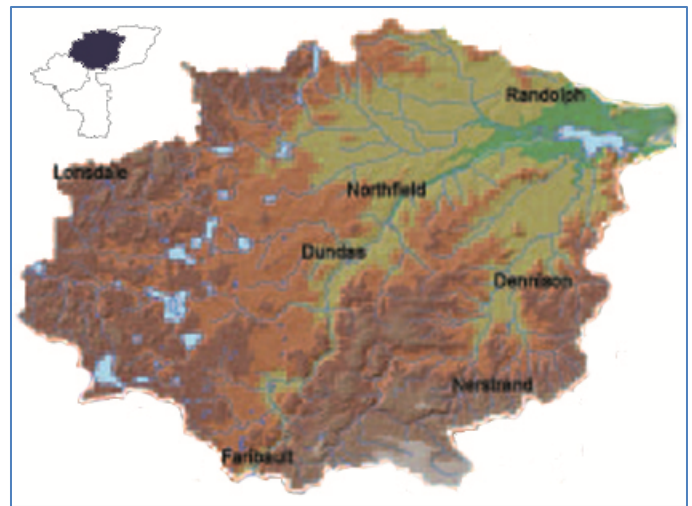


Outline

1. Introduction
2. Overview of Physical Landscape and Land Use
3. Summary of Water Quality Data
4. Management Strategy: Priority Management Zones and Concepts
5. Monitoring Strategy
6. References



Introduction

As discussed in Chapter 1, watershed management and monitoring strategies in this document are broken up by watershed lobe. The Middle Cannon Lobe includes portions of three counties: Rice, Dakota, and Goodhue. It begins at the confluence of the Straight and Cannon Rivers in Faribault and ends at the Byllesby Reservoir near Cannon Falls. This chapter contains a brief overview of the Middle Cannon 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 suggested 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

This section of the Cannon River runs between Faribault and Cannon Falls, with Northfield in the center. A significant resource in this watershed is the Big Woods, or maple-basswood forest with area of oaks and lowland hardwoods. The Cannon River Wilderness Park, Nerstrand Big Woods State Park, and adjacent areas include relatively large remnants of this natural community that once extended west to Mankato and north to St. Cloud.

This portion of the watershed has some of the largest cities: Faribault (14,624), Northfield (19,633), and Cannon Falls (4,109) (July 2008 US Census Bureau). In the western portion, the Middle Cannon lobe contains lakes and wetlands similar to those in the Upper Cannon watershed. The Cannon River is classified as a state Recreational River in this area.

Summary of Water Quality Data

Byllesby Reservoir Excess Nutrients Total Maximum Daily Load (TMDL)

As of June 30, 2011, the Byllesby Reservoir Excess Nutrients TMDL is being reviewed by the USEPA for the proposed Site Specific Standard to be used in the TMDL. At this time, it is not known when the Site Specific Standard and subsequently the TMDL will be approved.

The proposed Site Specific Standard and other information about the Byllesby Reservoir TMDL can be found on the MPA website (<http://www.pca.state.mn.us>). The draft TMDL report is included in the Watershed Library on the CRWP website at <http://www.crwp.net/byllesby-reservoir/> or can be found on the MPCA website.

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 Middle Cannon River Lobe. Unfortunately, all of the Middle Cannon’s lakes have grades of “C” or below, with most lakes having a grade of “F”. Table 10 shows the Met Council rating for each lake in the Middle Cannon River Lobe. Additional monitoring data for the Middle Cannon 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.

Table 10. *Met Council grades for Middle Cannon River lobe lakes*

| Lake (Years observed) | Met Council Secchi rating (m) | Met Council TP rating (ug/L) | Met Council Chlorophyll- A rating (ug/L) |
|--------------------------------------|--|---|---|
| Byllesby ('91-09) | F | F | D |
| Chub ('95-04) | F | F | F |
| Circle ('80-09) | F | F | F |
| Fox ('55-08) | C | D | C |
| Mazaska ('55-07) | F | D | D |
| Union ('03-04) | F | D | D |

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 H. The “list of assets” for the Middle Cannon 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. Circle Lake: Phosphorus loading reduction
2. Rice Creek: Protection of brook trout habitat
3. Faribault and Northfield: Urban stormwater management
4. Middle Cannon River Green Corridor: Increase land protected along the Cannon River

While not designated as PMZ because of its very large watershed, the Byllesby Reservoir serves to provide *an overarching context for watershed management* in the Middle Cannon River Lobe. The success or failure of watershed management activities throughout the Middle Cannon River Lobe (and the Upper Cannon

River Lobe and Straight River Lobe) will be reflected in the improvement or decline in the health of the Byllesby Reservoir. Moving forward, the Byllesby Reservoir will serve as a “report card” of overall water quality for the Cannon River watershed.

Circle Lake: Phosphorus loading reduction

Circle Lake is an 837 acre lake located in Western Rice County. Its watershed is large and includes Fox Lake and Lake Mazaska. Circle Lake has a long history of poor water quality. In 1972 it was one of the worst lakes in Rice County for water quality (National Biocentric, Inc., 1972). In 1991 total phosphorus, chlorophyll-a, and secchi disk were worse than other area lakes (Weir & Ganske, 1992), and in 1999 total phosphorus and chlorophyll-a were extremely high (Heiskary, 2000).

In 2010 the Circle Lake Association contracted with Blue Water Science to conduct a lake and watershed evaluation and prepare a lake management plan to improve lake conditions and remove Circle Lake from the impaired waters list. The lake management plan was completed in April 2011 and provides direction for future management activities to improve the lake.

Actions Items (McComas, 2011)

1. Implement watershed projects to reduce phosphorus entering the lake.
 - a. Control erosion above mouth of Wolf Creek
 - b. Implement a wetland Restoration along County Ditch 32.
 - c. Install at least 50 foot buffers on all of County Ditch 32 and Wolf Creek.
 - d. Use fieldwork, terrain analysis, and other GIS information (soils, highly erodible land, restorable wetlands) to determine additional sites to implement BMPs for phosphorus reduction.
 - e. Conduct general outreach to landowners in the watershed about efforts improve lake conditions and reducing phosphorus entering the lake.
 - f. Conduct targeted outreach to landowners based on results of fieldwork and terrain analysis.
2. Implement a Carp management program addressing three components: immigration, recruitment, and mortality.
3. Control Curlyleaf pondweed.
4. Manipulate lake sediments through an alum or iron addition for nutrient control.

Rice Creek: Protection of brook trout habitat

Rice Creek (also known locally as Spring Brook) is the only coldwater trout fishery in Rice County. It supports naturally reproducing brook trout, which have become increasingly rare because of their sensitivity to pollution and competition from introduced brown trout. Rice Creek (class 2A) is a 7-mile-long stream with 1.3 miles designated as trout stream located in Bridgewater Township. The headwaters and majority of the stream length is a ditch- Rice County Ditch 22. The Rice Creek watershed is approximately 4,130 acres and currently impaired for E. coli bacteria, nitrates, and turbidity. The dominant land use within this watershed is agriculture (84%); however, lower portions are within annexation zones of the cities of Northfield and Dundas. It is likely that development pressures will increase in the next decade posing a threat to this

unique biological community. For these reasons it was felt that this stream should be a priority management zone.

Bridgewater Township was awarded a Clean Water Partnership grant in 2011 to conduct an intensive research project to evaluate the current ecological health of the stream by conducting biological and habitat assessments, studying food web structure and interactions, collecting macroinvertebrates and fish, monitoring stream flow and water quality, profiling stream temperature, and identifying groundwater sources. Results from the project will help to guide implementation actions to restore and protect the stream with a special focus on brook trout habitat. The Cannon River Watershed Partnership, St. Olaf College, and the Rice Creek Concerned Citizens group are collaborators on this project.

In order for trout populations to thrive the conditions in the stream must meet certain criteria. The following table is excerpted from a Trout Unlimited publication entitled “A Guide to Native Trout Restoration: Science to Protect and Restore Coldwater Fishes and their Habitats”, by Trout Unlimited, Arlington, Virginia, April 2006.

Table 11 – Characteristics of a Healthy Trout Stream (Trout Unlimited, 2006)

| Characteristic | Description |
|----------------------|---|
| Habitat Diversity | Roughly equal numbers of pools, riffles and runs should be present. Complex braided channels are preferred over simple, straight streams. |
| Large wood | Downed trees and other large woody debris functions to create pools, store sediments, and act as a source of needed organic matter. |
| Water quality | Cool, pollutant –free water is critical to spawning juvenile rearing and adult resting habitat for many fish species. Generally, < 16 °C (60.8 °F) is needed for spawning, and < 18 °C (64.4 °F) for rearing. |
| Flow regime | The hydrograph is similar in intensity and flow amounts to historical conditions. Minimum flows are important but high flows may be required at certain times to dig pools and move sediment. |
| Riparian vegetation | Adequate riparian vegetation is needed to shade streams, protect banks from severe erosion, and provide nutrients. |
| Deep pools | Sufficient deep pools are necessary as thermal refuges and holding habitat for many fish species. |
| Width to depth ratio | Generally, deeper and narrower streams provide better habitat than shallower, wider streams. |
| Bank stability | Banks should be 80-90% stable. Some erosion is needed, but too much is detrimental. |
| Fine sediments | Stream substrates should not exceed 20% fine materials (clay, silt and sand) in riffles. Most streams suffer from high loads of sediment. |

Actions Items

The following action items are some steps that can be taken to improve brook trout habitat.

1. Ensure all branches of the stream including the ditch have adequate, perennial vegetated buffers.
2. Restrict access for livestock to the stream.
3. Work with producers to improve manure and nutrient management.
4. Maintain the ditch and make improvements to reduce pollutant loading to the trout stream segment.
5. Work with producers to limit sediment inputs to the stream.

Faribault and Northfield: Urban stormwater management

The cities of Faribault and Northfield both fall 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.

Middle Cannon River Green Corridor: Increase land protected along the Cannon River

The riparian zone along a river serves many important functions. It provides habitat for wildlife, reduces sediment, bacteria, and phosphorus entering the river, provides flood storage, and creates a beautiful recreational experience.

Much of the Upper Cannon River’s riparian zone has been permanently preserved through land acquisition by the DNR and other conservation groups, or in other conservation programs such as RIM, to create a fairly significant “green corridor”. Less of the Middle Cannon River’s riparian zone is protected. The two major protected areas are the Cannon River Wilderness Park and the Carleton Arboretum. Figure 13 shows the locations of the protected lands and the acreage protected in various conservation programs.

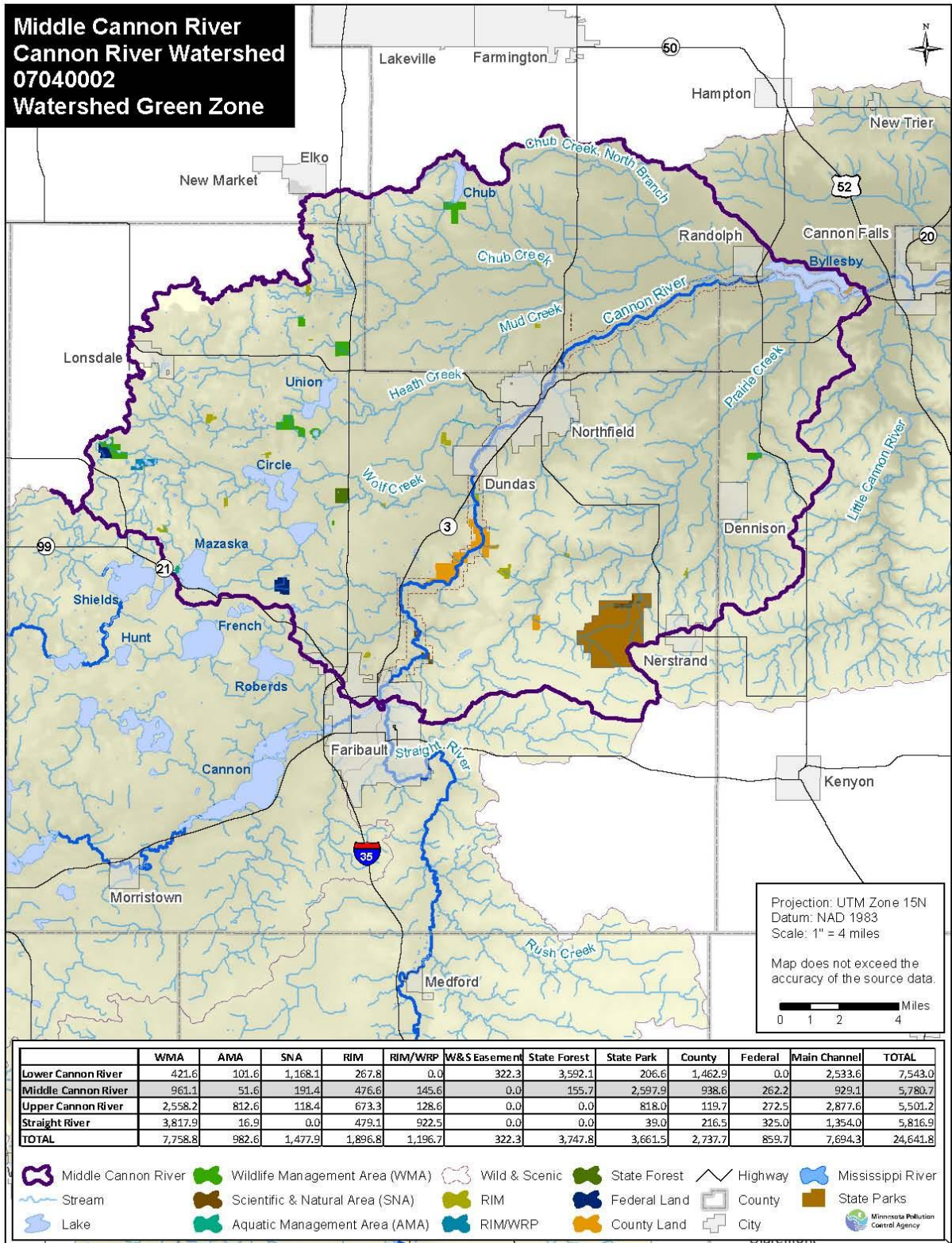


Figure 13. Middle Cannon River Green Corridor

Unlike the Upper Cannon River however, the Middle Cannon River (from Faribault to Lake Byllesby) is designated as a Minnesota Wild and Scenic River. Within the Wild and Scenic River designation there are three classifications: wild, scenic, and recreational. The Middle Cannon River is classified as recreational. (The Lower Cannon River from Cannon Falls to the Mississippi is classified as scenic.)

Recreational rivers are those that may have undergone some impoundment or diversion in the past and that may have adjacent lands which are considerably developed, but that are still capable of being managed so as to further the purposes of this act. This means that bordering lands may have already been developed for a full range of agricultural or other land uses, and may also be readily accessible by pre-existing roads or railroads (Minnesota Department of Natural Resources, 2011).

The Wild and Scenic designation calls attention to the Cannon River's outstanding natural, scenic, and recreational value and also provides some limited protection, mostly in the form of zoning rules regulating setbacks, subdividing, etc., for the river. Additionally, the MN DNR can acquire land and scenic easements along wild and scenic rivers. Along the Cannon River the DNR currently holds scenic easements on thirteen parcels protecting 341 acres, although all of these easements are all in the Lower Cannon River Lobe.

Actions

1. Identify priority parcels for inclusion in the Middle Cannon River Green Corridor using aerial photos, fieldwork, already completed planning processes or assessments such as county biological surveys, ecological assessments, natural resource inventories, or floodplain maps.
2. Conduct outreach to landowners of unprotected land along the Cannon River about protecting their land as part of the Cannon River Green Corridor.
3. Promote the Cannon River Green Corridor concept and the Cannon River's Wild and Scenic designation to the general public and outdoor enthusiasts.
4. On lands already protected, restore or enhance habitat and natural communities.

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

Water quality information was reviewed to gain perspective on impaired areas and the type of information collected from these various projects. Based on the 2010 draft Impaired Waters list, there are five nutrient impaired lakes (Chub, Union, Mazaska, Fox, Byllesby, and Circle) and nine different stream reaches (Chub Creek, Mud Creek, Prairie Creek, Wolf Creek, Heath Creek, Rice Creek, two unnamed tributaries to Prairie Creek, and Cannon River) listed for various stream impairments. After reviewing water quality and physical data collected in this region, it revealed an additional need for supplemental information on the tributary streams to address pollution problems. Specifically, these projects were lacking detailed stream flow, and physical or biological metrics of the resource. This supplemental information is essential to derive pollutant load calculations for future TMDL projects, restoration activities, and indicate possible pollutant sources or priority management areas. These past monitoring projects were conducted on

a rotational or limited schedule due to budget, equipment, and staff limitations making it more difficult to define pollutant sources and develop future restoration activities. Recent projects (*e.g.*, Chub Creek Assessment, Rice Creek Assessment, and Surface Water Assessment Grants projects)(5,6) have allowed for some surface water assessment, limited watershed modeling efforts, identification of priority management areas, and possible areas where restoration activities or BMP strategies could be implemented.

2.) Conduct BMP effectiveness monitoring

The second short-term monitoring benchmark for the Middle Cannon lobe is to conduct BMP effectiveness monitoring. This type of monitoring will help in determining the effectiveness of restoration efforts and nutrient management strategies on surrounding surface water systems. Hopefully, these strategies will be the first steps to delisting impaired waters in this lobe of the watershed. This process has already begun in the Dakota County region of this particular lobe of the watershed which is managed by North Cannon Watershed Management Organization (NCWMO). Currently, NCWMO has implemented sixteen conservation projects (*e.g.*, filter strips, sediment basins, grassed waterways, rain gardens, etc.) to protect and improve water quality conditions. Having BMP effectiveness monitoring in place during and after implementation will allow for proper evaluation of these practices. However, limited funding and staff resources make it difficult to monitor the current status of surface water systems before and after implementation.

3.) Assess streams within the lobe

The third short-term monitoring benchmark is to assess the streams (*e.g.*, Spring Creek to Byllesby, North Grove Church Creek, and Spring Creek to Cannon River) in the lobe of the watershed that have not been evaluated or do not possess enough water quality data to be considered completely “assessed” by EPA standards. In comparison to the other lobe of the watershed, the Middle Cannon contains some historical long-term stage and flow discharge measurements at the Ames Mills Dam in Northfield, MN and from other various projects conducted within this portion of the watershed. These historical records did not include water quality information, but recent Surface Water Assessment grants have provided more water quality information on these streams and lakes in this area. Generally, this lobe of the watershed has a considerable amount of water quality data collected. However, the middle cannon lobe contains numerous stream and ditch systems that have not been evaluated representing a potential source of pollutants leading to many of these impairment listings.

4.) Conduct effectiveness monitoring for Lower Mississippi River 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 Middle Cannon River Lobe a section of the Cannon River, Chub Creek, and Prairie 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. 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 Prairie Creek. Significant time and resources have been invested in working with landowners to reduce fecal coliform pollution in this area.

Long-term (5-10 years)

1.) Establish four dedicated monitoring stations within the lobe

Long-term monitoring benchmarks for the Middle Cannon lobe will first, consist of establishing four permanent year-round or seasonal (April-October) monitoring stations. This lobe of the watershed does not have any permanent flow monitoring stations. Carleton College Arboretum and the Byllesby Reservoir Dam does record flow and stage on the Cannon River, but it should be evaluated with caution due to the limited maintenance on the equipment. The Byllesby Reservoir Dam can be considered the outlet point of this lobe of the watershed and the beginning of the Lower Cannon lobe. Determining the location of these monitoring stations may prove difficult due to the numerous and growing number of surface water impairment listings. So, preliminary monitoring site locations are based on the current impairment listings, overall value of each location, and size of each sub-watershed. Based on these criteria, the monitoring stations are recommended on Wolf Creek, Prairie Creek, Chub Creek, and the Cannon River in Dundas, MN. These additional monitoring locations will provide additional flow, stage, and water quality data necessary to determine pollutant loads, discharge, and seasonal effects on stream nutrient concentrations.

2.) Establish flow discharge curves for nine tributaries

The second long-term monitoring benchmark is to establish flow discharge curves for nine major tributaries to the Cannon River. Tentatively, these tributaries would be Chub, Mud, Prairie, Wolf, Heath, Knowles, Rice, and both Spring Creeks. These sites were selected based on access, drainage area, predicted stream discharge, past flooding issues, and past water quality monitoring data. Similar to the other lobes in the watershed, there is limited or no stream discharge data developed for these selected tributaries. This information is vital in determining tributary's contribution to pollutant problems seen in the Cannon River Watershed. By collecting this information it will help to focus future restoration activities.

3.) Conduct BMP effectiveness monitoring within the lobe

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.

4.) Develop and implement field stream assessments with the lobe

This field stream assessment 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 assist to help identify priority areas where restoration activities need to be focused to address impairment issues. In addition, it enables researchers to monitor the stream's condition over-time in a subjective manner.

5.) Establish, develop, and identify agricultural subsurface tile and point source 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 and point sources within the middle lobe of the Cannon River watershed. A critical component of this fourth benchmark would be to conduct field surveys on the numerous streams and ditches. This process could take years to develop and would require landowners to “buy-in” and allow for property access. This process would identify tile system and straight pipe outlet points, these points would be referenced using GPS, and the data would be comprised of: pipe diameter, type of pipe, type of material drained, installation date, and current land-use. This information could prove to be very beneficial for flood modeling and mitigation, bacteria reduction, nutrient management initiatives, nutrient pollutant reductions, and implementation of BMPs across the watershed. In addition to the benefits that this information can provide, it can lead to protect of streams reaches that have sensitive biotic communities living within them. One example of such a place in the Middle Cannon is Rice Creek, located just outside the city limits of Northfield, MN. This creek contains naturally-reproducing brook trout populations that are very sensitive to changes in water temperature as well as water quality conditions. Therefore, it is very important to inventory and identify all possible contributors to the overall stream condition to protect this unique fish community. Currently, tile drainage information is not being inventoried by any local or county government unit making it particularly difficult to come by, but this information is essential in determining point and non-point sources that may be contributing to flooding and 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.

References

- Heiskary, S. (2000). Status and trend monitoring summary for Rice County, Minnesota 1999. Retrieved from <http://www.crowp.net/storage/upper-cannon-river-lobe-library/MPCA%20Status%20and%20Trends%20for%20Cannon%20Wells%20Kelly%20Dudley%20Circle%20Cedar%20Roberds.pdf>
- McComas, S. (2011). Data report and management plan for Circle Lake, Rice County, Minnesota, 2011. Retrieved from <http://www.crowp.net/storage/middle-cannon-river-library/Circle%20Lake%20Management%20Plan%20April%202011.pdf>
- Minnesota Department of Natural Resources. (2011). River classifications. Retrieved from http://www.dnr.state.mn.us/waters/watergmt_section/wild_scenic/wsrivers/classification.html
- National Biocentric, Inc. (1972). Water quality evaluation in Rice County, Minnesota. Retrieved from http://www.crowp.net/storage/upper-cannon-river-lobe-library/Water%20Quality%20Evaluation%20in%20Rice%20County_NBI_%201972.pdf

National Biocentric, Inc. (1986). Rice County water quality evaluation 1972 to 1984/85. Retrieved from http://www.crowp.net/storage/upper-cannon-river-lobe-library/Water%20Quality%20Evaluation%20in%20Rice%20County%201972_1985.pdf

Trout Unlimited. (2006). A guide to native trout restoration: Science to protect and restore coldwater fishes and their habitats.

Weir, E., & Ganske, L. (1994). Lake assessment program 1991 Circle Lake. Retrieved from <http://www.crowp.net/storage/middle-cannon-river-library/MPCA%20Lake%20Assessment%20Circle%201991.pdf>