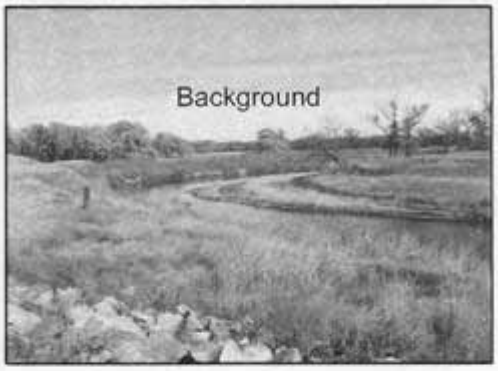
AN EQUAL OPPORTUNITY EMPLOYER

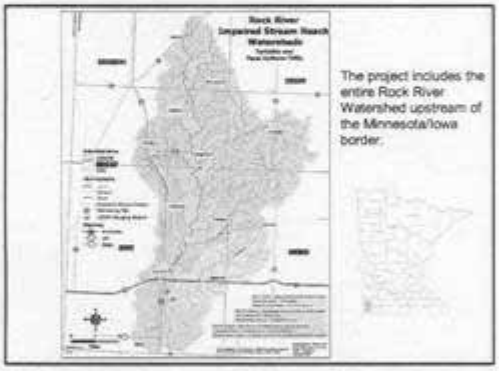
Murray County Mailing

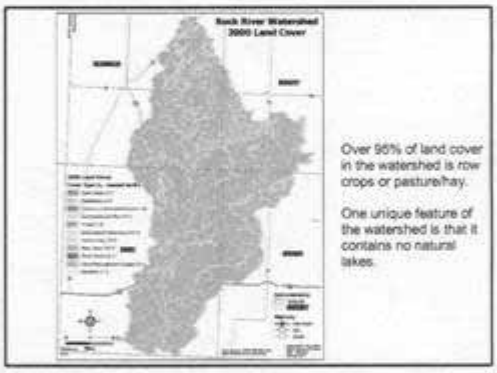
Name	Address	City	State	Zip
Beaver Creek Archers	1945 Engebretson Avenue	Slayton	MN	56172
Pheasants Forever - John Giese	3015 Pine Avenue	Slayton	MN	56172
Pork Producers - Jeff Boerboom	1036 111th Street	Hadley	MN	56151
Cattleman's Association - Dennis Swan	1825 110th Avenue	Balaton	MN	56115
Ducks Unlimited - Wendy Kruger	2611 Broadway Avenue	Slayton	MN	56172
Dairy Association - Dave Schwartz	1323 U.S. Highway 59	Slayton	MN	56172
Driftbreaker's Club - Earl Linder	66 South Shore Drive	Slayton	MN	56172
Cameron Township - Gail Ness	152 131st Street	Woodstock	MN	56186
Chanarambie Township - Connie Post	635 30th Avenue	Chandler	MN	56122
Fenton Township - John Busman	776 1st Street	Chandler	MN	56122
Leeds Township - James York	709 State Highway 30	Lake Wilson	MN	56151
Moulton Township - Karen Bruxvoort	497 41st Street	Chandler	MN	56122
City of Chandler - Alvin Vis	PO Box 37	Chandler	MN	56122
Friends of the Casey Jones Trail - Amy Hoglin				
Murray County Commissioners				

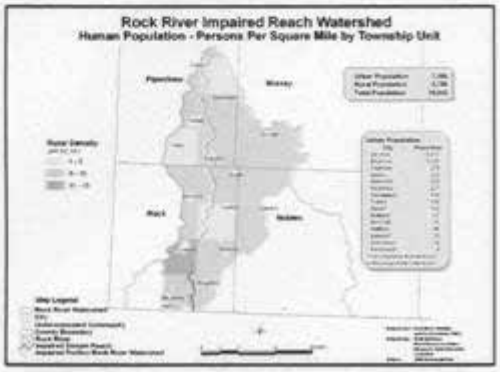
Presentation for 01-24-08 public meeting

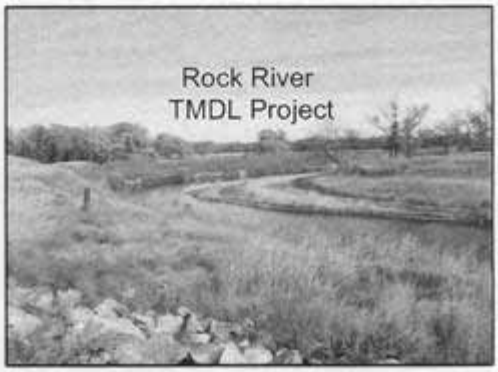












Presentation for 01-24-08 public meeting

Water Quality Monitoring

The Minnesota Pollution Control Agency (MPCA) and various local and state groups collect water quality samples from lakes and streams.
Long term monitoring data for the Rock River has been collected at the Minnesota/Iowa border.

Water Quality Standards

Samples are analyzed for many pollutants, such as fecal coliform bacteria, pesticides, turbidity and excessive nutrients.

The MPCA sets a limit for how high each pollutant can be, which is called a ***water quality standard***.

Impaired Streams

When a portion of a stream or river exceeds these standards, the stream is listed as an ***Impaired Water***.

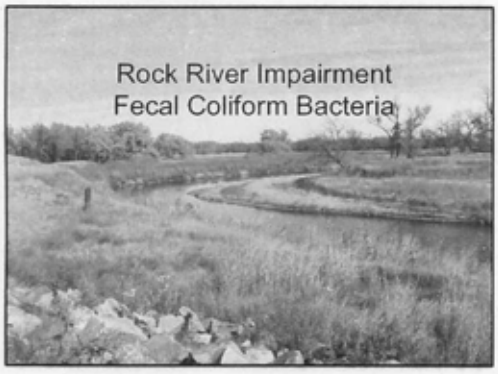
This leads to the requirement of a ***Total Maximum Daily Load (TMDL).*** A TMDL is required for each impaired water.

What is a TMDL?

"Total Maximum Daily Load" is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources." - US EPA

Two Parts to a TMDL:

1.) Water Quality and Source Assessment
2.) TMDL Allocations



What is fecal coliform bacteria?

Fecal coliform bacteria live in the digestive tract of warm-blood animals (humans, pets, farm animals, and wildlife) and are excreted in the feces.

Presentation for 01-24-08 public meeting

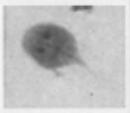
Why is it a concern?

Fecal coliform bacteria themselves are usually not harmful, but they can indicate the presence of waterborne pathogens.

Examples of Waterborne Pathogens

Giardia

A microscopic protozoan parasite that lives in the intestine of people and animals. There are approximately 970 to 1550* cases of giardiasis reported to the MN Department of Health each year.



Cryptosporidium

- Cryptosporidiosis (often called "Crypto") is a diarrheal disease caused by the protozoan parasite *Cryptosporidium* spp. Approximately 90-240* cases of Crypto are diagnosed in Minnesota each year.

* statistics reflect reported foodborne and waterborne sicknesses

Source: MN Department of Health

Water Quality Standard

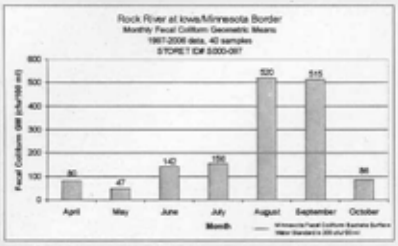
- No month shall have a geometric mean above 200 org/100ml.

  The standard applies to April through October. A minimum of five samples is needed to calculate a geometric mean.

- Not more than 10% of individual values may exceed 2000 org/100 ml.

Where is the Rock River Impaired for Fecal Coliform?

What levels of fecal coliform are found in the Rock River?



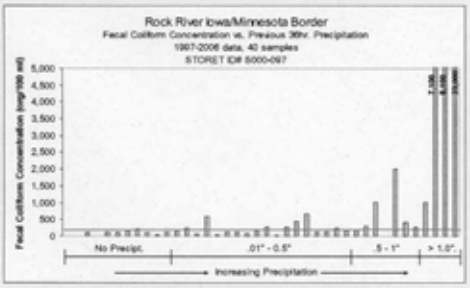
The Rock River qualified to be listed as impaired during July and August.

Factors that Affect Fecal Coliform Bacteria Concentrations

- Temperature – As water temperature increases, the ability of fecal coliform to survive increases. In most rivers, concentrations are highest in July and August.
- Sediment – Bacteria attach to sediment, when the river appears very dirty, bacteria concentrations are usually elevated.
- Precipitation – On average, concentrations are ten times higher during storm runoff.

Presentation for 01-24-08 public meeting

Effect of Precipitation of Fecal Coliform Levels



The highest concentrations of FC occurred during storm runoff.

Sources of fecal coliform bacteria in the Rock River Watershed

Septic Systems and Unsewered Communities

Based on county estimates, approximately 72% of the individual septic systems in Rock River Watershed are non-compliant systems. This equates to an estimated 1,080 systems that discharge partially or untreated sewage to streams.

Surface discharge from non-compliant septic system that would be considered an ITPHS.

The communities of Trosky, Ash Creek and Kanaranzi are unsewered. Some homes and businesses in these communities also may have inadequate wastewater treatment.

Typical Septic System

Wastewater Treatment Plants

Municipal wastewater treatment plants are required to monitor their effluent and meet a discharge limit of 200 organisms/100 ml fecal coliform concentration.

Wastewater Treatment Plant Violations and Bypasses

(2002-2006)

Violations

Hatfield – 29 (treatment system now in place)
Edgerton – 2 in 2006
Holland – 2 in 2004, 1 in 2005

Bypasses

Woodstock, March 31, 2006 was the only reported bypass. This was following 3.5" of precipitation.

Stormwater Runoff

Fecal coliform bacteria and other pollutant concentrations in urban runoff can be as great or greater than those found in cropland, grazed pasture, and feedlot runoff (USEPA, 2001).

Presentation for 01-24-08 public meeting

Open Feedlots

The majority of the 684 livestock facilities are confined operations with little runoff to surface water. Still, there is a significant number of open feedlots, some of which have pollution problems and pose a risk of fecal contamination.

Open Feedlots with pollution problems

Land Application of Manure

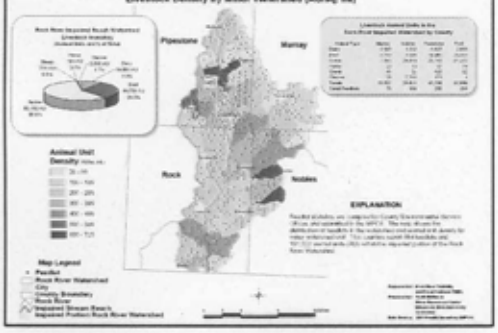
Land application of manure can be a major source of fecal contamination. The significance of this source depends on how the manure application is managed, the rate and time of application, observance of setbacks from surface water, timely incorporation to avoid major runoff following a rain, residue management, and other practices.

Injected Manure

Surface Applied Manure

Rock River Impaired Reach Watershed

Livestock Density by Minor Watershed (AU/sq. mi)



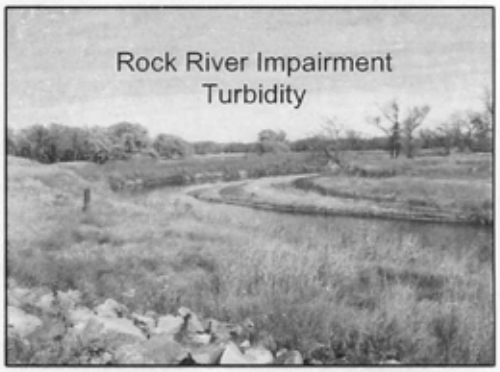
Cattle with Access to Streams

Cattle that have access to streams are another potential source of fecal coliform bacteria.

Wildlife & Pets

Wildlife and pets can also contribute to bacterial contamination (e.g. Canada geese, deer, wild turkeys, pheasants, as well as dogs and cats).

Rock River Impairment Turbidity



Presentation for 01-24-08 public meeting

Turbidity

Turbidity is closely associated with two other stream measurements, total suspended solids (TSS) and transparency. These measurements can be used with turbidity data is not available.

TSS is a measurement of the amount of sediment and organic matter present in a water sample.

Transparency is a visual assessment of how far down into the water you can see using a "transparency tube".

Why is it a concern?

High turbidity/TSS and low transparency levels limit light penetration and inhibit healthy plant growth on the stream bottom. It also makes it difficult for aquatic organisms to find food, can affect gill functions and elevated amounts of sediment can cause spawning habitat to become covered.

Surface Water Standards

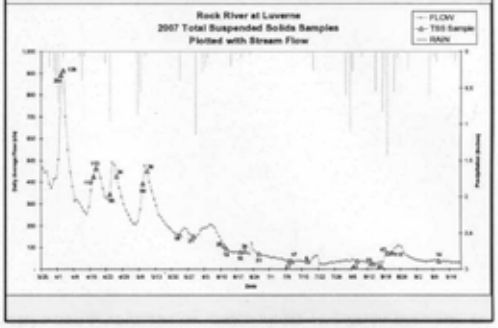
Turbidity – Not more than 10% of samples shall exceed 25 NTU's.

TSS – Not more than 10% of samples shall exceed 66 mg/L.

Transparency – Not more than 10% of samples shall be under 20 cm.

Where is the Rock River Impaired for Turbidity?

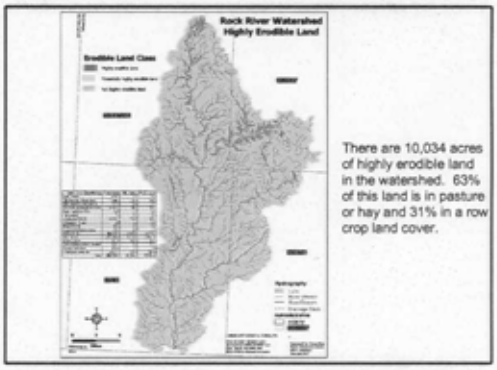
What levels of turbidity are found in the Rock River?



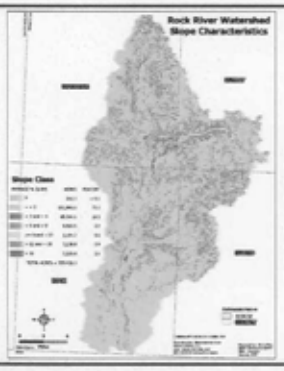
Presentation for 01-24-08 public meeting

Sources of turbidity in the Rock River Watershed

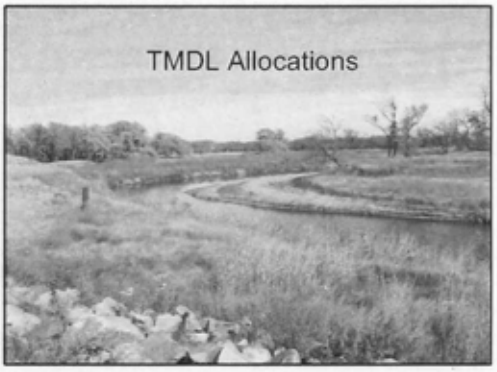
- Suspended silt from soil erosion after storms.
- Stream channel erosion.
- Suspended organic matter, such as bacteria, plankton, plant material, etc.



There are 10,034 acres of highly erodible land in the watershed. 63% of this land is in pasture or hay and 31% in a row crop land cover.



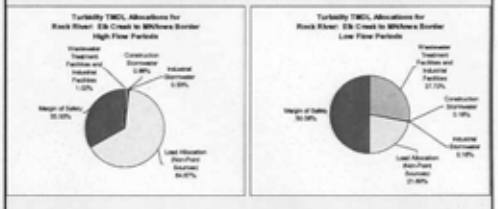
Slope percentage is often a indicator of where significant soil erosion is occurring in a watershed. Depending on land cover, slopes above 12% often deliver the highest sediment loads to streams.



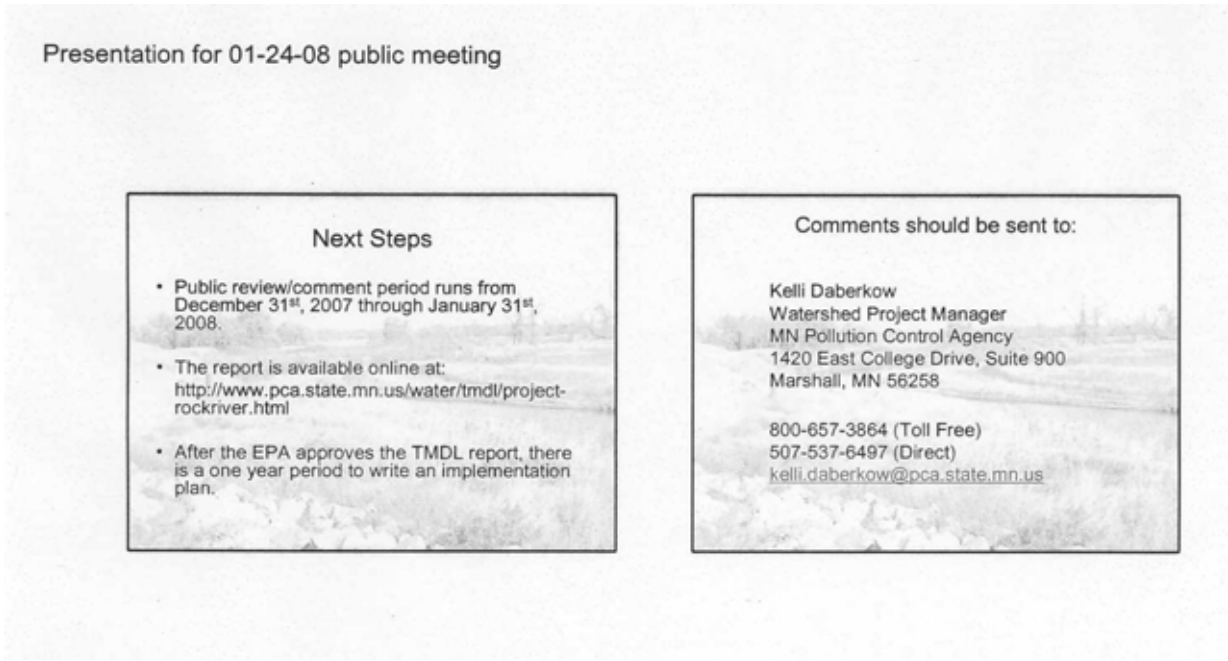
Example of a TMDL Allocation

High flow vs. Low flow
Fecal Coliform TMDL Allocations
for Rock River at MN/Iowa Border

High flow vs. Low flow
Turbidity TMDL Allocations
for Rock River at MN/Iowa Border



Presentation for 01-24-08 public meeting



Rock River TMDL Public Meeting Minutes
Thursday, January 24, 2008

Edgerton

- Open house at 2:30 pm, Meeting started at 3:00 pm. Meeting lasted 1 hour, 10 min.
- 57 people present and 10 committee members
- Meeting:
    - Kelli Daberkow, MPCA Project Manager, gave an overview of the TMDL process, history of the project, and discussed the public comment period options for expressing comments.
    - Scott Matteson, Minnesota State University-Mankato Water Resources Center (MSU-M WRC) gave a Powerpoint presentation on the Rock River TMDL Assessment.
    - Doug Bos, Rock County Land Management Office (RCLMO) talked about the Implementation Plan and Advisory Committee role.
    - Arlyn Gehrke, (RCLMO) updated the group about ongoing monitoring in the watershed.
    - Kyle Krier, Pipestone County; Wayne Smith, Nobles County; and Chris Hansen, Murray County talked about current programs offered and county updates.
- Questions and comments that were received:
    - You talked about getting funding; funding for what?
    - What time period does this sampling cover? Did you look at trends and changes since the 1960s, 1970s, etc?
    - You only sampled by Luverne?
    - Where is the bacteria coming from that is getting in the storm sewers?
    - Is the Rock impaired/polluted with other things besides fecal & turbidity?
    - Comment-we need to encourage livestock producers to be apart of this process.
    - Samples were only collected in 1 year?
    - Comment: There are not many pesticides in the aquifers around here.
    - Is there monitoring at landfills and old dumps? What does that show?
    - Comment: I live on Poplar Creek and DNR sampled there two years ago and they said the water was good quality.
    - How do we know that the Rock River itself is not causing the turbidity through bank slumping?
    - In Pipestone County, many producers are already doing nutrient management, what more is there to do?
    - About 10 years ago, there was a push to have septics all updated, that was unrealistic, there needs to be adequate time to have these things done.

Meeting concluded at 4:10 pm.

Luverne

- Open house at 6:30 pm, presentation started at 7:00 pm. Meeting lasted 1 hour, 40 min.
- 60 people present and 10 committee members.
- Meeting:
    - Kelli Daberkow, MPCA Project Manager, gave an overview of the TMDL process, history of the project, and discussed the public comment period options for expressing comments.

- Scott Matteson, Minnesota MSU-M WRC gave a Powerpoint presentation on the Rock River TMDL Assessment.
- Doug Bos, RCLMO talked about the Implementation Plan and Advisory Committee's role.
- Arlyn Gehrke, (RCLMO) updated the group about ongoing monitoring in the watershed.
- Doug Bos, RCLMO mentioned that Rock County received grant money to complete a stream bank stabilization on the Rock River.
- Ed Lenz, Nobles County, talked about the programs offered and water plan updates.

- Questions and comments that were received:
  - How many miles in the impaired reach?
  - Does fecal coliform reproduce?
  - How many samples have been collected?
  - Do you have the individual fecal coliform values for August?
  - Can 1 septic system cause a problem or does it take 10,000?
  - Where is fecal coliform bacteria coming from in stormwater?
  - If fecal coliform increases in hot temperatures, what does it do in cold weather?
  - In that research, how do you know fecal coliform is coming from manure?
  - Have you studied fecal coliform levels when manure is applied?
  - Is bacteria anaerobic or aerobic?
  - Comment: E. coli grows in normal conditions.
  - Has MPCA measured the fecal coliform levels in areas with increased wildlife?
  - Have the long-term fecal coliform trends been looked at in northern MN?
  - Is there any efforts to validate the volunteer transparency tube samples that caused the impairments?
  - How many total volunteer transparency tube readings were taken?
  - How do you determine that areas with more slope caused erosion?
  - What factor was used for natural background?
  - What is Iowa doing for TMDLs?
  - What are the standards for IA water quality?
  - What is the standard for SD?
  - How do you know that some of this turbidity is not naturally occurring?
  - You noted that there are no lakes in the watershed, would lakes make it better or worse?
  - Can you explain that higher fecal coliform from sediment getting stirred up?
  - Is there currently volunteer sampling taking place?
  - Do you think the fecal coliform samples that are in the thousands are lab errors?
  - Why can't you dump cement in the river?
  - On the slide with feedlots and fecal coliform, in NW MN there are not very many feedlots, but there is a fecal impairment, what is that from?
  - Rock County has updated the septics and feedlots, what is left?
  - Comment: concerns about assumptions in the report, non-rangeland CRP causes more turbidity.

Meeting concluded at 8:40 pm.

Edgerton, MN **Rock River TMDL Public meeting** 57 present +10 committee **January 24, 2008** 50 signed in

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
1	Al Vis	City of Chandler	Newsletter
2	Jeff Gunnink	City of Chandler	"
3	Jay Dienn	1750 St Hwy 30 Woodstock	
4	Marvin Funkenberg	P.O. Box 5 Edgerton MN	Mailed Letter by mail
5	Robert Schellhaas	Farmer	"
6	Jim Anderson	City of Woodstock	News Letter
7	Ron Beckering	City of Hatfield	News letter
8	Andrew Bennett	—	Newsletter
9	Anna Mae Fritz	Pipestone Co. Soil-Water Sup.	Herald Rev.
10	Henry Dyk	Edgerton city	Paper
11	Jerry Gunnink	Edgerton Enterprise	Paper
12	Chris Veldhuizen		
13	Randy Landhuis	Leota Sanitary Dist.	Newsletter
14	ALLEN VIS	former County Commissioner	Newspaper
15	Jerry Blankers		

Appendix C-47

Edgerton, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
16	Lou Anker		post card
17	Mike Kuhlke		
18	Randy Sprunk		
19	Ron Brands		
20	Ron Nykanp		
21	Dennis Smith	City of Edgerton	
22	Roger Tolsma	Chandler	
23	John H Zwier	Chandler	
24	Leon Kradt	Edgerton	
25	Lewis Kuntz	Edgerton	
26	Steve Howey	MPCA	
27	Dawn Schuld		Post card
28	Dan Schuld		
29			
30			

Edgerton, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
31	[illegible]	[illegible]	Letter
32	Ed O'[illegible]		
33	Al Brummel	none	letter
34	Bernard Baker	none	letter
35	Terry Pronk		
36	Ron Pronk	Lista Water	
37	Katherine Pekarek-Scott	MPCA	
38	Kim Beuckens	P&T River Project	MPCA
39	John Busman	Fenton Township / Murray County	Mailout
40	Lloyd K. Wassink	Osborne Township clerk	mail
41	Jack Brake	LAND OWNER —	MAIL —
42	Alvin Vander Tuig	Land owner	NEWSLETTER
43	Bill Post	Land owner	Letter
44	Jim Bloemendaal	Murray Co.	
45	Chris Hansen	Murray County	

Edgerton, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
46	John Bleyenberg		
47	Rodney Bleyenberg		
48	Floyd Prins		
49	Rod Sprik		
50	Al Langseth	Nobles County	
51	Mike VanderPol		
52	Stephanie	Pipestone Co	
53	Forrest Peterson		
54			
55			
56	COMMITTEE		
57	Lexyne Smith, Doug	Pos Justin Decker, Arlyn Gehrke, Chris Hinsen, Kelli Dabelstein	
58	Scott Mathison, Mark Vaninman, Ed Lenzi		
59			
60			

Luverne, MN **Rock River TMDL Public meeting** 60 present **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
1	Elmer Stoltenberg	farmer	
2	Norman Pahl	Farmer	
3	Roger Jackson	RIM Ground	
4	Louie Loget	Clinton Twp	
5	Eric Binford	Farmer	
6	Bryce Stoltenberg		
7	Don Reker	SWCD	
8	John Cell	City of Luverne	
9	Mike Feikema		
10	Chuck Feikema		
11	[illegible]	Kanaranzi Township	Letter
12	Dave Ahles		
13	Jim Wilken	Beaver Creek	
14	Eugene Sandager	Farmer	Paper
15	George W. Shurr	Family Landowner	Newspaper

Luverne, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
16	Pete Bakken	Rock Co. Farm Bureau	internet e-mail
17	Steve Top	Rock Corn Soybean	
18	Ken Haima	Rock Co. Comm.	
19	Chuck Van Wyhe	Rock Co Pheasants Forever	
20	David Breyfogle	self.	mailing.
21	Matt Hirsbrunner	Producer	task effort
22	Al Lais	City of Luverne	newsletter
23	Derick Feikema	Rock Co. Pork Producers	newsletter
24	Sharon Feikema		newsletter
25	[illegible]	Rock Co.	
26	[illegible]	Farmer	paper
27	David DeBoer	Producer	newsletter
28	Lori Ehde	Star Herald	paper
29	Harold Stutt		Paper
30	Roy Moeller	Farmer	

Luverne, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
31	Mary Tilstra	Land owner	Post card
32	Harold Tilstra	Land owner	
33	Richard Bakker	"	
34	Ron [illegible]	Rock Co	
35	Norlan Vis Stroeg	Land owner	
36	Shaun Feikema	Land Owner	
37	Julie Buntjer	Daily Globe	
38	Jeffrey R Ahrendt	Land Owner	
39	[illegible]	Land owner	
40	[illegible]	Consultant	
41	[illegible]	NRCS	
42	Steven Commerford	MSGA	Internet
43	Steve Sodeman	MCGA	
44	Jay Bakken	Producer - LNCA	
45	Lyle Rollag	Producer - MCGA	

Over →

NAME	GROUP	HOW DID YOU HEAR ABOUT THIS MEETING
Marilyn Bloemendaal	Landowner	Advertising
Daryl Hansburg	Landowner	Advertising

Luverne, MN **Rock River TMDL Public meeting** **January 24, 2008**

	Name	Agency/Group Representing	How did you hear about the meeting? i.e. radio, newsletter, newspaper, neighbor, etc.
46	Merlin Wyaia	Landowner/producer	Newspaper
47	TOM JENNINGS	St. Catherine Church	news "
48	ESTHER FRAKES	Luverne City Council	mtg/mailing/news
49	Stacey Gravenhof	Rock Nobles Cattlemen	Cattlemen
50	Grant Binford	Rock Nobles cattlemen	Cattlemen
51	Steve Honey	MPCA	County staff
52	Case Veikema		WASTO 1st one-Paper
53	Harold Vander Stoep		
54	Lowell Brown		Newsletter
55	Jerry Jensen		mailing
56	Kevin Barnhart	Rock County Pork Producers	Newsletter
57	Curt Bloemendaal		"
58	Jerry Smith		Newsletter
59	Chad Hoff		Pork board meeting
60	Brad Eberhardt		

How Do We Address the Issues of the Rock River?

In other words, how should the TMDL implementation plan be written to fix these impairments?

Turbidity- Measurement of water clarity. Caused by soil particles, organic materials, and algae. *50% of Rock County's water samples (1997-2006) exceeded the standard of 25 NTU.

Causes:

- Soil erosion from fields, construction sites, etc.
- Eroding stream banks and gullies.
- Decaying plants and animals.
- Urban runoff.
- Wastewater and septic system discharge

Possible Fixes:

- High residue crop farming, i.e. –no-till, ridge till, minimum till.
- Conservation practice structures, i.e. –sediment basins, terraces, waterways.
- Grass buffers along streams and watercourses.
- Rain Gardens and storm water retention ponds to absorb storm water in cities.
- Stream bank stabilization and diversion structures.

Fecal Coliform Bacteria- bacteria that passes through the fecal excrement of humans, livestock and wildlife. *Concentrations of fecal coliform were 2.5 times the acceptable limits during August and September each year.

Causes:

- Wildlife in streams.
- Non compliant septic systems.
- Uncontrolled feedlot runoff.
- Manure application during rainy periods
- Livestock watering in streams.
- Animal waste from parking lots and streets delivered via a storm water system.

Possible Fixes:

- Feedlot runoff control structures.
- Nutrient management and proper manure application.
- Pasture Management, i.e. –Steam crossings, rotational grazing, exclusion fencing.
- Repair septic systems.

What do we do now that impairments have been verified and loads allocated?

- Write a plan to address the impairments, Turbidity and Fecal Coliform, by using various fixes and BMPs.
- Utilize Two Committees
  - -Technical Committee-*existing*
  - -Advisory Committee-*looking for volunteers*
- Meet with both committees for input, use technical committee to draft an implementation plan, bring both committees back together to review and revise.

Request for Input on Implementation Plan—Advisory Committee

We need public input for writing the implementation plan. The implementation plan will be developed between February and August 2008. There will be 3-4 meetings during this timeframe to develop the plan. Your input is needed! Talk to Doug if you are interested or if you would prefer, fill out the Suggestion form and return to the Rock County SWCD/LMO by January 31?

Suggestions for Improving the Rock River

By addressing fecal coliform bacteria and turbidity

Coliform Bacteria-
Causes can include feedlot runoff, non-compliant septic systems, improper land application of manure, cattle in streams and wildlife.

Turbidity-
Causes can include soil erosion from fields, urban runoff from precipitation, and stream bank erosion.

Possible solutions & programs;

-High residue crop farming, i.e. -no-till, strip-till, minimum till.
-Conservation practice structures, i.e. –sediment basins, terraces, waterways.
-Grass buffers along streams and watercourses.
-Rain gardens and storm water retention ponds to absorb storm water in cities.
-Stream bank stabilization and diversion structures.
-Pasture management i.e. -stream crossings, rotational grazing, exclusion fencing.
-Feedlot runoff control structures.
-Nutrient management and planning for manure application.
-Septic replacement program.

Your input is valuable to developing a comprehensive implementation plan! Please list any ideas, choices and/or other suggestions that will decrease the bacteria and turbidity in the Rock River. (Please use the back of this form if needed.)

☐ Or, we do not wish to be part of the Implementation Plan process but would like to be on the mailing list for public meetings and notices.

Name: _____
Agency/Group representing: _____
Address: _____
_____

Please return to Rock County Land Management Office, 311 West Gabrielson Road, Ste 5 Luverne, MN 56156
Contact: Dawn Rae 507 283 8862

PRINT CLOSE

Rock County Online Edition
STAR HERALD

Thursday, January 31, 2008

Residents, officials meet to clean up Rock River pollution

Lori Ehde
Editor

Thursday, January 31, 2008

The Rock River is polluted, and some local livestock producers are afraid fingers are pointing at them.

That was the tone of a public meeting Thursday, Jan. 24, that drew nearly 70 people to the Rock County Human Services building to discuss the state's "impaired" label on the Rock River.

The point of Thursday's meeting was to provide information to the public and to seek public participation in order to garner state and federal dollars for river cleanup.

But many at the meeting seemed worried the end result will mean more government restrictions on their livestock operations, and some discussion questioned the validity of the river's "impaired" status.

"There's no one here who isn't interested in maintaining water quality," said livestock producer David Thier, Rushmore.

"But people aren't extremely interested in going out and making changes to their operations based on hunches."

State and county officials emphasized this needn't be the focus.

The point, they said, is that the river is polluted and Thursday's meeting is just one of the steps involved in accessing public funds to fix the problem.

Doug Bos, assistant director of Rock County's Land Management Office, tried to reassure livestock producers.

"This is meant to be a tool, not a hammer used to force people to change farm operations or practices," Bos said. "It's a tool to bring changes to the Rock River watershed."

By going through the state's process of addressing the problem, he said everyone stands to benefit.

"We could stick our heads in the sand and say we don't have a problem and we don't want to deal with it," Bos said.

He said other communities with impaired waters who took that approach ran into economic development roadblocks later on, because their wastewater load was maxed out.

Bos said an impaired water label on the community could affect things like an ethanol plant expansion or housing growth.

He said the good news is that there is money available to clean up the river, whatever those solutions might be.

"By going through this process, we have access to cost share programs, and that's why we're here and that's why I'm excited to see all of you here."

TMDL process

Every two years, the state of Minnesota publishes a list of "impaired" waters that do not meet water quality standards.

Once a river or lake is put on the impaired list, a Total Maximum Daily Load study is required.

The Rock River in 1994 was listed as impaired for fecal coliform (feces), based on data collected at monitoring site at the Minnesota-Iowa border. In 2002 it was found to be impaired for turbidity (cloudiness).

The Water Resources Center at Minnesota State University, Mankato, is working with local, state and federal agencies to identify sources of pollution and possible solutions.

MSU specialists are working under a grant from the U.S. Environmental Protection Agency to conduct the TMDL on the Rock River Watershed.

The actual portions of the river labeled "impaired" start north of Luverne through the Iowa border. Elk Creek, a major contributory to the river, is also impaired from Lismore to the Rock River south of Luverne.

The Rock River watershed includes 355,000 acres in portions of Pipestone, Murray, Rock and Nobles counties. It starts as far north as Holland and continues south into Iowa. It spreads roughly from Highway 75 east to Highway 91, the north-south road between Chandler and Adrian.

The entire watershed is being searched for possible pollution sources.

Once sources are determined, a plan will be developed to correct problems and implement measures to meet water quality standards.

It's these measures that have some people worried.

"I'm all for clean water and conservation, but I have huge concerns about the models that the state has used to determine what is 'impaired' and what isn't," said Eugene Sandager, Hills.

"Minnesota has always far exceeded federal standards, and I have even more concerns about what the solution might be. I want to make sure that what we're doing will actually be a solution."

Become part of process and reap rewards of grant money for solution

Bos said this is why it's important for local residents to become part of the TMDL process.

"It won't be an easy process," he said, "but it's about how to fix the problem with input from all those affected."

The technical committee already working on the project will work with an advisory committee of volunteers to draft an implementation plan to clean the river.

The implementation plan will be drafted between February and August, and additional public input will be sought at three to four meetings scheduled in that time.

Those interested in serving on the advisory committee or those interested in providing written comment on the process should contact the Rock County Land Management Office, 283-8862.

The first advisory committee meeting will be scheduled within a couple weeks.

Ultimately the goal of the project is to secure funding to implement practices to reduce fecal coliform and turbidity numbers.

Affected residents will have access to cost share funds and low interest loans to help restore water quality in the Rock River.

The Rock River TMDL report can be viewed at www.pca.state.mn.us/water/tmdl.

Related Links

THE Edgerton ENTERPRISE
EDGERTON, MINNESOTA VOLUME 126, NUMBER 50 JANUARY 30, 2008 SINGLE

Community members attended a public meeting last Thursday where information was presented on pollution problems in the Rock River. The meeting was held at the Edgerton Ambulance building.

What can be done to clean the Rock River?

By Jill Fennema

Last week Thursday, more than 60 concerned citizens attended a public meeting hosted by Rock River Technical Committee. The open house, which was held at the Edgerton Ambulance building, was a forum for giving the public information regarding the water quality of the Rock River.

In 1994, the Minnesota Pollution Control Agency (MPCA) determined that portions of the Rock River were impaired because the water contained too much fecal coliform bacteria. In 2002, turbidity was also added as one of the impairments.

What does that mean to you and I?

It means that the Rock River in southwestern Minnesota fails to meet the standard for human contact. Recreational contact, especially swimming, is not recommended when high concentrations of fecal coliform bacteria are present.

Edgerton's city water supply is sometimes affected by fecal coliform. Last summer, the city water had to be treated because of high levels of the bacteria. You may have noticed your water tasted like bleach after it was treated.

Fecal coliform is a bacteria found in the feces of all warm-blooded mammals. The bacteria itself is usually not harmful, but high concentrations can indicate the presence of other harmful bacteria, viruses, and parasites.

Turbidity is a measure of water clarity. A decrease in water clarity is caused by suspended and dissolved matter such as clay, silt, organic matter, and algae. Increased turbidity levels limit light penetration and inhibit healthy plant growth. According to the MPCA's website, high turbidity can make it difficult for aquatic organisms to find food, affect gill functions and cause spawning habitat to become covered.

The Rock River begins about 13 miles northeast of Pipestone and flows southward through Rock County and into Iowa. The impaired portion of the river is 6-7 miles from where it meets the Elk Creek south to the Minnesota/Iowa border. Elk Creek flows south from Luverne and joins the Rock River south of Luverne.

Continued on Page 5

Rock River watershed, continued

Continued from front

According to Kelli Daberkow, who works for the MPCA out of Marshall, sampling was conducted at a site on the border.

The TMDL report shows the Rock River watershed as being impaired because the sampling point on the border encompasses all of the area above that point. Edgerton, along with Hatfield, Trosky, Woodstock, Chandler, Leota, Lismore, Magnolia, and Luverne are all located within that watershed.

According to Scott Matteson, who is with the Minnesota State University-Mankato (MSUM) Water Resources Center and a consultant for the Rock River TMDL study, the effected area includes about 355,000 acres of the Rock River watershed located in portions of Murray, Nobles, Pipestone and Rock counties. There are about 11,000 people living in that area.

The Minnesota State University-Mankato (MSUM) Water Resources Center has prepared a Total Maximum Daily Load (TMDL) report documenting the impairments to the Rock River. A TMDL study calculates the maximum amount of a pollutant a water body can receive (known as the "loading capacity") without violating water quality standards. The TMDL identifies all the sources of pollutants causing impairments and lists the reductions necessary to meet the water quality standard.

According to the draft TMDL, the pollution of the Rock River is caused by a combination of human and animal sources.

Fecal coliform pollution can be caused by cattle that are allowed access to streams, improper application of manure to agricultural land, runoff from feedlots, illegally discharging septic systems, city storm water, and wildlife.

In general, the primary sources of pollution during wet conditions are related to livestock manure. During dry conditions, illegally discharging septic systems and wildlife are the primary pollutants, according to the TMDL report.

The Rock River Watershed Project estimates that there are about 1,100 non-compliant septic systems.

Sources of increased turbidity levels include erosion from fields or construction sites, urban runoff from precipitation, eroding streambanks, bottom feeders such as carp and excessive algal growth.

What can be done to repair the Rock River?

The Rock River Technical Committee is composed of individuals from the MSUM Water Resources Center, Rock, Nobles, Pipestone and Murray counties, the MPCA, the U.S. Fish and Wildlife Service and the Department of Natural Resources (DNR). They are working to identify the sources of pollution and find possible solutions.

Citizen participation is an important part of the TMDL process. The MPCA is seeking public input to help develop the implementation plan. Their ultimate goal is to gain federal funding to help clean up the river. Volunteers are needed to serve on an advisory committee. This committee will be instrumental in developing an implementation plan. The plan will provide a strategy for implementing practical management measures so that the Rock River can meet water quality standards.

The Rock County Land Management Office is leading the implementation plan effort, which will be developed between February and August 2008. There will be 3-4 regular meetings during that time to develop the plan.

Right now, the MPCA is seeking written comments on the draft TMDL report. You can view the draft a www.pca.state.mn.us/water/tmdl/project-rockriver.html

If you would like to comment or request more information, you must contact Kelli Daberkow at 1-800-657-3864 or email her at kelli.daberkow@pca.state.mn.us. Written comments on the draft TMDL Report must be sent to her by January 31 by 4:30 p.m. If you do not have access to email, comments can be faxed to her attention at 507-537-6001.

The MPCA will prepare responses to the public comments, make revisions to the draft TMDL Report, and submit it to the U.S. Environmental Protection Agency for approval.

For more information on the Rock River fecal coliform bacteria and turbidity TMDL project, contact: Kelli Daberkow, MPCA-Marshall, 507-537-6497

Scott Mattison, MSU-Mankato WRC 507-389-5338

Rock County Land Management Office, 507-283-8862 ext. 3.

Idyl Exhibit launches CD with concert in Luverne
See Page A8

WEEKEND
January 26 & 27, 2008
Worthington, Minnesota

Daily Globe

Work begins to improve Rock River watershed

Comments on TMDL accepted through Thursday

BY JULIE BUNTJER
DAILY GLOBE

LUVERNE — The results of a Total Maximum Daily Load (TMDL) assessment — identifying high levels of fecal coliform bacteria and poor water clarity in the Rock River — were presented to a standing room-only crowd of nearly 70 people in Luverne Thursday night.

Hosted by the Minnesota Pollution Control Agency (MPCA) and Mankato-based Water Resources Center (WRC), the event offered landowners within the Rock River watershed an opportunity to view data collected from the river during the past 10 years and ask questions not only about the testing, but about how to improve the river's water quality. A similar meeting was conducted Thursday afternoon in Edgerton, with nearly 60 people in attendance.

Kelli Daberkow, watershed project manager with MPCA's Marshall office, said the TMDL assessment is meant to be a tool for addressing water quality problems and is the first step in bringing financial resources to the watershed.

The watershed consists of 355,000 acres and spans portions of Rock, Nobles, Pipestone and Murray counties. Three segments of the river are deemed impaired because of turbidity (water clarity), while a fourth segment — stretching from the Minnesota-Iowa line north for about seven miles — showed high levels of fecal coliform bacteria, according to Scott Matteson, WRC project coordinator.

Sources of the bacteria include wildlife, livestock, birds and humans. The highest levels of the bacteria were recorded in tests conducted in August and September, said Matteson.

"As temperatures go up, the numbers for fecal coliforms bacteria go up," he said. Sediment levels and precipitation also have an impact on fecal coliform levels. Matteson said testing conducted on the

See RIVER, Page A8

RIVER: Volunteers sought

From Page A1

river within 36 hours of a 1-inch or greater rainfall caused spikes in the level of fecal coliform bacteria.

Coliform culprits

Matteson said more than 1,000 non-compliant septic systems are located within the watershed, and three communities — Trosky, Ash Creek and Kanaranzi — do not have sewer systems.

"Some homes and business in those communities may also have inadequate wastewater treatment systems," said Matteson, adding that the inadequate systems may be contributing to the high levels of fecal coliform bacteria in the Rock River.

Water treatment plants can also impact bacteria levels, and Matteson said plants in Hatfield, Edgerton and Holland have all had violations in recent years.

While storm water runoff can be a contributing factor, Matteson said that is likely a small factor because only 1 percent of the watershed is located within an urban setting. The two largest communities in the watershed are Luverne and Edgerton.

Drawing the most concern from those attending the meeting Thursday was the suggestion that feedlots and land applications of manure contribute to the high levels of fecal coliform bacteria.

Matteson said 694 feedlots are located within the Rock River Watershed, comprised of 69 percent swine, 30 percent beef and 9 percent dairy farms.

When one attendee asked Matteson if they could determine the fecal coliform bacteria was due to livestock or something else such as wildlife, he could not answer with certainty.

"I can't give you DNA fingerprinting — there's nothing like that out there," said Matteson. "(However), when we look across the state of Minnesota, we really don't have rivers in northern Minnesota (where wildlife is abundant) that are high in these fecal coliform bacteria."

The next step

Individuals have until Thursday to send written comments regarding the fecal coliform and turbidity TMDL assessment on the Rock River to the MPCA. After all of the responses have been collected, a report will be submitted to the Environmental Protection Agency for approval.

Meanwhile, Doug Bos with the Rock County Land Management Office, said volunteers are sought to serve on an advisory committee that will meet in the coming months to create an implementation plan for the watershed. Those wanting to serve on the committee should contact Bos at (507) 283-8862 by Thursday.

Bos has lists of possible fixes for both the poor water clarity and high levels of fecal coliform bacteria.

To correct the turbidity, Bos said farmers can practice high residue crop farming such as no-till, ridge-till or minimum-till; implement conservation practice structures including waterways, terraces and sediment basins; plant grass buffers along streams; and create stream bank stabilization and diversion structures. In communities, one avenue is to pursue rain gardens and storm water retention ponds.

Possible solutions Bos outlined for reducing the amount of fecal coliform bacteria in the river are encouraging feedlot runoff control structures, implementing nutrient management and proper manure application plans and practicing pasture management such as rotational grazing, creating stream crossings and constructing fencing. Repairing septic systems would also have a positive impact.

By implementing a variety of new programs and practices, the goal is to return bacteria levels in the Rock River to a level for safe recreational contact. Daberkow said Iowa is taking the same steps toward completing a TMDL on the Rock River in its state.

Once the TMDL implementation plan is complete, the hope is that Clean Water Legacy dollars can help fund new programming. Rock County Administrator Kyle Oldre assured those at the meeting that the staff and the technical expertise are in place to address the TMDL.

Gene "Pucky" Sandager of Jasper was one of the farmers in the audience not sold on the TMDL study.

"I have huge concerns about the models the state has used in determining what is impaired and what is not impaired," Sandager said. "As we look at bringing money into our county, I want to make darn sure we're going to fix it.

"Take it a little slow, make sure we're doing the right thing before we go off on a rampage," he added.

Minnesota Pollution Control Agency

MPCA Feedlot Program Update

Jan. 31, 2008

Please forward this to anyone who might be interested in this information. If you know of anyone who would like to be on this distribution list, please send us their e-mail address. If you have any questions, or would like to suggest a newsletter topic, please contact Forrest Peterson, MPCA Willmar office, 320-214-3789, forrest.peterson@pca.state.mn.us. Thanks.

To sign up for a free subscription to the MPCA's **Minnesota Environment** magazine, e-mail your name and postal mailing address to: becky.helgesen@state.mn.us or call 651-282-6244.

ARTICLES IN THIS ISSUE

ROCK RIVER TMDL MEETINGS WELL-ATTENDED; VOLUNTEERS NEEDED

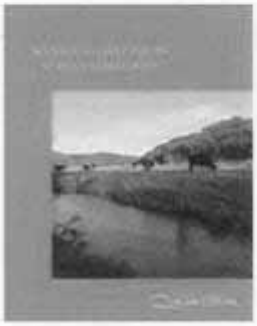
Kelli Daberkow of the MPCA presents an overview of the Rock River bacteria pollution study to livestock producers and others meeting at Edgerton Jan. 24.

Interest in the Rock River fecal coliform and turbidity TMDL (Total Maximum Daily Load) project drew a total of more than 100 people to meetings at Edgerton and Luverne on Jan. 24. The Minnesota Pollution Control Agency has placed two sections of the Rock River and one section of Elk Creek on the state's impaired waters list for exceeding water quality standards. Monitoring data show that these reaches fail to meet the standard for human contact due to excessive amounts of fecal coliform bacteria, and also the water quality standard for turbidity. Possible sources of bacteria include inadequate septic systems, unsewered residential areas, manure-contaminated runoff, and wildlife. Counties and agencies working on the project are seeking volunteers to participate in developing a plan to address the pollution sources. Interested persons may

contact Kelli Daberkow, MPCA-Marshall, 507-537-6497; or Rock County Land Management Office, 507-283-8862 ext. 3. For more information on impaired waters and TMDL projects on the Web, visit: http://www.pca.state.mn.us/ and click on "Impaired waters and TMDLs".

'BMPs for Pathogen Control in MMPs' – print copies available.

A print version is now available of the UM Extension Bulletin 08544 "Best Management Practices for Pathogen Control in Manure Management Systems". For copies contact Karen Barenz of the MPCA (651-296-7902). The publication is also available in electronic format at www.extension.umn.edu. Authored by Mindy Spiehs and Sagar Goyal, the bulletin is targeted to livestock producers and agricultural professionals in Minnesota and the upper Midwest. Contact Les Everett, 612-625-6751 evere003@umn.edu



'Managing Grazing in Stream Corridors' Booklet Available from MDA

"Managing Grazing in Stream Corridors" is a new publication from the Department of Agriculture providing practical information for farmers managing livestock in pastures containing small streams and flowing riparian areas. It tells how to shift from continuous to rotational grazing using a variety of paddock designs. The 31-page booklet is available from the department, and can be downloaded from its Web site at: www.mda.state.mn.us/news/default.htm. From the news, media, events, and publications go to Related Information, click on All MDA Publications A-Z, and scroll down to the document.

MDA Offers Workshops on Agriculture Emergency Response

The Department of Agriculture has scheduled workshops around the state to improve data and information systems in responding to agriculture industry emergencies arising from natural disasters, disease, or other situations such as a large-scale power failure, or crime. Counties are being sought to participate in a pilot program to compile geographic location information on feedlots. Local communication is a key factor in dealing with emergencies. Workshop dates and locations are: Feb. 5-Lanesboro, Feb. 6-North Mankato, Feb. 12-Willmar, Feb. 21-New Brighton, March 4-Grand Rapids, March 18-Thief River Falls, March 20-Marshall. For more information contact the Dairy & Food Inspection Division, 651-201-6027.

Manure Application Planning Workshop Feb. 27-28

A two-day Manure Application Planning workshop will be presented by UM Extension Feb. 27-28 at the Victorian Inn, Hutchinson. A full description and registration form is available at https://umconnect.umn.edu/mapworkshop , or http://www.manure.umn.edu under Workshops and Training. The target audience is technical staff from NRCS, SWCD, CFO, MPCA, Extension and private consultants needing information on manure management related to nitrogen, phosphorus and manure management planning. This course replaces the previous Manure Management Planning Workshop Series MMP I, MMP II and MMP III offered by UMN Extension Service. The first day addresses nutrients in manure and UM nutrient recommendations. The second day addresses manure management plans. For more information contact David Schmidt, 612-625-4262, schmi071@umn.edu

Blanchet New Regional Extension Educator in Manure Systems

Minnesota Pollution Control Agency February 2008

WaterFront Bulletin

Water Restoration and Protection: Headlines and Deadlines

WaterFront is a web-based bulletin featuring updates on impaired waters, watershed project funding and water restoration and protection activities underway throughout the state. *WaterFront* is published to share information with internal MPCA staff and external watershed partners.

In this issue

PROJECT UPDATES

Social Indicator Tools Help Measure Non-Point Outcomes

The U.S. Environmental Protection Agency has received increased congressional demand to report on the outcomes of Section 319 Grant spending for non-point source water quality projects. To that end, the Social Indicators Evaluation Framework Initiative (SI) was developed to examine elements that measure behavior change. Representatives from land grant universities in the U.S. EPA Region Five states created the Social Indicators Data Management and Analysis (SIDMA) system to help implement the SI framework.

SIDMA provides standardized surveys for urban and rural target groups. The surveys are conducted at designated points to help measure behavior change over the course of the project. Minnesota is currently pilot testing the surveys with local project partners including the City of Duluth, the National Resources Research Institute, the Minnesota Sea Grant College Fund and Fortin Consulting. Eventually, all projects in Minnesota that receive 319 Grant funding could be asked to capture pre and post project data using the SIDMA surveys. For more information contact Karlyn Eckman, Water Resources Center, U of M, at 612-625-6781, or Kimberly Nuckles, MPCA, at 651-297-2810.

Rock River TMDL Implementation Plan: Volunteers Needed

The Rock River is located in southwest Minnesota and drains into Iowa where it joins the Big Sioux River and eventually the Missouri River. The public notice for a Total Maximum Daily Load addressing fecal coliform and turbidity impairments was recently completed. The next steps include submitting the TMDL to the U.S. EPA for final approval and developing an implementation plan to address the identified pollutant sources. Counties and agencies working on the project are seeking volunteers to help develop the implementation plan. Interested parties may contact Kelli Daberkow, MPCA-Marshall, 507-537-6497; or Rock County Land Management Office, 507-283-8862 ext. 3.

Appendix D: Comment Letters and MPCA Responses

Daberkow, Kelli

From: Leslie A. Everett [evere003@umn.edu]
Sent: Thursday, January 03, 2008 3:53 PM
To: Daberkow, Kelli
Subject: Comments on the Draft Rock River TMDL

Categories: TMDL Comments

Kelli Daberkow
Minnesota Pollution Control Agency
1420 East College Drive, Suite 900
Marshall, Minnesota 56258

These are my formal comments on the Draft Fecal Coliform and Turbidity TMDL Assessment for the Rock River:

1. My interest
As a participant in the Stakeholder Advisory Committee of the Lake Pepin and Minnesota River TMDLs I have an interest in seeing that those TMDLs which are completed prior to our TMDL report set a useful precedent.

2. Action needed by MPCA
The section labeled "Implementation Activities" should be very much strengthened. As currently written it is simply a list of possible activities that could be used to improve water quality, and is no different from activities currently in place. There are no grounds for claiming "reasonable assurance" that the water quality will be brought within standards. What practices applied to what extent and where, will bring water quality within standards by when? What will be done in addition to what is already being done, since current activities are apparently insufficient to meet water quality standards? Will there be additional regulations? Additional funding?

3. Reasons supporting this position
A list of possible activities is not a plan. Without a plan, the TMDL does not meet the test of "reasonable assurance" that the water quality standards will be met.

Thanks for the opportunity to comment.

Les Everett
Water Resources Center
University of Minnesota
173 McNeal Hall
1985 Buford Ave
St. Paul, MN 55108
tel 612-625-6751
email evere003@umn.edu
fax 612-625-1263

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Les Everett
Water Resources Center
University of Minnesota
173 McNeal Hall
1985 Buford Ave
St. Paul, MN 55108

Dear Mr. Everett:

Thank you for your comments in your January 3, 2008 e-mail on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. We appreciate that your organization took the time to review the draft document. The responses to your comments are provided below in italic.

1. My interest
As a participant in the Stakeholder Advisory Committee of the Lake Pepin and Minnesota River TMDLs I have an interest in seeing that those TMDLs which are completed prior to our TMDL report set a useful precedent.

Response: As the Minnesota Pollution Control Agency (MPCA) has moved forward with each TMDL, the process has become more efficient and there have been lessons learned that will be applied to future TMDL projects. The MPCA staff working on TMDLs are keeping other MPCA staff informed of issues, concerns, and ideas to ensure stronger, well-rounded TMDLs.

2. Action needed by the MPCA
The section labeled "Implementation Activities" should be very much strengthened. As currently written it is simply a list of possible activities that could be used to improve water quality, and is no different from activities currently in place. There are no grounds for claiming "reasonable assurance" that the water quality will be brought within standards. What practices applied to what extent and where, will bring water quality within standards by when? What will be done in addition to what is already being done, since current activities are apparently insufficient to meet water quality standards? Will there be additional regulations? Additional funding?

Response: As stated in Section 11.0-Implementation Activities, it was the intent of the Report to outline potential management practices that will address the impairments. Following the public notice process, a stakeholder committee composed of landowners, feedlot operators, crop producers and homeowners will develop a draft implementation plan that will outline specific management practices to address fecal coliform and turbidity. This draft implementation plan will then be reviewed by a technical committee. The implementation plan will include the following items: identification of priorities, nonpoint source and point source management measures alternatives and analysis, objectives and tasks, roles and responsibilities of project partners, a timeline, evaluation methods, an adaptive management structure

and a budget. It should also be noted that the Environmental Protection Agency (EPA) does not require an implementation plan; the MPCA does require an implementation plan within a year of the EPA approval of the Report.

Regarding reasonable assurance, research has shown pollutant reductions with the implementation of management measures. This research, along with the current interest of landowners and operators, indicates a potential for success in implementing various programs. Finally, local governmental units are dedicated to improving the water resources in their respective areas; most have goals in county Water Plans and overall plans to protect the Rock River. Through this TMDL, increased regulatory control is not anticipated. TMDLs are not enforceable. National Pollutant Discharge Elimination System (NPDES) permits offer an opportunity for increasing regulatory control; but this is not needed in this TMDL assessment. All of the NPDES permittees are in compliance with the requirements specified in their permits. Local governments also have the authority to increase regulatory controls as part of larger implementation efforts. The MPCA is not aware of a push to do so on the part of the local government project partners.

3. Reasons supporting this position
A list of possible activities is not a plan. Without a plan, the TMDL does not meet the test of "reasonable assurance" that the water quality standards will be met.

Response: See comment number 2's response.

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

Daberkow, Kelli

From: Trojan, Mike
Sent: Monday, January 07, 2008 1:32 PM
To: Daberkow, Kelli
Subject: Rock River TMDL - stormwater comments

Kelli:

1. Summary Table 4 provides WLAs. Some of the headings are labeled "Individual LA". To be consistent, this should be changed to "Individual WLA".
2. Tables 8.11a, 8.11b and 8.11c provide summaries for allowable load. In some cases, construction or industrial stormwater have a WLA of 0. This means that under these flow conditions, construction and industrial stormwater discharges are not allowed. MPCA policy for setting stormwater WLAs (http://www.pca.state.mn.us/publications/wq-strm7-05.pdf) states construction and industrial stormwater can be given WLAs, but typically the preferred WLA is a de minimus WLA if the following two conditions are met.
   a. The contribution from construction or industrial stormwater is less than one percent of the total load; and
   b. The overall contribution for construction or industrial stormwater is difficult to quantify. Using an area approach to estimate loading is considered to meet the criteria of 'difficult to quantify'.

   Considering the above, I recommend that construction and industrial stormwater be given de minimus WLAs and the following language be inserted into the TMDL.
   - "Construction storm water activities are considered in compliance with provisions of the TMDL if they obtain a Construction General Permit under the NPDES program and properly select, install and maintain all BMPs required under the permit, or meet local construction stormwater requirements if they are more restrictive than requirements of the State General Permit."
   - "Industrial storm water activities are considered in compliance with provisions of the TMDL if they obtain an industrial stormwater general permit or General Sand and Gravel general permit (MNG49) under the NPDES program and properly select, install and maintain all BMPs required under the permit."

   If you disagree with this approach or if you feel this change is problematic at this point in the TMDL, perhaps we should discuss this, since a WLA of 0 is problematic.

Thanks.

Mike Trojan
Stormwater Section
Municipal Division

1/8/2008

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Mike Trojan
Minnesota Pollution Control Agency
Municipal Division
520 Lafayette Road North
St. Paul, MN 55155

Dear Mike:

Thank you for your comments in your January 3, 2008 email on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. I appreciate that you were able to review the draft document. The responses to your comments are provided below in italics.

1. Summary Table 4 provides WLAs. Some of the headings are labeled "Individual LA". To be consistent, this should be changed to "Individual WLA".

Response: Thank you for recognizing that typographical error. The heading has been changed to "Individual WLA".

2. Tables 8.11a, 8.11b and 8.11c provide summaries for allowable load. In some cases, construction or industrial stormwater have a WLA of 0. This means that under these flow conditions, construction and industrial stormwater discharges are not allowed. The MPCA policy for setting stormwater WLAs (http://www.pca.state.mn.us/publications/wq-strm7-05.pdf) states construction and industrial stormwater can be given WLAs, but typically the preferred WLA is a de minimus WLA if the following two conditions are met:

a. The contribution from construction or industrial stormwater is less than one percent of the total load; and
b. The overall contribution for construction or industrial stormwater is difficult to quantify. Using an area approach to estimate loading is considered to meet the criteria of 'difficult to quantify'.

Considering the above, I recommend that construction and industrial stormwater be given de minimus WLAs and the following language be inserted into the TMDL:

- "Construction storm water activities are considered in compliance with provisions of the TMDL if they obtain a Construction General Permit under the NPDES program and properly select, install and maintain all BMPs required under the permit, or meet local construction stormwater requirements if they are more restrictive than requirements of the State General Permit."

- "Industrial storm water activities are considered in compliance with provisions of the TMDL if they obtain an industrial stormwater general permit or General Sand and Gravel general permit (MNG49) under the NPDES program and properly select, install and maintain all BMPs required under the permit".

If you disagree with this approach or if you feel this change is problematic at this point in the TMDL, perhaps we should discuss this, since a WLA of 0 is problematic.

Response: Tables 8.11a-c show construction or industrial stormwater loads at zero, due to rounding of the numbers. The tables have been changed to show that the values are not zero. In addition, the suggested paragraphs have been added to page 50 in the Report.

Again, thank you, Mike, for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

Minnesota Farm Bureau Federation®

January 9, 2008

Kelli Daberkow
Minnesota Pollution Control Agency
1420 East College Drive, Suite 900
Marshall, Minnesota 56258

Dear Ms. Daberkow,

The Minnesota Farm Bureau Federation (Farm Bureau) appreciates the opportunity to comment on the Draft Rock River Fecal Coliform and Turbidity Total Maximum Daily Load (TMDL) Report. Agriculture is an important part of the Rock River watershed. Corn, soybeans, swine, beef, and dairy are the major commodities. Farm Bureau believes it is critical that MPCA work with individual producers, producer organizations, and agri-businesses in this watershed in implementing the objectives of this TMDL. We are pleased that MPCA is doing one TMDL for two impairments rather than separate TMDLs. This is a better use of time and resources.

Farm Bureau asks MPCA to consider the following points in the final development of this TMDL report and the subsequent implementation plan:

- **Agricultural Stakeholder Involvement**: Farm Bureau has been working to educate and engage farmers on impaired waters and the TMDL process in Minnesota. We believe it is imperative that agricultural stakeholders are not only made aware of this TMDL, but are an integral part of developing and approving the future implementation plan for the Rock River Fecal Coliform and Turbidity TMDL. Farm Bureau is willing to assist MPCA in engaging farmers during the implementation plan development stage of the TMDL. Farmers may be reluctant to participate because TMDL meetings are often overloaded with agency staff and environmental groups, creating an intimidating atmosphere. TMDL meetings, hearings, and comment periods should be scheduled at times that are conducive to farmer involvement (avoid the busy fall harvest and spring planting seasons). Simply notifying farmers of the meetings is not enough. On page vii, under public participation, it states "A group of local state and federal officials have been meeting on a bimonthly basis to receive TMDL updates and will lead the development of the implementation plan. There have been several new releases and newspaper articles about the project." In reviewing the Clean Water Legacy Act, it states "The agency shall seek broad and early public and stakeholder participation in scoping the activities necessary to develop a TMDL, including the scientific models, methods, and approaches to be used in TMDL development, and to implement restoration pursuant to section 114D.15, subdivision 7." We do not believe the agency has met the spirit of the law, especially the portion I have underlined above.

- **Research Needs**: Farm Bureau believes that there are significant research needs regarding the movement and survival of fecal coliform bacteria within watersheds and the accurate allocation of sources of turbidity. We also believe that there is a need for more DNA "fingerprinting" to properly determine all sources of fecal coliform. This process needs to be improved so we can properly allocate with reasonable certainty the background levels coming from wildlife, and the percentage coming from humans and pets, in order to make sure we aren't blaming livestock for more than their share. Farm Bureau believes it is important for MPCA to work with the Minnesota Department of Agriculture, the University of Minnesota, and producer organizations in undertaking future research projects to further investigate the fecal coliform and turbidity issues. This is of particular importance with respect to load reductions associated with specific BMPs. We need to be sure the BMPs we are recommending will actually have the desired effect. For example, incorporating manure is good for reducing odors, but do we know what effect that has on the transport of fecal coliform? Farm Bureau would like MPCA to incorporate a research component into the TMDL implementation plan. Because there are a number of fecal coliform and turbidity TMDLs that will be completed throughout MN over the next few years and funding for new research may be limited, we believe it is important that MPCA work with other watersheds in developing collaborative research strategies that will provide more insight on the intricacies of fecal coliform and turbidity impairments. Another possible research need could be the development of manure additives farmers could use

Physical Address: 3080 Eagandale Place, Eagan, MN 55121-2118 Mailing Address: P.O. Box 64370, St. Paul, MN 55164-0370
Phone: 651.905.2100 Fax: 651.905.2159 Email: info@fbmn.org www.fbmn.org

during land application to reduce fecal coliform. In general, Farm Bureau policy supports the use of repeatable, peer-reviewed, scientific data through all phases of the TMDL, including the allocation of natural/background levels of various impairments. On page 31, the TMDL report assumes only 4% delivery ratio of the fecal coliform for geese, a number which seems extremely low to us. It would seem logical that the vast majority of fecal matter produced by geese would be deposited directly in the river or on the adjacent shore land. Can we say with any degree of certainty that the TMDL has allocated the correct degree of impairment caused by wildlife and other background sources? A recent article in the Washington Post refers to a Virginia Tech study that found 50 percent of the bacteria in streams came from wildlife (compared to 16-24% from humans, and only 10% from livestock). Wildlife may produce a smaller percentage of bacteria; however, a much larger percentage of what they produce gets into the water, especially in the case of waterfowl. On page 25, the report says "Conditions when wildlife can be a significant source include isolated areas of high density and during low flow/drought conditions." Is this correlated to the spike in fecal coliform levels in August and September? There are more wildlife than pets (p. 26), yet pets are assigned 9 times as much fecal coliform production (p.28). That seems illogical. Stream bank erosion is an important contributing source of turbidity. What is the estimate for natural/background levels of turbidity from bank erosion? MPCA staff have stated that recent preliminary studies are suggesting as much as 40-80% of turbidity is caused by stream bank erosion, yet this report says "…it can be assumed that higher flows are causing turbid conditions from overland runoff" (p.55). A recent presentation at the Lake Pepin TMDL stakeholder group noted that the majority of sediment was coming from near channel sources, not from overland run-off. Perhaps the assumptions in this TMDL are incorrect.

- **Adaptive Management**: Farm Bureau encourages the use of adaptive management principles when new information (i.e. monitoring or research data) and new best management practices (BMPs) are available that will be helpful in updating and/or redirecting the load reduction goals and implementation steps for the TMDL. In addition, adaptive management should be used to incorporate future fecal coliform and turbidity impairments within the watershed into this TMDL over time, rather than constructing separate, new TMDLs. It is also vitally important that we consider the feasibility of attaining the water quality standards for each impaired water body. Is it realistic to expect a 60% reduction in fecal coliform and a 68% reduction in turbidity (especially since 40-80% of the turbidity is likely caused by streambank erosion)? There may be some cases where the reductions needed to meet water quality standards are not realistic. In those cases the TMDL plan should include a strategy for re-evaluating the designated use of those water bodies. We are concerned that many water bodies were arbitrarily assigned a designated use, which may be inappropriate.

- **Implementation Strategies**: Farm Bureau would encourage the Agency to develop an implementation plan that focuses voluntary adoption of agricultural BMPs and upgrading non-compliant septic systems to meet the goal of improved water quality. We encourage those involved in implementing this TMDL to seek funding to provide additional incentives for septic system upgrades, fencing for rotational grazing and BMP adoption in high priority areas. We encourage MPCA and other agencies involved in TMDL development to focus on voluntary, incentive-based BMPs for this and all TMDL projects. The implementation activities mentioned on p. 59-62 contain very little information on how any of these activities will be paid for.

Please consider Farm Bureau's comments in the development of the Rock River Fecal Coliform and Turbidity TMDL report. If you have any questions about Farm Bureau's comments, please contact Jeremy Geske or Chris Radatz at 651-905-2100.

Sincerely,

Kevin Paap

Kevin Paap
President
Minnesota Farm Bureau Federation

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Kevin Paap, President
Minnesota Farm Bureau Federation
PO Box 64370
St. Paul, MN 55164-0370

Dear Mr. Paap:

Thank you for your comments in the January 9, 2008 letter on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. The MPCA appreciates that your organization took the time to review the draft document. The responses to your comments are provided below in italics.

Agricultural Stakeholder Involvement: Farm Bureau has been working to educate and engage farmers on impaired waters and the TMDL process in Minnesota. We believe it is imperative that agricultural stakeholders are not only made aware of this TMDL, but are an integral part of developing and approving the future implementation plan for the Rock River Fecal Coliform and Turbidity TMDL. Farm Bureau is willing to assist MPCA in engaging farmers during the implementation plan development stage of the TMDL. Farmers may be reluctant to participate because TMDL meetings are often overloaded with agency staff and environmental groups, creating an intimidating atmosphere. TMDL meetings, hearings, and comment periods should be scheduled at times that are conducive to farmer involvement (avoid the busy fall harvest and spring planting seasons). Simply notifying farmers of the meetings is not enough. On page vii, under public participation, it states "A group of local, state, and federal officials have been meeting on a bimonthly basis to receive TMDL updates and will lead the development of the implementation plan. There have been several news releases and newspaper articles about the project". In reviewing the Clean Water Legacy Act, it states "The agency shall seek broad and early stakeholder participation in scoping the activities necessary to develop a TMDL including the scientific models, methods and approaches to be used in TMDL development and to implement restoration pursuant to section 114D.15 subdivision 7". We do not believe the agency has met the spirit of the law, especially the portion I have underlined above.

Response: Thank you for your efforts in engaging farmers in the TMDL process. TMDLs have many components and can affect many stakeholders. Farm Bureau's dedication to providing your constituents with information is helpful to the MPCA and TMDL projects. A process has been developed to guide the upcoming task of creating an implementation plan. The foundation of the implementation plan is to have buy-in from stakeholders in the Rock River watershed. Personalized letters requesting input and assistance were sent to agricultural groups, targeted individuals, and environmental groups in January 2008.

150 YEARS of STATEHOOD

In addition, at the public meetings held on January 24, 2008, input and sign up of interested individuals to serve on an Advisory Committee was requested. There were several individuals, mostly farmers that agreed to serve on the committee. If needed, we will contact you for additional stakeholders to serve on the Advisory Committee.

This TMDL project, from the beginning, has made several attempts to involve the public through information and education. Section 13.0-Public Participation in the Report outlines the activities and publications which the Technical Committee committed time and resources, in order to provide the public with information. Some specific examples include a public meeting at the beginning of the TMDL process to inform interested individuals, articles in the Worthington Daily Globe and the Rock County Star Herald newspapers, several newsletter articles providing updates, and a project website. The MPCA was also in direct contact with the Minnesota Department of Agriculture to assist with informing stakeholders. In each of these activities, contact information was available for those needing more information. With the development of the Advisory Committee, direct stakeholder involvement will increase.

Research Needs: Farm Bureau believes that there are significant research needs regarding the movement and survival of fecal coliform bacteria within watersheds and accurate location of sources of turbidity. We also believe that there is a need for more DNA "fingerprinting" to properly determine all sources of fecal coliform. This process needs to be improved so we can properly allocate with reasonable certainty the background levels coming from wildlife, and the percentage coming from humans and pets, in order to make sure we aren't blaming livestock for more than their share. Farm Bureau believes it is important for MPCA to work with the Minnesota Department of Agriculture, the University of Minnesota, and producer organizations in undertaking future research projects to further investigate the fecal coliform and turbidity issues. This is of particular importance with respect to load reductions associated with specific BMPs. We need to be sure the BMPs we are recommending will actually have the desired effect. For example, incorporating manure is good for reducing odor, but do we know what effect that has on the transport of fecal coliform? Farm Bureau would like MPCA to incorporate a research component into the TMDL implementation plan. Because there are a number of fecal coliform and turbidity TMDLs that will be completed throughout Minnesota over the next few years and funding for new research may be limited, we believe it is important that MPCA work with other watersheds in developing collaborative research strategies that will provide more insight on the intricacies of fecal coliform and turbidity impairments. Another possible research need could be the development of manure additives farmers could use during land application to reduce fecal coliform. In general, Farm Bureau policy supports the use of repeatable, peer-reviewed, scientific data through all phases of the TMDL, including the allocation of natural/background levels of various impairments. On page 31, the TMDL report assumes only 4% delivery ratio of the fecal coliform for geese, a number which seems extremely low to us. It would seem logical that the vast majority of fecal matter produced by geese would be directly deposit in the river or on the adjacent shore land. Can we say with any degree of certainty that the TMDL has allocated the correct degree of impairment caused by wildlife and other background sources? A recent article in the Washington Post refers to a Virginia Tech study that found 50 percent of bacteria in

streams came from wildlife (compared to 16-24 % from humans and only 10 percent from livestock). Wildlife may produce a smaller percentage of bacteria; however, a much larger percentage of what they produce gets into the water, especially in the case of waterfowl. On page 25, the report says "Conditions when wildlife can be a significant source include isolated areas of high density and during low flow/drought conditions". Is this correlated to the spike in fecal coliform levels in August and September? There is more wildlife than pets (p. 26) yet pets are assigned 9 times as much fecal coliform production (p. 28). That seems illogical. Stream bank erosion is an important contributing source of turbidity. What is the estimate for natural/background levels of turbidity from bank erosion? MPCA staff have stated that recent preliminary studies are suggesting as much as 40-80% of turbidity is caused be stream bank erosion, yet this report says "…it can be assumed that higher flows are causing turbid conditions from overland runoff" (p.55). A recent presentation at the Lake Pepin TMDL stakeholder group noted that the majority of sediment was coming from near channel sources, not from overland run-off. Perhaps the assumptions in the TMDL are incorrect.

Response: There has been and continues to be research in Minnesota and throughout the country regarding the sources, movement, and survival of bacteria in watersheds. DNA fingerprinting may prove to be important to the understanding of fecal coliform bacteria and research is needed. This technology can be very time consuming and expensive but there are studies across the United States where DNA fingerprinting has been used for TMDLs. Currently in Minnesota, the Minnesota Department of Agriculture and several partners are conducting a project where this technology is used. As results become available, they can be applied to the Rock River through adaptive management principles.

We generally prefer our local projects, with their limited resources, to focus on implementation efforts rather than research, although some investigative-type monitoring may be appropriate. Regarding the effectiveness of BMPs, there are research projects at the state and national level as well as through universities to understand potential load reductions and effectiveness rates. This information is used and applied to TMDLs where similar watershed characteristics are apparent.

For your concerns on the allocations for geese, the Report uses the best data and information available. It is estimated that there are approximately 2,500 resident geese on the Rock River. While most of their time may be spent in or adjacent to the water, the amount of bacteria produced compared to livestock is quite different. As shown in Table 5.4, there is an estimated delivery ratio of four percent which is the second highest percentage shown. The Virginia Tech study you mentioned was mostly a forested region with only 30 percent of its land use in agriculture as compared to 95 percent of the Rock River watershed classified as agricultural. In addition, one of the three watersheds in this study did not have any documented livestock.

The samples collected during August and September were during storm events. This points to overland runoff as a likely source of higher bacteria levels.

Table 5.2 shows pets produce at least one order of magnitude more fecal coliform bacteria than wildlife. When applying this to the Rock River watershed, there would need to be over six times the amount of wildlife to produce as much bacteria as pets do. The amount of fecal coliform produced by each animal is based upon the recommendations in the Environmental Protection Agency's (EPA) Protocol for Developing Pathogen TMDLs (January 2001).

The Report did not define the amount of the turbidity impairment that was coming from upland erosion versus in-stream dynamics. Time, cost, and available data were the determining factors on the source assessment portion of the Report. As shown in the Report, a GIS application and monitoring data was utilized to analyze and document likely sources. Review of other research indicates many factors such as drainage, soils, slope, land use, rainfall, and watershed size all influence the amount of soil movement and detachment. As research results from Lake Pepin and other projects become available, they can be applied to the Rock River and other watersheds through adaptive management principles.

Adaptive Management: Farm Bureau encourages the use of adaptive management principles when new information (i.e. monitoring or research data) and new best management practices (BMPs) are available that will be helpful in updating and/or redirecting the load reduction goals and implementation steps for the TMDL. In addition, adaptive management should be used to incorporate future fecal coliform impairments within the Rock River Watershed into this TMDL over time, rather than constructing separate, new TMDLs. It is also vitally important that we consider the feasibility of attaining the water quality standards for each impaired water body. Is it realistic to expect a 60% reduction in fecal coliform and a 68% reduction in turbidity (especially since 40-80% of the turbidity is likely caused by stream bank erosion)? There may be some cases where the reductions needed to meet water quality standards are not realistic. In those cases the TMDL plan should include a strategy for re-evaluating the designated use of those water bodies. We are concerned that many water bodies were arbitrarily assigned a designated use, which in some cases may be inappropriate.

Response: A part of the implementation plan will be adaptive management and using new research to define future actions. If different reaches within the Rock River watershed are added to the 303(d) List, the MPCA agrees that incorporating the future listings into this Report as an addendum is important.

In impaired watersheds in southern Minnesota, it is not uncommon to have greater than fifty percent reductions needed. While attainment of these reductions may not seem feasible under current land use conditions, we believe aggressive attempts to address the impairments and improve the water quality is essential. The MPCA does not intend to include a strategy to re-evaluate the designated use of this water body if the standards are not achieved, because the only available reclassification option, "Class 7-Limited Resource Value", would not provide adequate protection of this resource. The MPCA is considering adopting a Tiered Aquatic Life Uses (TALU) framework in which biological and physical data is used to assess the aquatic life use of Minnesota's streams. It is unknown at this point, how and if this would affect the Rock

River. A TALU adoption plan is currently being developed and stakeholder meetings are planned for later this year.

Implementation Strategies: Farm Bureau would encourage the Agency to develop an implementation plan that focuses voluntary adoption of agricultural BMPs and upgrading non-compliant septic systems to meet the goal of improved water quality. We encourage those involved in implementing this TMDL to seek funding to provide additional incentives for septic system updates, fencing for rotational grazing and BMP adoption in high priority areas. We encourage MPCA and other agencies involved in TMDL development to focus on voluntary, incentive-based BMPs for this and all TMDL projects. The implementation activities mentioned on p. 59-62 contain very little information on how any of these activities will be paid for.

Response: As mentioned in the Report and also in the Stakeholder Involvement response, an Advisory Committee will be established that will be instrumental in developing the implementation plan. Adoption of BMPs will most likely be a part of this plan. The implementation activities listed in Section 11.0-Implementation Activities in the Report are possible BMPs that can be effective in reducing bacteria and turbidity in the Rock River watershed. A part of the Implementation Plan development process is to evaluate all possible BMPs and through analysis and justification, determine the BMPs that will be most effective in the Rock River watershed.

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

BOARD OF COMMISSIONERS

315 Tenth Street
P.O. Box 757
Worthington, MN 56187-0757

Phone: 507-295-5201
Fax: 507-372-8363
commissioner@co.nobles.mn.us

"Improving the quality of life for individuals, families and communities by fostering a healthy economy and environment."

January 25, 2008

Kelli Daberkow
Minnesota Pollution Control Agency
1420 East College Drive, Suite 900
Marshall, MN 56258

Dear Ms Daberkow:

The Nobles County Board appreciates the opportunity to comment on the Draft Rock River Fecal Coliform and Turbidity Total Maximum Daily Load (TMDL) Report.

The Nobles County Board asks the MPCA to consider the facts involving the study. This suggests that more research is needed regarding the movement and survival of fecal coliform bacteria; that there is a need for DNA "fingerprinting" to properly determine the sources; that adaptive management principles and implementation strategies be applied.

Economically, agriculture/animal agriculture is a large part of the Rock River watershed. The Nobles County Board strongly believes MPCA needs to take into consideration the above facts when working with producers and agri-businesses when implementing the TMDL objectives within the watershed.

Please consider the County Board's comments when the above report is compiled. In the event you should have questions, you may contact me at 507-483-2833.

Sincerely,

Diane Thier

Diane Thier
County Board, Chair

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Commissioner Diane Thier
Nobles County Board of Commissioners
315 Tenth Street
PO Box 757
Worthington, MN 56187

Dear Commissioner Thier:

This letter is in response to your comments dated January 25, 2008 regarding the *Rock River Fecal Coliform and Turbidity Total Maximum Daily Load (TMDL) Report*. Thank you for taking the time to review the report and provide comments in a timely matter. The response to your comments is below in italics.

Comment: The Nobles County Board asks the MPCA to consider the facts involving the study. This suggests that more research is needed regarding the movement and survival of fecal coliform bacteria; that there is a need for DNA "fingerprinting" to properly determine the sources; that adaptive management principles and implementation strategies be applied.

Response: There has been and continues to be research in Minnesota and throughout the country regarding the sources, movement, and survival of bacteria in watersheds. DNA fingerprinting is an emerging technology that can be used for source identification of fecal coliform bacteria. This technology can be very time consuming and expensive but has been utilized in TMDLs. In Minnesota, the Minnesota Department of Agriculture and several partners are conducting a project where this technology is used. As results become available, they can be applied to the Rock River through adaptive management principles.

Following the Environmental Protection Agency's approval of the TMDL report, an implementation plan will be developed locally. The Rock County Land Management Office will be leading this effort. This plan will include strategies to clean up the Rock River, budget, timeline, adaptive management principles and roles and responsibilities of partners. Volunteers are needed to serve on an Advisory Committee to develop the implementation plan that will meet the needs of the Rock River watershed residents. If you know of individuals that may be interested, please feel free to contact me.

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Market Street Mall | 1420 E. College Drive | Suite 900 | Marshall, MN 56258 | 507-537-7146 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

MINNESOTA DEPARTMENT OF AGRICULTURE
FROM THE FARM TO YOUR FAMILY

January 29, 2008

Kelli Daberkow
MPCA
1420 E College Dr., Suite 900
Marshall, MN 56258

RE: Draft Fecal Coliform and Turbidity TMDL Assessment for the Rock River

Dear Ms. Daberkow:

The Minnesota Department of Agriculture (MDA) appreciates the opportunity to comment on the Draft Fecal Coliform and Turbidity TMDL Assessment for the Rock River. The MDA is interested in this TMDL report because a significant amount of land in the Rock River watershed is rural and in agricultural use.

The MDA believes the Minnesota Pollution Control Agency (MPCA) should consider the following comments in the development of this TMDL report and subsequent implementation plan:

General Comments

- Agricultural Stakeholder Involvement: The MDA has been working with the MPCA and other State Agencies to educate and engage agricultural stakeholders on the impaired waters and TMDL process in Minnesota. It is imperative that agricultural stakeholders be engaged in every facet of the TMDL process particularly in agricultural watersheds. This not only includes stakeholder meetings but should also include technical advisory committee meetings for both the TMDL study as well as the implementation plan. The MDA offers to assist TMDL project managers in engaging representatives from the agricultural community outside of state and local agencies.
- Adaptive Management: The MDA believes it is important for the MPCA and TMDL project managers to reopen TMDL studies when new information such as monitoring data, modeling efforts, or research findings would affect load allocations or implementation strategies cited in the original studies.
- Research Needs: The MDA believes that there are significant needs for researching the fate, transport, and resiliency of fecal coliform bacteria within agricultural watersheds. More research is also needed to refine sediment budgets in different physiographic regions of the state and to develop more effective best management practice (BMP) implementation strategies that are targeted to critical sources in the landscape. These research areas will have implications for both load allocation estimates as well as implementation plans to meet water quality goals.
- Agricultural Practices and Funding: The MDA AgBMP loan program will be a very good vehicle to provide funding for installing new practices that will help reduce fecal coliform levels from livestock production systems and from individual sewage treatment systems (ISTS). AgBMP loans can also be used to implement BMPs that will help the agricultural sector meet the load reduction goals of this TMDL. If you have any

questions about the AgBMP loan program and how it can be utilized to address TMDLs, pleas contact MDA staff person Dwight Wilcox at (651) 201-6618.

- Monitoring Plan: A more detailed monitoring plan should be developed recognizing that its implementation would be contingent on funding. For the fecal coliform bacteria impairment, more data is needed to determine the geographic scope of the impairment. This is also true of the turbidity impairments particularly for reaches in which transparency tube data was used for the listing process. For these sites, TSS and/or turbidity data using USEPA approved methods should be utilized. The monitoring plan should also address sample frequency with respect to the flow regimes and outline how BMP effectiveness will be evaluated.

The following are comments on specific sections of the TMDL report as indicated by the page number of the report.

Fecal Coliform

- (pg viii) The report states that the Rock River exceeded water quality standards during the months of August and September and that fecal coliform levels will need to be decreased up to 60% during these months. The time period should be specified, because page 32 states that data collected from 1985 through 1994 indicate that the stream was impaired in the months of May and September. How was the 60% reduction figure calculated as it is not referenced anywhere in the remainder of the report?
- (p13. Section 3.6) Were the minimum number of samples available for August and September from 1997 through 2006 to meet the definition of an exceedance (geometric mean based on a minimum of five monthly samples over previous ten years) to determine that it remains to be impaired for fecal coliform? This should be specified to avoid confusion. Table 2.1 states that the Rock River was listed in 1994; however, the report states that it was first listed as impaired in 1992.
- (p14. Section 3.8) Monitoring should be a high priority to determine the spatial extent of the impairment. Given that the reach drains a large watershed (>300,000 acres) and that fate and transport mechanisms for fecal coliform are not well documented, assumptions regarding the geographic scope of the impairment should be addressed with monitoring.
- (p16. Section 3.10) Figure 3.1 suggests that conditions improved from the 1960's to the 1970's though there were a relatively limited number of samples collected in the 1960's compared to the other decades. Were there any documented changes in sources of fecal coliform during that time period that would provide insight into sources that should be prioritized today?
- (p19. Figure 4.1.2) The distribution of unsewered communities and density of inadequately functioning septic systems suggests that these sources are not distributed uniformly throughout the watershed. The impaired reach is in close proximity to two unsewered communities and the highest density of inadequately functioning septic systems in the watershed. Again, this highlights the need to conduct further monitoring to characterize the extent and magnitude of the impairment.
- (p20. Section 4.2) The report cites that 58% of the manure is incorporated and 13% is field surface applied. What source of information is being used to make these distinctions? Are these percentages expressed as fecal matter produced?

- (p24. Section 4.2.3) How is the pastureland within 1000 ft of a waterway distributed throughout the watershed?
- (p29. Section 5.3) The report states that assumptions derived from the GEIS on Animal Agriculture were made for livestock. Which assumptions are being referenced? Is the report referring to assumptions made about manure application methods?
- (p31. Section 5.5) Table 5.5 is very informative. Can the target areas for fecal coliform reduction be further refined based on when the impairments are observed? For instance, recent data indicates that the impairments occur in August and September. Figure 2.5 shows that mean streamflow is lowest during these months. Wouldn't this suggest that pastures within 1000 ft. of waterways and inadequately treated wastewater would be sources of highest priority? If land application of manure was a primary source of the impairment via preferential flow mechanisms as stated on page 23, wouldn't the elevated concentrations be observed during months when a majority of the manure is applied and surface/subsurface flow is most prevalent? The studies cited suggest that the preferential flow pathways would result in a rapid transport of the bacteria. Furthermore, page 31 of the report states that the majority of bacterial loading to streams occurs during wet conditions; however, page 15 states that the highest fecal coliform bacteria concentrations are found in the summer and early fall. If the elevated concentrations observed in August and September are linked to the spring applications of manure due to the influence of stream temperature, this highlights the need for further research into the relationship between manure management practices and the origin, fate, and transport of fecal coliform from agricultural systems.
- (p39. Section 6.8) It may be helpful to construct a load duration curve to illustrate the data in Table 6.8. Including the water quality data would also assist in graphically representing when the exceedances occur.
- (p59. Section 11.0) Implementation practices should be specified for fecal coliform verses turbidity to avoid confusion. Practices intended for both impairments should be specified. There are a number of Technical Service Providers (TSP) that can assist producers with developing and implementing manure management plans. The Clean Water Legacy Act requires that a TMDL include a range of cost estimates for implementation of the TMDL.
- (p60. Section 11.4) The MDA has recently released a document on managing grazing in stream corridors that could also be referenced in this section: http://www.mda.state.mn.us/news/publications/animals/livestockproduction/grazing.pdf .

Turbidity

- (p43. Section 8.2) What is the justification for using the "Duration Curve" approach for the three turbidity TMDLs in this instance?
- (p45. Section 8.5) The report states that the watershed remains fairly uniform from headwaters to the monitoring station located at the Minnesota/Iowa border. Which variables are uniform? Is the report referring to land use?
- (p48. Section 8.9) The Elk Creek Watershed is significantly smaller than the other impaired reaches. How appropriate is it to use the flow conversion factor in this instance? It seems monitoring data is needed to quantify both the flow and sediment contribution to the data observed at the Rock River on the Minnesota/Iowa border.

- (p53. Section 9) Turbidity Assessment for the Rock River Watershed: This section utilizes the flow data collected at Luverne and the water quality data collected from the Minnesota/Iowa monitoring station. How appropriate is it to apply this data to the Elk River Watershed? Statements made in this section regarding the magnitude, timing, and sources of TSS may not be appropriate for the Elk River Watershed given the differences in watershed size and other potential sources of sediment. For instance, figure 9.4 indicates that slope is not uniformly distributed throughout the watershed with steeper areas in the headwaters. How are the other variables related to sediment sources distributed throughout the watershed such as crop residue levels, geomorphology, and soil erodibility (k factor)? The report states that this section details the most recent ten-year period of TSS loading but the graphs indicate that the data represents 1995-2006.
- (p54. Section 9.2) The reduction estimates for high flows are based on a very limited number of samples. The graph indicates that only 2 of the samples exceed the standard during the highest flows. Monitoring should be conducted to refine this estimate.
- (p54. Section 9.3) This is the first time the load reduction goal is stated (i.e. fewer than ten percent of samples may exceed 25 NTU). This needs to be presented more explicitly at the outset of the turbidity portion of the report. How will the standard be applied? Will this represent ten percent of the samples over the course of a year or flow regime?
- (p56. Section 9.3) The report states that overall, the major sources of excess turbidity in the Rock River during higher flows are streambank erosion and upland soil loss. The MPCA Turbidity TMDL Protocols suggest that projects should identify and evaluate factors contributing to streambank instability if streambank and channel contributions to turbidity are driving factors for elevated turbidity. Is an assessment of stream stability warranted in this instance to further refine the magnitude of sediment sources?

Please consider the MDA's comments in the development of the Final Rock River Fecal Coliform Bacteria and Turbidity TMDL report. If you have any questions about the MDA's comments, please contact Becky Balk at (651) 201-6369.

Sincerely,

Joe Martin
Assistant Commissioner
Minnesota Department of Agriculture

CC:
Jim Boerboom, MDA
Bob Patton, MDA
Becky Balk, MDA
Dan Stoddard, MDA
Adam Birr, MDA
Wayne Anderson, MPCA

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Joe Martin
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155

Dear Mr. Martin:

Thank you for your comments in the January 29, 2008 letter on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. The MPCA appreciates that your organization took the time to review the draft document. The responses to your comments are provided below in italics.

General Comments

- Agricultural Stakeholder Involvement: The MDA has been working with the MPCA and other State Agencies to educate and engage agricultural stakeholders on the impaired waters and TMDL process in Minnesota. It is imperative that agricultural stakeholders be engaged in every facet of the TMDL process particularly in agricultural watersheds. This not only includes stakeholder meetings but should also include technical advisory committee meetings for both the TMDL study as well as the implementation plan. The MDA offers to assist TMDL project managers in engaging representatives from the agricultural community outside of state and local agencies.

Response: Thank you for your efforts in engaging and educating stakeholders in the TMDL process. As you know, TMDLs have many components and can affect many stakeholders. The Minnesota Department of Agriculture's dedication to providing farmers, landowners, and operators with information is helpful to the MPCA and TMDL projects. It has been extremely helpful to have Becky Balk in contact with the MPCA and the project managers.

A process has been developed to guide the upcoming task of creating an implementation plan. The foundation of the implementation plan is to have buy-in from stakeholders in the Rock River watershed. Personalized letters requesting input and assistance were sent to agricultural groups, targeted individuals, and environmental groups in January 2008. In addition, at the public meetings held on January 24, 2008, input and sign-up of interested individuals to serve on an Advisory Committee was requested. There were several individuals, mostly farmers that agreed to serve on the committee. If needed, we will contact you for additional stakeholders to serve on the Advisory Committee.

Adaptive Management: The MDA believes it is important for the MPCA and TMDL project managers to reopen TMDL studies when new information such as monitoring data, modeling

efforts, or research findings would affect load allocations or implementation strategies cited in the original studies.
Response: Adaptive management principles will be used in the implementation of the TMDL as new information will most certainly become available. Additional monitoring and studies are a part of the implementation plan. If there are additional impairments listed, the Environmental Protection Agency (EPA) has suggested attaching new impairments/revisions to the existing TMDL Report. A public notice process will need to take place at that time.

- Research Needs: The MDA believes that there are significant needs for researching the fate, transport, and resiliency of fecal coliform bacteria within agricultural watersheds. More research is also needed to refine sediment budgets in different physiographic regions of the state and to develop more effective best management practice (BMP) implementation strategies that are targeted to critical sources in the landscape. These research areas will have implications for both load allocation estimates as well as implementation plans to meet water quality goals.
Response: The MPCA along with several local, state, and federal entities and academic institutions are researching the items addressed above. These research efforts will provide the MPCA and its partners with the best answers, techniques, and solutions. The MPCA strives to obtain the best possible data, information, and knowledge in order to produce defensible TMDLs, while operating under timelines that do not always align with the publication of research results.

- Agricultural Practices and Funding: The MDA AgBMP loan program will be a very good vehicle to provide funding for installing new practices that will help reduce fecal coliform levels from livestock production systems and from individual sewage treatment systems (ISTS). AgBMP loans can also be used to implement BMPs that will help the agricultural sector meet the load reduction goals of this TMDL. If you have any questions about the AgBMP loan program and how it can be utilized to address TMDLs, please contact MDA staff person Dwight Wilcox at (651) 201-6618.
Response: As mentioned in the Report and also in the response to the Agricultural Stakeholder Involvement comment, an Advisory Committee will be established that will be instrumental in the implementation plan development. Adoption of BMPs will most likely be a part of this plan. In the Implementation Plan development process, an evaluation of all possible BMPs, through analysis and justification, will determine the BMPs that will be most effective in the Rock River watershed. Thank you for providing the AgBMP loan option in the Clean Water Legacy Act to be used in these TMDL projects as they move into the implementation phase. Mr. Wilcox's contact information will be passed onto the local entity leading the implementation plan development.

- Monitoring Plan: A more detailed monitoring plan should be developed recognizing that its implementation would be contingent on funding. For the fecal coliform bacteria impairment, more data is needed to determine the geographic scope of the impairment. This is also true of the turbidity impairments particularly for reaches in which transparency tube data was used for the listing process. For these sites, TSS and/or turbidity data using USEPA approved methods should

be utilized. The monitoring plan should also address sample frequency with respect to the flow regimes and outline how BMP effectiveness will be evaluated.
Response: Monitoring is definitely an important part of TMDLs. In the Rock River watershed, the MPCA and the project consultant agreed there was adequate data available to develop the TMDL. There is more monitoring could be done and that is happening at several sites. Currently, Rock County Land Management Office (RCLMO), in partnership with the City of Luverne and Rock County Rural Water System are monitoring four sites along the Rock River to gather more information. In addition, RCLMO collected water samples for the MPCA at one site in Luverne. A detailed monitoring plan will be included in the implementation plan that will be used to track BMP effectiveness. In other watershed projects, data at a subwatershed level shows improvements in water quality. This is the goal for the Rock River watershed.

Regarding the comment on the use of transparency tube data, the MPCA has conducted analysis showing a strong relationship between transparency and turbidity. In addition, waters are not listed based exclusively on transparency data unless there is corroboration from a local or state water resource manager.
The following are comments on specific sections of the TMDL report as indicated by the page number of the report.

Fecal Coliform

- (pg viii) The report states that the Rock River exceeded water quality standards during the months of August and September and that fecal coliform levels will need to be decreased up to 60% during these months. The time period should be specified, because page 32 states that data collected from 1985 through 1994 indicate that the stream was impaired in the months of May and September. How was the 60% reduction figure calculated as it is not referenced anywhere in the remainder of the report?

Response: The information shown on page 32 references the dataset that was used to list the Rock River (data was collected between 1985 and 1994). The dataset showing the impairment in August and September was based on the most recently collected data from 1997-2006. The percent reduction was developed through a simple equation:

$$\frac{\text{current monthly geomean-water quality standard}}{\text{water quality standard}} = \text{percent reduction}$$

This was not added to the Report because the EPA does not approve reductions, only daily loads. The percent reduction is merely an easily understood concept and was included in the Executive Summary. Based on your comment, this will be added to Section 3.6 of the Report.

- (p13. Section 3.6) Were the minimum number of samples available for August and September from 1997 through 2006 to meet the definition of an exceedance (geometric mean based on a minimum of five monthly samples over previous ten years) to determine that it remains to be impaired for fecal coliform? This should be specified to avoid confusion. Table 2.1

states that the Rock River was listed in 1994; however, the report states that it was first listed as impaired in 1992.
Response: Each of the months from April through October had at least five observations to calculate a geomean. The numbers of samples for each month were as follows: April (6), May (5), June (5), July (5), August (8), September (6), and October (5). The number of samples collected per month will be added to Figure 3.6. The Rock River was listed for fecal coliform in 1994. The error on page 13 has been changed.

- (p14. Section 3.8) Monitoring should be a high priority to determine the spatial extent of the impairment. Given that the reach drains a large watershed (>300,000 acres) and that fate and transport mechanisms for fecal coliform are not well documented, assumptions regarding the geographic scope of the impairment should be addressed with monitoring.
Response: This is a valid point. As mentioned above, currently there is monitoring throughout the Rock River watershed that should be helpful in documenting trends, impairments, and addressing the geographic scope. There will also be additional monitoring in the implementation portion of this project.

- (p16. Section 3.10) Figure 3.1 suggests that conditions improved from the 1960's to the 1970's though there were a relatively limited number of samples collected in the 1960's compared to the other decades. Were there any documented changes in sources of fecal coliform during that time period that would provide insight into sources that should be prioritized today?
Response: Yes, there are documented changes in land use, but the changes provide minimal direction for prioritization for the watershed today. Overall, the largest changes have been related to the change in livestock and the implementation of the Clean Water Act (CWA). In 1972, through the CWA, the National Pollutant Discharge Elimination System/State Disposal System program was initiated and pollutant limits were established for communities with a wastewater treatment facility. There are only three communities in the watershed that remain unsewered. The changes in livestock relate to the increased confinement building set up and decreased grazing.

- (p19. Figure 4.1.2) The distribution of unsewered communities and density of inadequately functioning septic systems suggests that these sources are not distributed uniformly throughout the watershed. The impaired reach is in close proximity to two unsewered communities and the highest density of inadequately functioning septic systems in the watershed. Again, this highlights the need to conduct further monitoring to characterize the extent and magnitude of the impairment.
Response: There may be additional fecal coliform impairments in the watershed. However, the impaired reach is the only location in the watershed that was sampled for fecal coliform bacteria. Solely linking the unsewered communities and inadequately functioning septic systems to the impairment would be unjustified without collecting additional water quality data upstream. In addition, while the two unsewered communities are in close proximity to the impaired reach, these communities only have an estimated five inadequately functioning systems within the watershed boundary.

- (p20. Section 4.2) The report cites that 58% of the manure is incorporated and 13% is field surface applied. What source of information is being used to make these distinctions? Are these percentages expressed as fecal matter produced?
Response: These percentages were developed using the data and assumptions in Table 5.3. The assumptions were derived in part from the report titled, "Generic Environmental Impact Statement on Animal Agriculture" (Minnesota Environmental Quality Board) and updated based on input from the Technical Committee. Table 5.3 shows that following percentages of manure from different livestock types are surface applied: dairy - 37 percent; beef - 17.5 percent; swine - 5%, horse, sheep, etc. 49.5 percent; and chicken - 49.5 percent. As an example, multiplying 37 percent dairy manure by 14,081 dairy animal units (AU) equals 5,210 AU; performing this calculation for each of the five types of livestock and summing all the animal units will produce the total AU contributing to surface applied manure. Then by simple division of 19,183 AU contributing to surface applied manure/151,222 total AU equals 13 percent. These percentages are related to animal units not bacteria produced. The MPCA fully acknowledges that these are best estimates designed to help inform implementation efforts.

- (p24. Section 4.2.3) How is the pastureland within 1000 ft of a waterway distributed throughout the watershed?
Response: Based on GIS analysis, 79 percent of pasture land was within 1,000 feet of a stream, river or creek. The distribution was fairly uniform across the watershed.

- (p29. Section 5.3) The report states that assumptions derived from the GEIS on Animal Agriculture were made for livestock. Which assumptions are being referenced? Is the report referring to assumptions made about manure application methods?
Response: The assumptions used are shown in Table 5.3 for the entire livestock category, not just the manure application portion. For humans, pets, and wildlife, the assumptions are based on the population estimates. More information regarding the source of the estimates can be found in Sections 4.1, 4.3, and 4.4.

- (p31. Section 5.5) Table 5.5 is very informative. Can the target areas for fecal coliform reduction be further refined based on when the impairments are observed? For instance, recent data indicates that the impairments occur in August and September. Figure 2.5 shows that mean streamflow is lowest during these months. Wouldn't this suggest that pastures within 1000 ft. of waterways and inadequately treated wastewater would be sources of highest priority? If land application of manure was a primary source of the impairment via preferential flow mechanisms as stated on page 23, wouldn't the elevated concentrations be observed during months when a majority of the manure is applied and surface/subsurface flow is most prevalent? The studies cited suggest that the preferential flow pathways would result in a rapid transport of the bacteria. Furthermore, page 31 of the report states that the majority of bacterial loading to streams occurs during wet conditions; however, page 15 states that the highest fecal coliform bacteria concentrations are found in the summer and early fall. If the elevated concentrations observed in August and September are linked to the spring applications of manure due to the influence of

stream temperature, this highlights the need for further research into the relationship between manure management practices and the origin, fate, and transport of fecal coliform from agricultural systems.
Response: Yes, targeting the impairment will result in implementation dollars being spent appropriately. As shown in Table 5.5, the highest likely contributors of fecal coliform contamination during low flow periods was livestock within 1,000 feet of waterways and inadequately functioning septic systems. Low flow conditions were defined as periods when overland flow was not occurring. The majority of days (more than 90 percent) would be considered dry conditions. Thus, from a time perspective, applied manure is not considered a significant source of contamination during most of the year. However, during periods of overland runoff, based on volume of manure applied and delivery ratios, manure can be a significant source of bacterial contamination. Water quality data indicate that during wet periods, fecal coliform bacteria concentrations in the Rock River are an average of ten times higher than during dry conditions. It is possible that during runoff events river sediments are saturated with bacteria that may be expressed in the water during drier conditions.

There is significant seasonality of fecal coliform concentrations in the Rock River. While the highest concentrations of bacteria are observed during storm runoff, most samples were collected during dry conditions. The data indicate, as shown in Figure 3.9, fecal coliform bacteria concentrations rise throughout the summer when plotting non-storm event samples. Thus, on average, due to most of the data set being collected during dry conditions and the apparent relationship of temperature and bacterial concentration, the late summer months had the highest bacterial levels.

The extent of macropores as a transport mechanism of fecal coliform bacteria is not well understood in Minnesota. The Report references work conducted in Ohio that indicated macropores can be a pathway of bacteria to tile drainage. Macropores are listed in this report as one potential pathway, along with overland runoff and open tile intakes. The degree of significance of macropores is not speculated in the report, as additional studies are needed.

- (p39. Section 6.8) It may be helpful to construct a load duration curve to illustrate the data in Table 6.8. Including the water quality data would also assist in graphically representing when the exceedances occur.
Response: Thank you for the recommendation. A load duration curve will be added to the Report.

- (p59. Section 11.0) Implementation practices should be specified for fecal coliform verses turbidity to avoid confusion. Practices intended for both impairments should be specified. There are a number of Technical Service Providers (TSP) that can assist producers with developing and implementing manure management plans. The Clean Water Legacy Act requires that a TMDL include a range of cost estimates for implementation of the TMDL.

Response: The implementation strategies outlined in Section 11.0-Implementation Activities are simply possible options for BMPs that address one or both impairments. Information specifying the impairment has been added to the Report. A local Advisory Committee will be instrumental in determining future implementation activities that will address the impairments. Thank you for the information regarding the TSPs. There is definitely a need for these individuals in the implementation phase of these TMDL projects. Cost estimates were not included in the Report because the implementation plan development had not begun. It did not seem reasonable to include cost estimates when the BMPs that would be incorporated into the implementation plan were not defined.

- (p60. Section 11.4) The MDA has recently released a document on managing grazing in stream corridors that could also be referenced in this section: http://www.mda.state.mn.us/news/publications/animals/livestockproduction/grazing.pdf.
Response: Thank you for providing a link to this publication. It has been referenced in Section 11.4 and will be utilized in the implementation planning process.

Turbidity

- (p43. Section 8.2) What is the justification for using the "Duration Curve" approach for the three turbidity TMDLs in this instance?
Response: Justification for utilizing the duration curve approach is important and was not included in the Report. The following paragraph has been added to Section 8.2:

"There is a need to identify, evaluate, and select the type/method of analysis to be used in quantifying the source loads and allocations for TMDLs. The duration curve model was chosen for this project because of available data, watershed characteristics, minor urban influence, consultant experience and guidance and ease of application. Also, duration curves are well-tested, widely used, and acceptable to the EPA. The MPCA recommends using the simplest model that includes all the important processes affecting water quality as along as integrity is not compromised."

- (p45. Section 8.5) The report states that the watershed remains fairly uniform from headwaters to the monitoring station located at the Minnesota/Iowa border. Which variables are uniform? Is the report referring to land use?
Response: A visual assessment of the watershed from headwaters to the Minnesota/Iowa border reveals uniformity among climate, precipitation, land use, geology, soils, farming practices, human influence and disturbance. In review of GIS information, these factors correspond well with the visual assessment. The water quality data that was used in the Report and the data that was collected in 2007 shows similarities in results among sites sampled.

- (p48. Section 8.9) The Elk Creek Watershed is significantly smaller than the other impaired reaches. How appropriate is it to use the flow conversion factor in this instance? It seems monitoring data is needed to quantify both the flow and sediment contribution to the data observed at the Rock River on the Minnesota/Iowa border.

Response: Ideally, flow data would be available for all impaired reaches for the development of TMDL allocations. However, in situations when flow data is lacking, the MPCA recommends using flow conversion factors. The USGS also has established methodology for calculating flow in ungaged streams.

- (p53. Section 9) Turbidity Assessment for the Rock River Watershed: This section utilizes the flow data collected at Luverne and the water quality data collected from the Minnesota/Iowa monitoring station. How appropriate is it to apply this data to the Elk River Watershed? Statements made in this section regarding the magnitude, timing, and sources of TSS may not be appropriate for the Elk River Watershed given the differences in watershed size and other potential sources of sediment. For instance, figure 9.4 indicates that slope is not uniformly distributed throughout the watershed with steeper areas in the headwaters. How are the other variables related to sediment sources distributed throughout the watershed such as crop residue levels, geomorphology, and soil erodibility (k factor)? The report states that this section details the most recent ten-year period of TSS loading but the graphs indicate that the data represents 1995-2006.

Response: I am assuming your comment is referring to the Elk Creek subwatershed in my response. The information presented in Section 9.0-Turbidity Assessment for the Rock River Watershed encompasses the entire watershed. Elk Creek is a relatively small portion of the watershed (41,000 acres) and using best information available, knowledge from the Technical Committee, and similarity of results, the information was also applied to the Elk Creek watershed. Flow data is needed to calculate the allocations and the Rock River was unique that there were two USGS/DNR stream gages approximately 17 miles apart which were used for analyzing Elk Creek's contribution. Steeper slopes are located in the Elk Creek watershed but at a lesser degree. As mentioned above, the characteristics of Elk Creek are similar to the Rock River watershed. ArcMAP and a Revised Universal Soil Loss Equation calculation showed little to no difference in characteristics of the adjacent subwatersheds.

Figures 9.1, 9.2, 9.3a, 9.3b titles are misleading. The titles have been changed to show that water quality data used was collected from 1997-2006. The flow data used was from 1995-2006.

- (p54. Section 9.2) The reduction estimates for high flows are based on a very limited number of samples. The graph indicates that only 2 of the samples exceed the standard during the highest flows. Monitoring should be conducted to refine this estimate.

Response: Again, the Report utilized data that was available in the last ten years. There is ongoing monitoring in the watershed, which will aid in learning more about the complex TSS/turbidity relationship in the Rock River.

- (p54. Section 9.3) This is the first time the load reduction goal is stated (i.e. fewer than ten percent of samples may exceed 25 NTU). This needs to be presented more explicitly at the outset of the turbidity portion of the report. How will the standard be applied? Will this represent ten percent of the samples over the course of a year or flow regime?

Response: There are several places in the Report where water quality standards can be found. Page two of the Report contains the assessment criteria for both turbidity and fecal coliform bacteria and page 45 also discusses the water quality standards. As additional data is collected, an analysis of the data will indicate if the samples exceed the standard. The availability of a real-time gage site will be useful in collecting samples over a variety of flow regimes. Data used for assessment is reviewed in ten-year increments. Flow is not used as a factor.

- (p56. Section 9.3) The report states that overall, the major sources of excess turbidity in the Rock River during higher flows are streambank erosion and upland soil loss. The MPCA Turbidity TMDL Protocols suggest that projects should identify and evaluate factors contributing to streambank instability if streambank and channel contributions to turbidity are driving factors for elevated turbidity. Is an assessment of stream stability warranted in this instance to further refine the magnitude of sediment sources?

Response: Conducting a stream geomorphology assessment was beyond the scope and budget of this project. Such work, however, may still be appropriate in the implementation phase. The MPCA is working hard to identify appropriate geomorphic assessment methods for TMDL projects. Methods will be tested as part of a new Clean Water Legacy Act intensive watershed monitoring program where major watershed's physical, chemical, and biological conditions are assessed for all major watersheds in the state on a ten-year rotating cycle.

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Jim Boerboom, MDA
Bob Patton, MDA
Becky Balk, MDA
Dan Stoddard, MDA
Adam Birr, MDA
Wayne Anderson, MPCA
Randall Hukriede, MPCA

To

MS KELLI DABERKOW
MCPA -
507-537-6001

From
LARRY FENICLE
507-777-4156

Ms. Daberkow

Please accept and file this as my testimony on the Rock River Watershed issue

Thanks You
Larry Fenicle

1442 111th St.
Woodstock, MN 56186
January 30, 2008

Ms. Kelli Daberkow
MCPA
1420 East College Drive
Suite 900
Marshall, MN 56258

Re: Public Comment on TDML Report

To Whom It May Concern:

I have lived on my present farm in section 6 of Burke Township for the past 32 years and have seen flooding and water flow increase three-fold during this time. This problem has been caused by the agencies that handed out money and allowed the straightening, tiling, and draining of the watershed with no regard to water flow damage and no retention measures taken to keep the water flow at the previous levels. Now these same agencies are planning to hand out more money to take care of problems created by their previous oversights.

Also there are other pollution problems on the Rock River that have not been mentioned in the statements from your group in the impact studies.

1. The Holland Waste Water Treatment Plant at the head of the Rock River which I am aware of having overflowed with the water arriving on my farm five miles away within a few hours.

2. The closed Pipestone County Landfill which lies on the east bank of the Rock River in Section 31 of Pipestone County. It is common knowledge and has even been admitted to me by personnel at Minnesota Pollution Control that there are things buried in that landfill which shouldn't have been while at the same time they maintain that there is nothing leaking out of the landfill. However, their reports indicate there are toxic substances leaking into the ground water test wells located between the landfill and the Rock River. Some of these are exceeding the health risk limits set by the MN Dept of Health with no action being taken to clean up the contamination.

3. Contamination by hog confinement unit drainage and spreading of hog manure in the Rock River flood plane.

It is ironic to me that since 1993 and the closure of the Pipestone County Landfill, I have experienced increasing health problems and death loss in my cattle herd to the extent that we cannot stay in business any longer. We have also had hog pathogens isolated in our sick cattle during the past year which leads us to believe that the river is being polluted by these hog confinement units.

It would appear to me that the cow standing in the Rock River, in the picture used in your brochure, is in more danger from the Rock River than the Rock River is by pollution from her.

It is common knowledge that for centuries animals have roamed and used the river at their discretion with no damage to the eco-system until man intervened and started managing them.

I realize I have been critical of past management and the agencies involved here. However, I believe the solution and what should have been done long ago, but still can be done now, is to form a watershed district which has been done on many other waters. This watershed district would oversee, develop, and implement water retention, water flow, and pollution issues on the Rock River.

Sincerely,

Larry Penicle

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Larry Fenicle
1442 - 111th Street
Woodstock, MN 56186

Dear Mr. Fenicle:

Thank you for your comments in the January 30, 2008 letter on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. The MPCA appreciates that you took the time to provide comments on the project. The responses to your comments are provided below in italics.

I have lived in my present farm in section 6 of Burke Township for the past 32 years and have seen flooding and water flow increase three-fold during this time. This problem has been caused by the agencies that handed out money and allowed the straightening, tiling and draining of the watershed with no regard to water flow damage and no retention measures taken to keep the water flow at previous levels. Now these same agencies are planning to hand out more money to take care of problems created by their previous oversights.

Response: Research shows that the amount of water entering lakes and streams has remained constant, but the rate which water is getting to these water bodies has increased due to human activities such as tiling, development of drainage ditches, addition of impervious surfaces, and removal of wetlands. The agencies involved in the implementation plan are for oversight and technical guidance. The implementation plan that will be developed will be drafted and created by individuals that live in the Rock River watershed. These individuals will have the ability to design a plan that meets the needs of landowners, operators, farmers, homeowners, and all other stakeholders in the watershed as well as reducing the fecal coliform and turbidity in the Rock River.

Also there are other pollution problems in the Rock River that have not been mentioned in the statements from your group in the impact studies:

1. The Holland Waste Water Treatment Plant at the head of the Rock River which I am aware of having overflowed with the water arriving on my farm five miles away within a few hours.

Response: The Holland Wastewater Treatment Facility (WWTF) has a National Pollutant Discharge Elimination System/State Disposal System permit that dictates effluent limits and discharge amounts. According to MPCA records, the Holland WWTF has not had a reported bypass in the last five years. The facility is designed to have a continuous discharge to the Rock River. This is legal and necessary to properly maintain the facility. Wastewater samples are collected monthly and reported to the MPCA. The water discharged needs to be equal or exceed the quality of the Rock River.

2. The closed Pipestone County Landfill which lies on the east bank of the Rock River in Section 31 of Pipestone County. It is common knowledge, and has even been admitted to me by personnel at Minnesota Pollution Control Agency, that there are things buried in that landfill which shouldn't have been, while at the same time they maintain that there is nothing leaking out of the landfill. However, their reports

Market Street Mall | 1420 E. College Drive | Suite 900 | Marshall, MN 56258 | 507-537-7146 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

indicate that there are toxic substances leading into the groundwater test wells located beneath the landfill and the Rock River. Some of these are exceeding the health risk limits set by the MN Dept of Health with no action being taken to clean up the contamination.

Response: Although groundwater contamination is important, the goal of the Report was to address the fecal coliform and turbidity impairments in the Rock River. There has been and continues to be monitoring efforts near the Pipestone County Landfill. Water sampling has been conducted three times a year for the past 17 years. There are presently 12 monitoring wells sampled, as well as the Rock River at the upstream point and downstream points where it passes on the west side of the landfill, and the drainage ditch where it exits the landfill property on the west side. The samples are analyzed for volatile organic compounds (VOCs) in the spring, summer, and fall, and metals and inorganic compounds in the summer. The last time there was an exceedance of the Health Risk Limits (HRLs) for one of the VOCs was in 1994. There have been trace amounts detected since then but infrequently in the past 10 years. Arsenic was detected in one of the monitoring wells on the west side of the north fill area that was above the HRL, but in 2007, the sample was within the HRL. Because of these detections, MPCA collected samples from another monitoring well further west that had not been regularly sampled in the past. These two samples also showed arsenic present. However, because this well had not been sampled in years, it is hard to say if these are representative results or if there is sediment in the bottom of the well that is skewing the results. The Rock River samples do not show impacts from the landfill and the downstream samples are usually lower in metal concentrations than the upstream samples.

It is probably true that this landfill collected items that would not be allowed today. This was fairly common among many of the other landfills in the state. The MPCA's standard remedy is to install a cap over the landfill to keep precipitation from percolating through the waste and leaching out contaminants that may be present. The gas vents also improve the water because the VOCs will escape with the methane gas and not move down into the water table. It usually takes a few years after the cap is installed to see the full effects on the ground water. Given the low levels of metals and lack of VOCs in the water, it appears to be working.

3. Contamination by hog confinement unit drainage and spreading of hog manure in the Rock River flood plane.

Response: According to MPCA feedlot staff, most of the hog confinement units have measures in place to monitor confinement pit leaks. This includes a physical assessment that the permitted facilities are required to report annually. Manure application is a concern for the Rock River due to the amount of fecal coliform produced by livestock. This most likely will be addressed in the implementation plan process that is mentioned above.

It is ironic to me since 1993 and the closure of the Pipestone County Landfill, I have experienced increasing health problems and death loss in my cattle herd to the extent that we cannot stay in business any longer. We have also had hog pathogens isolated in our sick cattle during the past year which leads us to believe that the river is being polluted by these hog confinement units.

It would appear to me that the cow standing in the Rock River, in the picture used in your brochure, is in more danger from the Rock River than the Rock River is by pollution from her.

It is common knowledge that for centuries animals have roamed and used the river at their discretion with no damage to the ecosystem until man intervened and started managing them.

Response: I am sorry to hear of your loss and closure of your business. Your information regarding pathogens causing sick cattle reiterates the importance of this TMDL. For the Rock River, the water quality standard relates to human health risk through the aquatic recreation designated use. However, attainment of this standard would also improve conditions for livestock uses. Relative to your comment on hog manure, bacteria source tracking has been done in some TMDL projects across the United States. This technique is time consuming and expensive and was not applied in the Rock River. Research continues, however, and such techniques may eventually be applied in water monitoring throughout Minnesota to help more specifically identify sources of contamination.

I realize I have been critical of past management and the agencies involved here. However, I believe the solution and what should have been done long ago, but still can be done now, is to form a watershed district which has been done on many other waters. This watershed district would oversee, develop and implement water retention, water flow, and pollution issues in the Rock River.

Response: You are correct. A watershed district can be formed to address water quality and pollution issues. Watershed districts are formed at the request of local citizens, county boards, or cities by petitioning the Minnesota Board of Water and Soil Resources (BWSR) under the procedures set forth in the Watershed Act. Please contact BWSR for more information. It may be of interest to you that legislation is being considered at the state level to expand watershed district coverage. You may wish to contact your local legislators.

Again, thank you for commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

Minnesota Soybean Growers Association

151 Saint Andrews Court, Suite 710 • Mankato, MN 56001
Phone (507) 388-1635 • Fax (507) 388-6751
Toll-free (888) 896-9678

January 31, 2008

Ms. Kelli Daberkow
Minnesota Pollution Control Agency
1420 East College, Suite 900
Marshall, MN 56258

RE: Comments on the Fecal Coliform and Turbidity TMDL Assessment for Rock River.

Dear Ms. Daberkow,

The Minnesota Soybean Growers Association (MSGA) appreciates the opportunity to comment on the draft Fecal Coliform and Turbidity TMDL report. MSGA farmer leadership and staff have reviewed the report and attended an informational meeting held at Luverne, MN on January 24, 2008. MSGA is very concerned that the Rock River TMDL, and others that are following a similar model, are neither in line with the intent nor the spirit of the 2006 Clean Water Legacy Act (MN Statutes Chapter114D). MSGA has listed below a number of comments regarding the Rock River Fecal Coliform and Turbidity draft report, as well as our concerns regarding the process that was used in developing this TMDL. MSGA feels that all of the concerns raised are significant, and the order in which they are presented, should not be viewed as relative to their importance.

Stakeholder Involvement: MSGA is concerned that the Rock River TMDL process did not involve agricultural stakeholders to the extent indicated by the MN Clean Water Legacy Act - **MN Statutes Chapter114D.35 Subdivision 1 Public and stakeholder participation -** *Public agencies and private entities involved in the implementation of this chapter shall encourage participation by the public and stakeholders, including local citizens, landowners and managers, and public and private organizations, in the identification of impaired waters, in developing TMDL's and in planning, priority setting, and implementing restoration of impaired waters. In particular, the Pollution Control Agency shall make reasonable efforts to provide timely information to the public and to stakeholders about impaired waters that have been identified by the agency. The agency shall seek broad and early public and stakeholder participation in scoping the activities necessary to develop a TMDL, including the scientific models, methods, and approaches to be used in TMDL development, and to implement restoration pursuant to section 114D.15, subdivision 7.*

Active farmers in the watershed do not believe the groups involved with the TMDL process adequately represented agricultural stakeholders. Active farmers, general farm and commodity organizations and agricultural professionals are in the best position to represent agriculture as stakeholders. Involvement of agricultural stakeholders early in the process would probably have allowed for many of MSGA's other concerns to be addressed in the TMDL study.

Natural Background Levels: The draft TMDL failed to quantify and distinguish non-point source and natural background in the TMDL study for either Fecal Coliform or Turbidity. The Federal Clean Water Act provides a mechanism for accounting for natural background levels of a pollutant in the TMDL process. The MN Clean Water Legacy Act (**MN Statutes Chapter114D.15 Subdivision 10 Total maximum daily load or TMDL.**) defines 'natural background' and **requires** that an allocation for natural background levels be made. *"Total maximum daily load" or "TMDL" means a scientific study that contains a calculation of the*

maximum amount of a pollutant that may be introduced into a surface water and still ensure that applicable water quality standards for that water are restored and maintained. A TMDL also is the sum of the pollutant load allocations for all sources of the pollutant, including a wasteload allocation for point sources, a load allocation for nonpoint sources and natural background, an allocation for future growth of point and nonpoint sources, and a margin of safety to account for uncertainty about the relationship between pollutant loads and the quality of the receiving surface water. "Natural background" means characteristics of the water body resulting from the multiplicity of factors in nature, including climate and ecosystem dynamics, that affect the physical, chemical, or biological conditions in a water body, but does not include measurable and distinguishable pollution that is attributable to human activity or influence. A TMDL must take into account seasonal variations.

The Fecal Coliform and Turbidity loadings in the Rock River, which are beyond the "point source" wasteload contributions, should be classified as natural background. The TMDL study did not provide scientific evidence to indicate otherwise. If the natural background loadings are the cause for exceeding the Water Quality Standards, then the Standards or the Designated Use should be re-evaluated. It is not uncommon for natural background loadings to exceed Water Quality Standards. A study in Nebraska during the late 1970's (J. W. Doran, USDA 1979, attached) determined that more bacterial runoff occurred from an ungrazed control area than from pastureland. However, in both cases, runoff concentrations were substantially higher than water quality standards.

Lack of Quantity and Quality of Data: MSGA is concerned over the quantity and quality of the data that went into the determination of impairment for Fecal Coliform and Turbidity of the Rock River; and believes it should not have been listed as impaired for Fecal Coliform and Turbidity based on the limited amount of monitoring data that was available. There were only a total of 42 samples from one site, taken over a ten year period, which were analyzed for Fecal Coliform. This is an inadequate data set for making an impairment determination. The total Rock River Watershed is over 355,000 acres. MSGA believes it is neither scientifically valid nor appropriate to try to draw conclusions about source and seasonality of Fecal Coliform problems from this limited data set.

MSGA questions the validity of using a Transparency Tube for establishing turbidity impairments. Minnesota Water Quality Standards have not been established for a Transparency Tube. In addition, the data from the one site that has TSS and Turbidity (NTU) data is limited and not adequate for determination of impairment. MSGA also believes it is neither scientifically valid nor appropriate to draw conclusions about source and seasonality of Turbidity problems from this limited data set.

Fecal Coliform Linkage to Livestock: The draft Rock River Fecal Coliform TMDL determined that land application of manure was a primary source of loadings of the Rock River. This was done without scientific evidence supporting a linkage between land application of manure and fecal coliform levels that exceed standards. A study sited in the Blue Earth River Basin Fecal Coliform study by *Gerba et al. (1975)* reported survival times of fecal-associated bacteria in soils range from 2 to 4 months. Most manure in the Rock River watershed is applied in the fall, while; fecal counts peaked and exceeded standards in August and September, under the lowest flow conditions. In order for manure application to be the source of the summer bacteria levels, a survival time that is twice that which have been documented would need to occur. In addition, there would need to be a viable transport mechanism. No logical or documented transport mechanism was presented in the TMDL study.

Recent studies, some at the U of Minnesota (Michael J. Sadowsky, et al.), have identified E. Coli populations that naturally occur and multiply in surface waters. It is possible that the higher Fecal Coliform counts in August and September are simply naturally occurring populations which are multiplying under favorable environmental conditions.

The draft Rock River Fecal Coliform TMDL made several assumptions (**which were not validated**) in an effort to draw a conclusion that land application of manure is responsible for summertime violations of fecal

coliform standards. In our society today, being called a polluter has very negative connotations and implications. It is neither fair nor ethical to label livestock producers in the Rock River Watershed as polluters without substantial evidence to support those claims. **This conclusion should be removed from the TMDL report until valid scientific studies can determine otherwise.**

Account for Wildlife contributions: MSGA believes that the TMDL study did not adequately account for wildlife contributions to the high Fecal Coliform levels in the summertime. It would seem logical that wildlife could be a primary source of summertime spikes in Fecal Coliform bacteria levels. Wildlife is increasing due to increasing wildlife habitat as a result of conservation programs that encourage buffer strips along rivers, streams and drainage ditches. In addition, there is significant CRP, CREP and WRP acres in the watershed. Wildlife will tend to concentrate in areas where there is habitat and water during the summertime, when other sources of water dry up.

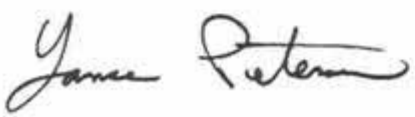
Wildlife in close proximity to water, during the summer months, is likely to increase the delivery ratio of wildlife sourced fecal bacteria dramatically. In addition to a much higher delivery ratio, there are many more species in the watershed than was sited in the draft TMDL report. **MSGA recommends development and use of DNA Finger Printing technologies to determine the actual source of summertime spikes in Fecal Coliform counts.** DNA Fingerprinting would help to quantify the levels of Fecal Coliform coming from wildlife, non-compliant septic systems and naturally occurring populations.

Water Quality Standards: Fecal Coliform or E Coli water quality standards need to be re-evaluated. Fecal Coliform and E Coli are surrogate tests for the presence of various other potential pathogenic organisms. Those pathogens may or may not be present when Fecal Coliform or E Coli are detected above standard levels. It would be more appropriate to develop standards for the individual pathogens of concern. This would help to focus resources on real problems and ensure that unnecessary costs are avoided.

Conclusion:
In summary, MSGA is concerned about the failure to follow the appropriate protocol, established by the MN Clean Water Legacy Act, in the Rock River Fecal Coliform and Turbidity TMDL study. This includes the failure to involve agricultural stakeholders in all parts of the TMDL process; the development of TMDL load allocations which did not properly account for natural background loadings; and, conclusions regarding the source of loadings which were not scientifically justified. In addition, MSGA believes the quantity and quality of monitoring data did not justify the initial listing for Fecal Coliform and Turbidity impairment.

The Minnesota Soybean Growers Association appreciates the opportunity to provide comments on the Draft Rock River Fecal Coliform and Turbidity TMDL report. If you have any questions, please contact me or the Minnesota Soybean office.

Sincerely,



Lance Peterson, President
Minnesota Soybean Growers Association
218-826-6759 (home)
218-731-1656 (cell)

CHEMICAL AND BACTERIOLOGICAL QUALITY OF RUNOFF FROM GRAZING LAND

J. W. Doran, J. S. Schepers, and N. P. Swanson
(USDA-SEA-AR)

Objective:

The environmental impact of runoff from agricultural lands is ill-defined and is one of the most difficult problems to study due to the diversity of nonpoint source pollution. An estimated one-third of the water pollutants in the United States comes from such nonpoint sources. Animal wastes are often cited as a major source of pollution since over one-third of the land area in the Continental United States is used for grazing livestock. These same lands receive an estimated 50% of all livestock wastes (USDA Agricultural Statistics, 1977). The impact of livestock-grazing operations on the quality of runoff waters depends on many management and climatological factors, and thus is not well defined. The objective of this study was to evaluate the impact of a seasonal cow-calf grazing operation in south central Nebraska on the chemical and bacteriological quality of rainfall runoff water.

Procedures:

Runoff was collected, either automatically or manually, from a 40-ha cow-calf pasture located at the Roman L. Hruska U. S. Meat Animal Research Center near Clay Center in south central Nebraska. Since the 1940s, the watershed has been planted to a combination of warm- and cool-season grasses and was instrumented in 1975. The average annual precipitation for the area is 66 cm. Animal stocking rate (45 to 55 cow-calf pairs) and management practices were typical of a controlled-grazing system. Fertilizer was applied each spring at 67 kg N/ha as ammonium nitrate. A small, fenced, ungrazed area of 0.11 ha was used to represent an ungrazed pasture. The control area was clipped periodically to maintain vegetative cover similar to the main pasture area. The principal soil types are Crete (Pachic Argiustolls) and Hastings (Udic Argiustolls) silt loams. Most of the watershed ranges in slope from 0 to 3%. Small areas adjacent to the grassed drainageway range in slope from 3 to 11%.

Results and Discussion:

Little runoff occurred in 1976 because the previous 2 years were relatively dry, and the rainfalls were numerous but small in intensity and amount. However, 1977 was a very wet year with several high-intensity rainfall events. Most of the runoff from the pasture area occurred during 1977.

Only Page 1 of report was included.

Minnesota Pollution Control Agency
Marshall Office

March 4, 2008

Mr. Lance Peterson, President
Minnesota Soybean Growers Association
151 Saint Andrews Court, Suite 710
Mankato, MN 56001

Dear Mr. Peterson:

Thank you for your comments in the January 31, 2008, letter on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment (Report)*. The MPCA appreciates that your organization took the time to review the draft document and attend the public meetings held on January 24, 2008. The responses to your comments are provided below.

Stakeholder Involvement: MSGA is concerned that the Rock River TMDL process did not involve agricultural stakeholders to the extent indicated by the MN Clean Water Legacy Act - **MN Statutes Chapter114D.35 Subdivision 1 Public and stakeholder participation -** *Public agencies and private entities involved in the implementation of this chapter shall encourage participation by the public and stakeholders, including local citizens, landowners and managers, and public and private organizations, in the identification of impaired waters, in developing TMDL's and in planning, priority setting, and implementing restoration of impaired waters. In particular, the Pollution Control Agency shall make reasonable efforts to provide timely information to the public and to stakeholders about impaired waters that have been identified by the agency. The agency shall seek broad and early public and stakeholder participation in scoping the activities necessary to develop a TMDL, including the scientific models, methods, and approaches to be used in TMDL development, and to implement restoration pursuant to section 114D.15, subdivision 7.*

Active farmers in the watershed do not believe the groups involved with the TMDL process adequately represented agricultural stakeholders. Active farmers, general farm and commodity organizations and agricultural professionals are in the best position to represent agriculture as stakeholders. Involvement of agricultural stakeholders early in the process would probably have allowed for many of MSGA's other concerns to be addressed in the TMDL study.

Response: *Minn. Statutes Chapter114D.35 Subdivision 1 contains several opportunities for the public to be involved with TMDL studies. The Rock River TMDL project, from the beginning, has made several attempts to involve the public through information and education. Section 13 - Public Participation of the Report outlines the activities and publications which the Technical Committee committed time and resources, in order to provide the public with information. In each of these public education activities, contact information was available for those needing*

150 YEARS of STATEHOOD

more information. Some specific examples include a public meeting at the beginning of the TMDL to inform interested individuals, articles in the Worthington Daily Globe and the Rock County Star Herald newspapers, several newsletter articles providing updates, and a project website. The MPCA was also in direct contact with the Minnesota Department of Agriculture to assist with informing stakeholders.

A process has been developed to guide the upcoming task of creating an implementation plan. The foundation of the implementation plan is to have buy-in from stakeholders in the Rock River watershed. Personalized letters requesting input and assistance were sent to agricultural groups, targeted individuals, and environmental groups in January 2008. In addition, at the public meetings held on January 24, 2008, input and sign-up of interested individuals to serve on an Advisory Committee was requested. There were several individuals, mostly farmers that agreed to serve on the committee.

Many of the members on the Technical Committee not only work for a local governmental agency or entity but also are landowners, livestock producers and homeowners that live in the Rock River watershed. They are aware of the issues in watershed from a standpoint of conservation and also as a resident. The Technical Committee is asking for assistance in developing the implementation plan to bring forward new ideas and input to develop a strong plan that represents all stakeholders.

Natural Background Levels: The draft TMDL failed to quantify and distinguish non-point source and natural background in the TMDL study for either Fecal Coliform or Turbidity. The Federal Clean Water Act provides a mechanism for accounting for natural background levels of a pollutant in the TMDL process. The MN Clean Water Legacy Act (**MN Statutes Chapter114D.15 Subdivision 10 Total maximum daily load or TMDL**) defines 'natural background' and **requires** that an allocation for natural background levels be made. *"Total maximum daily load" or "TMDL" means a scientific study that contains a calculation of the maximum amount of a pollutant that may be introduced into a surface water and still ensure that applicable water quality standards for that water are restored and maintained. A TMDL also is the sum of the pollutant load allocations for all sources of the pollutant, including a wasteload allocation for point sources, a load allocation for nonpoint sources and natural background, an allocation for future growth of point and nonpoint sources, and a margin of safety to account for uncertainty about the relationship between pollutant loads and the quality of the receiving surface water. "Natural background" means characteristics of the water body resulting from the multiplicity of factors in nature, including climate and ecosystem dynamics, that affect the physical, chemical, or biological conditions in a water body, but does not include measurable and distinguishable pollution that is attributable to human activity or influence. A TMDL must take into account seasonal variations.*

The Fecal Coliform and Turbidity loadings in the Rock River, which are beyond the "point source" wasteload contributions, should be classified as natural background. The TMDL study did not provide scientific evidence to indicate otherwise. If the natural background loadings are

the cause for exceeding the Water Quality Standards, then the Standards or the Designated Use should be re-evaluated. It is not uncommon for natural background loadings to exceed Water Quality Standards. A study in Nebraska during the late 1970's (J. W. Doran, USDA 1979, attached) determined that more bacterial runoff occurred from an ungrazed control area than from pastureland. However, in both cases, runoff concentrations were substantially higher than water quality standards.

Response: *Ultimately, the Report needs to be approved by the EPA. The EPA's requirements state: "EPA regulations require that a TMDL include load allocations, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonable accurate estimates to gross allotments. Where possible, load allocations should be described separately for natural background and nonpoint sources". For the Rock River TMDL, there was limited data available for documenting nonpoint sources versus natural background and therefore the load allocations were compiled into one gross allotment. It should also be noted that separating sources such as livestock, wildlife, and sewage discharge would put an amount (i.e. limit) that can be used for limiting the activities in the watershed such as feedlot expansion. The TMDL equation is the sum of allocations from wasteload and load, margin of safety and reserve capacity. The Report will present the allocations as recommended by and approved by EPA.*

We do not anticipate a change in the bacterial water quality standards based on our current understanding of natural background conditions. This is because the water quality standards for aquatic recreation are based on human health risk to exposure of pathogens. There are discussions of adopting a Tiered Aquatic Life Uses (TALU) framework in which biological and physical data is used to assess the aquatic life use of Minnesota's streams. It is unknown at this point, how and if this would affect the Rock River. A TALU adoption plan is currently being developed and stakeholder meetings are planned for later this year. This system would seem to allow for consideration of natural background conditions.

The report you mentioned indicates higher bacteria levels in the control but there are many unknowns, such as previous land use of the control, control location in the pasture, and potential contamination from overland runoff of the grazed pasture. This study would be more useful if some of these factors were known.

Lack of Quantity and Quality of Data: MSGA is concerned over the quantity and quality of the data that went into the determination of impairment for Fecal Coliform and Turbidity of the Rock River; and believes it should not have been listed as impaired for Fecal Coliform and Turbidity based on the limited amount of monitoring data that was available. There were only a total of 42 samples from one site, taken over a ten year period, which were analyzed for Fecal Coliform. This is an inadequate data set for making an impairment determination. The total Rock River Watershed is over 355,000 acres. MSGA believes it is neither scientifically valid nor appropriate to try to draw conclusions about source and seasonality of Fecal Coliform problems from this limited data set.

MSGA questions the validity of using a Transparency Tube for establishing turbidity impairments. Minnesota Water Quality Standards have not been established for a Transparency Tube. In addition, the data from the one site that has TSS and Turbidity (NTU) data is limited and not adequate for determination of impairment. MSGA also believes it is neither scientifically valid nor appropriate to draw conclusions about source and seasonality of Turbidity problems from this limited data set.

Response: *It is the responsibility of the MPCA to monitor Minnesota's rivers and lakes, to assess water quality, and to report the results to the public. The MPCA has established guidelines and criteria to assess Minnesota's waters for several water quality parameters. It serves to guide the interpretation and application of current water quality standards. This guidance can be found at http://www.pca.state.mn.us/publications/wq-iw1-04.pdf.*

The Rock River and Elk Creek were listed because the data indicated impairments to its designated uses. Additional monitoring conducted in 2007 shows that impairments still exist. The Report summarized and used the most recent data available. Regarding the comment on the use of transparency tube data, the MPCA has conducted analysis showing a strong relationship between transparency and turbidity. In addition, waters are not listed based exclusively on transparency data unless there is corroboration from a local or state water resource manager. If there are concerns regarding assessment procedures, please contact Louise Hotka, MPCA, 651-296-7223 for further information.

Fecal Coliform Linkage to Livestock: The draft Rock River Fecal Coliform TMDL determined that land application of manure was a primary source of loadings of the Rock River. This was done without scientific evidence supporting a linkage between land application of manure and fecal coliform levels that exceed standards. A study sited in the Blue Earth River Basin Fecal Coliform study by *Gerba et al. (1975)* reported survival times of fecal-associated bacteria in soils range from 2 to 4 months. Most manure in the Rock River watershed is applied in the fall, while; fecal counts peaked and exceeded standards in August and September, under the lowest flow conditions. In order for manure application to be the source of the summer bacteria levels, a survival time that is twice that which have been documented would need to occur. In addition, there would need to be a viable transport mechanism. No logical or documented transport mechanism was presented in the TMDL study.

Recent studies, some at the U of Minnesota (Michael J. Sadowsky, et al.), have identified E. Coli populations that naturally occur and multiply in surface waters. It is possible that the higher Fecal Coliform counts in August and September are simply naturally occurring populations which are multiplying under favorable environmental conditions.

The draft Rock River Fecal Coliform TMDL made several assumptions **(which were not validated)** in an effort to draw a conclusion that land application of manure is responsible for summertime violations of fecal coliform standards. In our society today, being called a polluter

has very negative connotations and implications. It is neither fair nor ethical to label livestock producers in the Rock River Watershed as polluters without substantial evidence to support those claims. **This conclusion should be removed from the TMDL report until valid scientific studies can determine otherwise.**

Response: *It was not indicated in the Report that manure application was the primary source of fecal coliform contamination nor did it label livestock producers as polluters. Improper manure application is a potential source along with wildlife, pets, and illegal septic discharge. The research and methods used are referenced in the Report and have also been used in other EPA-approved TMDLs.*

As shown in Table 5.5, the likely highest contributors of fecal coliform contamination during low flow periods are livestock within 1,000 feet of waterways and inadequately functioning septic systems. Low flow conditions were defined as periods when overland flow was not occurring. The majority of days (more than 90 percent) would be considered dry conditions. Thus, from a time perspective, applied manure is not considered a significant source of contamination during most of the year. However, during periods of overland runoff, based on volume of manure applied and delivery ratios, manure can be a significant source of bacterial contamination. Water quality data indicate that during wet periods, fecal coliform bacteria concentrations in the Rock River are an average of ten times higher than during dry conditions.

There is a significant seasonality of fecal coliform concentrations in the Rock River. While the highest concentrations of bacteria are observed during storm runoff, most samples were collected during dry conditions. The data indicate, as shown in Figure 3.9, fecal coliform bacteria concentrations rise throughout the summer when plotting non-storm event samples. Thus, on average, due to most of the data set being collected during dry conditions and the apparent relationship of temperature and bacterial concentration, the late summer months had the highest bacterial levels.

It is correct that bacteria under certain conditions can multiply/reproduce. It is unknown at this time the extent to which this is occurring in the Rock River. Ongoing research across Minnesota and the United States can hopefully provide some answers in the future.

Account for Wildlife contributions: MSGA believes that the TMDL study did not adequately account for wildlife contributions to the high Fecal Coliform levels in the summertime. It would seem logical that wildlife could be a primary source of summertime spikes in Fecal Coliform bacteria levels. Wildlife is increasing due to increasing wildlife habitat as a result of conservation programs that encourage buffer strips along rivers, streams and drainage ditches. In addition, there is significant CRP, CREP and WRP acres in the watershed. Wildlife will tend to concentrate in areas where there is habitat and water during the summertime when other sources of water dry up.

Wildlife in close proximity to water, during the summer months, is likely to increase the delivery ratio of wildlife sourced fecal bacteria dramatically. In addition to a much higher delivery ratio, there are many more species in the watershed than was sited in the draft TMDL report. **MSGA recommends development and use of DNA Fingerprinting technologies to determine the actual source of summertime spikes in Fecal Coliform counts.** DNA Fingerprinting would help to quantify the levels of Fecal Coliform coming from wildlife, non-compliant septic systems and naturally occurring populations.

Response: *The Report utilized the best data and information available. While most wildlife spends time adjacent to, or in the water, the amount of bacteria produced compared to livestock is less. As shown in Table 5.4, there is an estimated delivery ratio of four percent for wildlife which is the second highest percentage shown. The Report did account for wildlife other than deer, turkeys, pheasants and geese by using the same amount of contribution as the deer population.*

There has been and continues to be research in Minnesota and throughout the country regarding the sources, movement, and survival of bacteria in watersheds. DNA fingerprinting may prove to be important to the understanding of fecal coliform bacteria and research is needed to gain this information. This technology can be very time consuming and expensive but there are studies across the United States where DNA fingerprinting has been used for TMDLs. Currently in Minnesota, the Minnesota Department of Agriculture and several partners are conducting a project where this technology is used. As results become available, they can be applied to the Rock River through adaptive management principles. We generally prefer our local projects, with their limited resources, to focus on implementation efforts rather than research, although some investigative-type monitoring may be appropriate.

Water Quality Standards: Fecal Coliform or E. Coli water quality standards need to be re-evaluated. Fecal Coliform and E. Coli are surrogate tests for the presence of various other potential pathogenic organisms. Those pathogens may or may not be present when Fecal Coliform or E. Coli are detected above standard levels. It would be more appropriate to develop standards for the individual pathogens of concern. This would help to focus resources on real problems and ensure that unnecessary costs are avoided.

Response: *Thank you for your concerns regarding the water quality standards. Water quality standards are fundamental tools that help protect Minnesota's abundant and valuable surface and ground water resources. According to the EPA's Protocol for Developing Pathogen TMDLs (January 2001), pathogenic organisms are generally difficult to identify and to isolate as well as being highly varied in characteristic and type. Fecal Coliform and E. coli are used as indicator organisms since they are more easily measured and sampled and are associated with pathogens that are transmitted by fecal contamination. If you have concerns regarding water quality standards, please contact Mark Tomasek, MPCA, 651-296-7241 for further information.*

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html

Sincerely,

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

KD:bjw

cc: Randall Hukriede, MPCA

BEEF USA

Rock - Nobles Cattlemen's Association

805 141st Street • Luverne, MN 56156

January 21, 2008

Kelli Daberkow
Minnesota Pollution Control Agency
1420 East College Drive, Suite 900
Marshall, MN 56258

Dear Ms. Daberkow,

The Rock-Nobles Cattleman's Association appreciates the opportunity to comment on the Draft Rock River Fecal Coliform and Turbidity Total Maximum Daily Load (TMDL) Report. The Rock-Nobles Cattleman's Association (RNCA) represents the interests of over 60 livestock and crop producers in the Rock River Watershed. The RNCA believes that agriculture is an integral part of the economic viability of the communities in the Rock River Watershed. RNCA also believes that it is imperative for the MPCA to work with individual producers, agri-businesses, producer organizations and community groups in implementing measures of the TMDL report. Agricultural stakeholders represent the largest contingent of stakeholders in the region and need to be an important part of the effort in developing and approving the future implementation plan for the Rock River fecal coliform and turbidity TMDL.

The RNCA would like the MPCA to consider the following points and incorporate them into the final draft of this TMDL report:

1. **Seasonal Variation of Fecal Coliform Concentrations:** The RNCA would like to address the seasonal variation of fecal coliform levels in the Rock River. The report stated that "typically the highest bacterial concentrations are found in the summer and early fall. In the spring, concentrations are typically lower, despite the fact that significant manure application occurs during the time and that fields have little crop canopy to protect against water erosion." In fact, most manure applications from swine feedlots occur in October and November and most manure applications from cattle feedlots occur from October through March. The timing of most manure applications seems to contradict the notion that fecal coliform from manure applications are being delivered to waterways. Studies cited in this report that were conducted by Giles Randall at the University of Minnesota Southern Experiment Station in Waseca imply that the winter environment of Minnesota is a probable killer of fecal coliform in the soil due to manure applications. Other studies by Gerba et. al (1975) indicates that survival times of fecal-associated bacteria in soils range from 2-4 months. In addition, it seems logical that the increased flow of the water column in the stream during the months of April, May and June would *inhibit* the deposition of bacterial coliform in the stream bed. If fecal coliform is persisting in the soil of the field or the sediment in the stream bed from manure applications, more research needs to be done on the 'lag time' of when fecal coliform is applied to the soil in the form of manure and when it shows up in the stream. We understand that livestock produce the vast majority of fecal coliform in the watershed. However, we believe more consideration needs to be given to timing and method of the

manure applications as well as the transport mechanism that delivers fecal coliform to the stream.

2. **Wildlife and Noncompliant Septic Systems:** A great deal of time was spent talking about the high contributions of fecal coliform attributable to animal agriculture. This assumption is based purely on volume and was not actually verified by any part of the study. Certainly, the majority of fecal coliform in the watershed is produced for livestock. However, it may be that noncompliant septic systems and wildlife are higher contributors of fecal coliform than estimated in this report, particularly during the low flow periods when the fecal coliform concentrations are the highest. It is vitally important to have accurate delivery ratios when estimating the contributions of fecal coliform from any given source. We believe that the data in the report indicate wildlife and noncompliant septic systems are the primary contributors of fecal coliform in the summer months. Low flow periods are providing less dilution. The relatively small volumes of fecal coliform generated by non-compliant septic systems and wildlife (in comparison to that in livestock manure storage areas) will make a greater impact on the concentration of fecal coliform during these times. These are the sources actively contributing to the impaired reaches of the stream during the months that exceeded the water quality standard. It is more logical to look at actively discharging sources at the periods when the water quality standard is exceeded, rather than a focusing on an unknown and unproven 'lag time' of fecal coliform persisting in the soil. Focusing on 'lag times' only implies that land application of manure is the main culprit. Funding dollars should look for practical, cost-effective solutions rather than chasing a rabbit down a hole. In today's world, being called a polluter carries extremely negative consequences. It is unfair to label livestock producers polluters without substantiated evidence to backup the claim.

3. **Background Levels of Fecal Coliform:** The RNCA recognizes that more research needs to be completed in determining what levels of fecal coliform exist in undisturbed prairie ecosystems. We realize that there is some difficulty in getting baseline studies completed in areas that are not already developed. It was suggested at the meeting in Luverne that the levels of fecal coliform found in Northern Minnesota were indicative of background levels for Minnesota. We believe it is unwise to make this assumption. It seems that the combination of differences in landscape and temperature gradient make this comparison invalid for determining what an appropriate background level of fecal coliform may be. Furthermore, if background levels are found to be naturally higher than those previously estimated, then consideration should be given to raising the standard of fecal coliform.

4. **DNA Fingerprinting:** It would have been especially helpful if this report had utilized DNA evidence to pinpoint the source of fecal coliform bacteria in the stream. This type of research would have helped determine the specific source of fecal coliform in the stream during the given season. RNCA does not believe that the proportions of fecal coliform in the stream should be based solely on the volume of fecal

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coliform generated by each source category. In the future, DNA 'fingerprinting', if reliable, should be used to provide greater confidence in the source of fecal coliform in the impaired reaches of the watershed. In addition, this use of technology will give a higher degree of confidence to the delivery ratios used for determining the level of contribution of fecal coliform from each source in the watershed. The RNCA wants to see more research conducted on the levels of fecal coliform generated and delivered by both wildlife and non-compliant septic systems in the impaired reaches of the Rock River Watershed.

5. **Sources and Quantity of Sampling:** The RNCA believes that the use of data from volunteers as opposed to trained public employees needs to be viewed with caution. All data should be independently verified before being included in *any* report that assesses the relative contribution of *any* pollutant from specific sources. In addition, 40 samples over a period of ten nine years hardly qualify as a comprehensive look at the fecal coliform concentrations in the Rock River over the past decade. More sampling should have been conducted before any conclusions were made regarding the state of the Rock River.

6. **Reasonable Assurance:** The concentration of fecal coliform in the Rock River watershed has been trending down over the past 40 years. Current manure management requirements and manure application setbacks are designed to protect water quality. The RNCA believes the declining concentration of fecal coliform in the Rock River is most likely due to improved Waste Water Treatment Facilities, improved septic systems *and* the result of voluntary best management practices employed by livestock and crop producers. Manure, when properly handled, is a beneficial soil amendment that increases organic matter, improves water retention and reduces soil erosivity. Current input costs in agriculture are requiring even small producers to strongly consider the economic value of good manure management. Manure application is a complex issue; both the benefits and the potential negative impacts need to be addressed in the dynamics of fecal coliform and turbidity. The RNCA would like to urge the MPCA to use 'common sense' when creating mandates or implementation strategies in response the TMDL report. Unfunded mandates are neither well received by those they are imposed upon, nor are they effective in achieving their desired goals. Proper funding needs to be put in place if changes to livestock and crop producers' management practices are suggested.

Thank you for the opportunity to provide comment and input into this TMDL study. We sincerely hope that you incorporate our comments and concerns into the final draft of the report.

Regards,

Members of the Rock-Nobles Cattleman's Association

Minnesota Pollution Control Agency
Marshall Office

There is a significant seasonality of fecal coliform concentrations in the Rock River. While the highest concentrations of bacteria are observed during storm runoff, most samples were collected during dry conditions. The data indicate, as shown in Figure 3.9, fecal coliform bacteria concentrations rise throughout the summer when plotting non-storm event samples. Thus, on average, due to most of the dataset being collected during dry conditions and the apparent relationship of temperature and bacterial concentration, the late summer months had the highest bacterial levels.

It is true that fecal coliform and E. coli are not easily understood due to the complexities of the organisms. There is definitely a need for research to understand bacteria response and longevity in watersheds. It is important to note that the presence of fecal coliform and E. coli is an indicator that harmful pathogens may be present in the water. This is a major concern for human health. As new research becomes available, this information may be used in the Rock River watershed to better target implementation activities and future research.

2. **Wildlife and Noncompliant Septic Systems:** A great deal of time was spent talking about the high contributions of fecal Coliform attributable to animal agriculture. This assumption is based purely on volume and was not actually verified by any part of the study. Certainly, the majority of fecal Coliform in the watershed is produced for livestock. However, it may be that noncompliant septic systems and wildlife are higher contributors of fecal Coliform than estimated in this report, particularly during the low flow periods when the fecal Coliform concentrations are the highest. It is vitally important to have accurate delivery ratios when estimating the contributions of fecal Coliform from any given source. We believe that the data in the report indicate wildlife and noncompliant septic systems are the primary contributors of fecal Coliform in the summer months. Low flow periods are providing less dilution. The relatively small volumes of fecal Coliform generated by non-compliant septic systems and wildlife (in comparison to that in livestock manure storage areas) will make a greater impact on the concentration of fecal Coliform during these times. These are the sources actively contributing to the impaired reaches of the stream during the months that exceeded the water quality standard. It is more logical to look at actively discharging sources at the periods when the water quality standard is exceeded, rather than a focusing on an unknown and unproven 'lag time' of fecal Coliform persisting in the soil. Focusing on 'lag times' only implies that land application of manure is the main culprit. Funding dollars should look for practical, cost-effective solutions rather than chasing a rabbit down a hole. In today's world, being called a polluter carries extremely negative consequences. It is unfair to label livestock producers polluters without substantiated evidence to back up the claim.

   Response: *The lag time of manure was not used to imply that water quality standard exceedances were related to manure application as a source. While the exceedances in August and September may be partially related to wildlife and illegal septic systems, the fact that the samples collected during that time were mostly during storm events. This supports the conclusion that overland runoff was a likely cause of higher bacteria levels.*

   It was not the intent of the Report to label livestock producers as "polluters". The Report simply is stating that there are several potential sources of fecal coliform bacteria and based on actual population estimates and approved scientific evidence, livestock produce the most fecal coliform bacteria. The fate and transport of bacteria to the Rock River is varied and dependant on several conditions. The goal of this Report is to provide some known information regarding the impairments to satisfy the EPA's requirements. Upon approval by the EPA, the implementation planning effort is an opportunity to form solutions, focus research, and develop partners to protect the Rock River from further degradation. This effort will hopefully restore water quality to create a river that is safe for

swimming, canoeing and fishing. Improving the water quality in the Rock River will also benefit agricultural uses such as irrigation and livestock uses.

3. **Background Levels of Fecal Coliform:** The RNCA recognizes that more research needs to be completed in determining what levels of fecal Coliform exist in undisturbed prairie ecosystems. We realize that there is some difficulty in getting baseline studies completed in areas that are not already developed. It was suggested at the meeting in Luverne that the levels of fecal Coliform found in Northern Minnesota were indicative of background levels for Minnesota. We believe it is unwise to make this assumption. It seems that the combination of differences in landscape and temperature gradient make this comparison invalid for determining what an appropriate background level of fecal Coliform may be. Furthermore, if background levels are found to be naturally higher than those previously estimated, then consideration should be given to raising the standard of fecal Coliform.

   Response: *You are correct about the need to better understand fecal coliform in the environment. The example of northern Minnesota's streams was used to illustrate a point, and the MPCA agrees that the characteristics of the Rock River watershed and northern Minnesota vary substantially. While the MPCA does conduct periodic reviews of water quality standards, any change that would make the bacteria standard less protective to human health is unlikely at this time.*

4. **DNA Fingerprinting:** It would have been especially helpful if this report had utilized DNA evidence to pinpoint the sources of fecal Coliform bacteria in the stream. This type of research would have helped determine the specific source of fecal Coliform in the stream during the given season. RNCA does not believe that the proportions of fecal Coliform in the stream should be based solely on the volume of fecal Coliform generated by each source category. In the future, DNA 'fingerprinting', if reliable, should be used to provide greater confidence in the source of fecal Coliform in the impaired reaches of the watershed. In addition, this use of technology will give a higher degree of confidence to the delivery ratios used for determining the level of contribution of fecal Coliform from each source in the watershed. The RNCA wants to see more research conducted on the levels of fecal Coliform generated and delivered by both wildlife and non-compliant septic systems in the impaired reaches of the Rock River Watershed.

   Response: *There has been and continues to be research in Minnesota and throughout the country regarding the sources, movement, and survival of bacteria in watersheds. DNA fingerprinting may prove to be important to the understanding of fecal coliform bacteria and research is needed to gain this information. This technology can be extremely time consuming and expensive but there are studies where DNA fingerprinting has been used for TMDLs. Currently, the Minnesota Department of Agriculture and several partners are conducting a project where this technology is used. We generally prefer our local projects, with their limited resources, to focus on implementation efforts rather than research, although some investigative-type monitoring may be appropriate.*

5. **Sources and Quantity of Sampling:** The RNCA believes that the use of data from volunteers as opposed to trained public employees needs to be viewed with caution. All data should be independently verified before being included in *any* report that assesses the relative contribution of any pollutant from specific sources. In addition, 40 samples over a period of ten years hardly qualify as a comprehensive look at the fecal Coliform concentrations in the Rock River over the past decade. More sampling should have been conducted before any conclusions were made regarding the state of the Rock River.

Response: *It is the responsibility of the MPCA to monitor Minnesota's rivers and lakes to assess water quality, and to report the results to the public. The MPCA has established guidelines and criteria to assess Minnesota's waters for several water quality parameters. It serves to guide the interpretation and application of current water quality standards that are in water quality rules. This guidance can be found at http://www.pca.state.mn.us/publications/wq-iw1-04.pdf. In the assessment process, all data is reviewed before a site is placed on the Impaired Waters List. The public has an opportunity to review and comment on the Impaired Waters List when it is updated (every two years). In addition, the public also can provide comments and input on the assessment guidance that was referenced above. This is updated and open for comment every two years as well. More information is available in that document.*

The Rock River and Elk Creek were listed because the data indicated impairments to its designated uses. Additional monitoring conducted in 2007 shows that impairments still exist. The Report summarized and used the most recent data available. Regarding the comment on the use of transparency tube data, the MPCA has conducted analysis showing a strong relationship between transparency and turbidity. In addition, waters are not listed based exclusively on transparency data unless there is corroboration from a local or state water resource manager. If there are concerns regarding assessment procedures, please contact Louise Hotka, MPCA, 651-296-7223 for further information.

6. **Reasonable Assurance:** The concentration of fecal Coliform in the Rock River watershed has been trending down over the past 40 years. Current manure management requirements and manure application setbacks are designed to protect water quality. The RNCA believes the declining concentration of fecal Coliform in the Rock River is most likely due to improved Waste Water Treatment Facilities, improved septic systems *and* the result of voluntary best management practices employed by livestock and crop producers. Manure, when properly handled, is a beneficial soil amendment that increases organic matter, improves water retention and reduces soil erosivity. Current input costs in agriculture are requiring even small producers to strongly consider the economic value of good manure management. Manure application is a complex issue; both the benefits and the potential negative impacts need to be addressed in the dynamics of fecal Coliform and turbidity. The RNCA would like to urge the MPCA to use 'common sense' when creating mandates or implementation strategies in response to the TMDL report. Unfunded mandates are neither well received by those they are imposed upon, nor are they effective in achieving their desired goals. Proper funding needs to be put in place if changes to livestock and crop producers' management practices are suggested.

Response: *In 40 years, there have been many changes in rural America that have improved water quality. However, the Rock River is not meeting its designated uses, so more work needs to be done. Together, as a collective unit of farmers, homeowners, cities, and industries, water quality can improve. This can be accomplished without mandates; a more effective approach is to work together to design a plan that is suitable for all involved. In fact, as you may know, a process has been developed to guide the upcoming task of creating an implementation plan. The foundation of the implementation plan is to have buy-in from stakeholders in the Rock River watershed. Personalized letters requesting input and assistance were sent to agricultural groups, targeted individuals, and environmental groups in January 2008. In addition, at the public meetings held on January 24, 2008, input and sign up of interested individuals to serve on an Advisory Committee was requested. To date, the Rock County Land Management Office has received several inquiries and sign ups. I would encourage a representative from RNCA to serve on the Advisory Committee to ensure that your concerns, ideas and input are included.*

Again, thank you for reviewing and commenting on the *Draft Rock River Fecal Coliform and Turbidity TMDL Assessment.* Your comments provide valuable insight to the success of this project and future TMDL projects. If you have any further questions about this project, please contact me at 507-537-6497 or check out the project website: http://www.pca.state.mn.us/water/tmdl/project-rockriver.html.

Sincerely,

Kelli Daberkow

Kelli Daberkow
Pollution Control Specialist Senior
Marshall Office
Regional Division

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cc: Randall Hukriede, MPCA