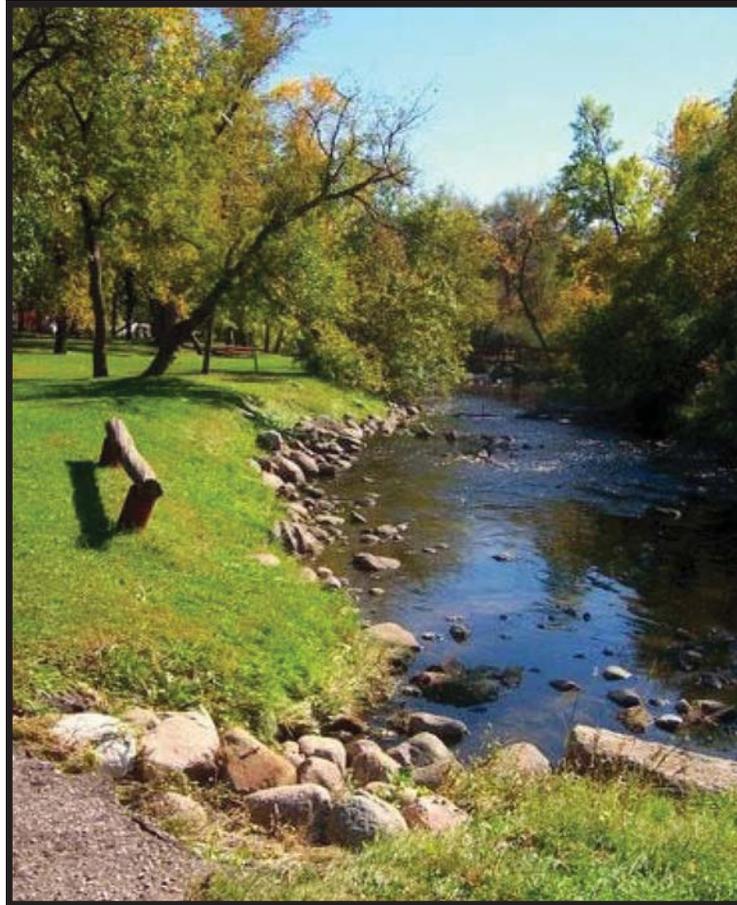
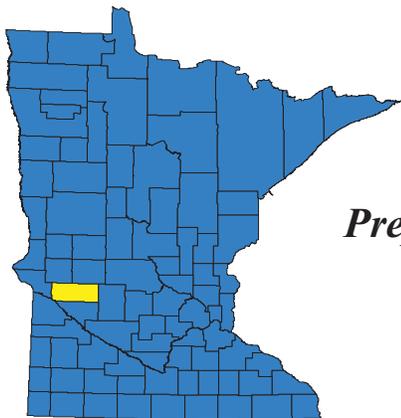


# Swift County 2014-2023 Local Water Plan

*~ With 5-Year Implementation Plan (2014-18) ~*



*Chippewa River*



*Prepared by Swift County with assistance from  
Midwest Community Planning, LLC*

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# Swift County Water Plan

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## Swift County Water Plan:

### *Executive Summary*

*The Swift County Water Plan follows the provisions set forth in Minnesota State Statutes 103B.314 - Contents of Water Plan.*

#### **A. Purpose of the Local Water Plan**

According to Minnesota Statute 103B, each county is encouraged to develop and implement a local water management plan with the authority to:

- Prepare and adopt a local water management plan that meets the requirements of this section and section 103B.315;
- Review water and related land resources plans and official controls submitted by local units of government to assure consistency with the local water management plan; and
- Exercise any and all powers necessary to assure implementation of local water management plans.

Pursuant to the requirements of the law, the Swift County Water Plan:

- Covers the entire area of Swift County;
- Addresses water problems in the context of watershed units and groundwater systems;
- Is based upon principles of sound hydrologic management of water, effective environmental protection and efficient management;
- Is consistent with comprehensive water plans prepared by counties and watershed management organizations wholly or partially within a single watershed unit or groundwater system; and
- Will serve as a 10-year water plan (2014-2023), with a 5-year implementation plan (2014-2018). In 2018, the implementation plan will be updated.

In addition, the Water Plan will also serve as the Swift County Soil and Water Conservation District's (SWCD) Comprehensive District Plan. This will be passed by the SWCD's Board of Supervisors by Resolution.

## **B. A Description of Swift County's Priority Concerns**

The Swift County Water Plan Task Force, listed on the inside cover page, met on December 12, 2012, to review the Priority Concerns Input Forms received (Appendix A contains a copy of the Sign in Sheet). The Water Plan Task Force identified the following as Swift County's priority water planning issues (note: these issues are not ranked in order of priority):

1. Surface Water Management
  - a. Agricultural Drainage
  - b. Stormwater Management
  - c. Wetlands and Water Storage/Retention
  
2. Reducing Priority Pollutants ~ Surface Water Quality
  - a. TMDL Implementation
  - b. Feedlot/Livestock Management
  - c. Subsurface Sewage Treatment Systems
  - d. Erosion and Sediment Control
  
3. Groundwater Quality & Quantity
  
4. Plan Administration
  - a. Watershed Focus - Stakeholder Cooperation
  - b. Raising Public Awareness - Education

## **C. Summary of Goals, Objectives, Action Steps, and Estimated Costs**

To address the priority concerns identified in the scoping process, the Swift County Water Plan Task Force held meetings and developed four goal areas. These four goal areas are further broken down into interrelated objectives that specific resource concerns. More importantly, each objective has a series of action steps designed to help address the priority concerns.

A summary of the County's Water Plan Goals, Objectives and Action Steps is provided below. Collectively they form the Implementation Plan for the County. In addition, a summary of annual estimated costs is provided. These estimated expenses are separated into Overall Costs and Local Costs. Overall Costs include all monies spent by water plan stakeholders, including the County, watershed districts, state agencies, and landowners. The Local Costs include funds spent and activities performed by Swift County (including items such as the County's 103E administrative costs) and the Swift County SWCD. The Swift County Water Plan Task Force recognizes that not all of the identified Action Items will be accomplished over the course of the

Water Plan's time-frame, however, the intent is to accomplish as many implementation activities as feasible. Also keep in mind the costs identified are only estimates, and actual direct and/or indirect costs may be more or less than indicated. Finally, many of the Action Items will be dependent upon receiving grants. Chapter Three contains the Water Plan's complete Goals, Objectives, and Action Steps, and Chapter Four provides additional details on administering the Water Plan.

### **Goal 1: To Ensure Swift County's Surface Water Resources Exceed Minimum Water Quality Standards**

The first goal area focuses on addressing surface water quality issues. Objectives were developed for maintaining a watershed focus and removing waters off the MPCA's 303d list of Impaired Waters. Additional objectives address feedlots, Subsurface Sewage Treatment Systems (SSTS), and erosion and sediment control. Implementation steps under the first goal area include a wide range of the following initiatives and Best Management Practices (BMPs):

- **Watershed Focus/TMDLs.** Supporting watershed planning, monitoring, and implementation by providing financial and in-kind assistance; annually reviewing monitoring data and participating in the watershed restoration and protection strategy with the Chippewa River, Pomme de Terre, and Upper Minnesota River Watersheds; and seeking opportunities to refine watershed analysis and management through GIS and other technology.
- **Feedlots.** Target feedlot inspections in shoreland areas; host annual educational meetings with feedlot operators; and cost share ag/waste feedlot BMPS, including nutrient management plans, closing unused ag waste impoundments; and identifying where grazing management improvements are needed.
- **SSTS.** Work with approximately 30 homeowners annually on compliance inspections; provide low interest loans to upgrade noncompliant systems; cost-share upgrading four low income noncompliant systems annually; and inspect all SSTS in impaired subwatersheds.
- **Erosion and Sediment Control.** Installing 80 acres of vegetative buffer strips annually (target J.D. 19 and Shakopee Creek); annually install two water and sediment control structures, five alternative tile intakes, two stream bank stabilization projects, and 1,000 feet of living snow fences. In addition, work with the watersheds districts/projects on implementing their numerous erosion and sediment control projects.

The various action steps identified to address the first goal area of surface water quality improvements in Swift County are estimated to have an overall 5-year cost of \$2,325,000, which averages to approximately \$465,000 annually. Many of the implementation activities will be paid for through grants and in-kind expenses.

### **Goal 2: Surface Water Management Initiatives**

The second goal area is aimed at effectively managing surface water resources for multiple purposes (surface water quantity). Separate objectives are included for agricultural drainage, stormwater management, and wetlands/surface water retention. The key implementation steps include the following:

- **Agricultural Drainage:** Re-determining the benefits on systems as requested; maintain and update a County Ditch Inventory; installing ten side inlets annually to control erosion; cost-sharing a wide range of drainage BMPs; and seeking funds to complete a drainage management plan.
- **Stormwater Management:** Assist with stormwater management planning; providing educational, technical, and financial support for the implementation of stormwater BMPs; and cost-sharing providing 50 rain barrels annually.
- **Wetlands/Water Retention:** Targeting impaired subwatersheds for wetland restorations and increasing the number of Wetland Reserve Program easements by two each year on marginal farmland.

The various action steps identified to address the second goal area of surface water management in Swift County are estimated to have an overall 5-year cost of \$600,000, which averages to approximately \$120,000 annually. Many of the implementation activities will be paid for through grants and in-kind expenses.

### **Goal 3: Groundwater Quantity and Quality Initiatives**

The third goal area focuses on addressing groundwater quality and quantity issues. Objectives were developed for wellhead protection areas, ensuring there is an adequate supply of safe drinking water, and working with stakeholders to protect groundwater levels for multiple uses. Implementation steps include a wide range of the following groundwater Best Management Practices (BMPs):

- **Wellhead Protection Areas (WPA).** Target groundwater BMP Programs in Wellhead Protection Areas, such as RIM, CRP, manure management and nutrient planning, abandoned well sealing and proper SSTS compliance; and target sealing all abandoned wells in Wellhead Protection Areas.
- **Safe Drinking Water.** Complete a pesticide management plan and water conservation plan with each new irrigation system; incorporate Swift County’s sensitive groundwater recharge areas map into to the local land use decision making process; implement two groundwater BMP projects into the local and use decision making process annually.
- **Groundwater Quantity.** Continue to monitor 26 groundwater test sites annually; host a workshop every three years with the DNR and Minnesota Geological Survey on how best to incorporate the county’s geologic and groundwater information into the land use making process; pursue funding to establish a water conservation/drought contingency plan.

The various action steps identified to address the third goal area of groundwater quality and quantity in Swift County are estimated to have an overall 5-year cost of \$349,000, which averages to approximately \$69,800 annually. Many of the implementation activities will be paid for through grants and in-kind expenses.

#### **Goal 4: Plan Administration Initiatives**

The fourth goal area is aimed at effectively administering the Swift County Water Plan. A specific objective was developed to “Engage the Citizens and Stakeholders on key water planning issues and implementation opportunities.” Implementation steps include the following:

- **Ongoing Issues and Programs.** Properly raise awareness on key water planning issues and available BMP funding opportunities.
- **Water Plan Funding/Support.** Secure funding to properly implement the water plan and meet annually to review progress.
- **Watershed Focus and Stakeholder Cooperation.** Partner with watershed and stakeholder groups on implementation activities.

The various action steps identified to address the fifth goal area of effectively administering the Water Plan in Swift County are estimated to have an overall 5-year cost of \$65,000, which averages to approximately \$13,000 a year.

### *Summary of Estimated Costs*

The four water plan goal areas and their corresponding estimated costs are summarized below in Table 1. The initiatives identified in Chapter Three are estimated to cost approximately \$3,339,000 over the five years, which averages to approximately \$667,800 annually.

**Table 1:  
Summary of Swift County’s Water Plan  
Estimated Overall and Local Costs**

	<b>5-Year</b>	<b>Yearly</b>
Goal Area One: Surface Water Quality	\$2,325,000	\$465,000
Goal Area Two: Surface Water Management	\$600,000	\$120,000
Goal Area Three: Groundwater Quality/Quantity	\$349,000	\$69,800
Goal Area Four: Plan Administration	\$65,000	\$13,000
<b>Totals</b>	<b>\$3,339,000</b>	<b>\$667,800</b>

*\*Note:* Please refer to Chapters Three and Four for a more detailed description of the estimated five-year and annual costs; expenses may seem exaggerated, but actually represent the numerous stakeholders involved and a collaboration of their corresponding activities and budgets.

#### **D. Relationship to other Plans**

The Swift County water planning process included feedback from local governmental units and stakeholders to ensure the Water Plan, and its corresponding Goals, Objectives and Action Steps, were developed to be consistent with existing plans and official land use controls. As a result, the updated Swift County Water Plan is believed to be consistent with the plans and official controls of the other pertinent local, State and regional plans and controls. In conclusion, there are no recommended amendments to other plans and official controls to achieve consistency with this Water Plan.

# **Chapter One: Swift County**

## **Water Plan Priority Concerns Scoping Document**

### **Section One: Introduction to the Water Plan & Swift County**

#### **A. Water Plan Background**

The original Swift County Water Plan was approved in 1991. Since then, the Water Plan has been updated in 1995, 2003, and 2008. As a result, this Plan is considered Swift County’s fifth generation Comprehensive Local Water Plan (CLWP). The entire Plan will cover a ten-year period (2014–2023), with the action steps (or implementation steps) covering a five-year period (2014–2018). In 2018, the action steps will need to be updated. According to Minnesota Statute 103B, each county is encouraged to develop and implement a local water management plan with the authority to:

1. Prepare and adopt a local water management plan that meets the requirements of this section and section 103B.315;
2. Review water and related land resources plans and official controls submitted by local units of government to assure consistency with the local water management plan; and
3. Exercise any and all powers necessary to assure implementation of local water management plans.

Pursuant to the requirements of the law, this Swift County Water Plan:

- Covers the entire area of Swift County;
- Addresses water problems in the context of watershed units and groundwater systems;
- Is based upon principles of sound hydrologic management of water, effective environmental protection and efficient management;
- Is consistent with comprehensive water plans prepared by counties and watershed management organizations wholly or partially within a single watershed unit or groundwater system; and
- Will serve as a 10-year water plan (2014-2023), with a 5-year implementation plan (2014-2018). In 2018, the implementation plan will be updated.

## B. Swift County Profile

The County is located in West Central Minnesota, approximately 120 miles west of the Minneapolis-St. Paul metropolitan area and 30 miles west of the City of Willmar. Map 1A shows the location of Swift County's cities and townships, along with the County's location in the State. The Minnesota River helps to form the County's southwestern border. In addition, the County shares borders with Stevens and Pope Counties to the north, Kandiyohi County to the east, Chippewa County to the south and Big Stone County to the west.

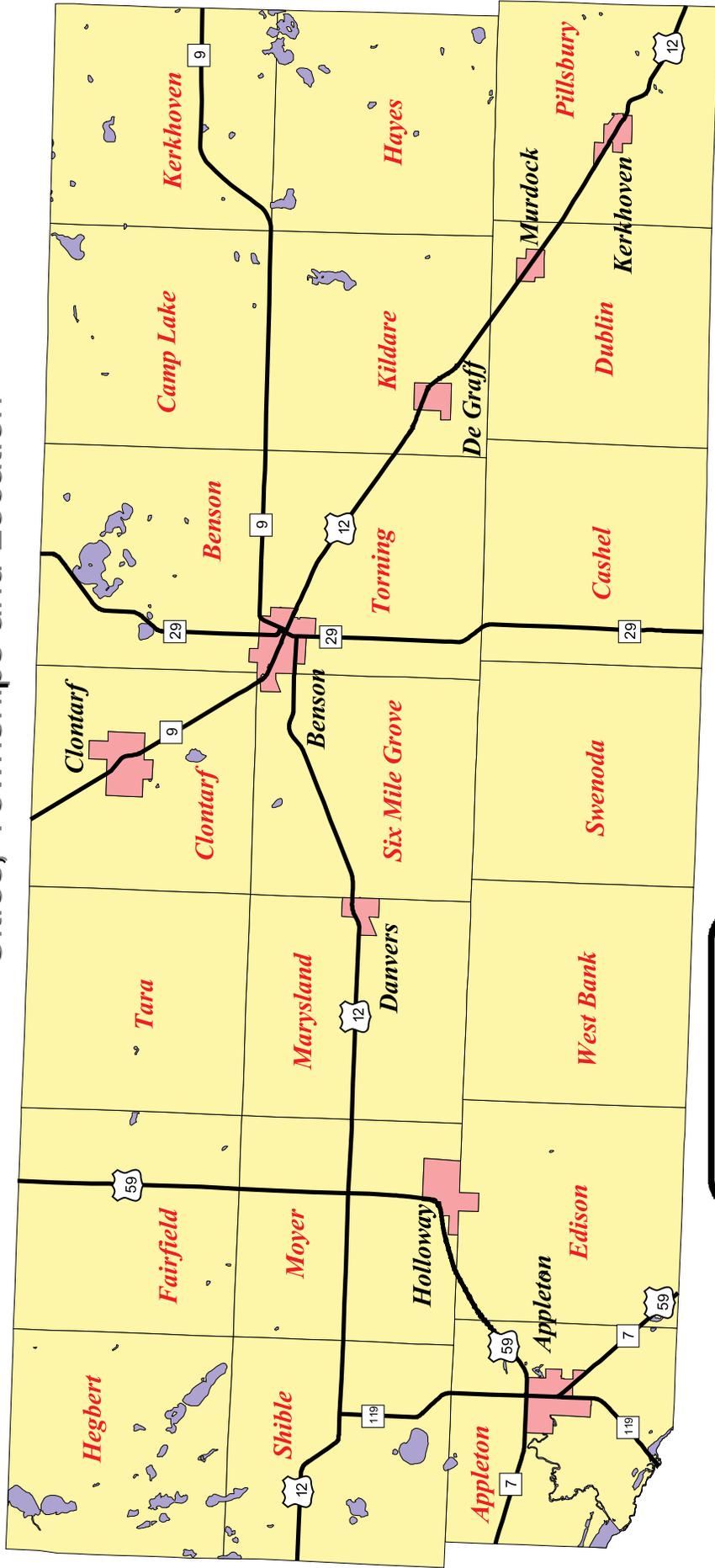
Swift County is located within three major watersheds: the Upper Minnesota River, the Pomme de Terre River, and the Chippewa River Watersheds (see Map 2A in Chapter Two). All three watersheds are part of the Minnesota River Basin.

According to the 2000 Census, Swift County has a total area of 752.35 square miles, of which 743.53 square miles (or 98.83%) is land and 8.82 square miles (or 1.17%) is water. Agricultural land is currently and will remain the dominant type of land use. Table 1 shows Swift County's Census population since 1960, which is currently around 9,783 residents (2010 Census). Overall, Swift County has lost population since 1960, with the exception of the 2000 Census, when it gained approximate 1,232 residents during the 1990s. Swift County is projected to continue to lose population over the next 10 years. This is a common trend among rural counties throughout Minnesota and the upper Midwest.

**Table 1:**  
**Swift County's Population since 1960 (Source: U.S. Census)**

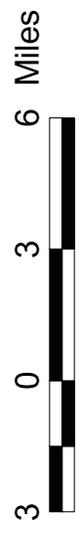
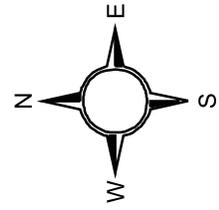
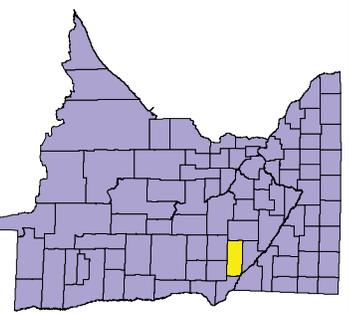
Area	Population	Change	
		#	%
1960	14,936	N/A	N/A
1970	13,177	-1,759	-12%
1980	12,920	-257	-2%
1990	10,724	-2,196	-17%
2000	11,956	1,232	11%
<b>2010</b>	<b>9,783</b>	<b>-2,173</b>	<b>-18%</b>
<b>Totals since 1960</b>		<b>-5,153</b>	<b>-35%</b>

# Map 1A: Swift County's Cities, Townships and Location



## Legend

-  Major Roads
-  Lakes
-  Cities
-  Townships



**Section Two:  
Priority Concerns Scoping Document Planning Process**

**C. Resolution to Update the Swift County Water Plan**

The first step in the Water Planning Process was for the Swift County Board of Commissioners to approve a resolution indicating the County was officially updating its Water Plan. This action took place on June 5, 2012, at the regularly scheduled County Board meeting. A copy of the resolution appears in Appendix A.

**D. Notice of Plan Update**

An official “Notice of Plan Update” for the Swift County Water Plan was sent on August 9, 2012, to the contacts as prescribed by Minnesota Statutes 103B:

[www.revisor.mn.gov/statutes](http://www.revisor.mn.gov/statutes)

and according to the “Routing Information” contained on BWSR’s website under the Resource Management and Planning tab:

[www.bwsr.state.mn.us/planning/routing.html](http://www.bwsr.state.mn.us/planning/routing.html)

A copy of the Notice of Plan Update can be found in Appendix A.

**E. Water Plan Public Meeting**

Swift County hosted an open house on August 28, 2012, from 2:00 p.m. to 3:30 p.m. The purpose of the meeting was to invite Swift citizens to voice their concerns on which County water planning issues they would like to see addressed in the Swift County Water Plan. A copy of the sign-in sheet appears in Appendix A. The following issues were identified and discussed:

## **Swift County Water Plan Open House Topics**

- A. Need to focus on assisting landowners with Best Management Practices (BMPS).
- B. Still need to seal abandoned wells.
- C. Septic Systems – low interests loans
- D. Importance of Wetlands
- E. Watershed Focus – Stakeholder Cooperation
- F. Erosion Control
- G. Water Bottle Refund

### **F. State & Local Stakeholder Comments**

At the beginning of Swift County’s water planning process, the County’s key water planning stakeholders were asked to submit comments on priority water planning issues and suggested implementation activities. This was accomplished by completing either a Swift County Priority Concerns Input Form, or by simply submitting a letter. The following stakeholders submitted comments:

- The Minnesota Department of Agriculture
- The Minnesota Pollution Control Agency
- The Minnesota Board of Water and Soil Resources

Table 2 summarizes the priority concerns identified by each of the stakeholders. Based upon the stakeholders comments received, *Swift County’s top three priority issues are:*

- 1. Agricultural Drainage Management**
- 2. Surface Water Quality/TMDLs (Impaired Waters)**
- 3. Soil Erosion/Sediment Control**

### ***Minnesota Department of Agriculture (MDA)***

The MDA submitted a Priority Concerns Input Form for Swift County. A copy of the form, dated September 11, 2012, is contained in Appendix B. The MDA's identified the following five priority water planning concerns:

1. Agricultural Drainage, Wetlands and Water Retention
2. Groundwater and Surface Water Protection: Agricultural Chemicals and Nutrients/Water Use/Land Management in Wellhead Protection Areas
3. Manure Management and Livestock Issues
4. Agricultural Land Management
5. Targeting of BMPs, Aligning Local Plans and Engaging Agriculture

The MDA also created a webpage which communicates and profiles their top five priority water planning concerns. The webpage provides links to each of the five priority concern areas, including information on why the issue is important, what actions need to be taken, and links to more information on the subject. For more information, please visit the following MDA link:

[www.mda.state.mn.us/protecting/waterprotection/waterplanning.aspx](http://www.mda.state.mn.us/protecting/waterprotection/waterplanning.aspx)

### ***Minnesota Pollution Control Agency (MPCA)***

The MPCA submitted a letter outlining their top three priority concerns for Swift County. A copy of the map and letter, dated September 6, 2012, can be found in Appendix B. The MPCA submitted the following four priority concerns for Swift County:

1. Impaired Waters/Total Maximum Daily Loads (TMDL)
2. Watershed Approach
3. Agricultural Drainage Management
4. General Update of the LWM Plan information relative to MPCA Programs

**Table 2: Swift County Water Plan  
Summary of Stakeholder's Priority Concerns  
(Please refer the text)**

Priority Concern/Issue	Stakeholder		
	MN Dept. of Agriculture	MN Pollution Control Agency	BWSR
1. Ag. Drainage Management	Yes*	Yes	Yes
2. Surface Water Quality/TMDLS	Yes	Yes*	Yes*
3. Soil Erosion/Sediment Control	Yes		Yes*
Septic Systems (SSTS)			Yes
Wetlands/Water Retention	Yes*		Yes
Groundwater quality/quantity	Yes		
Feedlots/Nutrient Management	Yes		Yes
Best Management Practices (BMPs)	Yes		Yes
Stakeholder Cooperation	Yes	Yes	
Watershed Approach		Yes	
1. Surface Water Quality/TMDLS	Yes	Yes*	Yes*

\* = Stakeholder's Top Priority Concern

*Minnesota Board of Water and Soil Resources (BWSR)*

The BWSR submitted a Swift County Priority Concerns Input Form on September 14, 2012 (a copy of the correspondence can be found in Appendix B). BWSR identified the following four top priority concerns:

1. Erosion and Sediment Control; Nutrient Management on Agricultural Land
2. Feedlot Management and Non-Conforming Subsurface Septic Treatment Systems
3. Drainage Water Management Planning/Drainage System Maintenance and Repair
4. Address Accelerated Runoff Impacts via Wetland Restoration, Protection, and Enhancement/Water Storage

**Section Three:  
Swift County  
Priority Water Planning Issues**

**G. Water Plan Task Force**

Swift County maintains a Water Plan Task Force which meets regularly on water plan initiatives. In addition, the Task Force is used throughout the water planning process to help identify priority issues and to develop the water plan's Goals, Objectives, and Action Steps. Members of the Task Force are listed on the inside cover of the Plan.

**H. Priority Water Planning Issues**

The Swift County Water Plan Task Force met on December 12, 2012, to review the Priority Concerns Input Forms received (Appendix A contains a copy of the Sign in Sheet). The Water Plan Task Force identified the following as Swift County's priority water planning issues (note: these issues are not ranked):

1. Surface Water Management
  - a. Agricultural Drainage
  - b. Stormwater Management
  - c. Wetlands and Water Storage/Retention
  
2. Reducing Priority Pollutants ~ Surface Water Quality
  - a. TMDL Implementation
  - b. Feedlot/Livestock Management
  - c. Subsurface Sewage Treatment Systems
  - d. Erosion and Sediment Control
  
3. Groundwater Quality & Quantity
  
4. Plan Administration
  - a. Watershed Focus - Stakeholder Cooperation
  - b. Raising Public Awareness - Education

## **I. Priority Issues Not Addressed by this Water Plan**

All of the priority issues identified in the Swift County Water Plan Survey and received in Swift County's Priority Concerns Input Forms, will either directly or indirectly be addressed in Swift County's updated Water Plan. This is particularly important to Swift County, since BWSR and the other State agencies have indicated that projects are less likely to receive grant money unless they are mentioned in Local Water Management Plans.

*As a result of not excluding any priority concern identified by a water plan stakeholder, Swift County does not anticipate needing to resolve any differences between Swift County's Priority Water Plan Issues and other state, local and regional concerns.*

**Section Four:  
Swift County  
Ongoing Water Plan Activities**

Swift County has numerous ongoing programs and land use controls that are directly linked to the County’s Water Plan. These ongoing activities include educational efforts on key water planning issues, stream monitoring, and Best Management Practices (BMPs) implementation. In addition, County staff regularly attends water management meetings, educational conferences, and promotes water protection projects. The County also annually provides cost-share to fund various watershed groups and similar organizations. All of these activities directly are related to implementing the Local Water Management Program (i.e., “Water Plan”).

In addition to implementing the County’s Water Plan, the County also accomplishes numerous water plan initiatives through implementing the following County programs. **Table 3 shows that Swift County has spent over \$480,535 in funds on all of these ongoing activities between the five-year period of 2007 and 2011.**

- ***County Feedlot Program*** – Swift County has a county feedlot program, administered through the Minnesota Pollution Control Agency (MPCA). This means the county works with producers on registration, permitting, inspections, education, and complaint follow-up.
  - ***Subsurface Sewage Treatment System (Program SSTS)*** – Swift County enforces MN Rules Chapter 7080-7083 through the Swift County SSTS Ordinance. This Ordinance helps ensure that septic systems are designed and maintained properly, and includes a compliance inspection requirement when property is transferred (seller’s responsibility).
  - ***Shoreland Management Program*** – Swift County assists the Minnesota Department of Natural Resources (DNR) with administering the Shoreland Management Act. This Act regulates land use development within 1,000 feet of a lake and 300 feet of a river and its designated floodplain.
  - ***Wetland Conservation Act Program (WCA)*** – Swift County assist the Minnesota Board of Water and Soil Resources (BWSR) with administering the Minnesota Wetland Conservation Act of 1991. The goals of the Act are to maintain a “no-net-loss of wetlands”, minimize any impacts on wetlands, and to replace any lost wetland acres affected by development.

**Table 3:**  
**Swift County's**  
**Natural Resource Block Grant Expenditures**  
**~ 2007 – 2011 ~**

Year - Category	2007		2008		2009		2010		2011		5-Year Totals		
	State	Match	State	Match	State	Match	State	Match	State	Match	State	Match	Overall
<b>Feedlot<sup>1</sup></b>	\$16,792	\$11,124	\$18,213	\$10,640	\$16,392	\$10,534	\$14,364	\$10,055	\$13,536	\$9,475	\$79,297	\$51,828	\$131,125
<b>SSTS<sup>2</sup></b>	\$9,885	\$0	\$10,000	\$0	\$10,000	\$0	\$9,931	\$5,000	\$9,931	\$0	\$49,747	\$5,000	\$54,747
<b>LWM<sup>3</sup></b>	\$19,816	\$2,743	\$19,816	\$3,090	\$19,816	\$19,816	\$20,609	\$3,445	\$14,798	\$4,141	\$94,855	\$33,235	\$128,090
<b>Shoreland<sup>4</sup></b>	\$3,126	\$3,126	\$3,126	\$3,126	\$3,126	\$3,126	\$3,126	\$3,126	\$2,698	\$2,698	\$15,202	\$15,202	\$30,404
<b>WCA<sup>5</sup></b>	\$13,806	\$13,806	\$13,806	\$13,806	\$13,806	\$13,806	\$13,806	\$13,806	\$11,915	\$13,806	\$67,139	\$69,030	\$136,169
<b>Sub-Total</b>	\$63,425	\$30,799	\$64,961	\$30,662	\$63,140	\$47,282	\$61,836	\$35,432	\$52,878	\$30,120	\$306,240	\$174,295	\$480,535
<b>Totals</b>	<b>\$94,224</b>		<b>\$95,623</b>		<b>\$110,422</b>		<b>\$97,268</b>		<b>\$82,998</b>		<b>\$480,535</b>		

- Feedlot<sup>1</sup>** – Refers to the County's Feedlot Program
- SSTS<sup>2</sup>** – Refers to the County's Subsurface Sewage Treatment Systems Program
- LWM<sup>3</sup>** – Refers to the County's Local Water Management Program
- Shoreland<sup>4</sup>** – Refers to the County's Shoreland Program
- WCA<sup>5</sup>** – Refers to the County's Wetland Conservation Act Program

## **Chapter Two: Assessment of Priority Concerns**

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This Chapter provides an assessment of the priority concerns identified throughout the Water Plan's priority concerns scoping process. These concerns were identified by a variety of stakeholders and were selected by the Swift County Water Plan Task Force. Please refer to Chapter One of this Water Plan for more information.

The priority concerns scoping process identified numerous priority issues that can be categorized into four larger topic areas; Surface Water Quality; Surface Water Quantity; Groundwater Quality & Quantity; and Plan Administration. The Task Force acknowledges the priority issues could've been organized differently and they also realize that some priority issues pertain to more than one of the larger topic areas. This Chapter provides assessments for the first three categories. The fourth category, Plan Administration, is profiled in Chapter Four.

### **Swift County Priority Water Plan Concerns/Issues:**

1. Reducing Priority Pollutants ~ Surface Water Quality
  - a. TMDL Implementation
  - b. Feedlot/Livestock Management
  - c. Subsurface Sewage Treatment Systems
  - d. Erosion and Sediment Control
  
2. Surface Water Management ~ Surface Water Quantity
  - a. Agricultural Drainage
  - b. Stormwater Management
  - c. Wetlands and Water Storage/Retention
  
3. Groundwater Quality & Quantity
  
4. Plan Administration
  - a. Watershed Focus – Stakeholder Cooperation
  - b. Raising Public Awareness – Education

## Section One:

### Surface Water Quality ~ Reducing Priority Pollutants

This section of the Water Plan provides an assessment of Swift County's surface water quality. To begin with is a subsection on Swift County's Watersheds, followed by subsections on Impaired Waters, Feedlots and Livestock Management, Subsurface Sewage Treatment Systems, and Erosion and Sediment Control.

#### A. Watersheds Assessment

Swift County is located within three major watersheds: the Chippewa River, Pomme de Terre, and the Upper Minnesota River Watersheds (see Map 2A). Each watershed is briefly described in this section, with additional contact information provided.

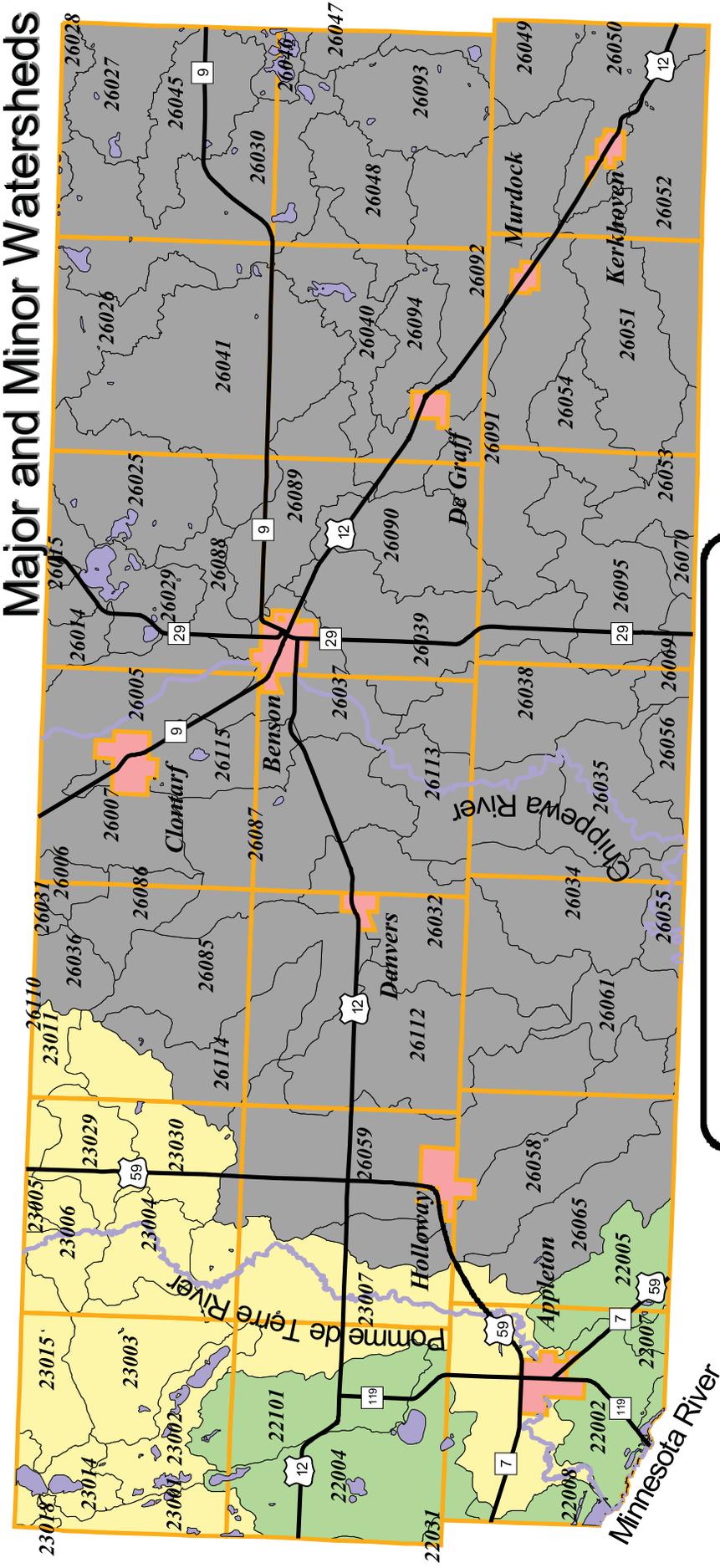
##### **Chippewa River Watershed**

The Chippewa River Watershed is the largest of Swift County's three major watersheds (refer to Maps 2A). The Chippewa River is one of 12 major tributaries of the Minnesota River. In total, the Chippewa River Watershed drains 2,080 square miles (1,3 million acres), including portions of Otter Tail, Grant, Douglas, Stevens, Pope, Swift, Kandiyohi, Chippewa, and Stearns Counties. The Chippewa River flows south to its confluence with the Minnesota River at Montevideo in Chippewa County. The total distance of the stream network is 2,091 miles of which 1,567 miles are intermittent streams and 525 miles are perennial streams.

Geomorphology of the Chippewa River Watershed includes a complex mixture of moraines, till, and outwash plains. The eastern half of the Chippewa River Watershed, extending from approximately Evansville in the north to just below the town of DeGraff in the south, lies within the North Central Hardwood Forest Ecoregion. More specifically, with the exception of a long, narrow section of the Belgrade-Glenwood outwash plain along the east edge of the basin, the eastern half of the watershed falls within the geomorphic setting of the Alexandria Moraine Complex. This morainal complex is composed of well drained, loamy, silty, sandy and mucky soils with moderate to steep sloping landscapes (6-45%), producing a large potential for sediment delivery to streams. Water erosion potential within this section of the watershed is classified as moderate to high. The section of the watershed situated in the Belgrade-Glenwood outwash plain, lying east of the line from Glenwood in the north to Lake Johanna in the south, is characterized by nearly level to gently sloping (2-6%), well drained landscapes with sandy-loamy soils of moderate water and wind erosion potential.

Lands in the western half of the Chippewa River Watershed fall within the Northern Glaciated Plains Ecoregion, primarily within three geomorphic settings: the Big Stone Moraine on the far

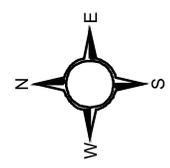
# Map 2A: Swift County's Major and Minor Watersheds



**\*Note\***  
*Minor Watersheds are labeled with their  
 corresponding 5-digit ID Number*

### Legend

	Major Roads		Watersheds
	Rivers		Chippewa River
	Lakes		Pomme de Terre River
	Townships		Upper Minnesota River
	Cities		



western edge, the Appleton-Clontarf Outwash Plain along the lower Chippewa River, and the Benson Lacustrine Plain within the south-central section of the watershed. Landscapes within the Big Stone moraine are characterized as rolling (6-12 %), with well drained, silty and loamy soils. Water erosion potential within the moraine is generally classified as moderate. Lands within the Appleton-Clontarf outwash are characterized as being nearly level to gently sloping (2-6%), poorly drained, and extensively tiled. Water and wind erosion potentials are classified as moderate for this region. The Benson Lacustrine Plain is also nearly level (0-2%), poorly drained and extensively tiled. Soil textures in the lacustrine plain range from silty clay to silt loam, water erosion potentials are high for lands adjacent to streams and much of the plain has the potential for significant wind erosion.

### ***Key Stakeholder: Chippewa River Watershed Project***

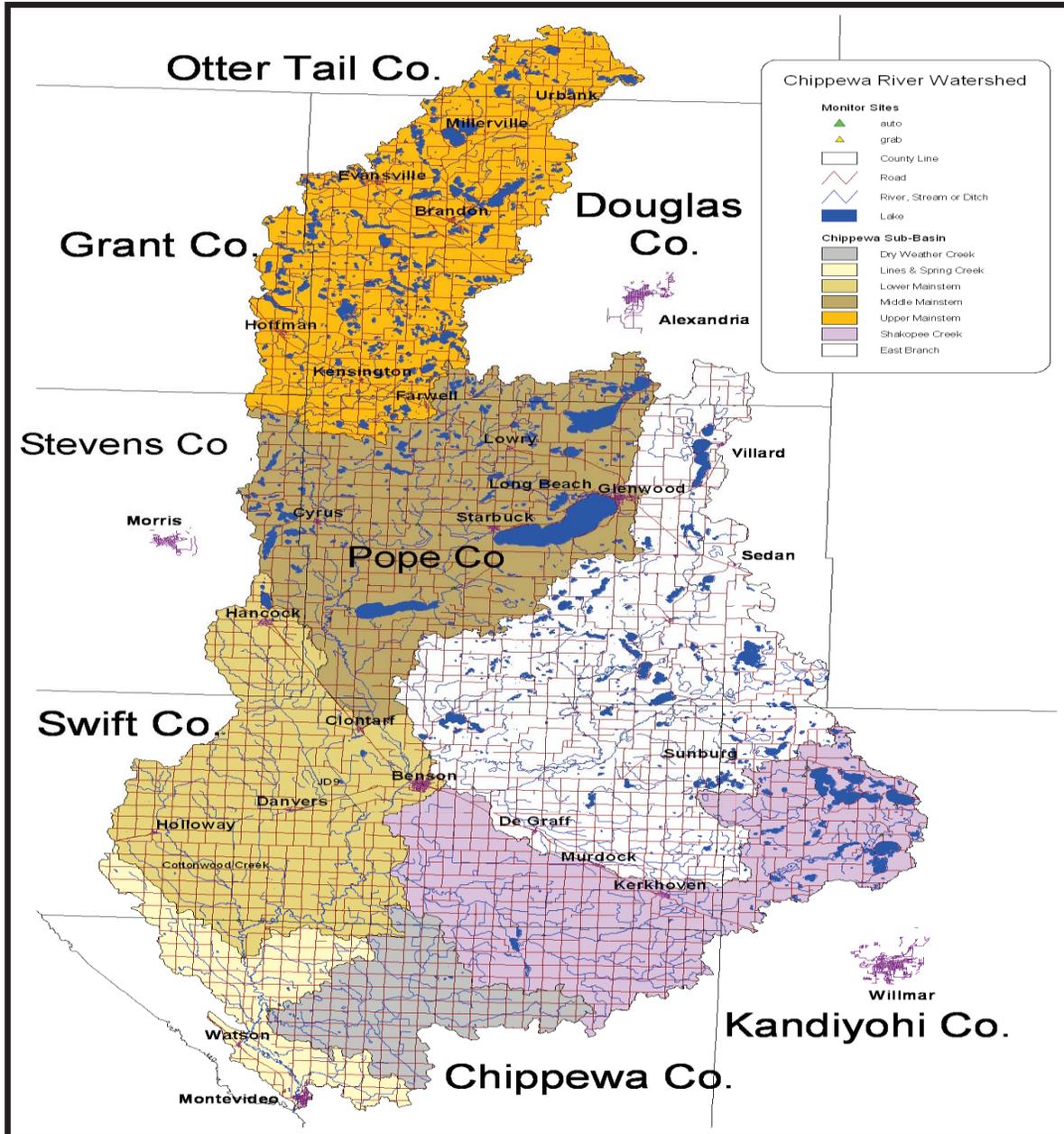
The Chippewa River Watershed is served by the Chippewa River Watershed Project (refer to Map 2B), which is a non-regulatory cooperative partnership and citizen based approach focused on improving water quality and watershed life in the Chippewa River and its tributaries. The CRWP is currently funded with state Clean Water Partnership Grants, Federal 319 Grant Dollars, and local water plan contributions. The CRWP also relies heavily on the volunteers and stakeholder participation. In 2011, Swift County joined the Chippewa River Watershed Project Joint Powers Board. For more information, visit [http://www.chippewariver.com/about\\_proj.aspx](http://www.chippewariver.com/about_proj.aspx).

The ten-year goals of the CRWP are:

1. To achieve the highest water quality attainable for ecoregion streams;
2. To increase the number of watershed residents taking an active role in enhancing and protecting the Chippewa River;
3. To continue to have the watershed community of agencies and organizations bonded together (across county boundaries) as a group working toward the common goal of improved water quality in the Chippewa River Watershed;
4. To develop the Chippewa River as a major recreational resource within the Minnesota River Basin.

In setting the watershed's goals and objectives, consideration was given to four important watershed characteristics. First, agriculture is the predominant land use in the watershed and improvements to water quality will require changes in agricultural practices, which requires education and presenting solutions that are economically viable to the agricultural community.

**Map 2B:  
Chippewa River Watershed Project**



Second, pollutant transport in the watershed is primarily affected by uncontrolled runoff through the many hydrologic pathways present, such as the watershed’s extensive drainage system. Third, the Chippewa River holds enormous potential for being a recreational resource, but past and present conditions prevent it from being used to its full potential. And fourth, watershed residents, through their involvement and actions, hold the key to protecting and enhancing the

Chippewa River. To achieve each of these goals, continued and increased education of urban and rural watershed residents needs to be done through an intense outreach campaign. The long-term goal of the CRWP is to improve the water quality and flooding problems in the watershed, while also promoting a healthy agricultural, industrial and recreation-based economy for the region. The best management practices (BMPs) to be utilized include nutrient management, residue management, wetland restoration, buffer strips, water and sediment control basins, livestock waste management, individual sewage treatment systems, grassed waterways, streambank restoration, terraces, contour farming, grade control structures, pasture management, alternative tile inlets, RIM, CRP and shoreline naturalization. Urban practices to be promoted include recycling, directing downspouts to lawns, phosphorus free fertilizer for lawn care, construction site erosion control and storm water management. Implementation of these practices on the landscape will be accomplished through the work of the cooperating partners and through grant applications for funds targeted for specific sub-basins of the watershed.

Because the Chippewa River is so large, it is necessary to prioritize sub-basins for the development of the Implementation Plan. The major tributaries of the Chippewa River create natural sub-basins making this delineation possible. Water quality monitoring data, watershed assessments and judgments about reasonable expectations for rivers and streams in this area of the State were used in ranking the sub-basins. Due to the high levels of nutrients (phosphorus and nitrogen), sediment and fecal coliform bacteria, the Shakopee Creek Headwaters (SCH) area was ranked as the watershed's first priority sub-basin. Other sub-basins of the Chippewa River include: East Branch Chippewa River, Lower Main Stem, Little Chippewa River, Dry Weather Creek, Spring Creek, Lines Creek, Cottonwood Creek and the Upper Main Stem. **In Swift County, Chippewa River's main subwatersheds are the Lower Main Stem, East Branch, and Shakopee Creek (refer to Map 2B).**

### **Chippewa River Watershed Water Quality Summary**

The Chippewa River Watershed Project (CRWP) has been collection extensive water quality data since 1998. In 2011, the CRWP published the *Chippewa River Watershed Monitoring Summary 2009-2010:- Learning from the River*. This section of the water plan provides a summary of the key water quality information pertaining to Swift County. During 2009 and 2010 CRWP maintained 29 intensive chemical monitoring sites, 12 of which had automated flow tracking equipment monitoring river stage levels every 15 minutes. The 250 transparency transect sites received special attention over these last two years. Rather than monitoring them three times a year CRWP bumped the number of visits per year up to ten and added Dissolved Oxygen, pH, Conductivity and Temperature to the transect field measurements. CRWP staff added a randomized stream bank survey to its list of activities surveying 71 sections of river for stream bank erosion levels. The Minnesota Pollution Control Agency also did significant monitoring in the watershed. They surveyed 74 sites for fish and aquatic insects.

### *Transect Surveys: Transparency*

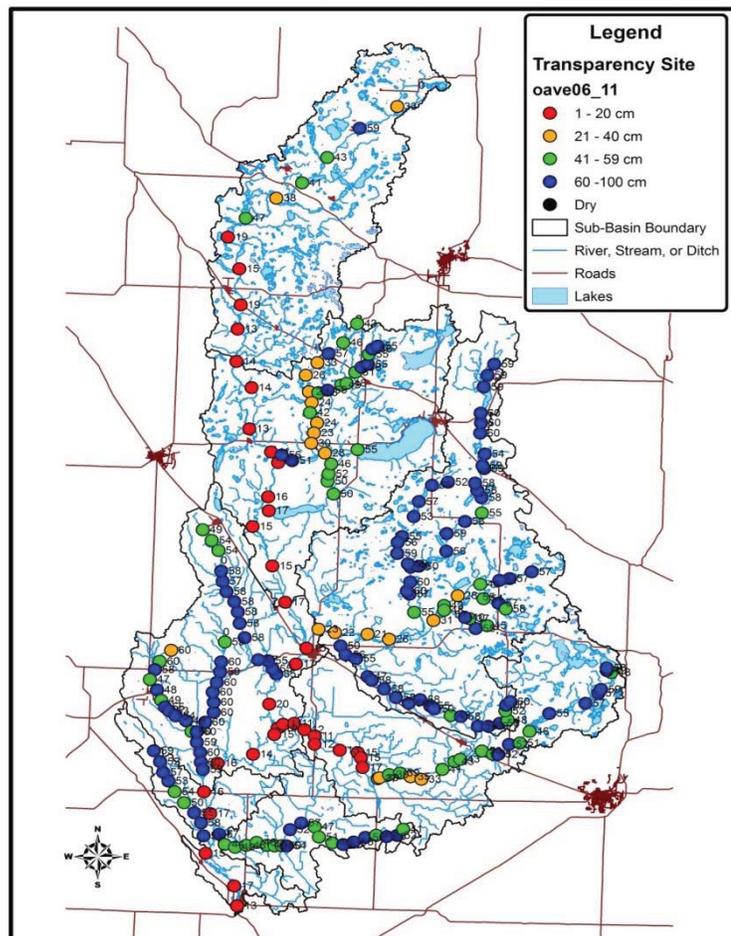
In 2009 and 2010 CRWP increased its number of site visits from three a year to ten a year. In addition to monitoring transparency and bank buffer width CRWP added Dissolved Oxygen, pH, Conductivity and Temperature to the transect field measurements. This major increase in intensity was brought about through the support of the MPCA.

Transparency is a measurement of the clarity of stream water: how much sediment, algae, and other materials are suspended in the water. It is measured with a transparency tube, a clear 100 cm-long tube with a colored disk at the bottom for measuring the depth at which the disk is visible. CRWP transparency data has been very useful in pinpointing where suspended solids and turbidity problems begin, end or are not an issue. This information can be used to convince landowners and resource managers to take action in those areas where we see the problem. The information from the transects has shown that water quality problems are not everywhere. There are many parts of the Chippewa Watershed that have very good water quality when it comes to transparency. These areas should be protected.

The data presented is an assemblage of the last five years of monitoring. Generally, transparency is highest in the upstream reaches of a tributary. Sometimes the water maintains its high level of transparency for the full length of a tributary. In some cases the water's transparency drops. Once the transparency had dropped it is rare for it to recover. As water flows downstream it has more opportunities to pick up pollutants, thus lower stream stretches tend to have more polluted water and lower transparency.

Low Transparency during high flows is expected. The continuation of low transparency during low flow periods is concerning. The constant low transparency levels suggest that sediment and nutrient levels in the Chippewa

2006-2010 Transparency Transect Survey



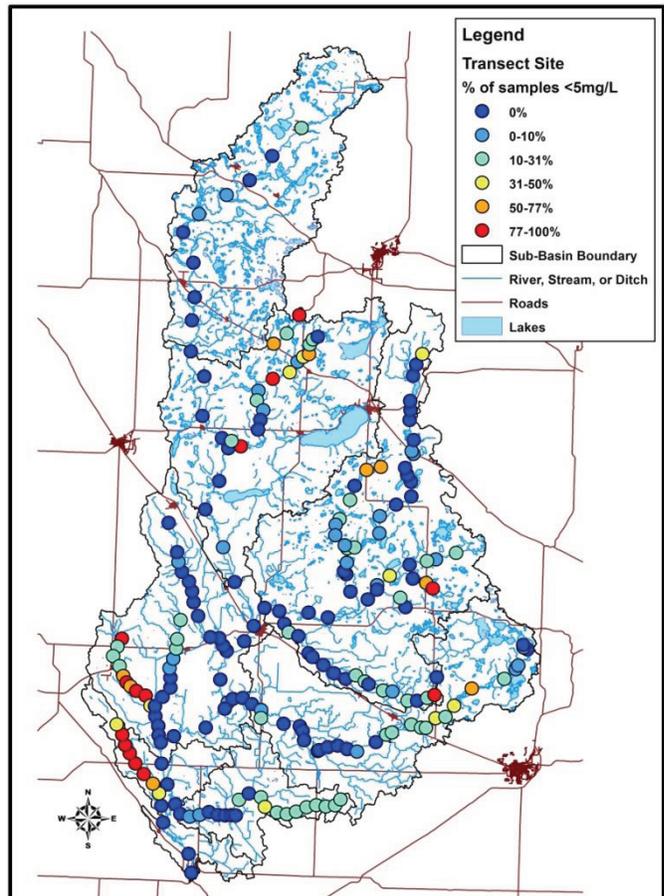
are a serious issue throughout the watershed. Low transparency during low flows has serious negative consequences for aquatic life and aesthetic enjoyment of the river.

Sites where the transparency level drops to 20 cm or below more than 10% of the time can be listed as impaired by the US EPA (given at least 20 sampling events). In 2009 and 2010, 17.4% of the measurements exceeded the standard. Basins that experienced problematic Transparency in 2009-2010 were the Lower Mainstem, the Middle Mainstem, The Upper Chippewa from Peterson Lake down, Downstream of Shakopee Lake on Shakopee Creek, the Little Chippewa before it enters Outlet Creek and the lower portions of the East Branch. Areas that experienced fair to good transparency included the Northern East Branch, the Upper Chippewa, JD19 (Swift County), Cottonwood Creek, and JD9 in Swift County. Dry Weather Creek also saw an improvement in transparency over previous years.

### ***Transect Surveys: Dissolved Oxygen***

In addition to increasing the number of monitoring sites from three to ten, the CRWP also added Dissolved Oxygen (DO) field measurements to their monitoring program. CRWP DO data has been very useful in identifying areas where DO is or is not an issue. This information combined with DO measurements taken at the automated sites can be used to identify the stressors causing difficulties for aquatic species. The information from the transects has shown that water quality problems are not everywhere. There are many parts of the Chippewa Watershed that have very good water quality when it comes to DO. These areas should be protected. The data presented in the map to the right was collected in 2009-10. The map presents a color code for each site representing the percentage of samples that were below the MN State Standard of 5 mg/L. Some low DO is natural and expected. In the southwest part of the watershed Lines Creek passes through a number of wetlands and low lying areas. Slow moving and stagnant water tend to lose their DO. Headwater regions of small streams tend to have lower DO due to their low and often short-lived flows. In some cases changes to the watershed have caused the water

**Transect Dissolved Oxygen Survey**  
**Percent of DO Samples below 5 mg/L, 2009-2010**



***What is Dissolved Oxygen?***

***Dissolved oxygen*** is one of the best indicators of the health of a water ecosystem. Dissolved oxygen can range from 0-18 parts per million (ppm), but most natural water systems require 5-6 parts per million to support a diverse population.

Oxygen enters the water by direct absorption from the atmosphere or by plant photosynthesis. The oxygen is used by plants and animals for respiration and by the aerobic bacteria which consume oxygen during the process of decomposition. When organic matter such as animal waste or improperly treated wastewater enters a body of water, algae growth increases and the dissolved oxygen levels decrease as the plant material dies off and is decomposed through the action of the aerobic bacteria. A decrease in the dissolved oxygen levels is usually an indication of an influx of some type of organic pollutant.

*Source: Science Junction, NC State University*

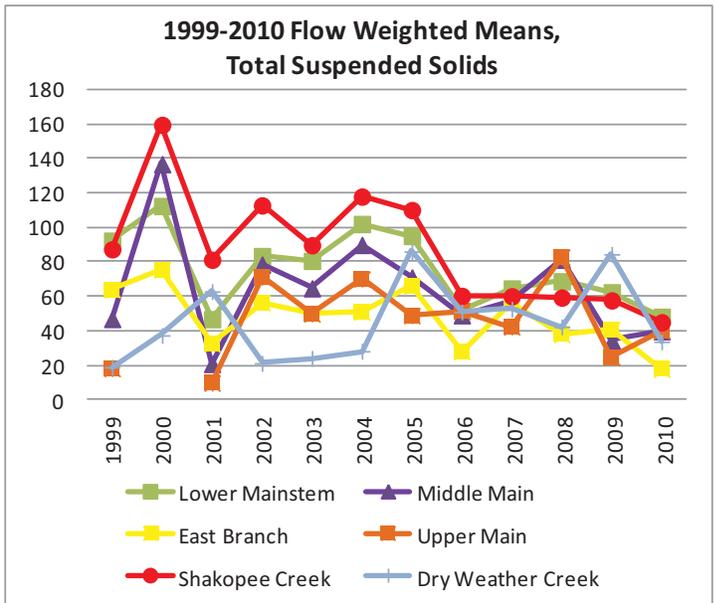
levels to run low or even dry up in later parts of the year. These developments have created the conditions for low DO. Persistent low DO levels have negative consequences for aquatic life and aesthetic enjoyment of the river.

On the positive side, locations where the DO was never observed below the 5mg/L represented 52% of the sites. These sites represent the vast majority of mainstem sites and the lower ends of the major tributaries. More concerning were the 35% of the sites where DO was observed to be below 5mg/L over 10% of the time. These low DO cases tended to cluster together suggesting a regional issue. The upper reaches of Cottonwood Creek, Lines creek, Pope CD15, and the Little Little Chippewa River deserve further attention to address their low DO levels.

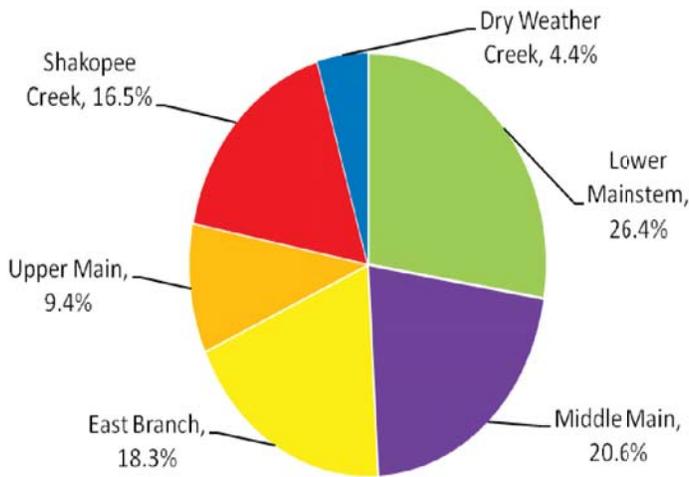
***Total Suspended Solids***

Total Suspended Solids (TSS) concentrations continued a declining trend in 2009 and 2010. In 2010 all of the sites actually came in under the 54 ppm target set for the watershed by the Minnesota Pollution Control Agency. 2009 would have been the same but for the notable exceptions of the Lower Mainstem, Dry Weather Creek and Shakopee Creek.

The big spring melts of both years had relatively low TSS levels. This brought the annual average down even though later season concentrations rose. As the spring melt ended, the algal component of TSS increased. This process is driven by water temperature and nutrient levels. As river levels drop the water saturated banks begin to fail and slump into the river this also contributes to later season increases in TSS.



**TSS Source Distribution (where did it come from)**



The main contributor to the TSS levels observed at Hwy 40 was the Lower Mainstem. Evidence from Transparency Transects and monitoring sites previously located on Cottonwood Creek and Judicial Ditch 9/County Ditch 3 indicate that more than 95% of the TSS from the Lower Mainstem comes from the region adjacent to the Chippewa River. Overall, in 2010 the Chippewa River delivered 143 tons of suspended sediment a day to the Minnesota River. That would be like seven 20-ton dump trucks dumping soil into the river every single day.

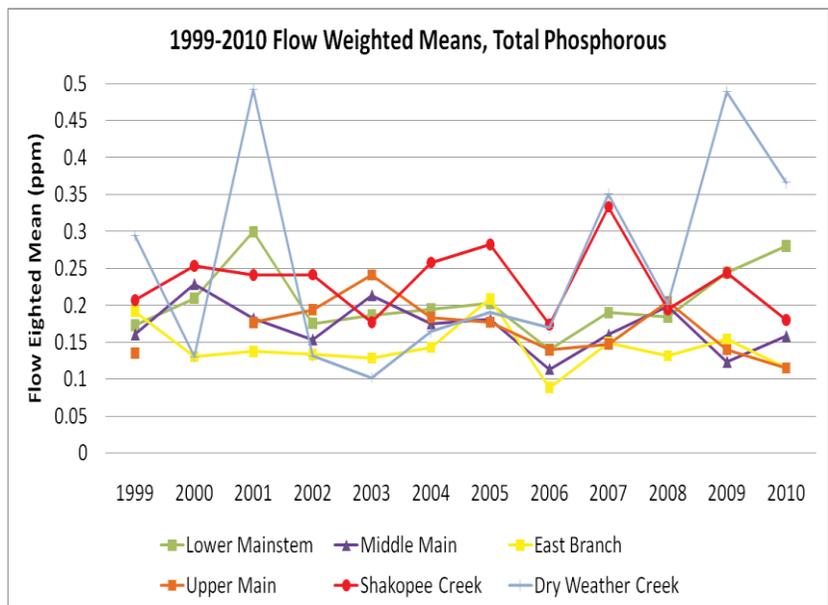
***What are Total Suspended Solids?***

The transport of sediment is a natural function of rivers. Modification of the landscape has accelerated the rate of soil into waterways. Increased runoff has resulted in stream bank erosion. Elevated sediment (suspended soil particles) has many impacts. It makes rivers look muddy, affecting aesthetics and swimming. Sediment carries nutrients, pesticides, and other chemicals into the river that may impact fish and wildlife species. Sedimentation can restrict the areas where fish spawn, limit biological diversity, and keep river water cloudy, reducing the potential for growth of beneficial plant species.

***Source: "State of the Minnesota River 2002 Executive Summary"***

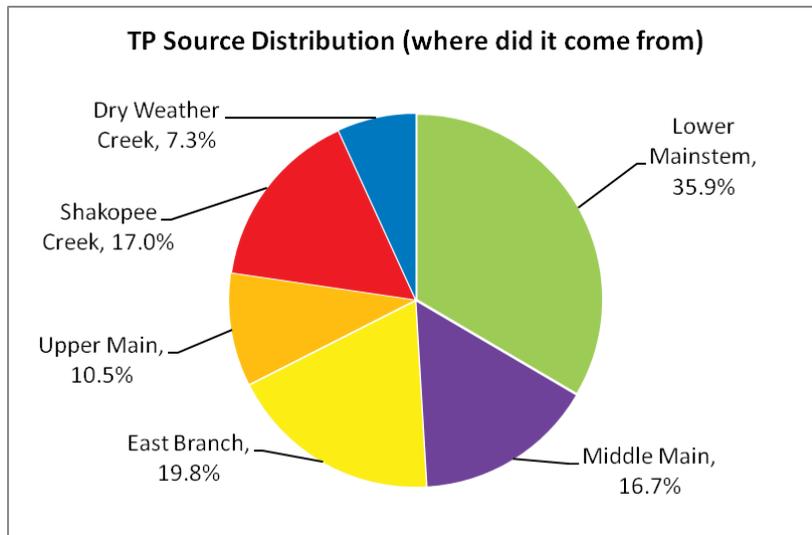
***Total Phosphorous***

Total phosphorous (TP) concentrations ranged widely across the watershed in 2009-2010. No basin was below the 0.1 mg/L desired goal set by the Environmental Protection Agency for prevention of algal growth. Dry Weather Creek, Shakopee Creek and the Lower Mainstem presented the highest concentrations of Phosphorous. Even though the Dry Weather



Creek produced the highest concentrations, the Lower Chippewa has been the largest overall contributor of actual phosphorous. In the last ten years the Lower Chippewa contributed 36% of the TP observed in the river. Considering that it only represents 16% of the Chippewa Watershed’s land area this is highly significant.

In 2010 at the outlet (Lower Mainstem) the 0.28ppm translated to 191.4 tons of phosphorous. 191 tons would have fertilized 10,914 acres of corn at 35 pounds/acre. It led to 191,400,000 pounds of algae in lakes and rivers.



***What is Phosphorus?***

Phosphorus is an important nutrient for plant growth. Total Phosphorous is the measure of the total concentration of phosphorous present in a water sample. Excess phosphorus in the river is a concern because it can stimulate the growth of algae. Excessive algae growth, death, and decay can severely deplete oxygen supply in the river, endangering fish and other forms of aquatic life. Low dissolved oxygen rates are of particular concern during low flow times or in slow moving areas such as reservoirs and the lower reaches of the river.

Point-source Phosphorous comes mainly from municipal and industrial discharges to surface waters. Non-point-source phosphorous comes from runoff from urban areas, construction sites, agricultural lands, manure transported in from feedlots and agricultural lands, and human waste from noncompliant septic systems.

***Source: “State of the Minnesota River 2002 Executive Summary”***

## *Chippewa River Watershed Monitoring and Assessment Report*

The Minnesota Pollution Control Agency published the *Chippewa River Watershed Monitoring and Assessment Report* in July 2012 after three years of intensive watershed monitoring. Ninety-six sites were sampled for biology at the outlet points of variable sized sub-watersheds within the Chippewa watershed. The Chippewa River Watershed Project also completed water chemistry sampling at the outlet points of seventeen major subwatersheds and lake water quality sampling focusing on basins greater than 100 acres in size. In 2010, a holistic approach was started to assess all of the watershed's surface water bodies for aquatic life, recreation and consumption use support. Where sufficient data was available, 112 stream reaches and 84 lakes were assessed in this effort. The following sections summarize the information presented in the report for the Chippewa River subwatersheds found in Swift County.

### **Lower West Branch Subwatershed -**

The Lower West Branch Chippewa River Watershed unit encompasses parts of Pope, Stevens, and Swift Counties and has a drainage area of 193.1 square miles (refer to the figure on the right). The western half of the watershed is in the Northern Glaciated Plains Ecoregion, the eastern half is in the North Central Hardwoods Ecoregion, and the very southern tip is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with open water being the second most abundant. This includes Lake



Minnewaska which is the largest lake in the watershed and is the thirteenth largest in Minnesota. The Lower West Branch Chippewa HUC-11 is made up of two main parts, the Chippewa River and Outlet Creek. The Chippewa River flows north to south from just south of Cyrus to just north of Benson. The Outlet Creek flows southwest out of Lake Minnewaska and combines with County Ditch 2, which drains the Little Chippewa HUC-11 due to stream modification. Outlet creek continues southwest to Lake Emily then west to the Chippewa River. The outlet of this watershed unit is represented by site 03MN010 on the Chippewa River.

***Stream biological assessment results*** - Two of the three assessed AUIDs in this watershed are not supporting of aquatic life and one AUID is supporting of aquatic life. The main stem of the West Branch Chippewa River is not supporting of aquatic life, similar to the two upstream HUC-11 watersheds. The main tributary, Outlet Creek, is also impaired. Signalness Creek which is a

tributary to Outlet Creek is fully supporting of aquatic life. The Outlet Creek and the West Branch Chippewa both have channelized reaches that have good biological scores. Habitat in this watershed is fair. Outlet Creek flows from Lake Minnewaska into Lake Emily, and both lakes are not supporting of aquatic recreation. The impaired lakes could affect the biology for the stream between them.

**Stream water chemistry assessment results** - Stream water quality data was available on three stream reaches in the Lower West Branch Chippewa River watershed unit. Lake Minnewaska to Lake Emily exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The Little Chippewa River to Unnamed Creek, which flows from the outlet of Lake Emily, was found to be impaired for aquatic life use based on excess turbidity. The reach directly downstream, Unnamed Creek to the East Branch of the Chippewa River exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life use based on excess turbidity.

**Lake water chemistry assessment results** - Five of the 14 lakes greater than four hectares (10 acres) were reviewed for aquatic recreation use in the watershed. Minnewaska and Signalness were both fully supporting of aquatic recreation. Minnewaska is a large, 3,144 ha, lake with only 30 percent littoral area. Efforts to keep phosphorus out of the lake with best management practices should be used to preserve the high water quality in this lake. Three lakes, Emily, Long, and Danielson Slough were found to be impaired for aquatic recreation use (excess nutrients). Lake Emily has a very large watershed and is shallow, allowing for internal loading. In addition reductions in nutrient run-off within the watershed will need to be addressed. Reducing phosphorus run-off and careful management of land use will be important in remediation of Long Lake and Danielson Slough.

### East Branch Chippewa River Subwatershed -

The East Branch Chippewa River Watershed unit encompasses parts of Pope and Swift Counties and has a drainage area of 262.4 square miles (refer to the figure on the right). The majority of the watershed is in the North Central Hardwoods Ecoregion and the southwest tip is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. The East Branch Chippewa River HUC-11 flows south from near the Forada State



Wildlife Management Area to Terrace then turns southwest to Swift Falls. From Swift Falls the East Branch Chippewa River flows south to Camp Kerk State Wildlife Management Area then flow west to the Chippewa River. The outlet of this watershed unit is represented by site 09MN011 on the Chippewa River, but the outlet of the East Branch Chippewa River is represented by site 07MN041. The HUC-11 boundaries extended the East Branch Chippewa River to past the confluence with the West Branch Chippewa River. Two intensive water chemistry sites are in this HUC-11, one on the main stem Chippewa River and the other on the main stem East Branch Chippewa.

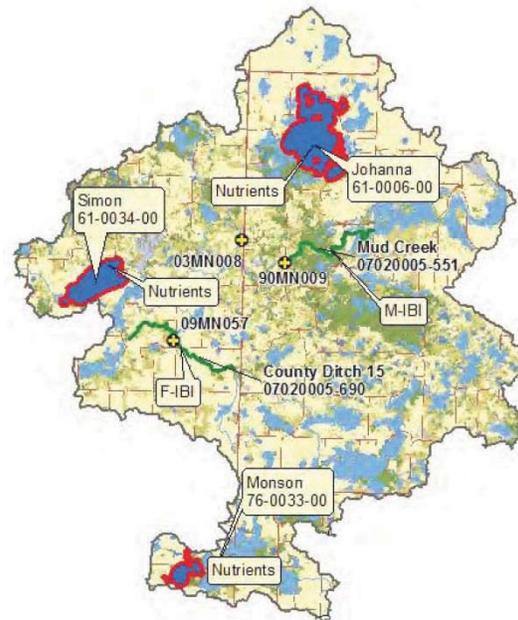
***Stream biological assessment results*** - There are two assessed AUIDs for biology in this watershed. The upstream AUID on the East Branch Chippewa River fully supports aquatic life while the downstream section is not supporting of aquatic life. This watershed has a significant amount of channelization in it. The combination of many impaired lakes, fair to poor habitat scores, and the abundance of channelization may contribute to the low IBI scores in the most downstream AUID in the watershed.

***Stream water chemistry assessment results*** - Stream water quality data was available on three stream reaches on the East Branch Chippewa River. The head waters of the East Branch Chippewa River and the Lake Amelia to Mud Creek segment exceeded the standard for bacteria and are considered impaired for aquatic recreation use. Mud Creek to the Chippewa River exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life use based on excess turbidity. The Chippewa River from the confluence of the East Branch of the Chippewa River to Shakopee Creek exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life use based on excess turbidity.

***Lake water chemistry assessment results*** - Twenty of the 43 lakes greater than four hectares (10 acres) were reviewed for aquatic recreation use in the watershed. Lakes in the northern portion of the watershed make up the head waters of the East Branch of the Chippewa River. Lakes in the headwaters portion of the watershed, except for Leven, tend to have good water quality. Ten lakes, Linka, Scandinavian, Round, Marlu, State, Amelia, Villard, Hoff, Benson (61-0097), and Nelson were all fully supporting of aquatic recreation. Efforts to keep phosphorus out of these lakes will be necessary to preserve good water quality. Eight lakes, Swenoda, Leven, Gilchirst, Hanson, Rasmuson, Steenerson, Mary, and Edwards were found to be impaired for aquatic recreation use (excess nutrients). Gilchirst and Hanson likely act as reservoirs for nutrients from large contributing areas upstream in the watershed. Reductions in overland run-off and management of internal loading of phosphorus in shallow lakes will need to be addressed to see water quality improvements in these basins. Two lakes, Benson (61-0139) and Moore had some water quality information available, but the data sets were not strong enough for an assessment decision to be made.

### **North Mud Creek Subwatershed –**

The North Mud Creek Watershed unit encompasses parts of Kandiyohi, Pope, Stearns, and Swift Counties and has a drainage area of 90.8 square miles (refer to the figure on the right). The entire watershed is in the North Central Hardwoods Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. The North Mud Creek HUC-11 flows west from the Stearns/Pope County line to the Swift/Pope County line just south of Lake Simon. North Mud Creek has the only coldwater AUID being assessed for biology in the entire Chippewa River HUC-8. The outlet of this watershed unit is represented by site 09UM014 on Mud Creek. The site is not within the boundaries of the North Mud Creek Watershed because of wetlands, so the site was added approximately 2 miles downstream of the outlet. There are no major tributaries to Mud Creek between the outlet and the site that represents the outlet.

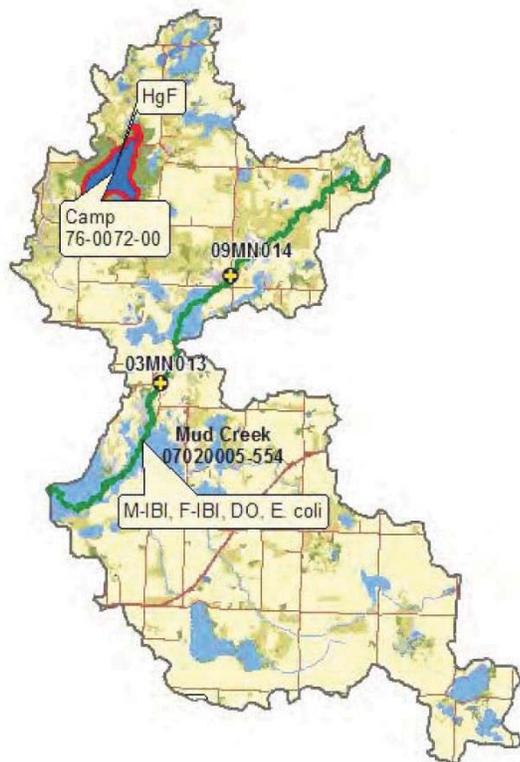


***Stream biological assessment results*** - Three AUIDs in this watershed were assessed for biology. Two of them were not supporting aquatic life and one was fully supporting. The habitat for this watershed is good. There are three lakes with nutrient impairments which could contribute to the biological impairments. The impairment on the upstream section of Mud Creek is a coldwater stream where invertebrates are found to be impaired, but fish were not assessed. Due to the isolation of this coldwater stream from other populations of coldwater species, it is believed that the native coldwater fish community in the upper portions of Mud Creek are susceptible to local extinction events caused by natural disturbances such as drought and beaver impoundments (i.e., increasing the water temperature). Therefore, even though groundwater inputs into this stream may be sufficient for supporting a coldwater fishery, other natural factors may be precluding the establishment and/or maintenance of a coldwater fish community in Mud Creek, which is why this AUID was not assessed with the Fish IBI. Migration of coldwater invertebrate species, particularly insects, is not restricted to coldwater pathways and thus may repopulate after such extinctions.

***Stream water chemistry assessment results*** - Stream water quality data was available on three stream reaches on the East Branch of the Chippewa River. The head waters of the East Branch of the Chippewa River and Lake Amelia to Mud Creek exceeded the standard for bacteria and are considered impaired for aquatic recreation use. Mud Creek to the Chippewa River exceeded the

standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life based on excess turbidity. The Chippewa River from the confluence of the East Branch of the Chippewa River to Shakopee Creek exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life based on excess turbidity.

**Lake water chemistry results** - Twenty of the 43 lakes greater than four hectares (10 acres) were reviewed for aquatic recreation use in the watershed. Lakes in the northern portion of the watershed make up the head waters of the East Branch of the Chippewa River, which travels the length of the watershed. Lakes in the headwaters portion of the watershed, except for Leven, tend to have good water quality. Ten lakes, Linka, Scandinavian, Round, Marlu, State, Amelia, Villard, Hoff, Benson (61-0097), and Nelson were all fully supporting for aquatic recreation use. Efforts to keep phosphorus out of these lakes will be necessary to preserve good water quality. Eight lakes, Swenoda, Leven, Gilchirst, Hanson, Rasmuson, Steenerson, Mary, and Edwards were found to be impaired for aquatic recreation use due to excess nutrients. Gilchirst and Hanson likely act as reservoirs for nutrients from large contributing areas upstream in the watershed. Reductions in overland run-off and management of internal loading of phosphorus in shallow lakes will need to be addressed to see water quality improvements in these basins. Two lakes, Benson (61-0139) and Moore had some water quality information available but the data sets were not strong enough for an assessment decision to be made.



**Frank Lake Subwatershed** - The Frank Lake Watershed unit encompasses parts of Pope and Swift Counties and has a drainage area of 27.3 square miles (refer to the figure on the left). The entire watershed is in the North Central Hardwoods Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. Mud Creek in the Frank Lake HUC-11 flows southwest from the Pope/Swift County line to the East Branch Chippewa River southwest of Camp Kerk Sate Wildlife Management Area. The outlet of this watershed unit is represented by site 03MN013 on the Mud Creek.

**Stream Biological Assessment Results** - One AUID was sampled twice for biology. The AUID was found not supporting of aquatic life. Habitat was fair to poor in the watershed and the upstream AUID impaired for aquatic life use. Upstream impairments may be playing a role in the state of the biology of this watershed.

**Stream Water Chemistry Assessment Results** - Stream water quality data was available on one reach of Mud Creek from County Ditch 15 to the East Branch of the Chippewa River. Dissolved oxygen exceeded the standard and the reach will be listed as impaired due to low DO levels. Turbidity does not look to be a biological stressor along this reach.

**Lake Water Chemistry Assessment Results** - One of the six lakes greater than four hectares (10 acres) was reviewed for aquatic recreation use in the watershed. Camp Lake was found to be fully supporting of aquatic recreation. Land use in Camp Lake Watershed is mostly forest and should be protected in order to prevent increased run-off that may cause nutrient levels in the lake to rise.

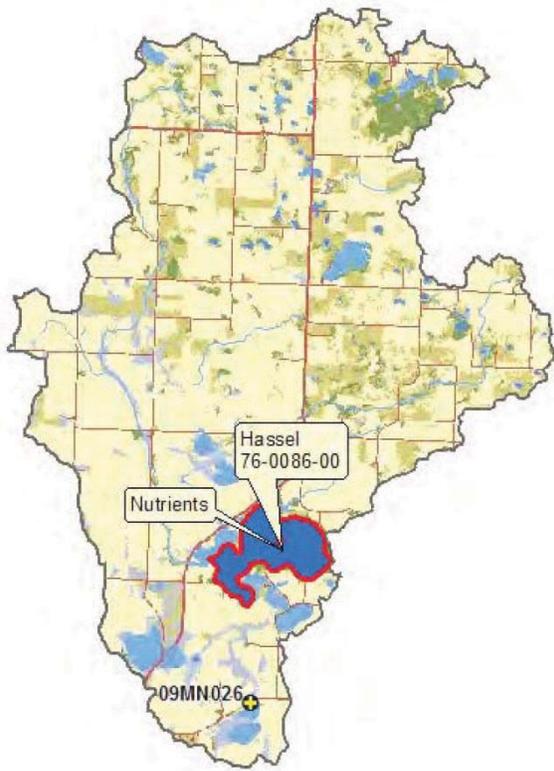
**South Mud Creek Subwatershed** - The South Mud Creek Watershed unit encompasses parts of Swift and Kandiyohi Counties and has a drainage area of 88 square miles (refer to the figure on the right). The northeast half of the watershed is in the North Central Hardwoods Ecoregion and the other half is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. The South Mud Creek HUC-11 flows northwest from the Swift/Kandiyohi county line, near Kerkhoven, to the East Branch Chippewa River near Benson. The outlet of this watershed unit is represented by site 07MN045 on Mud Creek.



**Stream Biological Assessment Results** - No AUIDs were assessed for biology in this watershed since all biological sites are on channelized reaches or limited resource waters. These reaches had fair biological scores and fair habitat scores.

**Stream Water Chemistry Assessment Results** - Limited stream water quality data was available within the South Mud Creek Watershed unit. Dissolved Oxygen (DO) ranged up to 17.79 mg/l indicating that it could be low in the early morning. A recording DO sondes should be placed at this site during August to ensure low DO is not impairing the stream.

**Lake Water Chemistry Assessment Results** - One of the two lakes greater than four hectares (10 acres) was reviewed for aquatic recreation use in the watershed. Hollerberg Lake was found to be impaired for aquatic recreation due to excess nutrients. Reductions in overland run-off and management of internal loading of phosphorus will need to be addressed to see water quality improvements in this lake.



**Lake Hassel Subwatershed** - The Lake Hassel Watershed unit encompasses parts of Pope and Swift Counties and has a drainage area of 39.9 square miles (refer to the figure on the left). The majority of the watershed is in the North Central Hardwoods Ecoregion, while the western edge is in the Northern Glaciated Plains Ecoregion and the southern tip is in the Western Corn Belt Plains Ecoregions. The predominant land use is cropland with rangeland being the second most abundant. Lake Hassel HUC-11 flows from the north to south from County Road 2, in Pope County, through Lake Hassel to the East Branch Chippewa River North of Benson. The outlet of this watershed unit is represented by site 09MN026 on Unnamed Creek, but no intensive water chemistry monitoring was done because this HUC-11 was less than 40 square miles.

**Stream Biological Assessment Results** - There is one biological station in this watershed. The site was not supporting aquatic life, but the AUID was over 90 percent channelized and was not listed for biology. Upstream of the biological site is Lake Hassel which is impaired due to excess nutrients, which could be a factor for the low fish IBI score.

**Stream Water Chemistry Assessment Results** - No Stream reaches were assessed for water quality in this watershed unit.

**Lake Water Chemistry Assessment Results** - Two of the six lakes greater than four hectares (10 acres) were reviewed for aquatic recreation use in the watershed. Hassel Lake was found to be impaired for aquatic recreation use due to excess nutrients. Hassel Lake has a very large watershed and is shallow allowing for internal loading to negatively impact water quality. In addition reductions in nutrient run-off with in the watershed will need to be addressed. An unnamed (61-0274) lake had some water quality information available but the data set was not strong enough for an assessment decision to be made.

**Moore Township Branch Subwatershed** - The Moore Township Branch Chippewa River Watershed unit encompasses parts of Stevens, Pope, and Swift Counties and has a drainage area of 91.4 square miles (refer to the figure on the right). The majority of the watershed is in the Northern Glaciated Plains Ecoregion and the very southern tip is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. The Moore Township Branch Chippewa River HUC-11 flows south from near Hancock to the Chippewa River between Danvers and Benson. The outlet of this watershed unit is represented by site 09MN012 on the County Ditch 3.



**Stream biological assessment results** - No AUIDs were assessed for biology in this watershed since all biological sites are on channelized reaches or limited resource waters. These reaches had fair to poor biological scores and poor habitat scores.

**Stream water chemistry assessment results** - Limited stream water quality data was available within the Moore Township Branch Chippewa River Watershed unit. Turbidity data looked to meet the standard; however, data was insufficient to list the reach as fully supporting aquatic life. Dissolved oxygen ranged up to 15.2 mg/l indicating that it could be low in the early morning. A recording DO sondes should be placed at this site during August to ensure low DO is not a cause of impairment.



**Lake water chemistry assessment results** - No lakes were assessed for water quality in this watershed unit.

**Chippewa River Subwatershed** - The Chippewa River Watershed unit encompasses parts of Swift and Chippewa Counties and has a drainage area of 110.8 square miles (refer to the figure on the left). The entire watershed is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with urban development being the

second most abundant. The Chippewa River HUC-11 flows south from near Danvers to the confluence with the Minnesota River in Montevideo. There is also a diversion channel northeast of Watson that flow west to the Minnesota River. There are two dams on the main stem Chippewa River and one on the diversion channel in this HUC-11. The outlet of this watershed unit is represented by site 09MN019 on the Chippewa River. The fish contaminants data and additional intensive water chemistry was also collected in this watershed unit at site 09MN001 upstream of the diversion channel.

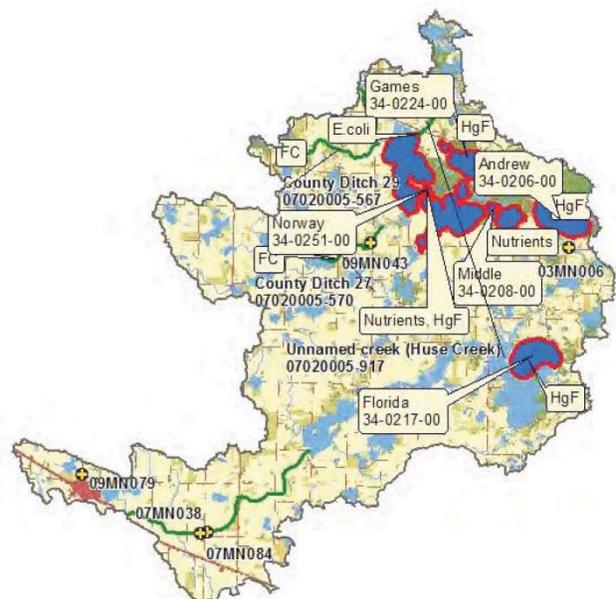
**Stream biological assessment results** - Three biological stations were assessed in this watershed. All three are not supporting aquatic life. All of the sites are on the main stem Chippewa River and all upstream AUIDs are also not supporting aquatic life. There were two biological stations on channelized reaches of the Chippewa River which had good biological scores. The habitat in this watershed is fair.

**Stream water chemistry assessment results** - Water quality data for assessment was available on three stream reaches in the Chippewa River Watershed unit. The East Branch of the Chippewa River to Shakopee Creek exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach shows excess turbidity as a stressor for biology. The Chippewa River from Shakopee Creek to Cottonwood Creek exceeded standards for turbidity and is considered impaired for aquatic life. Further downstream the Chippewa River from Cottonwood Creek to Dry Weather Creek exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life use based on excess turbidity.

**Lake water chemistry assessment results** - No lakes were assessed for water quality in this watershed unit.

### Upper Shakopee Creek Subwatershed -

The Upper Shakopee Creek Watershed unit encompasses parts of Kandiyohi, Swift, and Chippewa Counties and has a drainage area of 125.4 square miles (refer to the figure on the right). The watershed is in the North Central Hardwoods Ecoregion and Western Corn Belt Plains Ecoregion. The predominant land use is cropland with rangeland being the second most abundant. The Upper Shakopee Creek HUC-11 flows southwest from the lakes in Sibley State Park to just southeast of Kerkhoven. The



outlet of this watershed unit is represented by site 09MN010 on the Shakopee Creek; the site is located in HUC 07020005150 because that was the best location to collect the best representation of water chemistry for the Upper Shakopee Creek Watershed unit.

***Stream biological assessment results*** - One AUID was assessed for biology and it was fully supporting aquatic life, but it is located in the headwaters of the watershed. The channelized reaches best describe the majority of the watershed and they have fair to poor biological scores. The habitat scores are fair. There are many lakes at the headwaters of this watershed that are impaired which could contribute to the poor biological scores of the downstream AUIDs.

***Stream water chemistry assessment results*** - Stream water quality data for assessment was available on five stream reaches in the Upper Shakopee Creek Watershed unit. All assessed reaches exceed the standard for bacteria and are considered impaired for aquatic recreation use. The impaired reaches are: Unnamed Creek (Huse Creek) from the headwaters to Norway Lake, Unnamed Ditch (Judicial Ditch #29) from the headwaters to Judicial Ditch #29, County Ditch #29, County Ditch #27, and Shakopee Lake from Swan Lake to Shakopee Lake. Dissolved Oxygen (DO) and turbidity also appear to be biological stressors in the Shakopee Lake to Swan Lake reach but were not listed as impairment causes. DO range up to 15.43 mg/l indicating that it could be low in the early morning. A recording DO sondes should be placed at this site during August to ensure low DO is not a cause of impairment.

***Lake water chemistry assessment results*** - Ten of the 23 lakes greater than four hectares (10 acres) were reviewed for aquatic recreation use in the watershed. Four lakes, Florida Slough, Andrew, Florida, and Games were all fully supporting for aquatic recreation use. The Shakopee Creek originates at the outlet of Andrew Lake and flows through Florida Lake and Florida Slough all of which have good water quality. Middle and Norway were found to be impaired for aquatic recreation use (excess nutrients). This is unexpected because these two lakes flow into Games Lake which has good water quality. If forest land in the watershed of the lakes is converted to crop or developed increased run-off may cause nutrient levels in the lakes to rise. Forested areas near these lakes should be protected in order to buffer run-off that could potentially enter the lake.

**Shakopee Creek Subwatershed** - The Shakopee Creek Watershed unit encompasses parts of Swift and Chippewa Counties and has a drainage area of 194.4 square miles. The watershed is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with developed being the second most abundant. The Shakopee Creek HUC-11 flows northwest from near Kerkhoven to the Chippewa River near County Road 6. The outlet of this watershed unit is represented by site 03MN015 on Shakopee Creek.

**Stream biological assessment results** - No AUIDs were assessed for biology in this watershed since all biological sites are on channelized reaches. These reaches have good to poor biological scores with most being poor. These also have poor habitat scores with poor substrate and channel morphology. The Upper Shakopee Creek Watershed unit has impaired waters which also may influence this watershed.

**Stream water chemistry assessment results** - Water quality data for assessment was available on three stream reaches in the Shakopee Creek watershed unit. The Shakopee Creek reach from Swan Lake to Shakopee Lake, continues from the Upper Shakopee Creek Watershed unit. This reach exceeded the standard for bacteria and is considered impaired for aquatic recreation use. A tributary to Shakopee Creek, Unnamed Creek, is considered impaired for aquatic life based on excess turbidity. Shakopee Creek from Shakopee Lake to the Chippewa River exceeded the standard for bacteria and is considered impaired for aquatic recreation use. The same reach is considered impaired for aquatic life based on excess turbidity.

**Lake water chemistry assessment results** - No lakes were assessed for water quality in this watershed unit.



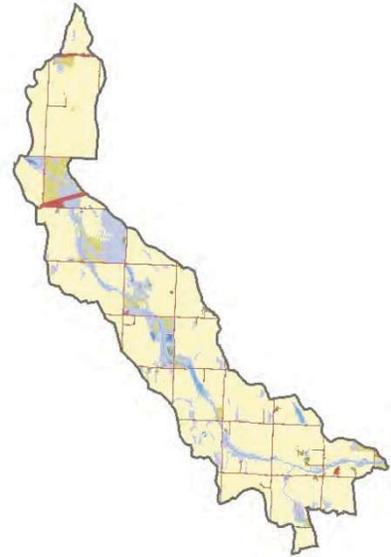
**Holloway Creek Subwatershed** - The Holloway Creek Watershed unit is in Swift County and has a drainage area of 32 square miles (refer to the figure on the left). The northern half of the watershed is in the Northern Glaciated Plains Ecoregion and the southern half is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with wetland being the second most abundant. Holloway Creek HUC-11 flows south from north of Holloway to County Road 6. The outlet of this watershed unit is represented by site 09MN027 on the Cottonwood Creek. This watershed was not sampled for intensive water chemistry because it is less than 40 square miles.

**Stream biological assessment results** - No AUIDs were assessed for biology in this watershed since the one biological site is on channelized a reach. The reach has a poor biological score and fair habitat score. The amount of upstream channelization and lack of habitat could be a factor in the low biological scores.

**Stream water chemistry assessment results** - Limited water quality data was available within the Holloway Creek Watershed unit. DO data appeared to exceed standards in the lower reaches of Cottonwood Creek, however, because of channelization the data was insufficient to list as non-supporting for aquatic life.

**Lake water chemistry assessment results** - No lakes were assessed for water quality in this watershed unit.

**Moyer-Edison Creek Subwatershed** - Moyer-Edison Creek Watershed unit is in Swift County and has a drainage area of 18.5 square miles (refer to the figure on the right). The northern tip of the watershed is in the Northern Glaciated Plains Ecoregion and the southern half is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with wetland being the second most abundant. The Moyer-Edison Creek HUC-11 flows south from west of Holloway to County Road 6. The outlet of this watershed unit is represented by site 09MN028 on the tributary to Cottonwood Creek. This watershed was not sampled because of low flow. It was not sampled for intensive water chemistry, because it is less than 40 square miles. *No stream biological, stream water chemistry, and lake water chemistry assessments were conducted in this subwatershed.*



**Judicial Ditch #8 Subwatershed** - The Judicial Ditch #8 Watershed unit encompasses parts of Swift and Chippewa Counties and has a drainage area of 72.2 square miles (refer to the figure on the left). The northern half of the watershed is in the Northern Glaciated Plains Ecoregion and the southern half is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with urban development being the second most abundant. Judicial Ditch #8 HUC-11 flows south from northwest of Danvers State Wildlife Management Area to the Chippewa River near Big Bend. The outlet of this watershed unit is represented by site 09MN008 on Cottonwood Creek. The lower section of Cottonwood Creek is listed as cold water by the Minnesota DNR. Coldwater IBI scores were not used in this section because the MDNR and MPCA agreed that it is not a coldwater reach.

**Stream biological assessment results** - Two AUIDs were assessed for biology in this watershed. Both AUIDs are not supporting aquatic life. One of the AUIDs was previously listed and is still impaired for this reason. The channelized

reaches had fair (generally the invertebrates) to poor (generally the fish) biological scores and the habitat score for the watershed is fair. Fair to poor habitat and the abundance of channelized streams may contribute to the low biological scores.

***Stream and Lake water chemistry assessment results*** - Limited stream water quality data was available within the Judicial Ditch #8 Watershed unit and no lakes were assessed for water quality in this watershed unit.

**Dry Weather Creek Subwatershed -**

The Dry Weather Creek Watershed unit encompasses parts of Swift and Chippewa Counties and has a drainage area of 106.3 square miles (refer to the figure on the right). The entire watershed is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with urban development being the second most abundant. The Dry Weather Creek HUC-11 flows west from County Road 6 to the Chippewa River, four miles northeast of Watson. The outlet of this watershed unit is represented by site 09MN009 on Dry Weather Creek.



***Stream biological assessment results*** - No AUIDs were assessed for biology in this watershed since all biological sites are on channelized reaches. These reaches have poor biological scores and poor habitat scores. The abundance of channelized streams and poor habitat may contribute to the low biological scores.

***Stream water chemistry assessment results*** - Water quality data was available on one reach of the Dry Weather Creek from the Headwaters to the Chippewa River. The Dry Weather Creek exceeded the standard for bacteria and is considered impaired for aquatic recreation use. Dissolved Oxygen (DO) ranged up to 19.2 mg/l indicating that it could be low in the early morning. A recording DO sondes should be placed at this site during August to ensure DO is not a cause of impairment.

***Lake water chemistry assessment results*** - No lakes were assessed for water quality in this watershed unit.

**Judicial Ditch #7 Subwatershed** - The Judicial Ditch #7 Watershed unit encompasses parts of Swift and Chippewa Counties and has a drainage area of 29.1 square miles (refer to the figure on the right). The entire watershed is in the Western Corn Belt Plains Ecoregion. The predominant land use is cropland with wetland being the second most abundant. Judicial Ditch #7 HUC-11 flows southeast from four miles west of Hagen to the Chippewa River two miles north of Watson. The outlet of this watershed unit is represented by site 09MN002 on Unnamed Creek.



**Stream biological assessment results** - One AUID was assessed in this watershed. There were two biological stations on the AUID and it is not supporting aquatic life. Habitat for the stations is good to fair but there is a dissolved oxygen problem which may contribute to the low biological scores.

**Stream water chemistry assessment results** - Water quality data was available on one reach of a tributary (Unnamed Creek) to the Chippewa River. DO exceeded the standard and the reach will be listed as impaired due to low DO. Turbidity does not look to be a biological stressor along this reach.

**Lake water chemistry assessment results** - No lakes were assessed for water quality in this watershed unit.

### **The Upper Minnesota River Watershed**

The Upper Minnesota River Watershed is one of the twelve major watersheds of the Minnesota River Basin. It is located in west central Minnesota within Swift, Chippewa, Lac qui Parle, Stevens, Swift, Traverse counties and northeastern South Dakota and southeastern North Dakota (refer to Map 2A). There are twelve municipalities in the watershed, with the City of Ortonville being the largest (2,158 residents according to the 2000 Census). The Upper Minnesota River watershed area is approximately 2,097 square miles or 1,341,917 acres, of which 487,068 acres are located in Minnesota and 854,849 acres are located in the Dakotas. The watershed is subdivided into 99 minor watersheds (also referred to as sub-watersheds). The minor watersheds range in size from 1,207 acres to 70,071 acres, with 13,555 acres being the average size.

Situated within the Northern Glaciated Plains Ecoregion, the watershed can further be divided into three geomorphic settings: the headwaters flowing off the Coteau des Prairies, the lower basin-situated within the Blue Earth Till Plain and the Minnesota River Valley-carved by the glacial River Warren. The portion of the watershed within the Blue Earth Till Plain is represented by nearly level to gently sloping lands, ranging from 0-6% in steepness. Soils are predominantly loamy, with landscapes having a complex mixture of well and poorly drained soils. Drainage of depressional areas is often poor. As a result, tile drainage is common. The water erosion potential is moderate on much of the land.

The Coteau des Prairies (or “Highland of the Prairies” called by the French explorers) is a morainal plateau that occupies the headwaters of the Upper Minnesota River and several other rivers. In addition to being an impressive topographic barrier, the Coteau acts as an important drainage divide. Its well drained southwestern side sheds water into the Big Sioux River, while waters on the northeastern side flow into the Des Moines and Minnesota Rivers. The Coteau is characterized by landscapes with long northeast facing slopes which are undulating to rolling (2-18%). Soils are predominantly loamy and well drained.

Tributaries draining the Coteau and entering the Upper Minnesota River from South Dakota include the Little Minnesota River - headwaters of Big Stone Lake and the Whetstone River. Alluvial deposits at the mouth of the Whetstone River formed a natural dam and originally impounded Big Stone Lake. In 1973, a diversion was completed that directed flows of the Whetstone River directly into Big Stone Lake. Further modifications were made in the late 1980s with the completion of the Swift/Whetstone River Control Structure. This structure can redirect up to 1,460 cubic feet per second (cfs) of flow from the Whetstone directly into the Minnesota River, bypassing the deposition of unwanted sediments and nutrients into Big Stone Lake during high flow periods.

Below Ortonville, the Minnesota River passes through the Swift-Whetstone Reservoir (constructed during the 1970s). Further down, the Yellow Bank River, whose headwaters are also in South Dakota, enters into the Minnesota River. The Upper Minnesota then meets Marsh Lake and Lac qui Parle Lake (meaning “the Lake that Speaks”). Both Marsh and Lac qui Parle Lakes are natural impoundments, dammed by alluvial fans of sediment deposited at the mouths of two major tributaries, the Pomme de Terre and Lac qui Parle rivers respectively. The Pomme de Terre River comes down from the hills of the lake country to the north. The Lac qui Parle River originates in the Coteau des Prairies, flows northeast through the prairies of the southwest, then confluences with the Minnesota River near the City of Watson. Although they are natural reservoirs, the lakes were subject to some natural fluctuation; thus dams were built at the outlets for greater water control. The outlet of the Upper Minnesota River Watershed is below the Lac qui Parle Reservoir, 288 miles upstream from the mouth of the Minnesota River.

Land use within the Watershed is primarily agricultural, with 76% of the available acres utilized for production of grain crops, mainly corn and soybeans. Of these acres, approximately 15% have been tilled to improve poorly drained soils. The majority of the crop-lands (82%) are classified as moderately productive. Approximately 39% of the lands draining into the Upper Minnesota River have a high water erosion potential and 26% have the potential for significant wind erosion. Water erosion potential is highest on lands draining the Coteau region.

***Key Stakeholder: Upper Minnesota River Watershed District***

The Upper Minnesota River Watershed District is one of Minnesota’s 46 active watershed districts (refer to Map 2C). The District was formed in 1967 and is especially important due to its role in managing the headwaters of the Minnesota River. There is approximately 505 square miles of land within the District. The area is distributed between the following five counties:

- Big Stone County – 410 square miles (81%).
- Traverse County, 40 square miles (8%).
- ***Swift County – 35 square miles (7%).***
- Lac Qui Parle County – 18 square miles (3%).
- Stevens County – 2 square miles (1%).

Subwatersheds within the District flow to the Minnesota River, some through Big Stone Lake and others directly to the Minnesota River. There are two main subwatersheds with that are partially located in Swift County: Artichoke Creek, Lake Oliver, Shible Lake, Marsh Lake, and Pomme de Terre River.

***UMRWD Overall Plan’s Objectives***

According to the Upper Minnesota River Watershed District’s Overall Plan (2013), the Watershed operates with the following objectives:

- To slow down weed and algae growth in the District’s Lakes.
- To reduce the pollution of the water in the lakes and water courses within the District.
- To intelligently regulate the water levels of the managed lakes within the District.
- To keep adequate records of the water level, the chemistry, and other useful data.
- To enhance the recreational facilities and scenic beauty of the District.