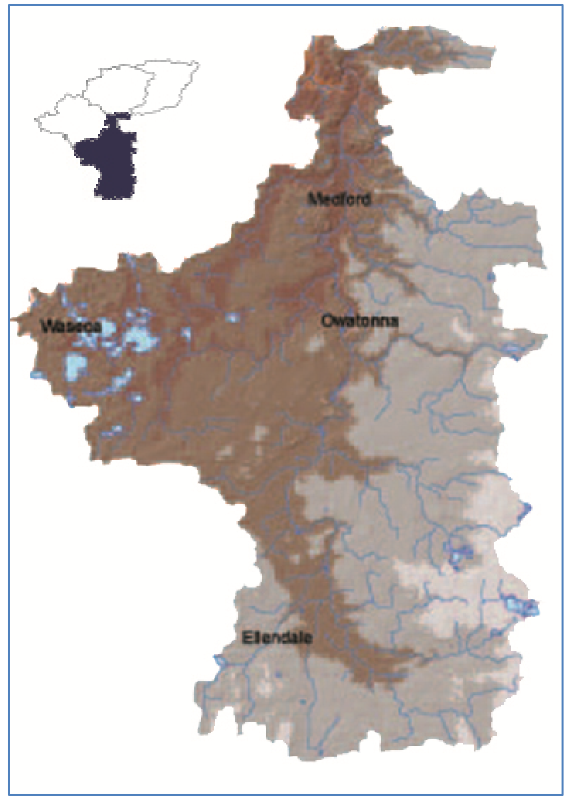
Outline



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Introduction

As discussed in Chapter 1, watershed management and monitoring strategies in this document are broken up by watershed lobe. The Straight River includes portions of three counties: Rice, Waseca, and Steele. It begins at the headwaters of the Straight River at Oak Glen Lake and ends at the confluence of the Straight and Cannon Rivers in Faribault. This chapter contains a brief overview of the Straight River Lobe's physical landscape and land use, a summary of monitoring data collected on the lobe's lakes and streams, priority management zones and concepts with suggestions actions and/or projects to be implemented, and finally a monitoring strategy to guide future work to assess the health of the lakes and streams and track progress in making improvements.

Overview of Physical Landscape and Land Use

The Straight River is about 45 miles long and drains 440 square miles. It falls an average of about seven feet per mile from Oak Glen Lake at 1,283 feet to Faribault at 960 feet. Crane Creek is a major tributary to the Straight River along with Turtle, Maple, Medford, Rush and Falls Creeks. Maple Creek enters the Straight River at Owatonna. There are few lakes in this lobe. The Straight River flows into the Cannon River near Faribault. It winds through steep bluffs near Faribault's River Bend Nature Center.

The Straight River Lobe has the most land with cultivated crops. The watershed is extensively drained by ditches and tile lines. In several places, the Straight River itself is officially classified as a ditch. County and judicial ditches (public) are funded and maintained through assessments on those property owners who benefit from the drainage of their land.

Summary of Water Quality Data

The Metropolitan Council, a governmental unit that plans for metropolitan growth in the Twin Cities metro area, has developed a grading scale for metro lakes using three parameters: total phosphorus and chlorophyll a concentrations, and Secchi disc transparencies. The grading criteria are based on a range of data collected from metropolitan lakes. The grading criteria are shown in Table 5.

The Met Council's grading scale is useful in comparing the water quality of the lakes in the Straight River Lobe. Unfortunately, all of the Straight River's lakes have grades of "C" or below, except Beaver Lake, with most lakes having a grade of "F". Table 9 shows the Met Council rating for each lake in the Straight River Lobe.

Table 9. *Met Council grades for Straight River lobe lakes*

Lake (Years observed)	Met Council Secchi rating (m)	Met Council TP rating (ug/L)	Met Council Chlorophyll-A rating (ug/L)
Beaver* (2008)	B	A	A
Clear ('60-09)	F	D	C
Goose* (2010)	D	F	B
Loon ('73-09)	D	F	C
Rice-Waseca*(2010)	F	F	D
Sprague* (2002)	F	F	F
Watkins* (2010)	F	F	B

*Indicates only one year of water quality data collected.

Straight River Turbidity TMDL

The Straight River Turbidity TMDL is in process (as of June 2011). This study covers five impaired reaches of the Straight River and one tributary, Rush Creek. As part of the TMDL project geomorphology sampling was conducted on the Straight River, Crane Creek, and Turtle Creek to help understand sediment sources related to bank erosion. A report and presentation of the geomorphology sampling can be found in the Watershed Library on the CRWP website at http://www.crwp.net/straight-river/.

Also as part of the TMDL project, DNR staff are calibrating a GSSHA model (Gridded Surface Subsurface Hydrologic Analysis) for Crane Creek, Turtle Creek, and the Straight River. The GSSHA model is a complete watershed simulation and management model used for hydrologic and sediment simulation and management. Once calibrated, GSSHA can be used to provide greater definition of sources of turbidity. By running scenarios using GSSHA the effectiveness of different BMPs in reducing turbidity in the watershed and where to best apply BMPs to reduce turbidity can be determined. The GSSHA model will be calibrated by August 2011. It is hoped scenarios will be worked on over the fall and winter of 2011/2012.

Additional monitoring data for the Straight River Lobe's lakes and streams and the Cannon River watershed as a whole is included in Appendix E. Analysis of whether the lakes and streams are improving can be found in Appendix A, Appendix C, and Appendix E.

Management Strategy: Priority Management Zones (PMZs) and Concepts (PMCs)

The Priority Management Zones and Priority Management Concepts below are meant to be for the next three to five years. Chapter 6 provides an explanation of PMZs and PMCs and a description of the process that was used to select the priority management zones and concepts for each lobe. The table summarizing information from the "list of assets" for each lake and stream in the lobe is included as Appendix G. The "list of assets" for the Straight River Lobe can be found in the Watershed Library on the Cannon River Watershed Partnership's website (www.crwp.net). The PMZs and PMCs selected by local water resource professionals and citizens leaders are listed below *(not in order of priority)*:

1. Maple Creek: Flood reduction
2. Turtle Creek: Sediment loading reduction
3. Owatonna: Urban stormwater management
4. Straight River at Clinton Falls: Improve channel stability
5. Continued focus on fecal coliform/*E. Coli* bacteria pollution reduction
6. Judicial Ditch 2 and Judicial Ditch 2-Lateral 2: Riparian buffer installation

Maple Creek: Flood reduction

Maple Creek begins east of Owatonna in Steele County and flows through the eastern and northeastern parts of Owatonna before entering the Straight River. Maple Creek experienced severe flooding in the City of Owatonna during the floods of September 2010 causing extensive damage. Since the flood of 2010, there has been interest from concerned citizens, the City of Owatonna, and Steele County in studying the hydrology of Maple Creek to understand the causes of the flooding and what can be done to protect the City of Owatonna from future flooding.

Maple Creek is also involved in the Straight River Turbidity TMDL, and in order to meet the sediment load reductions for the Straight River reducing sediment from Maple Creek will be necessary.

Actions

1. Model flood conditions (using a hydraulic routing model) to create flood inundation maps showing where water will go under different flood conditions.
2. Run scenarios on GSSHA to understand effectiveness of different BMPs in reducing flow in Maple Creek and where to apply BMPs to reduce flow.
3. Implement recommended BMPs from GSSHA modeling. Engage and incentivize landowners to implement BMPs in priority areas identified by GSSHA modeling.
4. In conjunction with watershed BMPs, implement in-channel BMPs to protect streambanks and reduce streambank erosion.

Turtle Creek: Sediment loading reduction

Turtle Creek begins south and east of Owatonna and joins the Straight River south of Owatonna. In the September 2010 flood, Turtle Creek experienced significant flooding and probably contributed to the severe flooding in Owatonna. Since the flood of 2010, there has been interest from concerned citizens in studying the hydrology of Turtle Creek to understand the causes of the flooding and what can be done to protect landowners along the creek and the City of Owatonna from future flooding.

Turtle Creek is also involved in the Straight River Turbidity TMDL, and in order to meet the sediment load reductions for the Straight River reducing sediment from Turtle Creek will be necessary.

Actions

1. Run scenarios on GSSHA to understand effectiveness of different BMPs in reducing turbidity and flow in Turtle Creek and where to apply BMPs to reduce turbidity.

2. Implement recommended BMPs from GSSHA modeling and engage and incentivize landowners to implement BMPs in areas identified by GSSHA modeling.
3. In conjunction with watershed BMPs, implement in-channel BMPs to protect streambanks and reduce streambank erosion, especially in the City of Owatonna.

Owatonna: Urban stormwater management

The City of Owatonna falls under the Municipal Separate Storm Sewer System (MS4) permitting program through the MPCA. The MS4 permit requires the cities create a Stormwater Pollution Prevention Plan (SWPPP) and are required to make progress on pollutant load reductions as specified in any TMDLs to which their cities make a contribution.

The Urban Stormwater Section of Chapter 5 – Management Strategies provides a summary of stormwater best management practices for prevention and treatment of stormwater. It also includes a summary of the strategy the MPCA is proposing to help MS4 permitted cities be in compliance with TMDL load reductions.

Straight River at Clinton Falls: Improve channel stability

Text by Todd Kolander, MN DNR Clean Water Legacy Specialist

In the Clinton Falls reach of the Straight River an abandoned dam from a mill or other stream powered structure exists. This structure previously held back the river creating a small reservoir for the purposes of using the water to power the mill. Over time this back up of the water interfered with the movement of the rivers bed load and suspended load causing these materials to deposit in the reservoir. Since the dam has been abandoned, the river has started to reclaim its channel by down cutting through these deposited sediments and moving them down stream by stream bank and bed erosion.

To limit some of this down cutting in the stream bed, the use of grade stabilization in the river channel might be a possible restoration option. This would require careful documentation of the existing and historical stream bed grade and riffle/pool spacing to allow for the proper installation of grade control structures. Grade control structures could be made from local cobble stones to create stream riffles which are dug into the stream bed. These artificial riffles prevent head cutting from moving up stream by acting as a barrier to any potential head cut moving upstream. They would also help dissipate energy, add habitat and make sure the stream remains in contact with its floodplain.

Actions

1. Further explore the feasibility and appropriateness of a grade stabilization project for the Straight River at Clinton Falls.

Continued focus on fecal coliform/E. Coli bacteria pollution reduction

Since the completion of the original Lower Mississippi River Basin Regional Fecal Coliform TMDL in 2002, Steele County has spent considerable time and resources implementing BMPs to reduce fecal coliform / *E. coli* pollution. While significant progress has been made, there are additional efforts that can be made to reduce pollution even further. Because a significant number of BMPs and projects have been put in place to reduce fecal coliform loading, monitoring to assess progress is proposed as part of this lobe's monitoring strategy.

Actions

1. Continue assisting small communities with inadequate wastewater treatment to upgrade their wastewater treatment systems.
2. Inventory and upgrade all ISTS with the highest priority being ISTS in shoreland.
3. Improve land application of manure practices through education and outreach. Possible education activities include field days and trainings for commercial animal waste technicians.

Judicial Ditch 2 and Judicial Ditch 2-Lateral 2: Riparian buffer installation

Judicial Ditch 2 and Judicial Ditch 2-Lateral 2 are located in southern Steele County. Judicial Ditch 2 ends north of Hope. Judicial Ditch 2 and Judicial Ditch 2-Lateral 2 are shown below in Figure 12.

Discussion at the Straight River Lobe meeting to determine PMZs centered around the need for buffers on these two parts of Judicial Ditch 2 and that these ditches would be good candidates for a redetermination of benefits process by Steele County. In addition, a new suggestion arose regarding incorporating water quality improvement projects into ditch maintenance activities. It was thought that it is important to begin viewing ditches as providing multiple benefits, not only drainage but also water quality protection and improvement. Unlike streams and rivers, ditches are periodically maintained which offers an opportunity to look at and implement projects to improve water quality at the same time as maintenance occurs.

Actions

1. Install at least 1-rod buffers along all of Judicial Ditch 2 and Judicial Ditch 2-Lateral 2. One possible approach to achieving the 1-rod buffer is as part of a redetermination of benefits process for both ditches.
2. Pilot a holistic approach to redetermination of benefits and ditch maintenance for Judicial Ditch 2 and Judicial Ditch 2-Lateral 2 in which as a part of ditch maintenance projects to improve water quality are identified and implemented along with projects to improve drainage.

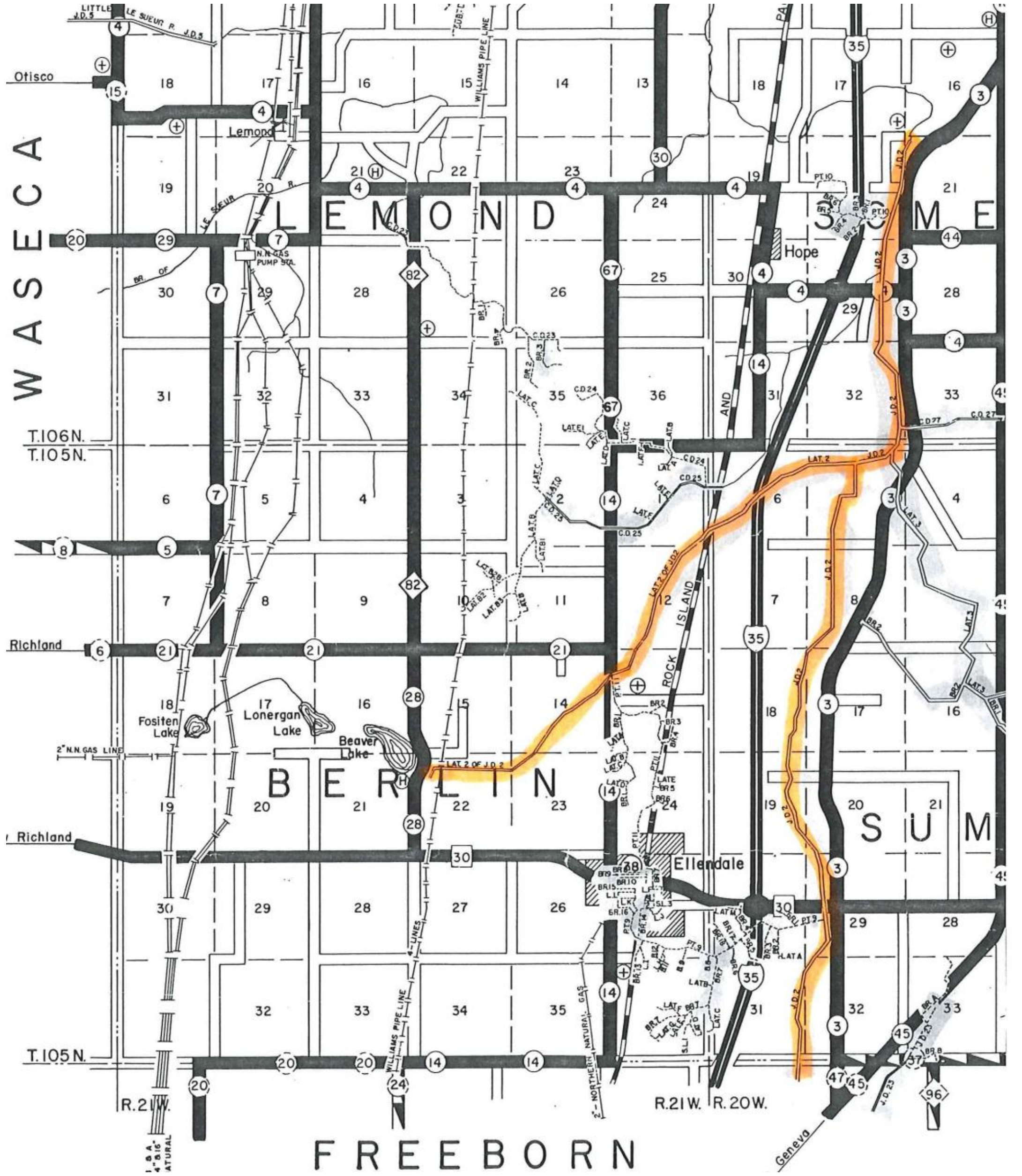

Figure 12. Judicial Ditch 2 and Judicial Ditch 2-Lateral 2

Monitoring Strategy

Short-term (0-3 years) and long-term (5-10 years) monitoring strategies were determined utilizing past, current, and future water quality monitoring data. These short and long-term monitoring strategies are discussed in further detail below.

Short-term (0-3 years)

1. Review all water quality and physical data collected

First, all previous water quality chemical and physical data collected throughout this watershed lobe was reviewed to gain perspective on the impaired areas and type of information collected from the various projects. Water quality and physical data collected in this lobe of the watershed can be characterized as good. Recent projects (*e.g.,* Straight River TMDL, Surface Water Assessment Grants, and Steele County monitoring program) have allowed for greater analysis of impairment sources, increased watershed modeling efforts, more surface water quality data, and stream bank evolution surveys. This has lead to the identification of possible priority management areas. However, there are areas within the lobe that have limited or no existing water quality information. These are the areas of the lobe were future water quality assessment projects should focus. Based on the current stream and lake impairment listings, there are four recommended water quality parameters that would assist to further surface water impairment evaluations they are: total suspended solids, total phosphorus, turbidity, and *E. coli* bacteria. In addition, it is important to re-evaluate "what we know" as it pertains to water quality information within each lobe of the watershed. Many different agencies, educational institutions, and organizations have water quality information being collected. It is essential to regularly update the water quality database to stay current on the health or "what we know" of the surface water resources of the lobe and watershed.

2.) Assess the water quality condition for all the lakes within the lobe

Although limited in numbers (7), a majority of lakes are currently in the assessment process or have not been assessed (*e.g.,* Goose, Beaver, Watkins, Oak Glen Lake, and Rice Lake). In addition to those lakes that have not been assessed, there are two lakes (Loon and Clear) recently placed on the impaired waters list for nutrients. It is important to characterize water quality conditions of these lakes to determine if future protection and restoration activities are needed. Most of the lakes in this area are connected to a ditch system and could be considered an "open or free-flowing system" with no control structures to retain water. This free-flowing system can lead to implementation difficulties due to limited water retention time and pollutant sources located elsewhere. These systems also contribute or increase the risk of flooding which has been the case of this particular region over the last decade.

3.) Evaluate stream and public ditch system for pollutant impairments

There has been extensive water quality data and physical data collected on the documented turbidity impaired reaches of the Straight River and Rush Creek. However, there is limited water quality and physical data collected on other tributaries and ditch systems in this lobe of the watershed (*e.g.,* Judicial ditch 1 and 6, County ditches 22, 23, 25, 21 and 5, and Oak Glen Lake outlet ditch). It is important to note that this lobe of the watershed has been heavily drained and tiled for increased agricultural production purposes. This may be causing some of the stream impairment and flooding issues in the area due to limited water retention areas, but this has yet to be determined.

4.) Conduct effectiveness monitoring for Lower Mississippi Rive Basin Regional Fecal Coliform TMDL

The initial TMDL report was approved by EPA in November 2002. A revised TMDL report was approved by EPA in April 2006 and an implementation plan was completed in September 2007. In the Straight River Lobe the Straight River, Turtle Creek, Maple Creek, Crane Creek, and Rush Creek were included in the TMDL. Implementation projects to address the TMDL have been ongoing since 2003. Millions of dollars have been invested in feedlot fixes, upgrading septic systems, constructing new wastewater treatment systems in small communities with inadequate sewer systems, and other projects. The Straight River Lobe has been the area of the Cannon River watershed where the most intensive efforts to decrease fecal coliform levels has occurred. It is important to determine if fecal coliform levels have decreased as a result of these efforts.

In 2007 MPCA conducted regional monitoring to begin evaluating the effectiveness of implementation activities and progress towards meeting the TMDL. To assess trends, five years of data is desirable. A good start for conducting effectiveness monitoring would be collecting three years of data making sure to include the sites that were monitored in 2007. There is particular local interest in assessing if fecal coliform levels have decreased in the Straight River.

Long-term (5-10 years)

<u>1.) Establish two dedicated monitoring stations</u>

Long-term monitoring benchmarks for the Straight River lobe will first, consist of establishing two additional permanent (year-round or seasonal: April-October) monitoring stations. There is already one permanent United States Geological Survey (USGS) river gauging station on the Straight River located south of the city of Faribault, MN. This river station has been in operation since 1965. The main purpose of this station is for flood forecasting and warnings, but it has provided a great deal of information about the seasonal flow patterns and water quality over the last 45 years. The two monitoring locations ideally would be located at County Road 18 and SW 81st Street within Steele County, MN. These two suggested monitoring locations are based on a preliminary evaluation of the watershed. A more comprehensive study will need to be conducted to determine the feasibility of each monitoring location. These additional monitoring locations will provide additional flow and sediment records necessary to identify areas within the lobe where future flood and sediment impairment mitigation activities should occur.

<u>2.) Establish flow discharge curves on six major tributaries within the Straight River lobe</u>

The second long-term monitoring benchmark is to establish flow discharge curves for six major tributaries to the Straight River. Tentatively, these tributaries would be Crane, Turtle, Fall's, Medford, Rush, and Maple Creek. These sites were selected based on access, drainage area, predicted stream discharge, past flooding issues, and past water quality monitoring data. It is important to note that this lobe of the watershed has limited discharge data developed for these selected tributaries. However, a recent TMDL project on the Straight River has collected some stage and flow data on Turtle and Crane Creeks. Discharge rating curves have been created for both streams, but recent flooding has corrupted some of data leading to inaccurate rating curves. Future discharge measurements would improve these discharge estimates.

<u>3.) Conduct BMP effectiveness monitoring after implementation has been completed</u>

The third long-term monitoring benchmark is to conduct BMP effectiveness monitoring after implementation projects have been completed. Dramatic changes in nutrient and sediment concentrations often occur naturally, so it is important to understand this natural variability in your system. In BMP effectiveness monitoring, the objective is to assess and/or demonstrate the impact of the BMP on addressing the water quality issue of concern. The ease with which this is done will depend on the magnitude of this impact relative to background conditions. The range of natural variability in the system must also be taken into consideration because this variability may mask any changes resulting from the BMP implementation. As a general rule, more samples are needed in a highly variable system, but by targeting sampling timing it may be possible to greatly improve the monitoring program. In the case of the Straight River lobe, the flow pattern has been greatly modified due to increased subsurface drainage and loss of wetland habitat. By conducting BMP effectiveness monitoring, it allows for evaluation of how well a technique or method will reduce pollutants and flow volume from entering surface water systems.

<u>4.) Develop and implement field stream assessments throughout the lobe</u>

The fourth long-term monitoring benchmark is to develop a field stream assessment toolbox. This field stream assessment toolbox is comprised of six distinct components which are: BEHI, NBS, stream discharge measurements, stream dimension surveys, stream habitat assessments, and invertebrate surveys. The components mentioned, from this field stream assessment toolbox would provide an abundance of information relating to stream condition, channel evolution, and overall stream health. This information would identify priority areas where restoration activities need to be focused to address impairment issues. In addition, it enables the researcher to monitor the stream's condition over-time in a subjective manner. Examples of these techniques were conducted as part of a turbidity TMDL project on the Straight River. Geomorphic conditions of the stream were assessed to provide a general estimate of bank erosion rates and stream bank contribution to total suspended solid (TSS) impairment, provide cross-sectional and sediment sieve data to assist with modeling efforts, provided a general stream classification, and physical description of the stream reaches evaluated. This geomorphic assessment process identified a couple of reaches on the

Straight River that could be characterized as "priority areas" contributing a disproportionate amount of sediment. These identified priority areas would be the focus of future restoration activities.

5.) Develop, establish, and implement an agricultural subsurface tile and point source drainage inventory database

The fifth long-term monitoring benchmark will identify, develop, and establish an agricultural tile and point source drainage inventory. This work will entail locating all existing or newly-installed drainage tile systems outlets and point sources. A critical component of this fifth benchmark as previously mentioned, would be to conduct field surveys on the numerous streams and ditches within the lobe of the watershed. This process could take years to develop and would require landowners to "buy-in" to the project by allowing property access to conduct the survey. This process would identify subsurface tile system outlets and straight pipes; their locations will be referenced using Global Positioning System (GPS), and data such as: pipe diameter, type of pipe, type of material drained, installation date, and current land-use will be incorporated into a database with public accessibility via the internet. This information could be very beneficial for flood modeling and mitigation, bacteria reduction, pollutant reductions, crop research, nutrient management programs, and implementation of BMPs across the watershed. Currently, drainage information is has not been inventoried by any local or county government unit, but this information is essential in determining point sources that may be contributing to flooding and water resource pollutant issues.

6.) Establishment of 5-6 long-term biological and geomorphic monitoring stations

These stations will collect biological and physical metrics used to establish long-term stream health trends. These locations will be determined in the future and will be dependent on funding availability, location, and utilization of trained citizen volunteers interested in this subject matter. After the MPCA concludes their 2011 intensive watershed monitoring project in the Cannon River watershed, information will be available to determine which locations would be the best suited for long-term stream health observation. By collecting this information, stream health trends, stream channel morphology, channel evolution, and long-term trends can be monitored and developed. Thus, allowing us to determine if the stream condition/health are improving or degrading over time.