

# Carver, Bevens and Silver Creeks Bacterial TMDL Implementation Plan

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## 1.0 Problem Statement

Section 303(d) of the Clean Water Act establishes a directive for developing Total Maximum Daily Loads (TMDLs) to achieve Minnesota water quality standards established for designated uses of State waterbodies. Under this directive, the State of Minnesota directed Carver County to develop a TMDL and subsequent Implementation Plan for fecal coliform exceedances in the Carver, Bevens, and Silver Creek Watersheds.

This TMDL Implementation Plan addresses fecal coliform impairments in four listed reaches in Carver and Sibley Counties (Table 1.0 and figure 1.1). Each of the reaches is treated independently in the TMDL, however the implementation approach and governance remains the same for each watershed.

**Table 1.0. Reaches Impaired for Fecal Coliform in Carver County.**

Stream Name	Reach Number	Reach Description	Beneficial Use
Carver Creek	07020012-516	Headwaters to Minnesota R	Aquatic recreation
Bevens Creek	07020012-514	Silver Cr to Minnesota R	Aquatic recreation
Bevens Creek	07020012-515	Headwaters (Washington Lake) to Silver Cr	Aquatic recreation
Silver Creek	07020012-523	CD 32 to Bevens Cr	Aquatic recreation

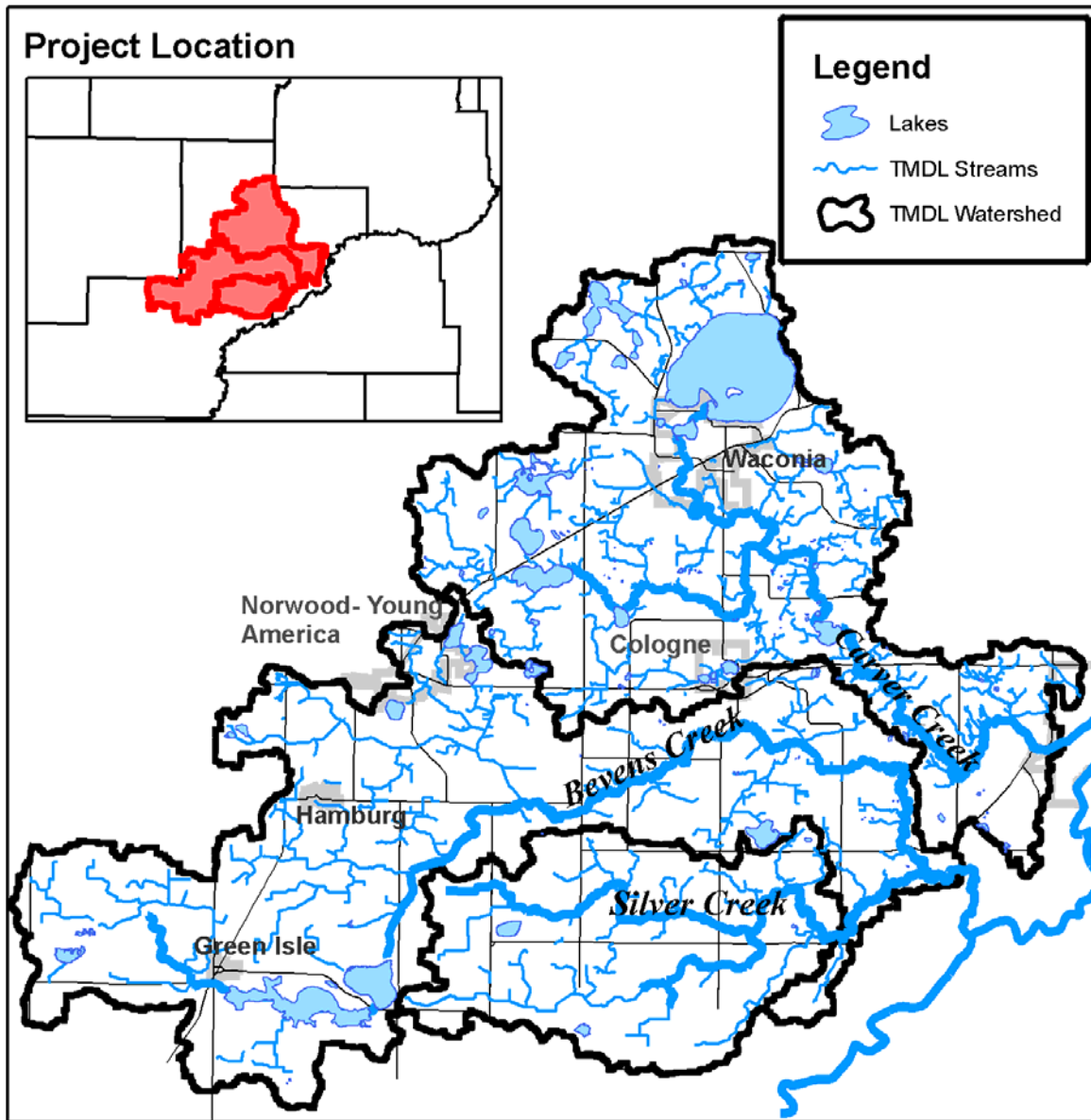
The goal of this TMDL Implementation Plan is to list best management practices to be utilized in achieving pollutant reductions needed to meet the water quality standards for fecal coliform in Carver, Bevens, and Silver Creeks. Ultimately, this TMDL Implementation Plan will result in reduced fecal coliform levels needed to achieve the State Standard for fecal coliform. A summary of the implementation practices to decrease fecal coliform bacteria levels is described in the following categories.

### 1.1 Target Watersheds

As a result of water quality evaluations, the State of Minnesota has determined that waters in the Bevens, Carver, and Silver Creek Watersheds exceed the State established standards for fecal coliform (see Section 2.2 for standards). A map of the three watersheds is presented in Figure 1.1.

Local Units of Government in the Project Area:

Counties	Townships	Cities
Carver	7	4
Sibley	3	3



**Figure 1.1 303(d) listed reaches (Carver, Bevens and Silver Creeks).**

The goal of this TMDL is to quantify the pollutant reductions needed to meet the water quality standards for fecal coliform in Carver, Bevens, and Silver Creeks. Ultimately, this TMDL will result in an implementation plan to achieve the identified load reductions needed to achieve the State Standard for fecal coliform.

## 1.2 Inventory of Fecal Coliform Sources

Table 1.1 summarizes the major sources of fecal coliform in the Carver Creek watershed. It is important to note that there is some uncertainty associated with the estimates in the table. Estimates of the population with inadequate wastewater treatment are based on an assumed septic failure rate in the county. Additionally, pet numbers are derived from a national survey and may not directly reflect conditions in Carver and Sibley Counties. Deer populations are from model estimates and geese population estimates are based on densities used in the Southeast Regional TMDL. This summary does, however, provide a reasonable estimate of fecal coliform producers in the watershed as well as the comparative densities in each category.

There are 107 livestock facilities in the Carver Creek watershed with a total of 10,000 animal units dominated by dairy and beef cattle. Over half of the human population in the watershed discharges to a Municipal Wastewater Treatment Facility.

**Table 1.1 Inventory of Fecal Coliform Producers in Carver Creek**

Category	Sub-Category	Animal Units or Individuals	
Livestock	The Basin contains an estimated 107 livestock facilities ranging in size from a few animal units to several hundred	Dairy	6,236 animal units
		Beef	2,747 animal units
		Swine	1,490 animal units
		Poultry	1 animal units
		Other	288 animal units
Human <sup>1</sup>	Rural Population with Inadequate Wastewater Treatment <sup>2</sup>	1,348 people	
	Rural Population with Adequate Wastewater Treatment	1,787 people	
	Municipal Wastewater Treatment Facilities	10,303 people	
Wildlife	Deer (average 6 per square mile)	847 deer	
	Geese <sup>3</sup>	237 geese	
	Other	Other wildlife was assumed to be the equivalent of deer and geese combined in the watershed.	

**Table 1.1 Inventory of Fecal Coliform Producers in Carver Creek**

Category	Sub-Category	Animal Units or Individuals
Pets	Dogs and Cats in Urban Areas <sup>4</sup>	4,820 dogs and cats
	Dogs and Cats in Rural Areas <sup>4</sup>	1,467 dogs and cats

<sup>1</sup>Based on 2000 census data

<sup>2</sup>Assumes 43% failure rate for septic systems (43% of rural population with inadequate wastewater treatment)

<sup>3</sup>Rough estimate, likely representing maximum numbers; geese densities based on Southeastern Minnesota Regional Bacteria TMDL (MPCA 2002) densities (2.8 per square mile)

<sup>4</sup> People divided by 2.8 people/household multiplied by 0.58 dogs/household, 0.73 cats/household as used in the Southeast Minnesota Regional TMDL (MPCA 2002).

Table 1.2 summarizes the major sources of fecal coliform in the Bevens Creek watershed. There are 144 livestock facilities with over 19,000 animal units dominated by dairy and beef cattle. Over half of the human population in the watershed discharges to a Municipal Wastewater Treatment Facility.

**Table 1.2 Inventory of Fecal Coliform Producers in Bevens Creek**

Category	Sub-Category	Animal Units or Individuals	
Livestock <sup>1</sup>	The Basin contains an estimated 144 livestock facilities ranging in size from a few animal units to several hundred	Dairy	7,638 animal units
		Beef	7,400 animal units
		Swine	3,321 animal units
		Poultry	No known commercial scale production
		Other	495 animal units
Human <sup>2</sup>	Rural Population with Inadequate Wastewater Treatment <sup>3</sup>	1,524 people	
	Rural Population with Adequate Wastewater Treatment	2,020 people	
	Municipal Wastewater Treatment Facilities	4,036 people	
Wildlife	Deer (average 6 per square mile)	935 deer	
	Geese <sup>4</sup>	262 geese	
	Other	Other wildlife was assumed to be the equivalent of deer and geese combined in the watershed.	
Pets	Dogs and Cats in Urban Areas <sup>5</sup>	1,888 dogs and cats	
	Dogs and Cats in Rural Areas <sup>5</sup>	1,658 dogs and cats	

1 Sibley Animal units were estimated by multiplying the average # units per feedlot in Carver County by the number of feedlots in Sibley County

2 Based on 2000 census data

3 Assumes 65% failure rate for septic systems (65% of rural population with inadequate wastewater treatment)

4 Rough estimate, likely representing maximum numbers; geese densities based on Southeastern Minnesota Regional Bacteria TMDL (MPCA 2002) densities (2.8 per square mile)

5 People divided by 2.8 people/household multiplied by 0.58 dogs/household, 0.73 cats/household as used in the Southeast Minnesota Regional TMDL (MPCA 2002).

Table 1.3 summarizes the major sources of fecal coliform in the Silver Creek watershed. There are 53 livestock facilities with over 6,000 animal units dominated by dairy and beef cattle. None of the human population discharges to a Municipal Wastewater Treatment Facility.

**Table 1.3 Inventory of Fecal Coliform Producers in Silver Creek**

Category	Sub-Category	Animal Units or Individuals	
Livestock <sup>1</sup>	The Basin contains an estimated 53 livestock facilities ranging in size from a few animal units to several hundred	Dairy	2,731 animal units
		Beef	2,441 animal units
		Swine	1,153 animal units
		Poultry	11 animal units
		Other	205 animal units
Human <sup>2</sup>	Rural Population with Inadequate Wastewater Treatment <sup>3</sup>	599 people	
	Rural Population with Adequate Wastewater Treatment	795 people	
	Municipal Wastewater Treatment Facilities	0 people	
Wildlife	Deer (average 6 per square mile)	358 deer	
	Geese (Average 2.8 per square mile) <sup>4</sup>	100 geese	
	Other	Other wildlife was assumed to be the equivalent of deer and geese combined in the watershed.	
Pets	Dogs and Cats in Urban Areas <sup>5</sup>	0 dogs and cats	
	Dogs and Cats in Rural Areas <sup>5</sup>	652 dogs and cats	

1 Sibley Animal units were estimated by multiplying the average # units per feedlot in Carver County by the number of feedlots in Sibley County

2 Based on 2000 census data

3 Assumes 65% failure rate for septic systems (65% of rural population with inadequate wastewater treatment)

4 Rough estimate, likely representing maximum numbers; geese densities based on Southeastern Minnesota Regional Bacteria TMDL (MPCA 2002) densities (2.8 per square mile)

### 1.3 Assumptions and Current Load Contributions

The first set of assumptions divides the fecal coliform produced in the watershed into several source areas such as surface applied manure (Table 1.4). It is important to note that this process assumes that all fecal coliform produced in the watershed, remains in the watershed. For example, all dairy cow manure is potentially available for runoff. Only 1% is assumed to be in overgrazed pastures while 64% is assumed to be applied to the watershed surface. Additionally, the assumptions identify the proportion available seasonally and the quantity that may be available. For example, it was assumed that 10% of cat and dog waste in urban areas was improperly managed. These assumptions are gross and are intended to represent average conditions in the watershed (MPCA 2002).

The assumptions were first developed as a part of the Southeast Regional TMDL (MPCA 2002; Mulla et al 2001) and then adjusted by the Carver County Water Environment and Natural Resources Technical Sub-Committee and Policy Committee to reflect current practices and conditions in the three local watersheds.

**Table 1.4 Assumptions Used to Estimate the Amount of Daily Fecal Coliform Production Available for Potential Runoff or Discharge into the Streams and Rivers of Carver and Sibley Counties**

Category	Source	Assumption
Livestock	Overgrazed Pasture near Streams or Waterways	1% of Dairy Manure 1% of Beef Manure
	Feedlots or Stockpiles without Runoff Controls	1% of Dairy 5% of Beef Manure 1% Poultry Manure
	Surface Applied Manure	64% of Dairy Manure 94% of Beef Manure 99% of Poultry Manure 10% Swine Manure; 20% of this manure applied in Spring 20% of this manure applied in Summer 60% of this manure applied in Fall
	Incorporated Manure	34% of Dairy Manure 90% of Swine Manure; 20% of this manure applied in the Spring 80% of this manure applied in Fall
Human	Failing Septic Systems and Unsewered Communities	All waste from failing septic systems and unsewered communities



**Table 1.4 Assumptions Used to Estimate the Amount of Daily Fecal Coliform Production Available for Potential Runoff or Discharge into the Streams and Rivers of Carver and Sibley Counties**

Category	Source	Assumption
	Municipal Wastewater Treatment Facilities (excluding bypasses)	Calculated directly from WWTP discharge (April through October) and the geometric mean fecal coliform concentration (2004 data)
Wildlife	Deer	All fecal matter produced by deer in basin
	Geese	All fecal matter produced by geese in basin
	Other Wildlife	The equivalent of all fecal matter produced by deer and geese in basin
Urban Stormwater Runoff	Improperly Managed Waste from Dogs and Cats	10% of waste produced by estimated number of dogs and cats in basin

The second set of assumptions provides information on the potential for the previously quantified source areas to reach surface waters. Developing the delivery potential for each source is based on assigning risk values on a scale of 1-5 (1= very low risk and 5 = very high risk). These risk assignments are then translated into delivery percentages where a low potential delivers one percent, moderate is two percent, high is four percent, and very high is 6 percent. (Table 1.5; Mulla et al. 2001).

These numbers were based on those used in the Southeast Minnesota Regional Bacteria TMDL (MPCA 2002) and adjusted to reflect conditions in the watershed. Additionally, these assumptions are divided into wet weather conditions and dry weather conditions to differentiate between those sources that are precipitation driven versus those which are not dependent on precipitation. The only assumed dry weather sources are septic systems, overgrazed pastures with direct access to the streams, and wildlife.

Each of the delivery potentials is presented seasonally, however no seasonal difference in the delivery from the source was assumed. Seasonality was accounted for in the amount available for wash off due to seasonal differences in application practices. Septic system delivery potential was not doubled here to reflect some of the variability in assessing failing septic systems. Some septic systems are considered failing due to interaction with the water table, but do not have a direct connection to surface waters. The delivery potential remains high though, due to the extensive drain tiling in the region.

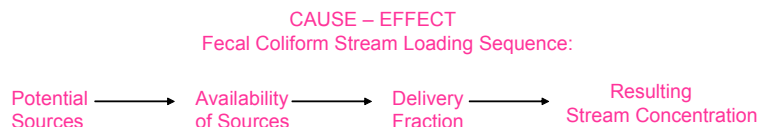
**Table 1.5. Assumed Fecal Coliform Delivery Potential**

Source	Estimated Delivery Potential					
	Spring (Wet)	Spring (Dry)	Summer (Wet)	Summer (Dry)	Fall (Wet)	Fall (Dry)

**Table 1.5. Assumed Fecal Coliform Delivery Potential**

Source	Estimated Delivery Potential					
	Spring (Wet)	Spring (Dry)	Summer (Wet)	Summer (Dry)	Fall (Wet)	Fall (Dry)
Overgrazed Pasture near Streams or Waterways	High (4%)	Low (1%)	High (4%)	Low (1%)	High (4%)	Low (1%)
Feedlots or Manure Stockpiles without Runoff Controls	High (4%)	N/A	Moderate (2%)	N/A	Moderate (2%)	N/A
Surface Applied Manure	Low (1%)	N/A	Low (1%)	N/A	Low (1%)	N/A
Incorporated Manure	Very Low (0.1%)	N/A	Very Low (0.1%)	N/A	Very Low (0.1%)	N/A
Failing Septic Systems and Unsewered Communities	Very High (6%)	Very High (6%)	Very High (6%)	Very High (6%)	Very High (6%)	Very High (6%)
Municipal Wastewater Treatment Facilities (excluding bypasses)	Contribution estimated directly based on discharge reports					
Deer	Low (1%)	Low (1%)	Low (1%)	Low (1%)	Low (1%)	Low (1%)
Geese	High (4%)	High (4%)	High (4%)	High (4%)	High (4%)	High (4%)
Other Wildlife	Low (1%)	Low (1%)	Low (1%)	Low (1%)	Low (1%)	Low (1%)
Urban Stormwater Runoff	High (4%)	N/A	High (4%)	N/A	High (4%)	N/A

The contributions from point and non-point sources are summarized in Table 1.5. The table illustrates the series of calculations relating the “potential” inventory of sources to the “available sources” to the “deliveries” from each of the available sources in a stepwise fashion.



**Table 1.6**

Tables 1.1 through 1.6 represent each of the four steps and are expressed as percent delivery from each of the available sources.

## 2.0 Building a Project Team and Public Support

The County has an excellent track record with inclusive participation of its citizens, as evidenced through the public participation in completion of the Carver County Water Management Plan, approved in 2001. The county has utilized stakeholder meetings, citizen surveys, workshops and permanent citizen advisory committees to gather input from the public and help guide implementation activities. The use of this public participation structure will aid in the development of this and other TMDLs in the County.

### **Advisory Committees**

The Water, Environment, & Natural Resource Committee (WENR) is established as a permanent advisory committee. The WENR is operated under the County's standard procedures for advisory committees. WENR works with staff to make recommendations to the County Board on matters relating to watershed planning.

The make-up of the Water, Environment, & Natural Resource Committee (WENR) is as follows:

- 1 County Board Member
- 1 Soil and Water Conservation District Member
- 5 citizens – (1 appointed from each commissioner district)
- 1 City of Chanhassen (appointed by city)
- 1 City of Chaska (appointed by city)
- 1 City of Waconia (appointed by city)
- 1 appointment from all other cities (County Board will appoint)
- 2 township appointments (County Board will appoint– must be on existing township board.)
- 4 other County residents (1 from each physical watershed area – County )

The full WENR committee received updates on the TMDL process from its conception

As part of the WENR committee, two sub-committees are in place and have held specific discussions on the fecal TMDL. These are the Technical sub-committee and the policy/finance sub-committee. Sub-committee review meetings were held on: November 10, 2004; December 15, 2004; January 12, 2005

TMDL progress, data results and implementation procedures were presented and analyzed at the WENR meetings mentioned. Committee members commented on ISTS failure rates, percent contribution allocations, target reductions, and implementation plans. All issues commented on were considered in the development of the Draft TMDL.

The Sibley County Water and Resources Advisory Committee is appointed by the County Board of Commissioners and composed of broad based public and private interests. The Advisory committee is made up of county commissioners, citizens and natural resource

agency staff. It meets biannually to review the Water Plan implementation and to identify emerging problems, opportunities and issues and serves as the initial body to receive proposed amendments to the county water plan.

Carver County Staff presented the background of the TMDL to the Sibley County Water and Resources Advisory Committee on November 22, 2004. The committee expressed interest in proposed allocation procedures.

**Sibley County Board February 22, 2005**

A motion was made and seconded by Sibley County commissioners on the 22<sup>nd</sup> of February, 2005 to support the submission of the Draft Bevens Creek Total Maximum Daily Load Study to the Minnesota Pollution Control Agency.

**Carver County Board March 1, 2005**

A motion was made and seconded by the Carver County Board of Commissioners on the 1<sup>st</sup> of March, 2005 to support the submission of the Draft Fecal Coliform Total Maximum Daily Load Study to the Minnesota Pollution Control Agency.

The Carver County Board of Commissioners had several comments on the Draft TMDL. Remarks were made about the allocations of fecal coliform in regards to wildlife, Canada Geese in particular. It was questioned whether the TMDL accurately assessed Canada geese contributions to the bacteria problem. Next, there were concerns about how Sibley County will be incorporated into the implementation plans due to the dual coverage of Bevens and Silver Creek watersheds. There were also remarks made about what BMPs would be implemented for manure management. Credit was given to the programs already in place in Carver County due to the Water Management Plan. Lastly, commissioners agreed that focusing on small subwatersheds is the best way to implement the TMDL. In addition to these remarks, a county landowner submitted a request to the county board via a written memo. The landowner indicated his thoughts that earthen liquid manure storage basins contribute high levels of bacteria to the creeks studied. The landowner voiced his concern that these basins must be assessed along with other potential bacteria sources in allocating bacteria sources.

Additional public meetings will be held upon approval of the TMDL by the EPA and completion of the TMDL Implementation Plan.

## ***2.1 Agency Roles and Responsibilities***

Carver County is the water management authority for Carver Creek and its portion of Bevens and Silver Creek. The County is uniquely qualified through its zoning and land use powers to implement corrective actions to achieve TMDL goals. The County has stable funding for water management each year, and will continue its baseline-monitoring program. Carver County recognizes the importance of the natural resources within its boundaries, and seeks to manage those resources to attain the following goals:

1. Protect, preserve, and manage natural surface and groundwater storage and retention systems;
2. Effectively and efficiently manage public capital expenditures needed to correct flooding and water quality problems;
3. Identify and plan for means to effectively protect and improve surface and groundwater quality;
4. Establish more uniform local policies and official controls for surface and groundwater management;
5. Prevent erosion of soil into surface water systems;
6. Promote groundwater recharge;
7. Protect and enhance fish and wildlife habitat and water recreational facilities; and
8. Secure the other benefits associated with the proper management of surface and ground water.

The Carver County Board of Commissioners (County Board), acting as the water management authority for the former Bevens Creek (includes Silver Creek), Carver Creek, Chaska Creek, East Chaska Creek, and South Fork Crow River watershed management organization areas, has established the “Carver County Water Resource Management Area”. The purpose of establishing the CCWRMA is to fulfill the County’s water management responsibilities under Minnesota Statue and Rule. The County chose this structure because it will provide a framework for water resource management as follows:

- Provides a sufficient economic base to operate a viable program;
- Avoids duplication of effort by government agencies;
- Avoids creation of a new bureaucracy by integrating water management into existing County departments and related agencies;
- Establishes a framework for cooperation and coordination of water management efforts among all of the affected governments, agencies, and other interested parties; and
- Establishes consistent water resource management goals and standards for at least 80% of the county.

The County Board is the “governing body” of the CCWRMA for surface water management and the entire county for groundwater management. In function and responsibility the County Board is essentially equivalent to a joint powers board or a watershed district board of managers.

Water management is an interdisciplinary effort and involves several County departments and associated County agencies including: Planning and Zoning, Environmental Services, County Extension and the Carver SWCD. The County Planning & Zoning Department is responsible for administration of the water plan and coordinating implementation. Other departments and agencies will be called upon to perform water management duties that fall within their area of responsibility. These responsibilities may change as the need arises. The key entities (Planning and Zoning, Environmental Services, County Extension

and the SWCD) meet regularly as part of the Joint Agency Meeting (JAM) process to coordinate priorities, activities, and funding.

Carver County has established a stable source of funding through a watershed levy in the CCWRMA taxing district (adopted 2001). This levy allows for consistent funding for staff, monitoring, engineering costs and also for on the ground projects. The County has also been very successful in obtaining grant funding from local, state and federal sources due to its organizational structure. Sibley County has similar departments and programs in place and has been the recipient of several state and federal grants dealing with similar issues in other watersheds within the county.

## **2.2 Integration with Existing Programs**

In addition to the Carver County Bacteria Implementation Plan, there are several additional Lake TMDL's within these watersheds that will benefit once this plan is in place since many of the practices and approaches used to lower fecal coliform bacteria also help to reduce the loading of total phosphorous (TP), Total Suspended Solids (TSS), and Nitrate-Nitrite (NO<sub>2</sub>-NO<sub>3</sub>).

## **2.3 Public Participation and Involvement**

Carver County, coupled with Sibley County staff, held local area meetings, published news releases, and implemented public mailings to gather public comment on the draft TMDL plan. A major emphasis at these meetings was to get comments regarding our approach to implementation. The following public meetings were held:

### **WENR Committee (open to public)                      January 25, 2005**

The Draft TMDL was presented to the WENR Committee in January 2005 in the format of a power point presentation. Staff explained the results of the TMDL and collected remarks on the data results and implementation plans considered. Comments on the achievability of the State Standards were discussed and considered for future evaluation. Suggestions were made to target implementation efforts in smaller sub-watersheds in order to focus funding and to better gauge effectiveness of implementation efforts.

### **Public Open House    February 2, 2005**

A public meeting, in the form of an open house, was held on February 2, 2005. The meeting was held in Cologne which is central to the watersheds included in the study. Individual invitations to key stakeholders along with news releases in several local papers announced the date, time and content of the open house. Attendees were accounted for by utilizing registration cards. A total of 36 landowners attended. In addition, two phone calls were received and two landowners visited the County offices in order to receive information on the TMDL. Public were persuaded to communicate opinions on the draft TMDL in person, by email or phone within the comment period ending on

February 22<sup>nd</sup>. All comments were recorded, summarized and considered in the development of the draft TMDL.

***Comment Summary:***

Staff persuaded attendees to comment on the data results and implementation plans. Several remarks were made of the allocation of fecal coliform to non-conforming ISTS. Landowners seemed to agree with the results of the TMDL in that ISTS have a high potential to contribute to fecal coliform loading. However, it seems that education on the subject is needed. There were several comments made about BMPs. Some landowners were interested to know how many miles of buffer strips were currently in the project area and what programs they were installed with. It is concluded that landowners whom attended the open house are generally interested in installing BMPs but again, more education is needed. Several comments were made about the suggested implementation plan of targeting small, upstream sub-watersheds with high fecal coliform loading. This plan was welcomed by landowners because effects of BMP installation would be recognized more easily in the smaller sub-watersheds. The overall attitude towards the draft TMDL was very supportive.

**WENR Committee (open to public) March 28, 2006**

The Draft Fecal Coliform Implementation Plan was presented to the committee as a power point presentation. The presentation outlined the major facets of the plan, including the problem, solutions and next steps. Comments were taken from the committee and were unanimously in support of moving forward with the plan, many eager to know when funding could be applied for.

***2.4 Education and Outreach***

Local residents and landowners and farm operators will be apprised of progress, updates, plans, and educational and public input events. Promotion for these events will include press releases, direct mailings, publication on the web, and other various forms best suited for the intended audience. The events may include public input forums, educational programs, and participation at large county events such as the County Fair. An annual educational tour may also be coordinated to discuss progress the Carver County Water Management Area including portions of the watershed within Sibley County. The CCWMA will provide information and education to citizens and landowners through a variety of sources. These are not limited to the traditional education workshops or educational brochures, but may also include demonstration projects, interactive web tours, and a Land and Water Services Newsletter. While education and outreach activities will include these large audience venues, there will be one on one contact with citizens and landowners as needed and requested. The progress of the work may be presented at local, state, and national conferences. An annual report of efforts and progress will be completed each year.

## **2.5 Communicating Lessons to Others in State and Beyond**

The communication of strategies used in the TMDL and their effectiveness, as well as TMDL findings to date, have been conducted locally in WENR meetings and WENR technical advisory committee meetings and will continue in the future. It is not clear at this time what other methods will be used to educate the local citizens about current events in the implementation phase, but more measures to that end will be adopted if needed. In addition to these meetings, other agencies both state and federal integral to the implementation plan, including: MN BWSR (MN Board of Water and Soil Resources); MN DNR (MN Department of Natural Resources); and the U.S.NRCS (U.S. Natural Resources Conservation Service) may hold educational conferences in concert or separately. The MPCA MN Pollution Control Agency will be integral to the implementation phase of the Carver, Bevens, and Silver Creek Implementation plan and will report their findings to the USEPA. Both the MPCA and the USEPA have websites that are used as educational tools to the public.

## **3.0 Set Goals and Identify Solutions**

Section 303(d) of the Clean Water Act (CWA) provides authority for completing Total Maximum Daily Loads (TMDL's) to achieve state water quality standards and/or designated uses. A TMDL is a calculation of the maximum amount of pollutant that a water body can receive while still meeting water quality standards and/or designated uses. It is the sum of the loads of a single pollutant from all contributing point and non-point sources. In general, the TMDL is developed according to the following relationship:

$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$

Where:

TMDL	=	Total Maximum Daily Load
WLA	=	Waste Load Allocation (point source).
LA	=	Load Allocation (non-point source)
MOS	=	Margin of Safety (may be implicit and factored into conservative WLA or LA, or explicit).

## **3.1 Existing vs. Desired Uses of Waters of Concern**

### **Applicable Water Quality Standards and Water Quality Numeric Targets**

Carver, Bevens, and Silver Creeks are classified as 2B waters. Class 2B refers to those State waters identified to support aquatic life (warm and cool water fisheries and associated biota) and recreation (all water recreation activities including bathing). The Minnesota standard for class 2B waters is as follows:



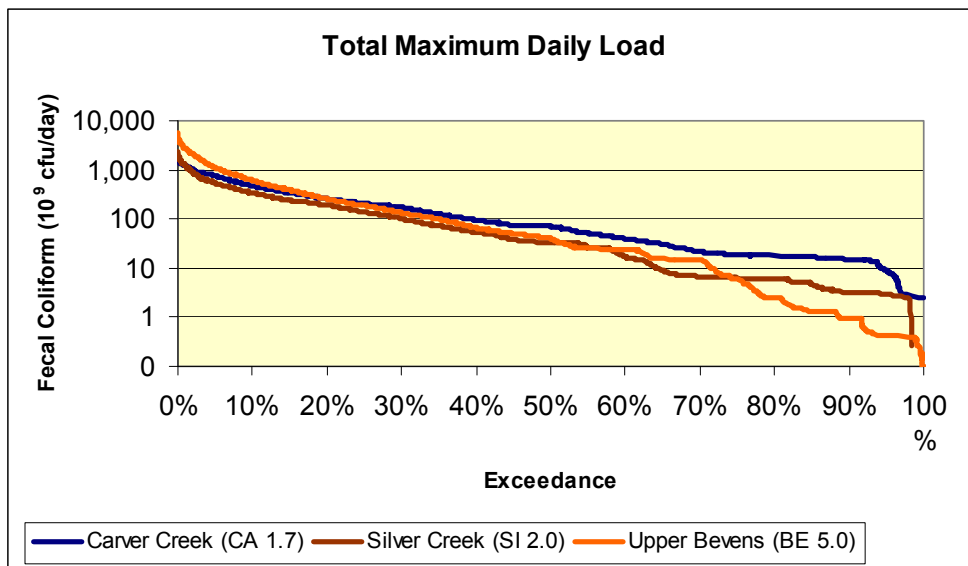
Minn. R. ch. 7050.0222 subp. 4 and 5, fecal coliform water quality standard for class 2B and 2C waters states that fecal coliforms shall not exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 2,000 organisms per 100 milliliters. The standard applies only between April 1 and October 31.

Endpoint fecal coliform concentrations were determined to be the State water quality standard of a monthly geometric mean of 200 cfu/ 100 ml and no value exceeding 2,000 cfu/ 100 ml for the period of April 1 through October 31. However, the focus of this TMDL is on the “chronic” standard of 200 cfu/ 100 ml. It is believed that achieving the necessary reductions to meet the chronic standard will also reduce the exceedances of the acute standard (MPCA 2002).

### 3.2 Water Quality Goals

#### Allocation and Reductions Needed to Satisfy the TMDL

Because fecal coliform is primarily a nonpoint source issue in the Carver, Bevens and Silver Creek watersheds, it is inappropriate to define the TMDL as a single number since the TMDL is entirely dependent upon the daily flow and concentration, which is highly dynamic. To this effect, the TMDL is represented by an allowable daily load across all flow conditions as is demonstrated in Figure 3.1. To determine acceptable loads under the critical flow regimes, chronic standard concentrations were multiplied by the flow at each interval.



**Figure 3.1. The Total Maximum Daily Load Across Flow Exceedances for Carver, Bevens, and Silver Creeks.** Data used to calculate the load duration curve was from 1997 through 2003. This graph represents the allowable load while meeting the State standard.

To develop the TMDL equations for each watershed, seasonal mean discharge was calculated at the outlets of each of the watersheds. These data were then multiplied by the standard of 200 cfu/100 ml to establish the TMDL (Table 3.1). The MOS was established using all existing watershed data to quantify uncertainty in the data. The MOS in the TMDL is essentially the ratio of the geomean of all data to the upper confidence interval of the geomean for all data. For example, in Carver Creek, the spring geomean was 68% of the upper confidence interval. So, the allocation (wasteload and load) was 68% of the load at 200 cfu/100 ml and the MOS was the remaining load. Consequently, the MOS represents the uncertainty in the estimate of the geomean.

**Table 3.1. The TMDL for Fecal Coliform in Carver, Bevens, and Silver Creeks.** Loads are based on seasonal mean discharge at the outlets of each watershed.

Reach	Critical Condition	Wasteload Allocation (10 <sup>9</sup> cfu/day)	Load Allocation (10 <sup>9</sup> cfu/day)	Margin of Safety (10 <sup>9</sup> cfu/day)	TMDL (10 <sup>9</sup> cfu/day)
Carver Creek	Spring	3	197	93	293
	Summer	3	165	78	245
	Fall	3	62	29	94
Bevens Creek	Spring	9.5	249	117	376
	Summer	9.5	226	106	342
	Fall	9.5	34	16	59
Silver Creek	Spring	0	116	91	208
	Summer	0	110	86	196
	Fall	0	29	23	52

An alternate expression of the TMDL to better facilitate implementation, EPA TMDL guidance suggests that alternate expressions of the TMDL can be applied where appropriate. In this case, the TMDL is also represented as a percent reduction across the flow regimes needed to meet the standard (Tables 3.2 and 3.3). Reductions were

calculated using the difference between the geomean and the standard. In essence, the reduction represents what is needed so that the geomean meets the standard of 200-cfu/100 ml. The margin of safety is the difference between the reduction needed for the upper 95% confidence interval to meet the standard and the reduction needed for the geomean to meet the standard.

**Table 3.2. Seasonal Fecal Coliform Statistics Utilized in the Development of Percent Reductions and the Associated TMDL for Carver, Bevens, and Silver Creeks in Caver County, Minnesota.**

	Watershed	N	STDEV	Geomean (cfu/ 100 ml)	UCI (cfu/ 100 ml)	% Reduction	
						Geomean	UCI
Fall	Bevens	89	7.6	1,277	1,991	84%	90%
	Carver	94	6.4	906	1,344	78%	85%
	Silver	21	7.4	926	2,283	78%	91%
	Grand Total	204	7.0	1,055	1,397	81%	86%
Spring	Bevens	90	7.4	655	992	69%	80%
	Carver	84	8.0	290	442	31%	55%
	Silver	23	6.9	971	2,689	79%	93%
	Grand Total	197	8.1	485	650	59%	69%
Summer	Bevens	193	6.7	891	1,199	78%	83%
	Carver	192	6.5	335	456	40%	56%
	Silver	53	10.7	1,168	2,019	83%	90%
	Grand Total	438	7.3	600	737	67%	73%

**Table 3.3. The TMDL for Fecal Coliform in Carver, Bevens, and Silver Creeks as Represented by a Percent Reduction.**

Reach	Critical Condition	Wasteload Allocation (percent)	Load Allocation (percent)	Margin of Safety (percent)	TMDL (percent reduction)

		<b>reduction)</b>	<b>reduction)</b>	<b>reduction)</b>	
Carver Creek	Spring	0%	31%	24%	55%
	Summer	0%	40%	16%	56%
	Fall	0%	78%	7%	85%
Bevens Creek	Spring	<1%(66%) <sup>1</sup>	69%	11%	80%
	Summer	<1%(66%) <sup>1</sup>	78%	5%	83%
	Fall	<1%(66%) <sup>1</sup>	84%	6%	90%
Silver Creek	Spring	0%	79%	14%	93%
	Summer	0%	83%	7%	90%
	Fall	0%	78%	13%	91%

<sup>1</sup> The wasteload reduction in Bevens Creek represents the necessary reduction for the point source discharges to come in compliance with associated permits and not the reduction associated with overall loads, which would be less than 1%.

This expression of the TMDL is provided to help managers responsible for implementing the TMDL. The percent reduction expression is easy to understand and explain to local stakeholders and interested public. Additionally, selection of BMPs can be guided by their known effectiveness and treatment areas within the watershed without complex modeling where the uncertainty in predictions can often present significant obstacles. For example, if changes to manure spreading is expected to decrease export by 50% and runoff from fields is calculated as 50% of the load, we can expect a 25% reduction which can be applied to the TMDL. BMPs can then be chosen to achieve the percent reduction allocation to meet the TMDL. Subsequent monitoring under adaptive management will verify that the predicted reductions were actually achieved.

## **4.0 Implementation Management Measures**

### **Overview**

In this section ten management measures are described that will be employed during the implementation plan to reach the goal of 69-86% source reductions of fecal coliform bacteria. Each management measure includes an estimate of the time and additional resources needed to achieve this goal.

The following implementation strategies referenced are of two major types: 1) Those that are regulatory in nature (feedlots, manure management, ISTS, stormwater, and wastewater) and, 2) Those that are strictly voluntary such as the promotion of buffers and crop residue, and closing surface tile intakes. In the case of the voluntary implementation strategies, Carver County Water Resources will work with local, state and federal resources for technical and financial assistance and will be based on collaboration between local landowners, staff, departments and agencies.

The goals of any water quality project should be based on practical considerations. Two important considerations are the potential for improvement for the specific watershed and how feasible the implementation is. An agricultural watershed is never going to be as pristine as a low population forest and realistic goals should reflect the constraints of the local economy and subsequent land use practices. The implementation controls have to be contiguous with the local culture, in that a certain degree of local “buy in” is necessary for the general success of the project.

The project staff, partners, and technical committee feel that the goals are realistic and obtainable, and that the initial success of the implementation plan is crucial to the long-term management of watershed water quality. The availability of programs, funding, local technical expertise and experience, and public acceptance are considered optimal with the project goals and strategies.

The basic approach to meeting the water quality goals is three fold: 1) limit and control the amount of production of Fecal Coliform and the location of the production facilities; 2) adopt effective management practices to properly handle fecal materials that are produced; and 3) provide barriers between the fecal loading sources and the streams.

### **4.1 Regulatory Approaches**

#### **4.1.2 Watershed Rules**

Water Rules establish standards and specifications for the common elements relating to watershed resource management including: Water Quantity, Water Quality, Natural Resource Protection, Erosion and Sediment Control, Wetland Protection, Shoreland Management, and Floodplain Management. Of particular benefit to Fecal TMDL reduction strategies are the stormwater management and infiltration standards which are required of new development in the CCWRMA. The complete water management rules are contained in the Carver County Code, Section 153. Sibley County Environmental

Services department operates under the Sibley County Zoning Ordinance, finalized 10/8/02.

### 4.1.3 NPDES MS4 Stormwater Permits

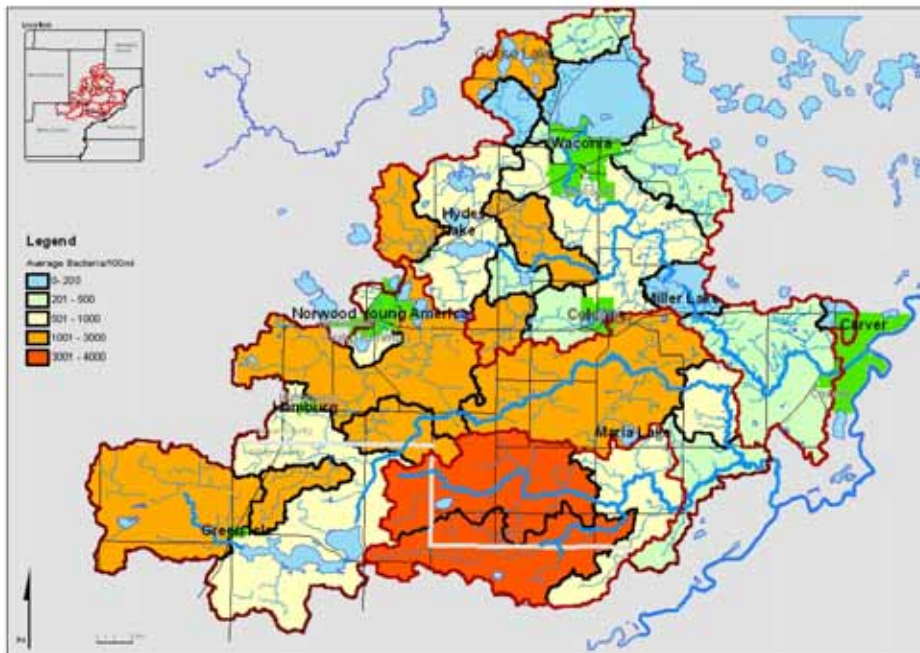
The Stormwater Program for MS4s is designed to reduce the amount of sediment and pollution that enters surface and ground water from storm sewer systems to the maximum extent practicable. Stormwater discharges associated with MS4s are regulated through the use of National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits are legal documents. Through this permit, the owner or operator is required to develop a stormwater pollution prevention program (SWPPP) that incorporates best management practices (BMPs) applicable to their MS4.

Under the stormwater program, MS4s are required to develop and implement a Stormwater Pollution Prevention Program (SWPPP). The SWPPP must cover six minimum control measures:

- Public education and outreach;
- Public participation/involvement;
- Illicit discharge, detection and elimination;
- Construction site runoff control;
- Post-construction site runoff control; and
- Pollution prevention/good housekeeping.

The MS4 must identify best management practices (BMPs) and measurable goals associated with each minimum control measure. An annual report on the implementation of the SWPPP must be submitted each year.

**Figure 4.1 Municipalities within the TMDL**



Annual reports are to be submitted to:

MPCA  
Stormwater Management Unit  
Municipal Division  
520 Lafayette Rd. N  
St Paul, MN. 55155-4194

More information about the Phase II Storm Water Program can be found at EPA's web site: <http://www.epa.gov/owm/sw/phase2/index.htm>.

MS4 permit requirements do not currently apply to any municipalities (Fig 4.1) in the Project area watersheds. However, Carver County holds a Phase II MS4 NPDES permit for areas determined by the MPCA to be "urbanized", which are currently the Cities of Chaska, Carver, Chanhassen and their surrounding areas. Therefore, Carver County MS4 permit activities do not necessarily extend to Carver Creek and Bevens Creek watersheds. In the future, the MPCA may change the permit requirements to be applicable countywide. The City of Waconia, in the Carver Creek Watershed submitted an MS4 permit in accordance with Minn. Rule 7090. Additionally, stormwater permits for construction sites greater than one acre and any industrial site on EPA's list of mandatory industrial facilities, per the Standard industrial code, are required.

**Comment:** Need to be updated- rog will send mention carver- make sure it covers matt concerns

#### 4.1.4 MPCA Permits

The MPCA issues NPDES permits for any discharge into waters of the state. Bongaard's Creamery, along with the cities of Carver, Cologne, Norwood Young America, Hamburg and Green Isle are permitted by the MPCA. Our modeling indicates that these facilities introduce little in regards to Fecal Coliform bacteria into the TMDL area. These permits have both general and specific limits on pollutants that are based on water quality standards. Permits regulate discharges with the goals of 1) protecting public health and aquatic life, and 2) assuring that every facility treats wastewater. More information about permits, water quality data and other MPCA programs can be found on the agency's web site; <http://www.pca.state.mn.us/water>.

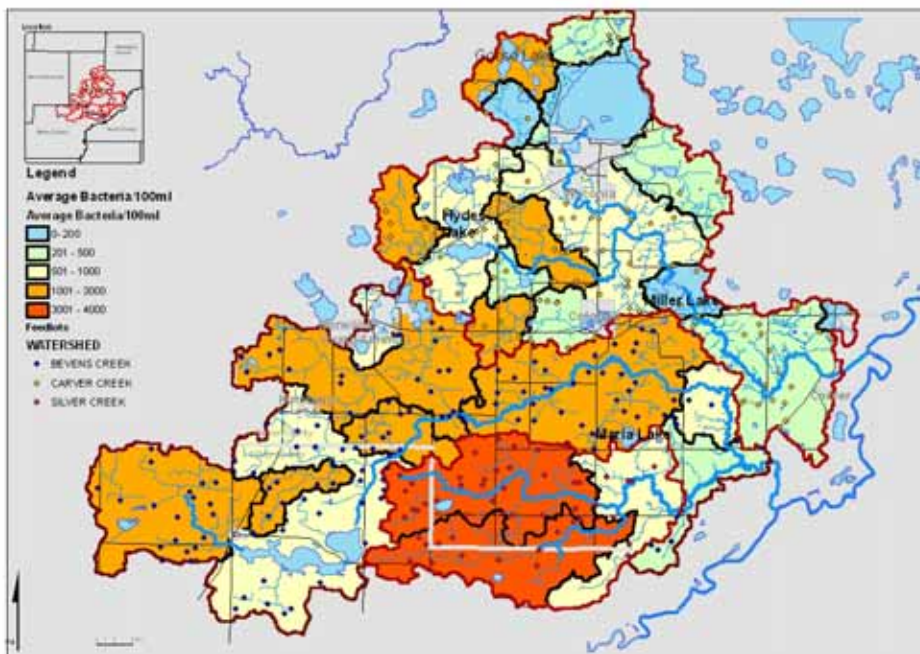
#### 4.1.5 Feedlot Permitting

The County feedlot Management Program includes the feedlot permitting process. The permit process ensures that the feedlot meets State pollution control standards and locally adopted standards. The County has had a locally operated permitting process under delegation from the MPCA since 1980. The County adopted a Feedlot Ordinance in

1996. The Feedlot Ordinance incorporates State standards plus additional standards and procedures deemed necessary to appropriately manage feedlots in Carver County.

Most feedlots in Carver, Sibley County and the State are not required to have an ongoing operating permit. All feedlots of 10 animal units or more in the Shoreland Zoned area and 50 animal units or more outside of the Shoreland area must be registered with the MN Pollution Control Agency (Fig 4.2). The information collected states who own the feedlot, the location of the feedlot and the type and number of animals. This information must be updated every four years. Carver County requires all feedlots of 10 animal units or more to be registered. Over 400 feedlots have completed this process. We believe this process has identified the vast majority of feedlots in the Counties.

**Figure 4.2 Feedlots within the TMDL area**



Feedlots that make substantial changes in animal numbers or manure management must obtain permits before making changes. Carver and Sibley Counties manage this process according to State regulations via a Delegation Agreement with the MPCA. Carver County requires feedlots of 10 animal units or more in the Shoreland, feedlots of 300 animal units or more in the eastern part of the County, and feedlots of 600 animal units or



more in the western part of the County to obtain Conditional Use Permits. These permits cover feedlot activities in sensitive areas and those of larger feedlots. About 15 of the 84 feedlots [80 in Shoreland, 4 larger operations not in Shoreland] that fall in these categories have CUPs. The others are brought into the CUP process when they expand or make other changes in their operations. Most of these operations have not made recent changes and have not been required to complete the CUP process.

No feedlots have yet been required to obtain the Federal NPDES Confined Animal Feeding Operation permit. No Carver County Feedlots have been identified that meet the criteria for these permits. These are typically feedlots of over 1,000 animal units.

More information on the County Feedlot Management Program can be found in the Carver County Water Management Plan 2001 or on the County's web site: <http://www.co.carver.mn.us/water/wmp.asp>. Specific information regarding the Sibley County Zoning Ordinance and Feedlot management can be found at [www.co.sibley.mn.us/Dept\\_Frame.htm](http://www.co.sibley.mn.us/Dept_Frame.htm) by clicking on the Environmental Services link.

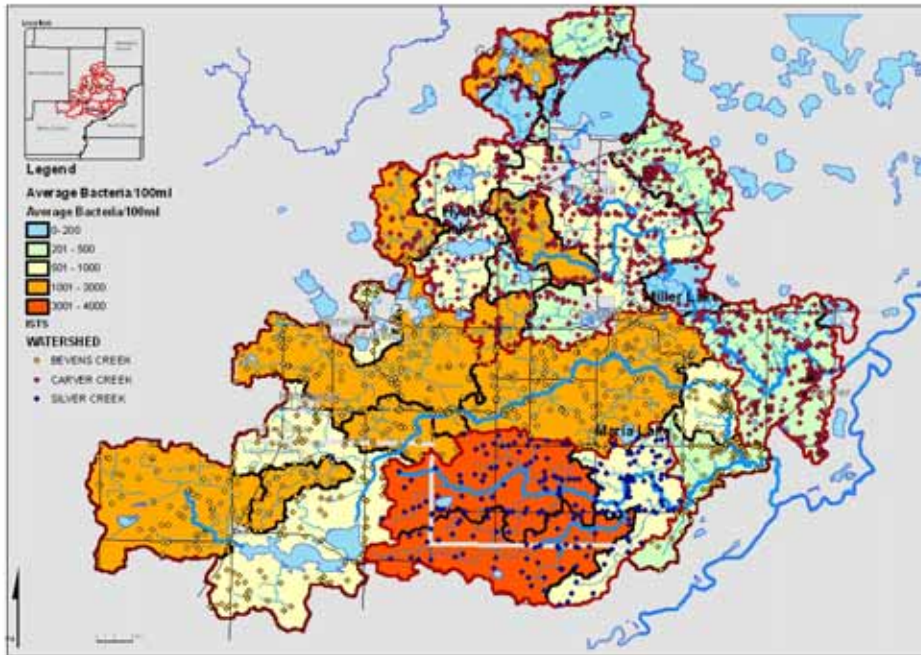
#### **4.1.6 County ISTS Ordinance**

The Carver County ISTS Code was first developed as an Ordinance in 1991. Prior to 1991, except for properties in shoreland areas, ISTS (aka septic system) regulations were guidelines, there were no mandatory state-wide regulations. Sibley County Environmental Services department oversees ISTS and operates under the Sibley County Zoning Ordinance, finalized 10/8/02.

The Current ISTS Rules, MN Rules Chapter 7080, outlines the minimum requirements for septic systems. Language in Chapter 7080 allows Local Units of Government (LUGs) to make their ordinances more restrictive than these minimum standards. Some areas of the current Carver County ISTS Code are more restrictive than state requirements.

The existing Code, Carver County Code 52, regulates the design, location, installation, construction, alteration, extension, repair, and maintenance of ISTSs within Carver County. It was adopted by the Carver County Board of Commissioners in June 2005, and covers all unincorporated areas, cities and townships in the County with the exception of the City of Chanhassen, which has its own ISTS Ordinance. There are currently an estimated 2000 ISTSs with the TMDL area (Fig 4.2), with approximately half of those suspected to be failing.

#### **Figure 4.2 ISTS Location in TMDL Area**



## 4.2 Non-Regulatory and Incentive Based Approaches

### 4.2.1 Education

The implementation of this plan relies on three overall categories of activities: 1) Regulation, 2) Incentives, and 3) Education. For most issues, all three means must be part of an implementation program. The County's have taken the approach that regulation is only a supplement to a strong education and incentive based program to create an environment of low risk and high success. Understanding the risk through education can go a long way in preventing problems. In addition, education, in many cases, can be a simpler, less costly and more community friendly way of achieving goals and policies. Education efforts can provide the framework for more of a "grass roots", community plan implementation, while regulation and incentives traditionally follow a more "top-down" approach. It is recognized however, that education by itself will not always meet intended goals, has certain limitations, and is characteristically more of a long-term approach.

To this end, Carver County created the Environmental Education Coordinator position in 2000. This position has principal responsibility for development and implementation of the water education work plan.

Several issues associated with the water plan were identified as having a higher priority for education efforts. These were identified through discussions with the advisory committees, ease of immediate implementation and knowledge of current problem areas and existing programs. The higher priority objectives are not organized in any particular order. The approach to implement the fecal TMDL will mimic the education strategy of the water plan. Each source reduction strategy will each need an educational component and will be prioritized based on number of landowners, type of source, and coordination with existing programs. Priorities for education are addressed annually and are subject to change based off needs such as local TMDL implementation plans

#### **4.2.2 Incentives**

Many of the existing programs, on which the water mgmt plan relies, are incentive based programs offered through the County and the Carver and Sibley Soil and Water Conservation Districts. Some examples include state and federal cost share funds directed at conservation tillage, crop nutrient management, rock inlets, conservation buffers, and low interest loan programs for ISTS upgrades. Reducing fecal sources will need to rely on a similar strategy of incorporating incentives into implementing practices on the ground. After the approval of the TMDL by the EPA and the County enters the implementation phase it is anticipated that we will apply for additional moneys to assist landowners in the application of BMPs identified in the Implementation Plan.

#### **4.2.3 Priority Areas**

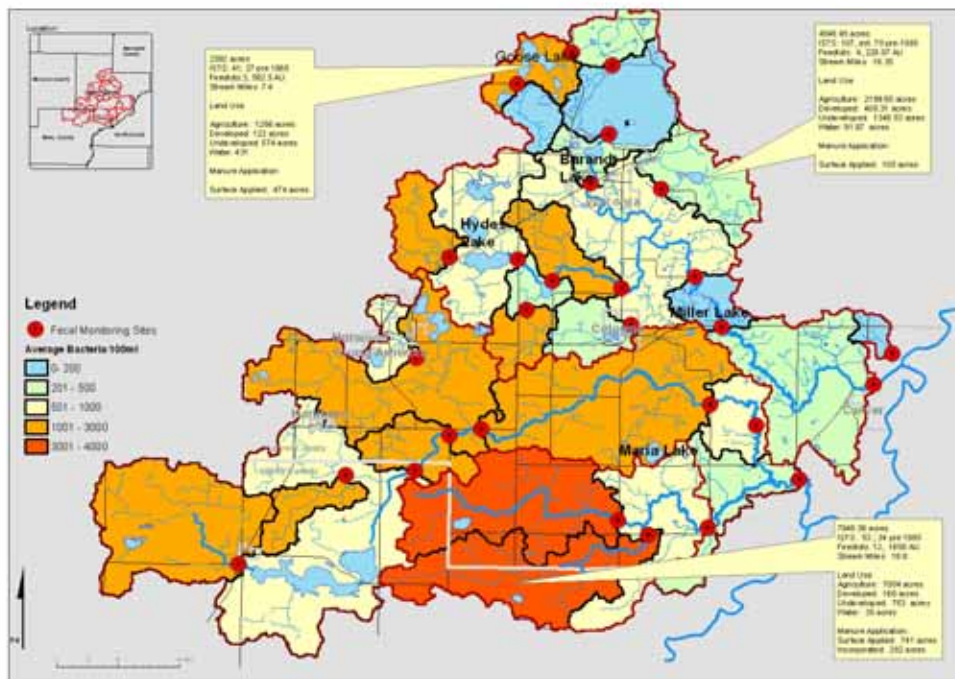
Based on information that we gathered at public meetings, via workgroups and because this implementation plan covers three watersheds (Carver, Bevens, and Silver Creeks) with varying severities of exceedances we have decided to take a targeted approach to combat the fecal coliform issues in the region. The following criteria were used to set a priority level for sub-watershed BMP implementation.

- Levels of Fecal Coliform Contamination (from seasonal averages)
- Proximity of sub-watershed to headwaters (assuming that targeting headwaters areas is easier to monitor progress).
- Total acreage of sub-watershed (smaller easier to monitor progress).
- Number of Fecal Coliform sources within the sub-watershed (smaller numbers easier to assess and manage).
- Priority given to sub-watersheds that have other listed water bodies (i.e. Lake TMDL's)

- If there is any planned or current development taking place within or near the sub-watershed (may offer us the opportunity to work more closely with the city or developer to implement BMP's).

The criteria were given to our Water Environment and Natural Resources committee and as a group it was decided that the following sub-watersheds should be focused on initially while not declining to offer services or incentives in areas outside the priority sub-watersheds within the TMDL area; CC1- Goose Lake sub-watershed composed of 2392 acres, CC7- Reitz Lake sub-watershed composed of 4048 acres, and SI 4 – South Fork Silver Creek Headwaters sub-watershed composed of 7948 acres (Fig 5.1).

**Figure 5.1 Priority Sub Watersheds**



**Priority Sub Watersheds**

The implementation plan will actively focus on the feedlots, manure application during spring and fall, ISTSs, and all other BMPs with the priority areas the for first 5 years of the 15 year plans with the intent to more easily gauge the effectiveness of our plan. With that being said any individual interested in implementing any portion of the plan within the TMDL area will be accommodated graciously. Years 6 -15 will operate in a similar fashion as new priority areas are identified by staff and committees. Stream buffers will

be targeted at priority locations based on the severity of the pollution sources in a given stream reach.

Intensive monitoring will follow each significant level of implementation to document the performance of the control measures put in place. Hopefully, with local acceptance by the landowners, sufficient Fecal Coliform control measures will be implemented throughout the Carver, Bevens and Silver Creek TMDL watershed wide and especially within the priority sub watersheds to determine the effectiveness of the control measures, and project the ultimate success of the plan within the 15 year time frame. Alternatively, if the control measures implemented prove ineffective or show limited performance, new or innovative measures for Fecal Coliform control will need to be evaluated and implemented to keep the plan on course with the water quality goals.

### ***4.3 Description of Implementation Practices***

#### **4.3.1 Riparian Buffers**

Riparian Buffers will be placed in priority areas which were deemed appropriate and/or existing buffers will be increased. Cattle and other livestock will be restricted from streams and fenced if needed. Riparian buffers should reduce runoff proportional to their size and strategic placement. Riparian Buffers have available funding through the CCRP program. Additional funding may be needed to supplement CCRP payment in some targeted areas.

#### **4.3.2 Manure Application/Management**

Land application of manure studies has shown that buffer strips, immediate incorporation and maintenance of surface residue have been demonstrated to reduce manure and pathogen runoff. The new state feedlot rules (Minn. R. ch. 7020, adopted 10/23/2000) require keeping records of manure application and management planning. These records will be used extensively to determine priorities for implementing controls. For any feedlots requiring a permit, the new feedlot rules require that manure management plans be developed. These include feedlots in the following categories:

- Feedlots with more than 300 animal units planning new construction or expansion;
- Feedlots where there is a pollution hazard not corrected by the Open Lot Agreement;
- The feedlot has been designated a CAFO or more than 1000 animal units or direct man-made conveyance to waters;

- Feedlots that have more than 300 animal units and is applying manure in sensitive areas, including: a) soil P levels exceeding 120/150 ppm Olsen/Bray, or half of those values within 300 feet of public waters; b) vulnerable drinking water supply management areas; or c) slopes exceeding 6 percent within 300 feet of waters.
- Feedlot has 300 to 1000 animal units and is not hiring a certified manure applicator.

Developing manure management plans for these feedlots should result in a significant reduction of the total Fecal Coliform delivery to the streams within the TMDL watershed. Based on production inventories and soil application areas and methods, manure handling is considered the largest source contributor to stream Fecal Coliform concentrations. Fecal coliform loading reduction practices will be encouraged for manure management plans within the TMDL area.

Some of the following strategies may be used to accelerate the development and use of manure management plans in the TMDL area:

- Promote Buffer Strips using incentives when necessary.
- Carver and Sibley county and their SWCD's will participate in the project to increase the amount of land set aside for riparian buffers in permanent vegetation.
- Promote Manure and Nutrient Management Plans using incentives to pay for manure and soil testing.
- Promote incorporation of manure in every application throughout the entire TMDL area.
- Implement Carver County's Feedlot Management Ordinance (section 4.4)
- Promote Sibley County's Zoning Ordinance, especially as it relates to ISTS and Feedlot management.
- Institute an intensive information and education program.

#### **4.3.3 Manure Composting**

Manure composting will be encouraged in the information and education program. There are several environmental advantages to composting manure. Advantages include: 1) the destruction of pathogens, 2) the conversion of manure to dry material (Manure is spread uniformly as a fertilizer and its nutrient content remains intact. It also reduces the risk of over-applying nutrients.), and, 3) When combined with the separation of liquids and solids, composting reduces the amount of storage needed. With education, technical support and financial assistance manure composting can significantly reduce manure runoff. This strategy can be cost effective with larger facilities where fixed costs can be spread over larger production in watersheds where fecal coli form impairment is high.

#### **4.3.4 Conservation Tillage**

Conservation tillage is another cost-effective management practice that can significantly reduce fecal coliform bacterial loading in the Bevens, Silver, and Carver Creek Watersheds. A balance between immediate incorporation of fecal matter as fertilizer into the soil and the need for surface residue cover for erosion control must be weighed however. The University of Minnesota published a document entitled: "Tillage Best Management Practices for Water Quality Protection in Southeastern Minnesota." This publication can be used in both promoting conservation tillage and determining the BMP in this implementation phase of the TMDL.

#### **4.3.5 Open Tile Inlet Replacement**

Modeling shows that manure management is a major source of our fecal coliform bacteria during wet periods, much of the runoff enters these streams unprotected during those flow regimes. Rock inlets, grass buffers, or patterned tile will be the methods used to protect surface tile intakes. Land that receives surface applied manure will receive the highest priority and likely be targeted with a combination of the above mentioned practices. Carver County has had success with getting rock inlets installed to replace open tile intakes.

#### **4.3.6 Wetland Restorations**

Wetlands in their natural setting act like a sponge, soaking up and filtering runoff before it is released into surface waters. Where ever feasible, staff will promote the existing programs that deal with wetland restoration. However, additional incentive payments may be needed to address the situations where current programs (CCRP, WRP) do not qualify do to lack of cropping history. In addition, it is important to note that upon saturation, the wetland acts like a faucet, allowing built-up runoff to be released into surface waters. As such, it is important that runoff into the wetlands be managed according to the listed BMP's.

### **4.4 *Septic System Management***

#### **4.4.1 Management Measures**

Individual Sewage Treatment Systems or ISTS with proper drain fields provide nearly complete treatment of fecal coliform bacteria. Acceptable designs are described in Minn. R. ch.7080. Both Carver and Sibley counties in the TMDL area are responsible to enforce these rules that come into play with transfer of ownership of property and/or when new construction/remodeling occurs. Failing and non-compliant septic systems are less than 10% of the fecal coliform load to Carver, Bevens, and Silver Creeks during wet conditions, but represent 60% or greater of the load during dry periods. Implementation with incentives (loans and or small grants) will be provided to address this source.

Critical areas for implementation of this strategy are given priority based on potential results in reducing fecal coliform loading and the potential for high delivery of pollutants. The priority in the TMDL area will be proximity to the streams and/or ditches. Additional priority will include systems that pose an imminent public health threat, and

ISTS with a direct discharge to surface water where little or no treatment is provided. These include direct discharges to ditches and failing systems that discharge directly to surface water. Carver County currently has a low interest loan program in place, that program will be bolstered with additional funding and will be more actively promoted to ensure that failing ISTS's within the three watersheds are systematically updated over the life of the implementation plan. Sibley County has utilized similar loan programs in other watersheds within the County and with proper funding may opt to promote those programs in other areas as well.

#### ***4.5 Implementation Monitoring and Evaluation***

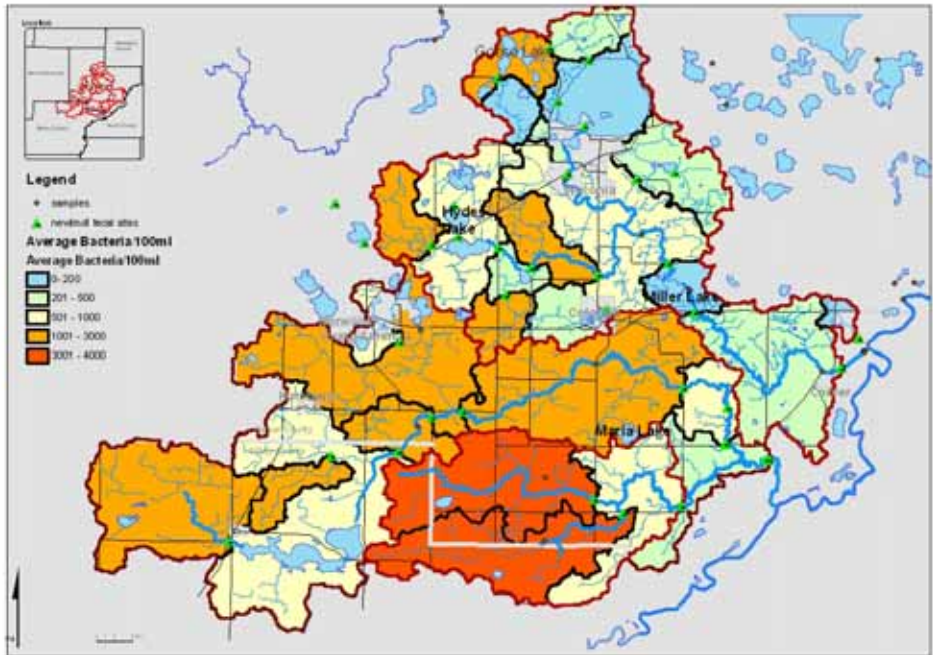
In order to accurately evaluate the progress of meeting the fecal coliform bacteria TMDL we plan on tracking adoption of practices as well as continuing to monitor changes in water quality.

To track changes in land use (i.e. conservation tillage, manure management) we will utilize current programs (i.e. e-Link and transect survey results) as well as tracking permits (ISTS, Feedlot, and Stormwater).

To evaluate changes in water quality, established water quality monitoring stations (Fig 5.2 )will be utilized so efforts are not duplicated and the results can also be used in evaluating other current and future TMDL's. Several of the sites are or will be situated on sub-watershed break lines so that we can accurately assess how the implementation plan is effecting water quality based on practices implemented solely in the targeted watersheds.

#### **Figure 5.2 Sampling Sites within the TMDL area**





A. Monitoring Plan

- a. Carver County Staff will utilize existing and future water quality monitoring stations at several locations to be determined in order to assess water quality at the sub-watershed scale.
  - i. Every year approximately 20 “baseline” sites will be monitored bi-weekly April – October for Fecal Coliform (and E. Coli at the discretion of the MPCA)
  - ii. Every fifth year 32 “TMDL sites” will be monitored bi-weekly April – October for Fecal Coliform (and E. Coli at the discretion of the MPCA)
  - iii. In addition to the above grab samples, 3 automated samplers will be established at the outlet of the 3 priority watersheds.
- b. Capturing flow data will be an important part of the monitoring program, not for assessing numbers of fecal coliform bacteria per se but to help assess other current and future TMDL’s. Along with flow, grab and storm samples will be analyzed by the Metropolitan

Council's Laboratory for the following analytes: total phosphorus, total dissolved phosphorus, nitrite plus nitrate nitrogen, ammonia nitrogen, total suspended solids, volatile solids, ortho phosphate, COD, turbidity, total Kjeldahl-nitrogen, and total alkalinity. Minnesota Valley Testing Laboratory (or another accredited laboratory) will be utilized for analyzing fecal coliform samples and at the discretion of the MPCA E.coli as well.

- B. Updating model that established TMDL
  - a. At the conclusion of the targeted sub-watershed activity after 5 years, the model that was initially developed for the fecal coliform TMDL will be updated with the new data, landuse, and practices. At that point we can make a comparison to when we started to see what type of reductions we have made and rate the effectiveness of the Implementation Plan.
- B. Criteria for achieving goals, revision of the TMDL Report, or revision of the implementation plan.
  - a. Criteria to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining targets, or assuring continued attainment of water quality standards include:
    - i. Success of number of implemented BMP's
    - ii. Results from future model runs.
    - iii. Results of water quality data.
    - iv. Public perception
  - b. Criteria for determining whether the TMDL Report or implementation plan need to be revised, new TMDLs need to be developed, or an use attainability study need to be completed for waters in the watershed if reductions are not achieved include:
    - i. Fecal coliform bacteria numbers are not met by the end of the 15 year Implementation Plan (assuming proper funding).
    - ii. After a significant increase in BMP's implemented, modeling and water quality data don't show improvements or trends that reflect the implementation plan is improving fecal coliform bacteria numbers.
    - iii. Public perception

#### **4.6 Efficacy of Best Management Practices**

The source reduction strategies (Implementation) have been shown to be successful in reducing fecal coliform transport and survival. Many of the mentioned strategies are already adopted by the County Water Management Plan. However, after the approval of the Draft TMDL, additional funding will enable the strategies to be aggressively approached.

**Individual Sewage Treatment Systems-** ISTS with correct drain fields provide virtually complete treatment of fecal coliform bacteria. Acceptable designs for ISTS are described in Minn. R. ch. 7080. The County ISTS Ordinance regulates the design, location, installation, construction, alteration, extension, repair, and maintenance of ISTSs. Carver County is entrusted to implement these rules, which require conformance with state standards for new construction and disclosure of the state of the ISTS when property transfers ownership. Sibley County Environmental Services department operates under the Sibley County Zoning Ordinance, finalized 10/8/02.

**Feedlots-** When feedlots are managed properly, the quality of surface water and groundwater will not be impaired. Feedlots in the County must obtain a permit as required by the County Ordinance and will be operated and managed according to the Ordinance and current best management practices. Runoff controls are evaluated by professional engineers through the Feedlot Evaluation Model referenced in Minn. R. ch 7020. These rules are implemented by MPCA, SWCD and county staff. Sibley County Environmental Services department operates under the Sibley County Zoning Ordinance, finalized 10/8/02.

**Rural Practices-** Carver County and Carver SWCD promote a Core-4 approach, developed by the Conservation Technology Information Center (CTIC) and its agricultural partners, to farmers including 1) Conservation Tillage; 2) Crop Nutrient Management; 3) Insect, Weed and Disease Management; and 4) Conservation Buffers. Core-4 benefits both crop production and natural resource conservation. These methods are practical and when planned and applied properly reduce runoff and soil erosion, improve water quality and reduce risk of potential pollution. State feedlot rules (Minn. R. ch 7020) require manure application record-keeping and manure management planning with the exact requirements differing according to size of operation and pollution risk of application, based on method, time and place of application. Sibley County Environmental Services department operates under the Sibley County Zoning Ordinance, finalized 10/8/02.

**Stormwater Management-** Practices such as runoff detention, infiltration, and street sweeping have been shown to be effective in reducing urban runoff and associated pollutants. Communities in the watershed are required to have a Local Stormwater Management Plan and to meet County Water Management Rules, which are being amended to mirror NPDES Phase II construction permit requirements, all of which address treatment of stormwater runoff.

## 5.0 Budget

The annual and 15 year budget and associated assumptions are shown in detail below. There are 7 elements to budget: 1) Administration; 2) Water Quality Monitoring; 3) Watershed Assessment/Modeling/Data Analysis; 4) Education; 5) Implementation; and 7) Incentives. The costs are presented as annual costs with the exception of one time equipment purchase listed under element 2.1 and element 5.2 that represents all 15 years of implementation.

Administration element involves the planning and continuous review of the work plan. Tracking the implementation activities, monitoring results, costs, and the sentiment of the land owners and make adjustments to the work plan based on these factors. The water quality monitoring element involves both hydrologic and water quality sampling programs. The Watershed assessment element involves tracking the project progress using GIS, upgrading databases, populating models, reducing and summarizing the hydrological, water quality, and GIS data and will focus on the implementation activities and the agreements developed to project there efficiency. This will include performance assessment of individual implementation activities, the effect of implementation on the three priority sub watersheds, and the total TMDL watershed performance. Information and education will be an ongoing and important element in the implementation plan; public meetings, local and national information dissemination, watershed tours, and individual discussions with citizens and land owners. This element will be the driving force for local acceptance of the implementation plan.

The implementation element involves the activities described in the Implementation Plan Budget (below) numbers 5.1 and 5.2, and includes the labor required. The administration costs are described in element 7 and the total costs for the project are summarized on an annual and 15 year basis.

**Table 5.1** Implementation Elements

Carver, Bevens, and Silver Creek Fecal Coliform TMDL							
Implementation Plan Budget							
Budget Element		Cost	hours	Expense			Total
<b>1.0 Administration</b>							
Project Manager		\$50.00	100				\$5,000.00
Consultant		\$100.00	20				\$2,000.00
Supplies				\$1,000.00			\$1,000.00
						<b>Total/year</b>	<b>\$8,000.00</b>
<b>2.0 Water Quality</b>							
<b>Monitoring</b>							
		Cost	hours	Expense			Total
Staff		\$50.00	250				\$12,500.00
Mileage		\$0.45	1,500				\$675.00
consultant		\$100.00	15				\$1,500.00
maintenance				\$1,500.00			\$1,500.00
*One time equipment purchase				<u>\$37,500.00</u>			
Included in 1st year total							
<b>Analysis</b>							
		Cost	Number of Samples				Total
Fecal analysis		\$15.00	420				\$6,300.00
Outlet Sampling		\$70.00	100				\$7,000.00
						<b>Total/year</b>	<b>\$29,475.00</b>
<b>3.0 Watershed Assessment...</b>							
		Cost	hours	Expense			
Staff		\$50.00	150				\$7,500.00
Consultant		\$100.00	60				\$6,000.00
Supplies				\$1,000.00			\$1,000.00
						<b>Total/year</b>	<b>\$14,500.00</b>
<b>4.0 Education/Information</b>							
		Cost	hours	Expense			
Staff		\$50.00	100				\$5,000.00
Consultant		\$100.00	10				\$1,000.00
Supplies				\$2,000.00			\$2,000.00
Public Meetings				\$2,000.00			\$2,000.00
County Fair				\$2,000.00			\$2,000.00
Watershed Tours				\$2,000.00			\$2,000.00
National Conference				\$2,500.00			\$2,500.00
						<b>Total/year</b>	<b>\$16,500.00</b>
<b>5.0 Implementation</b>							
5.1 Staff		\$50.00	2080			<b>Total/year</b>	<b>\$104,000.00</b>
<b>5.2 Control Measures (lump sum loan/grant dollars)</b>							
			acres/ number of systems			% Implemented (x 100)	
Feedlots				\$200,000.00		1	\$200,000.00
Buffers/CCRP		\$100.00	3100			0.5	\$155,000.00
Open Inlets		\$300.00	900			0.5	\$135,000.00
ISTS Upgrades		\$500.00	2500			0.5	\$625,000.00
ISTS Loans				\$750,000.00			\$750,000.00
						<b>Total</b>	<b>\$1,865,000.00</b>

**Table 5.2** Summary of Implementation elements

<b>6.0 Summary</b>			Inkind	Cash	Total			
<b>Annual Budget</b>								
Element 1: Administration				\$8,000.00	\$8,000.00			
Element 2: Water Quality				\$66,975.00	\$66,975.00			
Element 3: Watershed Assessment				\$14,500.00	\$14,500.00			
Element 4: Education				\$16,500.00	\$16,500.00			
Element 5: Implementation Staff				\$104,000.00	\$104,000.00			
				<b>Total year*</b>	<b>\$209,975.00</b>			
<b>15 Year Budget</b>								
Element 1: Administration				\$120,000.00	\$120,000.00			
Element 2: Water Quality				\$442,125.00	\$442,125.00			
Element 3: Watershed Assessment				\$217,500.00	\$217,500.00			
Element 4: Education				\$247,500.00	\$247,500.00			
Element 5: Implementation				\$1,560,000.00	\$3,425,000.00			
				<b>15 Year Total</b>	<b>\$4,489,625.00</b>			
				*One time equipment purchase				
				Included in 1st year total (\$172,475 thereafter)				

The expected performance of the implementation plan depends on the local acceptance and the performance of each control strategy. The plan addresses the largest sources with the most implementation strategies, manure management. Stream Buffers, drain tile intakes, tillage practices, and nutrient/manure management are all intended to inhibit fecal coliform from entering the stream. Feed lot and septic system upgrades will be addressed by the current rules coupled with incentives.