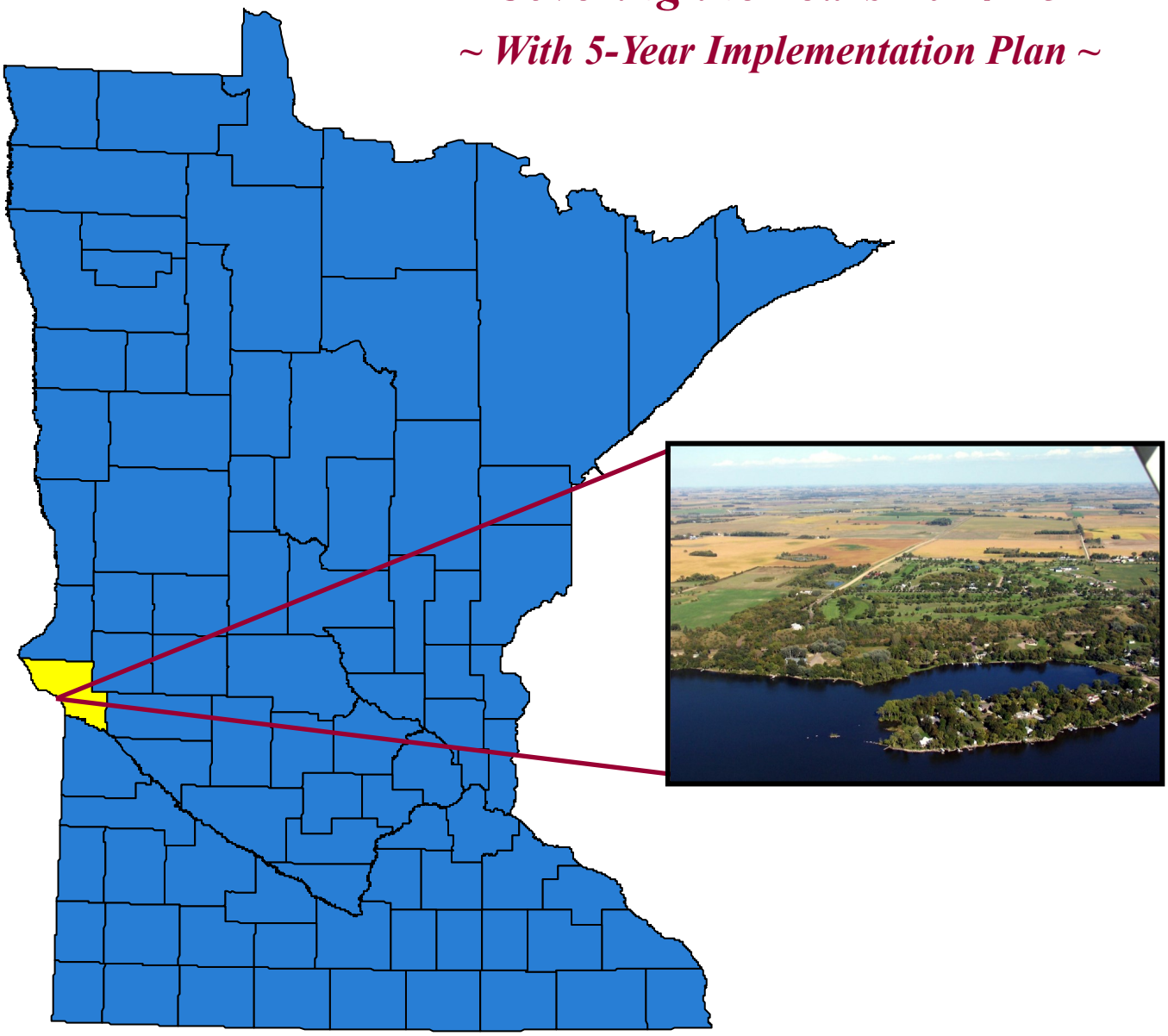
Big Stone

County Water Plan

Covering the Years 2014-23

~ With 5-Year Implementation Plan ~



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Big Stone County Water Plan:

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Big Stone County Water Plan:

Executive Summary

The Big Stone 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 Big Stone County Water Plan:

- Covers the entire area of Big Stone 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 Big Stone County Soil and Water Conservation District's (SWCD) Comprehensive District Plan. This will need to be passed by the SWCD's Board of Supervisors by Resolution.

B. A Description of Big Stone County's Priority Concerns

Chapter Two provides a detailed assessment of the priority concerns. Based upon the Big Stone County Water Plan Survey, and comments received by the various water plan stakeholders, the Water Plan Task Force identified the following priority water planning issues (note: these issues are not ranked):

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
    a. Agricultural Drainage
    b. Stormwater Management
    c. Wetlands and Water Storage/Retention

3. Groundwater Quality & Quantity
    a. Wellhead Protection Areas
    b. Irrigation
    c. Drinking Water Quality

4. Plan Administration
    a. Stakeholder Cooperation – Watershed Focus
    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 Big Stone County Water Plan Task Force held meetings to develop the four goal areas. These four goal areas are further broken down into interrelated objectives that address each of the priority concerns. Most importantly, each objective has a series of action steps designed to help achieve implementation of the identified goal.

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 Big Stone County (including items such as the County's 103E administrative costs) and the Big Stone County SWCD. The 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.

Surface Water Quality Initiatives

The first goal area focuses on addressing surface water quality issues. Objectives were developed for protecting and enhancing the County's surface water resources, removing waters off the MPCA's 303d list of impaired waters, feedlots, failing Subsurface Sewage Treatment Systems (SSTS), and Aquatic Invasive Species (AIS). Implementation steps under the first goal area include a wide range of the following surface water quality Best Management Practices (BMPs):

- Surface Water Quality Monitoring: including developing a web-based mapping application that connects users with water quality data from specific monitoring sites.

- Surface Water Quality Profiles: including seeking opportunities to refine watershed analysis and management strategies using detailed GIS information, water quality data, and other tools to guide plan actions, target implementation and augment funding from outside sources.

- Marsh Lake Restoration: Support/sponsor the Marsh Lake restoration efforts that will restore the Pomme de Terre River to its historic channel, modify the Marsh Lake Dam, construct fishway, construct secondary drawdown structure, breach dike at abandoned fish pond, install gated culvert in the Louisburg Grade Road (2017).

- Target Areas: Implementing BMPs to protect and enhance water quality on Artichoke, Big Stone, Long, and East Toqua Lakes; Twelve Mile Creek/County Ditch 4; and Dry Wood Creek.

- Feedlots: Identifying and cost-sharing sites where cattle exclusions are needed; upgrading five feedlots with BMPs to eliminate runoff to nearby waters, and promoting 500 acres of pasture management.

- SSTS and Wastewater: Upgrading ten noncompliant SSTS systems annually; and resolving wastewater treatment-related pollution issues in Ortonville and Browns Valley.

- Aquatic Invasive Species (AIS): Developing an AIS Management Plan for Big Stone County and creating a local AIS Task Force.

The various action steps identified to address the first goal area of surface water quality improvements in Big Stone County are estimated to have an overall 5-year cost of $3,590,000. Of this amount, $359,000 is estimated to come from the County, including direct and indirect (in-kind) SWCD estimated costs. Many of these implementation activities will be eligible for grant funding.

Erosion and Sedimentation Control Initiatives

The second goal area is aimed at reducing erosion and controlling sedimentation. The specific objective is to "Work with landowner to identify priority sites to implement erosion and sediment control Best Management Practices." Implementation steps include the following BMPs:

- Cost-sharing BMPs, such as water and sediment control basins, alternative tile intakes, stream bank stabilization projects, grassed waterways, buffer strips, rain gardens, and wetland restorations.

- Targeting Stoney Run, Fish Creek, Long Tom Lake, and Artichoke Lake subwatersheds for erosion and sediment control BMPs.

- Soil Health: Promoting soil health by targeting marginal land for BMPs.

- Stabilizing the shoreline on Artichoke Lake.

- Completing ravine terrain analysis for Fish, Meadowbrook and Stoney Run Creeks;

- Participating with implementing the MN Prairie Plan goals/objective to have 40% grassland and 20% wetland coverage in key corridors.

The various action steps identified to address the second goal area of erosion and sediment control improvements in Big Stone County are estimated to have an overall 5-year cost of $605,000. Of this amount, $106,000 is estimated to come from the County, including direct and indirect (in-kind) SWCD estimated costs.

Surface Water Management Initiatives

The third goal area is aimed at reducing managing surface water quantity issues, including separate objectives for agricultural drainage, stormwater management, wetlands/surface water retention, and shoreline restorations. The key implementation steps include the following:

- Drainage: Completing a ditch inventory and drainage records modernization project; conducting a buffer inventory; pursing funds to establish a two-stage ditch site; cost-sharing drainage BMPs; and targeting County Ditch 2 and 12 Mile Creek/County Ditch 4 for BMPs and the development of drainage management plans.

- Stormwater Management: Cost-sharing stormwater BMPs, such as urban stormwater ponds and rain gardens; assisting with developing a Stormwater Management Plans with the cities of Ortonville and Graceville.

- Wetlands/Water Retention: Restoring two wetlands countywide annually; increasing the number of Wetland Reserve Program easements by two each year; partnering with the Bois de Sioux on restoring Moonshine Lake Basin; targeting West Toqua Lake subwatershed with flood mitigation projects; and working with stakeholders to restore the original Upper Minnesota River near Ortonville and the Big Stone National Wildlife Refuge.

- Shoreland Restorations: Using LIDaR and GIS technology to annually identify potential sites; cost-sharing two shoreland restorations annually; and targeting Big Stone, Long Tom, Artichoke, Long, and East Toqua Lakes with shoreline BMPs.

The various action steps identified to address the third goal area of erosion surface water management issues in Big Stone County are estimated to have an overall 5-year cost of $1,990,000. Of this amount, $386,000 is estimated to come from the County, including direct and indirect (in-kind) SWCD estimated costs.

Groundwater Quantity and Quality Initiatives

The fourth goal area focuses on addressing groundwater quality and quantity issues. Objectives were developed for drink water quality and groundwater quantity BMPs. Implementation steps include a wide range of the following groundwater Best Management Practices (BMPs):

- Groundwater Quality BMPs: Target sensitive groundwater recharge areas and Wellhead Protection Areas with groundwater quality BMPs; and cost-sharing sealing twenty-five abandoned wells.

- Pesticide Container Collection: Host an annual pesticide container collection day.

- Wellhead Protection: Working with cities on mutually agreed upon ordinance language for Wellhead Protection Areas.

- Groundwater Quantity: Increasing irrigation management by 1,000 acres; continue monitoring groundwater quantity; completing a County Geologic Atlas; and developing a Water Conservation/Drought Contingency Plan.

The various action steps identified to address the fourth goal area of groundwater quality and, quantity BMPs in Big Stone County are estimated to have an overall 5-year cost of $600,000. Of this amount, $137,500 is estimated to come from the County, including direct and indirect (in-kind) SWCD estimated costs.

Plan Administration Initiatives

The fifth goal area is aimed at effectively implementing the County's Water Plan. The specific objective is to "Engage the Citizens and Stakeholders on key water planning issues and implementation opportunities." Implementation steps include the following:

- Education/Outreach: Publishing quarterly newsletters; establishing BMP test sites; annually hosting workshops; and semi-annually promoting BMP programs in local newspapers.

- Watershed Focus and Stakeholder Cooperation: Partnering with watershed/stakeholder groups on implementation activities to minimize expenditures and to maximize results.

The various action steps identified to address the fifty goal area of effectively administering the Water Plan in Big Stone County are estimated to have an overall 5-year cost of $85,000. Of this amount, $60,000 is estimated to come from the County, including direct and indirect (in-kind) SWCD estimated costs.

Summary of Estimated Costs

The five water plan goal areas and their corresponding estimated costs are summarized below in Table A. The initiatives identified in Chapter Three are estimated to cost approximately $1,328,400 annually overall, with approximately $209,700 coming from local/county funds.

Table A:
Summary of Big Stone County's Water Plan
Estimated Overall and Local Costs

	Overall	***Local/County***
Goal Area One: Surface Water Quality	$3,362,000	$359,000
Goal Area Two: Erosion & Sedimentation Control	$605,000	$106,000
Goal Area Three: Surface Water Management	$1,990,000	$386,000
Goal Area Four: Groundwater Quality & Quantity	$600,000	$137,500
Goal Area Five: Plan Administration	$85,000	$60,000
5-Year Estimated Costs	**$6,642,000**	**$1,048,500**
Average Annual Estimated Costs	**$1,328,400**	**$209,700**

These estimated expenses are separated into Overall Costs and Local Costs. The Local costs include funds spent and activities performed (i.e., in-kind expenses) by Big Stone County and the Big Stone County SWCD.

*Note: Please refer to Chapters Three and Four for a more detailed description of the estimated overall costs and the estimated total local costs to Big Stone County and the Big Stone County SWCD. 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 Big Stone County Water Plan Task Force includes a diverse group of people representing a number of key water plan stakeholders. Assistance from the Task Force in the planning process, along with information requested from Local Governmental Units, helped 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 Big Stone 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: Big Stone County
Water Plan Priority Concerns Scoping Document

Section One:
Introduction to the Water Plan & Big Stone County

A. Water Plan Background

The original Big Stone 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 Big Stone 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) coving 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 Big Stone County Water Plan:

- Covers the entire area of Big Stone 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 (2013-2018). In 2018, the implementation plan will be updated.

B. Big Stone County Profile

Big Stone County is located in West Central Minnesota along the South Dakota Border, approximately 170 miles west of the Minneapolis-St. Paul metropolitan area and 100 miles south of Fargo-Moorhead. Map 1A shows the location of Big Stone County's cities and townships, along with the County's location in the State. The County is characterized by the Minnesota River and Big Stone Lake, which forms the County's western and southern borders. The County also shares borders with Traverse County to the north, Stevens County to the north and east, Swift County to the east, Lac Qui Parle County to the south, and the South Dakota Border to the west. The County is characterized by rolling hills, vast agricultural land and Big Stone Lake, the headwaters of the Minnesota River.

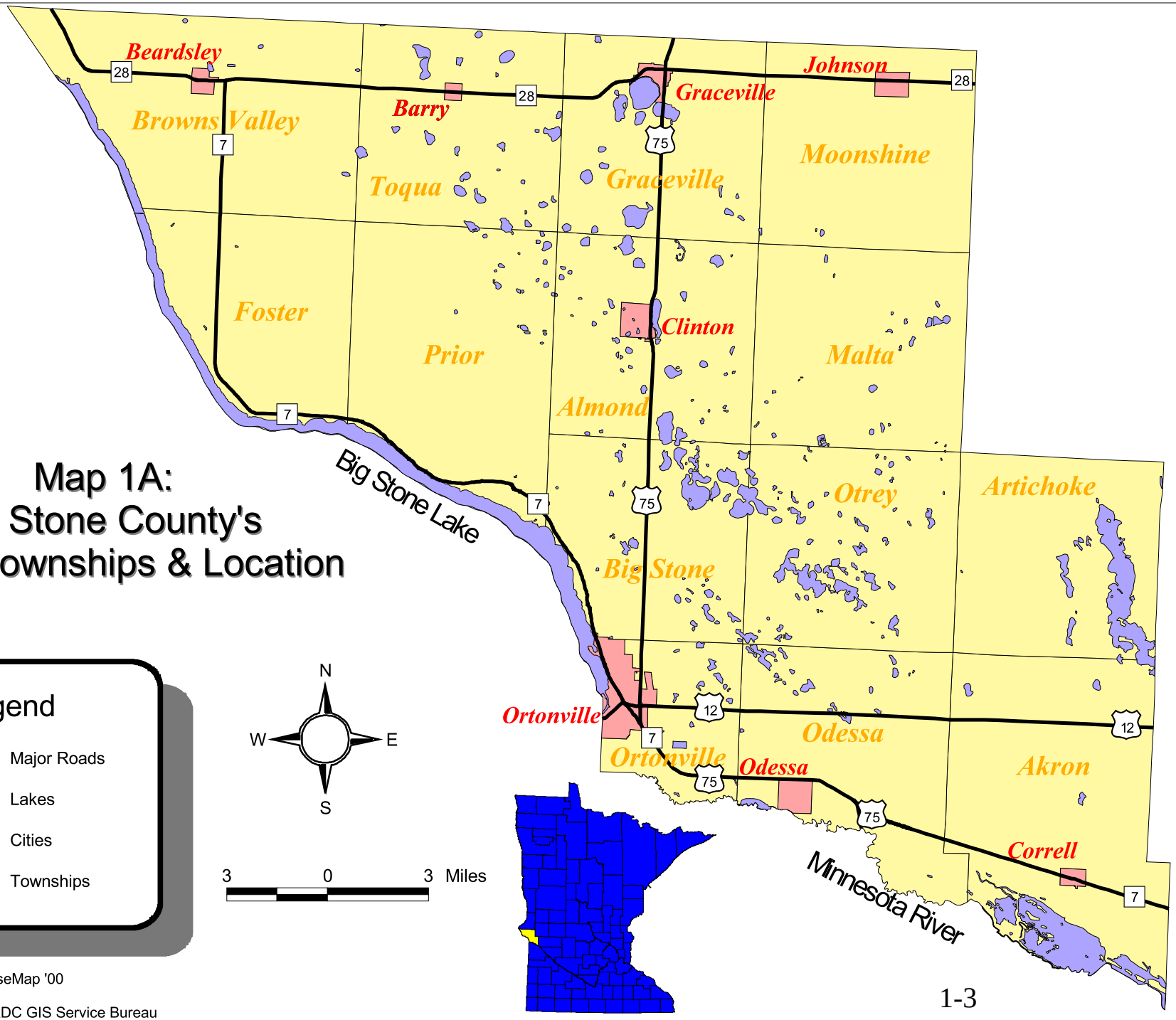
Big Stone County is located within three major watersheds: the Bois de Sioux, Pomme de Terre and Upper Minnesota River (see Map 2A in Chapter Two). Both the Pomme de Terre and Upper Minnesota River Watersheds are part of the Minnesota River Basin. The Bois de Sioux Watershed is part of the Red River of the North Basin.

According to the 2000 census the county has a total area of 527.88 square miles, of which 496.95 square miles (or 94.14%) is land and 30.93 square miles (or 5.86%) is water. Agricultural land is currently and will remain the dominant type of land use. Table 1 shows Big Stone County's Census population since 1960, which is currently around 5,269 residents (2010 Census). Big Stone County has steadily lost population since 1960 and is projected to continue this trend over the next 10 years. This is a common trend among rural counties throughout Minnesota and the upper Midwest.

Table 1:
Big Stone County's Population since 1960*

Area	Population	Change	
		#	%
1960	8,954	N/A	N/A
1970	7,941	-1,013	-11.3%
1980	7,716	-225	-2.8%
1990	6,285	-1,431	-18.5%
2000	5,820	-465	-7.4%
2010	**5,269**	**-551**	**-9.5%**
	Totals since 1960	-3,685	-41%

Source: U.S. Census



Map 1A: Big Stone County's Cities, Townships & Location

Legend

- Major Roads
- Lakes
- Cities
- Townships

Source: MNDOT BaseMap '00
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

Section Two:
Priority Concerns Scoping
Document Planning Process

C. Resolution to Update the Big Stone County Water Plan

The first step in the Water Planning Process was for the Big Stone 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 Big Stone County Water Plan was sent on August 9, 2012, to the contacts as prescribed by Minnesota Statutes 103B:

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

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

E. Water Plan Public Meeting

Big Stone County hosted an open house on August 28, 2012, from 4:30 p.m. to 6:00 p.m. The purpose of the meeting was to invite Big Stone citizens to voice their concerns on which County water planning issues they would like to see addressed in the Big Stone County Water Plan. A copy of the sign-in sheet appears in Appendix A. The following issues were identified and discussed:

Summary of Water Plan Topics

Discussed during the Public Open House

A. One property owner expressed having trouble controlling water levels on his property. Believes that a drainage plan should be established for his property.

B. Surface Water Quality needs to be improved.

C. Surface Water Quantity need to be managed.

D. Cooperate with the various Watersheds: follow their implementation needs.

E. Land prices hurt the effectiveness of conservation programs.

F. Lack of enforcement/incentive for filter strips along drainage ditches.

G. Watersheds need a sub-watershed analysis completed.

H. Stoney Run Sub Watershed should be a priority for implementation.

F. State & Local Stakeholder Comments

At the beginning of Big Stone 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 Big Stone 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
- Big Stone Soil & Water Conservation District
- Citizens for Big Stone Lake
- Toqua Township
- City of Graceville

Table 2 summarizes the priority concerns identified by each of the stakeholders. The "Survey" column in Table 2 combines the response from Big Stone County Water Plan Survey. Based upon the stakeholders comments received, ***Big Stone County's top three priority issues are:***

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

Minnesota Department of Agriculture (MDA)

The MDA submitted a Priority Concerns Input Form for Big Stone County. A copy of the form, dated September 14, 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

Minnesota Pollution Control Agency (MPCA)

The MPCA submitted a letter outlining their top three priority concerns for Big Stone County. A copy of the map and letter, dated September 4, 2012, can be found in Appendix B. The MPCA submitted the following four priority concerns for Big Stone County:

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

Minnesota Board of Water and Soil Resources (BWSR)

The BWSR submitted a Big Stone 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

Big Stone County Soil and Water Conservation District

The Big Stone County Soil and Water Conservation District submitted a Priority Concerns Input Form which can be found in Appendix B. Based upon the information submitted, the Watershed Project identified the following three priority concerns:

1. Water Quality
2. Erosion Control
3. Loss of Habitat

Citizens for Big Stone Lake

Charles Moeller, President of the Citizens for Big Stone Lake, submitted a Priority Concerns Input Form during the Big Stone County Water Plan scoping process. A copy of the Input Form can be found in Appendix B. According to Mr. Moeller, Citizens for Big Stone Lake has the following two priority issues:

1. To maintain level stability and improve water quality on Big Stone Lake
2. Review current drainage policies

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

Priority Concern/Issue	Stakeholder					
	Dept. of Ag	MPCA	BWSR	SWCD	Big Stone Lake	Other**
1. Surface Water Quality/TMDLS		Yes*		Yes*	Yes*	Yes*
2. Ag. Drainage Management	Yes*	Yes	Yes		Yes	Yes*
3. Soil Erosion/Sediment Control	Yes		Yes*	Yes		
Septic Systems (SSTS)			Yes			
Wetlands/Water Retention	Yes*		Yes			
Groundwater quality/quantity	Yes					
Feedlots/Nutrient Management	Yes		Yes			
Best Management Practices	Yes					
Stakeholder Cooperation	Yes	Yes				
Watershed Approach		Yes				
Natural Habitat				Yes		

** = Stakeholder's Top Priority Concern*
*Other** = Comments received from Toqua Township and the City of Graceville*

Toqua Township

A Priority Concerns Input Form was submitted on behalf of Toqua Township (a copy of the Input Form appears in Appendix B). The following priority concern was identified:

1. Improve drainage system to avoid future flooding

City of Graceville

The City of Graceville submitted a Priority Concerns Input Form (contained in Appendix B) which identified the following two priority issues:

1. Lake Toqua (Ditch 8 needs filter strips; golf course chemical runoff; and storm sewer runoff)
2. Ditch 4 and 12 Mile Creek (need cleaning, filter strips, etc.)

Section Three:
Big Stone County
Priority Water Planning Issues

G. Water Plan Task Force

Big Stone 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.

H. Priority Water Planning Issues

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

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
    a. Agricultural Drainage
    b. Stormwater Management
    c. Wetlands and Water Storage/Retention

3. Groundwater Quality & Quantity
    a. Wellhead Protection Areas
    b. Irrigation
    c. Drinking Water Quality

4. Plan Administration
    a. Stakeholder Cooperation – Watershed Focus
    b. Raising Public Awareness – Education

I. Priority Issues Not Addressed by this Water Plan

All of the priority issues identified in the Big Stone County Water Plan Survey and received in Big Stone County's Priority Concerns Input Forms, will either directly or indirectly be addressed in Big Stone County's updated Water Plan. This is particularly important to Big Stone 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, Big Stone County does not anticipate needing to resolve any differences between Big Stone County's Priority Water Plan Issues and other state, local and regional concerns.

Section Four:
Big Stone County
Ongoing Water Plan Activities

Big Stone 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 Big Stone County has spent over $353,414 in funds on all of these ongoing activities between the five-year period of 2007 and 2011.**

- ***County Feedlot Program –*** Big Stone 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)*** – Big Stone County enforces MN Rules Chapter 7080-7083 through the Big Stone 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 –*** Big Stone 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) –*** Big Stone 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:
Big Stone 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*
Feedlot[1]	$7,790	$5,453	$8,113	$5,250	$7,885	$5,250	$7,500	$5,250	$7,500	$5,250	$38,788	$26,453	$65,241
SSTS[2]	$9,885	$0	$10,000	$0	$10,000	$0	$9,931	$0	$9,931	$0	$49,747	$0	$49,747
LWM[3]	$20,685	$1,417	$20,685	$3,115	$20,685	$1,506	$21,512	$1,673	$15,447	$4,631	$99,014	$12,342	$111,356
Shoreland[4]	$3,065	$3,065	$3,065	$3,065	$3,065	$3,065	$3,065	$3,065	$2,645	$2,645	$14,905	$14,905	$29,810
WCA[5]	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$8,630	$8,630	$48,630	$48,630	$97,260
Sub-Total	$51,425	$19,935	$51,863	$21,430	$51,635	$19,821	$52,008	$19,988	$44,153	$21,156	$251,084	$102,330	$353,414
Totals	**$71,360**		**$73,293**		**$71,456**		**$71,996**		**$65,309**		**$353,414**		

Feedlot[1] – Refers to the County's Feedlot Program
SSTS[2] – Refers to the County's Subsurface Sewage Treatment Systems Program
LWM[3] – Refers to the County's Local Water Management Program
Shoreland[4] – Refers to the County's Shoreland Program
WCA[5] – Refers to the County's Wetland Conservation Act Program

Chapter Two:
Assessment of Priority Concerns

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 Big Stone 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 is provides assessments for the first three categories. The fourth category, Plan Administration, is profiled in Chapter Four. As a result, this Chapter contains assessments on the following water resource topics:

1. Reducing Priority Pollutants ~ Surface Water Quality
    A. Watersheds Assessment
    B. TMDL Impaired Waters Assessment
    C. Feedlot and Livestock Management Assessment
    D. Subsurface Sewage Treatment Systems Assessment
    E. Erosion and Sediment Control Assessment

2. Surface Water Management
    F. Agricultural Drainage Assessment
    G. Stormwater Management Assessment
    H. Wetlands and Water Storage/Retention Assessment
    I. Flooding Assessment

3. Groundwater Quality & Quantity
    J. Wellhead Protection Areas Assessment
    K. Drinking Water Quality Assessment

Section One:
Surface Water Quality ~ Reducing Priority Pollutants

This section of the Water Plan provides an assessment of Big Stone County's surface water quality. To begin with is a subsection on Big Stone 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

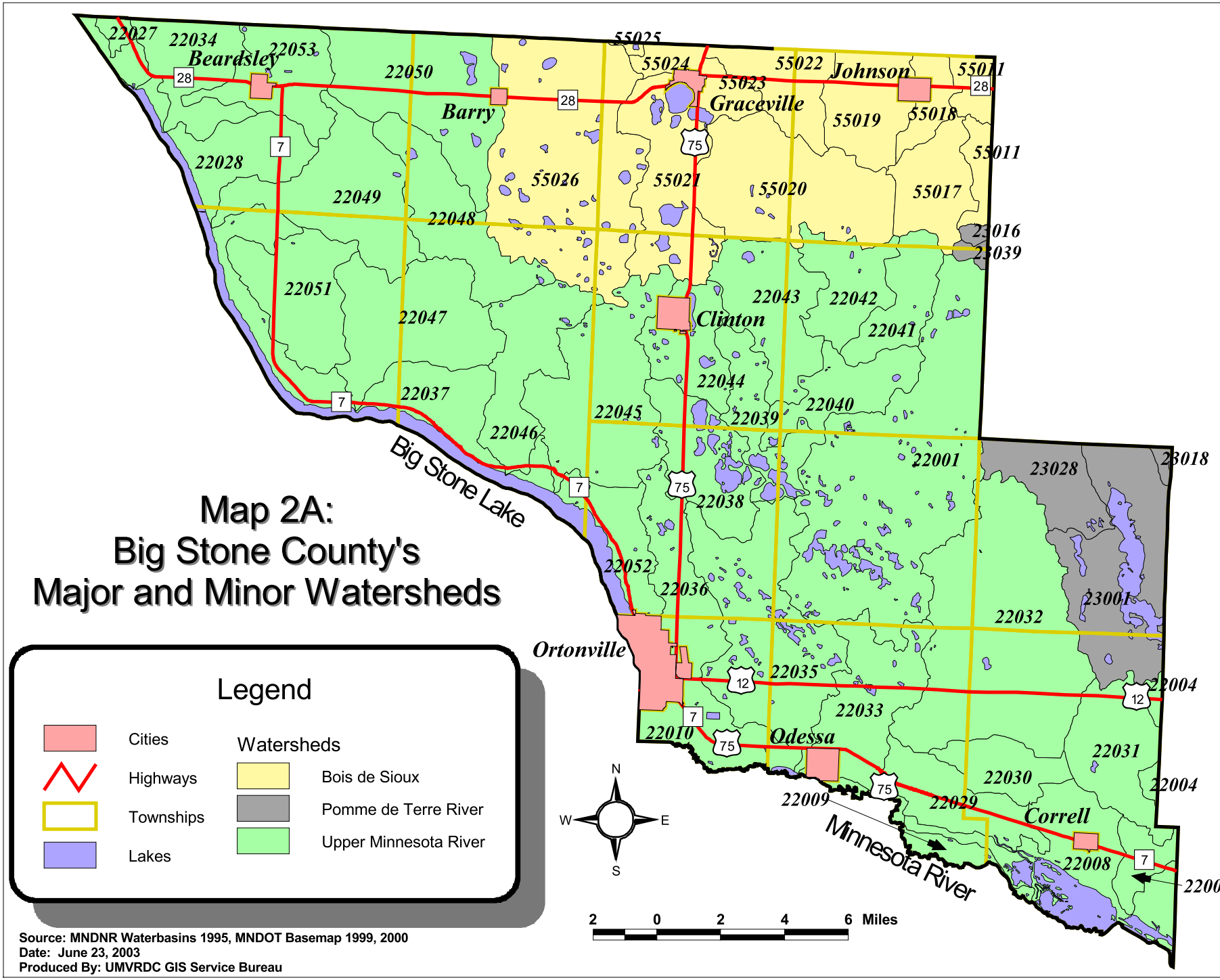
Big Stone County is located within three major watersheds: the Pomme de Terre, Bois de Sioux, and the Upper Minnesota River Watersheds (see Map 2A). Each watershed is briefly described in this section, with additional contact information provided.

<u>The Upper Minnesota River Watershed</u>

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 Big Stone, Chippewa, Lac qui Parle, Stevens, Swift, Traverse counties and northeastern South Dakota and southeastern North Dakota. 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


Map 2A:
Big Stone County's
Major and Minor Watersheds
Legend
Cities
Highways
Townships
Lakes
Watersheds
Bois de Sioux
Pomme de Terre River
Upper Minnesota River
Beardsley
Barry
Graceville
Johnson
Clinton
Ortonville
Odessa
Correll
Big Stone Lake
Minnesota River
22027
22034
22053
22050
55025
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55022
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22010
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Source: MNDNR Waterbasins 1995, MNDOT Basemap 1999, 2000
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

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 Big Stone/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.

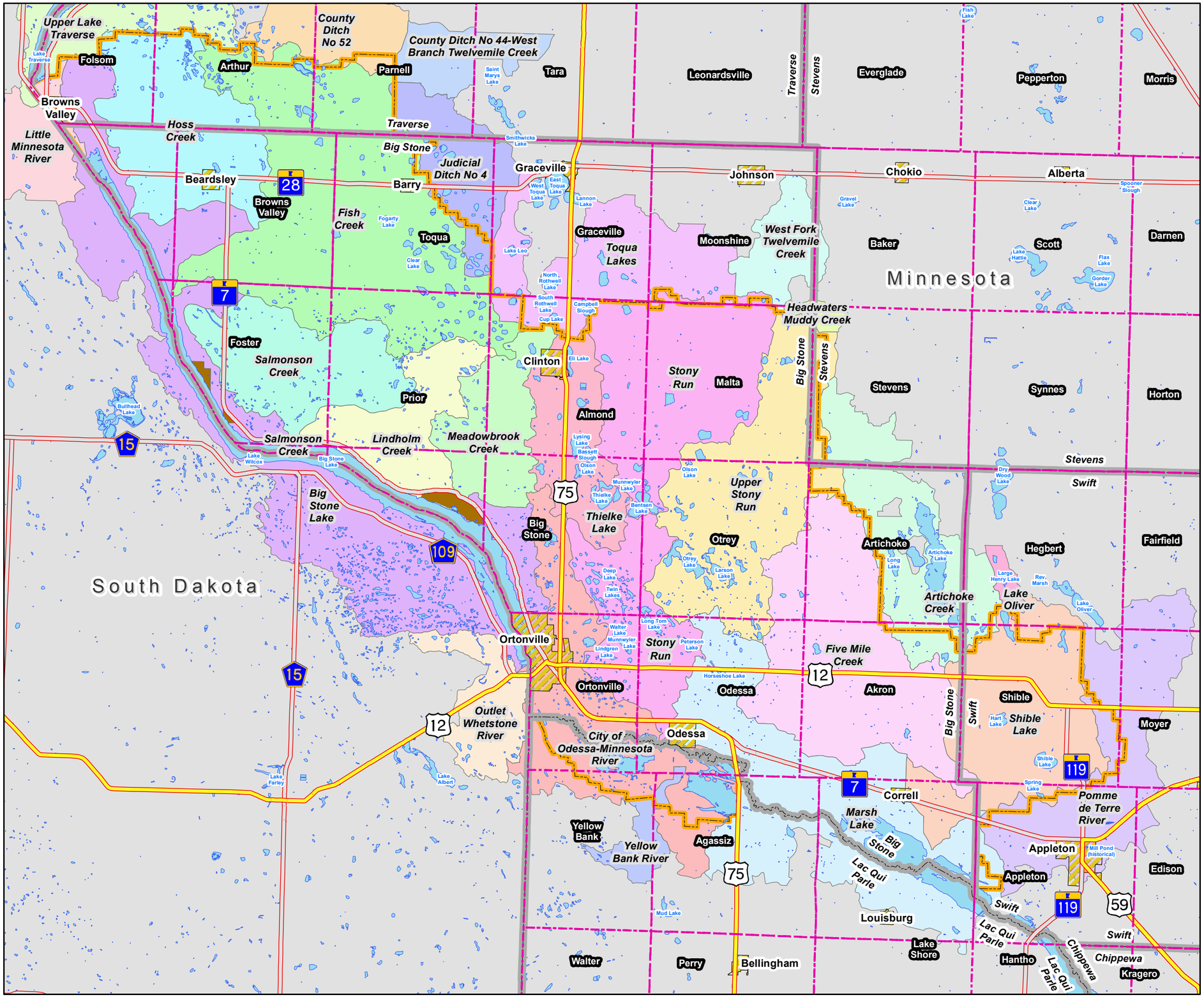
Below Ortonville, the Minnesota River passes through the Big Stone-Whetstone Reservoir (constructed during the 1970s). Further down, the Yellow Bank River, whose headwaters are also in South Dakota, enters into the Minnesota River. The Upper Minnesota then meets Marsh Lake and Lac qui Parle Lake (meaning "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 tiled 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 – Note: map numbering is not sequential due to some maps being created for the previous plan). The District was formed in 1967 and is especially important due to its role in managing the headwaters of the Minnesota River. Approximately 80% of the land area of Big Stone County is in the District. The small area of north central and northeast Big

Upper MinnesotaRiver Watershed District



Legend

- Townships
- US Highway
- State Highways
- Municipalities
- County Boundaries
- NHD Waterbody (Lakes)
- Big Stone Lake State Park
- Upper Minnesota River Watershed

N
W E
S

0 2.5 5 10 Miles

Sources: MN DNR, SD DOT, MN DOT, NHD

2-5

Figure 2 12 Digit Subwatersheds

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Sheet:
AS SHOWN	SMW		5304-006	1/31/2012	1 of 1

Houston Engineering Inc.
Maple Grove
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F: 763.493.5572

Stone County, not in the District, casts its runoff northward through the west branch of the Mustinka River. There is approximately 505 square miles of land within the District. The area is distributed between the following 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. Subwatersheds flowing into Big Stone Lake include Browns Valley, Hoss Creek, Fish Creek, Salmonsen Creek, Lindholm Creek, Meadowbrook Creek, direct drainage area in or near Ortonville and a number of small-scattered direct tributaries to Big Stone Lake. Subwatersheds which are tributaries on the northeast of the Minnesota River include: Stony Run, Upper Stony Run, County Ditch No. 4, Five-Mile Creek, Shible Lake and a few areas that contribute runoff directly to the Minnesota River. On the southwest side of the Minnesota River there are about 18 square miles that contribute runoff to the Minnesota River.

The total number of lakes within the District recognized by the Minnesota Department of Natural Resources is six. The lakes within the District include Big Stone, Arens, Botkers, Long Tom, Marsh, and North Tom. Big Stone Lake is by far the largest of the six lakes, having a surface area of approximately 12,600 acres. Marsh Lake is the second largest, having a surface area of approximately 4,500 acres. The remaining four lakes are generally classified as small, prairie lakes with surface areas ranging from approximately 24 to 133 acres. All six lakes are characteristically shallow and nutrient rich.

Water Quality: Upper Minnesota Watershed

In 2013, the UPRWD updated its Overall Plan. Appendix D of the Overall Plan contains a large 53-page section on water quality data throughout the District. The major highlights of the water quality data are presented below, however, the Plan and its corresponding appendices are linked off the District's website (www.umrwd.org).

Did you know?...it should be noted that none of Big Stone County's Impaired Waters have TMDL assessments completed (expect for mercury). Once completed, better water quality information will be available.

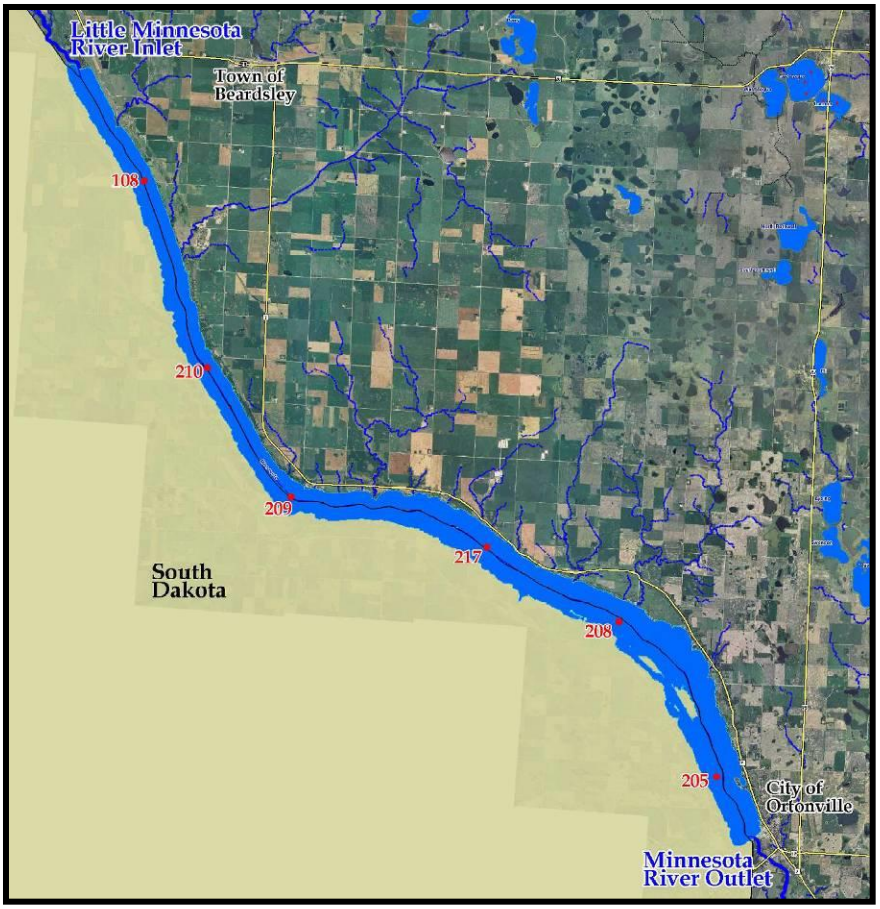
Big Stone Lake

Big Stone Lake is on the border between South Dakota and Minnesota. The lake occupies the valley of a glacial river that once drained historic Lake Aggasiz. The surface area of the lake is 12,610 acres, and the lake extends southward for 26 miles from Browns Valley, Minnesota, to Ortonville, Minnesota, and Big Stone City, South Dakota. Flow from the lake to the Minnesota River is regulated by the Big Stone Lake Dam, located at the southern end of the lake. The lake is fed by the Little Minnesota River at its north end and numerous tributaries along its length.

Agricultural, domestic, and municipal pollution have degraded fish habitat, reduced recreational opportunities, reduced the aesthetic quality of the lake, and increased the likelihood of more direct effects on the fisheries in the form of fish kills. Drainage and land use changes in the lake's watershed have contributed to increased sedimentation, nutrient loading, changes in tributary flows, increases in water level fluctuations, and direct destruction of aquatic habitats.

Big Stone Lake has been the subject of continuous water quality monitoring for many years (refer to Figure 2A). More recently, beginning in 2007, continuous monitoring has been conducted for total phosphorus, chlorophyll a, and secchi depth at six sites from the north end to the south end of the lake. The data assessment for Big Stone Lake shows that phosphorus concentrations are much higher than what one would expect when looking at the chlorophyll a and transparency data. This means that not all the phosphorus is being utilized by algae. One possible explanation could be that the phosphorus loading from the numerous tributaries is so high that it overloads the system and flows right through the lake to the

Figure 2A: Big Stone Lake's Monitoring Sites



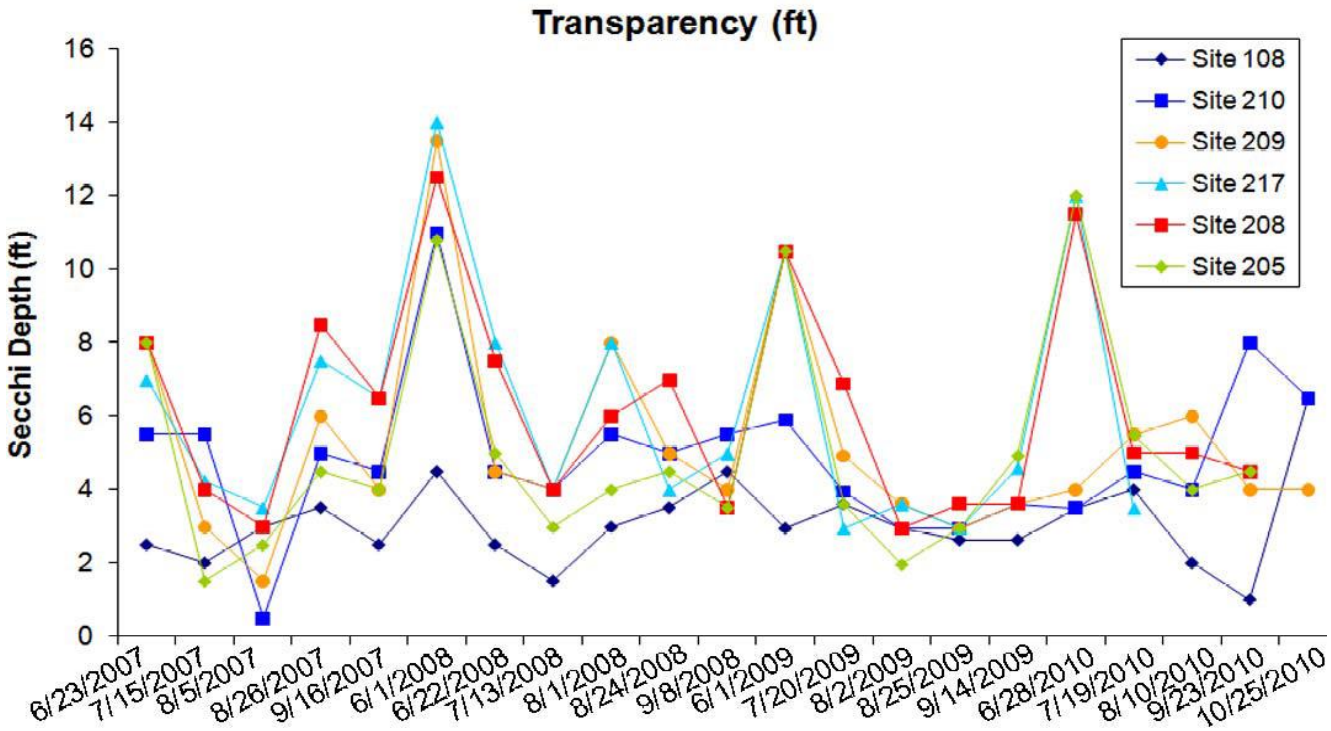
Minnesota River. In addition, the phosphorus concentrations are highest at the north end of the lake and steadily decline as one moves south throughout the lake. This could indicate that a high proportion of the phosphorus is entering the lake from the north end.

Big Stone Lake Transparency

Transparency is how easily light can pass through a substance. In lakes, it is how deep sunlight penetrates through the water. Plants and algae need sunlight to grow, so they are only able to grow in areas of lakes where the sun penetrates. Water transparency depends on the amount of particles in the water. An increase in particulates results in a decrease in transparency. The transparency varies year-to-year due to changes in weather, precipitation, lake use, flooding, temperature, lake levels, etc.

The transparency data from 2007-2010 is shown below in Figure 2B. Site 108 at the north end of the lake has consistently the lowest transparency. This result could be due to the fact that this site is only five feet deep and that it is closest to the Little Minnesota River inlet. The best transparency from 2007-2010 was consistently at sites 217, 209, and 208 (see Figure 2A for site locations).

Figure 2B:
Big Stone Lake Transparency

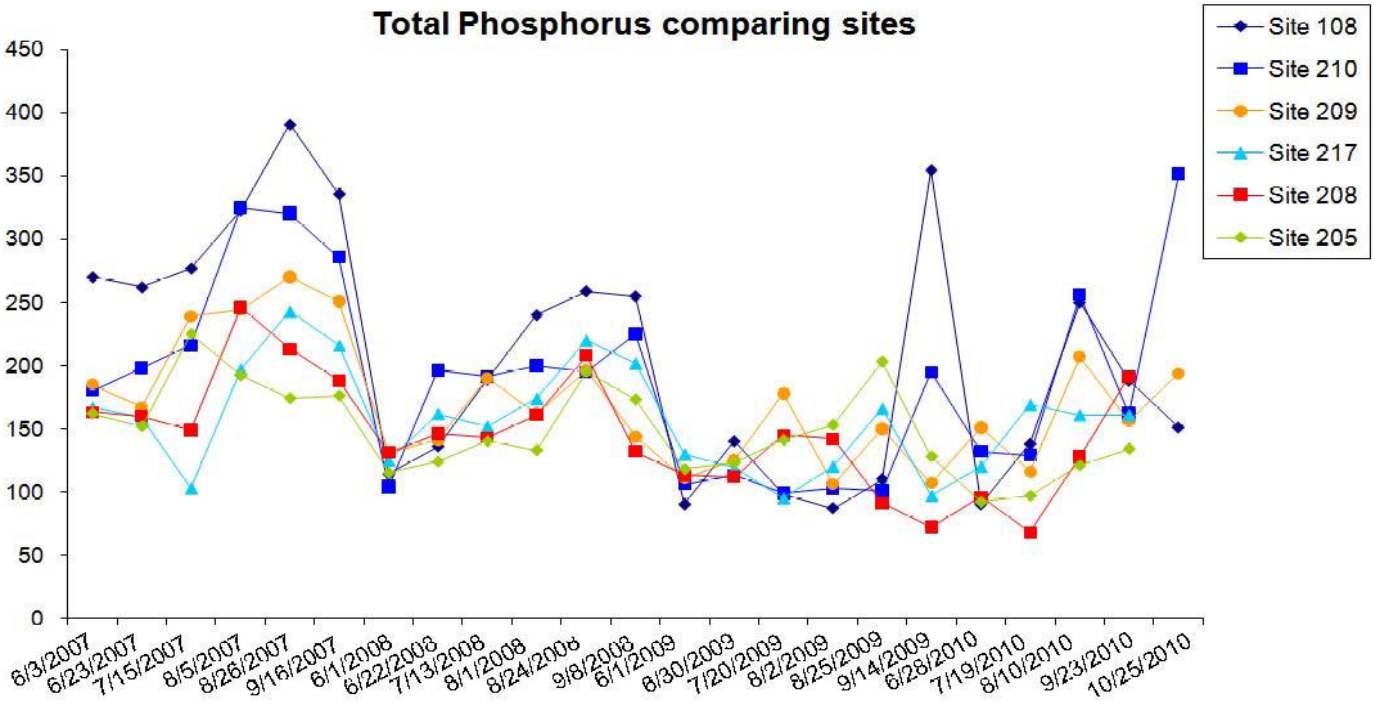


Big Stone Lake Phosphorus

Total phosphorus was evaluated in Big Stone Lake from 2007-2010, and concentrations ranged from 68-391 ug/L (Figure 2C). The phosphorus concentrations appear to decrease as one moves south throughout the length of the lake from north to south. Site 108 at the north end of the lake consistently has the highest phosphorus concentrations. There are three major tributaries located at this site; Hoss Creek, which has a drainage area of 25,600 acres, Fish Creek, which has a drainage area of 40,600 acres, and the Little Minnesota River, which has a drainage area of 290,400 acres, this amounts to a total of 356,600 acres of direct drainage to this site. The lowest mean phosphorus concentrations are at sites 217, 208 and 205 at the south end of the lake.

As far as a seasonal pattern, phosphorus concentrations peaked in August of each year from 2007-2010 and were lowest in early June. In comparing result year to year, 2007 had the highest phosphorus concentrations for all sites and 2009 had the lowest phosphorus concentrations for all sites except 205. This year to year variation could be just due to weather variation. In 2007, the northern part of the Big Stone Lake watershed had above normal rainfalls and flooding. These climatic factors could have contributed to higher phosphorus concentrations in 2007.

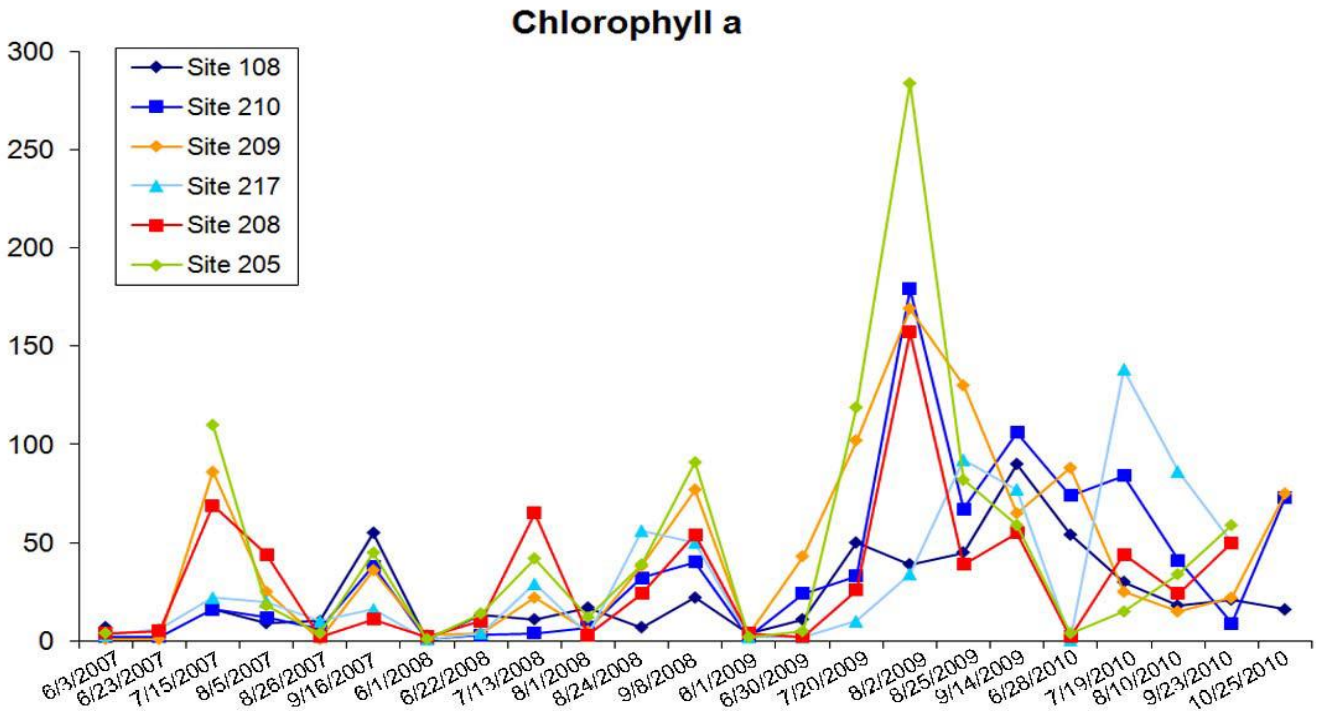
Figure 2C:
Big Stone Lake Phosphorus



Big Stone Lake Chlorophyll

Chlorophyll a is the pigment that makes plants and algae green. Chlorophyll a is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll a concentrations greater than 10 ug/L are perceived as a mild algae bloom, while concentrations greater than 20 ug/L are perceived as a nuisance. Chlorophyll a was evaluated in Big Stone Lake in 2007-2010 (Figure 2D). Chlorophyll a concentrations exceeded 20 ug/L every year, which indicates nuisance algae blooms. In August of 2009, there was an abnormal spike in chlorophyll a concentration at all sites except for 217 and 108. Phosphorus concentrations do not show a spike; therefore, the cause of this spike in chlorophyll a is unknown. Usually if phosphorus is high, the chlorophyll a is high because phosphorus is a main nutrient source for algae.

Figure 2D:
Big Stone Lake Chlorophyll



Big Stone Lake Dissolved Oxygen

Dissolved oxygen (DO) is the amount of oxygen dissolved in lake water. Oxygen is necessary for all living organisms to survive, except for some bacteria. Living organisms breathe oxygen that is dissolved in the water. Dissolved oxygen levels of <5 mg/L are typically avoided by game fish. Big Stone Lake is a relatively shallow lake, with a maximum depth of 16 feet. Dissolved oxygen profiles from 1971 (DNR) indicate that Big Stone Lake mixes throughout the summer. The sunlight can reach the bottom of 99% of the lake, allowing aquatic plants to grow. These plants produce oxygen as a by-product of photosynthesis, which keeps the water column fully oxygenated. The fact that the bottom of Big Stone Lake remains oxygenated throughout the summer means that fish may be found at all water depths throughout the summer.

Big Stone Lake Surface Water Assessment Grant

In 2011 the District received a two year Surface Water Assessment Grant from MPCA to monitor seven major tributaries of the District and one Lake. The tributaries that were monitored included; Little Minnesota River, Hoss Creek, Fish Creek, Salmonsen Creek, Meadowbrook Creek, Minnesota River and Stoney Run Creek. Long Tom Lake was also monitored for the two year period. MPCA will use the data in their Watershed Approach process.

Big Stone Lake Restoration Project (Clean Lake Project 2011)

The objective of the Big Stone Lake Restoration Project is to reduce nuisance algae blooms in Big Stone Lake through implementation of agricultural BMPs. Conservation practices in the lake's watershed include the installation of more than 50 animal waste management systems, no-till planting of crops, construction of multiple-use wetlands, grassed waterways through cropland fields, stream buffer strips, streambank stabilization, and implementation of the USDA Conservation Reserve Program. In addition, six municipal wastewater treatment. Significant lake water quality improvements have been noted. Water sampling results have shown a gradual but steady improvement in recent years. The trophic status of the lake has changed from hypereutrophic (extremely nutrient-rich) to eutrophic (nutrientrich). As a result, algae blooms are less extensive and shorter in duration. The sponsor is the Upper Minnesota River Watershed District in cooperation with the Big Stone SWCD, city of Ortonville, Big Stone County, Citizens for Big Stone Lake, DNR, USFWS, MPCA, and state and local groups from South Dakota.

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.
- To improve the needed drainage, prevent excessive runoff or seepage, and provide needed soil and water conservation in the District.
- To provide funds to accomplish these objectives and to engage technical assistance and advice.
- Investigate the possibility of securing additional watershed area to operate within the natural boundary of the Upper Minnesota River.
- To preserve, maintain, and improve habitat for fish and wildlife.

The District's Overall Plan established one main water quality goal, which is to "Maintain or improve water quality of all surface water and groundwater resources within the District." To achieve the goal of maximizing water quality within the District, the following objectives are listed:

1. Promote advanced treatment of wastewater at all point sources within the District and promote advanced treatment of surface water discharge as new technologies become available.
2. Uphold the existing laws controlling discharge of conventional and toxic pollutants into surface waters from point sources.
3. Monitor water quality when necessary and feasible to protect surface and ground water resources.
4. Encourage responsible, efficient use of fertilizers and pesticides in agricultural and urban settings.

5. Encourage land use and agricultural practices that reduce the movement of nutrients, sediments and other substances off surfaces and into groundwater and surface water resources.

6. Encourage the maintenance, restoration, enhancement or creation of wetlands that may be important for nutrient entrapment.

7. Assist the Minnesota Pollution Control Agency with the assessment and creation of any TMDL's necessary to address impaired waters with the District.

8. Assist with educating and informing District residents how individual actions may impact water quality. Involve citizens in water quality monitoring.

Because Big Stone Lake is such an important recreational and economic resource within the District and previous efforts to improve water quality are extensive; a separate goal has been developed for the lake. The contributing drainage area to Big Stone Lake is an estimated 740,157 acres, with 83.7% of the area located within South Dakota and 16.3% of the area in Minnesota. The present total phosphorus and total nitrogen loads to Big Stone Lake for a "normal" hydrologic year, for the entire contributing drainage area, are 16,346 kg/yr and 80,054 kg/yr, respectively.

The District has established an interim goal of no-net increase in nutrient loading to Big Stone Lake, from the contributing drainage area. The District established the interim goal because of the amount of time likely needed (probably decades) to attain the ultimate goal. The District has also established an ultimate goal for the lake. This goal was a direct result of the ten year Big Stone Lake Restoration final report. ***The ultimate goal is to reduce nutrient loading to Big Stone Lake by 40% for a normal hydrologic year,*** from the contributing drainage area. The 40% annual load reduction corresponds to the following in-lake annual concentration goals listed in Table 2A:

Table 2A:

UMRWD Big Stone Lake Annual Concentration Goals

Lake Segment	Total Phosphorus (ug l-1)	Chlorophyll-a (ug l-1)
BSL-1	220	42
BSL-2	160	38
BSL-3	105	38
BSL-4	80	36
BSL-5	100	39
BSL-6	110	38

The UMRWD participated with the development of the Big Stone County Water Plan. As a result, the District identified a number of customized action steps found in Chapter Three of this Plan. Most of the action items support establishing agricultural, shoreland, and other residential Best Management Practices (BMPs) to protect water quality. The Overall Plan contains the following statement which best summarizes the District's past and future priorities:

> *Maintaining and improving the water quality of Big Stone Lake has historically been the focus of the Upper Minnesota River Watershed District. The District has completed a number of activities oriented toward improving lake water quality, including the development of a work plan for continued improvement of lake water quality, bank stabilization projects along the shoreline, the implementation of agricultural conservation management practices, and addressing point source discharges within the watershed.*
>
> *The emerging issues within the District are more related to potential conflicts between natural resource and water management issues associated with natural, modified and created watercourses than management of the lake. Many of the present legal drainage systems within the District have not been "maintained" and now exhibit some degree of natural resource value. Proposals to modify these waterways become controversial with natural resource agencies.*
>
> *An important future direction for the District is becoming an integral component of the decision making process for these types of issues. Preference is to work with the Big Stone County Board of Commissioners to obtain responsibility for those financially solvent legal drainage systems. By integrating natural resource and water management issues, the District believes creative and innovative solutions, can be developed to address these complex issues (UMRWD Overall Plan 2013).*

Bois de Sioux Watershed

The Bois de Sioux Watershed (refer to Figure 2E) represents an area of about 1,420 square miles, including areas of Traverse County (38% of the watershed), Grant County (27%), Wilkin County (14%), Stevens County (10%), Big Stone County (7%) and Otter Tail County (4%). The watershed includes the drainage basins of Lake Traverse and the Bois de Sioux River. Where the Bois de Sioux River and the Otter Tail River join is considered the headwaters of the Red River Basin. The major tributaries of the watershed include the Mustinka River, numerous creeks in the south and east portions of the watershed and the Rabbit River in the Northern portion of the Watershed.

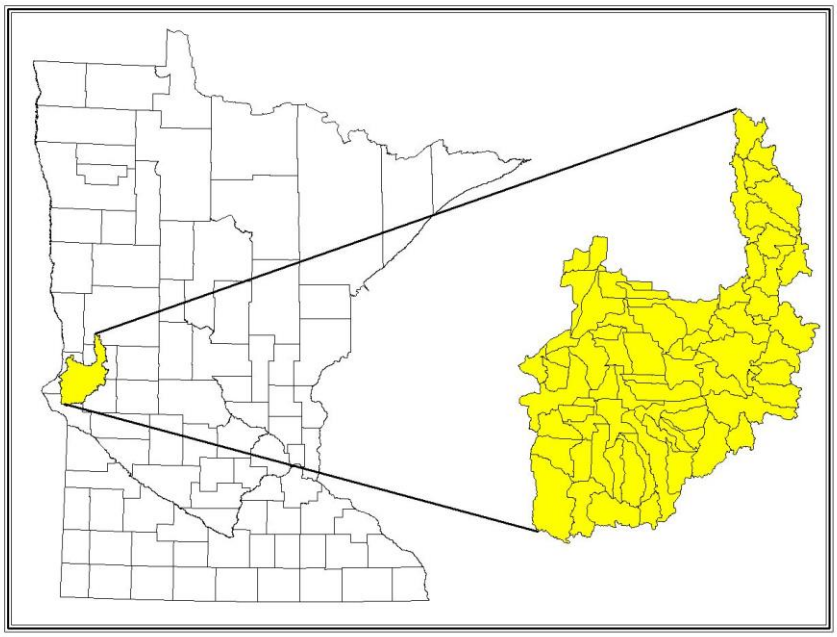
Three different ecoregions are included in the watershed: The Red River Valley Ecoregion, the Northern Glaciated Plains Ecoregion and the North Central Hardwood Forests Ecoregion.

The Red River Valley ecoregion encompasses most of the watershed in the north, central and western portions of the watershed. The Northern Glaciated Plains Ecoregion is found in the southern and eastern portion of the watershed. The northeastern portion of the watershed includes a small area of the North Central Hardwood Forests Ecoregion. The majority of glacial deposits in the watershed are till, made up of clay, silt, sand and gravel. Soils are predominantly black, limey and clayey in the central portion of the watershed, with black, loamy soils in the southwest and eastern portions.

Historically, the watershed cover was dominated by prairie/grassland (78%) and wetlands (17%). As a result of the fertile soils present, land use and cover in the watershed is now dominated by cropland (88%), while prairie/grassland and wetlands provide only 2% and 4%, respectively. Land cover in the riparian areas (1,000 feet on either side of rivers) of the watershed are mainly cultivated land (78%) and wetlands (12%). The central portion of the watershed has been extensively drained.

Much of the watershed, primarily in the southwest and central portion, is underlain by a buried aquifer. Wells able to yield small quantities of ground water can be developed throughout the watershed. Wells able to yield larger amounts of water can be developed in areas of alluvial and outwash deposits. The moraine areas in the eastern and southern portions of the watershed are ground-water recharge areas, while the glacial lake plain is a discharge area. Ground water use for water works and crop irrigation averages 1,125 acre-feet per year.

Figure 2E:
Bois de Sioux Watershed



Key Stakeholder: Bois de Sioux Watershed District

The Bois de Sioux Watershed District (BdSWD) is located in west central Minnesota and includes the entire drainage basin of the Bois de Sioux River located in Minnesota (Figure 2F). The Counties included in this area are Traverse, Grant, Wilkin, Stevens, Big Stone, and Otter Tail. The total area is about 1,412 square miles. The Bois de Sioux River and its source, Lake Traverse, form the boundary between Minnesota and South and North Dakota. The river flows north from Lake Traverse to Breckenridge, where it joins with the Otter Tail River to form the Red River of the North. The major tributaries in Minnesota are the Mustinka River and the Rabbit River. Tributaries in North and South Dakota contribute drainage from an additional 549 square miles.

The Bois de Sioux Watershed District was established on March 11, 1988, by order of the Minnesota Board of Water and Soil Resources under the provisions of Minnesota Statutes, Chapter 103D, otherwise referred to as "The Minnesota Watershed Act." The original mission of the District was: "To provide coordinated water resource management over the entire hydrologic basin of the Bois de Sioux River lying within the State of Minnesota." This mission has not changed to date.

The Bois de Sioux Watershed District was established and is operated for the following purposes:

I. To provide coordinated water resource management over the entire hydrologic basin of the Bois de Sioux River lying within the State of Minnesota.

II. For all the purposes provided for in Minnesota Statutes 103D as they may apply now and in the future, as follows:

    A. Control or lessen damage by floodwaters.

    B. Improve stream channels for drainage, navigation, and any other public purpose.

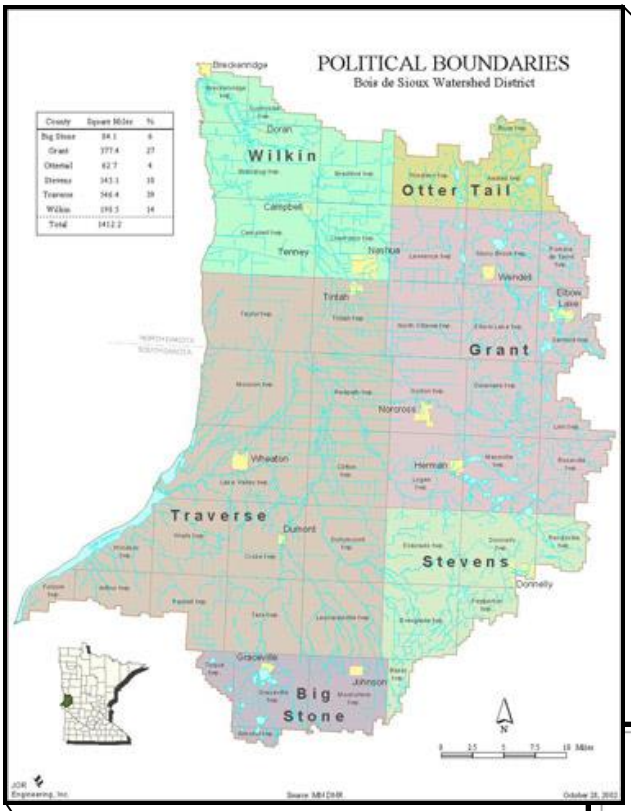
    C. Reclaim or fill wet and overflowed lands.

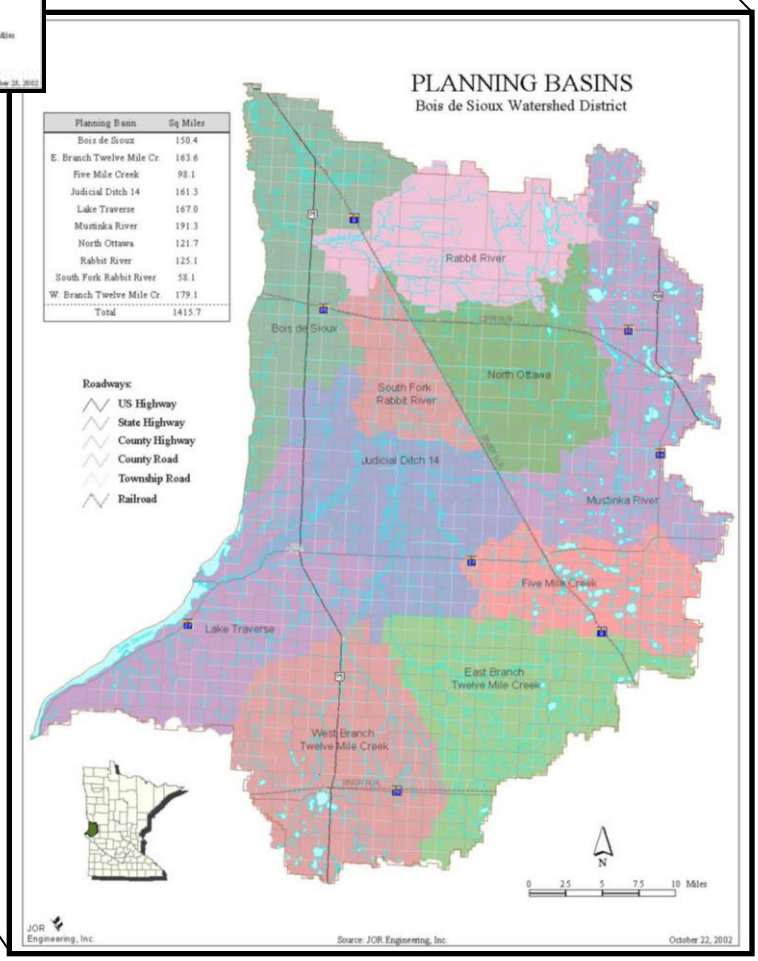
    D. Provide water supply for irrigation.

    E. Regulate the flow of streams and conserve their waters.

    F. Divert or change watercourses in whole or part.

Figure 2F: Bois de Sioux Watershed District





G. Provide and conserve water supply for domestic, industrial, recreational, agricultural, or other public use.

H. Provide for sanitation and public health and regulate the use of streams, ditches, or watercourses for disposal of waste.

I. Repair, improve, relocate, modify, consolidate and abandon, in whole or part, drainage systems within a watershed district.

J. Impose preventative or remedial measures to control or reduce land and soil erosion and siltation of watercourses or bodies of water affected by erosion.

K. Regulate improvements by riparian landowners of the beds, banks, and shores of lakes, streams, and marshes by permit or otherwise to preserve them for beneficial use.

L. Provide for the generation of hydroelectric power.

M. Protect or enhance the quality of water in watercourses or bodies of water.

N. Protect groundwater and regulate its use to preserve it for beneficial use.

The District has adopted rules and policies to meet its goals and objectives and has a successful history of implementing projects and completing permit reviews that have positively impacted draining and flooding issues within the District. A key to future success will hinge on the efforts of the District to follow the principles of the Mediation Agreement and to work within the guidelines of the Red River Flood Damage Reduction Work Group when developing projects.

The purpose of the Mediation Agreement process was to reach agreements on long-term solutions for reducing flood damage and for protection and enhancement of natural resources. The focus of the agreements is to balance economic, environmental and social considerations when developing and pursuing flood damage reduction and natural resource enhancement projects. The District has developed a Water Plan by inviting all of the members of the Flood Damage Reduction Work Group, local, state and federal agencies, environmental organizations and citizens to be “at the table” in an effort to follow the spirit and intent of the Mediation Process. The actions and projects proposed in the plan reflect consensus of this diverse working group and the Bois de Sioux Watershed District Board of Managers.

BdSWD Overall Plan's Objectives

The Bois de Sioux's Overall Plan was written in 2003. According to the Plan, the West Branch Twelve Mile subwatershed is the only subwatershed located in Big Stone County (and Traverse County (refer to Figure 2G). Dumont and Graceville are cities within this subwatershed. This subwatershed has an area of 179 square miles of which 92 percent is in agricultural production. The land mass is approximately 81 percent glacial moraine and 19 percent glacial lake plain. Surface water management problems within this watershed include: flooding, drainage, erosion, water quality, and wildlife issues. Specifically, the Overall Plan identified the following priorities for this subwatershed:

- Create an additional 30,000 acre-feet of storage.
- Address Judicial Ditch #4 concerns when the opportunity exists.
- Implement urban flood damage reduction projects.
- Support projects that reduce erosion and sedimentation.
- Support projects to improve East Toqua Lake.

Water Quality: Bois de Sioux Watershed

Water quality is poor within this subwatershed due to nutrient and sediment loading. During periods of high runoff, channel erosion causes bank stabilization concerns. The severity depends on the land cover, duration and volume of water. Erosion is often worse in the spring due to the lack of vegetative cover on the fields. The District will promote agricultural best management practices to improve crop residue, tillage and cover and reduce soil erosion.

The landscape throughout the watershed has been extensively altered, primarily to improve agricultural production. While the agricultural land has been highly productive, much of the natural landscape values once present in the subwatershed have been lost. Most of the original prairie landscape has been cultivated and many of the original wetlands have been drained. Many of the original streams have been channelized and riparian corridors have been diminished or lost. In addition to maintaining soil productivity and minimizing crop damage from blowing soil, control of wind erosion and the resulting sediment, has the added benefit of minimizing the clogging of drainage and road ditches. Management of crop residues during tillage has long been a key component of an erosion control and water management strategy. Thirty percent crop residue after planting, averaged over the crop rotation, is generally recommended as the minimum amount of residue necessary to achieve acceptable soil erosion (a 65 percent reduction in soil erosion). A combination of a hydrologic soil group (soil) and a

landuse and treatment class (cover) is used to determine the hydrologic soil-cover complex. The effect of the hydrologic soil-cover complex on the amount of rainfall that runs off is represented by a runoff curve number (CN). Higher curve numbers indicate more runoff. Conversion of cropland to grasslands via land retirement programs will achieve a significant reduction in runoff.

Retired riparian croplands provide the additional benefit of significantly reducing sediment, phosphorus and other pollutants contained within runoff entering the vegetative buffer strip. In addition to considering natural resource enhancements when implementing their projects in this subwatershed, the District will encourage and support natural resource agencies and private landowners to take the following actions to protect and improve the natural resources in this subwatershed. Specifically, the Overall Plan identified the following natural resource priorities for this subwatershed:

- Support the efforts of the SWCDs to implement a buffer strip program to reduce erosion and sedimentation.

- Manage closed basins to reduce erosion in during flash events.

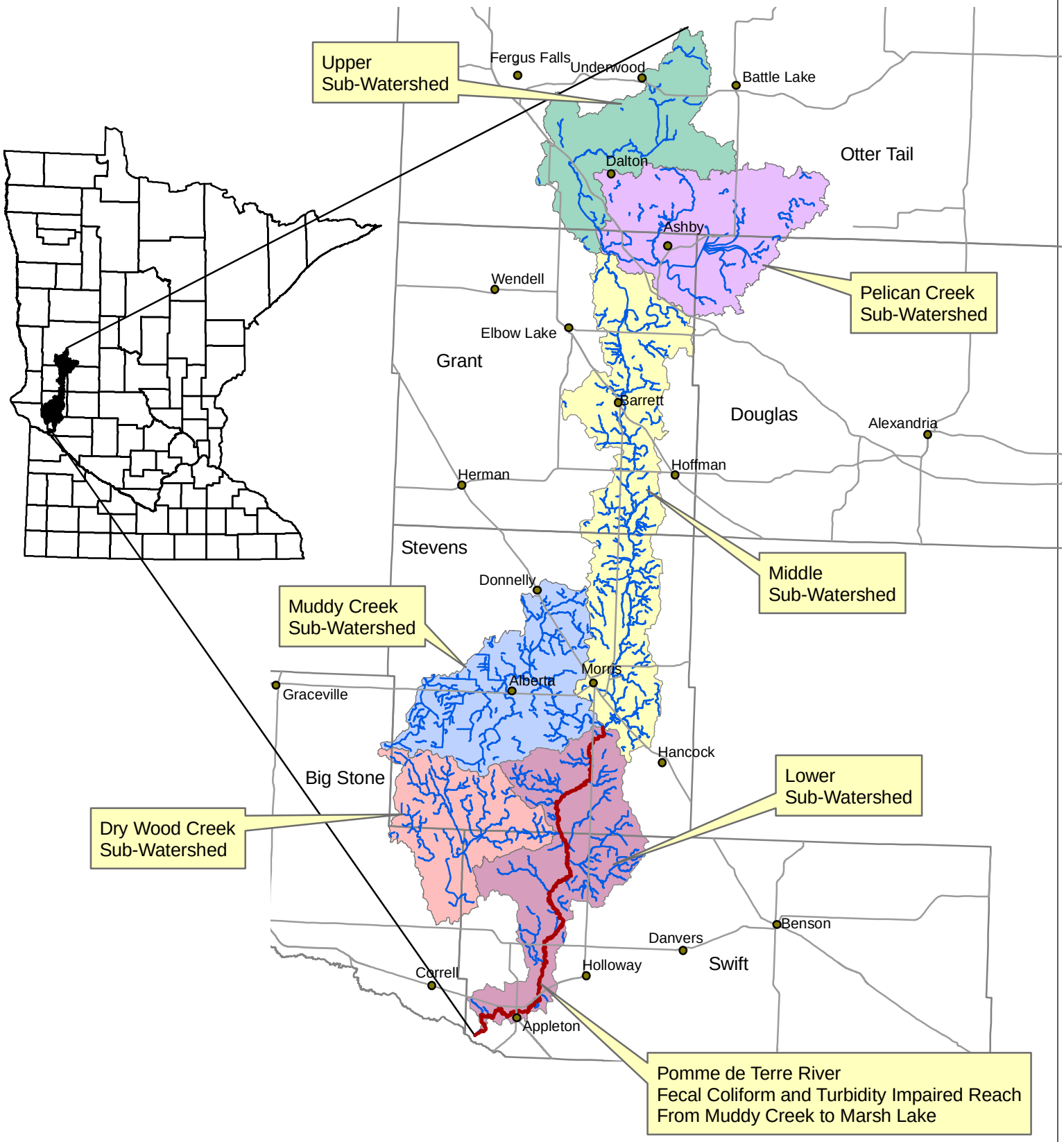
Pomme de Terre River Watershed

The Pomme de Terre River Watershed is approximately 875 square miles (599,966 acres), containing 52 minor watersheds. It is the most northern watershed in the Minnesota River Basin. The watershed begins in the North Central Hardwood Forest eco-region and flows into the Northern Glaciated Plains eco-region. The Pomme de Terre River flows through nine cities, with the largest populations being in Morris and Appleton . The river's watershed covers portions of six counties in West Central Minnesota: Otter Tail, Grant, Douglas, Stevens, Swift, and Big Stone. Approximately 5.35% of Big Stone County is located within the watershed (refer to Map 2D).

Otter Tail County, where the river begins, used to have many dairy farms but now the land is mostly used for cash grains. This northern area of watershed consists of mostly lakes, wetlands, cattails, woods and meadows. The river then flows into Grant County where the landscape begins to flatten out and more agriculture occurs along the edges of the river. The river continues to widen as it enters Stevens County where prairie and agricultural landscapes dominate. Finally, the river flows into Swift County where it drains into the Minnesota River. The majority (76.4%) of the watershed consists of agricultural/cultivated landscape. Although the river does not flow through Douglas County, it is considered in the watershed because Lake Christina drains into the Pomme de Terre.

Pomme de Terre River Watershed

Fecal Coliform and Turbidity Impaired Reach from Muddy Creek to Marsh Lake



0 4 8 16 24 32 Miles

Table 2B:
Pomme de Terre River Watershed

County	Acres in watershed	Square miles in watershed	Percent of county in watershed	Percent of watershed in county
Big Stone	18, 116	28.3	5.35%	3.24%
Douglas	19,390	31.1	4.32%	3.56%
Grant	100,334	156.8	27.23	17.92%
Otter Tail	128,829	201.3	9.05%	23.01%
Stevens	221,334	345.8	60.07%	39.53%
Swift	71,421	111.6	14.84%	12.73%
Table data was compiled by the Minnesota River Basin Data Center				

Key Stakeholder: Pomme de Terre River Association (PdTRA)

The Pomme de Terre River Association of Minnesota was formed on May 27, 1981 with the purpose of improving water quality in the Pomme de Terre River. The river, located in west central Minnesota, is impaired for high levels of fecal coliform bacteria and turbidity. The association is a Joint Powers Board (JPB) consisting of a Soil and Water Conservation District supervisor and a county commissioner from each of the six counties within the watershed. The JPB is committed to engaging local people to become informed and active in cleaning up the Pomme de Terre River. Many other agencies, individuals, and organizations are involved with the Pomme de Terre River Association.

Pomme de Terre River Watershed Water Quality

The Pomme de Terre River Association has a variety of water quality information posted on their website (www.pdtriver.org). The following two figures summarizes the available data, although more can be found on the website. In addition, Section B of the Chapter describes the Watershed's Impaired Waters and what implementation steps are needed in order to properly address the identified pollutants.

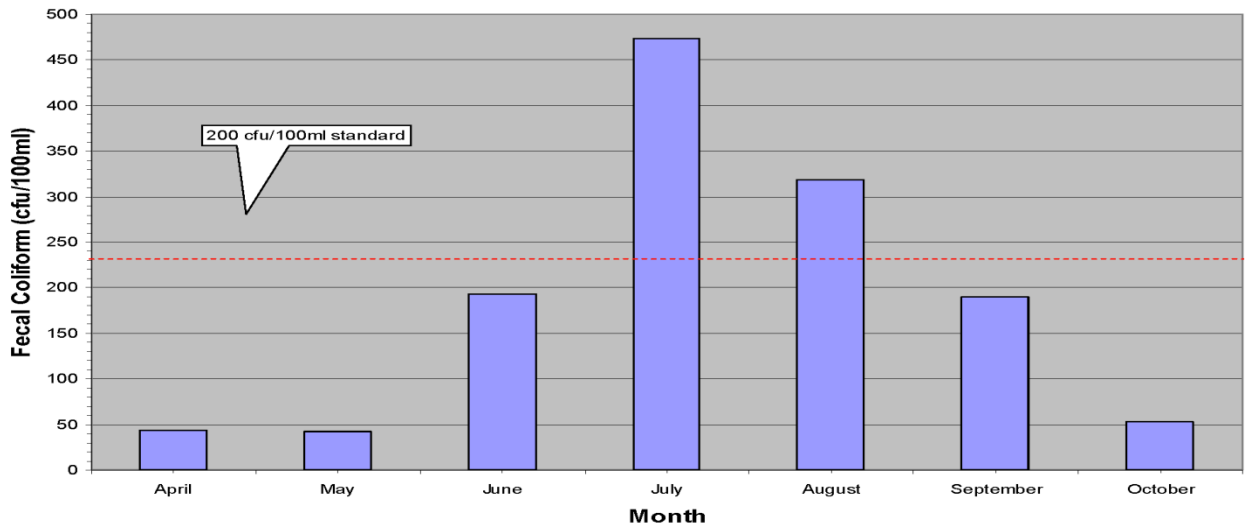
Note: According to comments received from the MPCA during the water plan's final State agency review (refer to Appendix C), much of the water quality information presented in the Pomme de Terre River Watershed section has been updated. Please visit the following two websites for more information:

www.pca.state.mn.us/pyri9c7
www.pca.state.mn.us/hqzq9c

During the period from October 5, 1983 to September 27, 1993, 74 fecal coliform observations and samples were done at the bottom of the Pomme de Terre Watershed at the USGS gauging site in Appleton, Minnesota. Of these samples, 23 were greater than 200 cfus/100ml. These samples containing excessive amounts of fecal coliform were all taken in the months from August to October. This data put the stretch of the Pomme de Terre, from Muddy Creek in Stevens County to Marsh Lake, on the EPA's impaired waters list under the 303(d) list. However, the data does not represent the effect that Muddy Creek has on the level of fecal coliform bacteria found in the river, and more research was needed to determine fecal levels.

Figure 2G shows the Pomme de Terre River's average fecal coliform concentrations (in colony-forming units per 100 milliliter) by month between 1997 and 2007. 200 cfu/100ml is considered the standard water quality benchmark for fecal coliform. Notice the Pomme de Terre River exceeds this standard on average for the months of July and August.

Figure 2G: Pomme de Terre River
Fecal Coliform Concentration by Month (Geometric Means) 1997-2007

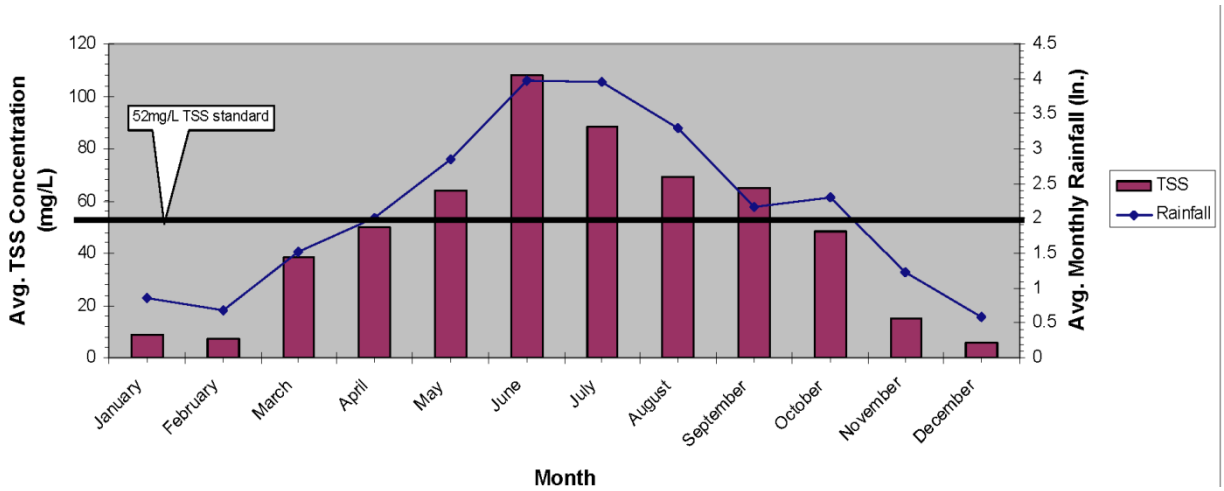


After data compilation, the Pomme de Terre Technical Advisory Committee determined that, although there is a large amount of water quality data, additional information is needed to make sound assessments of the watershed. Information currently being gathered includes flow data and water quality samples from both north and south of the Muddy Creek input into the Pomme de Terre. Water quality samples are being analyzed for total Phosphorus, Nitrate-Nitrogen, Nitrite-Nitrogen, total suspended solids, turbidity, and fecal coliform. Water quality samples and other information will be compiled into a TMDL report that will list sources of increased fecal material and best management practices for lowering levels of fecal coliform and returning the Pomme de Terre to a healthy state.

The focus of this project is to better characterize fecal coliform levels, identify the probable sources, and estimate the reduction required to meet TMDL water quality standards. The entirety of the project includes identifying and quantifying the point and nonpoint sources of fecal coliform and linking these sources to the river concentrations. The project has three goals. The first is the analysis of data that put the Pomme de Terre on the impaired waters list. Second, the effects of Muddy Creek on the lower Pomme de Terre watershed will be analyzed. The third goal is to develop and initiate an implementation plan to attain and maintain water quality standards of fecal coliform bacteria in the river.

Figure 2H shows a typical bell curve of how the Pomme de Terre River's Total Suspended Solids (TSS) concentrations increase as rainfall amounts increase. Although this is fairly common, it also shows that more efforts need to be made to minimize erosion and sedimentation.

Figure 2H:
Pomme de Terre River Average Monthly
Total Suspended Solids (TSS) Concentrations vs.
Average Monthly Rainfall Amounts (1997-2007)



Clean Water Funds…after two straight years of Clean Water Fund awards, the Pomme de Terre River Association sought to continue the restoration and protection efforts in the watershed. In 2012, three grant funds were applied for to implement BMPs, to characterize the watershed through mapping, and to begin a Conservation Drainage initiative. Though only one application was successful, the Pomme de Terre was awarded $480,000 in grant funds to continue the implementation momentum! Through the Clean Water Fund and BWSR, the Pomme de Terre is taking the lead role in conservation in the Upper Minnesota River basin. In 3 years of successful applications we've brought nearly $1.1 million dollars in tax generated grant funds back to rural Minnesota.

Major Watershed Restoration and Protection Plan (MWRPP)

The newest development in the Pomme de Terre River Watershed is the Major Watershed Study to address many different river impairments. The project was approved by the Joint Powers Board on April 15th, 2011 and is currently under way. The study will help to understand where problem areas are located, and what needs to be done to address the issue on a watershed level. The study will involve TMDLs, more intensive lake and stream monitoring, and the potential for increased funding for incentives programs.

The MPCA did what is called Intensive Watershed Monitoring on the Pomme de Terre and its tributaries from 2007 until 2010 so there's plenty of data to analyze. Work currently underway in the watershed includes both lake and stream monitoring. Details of other tasks within the plan are still being worked out but will likely include stakeholder meetings, and priority site determinations for future funding opportunities.

Potential impairments could include but are not limited to:

- ***Turbidity*** - Too much sediment causing reduced light penetration.
- ***Fecal coliform*** - Bacteria found in the intestines of warm blooded animals, causes sickness in humans who are exposed.
- ***Biological indicators*** - Too few of certain plant and animal species including bugs, fish, reptiles and amphibians.
- ***Excessive nutrient/Eutrophication*** - Nutrients causing advanced aging of lakes or streams.

B. TMDL - Impaired Waters Assessment

Why are Impaired Waters a Priority Concern? The Federal Clean Water Act requires states to adopt water quality standards to protect the nation's waters. These standards define how much of a pollutant can be in a surface and/or groundwater while still allowing it to meet its designated uses, such as for drinking water, fishing, swimming, irrigation or industrial purposes. When a water body cannot meet its designated uses due to pollution, it is considered an Impaired Water.

The Minnesota Pollution Control Agency (MPCA) produces a list of Minnesota's Impaired Waters every two years, referred to as the 303d List of Impaired Waters. The List identifies impaired water bodies and identifies the types of pollutants that exceed the State's minimum water quality standards, ranging from high Mercury levels, to Turbidity (suspended solids), to Fecal Coliform (bacteria).

What are the Risks? The various pollutants listed on the 303d List of Impaired Waters each pose a unique threat to aquatic life, human life, and/or wildlife. The major risk areas of concern can be summarized into the following categories:

- **Protection of Aquatic Life**
  - Main pollutants include trace metals, un-ionized ammonia, chloride, low dissolved oxygen, pH levels, turbidity, temperature, and various biological indicators.
- **Protection of Aquatic Consumption & Drinking Water**
  - Main pollutants include mercury, polychlorinated biphenyls, dioxins and chlorinated pesticides
- **Wildlife-Based Water Quality**
  - Main pollutants include DDT, Mercury and PCBs (human health standards are more stringent than for wildlife)
- **Protection of Aquatic Recreation**
  - Main pollutants include E. coli bacteria and lake eutrophication

Where are Big Stone County's Impaired Waters Located? The MPCA submitted a Priority Concerns Input Form that was profiled in Chapter One. The key component of the Input Form was a listing of the Impaired Waters found in Big Stone County. Table 2C provides a list of the information submitted (a copy of the correspondence and the list of Impaired Waters can be found in Appendix B…although Table 2C has updated information). The MPCA publishes the list on their website (www.pca.state.mn.us), and also has an interactive mapping program, however, the maps cannot be printed in good quality.

Table 2C:
MPCA's 303d List of Impaired Waters for Big Stone County (2012)*

Impaired Water	ID#	Impaired Uses	Impairment Cause	Status
Minnesota River: Big Stone Lake to Whetstone River	07020001-506	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Minnesota River: Whetstone River to Yellow Bank River	07020001-503	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Minnesota River: Yellow Bank River to Marsh Lake	07020001-511	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Stoney Run Creek: Unamed Creek to Minnesota River	07020001-531	Aquatic Life	Fish Bioassessments	TMDL Required
Marsh Lake	06-0001-00	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Artichoke Lake	06-0002-00	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Big Stone	06-0152-00	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
East Toqua	06-0138-00	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved
Long Tom	06-0029-00	Aquatic Consumption	Mercury in Fish Tissue	TMDL Approved

**** Submitted by the MPCA***

What actions are needed to properly address Impaired Waters? By definition, being listed as an impaired water for a pollutant means the water body cannot sustain itself naturally. As a result, collaborative measures need to be taken in order to give the water body a chance to become healthy again. Addressing Impaired Waters in County Water Plans is voluntary, however, Big Stone County anticipated being fully engaged in TMDL assessments and their anticipated implementation activities. Due to the varying types of pollutants, however, nearly all of the Big Stone County's Water Plan stakeholders play some role in properly addressing impaired waters.

TMDL Best Management Practices (BMPs)

Dr. David Mulla of the University of Minnesota developed matrices to provide general planning-level guidance on the application of BMPs. The BMPs were developed through a focus group process that included experts from the University of Minnesota, Minnesota Pollution Control Agency, Minnesota Department of Agriculture, and the Minnesota Board of Water and Soil Resources. Four broad categories of management practices discussed include nutrient management, vegetative practices, tillage practices, and structural practices. Selection of appropriate management practices for the pollutant(s) of concern depends on site-specific conditions, stakeholder attitudes and knowledge, and on economic factors. This information is intended to be used as a starting point in the development of a custom set of BMPs to reduce sources of pollution generation and transport through improved management of uplands and riparian land within the TMDL project area. Reducing sediment generation and transport will also lead to decreases in turbidity, bacteria concentrations, and improve Dissolved Oxygen (DO) in downstream reaches.

Each of the broad categories of management practices as it applies to TMDL implementation is briefly summarized:

Nutrient Management Practices - Nutrients have an effect upon algal and periphyton growth and subsequent death, decay, and development of SOD; and well as periphyton–developed diurnal swings in dissolved oxygen. Therefore, fertilization management is an important BMP component of the Dissolved Oxygen Implementation Plan.

Vegetative Management Practices - Vegetative practices include those focusing on the establishment and protection of crop and noncrop vegetation to minimize sediment mobilization from agricultural lands and decrease sediment transport to receiving waters. The recommended cropping practices are designed in part to slow the speed of runoff over bare soil to minimize its ability to entrain sediment. Grassed waterways and grass filter strips provide settling of entrained sediment which gets incorporated into both the soil and vegetation. Other practices, such as alternative crop rotations and field windbreaks are designed to minimize exposure of bare soils to wind and water which can transport soil off-site. Pasture management often emphasizes rotational grazing techniques, where pastures are divided into paddocks, and the livestock moved from one paddock to another before forage is over-grazed. As livestock are moved frequently, forage is able to survive.

Maintaining the vegetation, as opposed to bare soil, allows for greater water infiltration, reducing runoff and associated sediment transport. The Natural Resources Conservation Service offices and the Big Stone Soil and Water Conservation Districts facilitate the Environmental Quality Incentives Program (EQIP), state, and other cost-share programs to put Best Management

Practices into place. There are a number of programs available to compensate land owners for moving environmentally sensitive cropland out of production for varying periods of time. These include the Conservation Reserve Program (CRP), Re-Invest in Minnesota (RIM) Reserve Program, and the Conservation Reserve Enhancement Program (CREP) or similar programs. Anticipated benefits in reducing soil erosion and improving water quality are key considerations in deciding what lands can be enrolled in each program. These easements are either Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), Wetland Preservation Areas (WPA) and Wildlife Management Areas (WMA).

List of Primary BMP Vegetative Practices

- ✓ Grassed waterways
- ✓ Grass filter strip for feedlot runoff
- ✓ Buffers
- ✓ Wetland restoration
- ✓ Alternative crop in rotation
- ✓ Field windbreak
- ✓ Pasture management, intensive rotation grazing (IRG)
- ✓ Conservation Reserve Program (CRP) or Conservation Reserve Enhancement Program
- ✓ (CREP) or similar programs

Primary Tillage Practices - Certain kinds of tillage practices can significantly reduce the generation and transport of soil from fields. Conservation tillage techniques emphasize the practice of leaving at least some vegetation cover or crop residue on fields as a means of reducing the exposure of the underlying soil to wind and water which leads to erosion. If it is managed properly, tillage management can reduce soil erosion on active fields by up to two-thirds (Randall et. al. 2008). The Natural Resources Conservation Service office and Big Stone Soil and Water Conservation District facilitate Environmental Quality Incentives Program (EQIP) or other cost-share programs to put Best Management Practices into place.

List of Primary BMP Tillage Practices

- ✓ Chisel Plow
- ✓ One pass tillage
- ✓ No-till
- ✓ Strip-till
- ✓ Ridge till

Structural Practices - Structural practices emphasize elements that generally require a higher level of site-specific planning and engineering design. Most structural practices focus on watershed improvements to decrease sediment loading to the receiving water. For example,

restoration of wetlands can create a natural method of slowing overland runoff and storing runoff water, which can both reduce channel instability and flooding downstream. In addition, the quiescent conditions of a wetland mean that they can be effective at settling out sediment particles in the runoff that reaches them, although accumulation of too much sediment too rapidly can compromise other important functions of the wetland. Livestock exclusion involves fencing or creating other structural barriers to limit or eliminate access to stream by livestock, and may involve directing livestock to an area that is better designed to provide limited access with minimal impact. Sediment load reduction structures such as basins, diversions and terraces trap sediment from migrating downstream into channels and ditches. The Natural Resources Conservation Service office and the Big Stone Soil and Water Conservation District facilitate Environmental Quality Incentives Program (EQIP) or other cost-share programs to put Best Management Practices into place.

List of Primary BMP Structural Practices

- ✓ Wetland creation
- ✓ Livestock exclusion
- ✓ Liquid manure waste facilities
- ✓ Water and sediment control basins
- ✓ Diversions
- ✓ Terraces

Feedlot Runoff Reduction - This strategy is presently under implementation through the MPCA's Open Lot Agreement (OLA) established in October 2000. The OLA has a Full Compliance goal to meet effluent limits in Minn. R. 7053.0305 by October 1, 2010. This program encourages producers to seek information and assistance for practical solutions to treat feedlot runoff that discharges into waters of the state from feedlots that do not require NPDES permits. There are a variety of options for improving open lot runoff problems that reduce diffuse source loading of bacteria and turbidity, including:

- ✓ Move Fences/Change Lot Area
- ✓ Eliminate Open Tile Intakes and/or Feedlot Runoff to the Intake
- ✓ Install Clean Water Diversions and Rain Gutters
- ✓ Install Grass Buffers
- ✓ Maintain Buffer Areas
- ✓ Construct a Solids Settling Area(s)
- ✓ Prevent Manure Accumulations
- ✓ Manage Feed Storage
- ✓ Manage Watering Devices
- ✓ Total Runoff Control and Storage
- ✓ Roofs

- ✓ Runoff Containment with Irrigation onto Cropland/Grassland
- ✓ Vegetated Infiltration Area
- ✓ Tile-Drained Vegetated Infiltration Area with Secondary Vegetated Filter Strip
- ✓ Sunny Day Release on to Vegetated Infiltration Area or Filter Strip

These practices can achieve a 50% to 90% reduction of suspended solids and phosphorus within a stream reach.

Manure Management Planning - Continued cooperation between the County and the MPCA through the County Feedlot Program ensures that feedlot owners get assistance to remain compliant with their permits. The Natural Resources Conservation Service office and the Big Stone Soil and Water Conservation District facilitate Environmental Quality Incentives Program (EQIP) or other cost-share programs to put Best Management Practices into place. The development and update of manure management plans continue to reduce bacteria in runoff.

Stream and Channel Restoration - Other practices which may be considered for the project area involve making improvements to the structure of the receiving water to improve stability and decrease in-stream sources of sediment. In-stream structures need to be carefully designed to direct flow where appropriate under a wide range of discharge conditions and make sure that solution of one channel stability problem doesn't create another elsewhere. Also important is, where possible, making sure that the main stream channel can overflow into its floodplain at high flows to allow the stream to temporarily store water outside the streambank, reducing flow velocity and excessive scouring of the channel. Intact natural vegetation in the floodplain also acts to slow flow velocities and encourages deposition and permanent capture of sediment.

Upstream Sources - South Dakota applies less stringent standards to water classified to support indirect contact recreation. If South Dakota does not meet Minnesota standards for streamflows discharged across the border, exceedances of Minnesota's bacteria standards in Minnesota are likely even if Minnesota sources are complying with standards. USEPA facilitation of an agreement between Minnesota and South Dakota to protect water quality over state boundaries should be pursued.

Waste Water Treatment Facilities - Counties, Regional Development Commissions and MPCA staff will work with Waste Water Treatment Facilities to ensure continued compliance.

Subsurface Sewage Treatment Systems (SSTS) - Low interest loan dollars are available to aid landowners in upgrading SSTS through the Big Stone County Environmental Services Office. These funds are administered by the State Revolving Fund (SRF) through the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency.

C. Feedlots and Livestock Management Assessment

Why are Feedlots and Livestock Management a Priority Concern? The Minnesota Pollution Control Agency (MPCA) regulates and controls pollution created by animal feedlots. The MPCA's feedlot rules were first adopted in 1971 and were amended in 1974, 1978 and again in 2000. The trend in agriculture has been toward fewer but larger livestock and poultry facilities. There has also been a trend of increasing awareness about the potential environmental effects of feedlots. In accordance with MPCA feedlot regulations, the owner(s) of an animal feedlot or manure storage area with 50 or more animal units, or 10 or more animal units if in shoreland (less than 300 feet from a stream or river, less than 1,000 feet from a lake) needed to register with the MPCA.

> ***Definition of an Animal Unit***
>
> A standardized measure to compare differences in the production of animal manure for an animal feedlot or manure storage area. A mature cow of about 1000 pounds (455 kg.) is the standard unit.

Big Stone County is a delegated county for the Feedlot Program which is ruled by the MPCA. Large Concentrated Animal Feeding Operations (CAFOs) are permitted through MPCA. All other feedlots that are required to be permitted hold a County permit. All feedlots in the County are also registered whether they need a permit or not when the amount of animal units dictates. As part of the feedlot program Manure Management Plans are a requirement for obtaining the initial permit for a feedlot with 100 animal units or more. MMP's are also required if the manure is applied to fields by non-certified animal waste technicians. MMP's are required by federal regulations for Concentrated Animal Feeding Operations (CAFOs). MMP's show how manure generated at a feedlot facility is going to be used during upcoming cropping year (s) in a way that maximizes the benefits of manure application to cropland and meets all rules and regulations and protects surface and groundwater quality. These regulations include proper setbacks from all rivers, streams, natural waterways, private and public wells, drainage ditches and drain tile intakes. This also includes the incorporation of liquid manure and regulations concerning application before known large rain events and the strict regulations for winter application when allowed by special permit.

What Risks do Feedlots and Livestock Management Issues Pose? Feedlot and livestock environmental issues are mostly concerned with manure management. Specifically, phosphorus and nitrogen runoff from manure can lead to water quality problems if not handled properly. In addition, livestock grazing can substantially increase erosion and sedimentation rates when best management practices are not followed.

Where are Big Stone County's Problem Feedlots Located? Like most agricultural counties, Big Stone County's feedlot located are vastly spread out across the rural landscape. According to the County's 2012 Feedlot report, Big Stone County has approximately 59 feedlots. The breakdown by category is shown in Table 2D:

Table 2D:

Big Stone County 2012 Feedlots

Feedlots registered in shoreland with 10 – 299 AU:	6
Feedlots registered outside shoreland with 50 – 299 AU:	36
Non-NPDES sites ≥ 300 AU:	10
Feedlots registered with NPDES permits:	7
Total:	**59**

What actions are needed to address Feedlots and Livestock Management issues and Who are the Key Stakeholders?

Minnesota Department of Agriculture (MDA) - In addition to the MPCA and the County, the Minnesota Department of Agriculture (MDA) is also a key stakeholder in feedlot/livestock management issues. The MDA submitted a Priority Concerns Input Form during the Water Plan's scoping process (contained in Appendix B). The main comments concerning feedlots and livestock issues are as follows:

> "Livestock manure used as fertilizer has benefited farmers for decades and if applied properly can meet crop nutrient requirements, build up soil organic material and decrease dependence on commercial fertilizers, increase soil fertility, and in some cases, reduce soil erosion. Manure as fertilizer is a constant reminder that we can reuse and recycle a product that was once thought of as a waste product with insignificant value. However, if manure is not properly applied it can lead to negative environmental impacts.
>
> Manure, feed/silage leachate and milkhouse waste can be high in nutrient values, specifically pertaining to nitrogen and phosphorous. If improperly applied, manure does have the potential to contribute to nutrient loading and bacteria/viral levels of water sources. It is important for counties in the state to encourage the development of manure/nutrient management plans for the livestock producers within their borders. These plans address agronomic application rates for crops planted, buffered or protection areas around sensitive features, and reduce the potential of impacting surface or ground water.
>
> Pasturing livestock is a common practice among livestock producers. Several studies and research through the University of Minnesota show that livestock grazing, if done properly, can enhance the quality of grazing lands. As your county is aware, pasture areas are often those areas that are not conducive to farming and generally contain sensitive landscape and

surface water features. Nutrients left by livestock serve as a fertilizer source to pasture plant species, which then utilize and filter the nutrients rather than the nutrients being in excess and exiting the area in the form of runoff.

Types of vegetation, length of time in a pasture, stocking density and water availability are all issues livestock producers must be continued to be educated, in order to produce and utilize a productive, environmentally sound pasture or grazing system. Pastures or grazing systems not managed properly can restrict or eliminate vegetative growth and cover, which in turn can result in potentially negative water quality issues" (www.mda.state.mn.us).

D. Subsurface Sewage Treatment Systems Assessment

Why are Subsurface Sewage Treatment Systems a Priority Concern? Subsurface Sewage Treatment Systems (SSTS), commonly known as septic systems, pose a threat to public health and the environment if not properly installed and maintained. They are regulated by Minnesota Statutes 115.55 and 115.56. These regulations detail:

1. Minimum technical standards for individual and mid-size SSTS (Chapter 7080 and 7081);
2. A framework for local administration of SSTS programs (Chapter 7082) and;
3. Statewide licensing and certification of SSTS professionals, SSTS product review and registration, and establishment of the SSTS Advisory Committee (Chapter 7083).

What Risks do SSTS's Pose? According to the MPCA, "Expose to sewage through ingestion or bodily contact can result in disease, severe illness, and in some instances death from bacteria, viruses and parasites contained in waste. Therefore, it is important for sewage to be properly treated" (***Facts About Subsurface Sewage Treatment Systems,* MPCA-June 2008*)***. In addition, high phosphorus levels normally found in sewage can also lead to excessive aquatic plant growth, causing a number of corresponding water quality problems.

Where are Big Stone County's SSTS Located? Although SSTS's are sometimes located within incorporated areas, SSTS's are commonly located throughout the rural areas of the County. They are the primary means of treating sewage on farmsteads, rural homesteads, and for lakeshore properties. Table 2E shows the number of SSTS permits by type since 2008.

Table 2E:
Big Stone County SSTS Permits by Type and Year

Year	New Residential	Other New Establishment	Replacement Residential	Replacement Other Establishment	Totals by Year
2008	22	5	0	17	44
2009	10	0	20	0	30
2010	8	0	10	0	18
2011	7	0	21	2	32
2012	0	4	17	0	23
Totals	**47**	**9**	**58**	**19**	**147**

What would happen if SSTS issues are not addressed? SSTS concerns need to be properly addressed in the Water Plan to minimize the potential for them to have negative effects on public health and/or the environment. In addition, proper SSTS management will also help to protect overall water quality and will help address some of the problems listed in the County's impaired waters.

The Big Stone County Environmental Services Office assists with enforcing MN Rule Chapter 7080-7083 through the Big Stone County SSTS Ordinance. Two of the major components of the ordinance require a septic system disclosure form and a transfer agreement form upon property being transferred between the seller and buyer of property.

E. Erosion and Sediment Control Assessment

As an agricultural county, soils are one of Big Stone County's most valuable resources. Soils develop from the breakdown of rock minerals, intermixed with plant and animal remains. The formation of a soil is an extremely long process, taking place over thousands of years. Big Stone County's soils were formed from deposits originally left by glaciers more than 10,000 years ago. Map 2B displays the Big Stone County's major soil associations (***Note***: map numbers are not sequential due to some of the maps being created for the County's previous Water Plan). Chapter Three contains a map of Big Stone County's erosion prone soils. More detailed information about Big Stone County's soils can be found in the County's Soil Survey or by contacting the Big Stone County Soil and Water Conservation District.

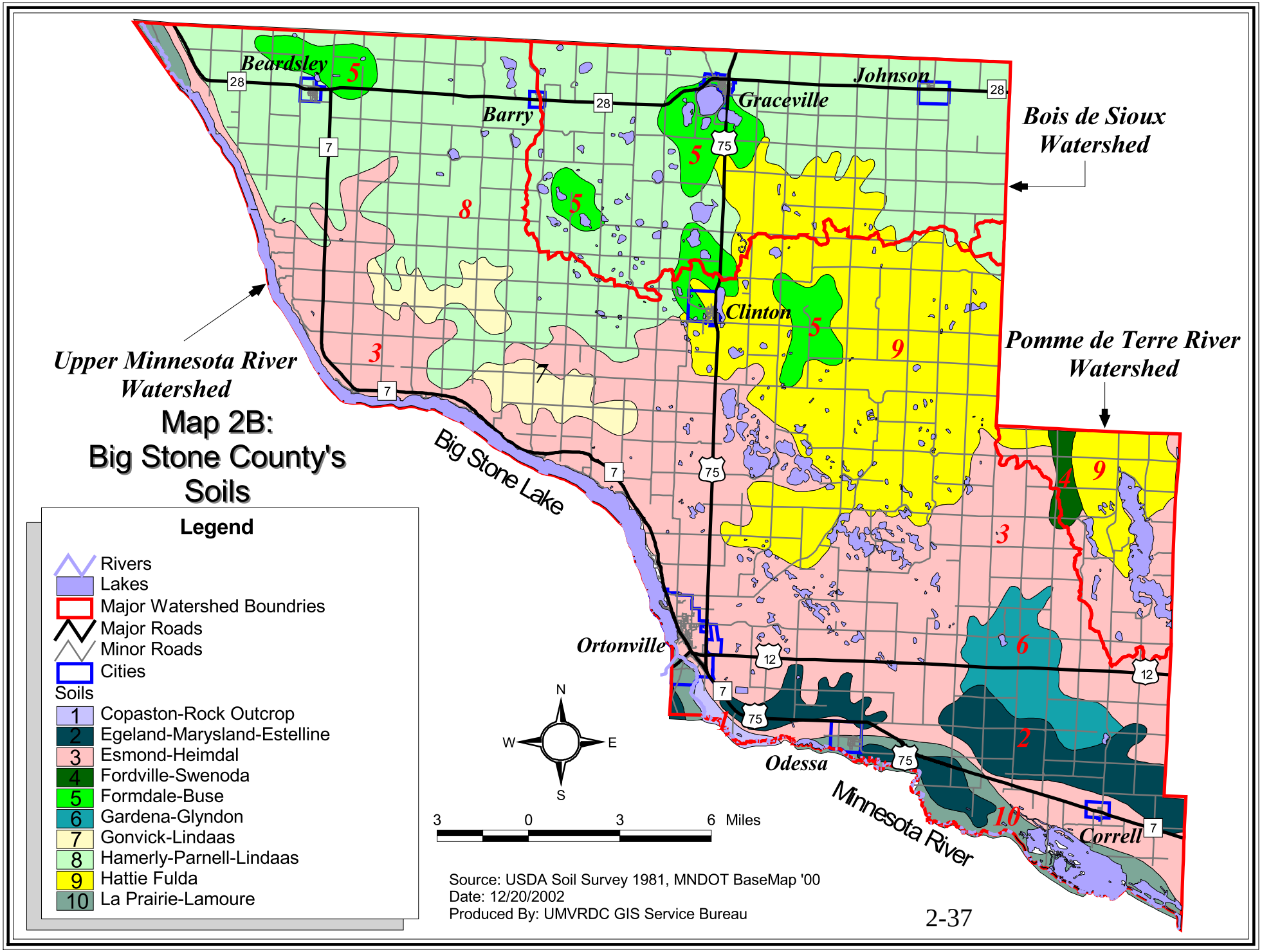
For administration of the State Cost-Share Program by the Big Stone County Soil and Water Conservation District the following definitions apply:

High Priority Erosion Problems – "High priority erosion problems" means areas where erosion from wind or water is occurring equal to, or in excess of, 2 x T tons per acre per year or is occurring on any area that exhibits active gully erosion or is identified as high priority in the comprehensive local water plan or the conservation district's comprehensive plan.

High Priority Water Quality Problems – "High priority water quality problems" means areas where sediment, nutrients, chemicals, or other pollutants discharge to Department of Natural Resources designated protected waters or to any high priority waters as identified in a comprehensive local water plan or the conservation district's comprehensive plan, or discharge to a sinkhole or groundwater. The pollutant delivery rate to the water source is in amounts that will impair the quality or usefulness of the water resource.

Water Erosion - Water erosion results from soil being moved from its original location by the force of water to the convex lower slopes and flats. Average tolerable soil loss for the County is three to five tons per acre per year. Erosion types are classified as sheet and rill, ephemeral and gully. Soil erosion affects cropland, urban areas, roadsides, lakeshores, stream banks and drainage systems. Water erosion impacts the water quality of the County's water bodies, as well as develops detrimental conditions in the uplands and steeper slopes of the soil associations with erosion prone characteristics. Water erosion in Big Stone County generally occurs the most between the months of April and June, when fields have been tilled and planted, but a crop canopy has not developed to protect the surface. The USDA developed the Universal Soil Loss Equation (now replaced by RUSLE) to effectively predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. One of the six factors used in the equation, erosion factor K, indicates the susceptibility of a soil to sheet and rill erosion. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion. Map 3B (numbered in the previous water plan) identifies the water erosion prone Big Stone County soil associations that have K factors equal to or greater than 0.28.

Wind Erosion - The potential for wind erosion occurs when wind velocities increase above 12 miles per hour. Wind speeds above this mark overcome the force of gravity and dislodge soil particles. Soil is most vulnerable when unprotected by vegetative cover. Soils with fine granulated structure are most susceptible to erosion, including sandy loam, loamy sand and sand. November through June is the worst time for wind erosion, when field surfaces are normally dry and strong northwest winds are prevalent. The USDA has classified soils into Wind Erodibility Groups, according to their susceptibility to wind erosion in cultivated areas. Wind Erodibility Groups range from 1-8. The lower the group number, the higher the vulnerability to wind erosion. Groups 4L or less are classified as highly susceptible to wind erosion. Map 3B displays the County's wind erosion-prone soils.


Beardsley
Barry
Graceville
Johnson
Clinton
Ortonville
Odessa
Correll
Big Stone Lake
Minnesota River
Bois de Sioux Watershed
Pomme de Terre River Watershed
Upper Minnesota River Watershed
Map 2B:
Big Stone County's Soils
Legend
Rivers
Lakes
Major Watershed Boundries
Major Roads
Minor Roads
Cities
Soils
1 Copaston-Rock Outcrop
2 Egeland-Marysland-Estelline
3 Esmond-Heimdal
4 Fordville-Swenoda
5 Formdale-Buse
6 Gardena-Glyndon
7 Gonvick-Lindaas
8 Hamerly-Parnell-Lindaas
9 Hattie Fulda
10 La Prairie-Lamoure
N
W
E
S
3 0 3 6 Miles
Source: USDA Soil Survey 1981, MNDOT BaseMap '00
Date: 12/20/2002
Produced By: UMVRDC GIS Service Bureau

Why is Soil Erosion and Sediment Control a Priority Concern?

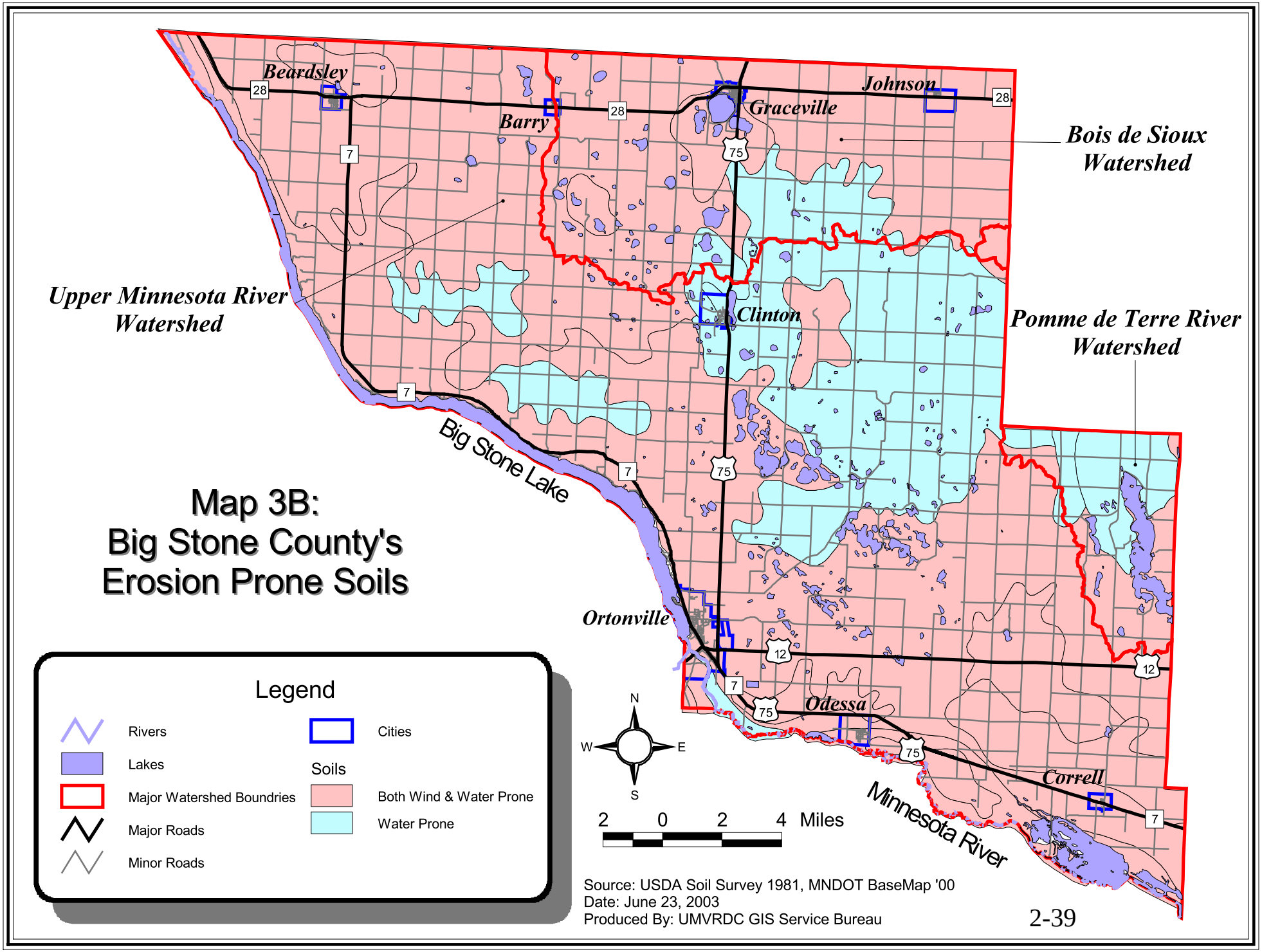
The Priority Concerns Scoping Document (Chapter One) identified that cultivated agricultural land is the single largest land use in the County. The Priority Concerns Input Form submitted by the Minnesota Board of Water and Soil Resources (BWSR) best summarizes the significance of having erosion and sediment control as a priority issue addressed in the Big Stone County Water Plan (see Appendix B):

> "According to the "2003 – 2012 Big Stone County Comprehensive Local Water Plan", the single largest land use in the County is cultivated agricultural land--approximately 75%. Farming practices change over the decades. What once was a diversified agricultural landscape is now primarily cash grain operations. Cash grain operations tend to have soils that are more susceptible to water and/or wind erosion, which can and do impact the quality and quantity of surface and ground water resources. The rivers, shallow lake/wetlands and streams of the County (and Minnesota) depend on best management practices to be implemented on these lands so water quality degradation from sediment of eroding lands does not occur. To provide for the long-term productive capacity of the County's soil resource base (and the quality of surface water), these agricultural soils need to be protected."

Table 2F provides the 2013 conservation lands summary for Big Stone County.

Table 2F:
Lac qui Parle County Conservation Lands Summary
~ Prepared by BWSR as of 8-1-2013 ~

Conservation Reserve Program (CRP)	4,075 acres
Continuous CRP	3,296 acres
Conservation Reserve Enhancement Program (CREP)	772 acres
Reinvest in Minnesota (RIM)	398 acres
RIM – Wetlands Reserve Program (WRP)	285 acres
Wetlands Reserve Program (WRP)	835 acres
Total Resource Acres	**9,661 acres**
Cropland Acres	**251,987 acres**


Map 3B:
Big Stone County's
Erosion Prone Soils
Beardsley
Barry
Graceville
Johnson
Clinton
Ortonville
Odessa
Correll
Bois de Sioux Watershed
Upper Minnesota River Watershed
Pomme de Terre River Watershed
Big Stone Lake
Minnesota River
28
7
75
12
Legend
Rivers
Lakes
Major Watershed Boundries
Major Roads
Minor Roads
Cities
Soils
Both Wind & Water Prone
Water Prone
N
W
E
S
2 0 2 4 Miles
Source: USDA Soil Survey 1981, MNDOT BaseMap '00
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

Section Two:
Surface Water Management ~ Surface Water Quantity

This section of the Water Plan provides an assessment of Big Stone County's surface water management issues (and/or surface water quantity issues). Included are subsections on Agricultural Drainage, Stormwater Management, Wetlands/Water Retention, and Flooding. It is important to remember that all four of these subsections are interrelated. Consequentially, many points made as part of one resource assessment also pertains to the resource assessments for the other three categories.

F. Agricultural Drainage Assessment

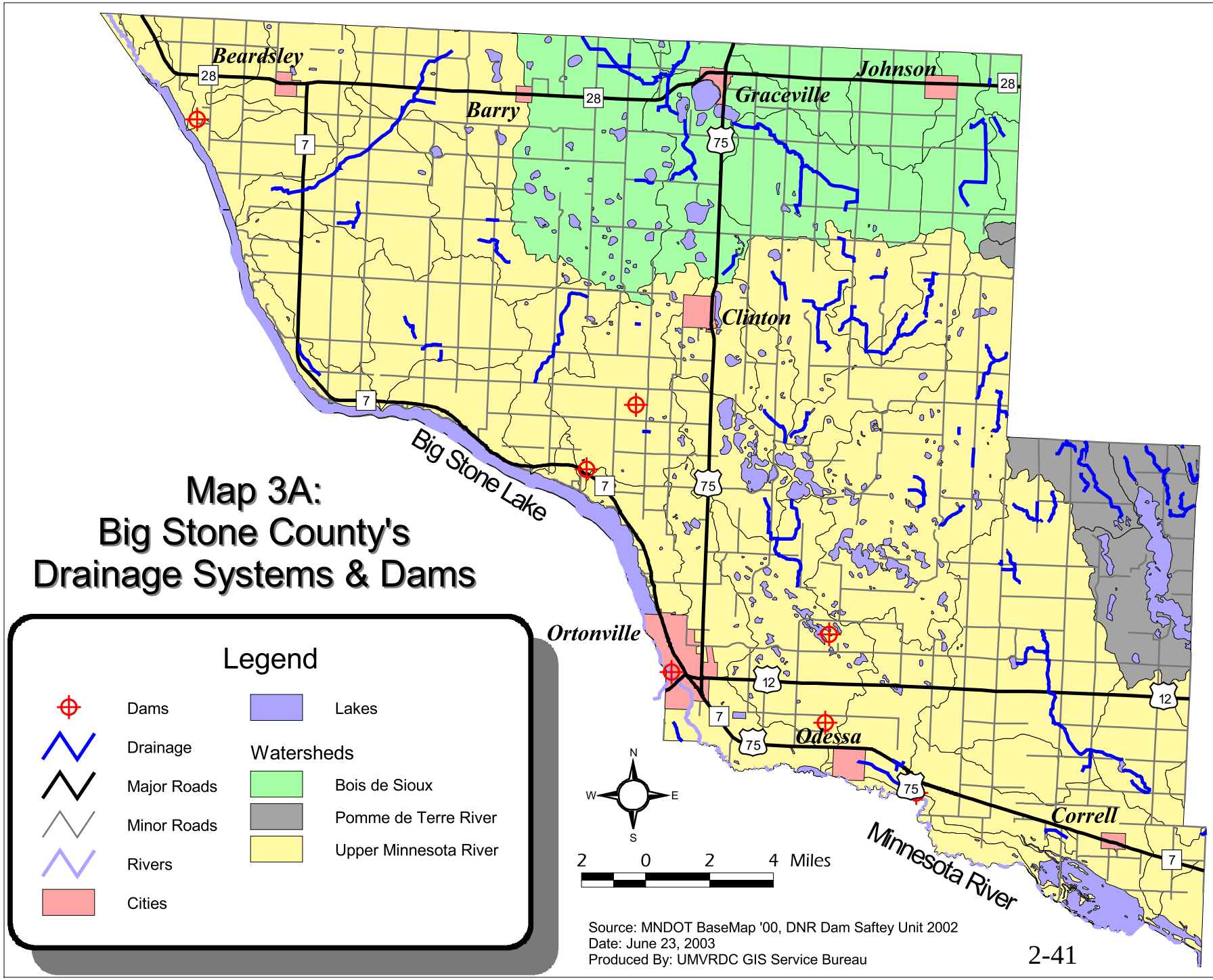
Why is Agricultural Drainage a Priority Concern?

Big Stone County has an extensive agricultural drainage system, shown on Map 3A (numbered from the County's previous water plan). These ditches were installed to provide drainage for agricultural lands, at a time when Federal and State policies were to increase agricultural production. Having adequate drainage for agricultural production is an essential component of our economy, however most of the drainage systems installed in the past were designed primarily to remove water as rapidly as possible, without regard to effects on surface water quality and quantity.

Best management practices (BMPs), such as filter strips and alternative drainage methods, need to be targeted on drainage systems to prevent exacerbating current water quality and quantity problems. Implementation of such practices would not only improve the quality of the County's surface water, but it would also reduce the need for expensive ditch cleanout and repair.

The Minnesota Department of Natural Resources (DNR) has observed more "flashy" stream flows throughout the State, meaning that both high and low flows are exaggerated. Because many drainage ditch systems were designed to remove large quantities of water in a short duration, flooding problems are occurring more frequently, especially following major storm events and during the spring snowmelt. To minimize flooding impacts, upland storage needs to be increased to reduce the overall volume of water transported by the drainage system.

Due to recent high crop prices, an increasing amount of farmland is being tiled. This presents itself the opportunity to install new conservation drainage systems and to make improvements to the existing system. The newer systems can be designed to reduce nutrient losses and also positively affect the timing of flows into surface waters. **Note:** ***Please refer to MDA's State review comments contained in Appendix C for an explanation of more reasons (other than high crop prices) explaining why more farmland is currently being tiled.***



Map 3A: Big Stone County's Drainage Systems & Dams

What are the Risks Associated with Agricultural Drainage? Although proper agricultural drainage is a necessary component in a healthy farming community, some negative environmental risks do exist if best management practices are not implemented properly. These sometimes include the following water-related problems:

- Loss of wetlands and water storage
- Increased flooding (due to loss of wetlands and water storage)
- Increased loss of nitrates through tile drains; increased phosphorus levels
- Increased soil erosion and turbidity
- Increased pesticides and farm chemicals in public waters

What actions are needed to properly address Agricultural Drainage issues and who are the Key Stakeholders in Big Stone County?

On the County level, the Big Stone Highway Department is main contact for drainage issues. On the watershed level, the Bois de Sioux and the Upper Minnesota River Watershed Districts have overall drainage authority. In recent years the amount of pattern tiling has dramatically increased within the County. While pattern tiling has definite water quality and quantity benefits over conventional open tile intakes, the increasing installation has raised numerous questions on what overall impacts it will have on the environment.

A number of drainage authorities in Minnesota have undertaken a systematic redetermination of benefits and damages for all of the Chapter 103E drainage systems under their jurisdiction, including surface ditches and subsurface tile systems. These drainage authorities include: Freeborn, Martin, Steele, Sibley, Kandiyohi and Faribault Counties. According to a BWSR (www.bwsr.state.mn.us/drainage), in a publication titled "Redetermination of Benefits and Damages for Drainage Systems:"

- Benefited lands and benefits of many public drainage systems have not been updated for decades, some for over a century.
- Drainage system benefits are determined at one point in time, with no provision in Chapter 103E to index for inflation over time. The cost of a repair cannot exceed the total value of benefits of the drainage system on record.
- The drainage system repair fund limit is 20% of the total assessed benefits of the system, or $100,000, whichever is greater.
- Chapter 103E projects that require right-of-way (establishment, improvement, or repair by resloping of ditch side slopes) must have viewers appointed to determine associated benefits and damages. Partial system projects can create benefit inequities.

- ➢ As new private drainage is outlet into a public drainage system, the total benefits of the system and the relative benefits to land parcels and other infrastructure change. These benefits and associated assessments for repairs can only be updated via a redetermination of benefits and damages.

Minnesota Board of Water and Soil Resources (BWSR) – BWSR has increasingly become an important stakeholder in assisting with agricultural drainage issues. One of the categories in the last BWSR Clean Water Fund competitive grant RFP (FY2013) was:

- ***Clean Water Conservation Drainage Management Grants*** *~ the purpose of these grants is to facilitate the installation of conservation practices on drainage systems through planning and project implementation to improve water quality and local hydrologic conditions. However for FY2014 and on - the installation of conservation practices on drainage systems are still eligible, in the future however they simply will be part of a larger category of Clean Water Funds called BWSR Projects and Practices and not a separate grant program.*

Projects developing a multipurpose drainage management plan for a public drainage system must involve participation of the applicable MN Statutes Chapter 103E drainage authority. The proposed projects were to contain the following components:

- Outcomes and evaluation: proposed projects must be conducted on a reach scale, field scale or another suitable scale such that project outcomes can be evaluated; projects must include a project evaluation plan,

- Outreach: project must include an outreach component. Examples include: (1) hosting public meeting(s)/workshop(s) to discuss project objectives, benefits and results; (2) developing project fact sheets that are distributed to landowners/operators; and (3) hosting field day(s) to show and discuss project objectives and outcomes on-site, and

- Practice implementation: proposed conservation drainage management grant projects must have an on-the-ground implementation component.

Eligible Activities - Proposed activities were to be conducted on existing drainage systems (e.g. retrofits) or new pattern tile systems. Eligible activities included:

- Multipurpose Drainage Management Planning for public drainage systems:

  - ✓ Planning to develop subwatershed (drainage system) scale implementation plans for multipurpose drainage management on Chapter 103E drainage systems to protect and

improve water quality, together with adequate agricultural drainage, equitable flood protection, peak flow and erosion reduction, and wildlife habitat improvement. The subwatershed plan(s) should consider practices such as grassed waterways, water and sediment control basins, culvert sizing (surface drainage coefficient of 1 inch per day or less), side inlets, controlled subsurface drainage, nutrient management, denitrifying bioreactors, constructed or restored wetlands, and other applicable hydrology management and water quality practices on a subwatershed basis that reduce peak flows, nutrient transport and erosion potential.

- ✓ Targeting of BMPs to critical areas of the landscape and encouraging use of other federal, state or local BMP implementation funds.
- ✓ Marketing of multipurpose drainage management to landowners within the public drainage system subwatershed(s).

- NRCS Conservation Activity Plan (CAP) 130 Drainage Water Management – including controlled subsurface drainage, denitrifying bioreactor, and nutrient management components.
- NRCS Practice 587 Structure for Water Control – to enable controlled subsurface drainage, including stop log structures and / or Agri Drain Water Gates structures, or equal.
- NRCS Practice 747 Denitrifying Bioreactor – for existing or new tile drainage systems.
- NRCS Practice 590 Nutrient Management
- Open tile inlet replacement – replacement of existing open tile inlets with water quality improvement inlets (e.g. perforated riser or dense pattern tile) in accordance with NRCS Practice 606 Subsurface Drain, as applicable.
- Side inlet controls – for existing drainage ditches and / or streams to reduce erosion, provide temporary detention, and sediment settling (NRCS Practice 410 Grade Stabilization Structure, Side inlet).
- Buffers – limited to locations adjacent to side inlets or tile inlets,
- Other innovative conservation drainage practices…

Ineligible Activities included the following:

- ➢ Tile, except for dense pattern tile to replace existing open tile inlets,
- ➢ Ditching

- Culverts or bridges through roads, and
- Ambient water quality monitoring

G. Stormwater Management Assessment [partially recreated from www.pca.state.mn.us]

Why is Stormwater Management a Priority Concern and What are the Risks?

According the Minnesota Pollution Control Agency, the surest way to improve water quality in Minnesota is to better manage stormwater. Unmanaged stormwater can have devastating consequences on the quality of lakes, streams and rivers we enjoy. Stormwater often contains oil, chemicals, excess phosphorous, toxic metals, litter, and disease-causing organisms. In addition, stormwater frequently overwhelms streams and rivers, scours streambanks and river bottoms and hurts or eliminates fish and other aquatic organisms.

To better manage stormwater across the state, the MPCA administers the requirements of the federal Clean Water Act in addition to its own State Disposal System requirements. At the MPCA, the Stormwater Program includes three general stormwater permits: the Municipal Separate Storm Sewer Permit, the Construction Stormwater Permit and the Industrial Stormwater Permit. Each program administers a general permit (and in some cases, individual permits) that incorporates federal and state requirements for Minnesota stormwater management.

Stormwater management has evolved substantially over the past 20 years. Historically, the goal was to move water off the landscape quickly and reduce flooding concerns. Now we are focusing on keeping the raindrop where it falls and mimicking natural hydrology in order to minimize the amount of pollution reaching our lakes, rivers and streams, and to recharge our ground waters. In order to successfully do so, standards are needed to create consistency in design and performance. In response to this need, and advanced by a diverse group of partners, the Minnesota Legislature allocated funds to "develop performance standards, design standards or other tools to enable and promote the implementation of low impact development and other stormwater management techniques." (Minnesota Statutes 2009, section 115.03, subdivision 5c).

Minimal Impact Design Standards (MIDS) represents the next generation of stormwater management and contains three main elements that address current challenges:

- A higher clean water performance goal for new development and redevelopment that will provide enhanced protection for Minnesota's water resources.

- New modeling methods and credit calculations that will standardize the use of a range of "innovative" structural and nonstructural stormwater techniques.

- A credits system and ordinance package that will allow for increased flexibility and a streamlined approach to regulatory programs for developers and communities.

The development of Minimal Impact Design Standards is based on low impact development (LID) — an approach to storm water management that mimics a site's natural hydrology as the landscape is developed. Using the low impact development approach, storm water is managed on site and the rate and volume of predevelopment storm water reaching receiving waters is unchanged. The calculation of predevelopment hydrology is based on native soil and vegetation (Minnesota Statutes 2009, section 115.03, subdivision 5c).

What actions are needed to properly address Stormwater Management issues in Big Stone County and who are the Key Stakeholders?

The MPCA has put together a number of Best Management Practices (BMPs) guidelines for everyone from homeowners to industrial operations. Promoting them becomes an essential component of what Big Stone County can do to assist with minimizing stormwater pollution. The most effective solution to stormwater pollution is encouraging people to change the way they see and treat stormwater. The County should work with landowners in these areas to install BMPs to reduce runoff rates. The County should also consider developing a stormwater management ordinance, to set standards for the quality and quantity of runoff. Through land use controls, stormwater management plans should become increasingly important as a method to assist with minimizing pollution and managing temporary surface water.

Since the major stormwater management concerns are in the developed areas of the County, the various municipalities are the major stakeholders involved with properly addressing stormwater concerns (refer to the text box). The Big Stone County Environmental Office also plays a large role in reviewing stormwater management plans for all types of rural development. At the State level, the Minnesota Pollution Control Agency is the largest stakeholder dealing with stormwater issues, largely due to its oversight responsibility with the Clean Water Act. For more information on MPCA's stormwater rules, initiatives, and programs, please visit the following website: **www.pca.state.mn.us**

City of Ortonville

One of the largest stakeholder's in managing stormwater issues in Big Stone County is the City of Ortonville. With a population of approximately 1,915 people, combined with a sloping topography adjacent to Big Stone Lake, it is safe to say that addressing stormwater concerns in Ortonville is one of the County's largest water planning concerns. One key area in the community's Central Park. Marcy Stotesbery of the Central Park Restoration Committee (CPR) has reported the 70-year old storm water system near Central Park is not functioning properly and there are concerns regarding outflow that eventually reaches the lake. In addition, the City of Ortonville has expressed the need to develop an overall Stormwater Management Plan. Both of these projects should be implemented as high priority issues.

H. Wetlands and Water Storage/Retention Assessment

Why are wetlands and water storage/retention a priority concern?

Wetlands in Big Stone County serve many important functions, including: flood attenuation, wildlife habitat, improved water quality, recreational opportunities and aesthetics. Although many of the County's Type 3 or larger wetlands remain, most of the County's Type 1 and 2 wetlands have been drained for agricultural production. Much of the wetland draining in the County occurred in the 1960s and early 1970s, when the Federal government's farm policies compensated agricultural producers up to 90 cents on the dollar to install artificial drainage systems. As result of these Federal government payments and policies, an extensive artificial drainage system was installed in Big Stone County. Recent developments in USDA's "Swampbuster" guidelines have led to a recent rise in agricultural wetland mitigation.

There are numerous water quality and quantity concerns directly related to wetlands and/or water retention issues. Their main water quantity value stems from the increasingly important water management philosophy of allowing water to be absorbed into the ground where it falls. Not only does this avoid overloading ditch systems and streams, thereby reducing erosion and flooding issues, they also provide an extremely value source of groundwater recharge. From a water quality perspective, wetlands provide a natural basin for stormwater management, acting as highly effective filters and providing erosion control. The vegetation found in wetlands help to remove phosphorous. This helps to minimize the unwanted growth of aquatic weeds and algae, which end up using the oxygen that plants and animals need to survive.

Retaining water in the upland will reduce the quantity and improve the quality of the water entering Big Stone County waterbodies. Water storage and retention practices will also help to reduce the quantity of water during peak flows, which can prevent damage to a waterbodies banks. In addition, residents and landowners located in floodplain zones would benefit from reduced peak flood elevations which can help to prevent damage to their property from overland flooding.

Wetlands Conservation Act

In 1991, the Minnesota Legislature passed Chapter 354, the Wetlands Conservation Act (WCA), which created a statewide "no-net loss" policy for wetlands (refer to Minnesota Rules 8420). The law requires anyone proposing to drain or fill a wetland to first try to avoid disturbing the wetland; second, try to minimize any impact on the wetland; and, finally, replace any lost wetland acres, functions and values. Certain wetland activities are exempt from the act, allowing projects with minimal impact or projects located on land where certain pre-established land uses are present to

proceed without regulation. A WCA exemption means the wetland area is exempt from the replacement provisions of WCA. It does not make it "free from regulation".

The WCA recognizes a number of wetland benefits deemed important, including:

- Water quality, including filtering pollutants out of surface water and groundwater, using nutrients that would otherwise pollute public waters, trapping sediments, protecting shoreline, and recharging groundwater supplies;
- Floodwater and stormwater retention, including reducing the potential for flooding in the watershed;
- Public recreation and education, including hunting and fishing areas, wildlife viewing areas, and nature areas;
- Commercial benefits, including wild rice and cranberry growing areas and aquaculture areas;
- Fish and wildlife benefits; and
- Low-flow augmentation during times of drought.

The Big Stone Environmental Services office administers WCA locally. The Minnesota Board of Water and Soil Resources (BWSR) directs local governmental units statewide, provides technical assistance for WCA and oversight of the banking program.

What actions are needed to properly address Wetlands/Water Retention issues in Big Stone County?

The West Branch Twelve Mile subwatershed in the Bois de Sioux Watershed experiences frequent flooding throughout the subwatershed. Spring flooding is almost an annual occurrence. Damages associated with flooding are to public infrastructure, personal property, cropland and public resources (fisheries, wildlife, soils and water quality). This subwatershed has been identified as a major contributor to downstream flooding.

The moraine area is characterized by lakes and depressional wetland basins. Many of them are landlocked basins, or were prior to construction of public and private ditch systems. Flood flows in the moraine area are relatively slow due to storage on lake and wetland areas. The City of Graceville, located on the banks of East Toqua Lake, is subject to flooding due to occasionally high lake levels. Storage is the preferred solution to flooding in this part of the District.

Opportunities exist to restore many of the previously drained basins which would provide natural resource benefits along with flood control. One such project is under way with the planned restoration of Moonshine Lake which had been drained by Big Stone County Ditch 8.

In contrast, the upper lake plain area is characterized by relatively steep sloping lands. Rapid runoff from steep slopes combined with the fan shape of the watershed lead to flash flood conditions in the area around and including the City of Dumont. Due to the flooding problems downstream, storage is the preferred solution in this area also. Reservoirs will have to be built through the construction of dikes, since there are few natural storage areas.

Bois de Sioux Flood Damage Reduction Action Items:

- Pursue projects to create an additional 30,000 acre-feet of flood storage within the West Branch Twelve Mile subwatershed.
- Implement a project to address the "county line dispute."
- Work with the Minnesota Department of Transportation (MnDOT) to eliminate the road washout and inundation problems with Highway 75.
- Implement the Moonshine Lake project.

The Minnesota Department of Agriculture (MDA) summaries the issues best (please refer to the MDA's Priority Concerns Input Form letter submitted for Big Stone County in Appendix B and corresponding MDA website): Properly locating wetlands and water storage or retention projects can be a strategic component of overall efforts to manage nutrients, sediments and water quantity issues.

A Technical and Scientific Advisory Committee for the Red River Water Management Board has developed a number of scientific papers on a variety of issues related to flood damage reduction. Specifically, counties should consider:

- Conducting/updating culvert inventories in conjunction with identifying where water retention projects can be constructed utilizing LIDAR and GIS technologies.
- Identifying projects where tile water from public drainage systems can potentially be used to augment long-term water levels in wetland restorations for water retention purposes.
- Working with local farmers on agricultural wetland mitigation banking initiatives and include agricultural sectors on overall wetland planning efforts.

- Identify areas where constructed wetlands can be located for treating tile drainage water" (http://www.mda.state.mn.us/protecting/waterprotection/waterplanning/agdrainage.aspx).

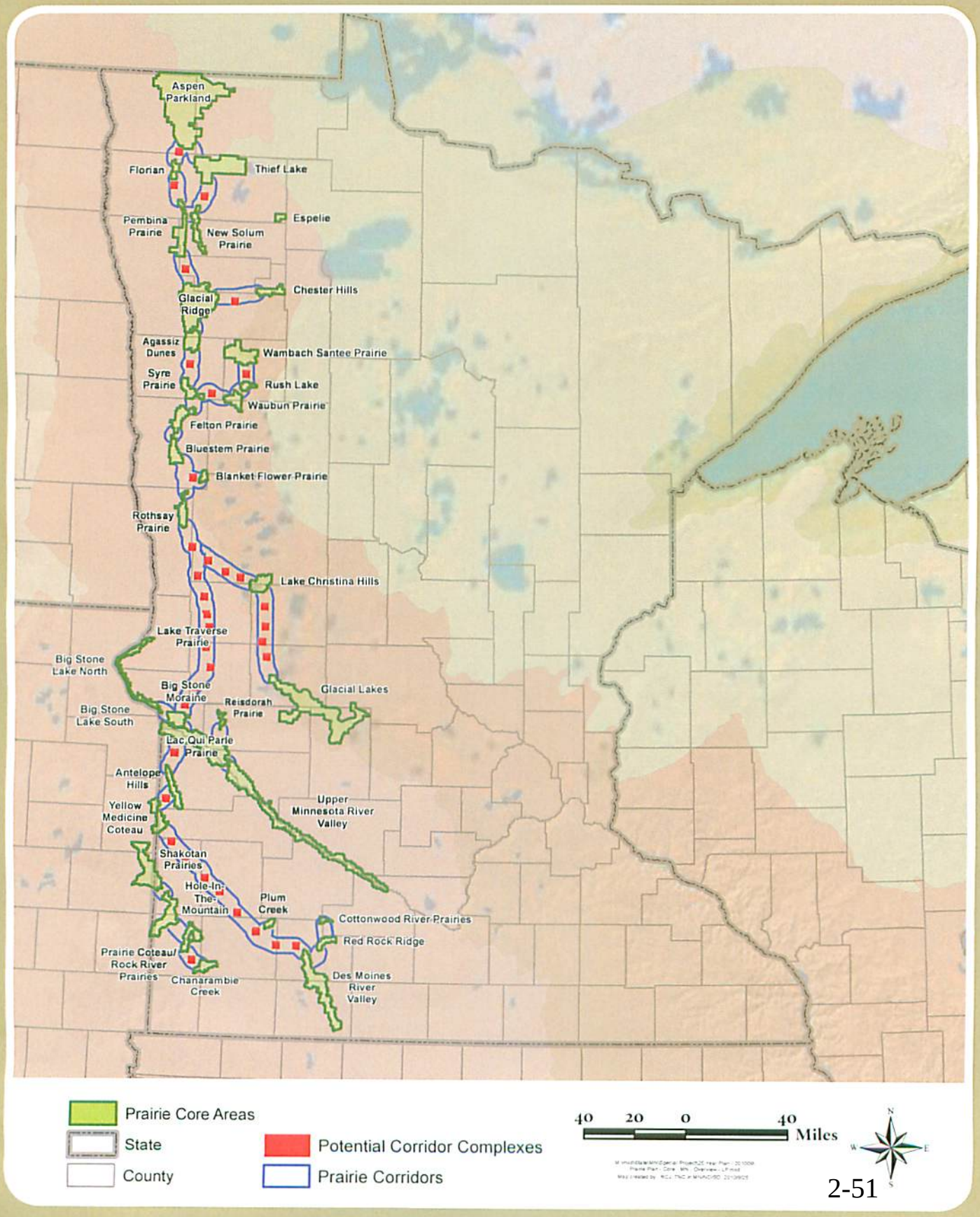
Today, due in part to regulations such as the WCA, the loss of wetlands has been greatly reduced. The State's Protected Waters Inventory, the Federal Swampbuster Act, and Section 404 of the Clean Water Act also largely contribute to protecting wetland resources. In addition, conservation programs, such as the Wetland Reserve Program (WRP) and Reinvest in Minnesota Program (RIM), provide landowners an opportunity to restore previously drained wetlands along with preserving existing wetlands. These programs, and others like them, should continue to be promoted to landowners within Big Stone County. Wetland restorations should also be targeted in conjunction with drainage ditch system improvements to assist with flood mitigation, water retention, and stormwater management.

Finally, the Minnesota Prairie Conservation Plan (2011) calls for three approaches to conservation in the Prairie Region of the State, which includes Big Stone County. First, core areas with a high concentration of native prairie, other grasslands, wetlands, and shallow lakes were identified (refer to Map 2K). Within these core areas, partners will work to ensure a minimum of 40% grassland and 20% wetland with the remainder in cropland or other uses. Second, habitat corridors connecting core areas were designed that include grassland/wetland complexes nine square miles in size at about six mile intervals along and within the corridors. Within the corridor complexes a goal of 40% grassland and 20% wetland was set and for the remainder of the corridors, 10% of each legal land section is to be maintained in permanent perennial cover. Third, in the remainder of the Prairie Region a goal to maintain 10% of each Land Type Association in perennial native vegetation was established. The existing wildlife management area plan, pheasant plan, duck plan and other resource plans provided guidance in setting goals for protection, restoration and enhancement in each conservation approach. These earlier plans set a habitat goal for the Prairie Region of protecting all 204,000 acres of native prairie while protecting and restoring a total of 2.0 million acres of grassland and savanna along with 1.3 million acres of wetlands and shallow lakes.

MDA submitted the following comments during the final State review period (contained in Appendix C):

> Page VII of the document states, "Participating with implementing the MN Prairie Plan goals/objective to have 40% grassland and 20% wetland coverage in key corridors." There are also references to the MN Prairie Plan on pages 2-50 and 2-51. **The MDA encourages Big Stone County to further review where prime soils or important agricultural soils are located in relation to where potential new grassland and wetland areas would be located in key corridors.**
>
> **The MDA is not opposed to grassland/wetland restoration or easement programs that set land aside as long as the lands are strategically prioritized and targeted.** However, the MDA encourages Big Stone County to utilize prime soils information that is available via the USDA Web Soil Survey (WSS). A general soils map is provided on Page 2-37 and an erosion prone soils map is provided on Page 2-39 of the draft plan.

Prairie Core Areas



I. Flooding Assessment

Why is Flooding a Priority Concern? A flood is defined as an overflowing of water onto an area of land that is normally dry. For floodplain management purposes, the Federal Emergency Management Agency uses the following definition of "100-year flood." The term "100-year flood" is misleading - it is not a flood that will occur once every 100 years; rather, it is the flood elevation that has a one percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time. One-hundred year floodplains have been identified, mapped and used for further analysis using the county's Geographic Information System (GIS) and the map data provided by FEMA is dated March 16, 2006. Floods generally occur from natural causes, usually weather-related, such as a sudden snowmelt, often in conjunction with a wet or rainy spring or with sudden and very heavy rainfalls.

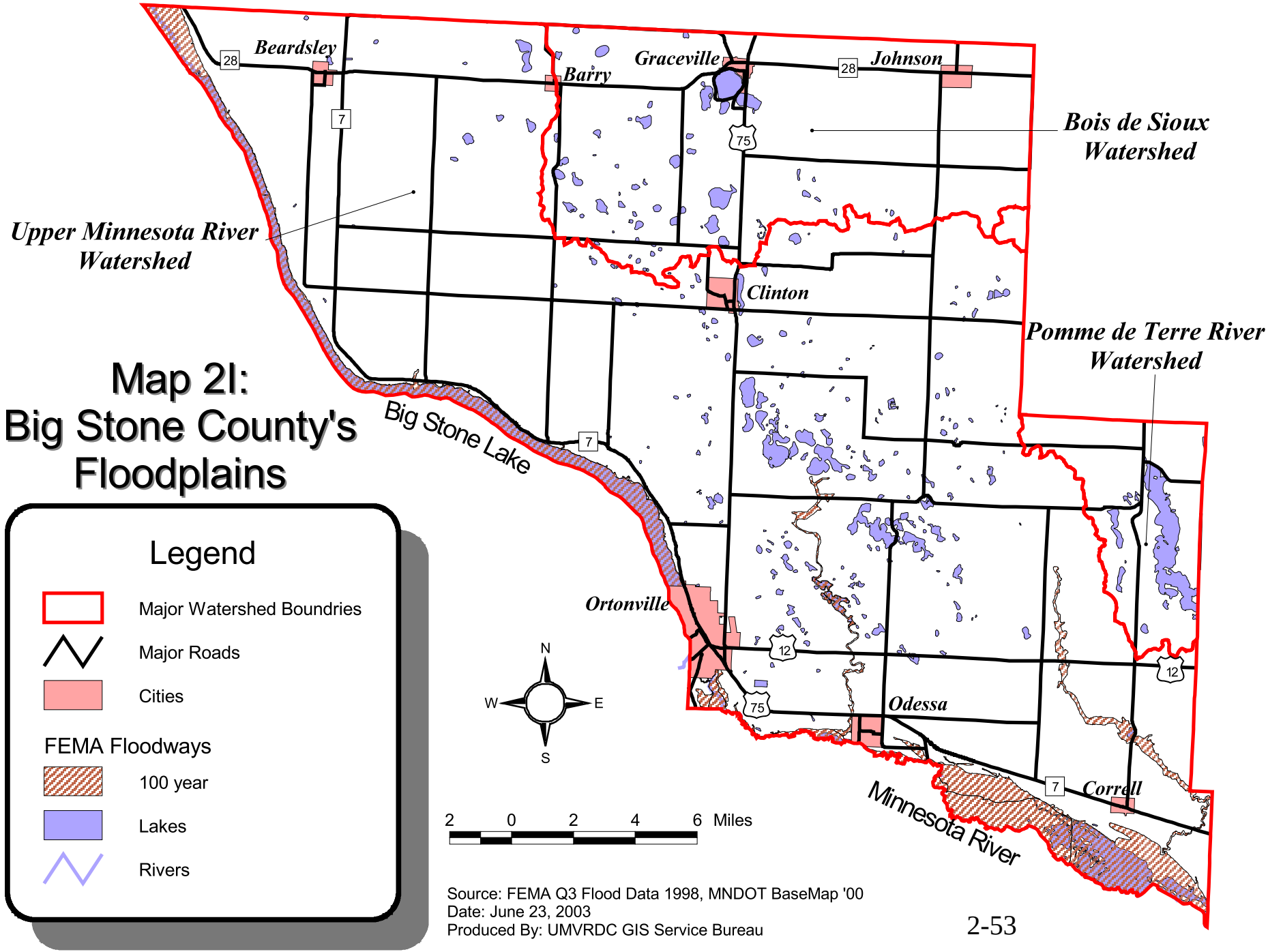
History of Flooding in Big Stone County

Big Stone County's Floodplain is displayed on Map 2I (numbered in the previous water plan). The County has recently experienced two major flooding events in 1997 and 2001. Both flooding events are summarized below:

1997 - 100-year Flood

As temperatures began to warm up towards the end of March, the near record to record snow pack across Big Stone and Traverse Counties began to melt and runoff, filling up ditches, lakes, creeks, streams, and low-lying areas. The extensive amount of water, inundated many county and township roads as well as some highways. Many sections on the roads were broken up or washed out. Some culverts were damaged or blown out and some bridges were damaged or washed out by ice chunks and high water flows. Thus, road closures occurred with rerouting taking place for school buses, mail carriers, farmers, ranchers, etc. Many acres of farmland and pastureland were underwater. Due to the high ground water level, some homes received water in their basements.

Late March flooding from the meltdown of the near record to record snow pack continued throughout April. Most of the snowmelt across Big Stone and Traverse Counties occurred in early April. Ditches, lakes, creeks, streams, and low-lying areas continued to rise and flood into April. Many sections of county and township roads as well as some highways were inundated, broken up, or washed out. Many culverts were damaged or blown out and some bridges were damaged or washed out by ice chunks and high water flows. Thus, road closures were extensive with rerouting taking place for almost everyone, especially school buses, mail carriers, farmers, ranchers, etc. Some of the roads were closed up to several weeks. Countless acres of farmland and pastureland were under water. As a result, many of the crops were not planted or there were



Source: FEMA Q3 Flood Data 1998, MNDOT BaseMap '00
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

significant delays in planting. High ground water resulted in water in many basements. Some farms were also surrounded by water and were inaccessible, leaving some people and livestock stranded. In early April, President Clinton declared Big Stone and Traverse Counties a federal disaster area. The total damage estimate for the flooding was $5 million.

Near record to record snowmelt runoff combined with heavy rains of 1.5 to 2.5 inches on April 5th caused the Big Stone Lake to rise to a record level of 973.45 feet above sea level, two feet above the old record in 1952. The rising lake threatened to breech the Big Stone Dam. As a result, extensive evacuations took place downstream from the Whetstone River and the Big Stone Dam. If the earthen dam would break, water from the lake and river would travel down the Minnesota River flooding homes and farms in low areas. Residents were urged to move to higher ground. Hundreds of people worked around the clock filling sandbags to fortify the dam. All of the residents of the town of Odessa were evacuated on the 6th. People on the peninsula in Ortonville were ordered to move out on the 5th and traffic on Highway 12 was stopped. As Big Stone Lake rose to a record level, many homes, resorts, and businesses in parts of Ortonville and along the lake were flooded and significantly damaged. This was the worst flooding for this area in history.

April 7, 2001

Heavy rains of one to two and one-half inches combined with snowmelt runoff brought flooding to parts of Traverse and Big Stone Counties. Several roads were flooded with some receiving damage.

Whetstone Diversion Project…in March 2011, the Upper Minnesota River Watershed District petitioned the Army Corps of Engineers to conduct a reconnaissance study of the Whetstone River watershed, with the ultimate goal of reducing future flood damages.

The issues that arose from the 1997 and 2001 flood events include the following highlights:

Entire County

- Roads damaged from hauling of sand, etc.
- Flooded county and township roads, bridges and culverts.
- Flooded county ditches.
- High groundwater all over.
- Flooding all over county – streams, creeks and wetlands as well as the major rivers and lakes.
- Many roads closed.
- Lives at risk, especially in 1997.

- In 1997 only, septic tanks backed up into homes (many rural septic systems have been updated since).
- Eighty-two cabins and/or residences in the county were flooded. This does not include residences within city limits.
- Every road in Big Stone County had some flooding. A portion of every road was closed because of the flooding.
- In 2001 flooding was much less because of weather conditions. The lake was four feet lower.

Townships

- High water over township road in Otrey Township. The road has been under water for three years but was not a mail or bus route. Other roads often flood during large rain events.
- Slough – erosion - gravel road is eroding away. Animals (muskrats) are causing erosion and rip-rap is needed for river banks. Safety issues arise as roads are continually used by public.

Clinton

- Slough within community, no natural runoff – which led to flooded homes:
- Currently a pump system is used, but it is a slow process.
- A solution would be to put in a stand pipe in storm sewers.

Graceville

- Northwest corner of Graceville flooded in 1997 and 2001.
- Since the 2001 floods, ditches and dikes have increased in capacity to hold floodwaters by four times. Graceville should be safe from future flood events.

Ortonville

- One house flooded by creek in 1997.
- Overflow for dike along Big Stone Lake.
- Eleven homes flooded in 1997 and twelve in 2001. All these homes are located on the Peninsula. Another home flooded in 2001 due to ice buildup. After the 1997 flood, these homes raised main floors or built homes higher. The residences near the flood area do not

have basements and all residents had an opportunity to be bought out, but not all owners choose to do so.

- Other repairs on the Peninsula included replacing water mains and bad sewer mains. The road was redone above these utilities to protect in future flood events. The lift station was also replaced and raised from the original location. The city was only able to do one-half of the bad sewer main; they would like to finish the three-fourths mile.

Plans and Programs for Flooding

- *County Flood Area Map and Controls.* The current county official Flood Insurance Rate Map (FIRM) identifies the 100-year flood areas. The county zoning ordinance controls the permitted land uses in these areas, what can be built and how.
- *Ortonville and Graceville Flood Map and Controls.* Both Ortonville and Graceville have identified 100-year flood areas on the official FIRM maps and adopted in its zoning ordinance appropriate zoning and land use controls governing these areas.
- *Response Plan.* A response plan to a flood emergency has been developed and local resources and personnel have been committed to it.

Program Gaps or Deficiencies for Flooding

- The Peninsula along Big Stone Lake is subject to large flood events.
- Ortonville would like to finish the three-fourths mile of bad sewer and water lines on the Peninsula.
- Township roads left under water after the 1993 and 1997 floods need to be raised.
- Township roads that receive repeated flooding need to be rip-rapped. Lake Toqua near Graceville would also benefit from having its shoreline restored.

Source: *Big Stone County All-Hazard Mitigation Plan*

Section Three:
Groundwater Quality & Quantity

Why is Groundwater a Priority Concern?

Groundwater quality issues are at the forefront of environmental protection efforts, primarily due to groundwater being the main source of people's drinking water. The numerous multiple uses of groundwater, however, also contributes to groundwater quantity becoming an increasingly important resource concern. The farming community, for example, is dependent upon having adequate access to groundwater in order to produce high yield crops. Numerous business and industries are also dependent upon having adequate groundwater supplies. Poor groundwater quality and quantity supplies directly affect people's health and ability to generate income.

There is a vast amount of information available on both groundwater quality and quantity for Big Stone County. There are numerous stakeholders who are involved with groundwater issues, including the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Minnesota Department of Health, and the Minnesota Department of Agriculture. Their major roles regarding groundwater are explained and their groundwater data is summarized. The following groundwater information is separated into assessments for groundwater quality and groundwater quantity. Much of the information presented, however, applies to both assessments.

Did you know…?

- More than 70% of Minnesotans rely on groundwater for drinking water.
- As of 1990, an estimated 483,000 Minnesota residences used private wells to obtain water for their homes.
- As of 1990, there were 2,388 active community public water supply wells in Minnesota.
- In 1995, an estimated 700 million gallons of groundwater per day were withdrawn from Minnesota's aquifers (550 million gallons per day were permitted).
- As of 1989, contaminated groundwater cost 17 Minnesota cities and 18 Minnesota companies a total of $67,072,000.
- As of 1994, there were an estimated 700,000 to 1.2 million unsealed, abandoned wells in Minnesota that could potentially serve as contamination pathways to harm Minnesota groundwater.
- As of May 1998, 100,000 unused wells have been sealed to protect Minnesota groundwater.

Source:
http://www.pca.state.mn.us/index.php/water/water-types-and-programs/groundwater/groundwater-basics/about-groundwater.html

J. Groundwater Quality Assessment

Minnesota Pollution Control Agency

In 1989, the Minnesota Pollution Control Agency (MPCA) received a grant from the Legislative Commission on Minnesota Resources (LCMR) to redesign Minnesota's ambient groundwater monitoring program. The resulting program was called the Groundwater Monitoring and Assessment Program (GWMAP). GWMAP's primary objective was to meet statewide and local groundwater quality information needs. For over a decade the program endeavored to answer five basic questions about Minnesota groundwater quality:

1. What are background concentrations of chemicals in Minnesota's groundwater?
2. Where is the groundwater impacted by human activities?
3. What is the nature and severity of the impact?
4. Why is the groundwater impacted?
5. What can be done to minimize groundwater impacts?

Three components were created to facilitate answering these questions. The first component was a statewide baseline assessment of water quality in Minnesota's principal aquifers, conducted from 1990-1996. The second component involved conducting groundwater trend studies. The staff of GWMAP conducted a series of discussions and determined that changes in land use could be linked to trends in water quality. Consequently, GWMAP designed and conducted a variety of land use studies between 1996 and 2001. Groundwater studies were conducted throughout the State to evaluate impacts from different land use management strategies. The third and final component of GWMAP was the development of regional cooperatives. Between 1992 and 2001, GWMAP staff provided groundwater data and information to a variety of people and groups, as well as technical support to local groups conducting groundwater monitoring. The GWMAP program was discontinued in the summer of 2001. Although the program was discontinued, the results are still available by visiting the following website:

http://www.pca.state.mn.us/index.php/water/water-types-and-programs/groundwater/groundwater-monitoring-and-assessment/index.html

Big Stone County's GWMAP Results

In 1993 and 1994, the MPCA's Ground Water Monitoring and Assessment Program (GWMAP) sampled 132 primarily domestic wells in MPCA Region 4, which includes Big Stone County. ***In summary, concentrations of most chemicals were greater in the surficial aquifers of Region 4 than in similar aquifers statewide.*** Nitrate was the primary chemical of concern in these aquifers. The major factors which increase the likelihood of having high nitrate concentrations are: agriculture, poor well construction (particularly large diameter wells), fractured bedrock near the land surface, groundwater recharge, and screening wells located near the top of aquifers. For more information on GWMAP results for Big Stone County, visit the following link which takes you to the Baseline Results of Water Quality of Minnesota's Principal Aquifers for Region 4:

http://www.pca.state.mn.us/index.php/view-document.html?gid=6294

Minnesota Department of Agriculture

In 1989 the Minnesota Comprehensive Ground Water Protection Act (Minnesota Statutes 103H) expanded ground water protection responsibilities of the MDA, including specific direction regarding detection and trend monitoring following detection of agricultural chemicals. The Ground Water Protection Act mandated development of Best Management Practices (BMPs) for chemicals commonly found in ground water. Monitoring of the State's groundwater was to serve as the primary support to management decisions within that Plan. As a result, the MDA currently provides technical information and financial assistance to implement specific water-quality BMPs.

MDA Nitrate Water Testing Program - In 1993, the Minnesota Department of Agriculture developed a "walk-in" style of water testing clinics with the goal of increasing public awareness of nitrates in rural drinking and livestock water supplies. Results from the testing not only educate the participants, but also provide information on the occurrence of nitrate 'hot spots' across the State. This information is essential to help justify the significance of nitrate monitoring networks and programs. The clinic concept revolves around a number of simple principles: local participation is critical; testing is free to the public with immediate results; the overall program needs to be inexpensive; a non-regulatory atmosphere is important and well owners may remain anonymous; and the staff's most important goal is to provide the required technical assistance across a diverse audience of well owners. Since the beginning of the program, the Nitrate Water Testing Program has provided testing services and educational outreach to over 50,000 well owners. The concept has proven adaptable for county fairs, field day events, public school programs and 'stand alone' events. Past sponsors have been the Soil and Water Conservation Districts, U of M Extension Service, county health or environmental health services, county water planning, public schools, lake associations and farm organizations.

Big Stone County's 2011 Results (2012 summary results not yet available at time of draft)

In 2011, over 2000 samples were analyzed from 41 counties throughout Minnesota, however, none took place in Big Stone County (see Map 2F). Table 2G shows the results of the 2011 Nitrate Testing Clinics for some of the counties near Big Stone County. Notice that statewide only 6.6% of tested wells had concentrations of nitrates over 10mg/L. The results were much higher for nearby counties, including Chippewa County (10%) and Lac qui Parle County (11.3%). For more information on MDA's Nitrate Testing Clinics, visit the following MDA website link:

http://www.mda.state.mn.us/protecting/waterprotection/nitrate.aspx

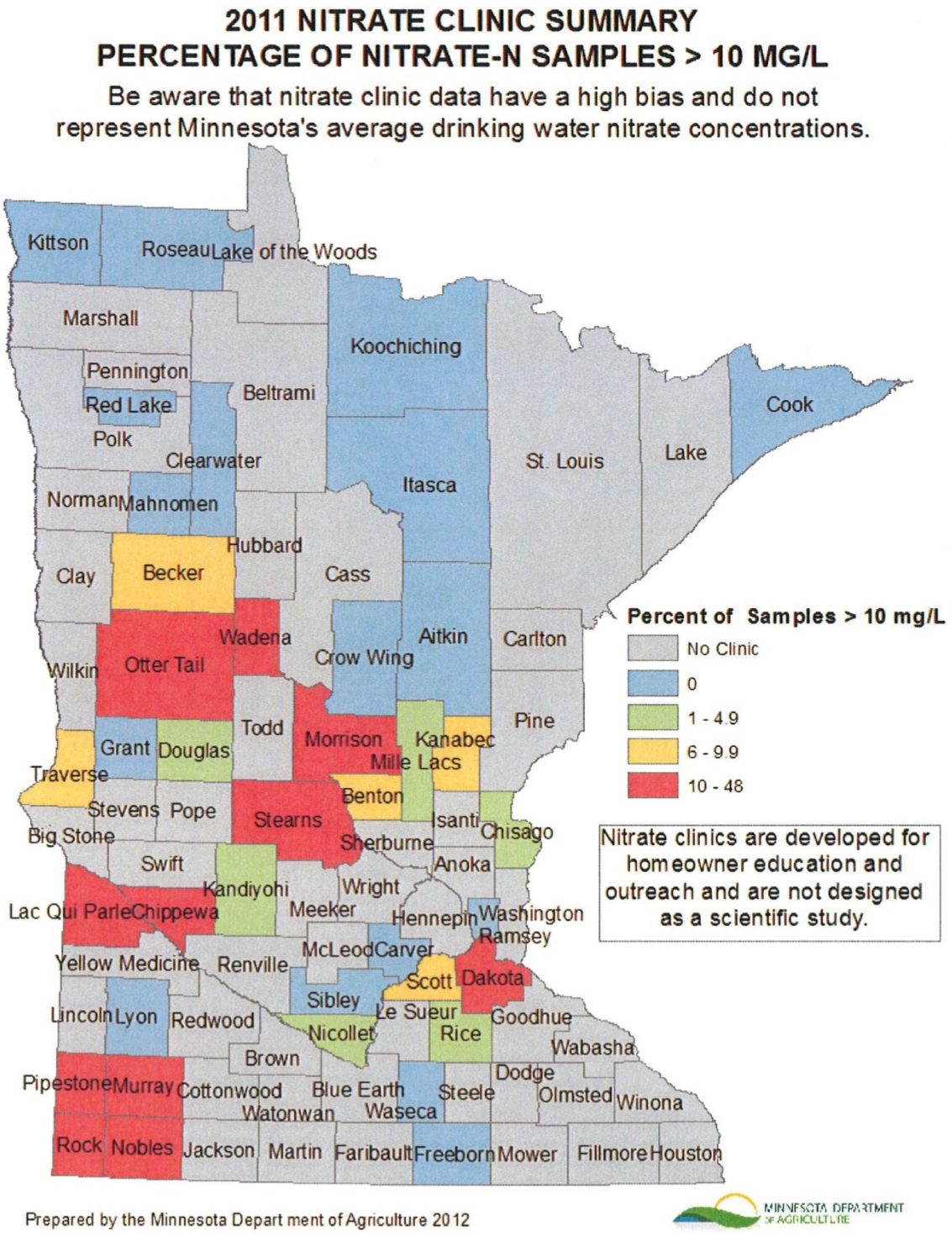
Table 2G:
2011 MDA Nitrate Clinics Testing Results for Nearby Counties

County	Number of Samples	Minimum	Maximum	Median	Percentage of Nitrate Samples Over 10 mg/L
Chippewa	10	0	11.7	1.1	10.0
Grant	41	0	6.7	0.1	0.0
Kandiyohi	42	0	18.0	0.0	4.8
Lac qui Parle	53	0	13.7	0.0	11.3
Traverse	31	0	11.5	1.0	6.5
Overall	**2093**	**0.00**	**72**	**0.7**	**6.6**

MDA Pesticide Monitoring/Management Regions

In 2004 to facilitate water quality monitoring, pesticide management and BMP promotion, MDA, with assistance of the University of Minnesota, divided the state into 10 pesticide monitoring/management regions (PMRs). Big Stone County is in PMR 6, along with Stevens, Chippewa, Swift, Lac qui Parle, and Yellow Medicine counties.

Map 2F:
Statewide Map of Nitrate Clinics



***Source*: MDA's Nitrate Testing Clinic Program: 2011 Results Summary**

The most sensitive ground water conditions in PMR 6 are alluvial river valley deposits of sand and gravel. A large outwash plain in the vicinity of Appleton is also of concern. The river valley deposits tend to be narrow and relatively thin with sandy surface soils and are highly valued where they exist. These areas display rapid infiltration of water from the soil surface to underlying ground water and contain little capacity to limit the downward movement of dissolved or suspended chemicals. Agricultural chemicals have been detected in these areas in reconnaissance sampling previously completed. PMR 6 currently contains 9 monitoring wells. Irrigated fields of corn and soybeans are prevalent in the areas of interest in PMR 6. Soils in the area typically have higher pH and low organic matter. Animal agriculture is increasing in the area although it is somewhat limited by the availability of adequate supplies of water. For more information on MDA's pesticide monitoring, visit the following MDA website:

http://www.mda.state.mn.us/chemicals/pesticides/maace.aspx

MDA's Source Water Protection Web Mapping Application

The MDA has an online source water protection mapping application that was developed in cooperation between the Minnesota Department of Health (MDH) and intended for use as a visual aid to better understand where source water protection areas are located throughout Minnesota. The web map provides basic information to the general public of where their drinking water supply comes from, and probability to which it may be impacted by potential contamination sources. The web application identifies completed Wellhead Protection Areas (WHPA), Drinking Water Supply Management Areas (DWSMA), and Drinking Water Supply Management Area (DWSMA) vulnerability. Each of these categories is briefly described below. The interactive website can be viewed at the following address:

http://gis.mda.state.mn.us/source/

Wellhead Protection Areas

The fundamental goal of wellhead protection (WHP) is to prevent contaminants from entering public wells. To accomplish this goal, public well owners must first determine where the water supplying their well(s) is coming from this area is called the Wellhead Protection Area (WHPA). It can also be thought of as the recharge area to the public well and is ultimately the area to be managed by the WHP Plan. The process used to determine the WHPA boundaries is called delineation. An accurate WHPA delineation is critical to the overall success of WHP plans.

The WHP rule provides the framework and a minimum set of criteria to be considered for delineating WHPAs. These criteria are the technical factors which affect the size, shape, orientation, and location of the WHPA boundaries. There are five delineation criteria: 1) Time-of-Travel (TOT), 2) Aquifer Transmissivity, 3) Flow Boundaries, 4) Daily Volume of Water Pumped, and 5) Groundwater Flow. The Minnesota Department of Health (MDH) assigns staff in their Source Water Protection Unit to assist with preparing and implementing wellhead protection plans.

Drinking Water Supply Management Areas

The Drinking Water Supply Management Area (DWSMA) is the geographic area, including the Wellhead Protection Area (WHPA), which is to be protected and managed by the WHP Plan. Water suppliers use geographic landmarks, such as roads and property lines, to map the boundaries of the area so that it is identifiable to the general public.

Drinking Water Supply Management Area DWSMA Vulnerability

DWSMA Vulnerability identifies wells that should receive priority for source water protection efforts. Vulnerability assessments must address the following three components:

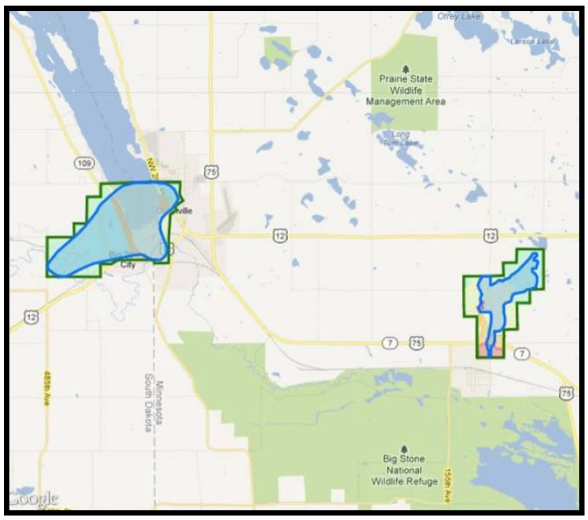
1. Geologic Sensitivity
2. Well Construction, Maintenance, and Use, and
3. Water Chemistry and Isotopic Composition (age dating).

The Minnesota Department of Health (MDH) uses a vulnerability rating method in which points are assigned for conditions that represent a perceived risk to a well. Supply wells classified as *non-vulnerable* are required to manage contaminant risks that may enter the aquifer through other wells. Wells classified as *moderately vulnerable* must manage point source contaminant risks through other wells along with identifying underground hazardous chemical storage tanks. Wells classified *vulnerable* must manage all point source contamination risks and address land use activities that threaten the aquifer.

Big Stone County's Online Source Water Protection Areas

The MDA's online source water protection mapping application reveals two Source Water Protections Areas in Big Stone County for the cities of Ortonville and Odessa (refer to Figure 2I). The main information for each area is briefly summarized.

Figure 2I: Source Water Protection Areas
For the Cities of Ortonville and Odessa



- **City of Ortonville Source Water Protection Areas –** The City of Ortonville has a Wellhead Protection Area of approximately 1,476 acres that was delineated in 2007. It is estimated that it takes approximately 10 years for surface water to reach the aquifer. In addition, the City of Ortonville has a Drinking Water Supply Management Area that is approximately 1,917 acres. Of this, approximately 74 acres are classified as "High Vulnerability" to potential pollution, with an additional 728 acres classified with "Moderate Vulnerability." According to Minnesota State Statutes, all wells that are classified as high vulnerability must manage all point source contamination risks and address land use activities that threaten the aquifer. The moderate vulnerable wells must manage point source contaminant risks through other wells along with identifying underground hazardous chemical storage tanks.

- **City of Odessa Source Water Protection Areas -** The City of Odessa has a Wellhead Protection Area of approximately 448 acres that was delineated in 2007. It is estimated that it takes approximately 10 years for surface water to reach the aquifer. In addition, the City of Odessa has a Drinking Water Supply Management Area that is approximately 1,082 acres. Of this, approximately 72 acres are classified as "Very High Vulnerability," 90 acres are classified as "High Vulnerability," and 520 acres are classified as "Moderate Vulnerability" to potential pollution.

Minnesota Department of Health's Source Water Assessments

A Source Water Assessment (SWA) is a document - produced by the Minnesota Department of Health (MDH), provided to the public water system, and made available to the public - which summarizes a variety of information regarding the water sources used by a public water system. There are 17 areas in Big Stone County with SWAs (listed in Table 2H). SWAs normally include the following information:

1. A description of the drinking water source(s) used by the water system (i.e. your well or wells) and the area that contributes water to the source(s). This will include a map showing the location of the water source(s).

2. A determination of the "susceptibility" of your drinking water source to contamination. Susceptibility describes how likely it is that a water source may become contaminated. For wells, susceptibility is based on well construction, the type of aquifer that supplies the well(s) and previous water sampling results.

3. Drinking water contaminants of concern to anyone using the water source. For wells, this will be based on any detection of regulated contaminants during previous water sampling.

Many of the sites identified in Table 2H are listed as having "potential" known contaminates of concern. This simply means that nearly potential pollutions sources are present in the inner wellhead management zone, such as an underground tank, sewer system, or similar potential pollution source. If "unknown" potential contaminants are listed, this simply means an inventory has not been completed.

Table 2H: Big Stone County's
Source Water Assessments

Public Water Supply Name	Assessment ID	Known Contaminants of Concern?	Nearest City
Odessa	1060007	Potential	Odessa
Beardsley	1060002	Potential	Beardsley
Graceville Golf Club	5060005	None	Graceville
Eidskog Lutheran Church	5060028	Potential	Ortonville
Ortonville	1060008	Potential	Ortonville
Big Stone National Wildlife Refuge	5060030	Potential	Odessa
Club 7-75	5060013	Unknown	Odessa
Johnson	1060006	None	Johnson
Toqua County Park	5060008	None	Graceville
Clinton	1060003	Potential	Clinton
Rustling Elms Resort	5060014	Unknown	Ortonville
Big Stone Lake State Park	5060021	Potential	Ortonville
Correll	1060004	None	Correll
Graceville	1060005	None	Graceville
Lismore Colony	1060010	None	Clinton
Big Stone Hutterite	1060009	None	Graceville
Lakeshore RV Park	5060024	None	Ortonville

Source: **http://www.health.state.mn.us/divs/eh/water/swp/swa/swainfo/pdwgetpws.cfm**

Minnesota Department of Health

The Minnesota Department of Health's (MDH) programs and monitoring activities have been mentioned throughout the Water Plan, but especially in the groundwater assessment section. This is because drinking water quality, and all of the subtopics that can be categorized under that, is the MDH's main responsibility. Specifically, MDH is involved with the following water quality initiatives:

1. Maintaining Drinking Water Quality Data
2. Drinking Water Protection: Public Water Supplies
3. Drinking Water: Private Wells (Well Management Program)
4. Clean Water Funding Activities
5. County Well Index (online database)
6. Licensed/Registered Well Contractor Directory
7. Well Sealing/Unused Wells
8. Well Disinfection for Private Wells

In addition, the MDH produces an Annual Drinking Water Report, which is a summary of drinking water protection activities in Minnesota. According to the 2011 report (the most recent one online), fifteen community systems statewide were tested positive for bacteriological contamination (none in Big Stone County). Standard procedures were followed in all of these cases (i.e., disinfected, flushed, and retested) to ensure that any contamination problems had been eliminated. All of the residents served by the affected systems were informed of the situation. MDH's website is full of a variety of water quality information and Best Management Practices. For more information on the Annual Drinking Water Report, visit the following website:

http://www.health.state.mn.us/index.html

Did you know…?

Unused wells that are not properly sealed can be a source of groundwater contamination, potentially affecting nearby drinking water wells. Groundwater is the main source of drinking water for three out of every four Minnesotans.

The Minnesota Department of Health (MDH) received $500,000 from the Clean Water Fund for the 2012-2013 fiscal years (FY). This means $250,000 for each year to use for sealing unused wells. This funding requires a 50 percent match from non-state sources. Well owners are paid up to half the cost of sealing unused wells.

The first $250,000 was passed through to the Minnesota Board of Water and Soil Resources (BWSR) as part of their 2012 Clean Water Fund Competitive Grants. BWSR awarded nine grants to local governmental units to provide funding to well owners to seal unused private wells.

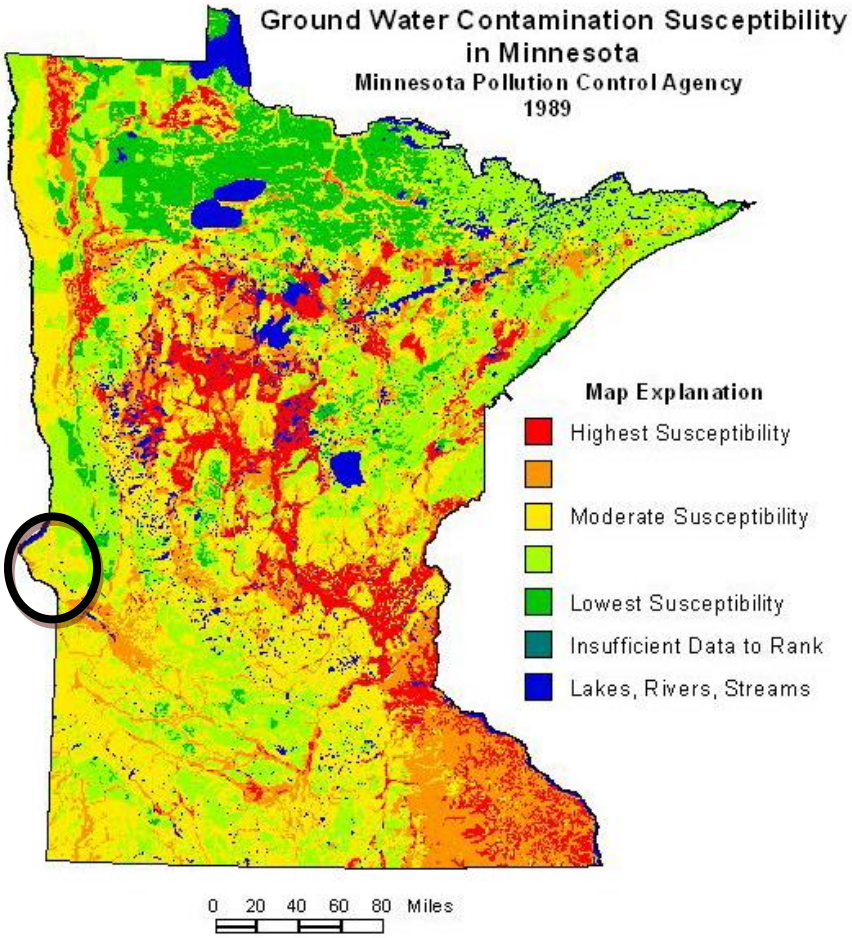
The second $250,000 was awarded by MDH to seal 29 unused public water-supply wells for 19 different public water suppliers.

Minnesota Pollution Control Agency

In 1989, the Minnesota Pollution Control Agency published a statewide evaluation of ground water contamination susceptibility. The assessment, called "Groundwater Contamination Susceptibility in Minnesota, used four parameters (aquifer materials, recharge potential, soil materials, and vadose zone materials) to delineate areas of relative susceptibility to ground water contamination. The assessment method used Geographic Information System (GIS) technology.

Map 2G displays the results of the assessment. Notice that Big Stone County is located in an area of the State which is considered to have Moderate to High Susceptibility to groundwater contamination. For more information, visit the MPCA link listed below the map.

Map 2G:
Groundwater Contamination Susceptibility



Source: www.dnr.state.mn.us/waters/groundwater_section/mapping/gwcontam_susceptibility.html

Minnesota's Groundwater Condition: A Statewide View (2007)

Ground water quality data collected in 2004 and 2005 by the MPCA and the Minnesota Department of Agriculture (MDA), served as the basis for evaluating the condition of Minnesota's ground water. The results were presented in the publication, ***"Minnesota's Groundwater Condition: A Statewide View"*** (2007). The following conclusions about ground water quality in Minnesota's vulnerable aquifers were made:

1. Ground water quality is generally good and in compliance with drinking water standards. However, human-caused impacts to ground water quality are apparent in many areas of the state.
2. In urban areas, especially the Twin Cities metropolitan area, Rochester and St. Cloud, elevated concentrations of chloride and nitrate and detectable concentrations of VOCs are common.
3. In rural and agricultural areas, nitrate concentrations are frequently elevated or exceed standards; and pesticides are commonly detected, though at concentrations that are nearly always less than applicable drinking water standards.
4. Areas of impacted ground water correlate well with land uses that are known to cause the observed quality impacts. The prevalence of elevated nitrate concentrations in ground water in regions dominated by agricultural land uses and in unsewered residential areas is particularly noteworthy.

According to the report, there are two key considerations for MPCA's future groundwater quality monitoring efforts that are worth highlighting:

- There is a growing need to better incorporate ground water and surface water interaction into water resource management activities. Several Minnesota cities have struggled to maintain a reliable source of good quality water and found that their ground water quality problems resulted in part from the interaction with impacted surface water. The potential for ground water to improve (or potentially degrade) surface water quality is a factor that should be routinely evaluated as the MPCA undertakes investigation of Minnesota's impaired waters.
- Many new challenges will be faced by Minnesota's water resource managers as the 21st century unfolds. Chief among these is a changing and less predictable climate, rapid growth of impervious soil cover that reduces the land area where aquifers can be recharged, and an ever increasing demand for potable water. These challenges require that Minnesota water resource managers monitor ground water condition with an eye to the future, and make the critical step of linking land use activities with their impact on ground water, so that practices and guidelines can be developed that will protect this valuable resource.

K. Groundwater Quantity Assessment

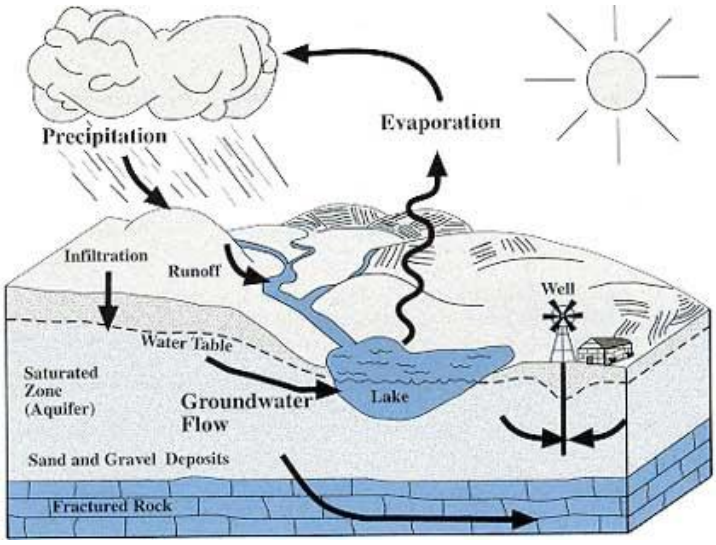
Groundwater is an important part of the Hydrologic Cycle, commonly referred to as the water cycle (see Figure 2J). Groundwater is the part of precipitation that seeps down through the soil until it reaches rock material that is saturated with water. Water in the ground is stored in the spaces between rock particles. Groundwater slowly moves underground, generally at a downward angle (because of gravity). Some groundwater also seeps into streams, lakes, and other surface waters.

The world's total water supply is approximately 333 million cubic miles of water. Of this, over 96 percent is saline (or saltwater). The remaining 4 percent is freshwater. Over 68 percent of freshwater, however, is locked up in ice and glaciers. Another 30 percent of freshwater is in the ground. Fresh surface-water sources, such as rivers and lakes, only constitute about 22,300 cubic miles (93,100 cubic kilometers), which is about 1/150th of one percent of total water. Yet, rivers and lakes are the sources of most of the water people use every day.

Did you know…?

An article published in the Minneapolis Star Tribune on February 24, 2013, (***State Draining Water Supplies as Nature Can't Keep up with Demand***) highlights that groundwater quantity has increasingly become a problem. Wells are increasingly experiencing conflicts and in some cases are running dry. The compound problem is that demand is increasing in all sectors (i.e., residential, industrial, agricultural, etc.), while land use practices inhibit the replenishment of groundwater supplies . When surface water is drained and sent downstream, as is the case with drainage, it loses its ability to be recharged into groundwater supplies. Likewise, residential and commercial water uses are normally sent down the drain, which eventually ends up downstream.

Figure 2J:
The Hydrologic Cycle



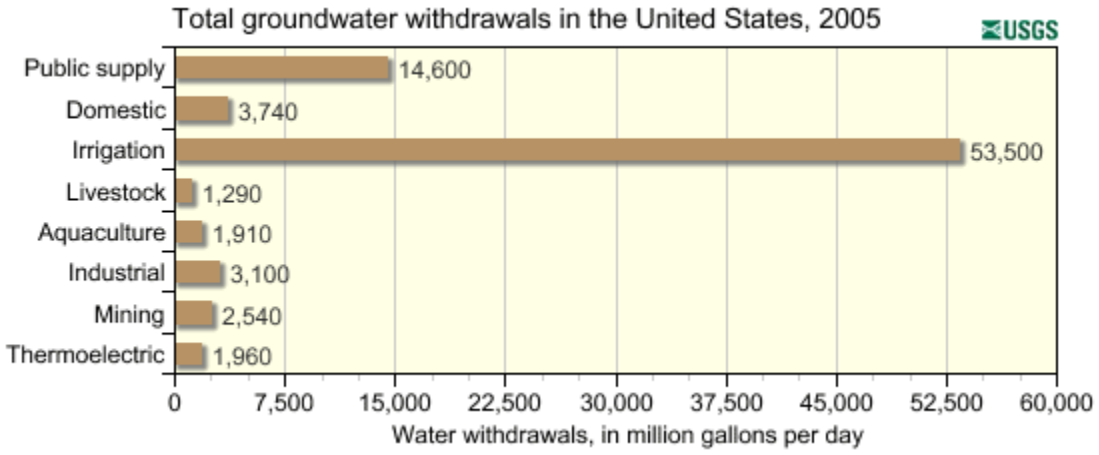
For the most part, groundwater comes directly from precipitation or surface water that infiltrates into the subsurface (below the land surface). In turn, groundwater flows into many streams and lakes. Groundwater can be seen exiting from the subsurface as springs. But most commonly, we obtain groundwater from wells.
Source: www.pca.state.mn.us

United States Geological Survey (USGS)

The State Geological Survey (USGS) is a science organization that strives to provide impartial information on the health of our ecosystems and environment, the natural hazards that threaten us, the natural resources we rely on, the impacts of climate and land-use change, and the core science systems that help us provide timely, relevant, and useable information. In 2005, the USGS produced a reported called, "***Estimated Use of Water in the United States in 2005.***"

According to the report, about 23 percent of the freshwater used in the United States in 2005 came from groundwater sources. The other 77 percent came from surface water. Groundwater is an important natural resource, especially in those parts of the country that don't have ample surface-water sources, such as the arid West. Figure 2K shows a bar chart of groundwater use by category for 2005. Most of the fresh groundwater withdrawals, 68 percent, were for irrigation, while another 19 percent was used for public-supply purposes, mainly to supply drinking water to much of the Nation's population. Groundwater also is crucial for those people who supply their own water (domestic use), as over 98 percent of self-supplied domestic water withdrawals came from groundwater.

Figure 2K:
Groundwater Withdrawals by Category in 2005



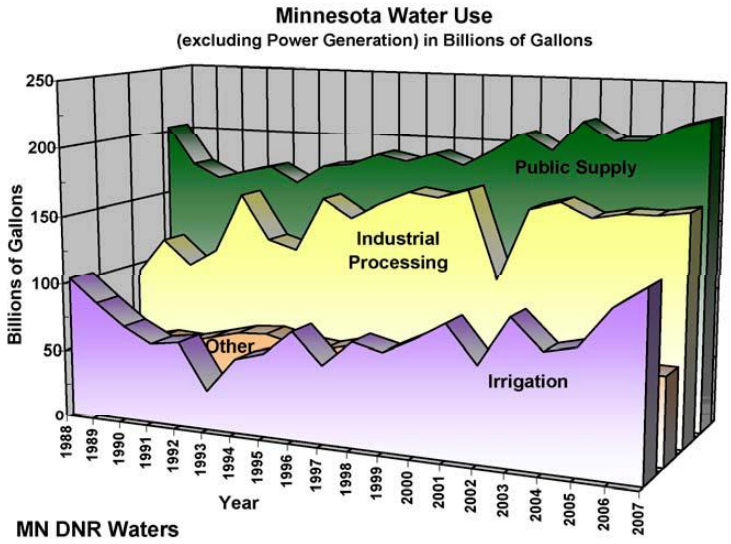
The USGS actively monitors streamflow data, drought conditions, and flooding status. Much of this information is updated regularly online, through the agency's WaterWatch Program. For more information on USGS and its role in water science, visit the following website:

http://www.usgs.gov/

Minnesota's Groundwater Use

The Minnesota Environmental Quality Board (EQB) produced a report of statewide water availability in 2008, titled, "***Managing for Water Sustainability***." According to the report, Minnesota water use has increased by 24% over the last 20 years as tracked by the Department of Natural Resources through the water permit program, while population has increased 22%. Figure 2L shows water use by major category in Minnesota from 1985-2007.

Figure 2L:



- ***Public water supply.*** Water distributed by community suppliers for domestic, commercial, industrial and public users. This category relies on both surface water and ground water sources. The increase in volume shown over the past 20 years correlates to a growth in population over the same period. Typically, residential water users consume 75 gallons per person per day. Public water supply accounted for approximately 16% of the total water used in 2007. It is estimated that water use from private household wells adds another 27.5 billion gallons to the public water supply annual use, representing slightly less than 2% of the total state water use.

- ***Industrial processing.*** Water used especially in mining activities, paper mill operations, and food processing, ethanol production, etc. Three-fourths or more of withdrawals are from surface water sources. Industrial processing used 12% of the total state water use for 2007. Based on ethanol facility water withdrawal reports provided to the DNR (1998-2006), Minnesota's ethanol industry achieved a 30% reduction in water demand; improving from an average of almost six gallons to about four gallons of water demand per gallon of ethanol produced. Progress has been made in reducing water use while also increasing the amount of ethanol produced from a bushel of corn.

- ***Irrigation.*** Water withdrawn from both surface water and ground water sources for major crop and noncrop uses. Nearly all irrigation is considered to be consumptive use. Of 7,000 active water appropriation permits, 73% are for irrigation. Irrigation represented 9% of the total permitted water use in the state, most of which (89%) came from ground water sources.

- ***Other.*** Large volumes of water withdrawn for activities, including air conditioning, construction dewatering, water level maintenance and pollution confinement. Collectively, these represented about 4% of Minnesota's 2007 total water use.

The Minnesota Department of Natural Resources (DNR)

The Minnesota Department of Natural Resources (DNR) monitors the use of the State's water and allocates resources to assure there is sufficient quality and quantity to supply the needs for future generations. Under the DNR's Observation Well Network Program, groundwater levels are routinely measured in 750 wells statewide. The primary objectives of the observation well network are to:

- Place wells in areas of future or present high groundwater use while considering variations in geologic and other environmental conditions;
- Identify long-term trends in groundwater levels;
- Detect significant changes in groundwater levels;
- Provide data for evaluation of local groundwater complaints;
- Provide data to resolve allocation problems; and
- Identify target areas that need further hydrogeologic investigation, water conservation measures, or remedial action.

Big Stone County's DNR Observation Wells

There have been a total of 10 DNR observation wells located throughout Big Stone County since 1951. Only five of these are actively monitored. Table 2I provides an overview of the information regarding these wells contained in the DNR's online records. The Table reports on well depth, number of observations recorded, average depth to water, and the last recorded depth to water (including the date observed at the time of drafting this Chapter).

Minnesota Department of Health

The Minnesota Department of Health maintains the County Well Index database which has water-level data, such as location, depth, and static water level, from more than 300,000 wells statewide. Most of the data has been collected since 1974, when the program began. For example, Figure 2M shows the approximate well locations in Malta Township in Big Stone County. By clinking on each well online, one can view the Well and Boring Record. Information can also be searched by aquifer type. To access this data online, visit the following website:

http://www.health.state.mn.us/divs/eh/cwi/

Figure 2M:
Online County Well Index

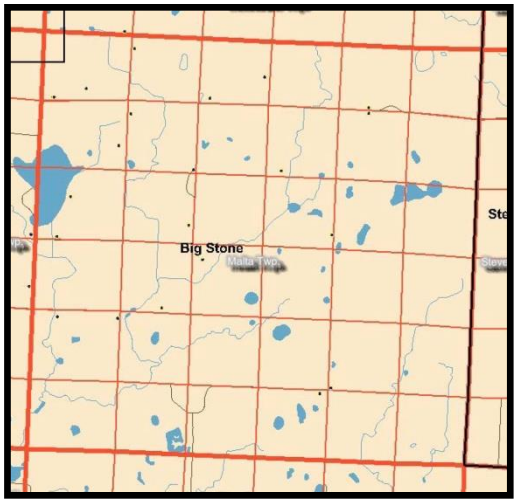


Table 2I:
Big Stone County's DNR Observation Wells

Number	Well Depth in feet	Nearest Town/Feature	1st Monitored - Currently Monitored?	Number of Observations	Average Depth to Water in feet	Last Recorded Depth to Water (date)
6007	22	Browns Valley	1977 – Yes	319	6	1 ft (4/30/13)
6001	81	Beardsley	1951 – No	11	19	20 ft (9/4/64)
6001	282	Beardsley	1978 – Yes	262	8	6 ft (4/30/13)
6009	30	Beardsley	2002 – Yes	97	7	7 ft (4/30/13)
6006	30	Beardsley	1977 – No	126	11	28 ft (10/10/02)
6005	47	Beardsley	1977 – No	22	27	32 ft (2/3/81)
6003	225	Beardsley	1978 – No	48	40	40 ft (10/26/81)
6008	247	Ortonville	1984 – Yes	279	22	18 ft (4/30/13)
6000	22	Artichoke	1972 – No	305	6	7 ft (11/15/11)
6010	28	Correll	2011 – Yes	16	3	2 ft (4/30/13)

To access additional DNR's groundwater quantity information, including more information on the DNR's Observation Well Network, visit the following website:

http://www.dnr.state.mn.us/waters/groundwater_section/obwell/waterleveldata.html

Did you know…?

An article published in the White Bear Press on July 18, 2012, titled, "*DNR Considers Aquifer Action*," indicates the Minnesota Department of Natural Resources been holding staff-level discussions about whether to create one or more groundwater management areas in problem areas throughout Minnesota. According to the article, Minnesota Statute 103G.287 gives the DNR commissioner special authority to designate groundwater management areas, which could lead to changes in how groundwater is used. Furthermore, in 2010, the State Legislature mandated that public water suppliers serving more than 1,000 customers encourage its customers to reduce demand by adopting a water conservation rate structure. If groundwater management areas are formed, it will be a first for Minnesota.

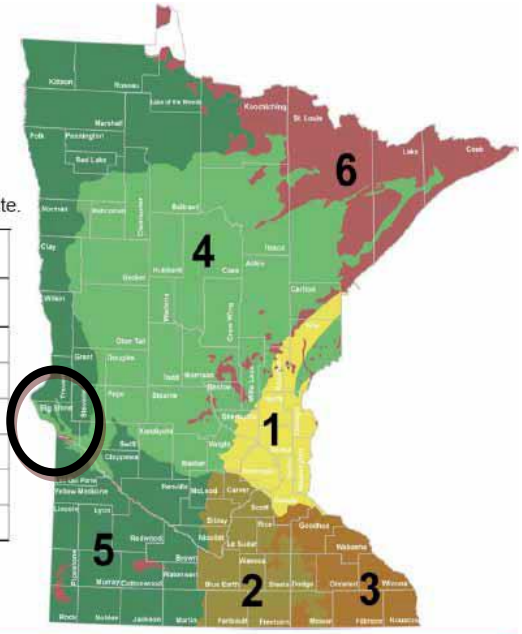
Minnesota's Groundwater Condition: A Statewide View

The Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Health (MDH) profiled Minnesota's groundwater quantity in their 2007 report, *"**Minnesota's Groundwater Condition: A Statewide View**."* According to the report, groundwater, particularly ground water of adequate quality for drinking and other desired uses, has always been scarce in northwest and southwest Minnesota because of the natural geologic and hydrologic conditions in these areas. Figure 2N shows the availability of groundwater statewide. Notice that Big Stone County is rated as having mostly moderate to limited availability of groundwater.

Figure 2N:
Availability of Groundwater in Minnesota (2005)

TABLE 1. Ground-water availability in the state.

	General Availability of Ground Water by Source		
Area	Surficial Sands	Buried Sands	Bedrock
1	Moderate	Moderate	Good
2	Limited	Moderate	Good
3	Limited	Limited	Good
4	Good	Moderate	Limited
5	Moderate	Limited	Limited
6	Limited	Limited	Limited



County Atlas – Regional Assessment Program

The County Atlas - Regional Assessment Program exists to develop County Geologic Atlases and Regional Hydrogeologic Assessments. It is a joint program between the Minnesota Department of Natural Resources (DNR) and the Minnesota Geological Survey (MGS). The program creates maps and reports depicting the characteristics and pollution sensitivity of Minnesota's groundwater resources. The main DNR online link for additional information is:

http://www.dnr.state.mn.us/waters/groundwater_section/mapping/index.html

County Geologic Atlas

A County Geologic Atlas is a systematic study of a county's geologic and groundwater resources. Geologic studies include both near-surface deposits and bedrock. Groundwater studies include flow systems, aquifer capacity, groundwater chemistry, and sensitivity to pollution. In some areas sand and gravel deposits, sinkholes, or other features are studied. The information is organized, analyzed, and displayed using GIS technology.

Atlas information is used in planning and environmental protection efforts at all levels of government. Source water protection and well sealing programs are examples of local programs that need geologic and groundwater information. Other typical uses include providing information for permit applications and plans and emergency response to contaminant releases. The information is also used by businesses and the general public.

Regional Hydrogeologic Assessment

A Regional Hydrogeologic Assessment is similar to an atlas in that both geology and groundwater are studied. However, a regional assessment covers a larger area--typically four to nine counties--in less detail. A regional assessment emphasizes near-surface geology, groundwater properties, and sensitivity to pollution.

Big Stone County's Map

The southern half of Big Stone County was included in the Upper Minnesota River Basin Regional Hydrogeologic Assessment, which included all of Swift, Lac qui Parle, and Yellow Medicine Counties, and parts of Lincoln, Lyon, Redwood, and Renville Counties. The northern half of Big Stone County was included in the Traverse-Grant Regional Hydrogeologic Assessment (along with Pope, Stevens, and parts of Douglas, Grant and Traverse Counties). The Assessment can be divided into the following four mapped subsections, referred to as "Plates:"

Geology

1. Plate 1 – Surficial Geology (information contained in report or GIS layer)
2. Plate 2 – Quaternary Stratigraphy (information contained in report or GIS layer)

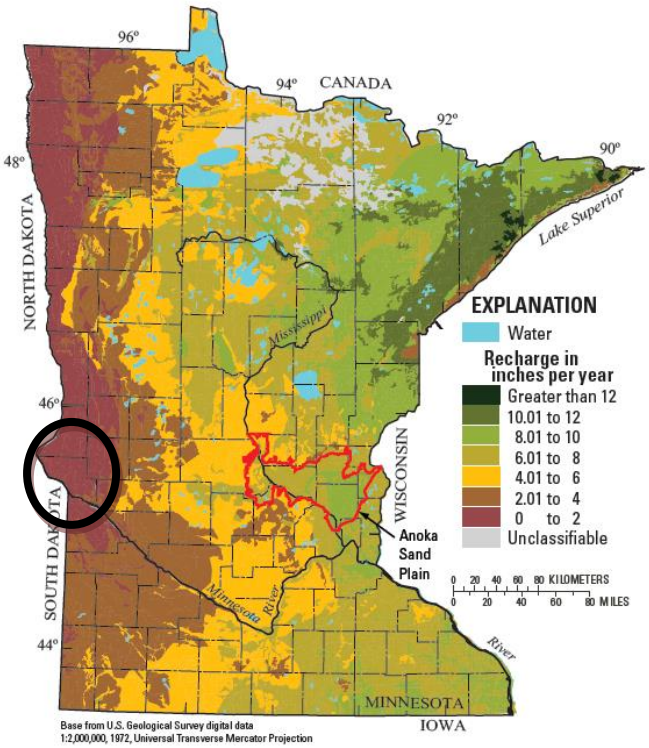
Hydrogeology

3. Plate 3 – Surficial Hydrogeology (map can be viewed online)
4. Plate 4 – Geologic Sensitivity to Pollution of Groundwater (map can be viewed online)

Groundwater Recharge Areas

Groundwater recharge refers to how water enters back into groundwater supplies (refer to Figure 2B – The Hydrologic Cycle). Most potential water recharging the groundwater system moves rapidly into surface waters, however, some eventually reaches the aquifers. The USGS has produced a fact-sheet titled, "***Groundwater Recharge in Minnesota*.**" Groundwater recharge is only between 0-2 inches per year in most of Big Stone County (refer to Figure 2O), compared to greater than 6 inches per year in the central and eastern parts of the State. This follows general trends in precipitation. In the western and northern parts of the State, where precipitation is the least (between 20-25 inches on average per year), recharge rates are also the least. In contrast, in the central and eastern parts of the State, where precipitation is greater than 30 inches on average per year, groundwater recharges rates increase to over 6 inches per year.

Figure 2O:
Average Annual Groundwater Recharge Rates



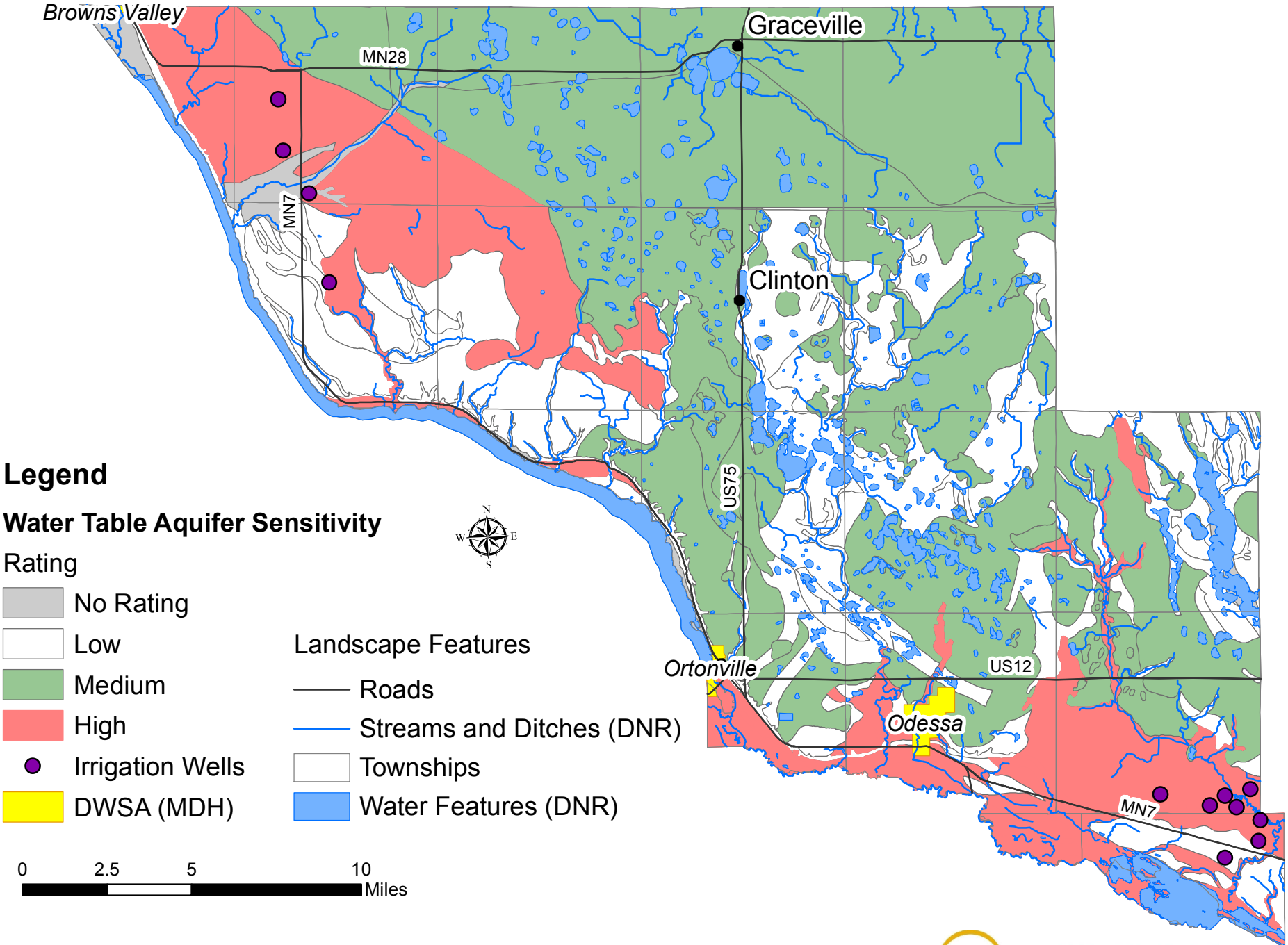
Recharge rates into unconfined aquifers are typically about 20-25 percent of precipitation. According to the United State Geological Survey (USGS), water at very shallow depths might be just a few hours old; at moderate depth, it may be 100 years old; and at great depth or after having flowed long distances from places of entry, water may be several thousands of years old.

The Minnesota Department of Agriculture submitted a Priority Concerns Input Form (found in Appendix B), that provided a number of key implementation suggestions for Big Stone County's Water Plan. Of special significance, the MDA submitted a map showing Big Stone County's Water Table Sensitivity, commonly referred to as "groundwater recharge."

Map 2H (provided by the Minnesota Department of Agriculture) classifies the County into three aquifer sensitivity ratings: low, medium, and high. These reflect the likelihood that infiltration precipitation or surface water would reach the water table, potentially polluting the groundwater with surface contaminants.

BIG STONE COUNTY WATER TABLE AQUIFER SENSITIVITY

Water Table Aquifer Sensitivity based on Sediment Association of Minnesota Geormophology (DNR, 1997)



Prepared by the Minnesota Department of Agriculture, September 2012

MINNESOTA DEPARTMENT OF AGRICULTURE

Minnesota's Groundwater: Is Our Use Sustainable?

The Freshwater Society, a public non-profit organization formed in 1968, published a special report in April 2013, titled, "***Minnesota's Groundwater: Is Our Use Sustainable?"*** The following highlights of the report are worth noting:

- Minnesota cannot afford to continue increasing its groundwater consumption as we have over the last several decades.

- Pumping of Minnesota's groundwater increased, on average, about 2.8 billion gallons each year from 1988 through 2011, a statistical analysis of reporting pumping estimates (refer to Figure 2H). Over that 23-year period, total reported groundwater use increased an estimated 31 percent, while the State's population increased 24 percent. Pumping for agricultural irrigation increased about 1.5 billion gallons per year over that period, equaling a 73 percent increase.

- The DNR plans in 2013 to use a 3-year-old law to begin creating "groundwater management areas" in two heavily irrigated regions of the state, agency officials say. The agency hopes to win community support for intensive monitoring of the impact of existing pumping and, perhaps, support for future limitations on pumping.

- The connections between ground and surface water need to be studied. Specifically, groundwater recharge rates and the flow between aquifer systems need to be better understood.

- Agricultural irrigation is Minnesota's second largest use of groundwater (behind municipal use), and it is by far the fastest growing segment of groundwater use.

- High commodity prices, high land prices, and incremental weather patterns, are likely to encourage more farmland to be irrigated.

Figure 2P:

MINNESOTA GROUNDWATER PUMPING TRENDS: 1988-2011

- Total groundwater pumping varied widely from year to year, but averaged about 235 billion gallons per year.
- Pumping by city water systems averaged 123 billion gallons per year, and averaged 53 percent of total reported groundwater pumping.
- Agricultural irrigation pumped an average of 63 billion gallons per year, averaging 26 percent percent of total reported pumping.
- Industrial pumping averaged about 22 billion gallons per year, averaging 9.5 percent of the total reported pumping.
- The next-biggest component of the total – a division the DNR calls "Special Categories" and that includes pollution containment, fish farms, snow making, livestock watering and sewage treatment – accounted for an average of 7.3 billion gallons pumped each year, about 3 percent of all groundwater use on average.
- Golf course sprinkling used an average of 4.7 billion gallons per year, 2 percent of total groundwater use on average.
- All other uses combined averaged about 14.7 billion gallons per year, 6 percent of the total on average.

Summary of Groundwater

Implications and Assessments

The following items summarize the implications and assessments for groundwater quality and quantity issues. Many of the listed items prescribe actions that are needed to properly address the issues identified.

- Current groundwater monitoring efforts by stakeholders should be continued and expanded within the County. More importantly, any important conclusions regarding the results of these monitoring efforts should be shared with Big Stone County in a timely fashion.

- The County should continue to partner with the Minnesota Department of Agriculture in hosting Nitrate Testing Clinics.

- Groundwater Best Management Practices should be promoted by providing cost-share incentives.

- Sealing abandoned wells should continue to be a priority.

- Conduct training sessions and workshops for farmers who have agricultural production activities within wellhead protection areas and drinking water supply management areas.

- Increased use of groundwater by multiple users has placed an increase stress on aquifer systems. An increasing amount of groundwater conflicts are being reported statewide.

- There is a high need for continued research and assistance to understand the impacts of drainage or other land use practices on groundwater recharge rates, and the means to quantify these impacts.

- Minnesota's groundwater use patterns are not sustainable (i.e., groundwater is being used more than it is being recharged). As a result, the Minnesota DNR has considered creating groundwater management areas in parts of the State where groundwater is stressed by over-use or pollution.

Chapter Three:
Big Stone County Water Plan
Goals, Objectives & Action Steps (2014-2018)

This Chapter establishes the Big Stone County's Water Plan Goals, Objectives, and Action Steps. Although the Water Plan will cover a span of 10 years (2014-2023), this Chapter of the Plan will guide the County in water resource management efforts over the first five years (2014-2018). Each Action Step has been assigned specific implementation information, including the priority watershed (if one was identified), stakeholders involved, and an estimated cost to implement the activity.

A. Definition of Goals, Objectives, and Action Steps

The Goals, Objectives, and Action Steps that are identified in this Chapter were developed with input from the public, various State and local governmental units/agencies, and the Big Stone County Water Plan Taskforce. The following provides a definition of these terms:

Goal: A goal is an idealistic statement intended to be attained at some undetermined future date. Goals are purposely general in nature.

Objective: An objective is an action-oriented statement that supports the completion of a goal. There may be more than one objective per goal.

Action Step: An Action Step is a specific activity that will be taken in order to achieve a goal and objective.

B. Action Step Information

Each Action Step identified in this Chapter has been assigned specific information on priority watershed(s), stakeholders involved, and the activity's estimated cost. In addition, if a specific time-frame was identified (i.e., when the Action Step should be completed by), this was communicated by placing a year in parenthesis in the Action Item. For example, if (2015) appears in the Action Step, this means the activity ideally would take place (or at least begin) in 2015. If a year is not indicated, the Action Step is intended to be implemented on an ongoing or annual basis. The following Action Step descriptions also apply:

Priority Watershed(s): Details the areas within the County where the implementation of the initiative shall take place. "All" is listed for countywide implementation.

Stakeholder(s): This entails who potentially will be involved in the implementation of the identified initiative. An *Asterisk and Underline indicates lead responsibility. A listing of the most common coordinating agencies and their respective acronyms is provided:

All (refers to all water plan stakeholders)
Cities (Cities)
Citizens for Big Stone Lake (CBSL)
County (County)
- County Board (CB)
- Ditch Authority (DA)
- Environmental Services (ES)
- Public Health (PH)
- Public Works (PW)
- Soil and Water Conservation District (SWCD)
- Water Plan Task Force (WPTF)

Minnesota Board of Water and Soil Resources (BWSR)
Minnesota Department of Agriculture (MDA)
Minnesota Department of Health (MDH)
Minnesota Department of Natural Resources (DNR)
Minnesota Geological Survey (MGS)
Minnesota Department of Transportation (MnDOT)
Minnesota Pollution Control Agency (MPCA)
Natural Resources Conservation Service (NRCS)
University of Minnesota Extension (UME)
United States Army Corps of Engineers (USACE)
United States Department of Agriculture (USDA) – Farm Service Agency (FSA)
United States Fish and Wildlife Service (USFWS)
Watersheds and Watershed Management-Like Organizations (WMLOs)
- Bois de Sioux Watershed District (BdSWD)
- Pomme de Terre River Association (PdTRA)
- Upper Minnesota River Watershed District (UMRWD)
- Watershed Districts (WD)

Estimated Cost: This category divides the estimated costs of completing the Action Step into two columns: Overall and County. The Overall column provides an estimate of the total cost among all stakeholders (i.e., grants, cost-share, County match, etc.) to implement the Action Step. The County column represents the estimated cost incurred either directly or indirectly by Big Stone County to implement the Action Step, including by the Big Stone County SWCD. If an Action Item's cost could not be estimated, a TBD appears in the column, which stands for To-Be-Determined. The costs are estimated over the five-year implementation time-span, which covers the period of 2014-2018. The tables also show the average annual amount which is simply the overall estimated costs divided by five.

C: Goals, Objectives & Action Steps (2014-2018)

GOAL 1: TO ENSURE THE COUNTY'S SURFACE WATER RESOURCES EXCEED MINIMUM WATER QUALITY STANDARDS				
Priority Watershed	**Action Step**	**Stakeholders** ****Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective A: Protect and Enhance the County's surface water quality.				
Countywide	**1.A.1. Surface Water Quality Monitoring.** Work with stakeholders to monitor surface water quality. 1.A.1.a) Annually review available surface water quality data and watershed priorities. Prioritize projects and Best Management Practices (BMPs) based upon the information. 1.A.1.b) Continue monitoring efforts throughout the County. 1.A.1.c) Develop and maintain a user-friendly database for all water resource monitoring data. 1.A.1.d) **EDA.** Annually submit surface water quality data to MPCA/EPA to be entered into MPCA's Environmental Data Access (EDA) system. 1.A.1.e) **Volunteer Monitoring.** Recruit volunteers to participate in monitoring programs. At least one volunteer should be identified for Big Stone, Long Tom, Marsh, and Otrey Lakes. 1.A.1.f) Develop an interactive, web-based mapping application that connects users with water quality data from specific monitoring sites.	*WMLOs, ES, SWCD, WPTF, MPCA, DNR, WD	$150,000	$15,000
Countywide	**1.A.2. Surface Water Quality Profiles.** Work with stakeholders to profile surface water quality. 1.A.2.a) Seek opportunities to refine watershed analysis and management strategies using detailed GIS information, water quality data, and other tools to guide plan actions, target implementation and augment funding from outside sources.	*SWCD, WMLOs	$20,000	$5,000

Countywide	**1.A.3. Subwatershed Water Quality Goals.** Build local water quality database, utilizing available data to identify specific water quality goals for water resources. Use to target BMP implementation at the sub-watershed level utilizing CWL funding.	*ES, SWCD, WMLOs	$10,000	$2,000
Countywide	**1.A.4. Alternative Shoreland Management Ordinance.** Adopt the Alternative Shoreland Management standards that are currently being discussed statewide once they become available.	*CB, *ES	$30,000	$10,000
UMRW	**1.A.5. Monitoring Plan.** Prepare an annual Monitoring Plan for assessing the condition of surface and groundwater resources, as well as identifying pollution sources. This Plan should identify the specific sites to be monitored and contain detailed information on the physical, chemical, and biological parameters to be analyzed at each site. 1.A.1.c) Continue the Big Stone Lake Water Quality Monitoring Program and Big Stone Lake tributary monitoring (UMRWD).	*UMRWD, DNR, CBSL, MPCA, USGS	$10,000	$1,000
UMRW	**1.A.6. Protect and Enhance Water Quality.** Implement water quality BMPS to protect and enhance Big Stone and Long Tom Lakes. 1.A.6.a) Complete a full inventory of sewer system compliance. 1.A.6.b) Survey and develop preliminary plans to repair shoreline and tributary erosion. 1.A.6.c) Reduce flows to Big Stone Lake from the Whetstone River. Work with the US Army COE on the restoration of the Whetstone River. 1) Complete diagnostic feasibility study, pre engineering and cost estimate (2015). 2) Complete final engineering and project development plans (2016). 3) Secure Funding (2017-18) 4) Construction/Restoration of river channel (2019-2023).	*UMRWD, *ACE, ES, DNR	$750,000	$50,000
UMRWD	**1.A.7. Marsh Lake Restoration.** Support/sponsor the Marsh Lake restoration efforts that will restore the Pomme de Terre River to its historic channel, modify the Marsh Lake Dam, construct fishway, construct secondary drawdown structure, breach dike at abandoned fish pond, install gated culvert in the Louisburg Grade Road (2017).	*ACE, UMRWD, DNR	$75,000	$5,000

UMRWD	**1.A.8. Land Locked Basin Elevations.** Work with the DNR to access the numerous land locked basins. Implement solutions to high water bank erosion, flood storage, and recreational enhancement.	*DNR, ES, SWCD, UMRWD	$25,000	$5,000
PdTRW	**1.A.9. Artichoke Lake.** Implement water quality BMPS to protect and enhance Artichoke Lake. 1.A.9.a) Stabilize 1,800 feet of shoreline on Artichoke Island. 1.A.9.b) Establish one mile of riparian buffers along Artichoke Creek in sections 13 and 14 in Artichoke Township. 1.A.9.c) Restore one mile of shoreline buffers. Target north shore, east shore, and south bay. 1.A.9.d) Cost-share establishing cattle exclusion fencing to eliminate bank erosion along Artichoke Lake and Artichoke Creek. 1.A.9.e) Target a wetland restoration in Section 24 of Artichoke Township to ease increasing elevations in Artichoke Lake.	*ES, SWCD, PdTRA, DNR	$200,000	$50,000
PdTRW	**1.A.10. Long Lake.** Implement water quality BMPS to protect and enhance Long Lake. 1.A.10.a) Restore one mile of shoreline buffers.	*ES, SWCD, PdTRA, DNR	$75,000	$18,750
BdSW	**1.A.11. East Toqua Lake.** Implement water quality BMPS to protect and enhance East Toqua Lake. 1.A.11.a) Restore 4,000 feet of native grass/trees along eastern shoreline. 1.A.11.b) Investigate upstream water retention/stormwater treatment opportunities and implement two (2) projects. 1.A.11.c) Partner with Graceville Golf Course to eliminate unnecessary phosphorus runoff into East Toqua Lake.	*ES, SWCD, BdS, DNR	$125,000	$31,000
BdSW	**1.A.12. Twelve Mile Creek/County Ditch 4.** Implement water quality BMPS to protect and enhance Twelve Mile Creek/County Ditch 4. 1.A.12.a) Reestablish two miles of filter strips and buffers.	*ES, SWCD	$50,000	$5,000
		Objective A Average Annual Costs	$270,000	$39,550
		Objective A 5-Year Overall Estimated Costs	$1,350,000	$197,750

GOAL 1: TO ENSURE THE COUNTY'S SURFACE WATER RESOURCES EXCEED MINIMUM WATER QUALITY STANDARDS				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead**	**5-Year Estimated Costs**	
			Overall	**Local**
Objective B: Remove The County's water bodies from the MPCA's 303d List of Impaired Waters by 2030.				
Countywide	**1.B.1.** ***MPCA Watershed Approach.*** Coordinate the preparation and implementation of the MPCA Watershed Approach. 1.B.1.a) Participate in the intensive monitoring and assessment; watershed characterization and problem investigation; and Watershed Restoration and Protection Strategies (WRAPS). 1.B.1.b) Fully participate in the WRAPS for the Upper Minnesota River Watershed (scheduled for 2015). 1.B.1.c) Continue to participate in the on-going WRAPS for the the Bois de Sioux River watershed. 1.B.1.d) Continue to participate in the completed WRAPS for the Pomme de Terre River Watershed.	MPCA, UMRWD, SWCD, ES	$250,000	$25,000
Countywide	**1.B.2.** ***Subwatershed Approach.*** Prioritize BMPs based on subwatershed modeling, analysis, and TMDL results. 1.B.2.a) Annually identify priority subwatersheds for BMP implementation. 1.B.2.b) Promote BMPs in priority subwatersheds through newsletters, mailings, and media sources.	MPCA, UMRWD, SWCD, ES	$10,000	$5,000

PdTRW – Dry Wood Creek	**1.B.3. Pomme de Terre Turbidity TMDL Implementation.** Partner with the Pomme de Terre River Association Watershed Project to properly implement the Pomme de Terre River Turbidity TMDL Implementation Plan. 1.B.3.a) Replace 5 open tile inlets. 1.B.3.b) Enroll 80 acres into rotational grazing plans. 1.B.3.c) Enroll 320 acres into filter strips. 1.B.3.d) Target 5,000 acres for conservation tillage. 1.B.3.e) Target 80 acres for wetland restorations. 1.B.3.f) Install 5 water and sediment control basins. 1.B.3.g) Target one feedlot buffer project. 1.B.3.h) Install 250 feet of exclusion fencing.	*PdTRWP, SWCD, ES, NRCS, MPCA	$500,000	$5,000
PdTRW – Dry Wood Creek	**1.B.4. Pomme de Terre Fecal Coliform TMDL Implementation.** Partner with the Pomme de Terre River Association Watershed Project to properly implement the Pomme de Terre River Fecal Coliform TMDL Implementation Plan. 1.B.4.a) Install one feedlot waste storage facility. 1.B.4.b) Install 250 feet of exclusion fencing. 1.B.4.c) Enroll 80 acres into rotational grazing plans. 1.B.4.d) Target two feedlot owners with less than 300 animal units to develop manure management plans. 1.B.4.e) Provide cost-share to upgrade 2 non-complying SSTS. 1.B.4.f) Provide low interest loans for SSTS upgrades.	*PdTRWP, SWCD, ES, NRCS, MPCA	$80,000	$10,000
Countywide	**1.B.5. SSTS Inspections.** Inspect SSTS for imminent health threats.	*ES	$25,000	$5,000
		Objective B Average Annual Costs	$173,000	$10,000
		Objective B 5-Year Overall Estimated Costs	$865,000	$50,000

GOAL 1: TO ENSURE THE COUNTY'S SURFACE WATER RESOURCES EXCEED MINIMUM WATER QUALITY STANDARDS				
Priority Watershed	**Action Step**	**Stakeholders** ****Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective C: Partner with feedlot and livestock producers to identify priority sites to implement agricultural waste Best Management Practices.				
Countywide	**1.C.1. County Feedlot Program.** Continue to locally administer the County Feedlot Program to assist feedlot operators in obtaining and maintaining compliance with State regulations. 1.C.1.a) Target feedlot inspections in shoreland areas. 1.C.1.b) Inspect a minimum of 10% annually. 1.C.1.c) Work with feedlot operators on registering sites (2017).	*ES, MPCA	$30,000	$20,000
Countywide	**1.C.2. Feedlot Education.** Continue educational efforts focusing on current regulations, permit issues, and BMP programs. 1.C.2.a) Host an annual educational meeting with feedlot operators. 1.C.2.b) Include information in local newspapers quarterly 1.C.2.c) Host County Fair Booth highlighting various feedlot rule components such as manure application by sensitive waters, registration, manure management planning and mortality composting.	*ES, SWCD, MPCA	$7,500	$1,250
Countywide	**1.C.3. Cattle Exclusions.** Identify sites where cattle exclusions are needed. 1.C.3.a) Cost-share five (5) cattle exclusion BMPs. 1.C.3.b) Target Stony Run and Big Stone Lake subwatersheds.	*ES, MPCA SWCD	$50,000	$5,000

Countywide	**1.C.4. County Feedlot BMP Implementation Program.** Work with feedlot operators to implement ag waste/feedlot BMPS. 1.C.4.c) Secure cost-share funding that includes technical assistance to install ag BMPs and nutrient management plans. 1.C.4.a) Implement two ag waste/nutrient management plans per year. 1.C.4.b) Provide low interests loans for noncompliant feedlots. Target two (2) annually. 1.C.4.a) Upgrade five (5) feedlots with BMPs to eliminate runoff to nearby bodies of water. 1.C.4.b) Promote 500 acres of pasture management by implementing BMPs such as stream crossings, fencing, remote water systems, managed grazing plans, etc. 1.C.4.c) Host a workshop on the importance of correct manure application. 1.C.4.d) Host a field day on the importance of correct manure management.	ES, SWCD, NRCS, MPCA	$100,000	$7,500
		Objective C Average Annual Costs	$37,500	$6,750
		Objective C 5-Year Overall Estimated Costs	$187,500	$33,750

GOAL 1: TO ENSURE THE COUNTY'S SURFACE WATER RESOURCES EXCEED MINIMUM WATER QUALITY STANDARDS				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead**	**5-Year Estimated Costs**	
			Overall	**Local**
Objective D: Identify and mitigate pollution caused by wastewater and failing Subsurface Sewage Treatment Systems.				
Countywide	**1.D.1. County SSTS Program.** Continue to locally administer the County's SSTS Program. 1.D.1.a) Semiannually publish information in local newspapers and/or newsletters. 1.D.1.b) Inspect all new/replacement sewer system installations and educate homeowners at that time. 1.D.1.c) Provide homeowner maintenance manuals when systems are replaced or new. 1.D.1.d) Require upgrades of all identified imminent public health threat systems.	*ES, MPCA, WMLOs	$94,500	$10,000
Countywide	**1.D.2. Noncompliant Upgrades.** Secure financial assistance programs to provide assistance for homeowners to upgrade noncompliant SSTSs. 1.D.2.a) Upgrade 10 noncompliant SSTS annually. 1.D.2.b) Secure MPCA and MDA funding to provide low interest loans to upgrade noncompliant systems. 1.D.2.c) Utilize grant dollars to upgrade low income noncompliant systems.	*ES, MPCA, WMLOs	$575,000	$20,000
UMRW	**1.D.3 Wastewater Treatment.** Cooperatively work with local governmental units and other partners to identify and resolve wastewater treatment-related pollution issues in Ortonville and Browns Valley. 1.D.3.a) Upgrade the Peninsula sewer line/lift station in Ortonville.	*Browns Valley, *Ortonville, UMRWD, MPCA	$200,000	$5,000
		Objective D Average Annual Costs	$173,900	$7,000
		Objective D 5-Year Overall Estimated Costs	$869,500	$35,000

GOAL 1: TO ENSURE THE COUNTY'S SURFACE WATER RESOURCES EXCEED MINIMUM WATER QUALITY STANDARDS				
Priority Watershed	**Action Step**	**Stakeholders** ****Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective E: Work with stakeholders to control and prevent the spread of Aquatic Invasive Species in the County.				
Countywide	**1.E.1. County AIS Plan.** Develop and AIS Management Plan for Big Stone County. Provide educational and financial assistance, as available, on AIS prevention methods.	*DNR, *CB, DNR COLA	$50,000	$10,000
Countywide	**1.E.2. Annual AIS Meeting.** Host an annual AIS public informational meeting with assistance from the Department of Natural Resources.	*WMLOs, DNR COLA	$15,000	$7,500
Countywide	**1.E.3. AIS Task Force.** Create a local AIS Task Force (2014).	*CB, DNR COLA	$25,000	$25,000
		Objective E Average Annual Costs	$18,000	$8,500
		Objective E 5-Year Overall Estimated Costs	$90,000	$42,500

GOAL 2: TO REDUCE SOIL EROSION AND SEDIMENTATION				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective F: Work with landowners to identify priority sites to implement erosion and sediment control Best Management Practices.				
Countywide & target Stoney Run and Fish Creek Sub-watersheds	**2.F.1. SWCD BMP Program.** Provide educational, technical, and financial assistance, as available, to landowners for the implementation of erosion and sediment control BMPs. 2.F.1.a) Install two (2) water and sediment control structures annually. 2.F.1.b) Install four (4) alternative tile intakes. 2.F.1.c) Install two (2) stream bank stabilization projects annually. 2.F.1.d) Install three (3) grass waterways annually. 2.F.1.e) Install four (4) wetland restorations using RIM/WRP or other funds. 2.F.1.f) Install one (1) terrace project annually. 2.F.1.g) Promote and install two (2) rain gardens annually.	*SWCD NRCS	$200,000	$50,000
Countywide & Long Tom Lake, Stoney Run and Fish Creek Sub-watersheds	**2.F.2. SWCD Surface/ground Water Quality & TMDL's.** 2.F.2.a) Install fifty (50) acres of vegetative buffer filter strips annually. 2.F.2.b) Assist with ten (10) well decommissioning's annually. 2.F.2.c) Provide up to 75% cost-share on intakes and pipe structures to control gully erosion on natural and designed channels. 2.F.2.d) Provide a one-time incentive payment of $1,000 per acre to establish vegetative buffers to a width of 2 rods. 2.F.2.e) Work with Boise de Sioux, Pomme de Terre and Upper Minnesota River Watershed District's to implement practices that improve water quality on TMDL impaired waters throughout Big Stone.	*SWCD NRCS MPCA UMRWD	$50,000	$5,000

Countywide	**2.F.3. Ongoing SWCD Programs.** Continue with and expand the SWCD's Conservation Programs as they are available. 2.F.3.a) Establish one mile of field windbreaks annually. 2.F.3.b) Install six miles of weed control fabric annually. 2.F.3.c) Publish ten (10) annual articles promoting the Tree Program. 2.F.3.d) Establish twelve (12) farmstead shelterbelts annually. 2.F.3.e) Establish ten acres of wildlife food plots/winter cover annually. 2.F.3.f) Install 500 feet of living snow fences annually. 2.F.3.g) Continue to work with involved agencies on expanding the Big Stone/Traverse County CWMA grant program. 2.F.3.h) Participate with implementing the MN Prairie Plan goals/objective. *Key corridor areas to have 40% grassland, 20% wetland coverage.	*SWCD, NRCS	$100,000	$25,000
Countywide	**2.F.4. Soil Health.** Promote soil health by encouraging cover crops, no-till/minimum till, grazing, etc.). 2.F.4.a) Publish information in quarterly newsletters. 2.F.4.b) Target marginal land for BMP programs. 2.F.4.c) Promote conservation tillage of 500+ acres annually.	*SWCD, NRCS	$5,000	$1,000
Countywide	**2.F.5. SWCD Clean Water Funding Projects.** Provide educational, technical, and financial assistance, as available, to landowners for the implementation of erosion and sediment control BMPs. 2.F.5.a) Secure funding for a shoreline stabilization project on ***Artichoke Lake***. Project includes re-sloping the North side of shoreline with rock rip/rap and a vegetative buffer with native grasses and forbs. 2.F.5.b) Support the UMRWD in pursuing funds for a watershed ravine terrain analysis of high priority areas including: Fish, Meadowbrook and Stoney Run Creek. 2.F.5.c) Search available funding sources for a potential project on Toqua Lake to reduce priority pollutants and strengthen the shoreline. 2.F.5.d) Continue to search for funding sources for the "Save the Island" project on Artichoke.	*SWCD, NRCS, WMLOs	$250,000	$25,000
		Objective F Average Annual Costs	$121,000	$21,200
		Objective F 5-Year Overall Estimated Costs	$605,000	$106,000

GOAL 3: TO EFFECTIVELY MANAGE SURFACE WATER RESOURCES FOR MULTIPLE PURPOSES				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective G: Ensure long-term agricultural production by properly maintaining the public drainage system.				
Countywide	**3.G.1. Public Drainage System.** Ensure that public drainage systems are operated and maintained in accordance with the State Drainage Law 103E. 3.G.1.a) Annually identify where maintenance is needed. Maintain one mile County ditch annually in high erosion areas that are considered damaged. 3.G.1.b) Assist with restoring proper flows where needed. 3.G.1.c) Redetermine the benefits on systems as requested. 3.G.1.d) Complete County Ditch Inventory to include details on each system. 3.G.1.e) Complete a Drainage Records Modernization project to scan and organize all drainage records. 3.G.1.f) Identify public and private tile lines that flow into the open ditch system. 3.G.1.g) Install five (5) buffers and/or side inlets annually to control erosion and sedimentation and to maintain efficiency. 3.G.1.h) Conduct a buffer inventory to ensure the systems are adequately protected from overland flow and that nutrient and sediment filtration exists.	*CB, PW	$350,000	$75,000
Countywide	**3.G.2. Conservation Drainage Practices.** Provide educational, technical, and financial assistance, as available, to landowners for the installation of conservation drainage practices. 3.G.2.a) Implement one (1) project annually. 3.G.2.b) Pursue funding to establish a two-stage ditch system test site.	*WMLOs, PW	$50,000	$12,500

Objective G continued…

Objective G continued…

UMRWD	**3.G.3. Watershed Project Drainage BMPS.** Provide cost-share to landowners for the implementation of conservation drainage BMPS. 3.G.3.a) Provide up to 75% cost-share on pipe structures to control gully erosion on natural and designed channels. Implement twenty (20) projects. 3.G.3.b) Provide up to 75% cost-share to remove open tile intakes and replace with alternative intakes. Implement fifty (50) projects. 3.G.3.c) Provide up to 75% cost-share on controlled drainage projects. Implement two (2) projects.	*UMRWD, SWCD	$100,000	$25,000
UMRWD	**3.G.4. County Ditch 2.** Provide cost-share to landowners for the implementation of conservation drainage BMPS along County Ditch 2 (a tributary to the MN River) 3.G.4.a) Cost-share pipe structures to control erosion. Implement five (5) projects. 3.G.4.b) Cost-share to remove open tile intakes and replace with alternative intakes. Implement five (5) projects. 3.G.4.c) Cost-share two (2) controlled drainage projects. 3.G.4.d) Target County Ditch 2 for the development of a Drainage Management Plan.	*UMRWD, SWCD	$150,000	$37,500
BdSW	**3.G.5. 12 Mile Creek/County Ditch 4.** Provide cost-share to landowners for the implementation of conservation drainage BMPS along 12 Mile Creek/County Ditch 4. 3.G.5.a) Cost-share intakes and pipe structures to control erosion. Implement five (5) projects. 3.G.5.b) Cost-share two (2) controlled drainage projects. 3.G.5.c) Target 12 Mile Creek/County Ditch 4 for the development of a Drainage Management Plan.	*ES, SWCD, BdS	$150,000	$37,500
		Objective G Average Annual Costs	$160,000	$37,500
		Objective G 5-Year Overall Estimated Costs	$800,000	$187,500

GOAL 3: TO EFFECTIVELY MANAGE SURFACE WATER RESOURCES FOR MULTIPLE PURPOSES				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective H: Manage stormwater pollution by identifying key stormwater issues and potential solutions.				
UMRW	**3.H.1. Watershed Project Stormwater BMPs.** Provide educational, technical, and financial support, as available, for the implementation of stormwater BMPs. 3.H.1.a) Cost-share installing three (3) Urban Stormwater Ponds. 3.H.1.b) Cost-share installing three (3) rain gardens/lakeshore buffers annually.. 3.H.1.c) Cost-share providing 1,000 rain barrels. 3.H.1.d) Include educational and cost-share information in quarterly newsletters. 3.H.1.e) Require that stormwater discharges into all water resources be approved by the District.	*UMRWD, SWCD	$75,000	$5,000
Countywide	**3.H.2. Stormwater Management Plans.** Participate in the development and implementation of Comprehensive Stormwater Management Plans. 3.H.2.a) Apply for funds to develop a Stormwater Management Plan for the City of Ortonville (2014). 3.H.2.b) Partner with the City of Ortonville on implementing its Stormwater Management Plan.	*ES, SWCD MPCA, Cities	$100,000	$20,000

BdS	**3.H.3. Stormwater Management Plans.** Participate in the development and implementation of Comprehensive Stormwater Management Plans. 3.H.3.a) Apply for funds to develop a Stormwater Management Plan for the City of Graceville (2015). 3.H.3.b) Partner with the City of Graceville on implementing its Stormwater Management Plan.	*ES, SWCD MPCA, Cities	$100,000	$20,000
		Objective H Average Annual Costs	$55,000	$9,000
		Objective H 5-Year Overall Estimated Costs	$275,000	$45,000

GOAL 3: TO EFFECTIVELY MANAGE SURFACE WATER RESOURCES FOR MULTIPLE PURPOSES				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective I: Identify opportunities to preserve and restore wetlands and other water retention sites.				
Countywide	**3.I.1. Wetland Conservation Act Administration.** Continue to locally administer the Minnesota Wetland Conservation Act. 3.I.1.a) Ensure that wetlands are protected or mitigated properly during land use activities and agricultural drainage.	*ES, SWCD, BWSR	$80,000	$40,000
Countywide	**3.I.2. Wetland Restorations.** Actively restore wetlands where water quality and quantity benefits outweigh the costs. 3.I.2.a) Restore two (2) wetlands annually. 3.I.2.b) Increase the number of Wetland Reserve Program easements by two (2) each year by targeting marginal farmland. 3.I.2.c) Promote various wetland banking programs, such the Agricultural Wetland Bank program establish in 2012. Increase the number of wetlands in these programs by one (1) annually.	*SWCD, BWSR, WMLOs	$300,000	$20,000
UMRW	**3.I.3. Watershed Project Wetland Restorations.** Work with stakeholders to restore wetlands in both urban and rural settings. 3.I.3.a) Partner with the U.S. Fish and Wildlife Service to provide up to 90% cost-share or $10,000, whichever is less, for wetland restorations. 3.I.3.b) Provide landowners with $1,000 per acre incentive payment for enrollment in programs, such as CRP, RIM, and WRP. 3.I.3.c) Implement five (5) wetland restorations.	*UMRWD, BWSR SWCD	$75,000	$5,000

BdSW	**3.I.4. Flood Mitigation.** Work with stakeholders to restore wetlands and other water retention projects to mitigation flooding. 3.I.4.a) Partner with the BdS to restore the Moonshine Lake Basin. 3.I.4.b) Target two (2) flood mitigation/water retention projects in West Toqua Lake subwatershed; Sections 2 and 3 Toqua Township; and Section 1 Graceville Township.	*BdS, ES BWSR SWCD	$150,000	$15,000
UMRW	**3.I.5. Upper Minnesota River Restoration.** Work with stakeholders to restore the original Upper Minnesota River near Ortonville and the Big Stone National Wildlife Refuge.	*UMRWD, ES BWSR, DNR, ACE	$250,000	$62,500
		Objective I Average Annual Costs	$171,000	$28,500
		Objective I 5-Year Overall Estimated Costs	$855,000	$142,500

GOAL 3: TO EFFECTIVELY MANAGE SURFACE WATER RESOURCES FOR MULTIPLE PURPOSES				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective J: Identify where shoreland restorations are needed.				
Countywide	**3.J.1. Shoreland Restorations.** Provide educational, technical and financial resources, when available, on proper shoreland management and restoration BMPs. 3.J.1.a) Use LIDaR and GIS technology to annually identify potential sites. 3.J.1.b) Examine alternatives to using rip-rap during shoreland restorations. 3.J.1.c) Cost-share two (2) shoreland restorations annually. 3.J.1.d) Secure funding to create two (2) shoreland restorations demonstration sites. 3.J.1.e) Cost-share shoreland restoration products, such as bio-logs, aquatic plugs, native seeding, etc.	*ES, SWCD, MWLOs, COLA, DNR	$50,000	$10,000
UMRW	**3.J.2. Watershed Project Shoreline Lake Restorations.** Provide cost-share and technical assistance to lakeshore owners along Big Stone and Long Tom Lakes for planting native grasses and forbs. 3.J.2.a) Implement five (5) shoreline buffer restoration projects.	*UMRWD, ES, SWCD, COLA, DNR	$10,000	$1,000
PdTRW	**3.J.3 Artichoke Lake.** Implement water quality BMPS to protect and enhance Artichoke Lake. 3.J.3.a) Conduct shoreline inventories to determine priority areas. 3.J.3.b) Stabilize 1,800 feet of shoreline on Artichoke Island. 3.J.3.c) Establish one mile of riparian buffers along Artichoke Creek in sections 13 and 14 in Artichoke Township. 3.J.3.d) Restore one mile of shoreline buffers. Target north shore, east shore, and south bay.	*ES, SWCD, PdTRA	Costs Included Previously in 1.A.9.	Costs Included Previously in 1.A.9.

PdTRW	**3.J.4. Long Lake.** Implement water quality BMPS to protect and enhance Long Lake. 3.J.4.a) Conduct shoreline inventories to determine priority areas. 3.J.4.b) Restore one mile of shoreline buffers.	*ES, SWCD, PdTRA, DNR	Costs Included Previously in 1.A.10.	Costs Included Previously in 1.A.10.
BdSW	**3.J.5. East Toqua Lake.** Implement water quality BMPS to protect and enhance East Toqua Lake. 3.J.5.a) Conduct shoreline inventories to determine priority areas. 3.J.5.b) Restore 4,000 feet of native grass/trees along eastern shoreline.	*ES, SWCD, BdS, DNR	Costs Included Previously in 1.A.11.	Costs Included Previously in 1.A.11.
		Objective J Average Annual Costs	$12,000	$2,200
		Objective J 5-Year Overall Estimated Costs	$60,000	$11,000

GOAL 4: TO PROTECT THE COUNTY'S AQUIFERS				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective K: Ensure there is an adequate supply of safe drinking water.				
Countywide	**4.K.1. Groundwater BMP Program.** Provide educational, technical and financial assistance, as available, to landowners for the implementation of groundwater protection BMPs. 4.K.1.a) Secure funding which would include technical assistance to install ag BMPs and nutrient management plans to protect groundwater. Prioritize sensitive groundwater recharge areas. 4.K.1.b) Incorporate the County's sensitive groundwater recharge areas map into to the local land use decision making process. 4.K.1.c) Implement two (2) groundwater BMP projects annually. 4.K.4.d) Cost-share sealing twenty-five abandoned wells.	*SWCD, MDH, MDA, UME	$150,000	$40,000
Countywide	**4.K.2. Groundwater Quality Monitoring.** Assist with groundwater quality monitoring efforts and proactively enact measures to protect water supplies, when appropriate. 4.K.2.a) Annually review data and prioritize BMP Programs accordingly. 4.K.2.b) Continue to participate in groundwater studies. 4.K.2.c) Continue to test drinking water for nitrates through the County's Public Health Department. 4.K.2.d) Biannually promote and conduct Nitrate Testing Clinics.	*SWCD, MDH, MPCA, PH, MDA	$25,000	$10,000
Countywide	**4.K.3. Pesticide Container Collection.** Work with Solid Waste to continue an annual pesticide container collection day.	*ES, PDSW, MDA	$10,000	$5,000

UMRW	**4.K.4. Wellhead Protection.** Participate in the implementation of wellhead protection plans for the cities of Odessa and Ortonville. 4.K.4.a) Target groundwater BMP Programs in Wellhead Protection Areas, such as RIM and CRP. 4.K.4.b) Incorporate Wellhead Protection Areas into local zoning maps. Make the maps available online and update annually. 4.K.4.c) Work with cities on mutually agreed upon ordinance language for Wellhead Protection Areas. 4.K.4.d) Target sealing all abandoned wells in Wellhead Protection Area. Implement two (2) annually.	*ES, *SWCD, MDH, Cities	$40,000	$10,000
		Objective K Average Annual Costs	$45,000	$13,000
		Objective K 5-Year Overall Estimated Costs	$225,000	$65,000

GOAL 4: TO PROTECT THE COUNTY'S AQUIFERS				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective L: Implement Best Management Practices to protect the quantity of groundwater.				
Countywide	**4.L.1. Groundwater Quantity Monitoring.** Assist with groundwater quantity monitoring efforts and proactively enact measures to protect water supplies, when appropriate. 4.L.1.a) Continue to monitor 20 groundwater well test sites annually. 4.L.1.b) Review data annually and prioritize BMP Programs accordingly in sensitive groundwater recharge areas. In addition, work with the DNR to identify areas of limited supply and/or known impacts to aquifers for prioritization of BMP projects. 4.L.1.c) Promote and/or install soil moisture monitoring equipment system(s) within the county to more accurately determine the need for agricultural irrigation water application during the irrigation season, to promote both water conservation and best use practices. Provide updated results on the County's website.	*SWCD, DNR, MDA	$100,000	$25,000
UMRW	**4.L.2. Groundwater Quantity BMPs.** Provide educational, technical and financial assistance, as available, to landowners for the implementation of groundwater protection BMPs. 4.L.2.a) Cost-share converting conventional irrigation systems to conservation systems. Implement two (2) projects annually. 4.L.2.b) Increase acres in Irrigation Management Program by 1,000 acres. 4.L.2.c) Annually participate in the MDA's Irrigation Workshops.	*SWCD, MDA, UME	$75,000	$5,000
Countywide	**4.L.3 County Geologic Atlas.** Secure funding to complete a County Geologic Atlas. 4.L.3.a) Partner with the DNR and MGS for training on how to understand and use the County's Geologic Assessment and, if/when available, the Geologic Atlas (2017).	*ES, SWCD, DNR, MGS	$150,000	$30,000

Countywide	**4.L.4 County Water Conservation Plan.** Pursue funding to establish a Water Conservation/Drought Contingency Plan (2015). 4.L.4.a) Partner with stakeholders to provide household water conservation kits, including low-flow showerheads and low-flow toilet conversion kits.	*SWCD, ES, DNR, MDA	$50,000	$12,500
		Objective L Average Annual Costs	$75,000	$14,500
		Objective L 5-Year Overall Estimated Costs	$375,000	$72,500

GOAL 5: TO EFFECTIVELY ADMINISTER THE WATER PLAN				
Priority Watershed	**Action Step**	**Stakeholders** ***Local Lead***	**5-Year Estimated Costs**	
			Overall	**Local**
Objective M: Engage the Citizens and Stakeholders on key water planning issues and implementation opportunities.				
Countywide	**5.M.1. Ongoing Issues and Programs.** Properly raise awareness on key water planning issues and available BMP funding opportunities. 5.M.1.a) Quarterly publish newsletters. 5.M.1.b) Promote BMP programs in the newspaper a minimum of two times annually. 5.M.1.c) Quarterly update websites with current information. 5.M.1.d) Establish BMP demonstration/test sites. 5.M.1.e) Annually host workshops on priority water planning issues. 5.M.1.f) Annually promote BMP practices and available funding at the the County Fair.	*SWCD, ES	$50,000	$25,000
Countywide	**5.M.2. Water Plan Funding.** Secure funding and stakeholder cooperation to properly implement the Water Plan's Action Steps. 5.M.2.a) Annually apply for Clean Water Funds and similar funding mechanisms to implement Action Steps. 5.M.2.b) Ensure the County is prepared to provide matching funds in order to qualify for BMP grants.	*ES, SWCD, CB	$20,000	$20,000
Countywide	**5.M.3 Watershed Focus and Stakeholder Cooperation.** Partner with watershed/stakeholder groups on implementation activities to minimize expenditures and to maximize results. 5.M.3.a) Annually attend watershed/stakeholder meetings. 5.M.3.b) Invite watersheds/stakeholders to participate with local water plan initiatives. 5.M.3.c) Participate fully in the Watershed Restoration and Protection Strategies (WRAPS) process - UMRW beginning in 2015; BdS in progress; PdT completed.	*ES, SWCD, UMRWD, PdT, BdS, WMLOs	$10,000	$10,000

Countywide	**5.M.4 Water Plan Task Force.** Keep the local Water Plan Task Force engaged in ongoing water plan activities. 5.M.4.a) Annually meet with the Task Force to review progress and to discuss current programs, upcoming projects and water plan activities. 5.M.4.b) Update the Water Plan's Action Steps before the Plan expires in 2018.	*ES, SWCD, WPTF	$5,000	$5,000
		Objective M Average Annual Costs	$17,000	$12,000
		Objective M 5-Year Overall Estimated Costs	$85,000	$60,000

Chapter Four:
Water Plan Administration

Chapter Four contains information regarding the administration of the Water Plan, including plan coordination, implementation process and timeline, role of the County and other agencies in implementation, recommended changes to State programs, intergovernmental conflicts/resolution process, major and minor plan amendment procedures, and general information.

A. Plan Coordination

Managing Big Stone County's water resources involves cooperation with many local, State and Federal agencies, as well as citizens and special interest groups. For any water planning activity to be successful, a well-coordinated effort is needed. Big Stone County is committed to working with each of these entities to ensure proper management of its water resources.

Throughout the Water Plan, County departments, local government units, special interest groups, and State and Federal agencies are listed pertaining to specific water planning topics. In addition, each Action Step found in Chapter Three under the County's Water Plan Goals and Objectives, identifies the potential stakeholders involved with implementing each Action Step listed. It is hoped that the valuable cooperation that has been established in the past years will continue and be enhanced through properly implementing this Water Plan.

Big Stone County will ensure coordination and implementation of its Comprehensive Local Water Plan through its established Water Plan Task Force. The Task Force will meet regularly to review progress, identify emerging problems, discuss opportunities, and to continue to direct the implementation of the Plan. The Task Force will be supported by the County Board appointed Water Plan Coordinator, which is housed in the Big Stone County Environmental Office. The Coordinator will administer the Action Step portion of the Plan, coordinate the Task Force activities, assist with writing grant proposals, prepare annual work plans and reports, and other activities as needed.

B. Implementation Plan and Priorities

Coordination of Water Plan activities will commence with the County Board adoption of the Plan. These activities will be conducted throughout the planning period identified as 2014 – 2023. Chapter Three of the Water Plan shall serve as the County's official Implementation Plan, and shall cover the first five years of the Plan (2014-2018). In 2018, Chapter Three will need to be updated to cover the years 2018-2023.

The SWCD annually prepares a Work Plan that is reviewed and approved by the Big Stone County SWCD Board of Supervisors. Many of the Action Steps identified in Chapter Three represent commitments on behalf of Big Stone County that will take place on an ongoing basis. For example, administering the State's Feedlot and SSTS regulations translates into being responsible for a variety of ongoing responsibilities. Conversely, many of the Action Steps identified in Chapter Three represent specific projects that would be implemented within a single year or over a few years.

Table 4A lists these specific projects and ranks them in order of implementation priority (i.e., high, medium, low). Please note that, although specific years are listed for target completion dates, many of the Action Steps will need to rely on grant and/or stakeholder funding in order to be accomplished. Furthermore, it is expected that Table 4A will be revised and updated as needed. This will help to ensure the County's current water planning priorities and list of potential projects are updated on a regular basis. ***Table 4A also does not represent all stakeholders' implementation prioritizes, but simply Big Stone County's priorities.***

Overall, Big Stone County's main water planning priority is to protect and enhance surface water quality. This will be pursued by implementing the Objectives and Action Steps identified in Chapter Three under Goal One.

After surface water quality, the County's next ranked priority water planning issue surrounds addressing surface water management and/or surface water quantity issues. This includes properly managing surface water quantity issues, including ag drainage, stormwater management, and water storage. The third priority area, soil erosion and sediment control, are also directly connected to water quality concerns; however, they also happen to be the main focus of the County's SWCD. Groundwater quality and quantity issues rank fourth, however, the issues are still vital to Big Stone County, primarily due to the connection between having access to good groundwater, and people's health and economic development capacity.

In summary, Big Stone County's priority water planning issues rank in the following order:

1. **Surface Water Quality Issues and Action Steps**
2. **Surface Water Quantity/Management Issues and Action Steps**
3. **Soil Erosion and Sedimentation Control Issues and Action Steps**
4. **Groundwater Quality/Quantity Issues and Action Steps**

Table 4A:
Big Stone County Water Plan Project Implementation Priorities

Action Step Number and Brief Description Ranked as High (H), Medium (M), and Low (L) Priorities ~ Please refer to Chapter Three for more details ~	Target Implementation Year
1.A.5. Monitoring Plan. Prepare an annual Monitoring Plan for assessing the condition of surface and groundwater resources, as well as identifying pollution sources. This Plan should identify the specific sites to be monitored and contain detailed information on the physical, chemical, and biological parameters to be analyzed at each site. 1.A.1.c) Continue the Big Stone Lake Water Quality Monitoring Program and Big Stone Lake tributary monitoring (UMRWD). **H**	2014
1.A.6. Protect and Enhance Water Quality. Implement water quality BMPS to protect and enhance Big Stone and Long Tom Lakes. 1.A.6.a) Complete a full inventory of sewer system compliance. **L** 1.A.6.b) Survey and develop preliminary plans to repair shoreline and tributary erosion. **M** 1.A.6.c) Reduce flows to Big Stone Lake from the Whetstone River. Work with the US Army COE on the restoration of the Whetstone River. **H** 1) Complete diagnostic feasibility study, pre engineering and cost estimate (2015). 2) Complete final engineering and project development plans (2016). 3) Secure Funding (2017-18) 4) Construction/Restoration of river channel (2019-2023).	2015
1.A.7. Marsh Lake Restoration. Support/sponsor the Marsh Lake restoration efforts that will restore the Pomme de Terre River to its historic channel, modify the Marsh Lake Dam, construct fishway, construct secondary drawdown structure, breach dike at abandoned fish pond, install gated culvert in the Louisburg Grade Road (2017). **H**	2017
A.9. Artichoke Lake. Implement water quality BMPS to protect and enhance Artichoke Lake. 1.A.9.a) Stabilize 1,800 feet of shoreline on Artichoke Island. **L** 1.A.9.b) Establish one mile of riparian buffers along Artichoke Creek in sections 13 and 14 in Artichoke Township. **M** 1.A.9.c) Restore one mile of shoreline buffers. Target north shore, east shore, and south bay. **L** 1.A.9.d) Cost-share establishing cattle exclusion fencing to eliminate bank erosion along Artichoke Lake and Artichoke Creek. **L** 1.A.9.e) Target a wetland restoration in Section 24 of Artichoke Township to ease increasing elevations in Artichoke Lake. **M**	2014-2016
1.A.11. East Toqua Lake. Implement water quality BMPS to protect and enhance East Toqua Lake. 1.A.11.a) Restore 4,000 feet of native grass/trees along eastern shoreline. **M** 1.A.11.b) Investigate upstream water retention/stormwater treatment opportunities and implement two (2) projects. **H** 1.A.11.c) Partner with Graceville Golf Course to eliminate unnecessary phosphorus runoff into East Toqua Lake. **H**	2015

1.B.1. ***MPCA Watershed Approach.*** Coordinate the preparation and implementation of the MPCA Watershed Approach. **H** 1.B.1.a) Participate in the intensive monitoring and assessment; watershed characterization and problem investigation; and watershed restoration and protection strategies. 1.B.1.b) Fully participate in the Water Resource Assessment Project(WRAP) on schedule for 2015 for the Upper Minnesota River Watershed. 1.B.1.c) Continue to participate in the on-going WRAP in the Bois de Sioux River watershed. 1.B.1.d) Continue to participate in the on-going WRAP Pomme de Terre River Watershed.	2015
1.B.3. Pomme de Terre Turbidity TMDL Implementation. Partner with the Pomme de Terre River Association Watershed Project to properly implement the Pomme de Terre River Turbidity TMDL Implementation Plan. **M** 1.B.3.a) Replace 5 open tile inlets. 1.B.3.b) Enroll 80 acres into rotational grazing plans. 1.B.3.c) Enroll 320 acres into filter strips. 1.B.3.d) Target 5,000 acres for conservation tillage. 1.B.3.e) Target 80 acres for wetland restorations. 1.B.3.f) Install 5 water and sediment control basins. 1.B.3.g) Target one feedlot buffer project. 1.B.3.h) Install 250 feet of exclusion fencing.	2015
1.B.4. Pomme de Terre Fecal Coliform TMDL Implementation. Partner with the Pomme de Terre River Association Watershed Project to properly implement the Pomme de Terre River Fecal Coliform TMDL Implementation Plan. **M** 1.B.4.a) Install one feedlot waste storage facility. 1.B.4.b) Install 250 feet of exclusion fencing. 1.B.4.c) Enroll 80 acres into rotational grazing plans. 1.B.4.d) Target two feedlot owners with less than 300 animal units to develop manure management plans. 1.B.4.e) Provide cost-share to upgrade 2 non-complying SSTS. 1.B.4.f) Provide low interest loans for SSTS upgrades.	2017
1.C.3. Cattle Exclusions. Identify sites where cattle exclusions are needed. **H** 1.C.3.a) Cost-share five (5) cattle exclusion BMPs. 1.C.3.b) Target Stony Run and Big Stone Lake subwatersheds.	2016
1.D.3 Wastewater Treatment. Cooperatively work with local governmental units and other partners to identify and resolve wastewater treatment-related pollution issues in Ortonville and Browns Valley. **H** 1.D.3.a) Upgrade the Peninsula sewer line/lift station in Ortonville.	2017

2.F.5. SWCD Clean Water Funding Projects. Provide educational, technical, and financial assistance, as available, to landowners for the implementation of erosion and sediment control BMPs. **M** 2.F.5.a) Secure funding for a shoreline stabilization project on ***Artichoke Lake***. Project includes re-sloping the North side of shoreline with rock rip/rap and a vegetative buffer with native grasses and forbs. 2.F.5.b) Support the UMRWD in pursuing funds for a watershed ravine terrain analysis of high priority areas including: Fish, Meadowbrook and Stoney Run Creek. 2.F.5.c) Search available funding sources for a potential project on Toqua Lake to reduce priority pollutants and strengthen the shoreline. 2.F.5.d) Continue to search for funding sources for the "Save the Island" project on Artichoke.	2014
3.G.1. Public Drainage System. Ensure that public drainage systems are operated and maintained in accordance with the State Drainage Law 103E. **M** 3.G.1.a) Annually identify where maintenance is needed. Maintain one mile County ditch annually in high erosion areas that are considered damaged. 3.G.1.b) Assist with restoring proper flows where needed. 3.G.1.c) Redetermine the benefits on systems as requested. 3.G.1.d) Complete County Ditch Inventory to include details on each system. 3.G.1.e) Complete a Drainage Records Modernization project to scan and organize all drainage records. 3.G.1.f) Identify public and private tile lines that flow into the open ditch system. 3.G.1.g) Install five (5) buffers and/or side inlets annually to control erosion and sedimentation and to maintain efficiency. 3.G.1.h) Conduct a buffer inventory to ensure the systems are adequately protected from overland flow and that nutrient and sediment filtration exists.	2017
3.G.4. County Ditch 2. Provide cost-share to landowners for the implementation of conservation drainage BMPS along County Ditch 2 (a tributary to the MN River) 3.G.4.a) Cost-share pipe structures to control erosion. Implement five (5) projects. **M** 3.G.4.b) Cost-share to remove open tile intakes and replace with alternative intakes. Implement five (5) projects. **M** 3.G.4.c) Cost-share two (2) controlled drainage projects. **M** 3.G.4.d) Target County Ditch 2 for the development of a Drainage Management Plan. **H**	2016
3.H.2. Stormwater Management Plans. Participate in the development and implementation of Comprehensive Stormwater Management Plans. **H** 3.H.2.a) Apply for funds to develop a Stormwater Management Plan for the City of Ortonville (2014). 3.H.2.b) Partner with the City of Ortonville on implementing its Stormwater Management Plan.	2014

3.H.3. Stormwater Management Plans. Participate in the development and implementation of Comprehensive Stormwater Management Plans. **H** 3.H.3.a) Apply for funds to develop a Stormwater Management Plan for the City of Graceville (2015). 3.H.3.b) Partner with the City of Graceville on implementing its Stormwater Management Plan.	2015
3.I.4. Flood Mitigation. Work with stakeholders to restore wetlands and other water retention projects to mitigation flooding. 3.I.4.a) Partner with the BdS to restore the Moonshine Lake Basin. **H** 3.I.4.b) Target two (2) flood mitigation/water retention projects in West Toqua Lake subwatershed; Sections 2 and 3 Toqua Township; and Section 1 Graceville Township. **M**	2016
3.I.5. Upper Minnesota River Restoration. Work with stakeholders to restore the original Upper Minnesota River near Ortonville and the Big Stone National Wildlife Refuge. **H**	2018
4.L.3 County Geologic Atlas. Secure funding to complete a County Geologic Atlas. 4.L.3.a) Partner with the DNR and MGS for training on how to understand and use the County's Geologic Assessment and, if/when available, the Geologic Atlas (2017). **M**	2017
5.M.2. Water Plan Funding. Secure funding and stakeholder cooperation to properly implement the Water Plan's Action Steps. **M** 5.M.2.a) Annually apply for Clean Water Funds and similar funding mechanisms to implement Action Steps. 5.M.2.b) Ensure the County is prepared to provide matching funds in order to qualify for BMP grants.	Annually

C. Types and Sources of Water Plan Funds

Big Stone County recognizes the importance of comprehensive local water planning and the key role the County, township and city government must play in water planning decisions that impact water resources. The Water Plan's Goals, Objectives and Action Steps are a reflection of the water resource concerns in the County. Implementation will be based on current needs, funding, and availability of staff.

The annual work plan will provide basic information on the actions intended to be implemented. The County realizes that completion of all Goals and Objectives requires staff and funds beyond the County's budget. It is also understood that State funding cannot provide the funding for all Goals and Objectives, therefore total stakeholder cooperation will be required. The County, through various sources, will pursue outside funding opportunities as they become available. To

properly fund the implementation of the Water Plan and related activities, Big Stone County will rely on a combination of the following types and sources of funding:

- **Natural Resource Block Grant Funds**, including but not limited to:

  - ***MPCA Feedlot Permit Program*** **-** This program was created to protect water quality by improving animal waste treatment systems on feedlots. A county feedlot program is established by transferring of regulatory authority from the Minnesota Pollution Control Agency to the county. This transfer of authority is granted by statute and it allows the Minnesota Pollution Control Agency to "delegate" administration of certain parts of the feedlot program to counties. County feedlot programs have the responsibility for implementing state feedlot regulations including: registration; permitting; inspection; education and assistance; and compliance follow-up.
  - ***Local Water Management Program*** **-** The Comprehensive Local Water Management Program is a voluntary program that requires counties to use local task forces to develop and implement water plans based on local priorities.

  - ***DNR Shoreland Management Program*** **-** the State Shoreland Management Program was established to promote the wise development of shorelands in order to preserve and enhance the quality of surface waters, preserve the economic values of shorelands, and ensure the wise use of water and related resources.

  - **MPCA Subsurface Sewage Treatment Systems (SSTS) -** Based on 1997 changes to Minnesota Statutes, all counties are required to pass ordinances regulating Individual Sewage Treatment Systems countywide. In return, Big Stone County receives money annually to implement the SSTS Program.

  - **Wetland Conservation Act (WCA) Implementation** - The purpose of the Wetland Conservation Act (WCA) is to maintain and protect Minnesota's wetlands and the benefits they provide. The Board of Water and Soil Resources requires that under this grant program, a county must transfer a minimum of $5,000 to the SWCD for WCA activities or a greater amount as agreed upon by the County and SWCD.

- **State, Local, and Federal Grants –** numerous grant funds and programs are made available to implement local water plan or related initiatives, including but not limited to Minnesota's Clean Water Fund.

- **Local Governmental Unit (LGU) Funds/In-Kind –** Some water planning initiatives will require funds spent by the various LGUs involved. This will include cities, townships, and watershed districts, along with Big Stone County. Numerous grant programs count the time spent by LGU representatives as an In-Kind expense.

- **Big Stone County Staff –** Big Stone County will continue to maintain a trained staff to properly implement the various Water Plan initiatives. This expense is normally considered as a cash contribution towards implementing various State and Federal Grant Programs.

- **Landowner Expenses –** Although many Water Plan Action Steps can be completed at no cost to landowners, some projects may require landowners to contribute a portion of the overall costs.

- **Stakeholder Participation –** The various stakeholders involved with implementing the Water Plan will also contribute funds and staffing, as available.

D. Recommended State Cooperation

In order to implement the goals and objectives set forth in the Big Stone County Water Plan, continued cooperation between the County and various State agencies is necessary. In an effort to increase coordination in this effort, the County makes the following recommendations:

1. Counties should continue to be notified of State agency program changes and the availability of funding; and
2. Data collected by State agencies should be readily shared with the County and other water plan stakeholders to avoid duplicative efforts; and
3. State agencies should continue to provide local and/or regional staff to assist local officials with agency programs; and
4. Fees collected at the County level should be allowed to remain within the County to administer and implement water-related programs; and
5. An annual listing of State agency staff that are assigned to water management planning should be created to facilitate increased coordination between local officials and agency staff; and
6. State agencies should provide greater flexibility to counties in setting annual work plan priorities. Priorities should be based upon current needs, funding, availability of staff and changes in State initiatives and regulations.

E. Intergovernmental Conflicts/Resolution Process

In the development of this Plan, there were no intergovernmental conflicts that arose. In the event that an intergovernmental conflict over the Water Plan does occur, the Big Stone County Board of Commissioners shall request the Big Stone County Water Plan Task Force to attempt to negotiate resolution of the conflict. If the Task Force does not resolve the conflict, the County shall petition the Board of Water and Soil Resources (BWSR) for a contested case hearing.

F. Water Plan Amendment Procedure

The Big Stone County Comprehensive Local Water Plan is intended to extend through the year 2023. If the County need to revise the Plan for any reason prior to a new Plan being developed, the County will need to follow Minnesota Statute 103B.314, Subdivision 6. In summary, copies of the proposed amendments (along with the date of the public hearing) need to be sent to BWSR, and local governmental units, and the State agencies for review. After the public hearing, BWSR must approve the amendments and copies shall be sent to the various stakeholders identified by State Statute.

G. Water Plan Key Stakeholders

The success of the County's Water Plan depends upon the collaborative efforts of multiple water plan stakeholders. To highlight the significance of this, the Big Stone County Water Plan Task Force created a separate objective in Chapter Three to "**Engage the Citizens and Stakeholders on key water planning issues and implementation opportunities."** This section briefly outlines some of Big Stone County's key Water Plan Stakeholders, including a link to the stakeholder's current website. It should be noted that watershed organizations were profiled in Chapter Two.

Big Stone County Soil & Water Conservation District (SWCD)

Big Stone SWCD is a local unit of government established under state law to carry out conservation programs at the local level. The SWCD works with Big Stone County landowners to help them manage and protect land and water resources on all private land and also assist with a variety of natural resource concerns. The Mission of the Big Stone Soil & Water Conservation District is "To promote, guide, and provide high quality technical assistance for Big Stone County and for the enhancement and protection of land and water resources through implementation projects that will lead toward effective conservation of soil and water."

Currently, the Big Stone SWCD is responsible for administering the County's Water Plan (traditionally that has been the responsibility of the Big Stone County Land and Resource Management Department). The SWCD office is co-located with the ***USDA Natural Resource Conservation Service (NRCS)***. For more information on the Big Stone County SWCD, visit the following website:

http://www.bigstoneswcd.org/

Big Stone County Environmental Services

The Environmental Services Department is responsible for administering plans and ordinances relating to planning and zoning, solid waste management, comprehensive local water planning and feedlot management. In addition to these local controls, the Environmental Services Department is also responsible for permitting and enforcement programs of the State's individual septic treatment system program, Wetland Conservation Act, and the feedlot program. The department's overall mission in administering these programs is to protect the public's health, safety and welfare.

For more information on Big Stone County's Land and Resource Management Office, please visit the following website:

http://www.bigstonecounty.org/environmental/environmental.vbhtml

Natural Resource Conservation Service (NRCS)

The Natural Resources Conservation Service (NRCS) draws on a long history of helping people help the land. For more than 75 years, NRCS and its predecessor agencies have worked in close partnerships with farmers and ranchers, local and state governments, and other federal agencies to maintain healthy and productive working landscapes. The main connection to the Water Plan is the NRCS administers many of the Farm Bill's conservation initiatives. The Big Stone County NRCS is co-located with the Big Stone County SWCD. For more information, visit the following website:

http://www.mn.nrcs.usda.gov/

State Agencies

Many of Minnesota's State Agencies are involved with some form of environmental protection efforts, especially when it pertains to protecting Minnesota's water resources. A brief synopsis of their major water planning efforts are summarized below.

Board on Water and Soil Resources (BWSR) - The Minnesota Board of Water and Soil Resources (BWSR) was created in 1987, when the Legislature combined the Soil and Water Conservation Board with two other organizations with local government and natural resource ties: the Water Resources Board and the Southern Minnesota Rivers Basin Council. Upon inception, its membership included 17 members: representing soil and water conservation districts; watershed management organizations, counties, citizen members, agency members (University of Minnesota Extension Service, the Minnesota Department of Natural Resources, the Minnesota Department of Agriculture, the Minnesota Department of Health, and the Minnesota Pollution Control Agency). BWSR provides oversight of local Water Management Plans. For more information, visit BWSR's website:

http://www.bwsr.state.mn.us

Minnesota Department of Natural Resources (DNR) – The Department of Natural Resources (DNR) is a key water plan stakeholder in many ways. They assist with monitoring ground and surface water quantity, they are the permitting agency for water appropriations, and they are the main agency working with preventing the spread of Aquatic Invasive Species. In addition, they work with a variety of stakeholders, including the general public, on providing a vast amount of water resource education. For more information, visit the DNR website:

http://www.dnr.state.mn.us/water/index.html

Minnesota Pollution Control Agency (MPCA) - The Minnesota Pollution Control Agency (MPCA) helps protect our water by monitoring its quality, setting standards and controlling what may go into it. They assist with water surface and groundwater quality protection programs including ground water monitoring, stormwater management, municipal wastewater permitting, identifying Impaired Waters, solid and hazardous waste management, Subsurface Soil Treatment System (SSTS) management, and animal feedlot registration and enforcement. They also provide a vast amount of technical and educational assistance on Best Management Practices (BMPs) related to water quality protection and land use practices. For more information, visit MPCA's website:

http://www.pca.state.mn.us/index.php/water/index.html

Minnesota Department of Health (MDH) – The Minnesota Department of Health (MDH) is the primary State agency involved with monitoring and protecting ground and drinking water supplies. They have a vast amount of ground water quality data, and take the lead in developing Wellhead Protection Plans for public water suppliers. They also provide information on the importance of sealing abandoned wells and testing household wells for a variety of contaminants. For more information on MDH's activities, visit MDH's website:

http://www.health.state.mn.us/macros/topics/environment.html

Minnesota Department of Agriculture (MDA) – As a leading agricultural state with more surface waters than any other of the 48 contiguous states, and an abundance of clean drinking water, Minnesota is committed to helping farmers, homeowners, and industry protect these water resources. The MDA is responsible for or involved in many water quality programs and initiatives. These include, but are not limited to, the following:

- Agricultural Best Management Practices Loan Program. A low interest loan program administered by the MDA that helps finance water quality practices.
- Minnesota Clean Water Legacy Act. The MDA currently oversees several research projects aimed at making cleanup efforts more effective.
- Comprehensive Groundwater Protection Act of 1989. The MDA regulates most matters relating to pesticides and fertilizers.

The MDA has also developed the following website to assist with County Water Plans:

http://www.mda.state.mn.us/en/protecting/waterprotection/waterplanning.aspx

Appendix A:

Water Plan Supporting Documents

~ Resolution to Update the Big Stone County Water Plan ~

~ Notice of Plan Update ~

~ Water Plan Public Open House Sign-In Sheet ~

~ Water Plan Task Force Meeting Dec. 12, 2012, Sign-In Sheet ~

RESOLUTION NUMBER 2012-12
BIG STONE COUNTY BOARD OF COMMISSIONERS

Date: June 6, 2012
Motion made by Commissioner Sandberg and seconded by Commissioner Olson.

WHEREAS, Minnesota Statutes, Chapter 103B.301, Comprehensive Local Water Management Act, authorizes Minnesota Counties to develop and implement a local water management plan; and

WHEREAS, the Act requires that a county update and revise their local water management plan on a periodic basis; and

WHEREAS, the Act encourages that a county coordinate its planning with contiguous counties, and solicit input from local governmental units and state review agencies; and

WHEREAS, the Act requires that plans and official controls of other local governmental units be consistent with the local water management plan; and

WHEREAS, Big Stone County has determined that the revision and continued implementation of a local water management plan will help promote the health and welfare of the citizens of Big Stone County.

NOW, THEREFORE, BE IT RESOLVED that the Big Stone County Board of Commissioners resolve to revise and update its current local water management plan.

BE IT FURTHER RESOLVED that Big Stone County will coordinate its efforts in the revision and update of its plan with all local units of government within the County, and the state review agencies; and will incorporate, where appropriate, any existing plans and rules which have been developed and adopted by watershed districts having jurisdiction wholly or partly within Big Stone County into its local water management plan.

BE IT FURTHER RESOLVED that the Big Stone County Board of Commissioners authorizes the establishment of a Water Management advisory committee with the responsibility of revising and updating the plan and who shall report to the County Board on a periodic basis.

BE IT FURTHER RESOLVED that the Big Stone County Board of Commissioners delegates the Environmental Services Office the responsibility of coordinating, assembling, writing and implementing the revised local water management plan pursuant to M.S. 103B.301.

VOTING AYE COMMISSIONERS	X WULFF	X ATHEY	X OLSON	X SANDBERG	X BERNING
VOTING NAY COMMISSIONERS	WULFF	ATHEY	OLSON	SANDBERG	BERNING

STATE OF MINNESOTA, COUNTY OF BIG STONE

I, Michelle R. Knutson, Auditor of the County of Big Stone, State of Minnesota, do hereby certify that the foregoing resolution is a true and correct copy of a resolution duly passed at a meeting of the Big Stone County Board of Commissioners held on the 5th day of June, 2012.

Witness by hand and official seal at Ortonville this 5th day of June, 2012.

Michelle R Knutson

SEAL

Michelle R. Knutson, Auditor

Notice of Decision to Revise & Update Big Stone County's Water Plan

Big Stone County Water Plan Stakeholder:

Big Stone County is currently in the process of updating their Comprehensive Water Plan. As a valuable water plan stakeholder, you are being asked to complete the attached Big Stone County Priority Concerns Input Form. Please feel free to only complete as much of the information as you want(you may have to "Enable Content" after you open the file in order to complete the form…Microsoft Word should prompt you to do this). Simply input your answers by typing into the boxes, save a copy of the document, and e-mail me back a copy by September 14, 2012. The County Water Plan Task Force will then use this information to help write the County's Water Plan.

In addition to completing a Priority Concerns Input Form, Big Stone County is holding an Open House for the County Water Plan on August 28, 2012. The Tuesday, August 28 open house will take place from 4:30 to 6:00 at the Big Stone County Courthouse in the Commissioner's Room. The meeting will be facilitated by Matthew Johnson from Midwest Community Planning, LLC.

Big Stone County has also created an online Water Plan Survey which can be accessed by the following link: http://www.surveymonkey.com/s/X2Q722D

If you have any comments or questions, please contact Darren Wilke, Big Stone County Environmental Officer, at (320) 839-6376 or by e-mail at darren.wilke@co.big-stone.mn.us

Please feel free to forward this email to anyone else who may be interested in Big Stone County's Water Plan. Thank you!

Matt Johnson, on behalf of Big Stone County

--
Matthew Johnson
Midwest Community Planning, LLC
P.O. Box 541 ~ Willmar, MN 56201
midwestplanning@gmail.com
(320) 212-2042

Please Sign In!

Date: August 26

Location: Big Stone County Courthouse

Purpose: Water Plan Open House

	Name	Representing
1.	Matthew Johnson	MCP
2.	Ronda Moad	BSC
3.	Darren Wilke	BSC
4.	Curt Olson	Myself
5.	[illegible]	PF
6.	Blaine Johnson	SWCD
7.		
8.		
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11.		
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19.		

Big Stone County Water Plan Task Force 12-12-12

Name	Representing
Matthew Johnson	Mid West Plan
Norm Hankos	DNR - FEW
Blayne Johnson	SWCD
Donald Deekmann	Farmer Member
David Sill	MN BWSR
Dianne Radermacher	UMRWD
Doug Sonderberg	BSC commissioner
Darren Wilke	Env. Services / Water planner

Appendix B:

Water Plan Priority Concerns Input Forms

- **The Minnesota Department of Agriculture**
- **The Minnesota Pollution Control Agency**
- **The Minnesota Board of Water and Soil Resources**
- **Big Stone Soil & Water Conservation District**
- **Citizens for Big Stone Lake**
- **Toqua Township**
- **City of Graceville**

From: Sip, Rob (MDA) <rob.sip@state.mn.us> Sep 14

to **Jeff**, me, darren.wilke

Matt,

As you know, the Minnesota Department of Agriculture (MDA) hasdeveloped the following Water Plan website to discuss and illustrate MDA priority concerns andrecommended courses of action for local county water plans. So, instead of a lengthy letter of recommendations andpriority concerns, please go to the new website for MDAs information and guidance. Please also share this email withBig Stone County water plan staff. Once you and Big Stone County staff have a chance to review the website, please let me know what your thoughts are on the website. Your feedback will be helpful and is useful as the MDA further refines its recommendations and priority concerns in the future.

http://www.mda.state.mn.us/en/protecting/waterprotection/waterplanning.aspx

A map will will be forthcomingfor Big Stone County that relates to the Groundwater/Surface Water priority concern and the map intent is discussed at that section of the MDA water plan website above. Also, one other item of interest that is not highlighted in the weblink above is the issue of water conservation in all sectors of the local economy in light of the current drought situation. There is discussion about irrigation management but the MDA recommends additional consideration given towards other non-agricultural areas that can reduce water usage.

Lastly, the MDA recommends that Big Stone County review its drainage policy if one exists or develop a drainage policy that utlizes the approaches discussed at the MDA water planning assistance weblink below. Incentives currently exist for landowners to implement a variety of drainage BMPs. The MDA encourages Big Stone Countyto work with the local SWCD and NRCS offices on outreach reagarding the implementation of drainage BMPs.

http://www.mda.state.mn.us/protecting/waterprotection/waterplanning/agdrainage.aspx

Thank you and please contact me with any comments or questions.

Robert L. Sip
Environmental Policy Specialist
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538
651-201-6487 (Telephone)
651-319-1832 (Cell)
651-201-6120 (Fax)

MINNESOTA DEPARTMENT OF AGRICULTURE

651-201-6000
800-967-2474
800-627-3529
TDD

Water Planning Assistance

County Water Plans

In the State of Minnesota, the Board of Water and Soil Resources (BWSR) has oversight to ensure that county water plans are prepared and coordinated with existing local, and state efforts and that plans are implemented effectively. County Water Plans are a major tool for addressing water resource concerns in Minnesota. The Minnesota Department of Agriculture (MDA), through this website and via input on County Water Plans, seeks to provide current planning guidance and references to support the planning process.

The MDA has a role in protecting water quality as it relates to agricultural pesticides and fertilizers. We can provide technical information, financial assistance to implement specific programs, and education and outreach assistance.

At the beginning of the County Water Plan Update Process, State Agencies, including the Minnesota Department of Agriculture are invited to provide input, in the form of Priority Concerns to the County. MDA has selected five Priority Concerns to focus on in Minnesota.

The MDA has redeveloped it's process to comment on local water plans and to provide comments to local units of government. The MDA appreciates the opportunity to work with counties and other partners on these local plans. This information is general guidance primary focused on counties that are conducting 10-year water plan re-writes. The MDA will provide more specific comments to counties that are going through this process. Information provided may not specifically be applicable for 5-year water plan updates. For those counties working on the 5-year updates, the MDA may also provide detailed comments or guidance. In any case, MDA will work closely with the local unit of government to provide information.

Priority Concerns

- Agricultural Drainage, Wetlands & Water Retention
- Agricultural Chemicals & Nutrients in Ground & Surface Water
- Livestock & Manure Management
- Agricultural Land Management
- Targeting BMPs, Aligning Local Plans & Engaging Agriculture

MDA Contacts

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651-201-6000
800-967-2474
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Agricultural Drainage, Wetlands and Water Retention

Why is it important the plan focus on this concern?

Adequate drainage can be a critical component of a successful farm operation. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. New drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes.

What actions are needed for Agricultural Drainage?

Generally, local plans should provide guidance, objectives, goals and action items for further coordination of agricultural water management issues and Conservation Drainage (CD) implementation efforts at the local level. A number of CD practices exist to address water quality issues. There is no single CD practice that will address all agricultural drainage issues. However, multi-purpose approaches to managing water quality and quantity on the agricultural landscape using a suite of CD initiatives is the best approach. It is recommended that:

• Local plans discuss how CD practices can be utilized based on the drainage needs of the county coupled with associated water management issues.

• Local drainage authorities be proactive in encouraging the use of CD practices and designs during repairs and improvements of existing drainage systems.

• Redetermination of Benefits for ditch systems continue to be done in a proactive, consistent and systematic manner.

• Buffer initiatives continue to be implemented consistently and according to current drainage law.

• The local drainage authority continues to base drainage regulations on science and current best management practice knowledge.

• The local drainage authority consider multipurpose drainage approaches as developed by BWSR.

As a point of interest, a technical and scientific committee is currently addressing the effect of tiling upon flooding in the Red River Valley. Here's a weblink where two recent briefing papers can be viewed on this subject. This committee conducted an extensive literature review and developed a number of conclusions from the review in addition to a set of statements and recommendations from these papers. While this document and effort is specific to the Red River Valley, counties may find it useful to reference this report within the drainage discussion of draft water plan amendments or re-writes.

What actions are needed for Wetlands and Water Retention?

Properly locating wetlands and water storage or retention projects can be a strategic component of overall efforts to manage nutrients, sediments and water quantity issues. Counties may consider consulting with the Red River

Watershed Management Board – Flood Damage Reduction Workgroup to determine how flood damage reduction, retention and mitigation efforts have progressed in Northwest Minnesota in conjunction with wetland restoration (via various state and federal programs).
The Red River Valley has a long history of managing floodwater and constructing impoundments to manage floodwaters and significant insight could be gained by corresponding with this organization regarding water retention. A Technical and Scientific Advisory Committee as part of this Board has also developed a number of scientific papers on a variety of issues related to flood damage reduction. Specifically, counties should consider:

• Conducting/updating culvert inventories in conjunction with identifying where water retention projects can be constructed utilizing LIDAR and GIS technologies.

• Identifying projects where tile water from public drainage systems can potentially be used to augment long-term water levels in wetland restorations for water retention purposes.

• Working with local farmers on agricultural wetland mitigation banking initiatives and include agricultural sectors on overall wetland planning efforts.

• Identify areas where constructed wetlands can be located for treating tile drainage water.

What resources may be available to accomplish the actions for Agricultural Drainage, Wetlands and Water Retention?

- MDA Drainage Information
- MDA Drainage Demonstration Sites
- Conservation Drainage Practices
- Conservation Drainage Designs
- University of Minnesota Drainage Research
- Board of Water and Soil Resources
- University of Minnesota Extension Service
- Red River Watershed Management Board

What area(s) of the county is high priority?

All agricultural lands of the county.

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Groundwater and Surface Water Protection: Agricultural Chemicals and Nutrients/Water Use/Land Management in Wellhead Protection Areas

Why is it important the plan focus on this concern?

Agricultural chemicals may contribute to water pollution from runoff into surface waters or infiltration into groundwater. Contaminated groundwater and surface water can affect human health as well as ecosystem quality. The protection of drinking water is an important health issue as approximately 75 percent of Minnesotans obtain their drinking water from groundwater. In areas with vulnerable groundwater, nitrates may exceed the drinking water standard. Once the standard is exceeded, it may be difficult to reduce the levels of contaminants. Therefore, it is highly desirable to prevent contamination of groundwater from occurring through protective actions in areas with vulnerable aquifers.

In areas with elevated nitrates in groundwater it is important to reduce their concentration. Similarly, pesticides may be present in shallow vulnerable groundwater. Agricultural chemicals are also frequently a concern related to surface water impairments under the clean water act. The most common agricultural sources of excess nutrients in surface water are chemical fertilizers and manure. Such nutrients contribute to eutrophication in surface water and have been identified as a source of hypoxia in the Gulf of Mexico.

What actions are needed?

- Continue the sealing of abandoned wells in agricultural landscapes and prioritize efforts for ISTS upgrades in sensitive areas. Utilize the MDA Ag BMP loan program and cost-share programs to assist landowners in addressing these issues.
- Crop Irrigation - Encourage the conversion of older irrigation systems to low pressure. MDA

What resources may be available to accomplish the actions?

The MDA prepares specific maps for counties to assist in local groundwater protection efforts. The maps should be used to prioritize groundwater BMP implementation, protection and restoration efforts. The Water Table Aquifer Sensitivity map classifies the county into three aquifer sensitivity ratings: low, medium and high. These reflect the likelihood that infiltrating precipitation or surface water would reach the water table possibly bringing surface contaminants with it. Priority should be given to the Drinking Water Supply Management Areas (DWSAs), Wellhead Protection Areas and to the areas given a high aquifer sensitivity rating.

Nitrate concentrations found in MDA monitoring wells and wells in the County Well Index (CWI) are also shown on the map. Concentrations greater than 3 mg/L indicate nitrate concentrations above background levels, while concentrations greater than 10 mg/L are above the nitrate drinking water standard. Additional websites:

EVALUATE

- Agricultural Chemical Monitoring and Assessment Programs
- Interactive Source Water Mapping Tool
- County Geologic Map Program
- Farm Nutrient Management Assessment Program (FANMAP)
- Nutrient Management Initiative

PREVENT

- Management Ideas for Wellhead Protection Programs

website on irrigation BMPs. The MDA recommends that this water plan consider the following items specific to irrigation:

- Develop and implement educational programs regarding water management in conjunction with nitrogen fertilizer management. Reference the following websites regarding coarse textured soils:
  - Best Management Practices for Nitrogen on Coarse Textured Soils
  - Best Management Practices for Nitrogen Use - Irrigated Potatoes
- Promote the establishment and data access of local climate stations to irrigators for ET (evapotranspiration) estimates.
- Promote the use and availability of irrigation scheduling software and record keeping.
- Promote the use of the county soil survey and other localized soils information in determining soil moisture holding capacity on a field-specific scale.
- Encourage the use of soil moisture sensors (moisture blocks, tensiometers, etc.) and other advanced tools for determining crop water stress.
- Fertigation (nitrogen applied through the irrigation water) is an excellent option for irrigators to distribute small amounts of nitrogen (20-30 lb/A). See the website above regarding coarse textured soils for details. Note that a fertigation permit and the proper backflow equipment is required by the MDA.
- Provide assistance in irrigation uniformity testing and nozzle calibrations.
- Provide nitrate testing services on irrigation water to help promote N crediting concepts and environmental protection. MDA staff can help provide equipment and technical assistance.
- Promote hybrid and crop selection that have lower water and/or nitrogen requirements.

- Conduct training sessions and workshops for farmers that have agricultural production activities within wellhead protection areas and drinking water supply management areas. Encourage the use of the Nutrient BMP Challenge, Nutrient Management Initiative and similar tools within these areas. More resources regarding drinking water protection in agricultural settings.

What area(s) of the county is high priority?

Rural or agricultural areas that are actively growing crops/producing livestock, coarse textured soils areas and wellhead protection areas that have agricultural activity.

- Water Quality BMPs for Agricultural Herbicides
- Water Quality BMPs for Nitrogen Fertilizers
- Private Well Testing for Pesticide Contamination
- Nutrient and Manure Management Planning
- Nutrient and Manure Management Tables
- Precision Conservation
- Animal Mortality Composting

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Manure Management and Livestock Issues

Why is it important the plan focus on this concern?

Livestock manure used as fertilizer has benefited farmers for decades and if applied properly can meet crop nutrient requirements, build up soil organic material and decrease dependence on commercial fertilizers, increase soil fertility, and in some cases, reduce soil erosion. Manure as fertilizer is a constant reminder that we can reuse and recycle a product that was once thought of as a waste product with insignificant value. However, if manure is not properly applied it can lead to negative environmental impacts.

Manure, feed/silage leachate and milkhouse waste can be high in nutrient values, specifically pertaining to nitrogen and phosphorous. If improperly applied, manure does have the potential to contribute to nutrient loading and bacteria/viral levels of water sources. It is important for counties in the state to encourage the development of manure/nutrient management plans for the livestock producers within their borders. These plans address agronomic application rates for crops planted, buffered or protection areas around sensitive features, and reduce the potential of impacting surface or ground water.

Pasturing livestock is a common practice among livestock producers. Several studies and research through the University of Minnesota show that livestock grazing, if done properly, can enhance the quality of grazing lands. As your county is aware, pasture areas are often those areas that are not conducive to farming and generally contain sensitive landscape and surface water features. Nutrients left by livestock serve as a fertilizer source to pasture plant species, which then utilize and filter the nutrients rather than the nutrients being in excess and exiting the area in the form of runoff.

Types of vegetation, length of time in a pasture, stocking density and water availability are all issues livestock producers must be continued to be educated, in order to produce and utilize a productive, environmentally sound pasture or grazing system. Pastures or grazing systems not managed properly can restrict or eliminate vegetative growth and cover, which in turn can result in potentially negative water quality issues.

Producers in watersheds that are impaired due to fecal coliform/E coli impairments need to be encouraged to be involved in TMDLs developed in the region. Local producer involvement on water plan advisory committees and water quality initiatives will provide additional insight into how producers can work with agencies to improve water quality.

What actions are needed?

- Continue and renew education and outreach efforts on manure/nutrient/pasture management planning and implementation. Work closely with local NRCS staff on this issue as well as regional MPCA staff.
- Encourage livestock producers to work with Technical Service Providers and/or Certified Crop Advisors to better utilize and understand the value of using GIS/GPS technologies in developing:
    - Manure management plans.
    - Comprehensive nutrient management plans
    - Pasture management plans

    - Rotational grazing plans

- Encourage involvement from livestock producers located within impaired watersheds and vulnerable areas in the landscape. One such approach may be the development of a local agricultural advisory committee.
- Continue and/or make it a priority to provide technical and financial assistance for livestock producers to assist them with adopting best management practices to reduce impacts from manure runoff and manure storage structures or areas.
- Encourage livestock producers to participate in an on-farm environmental assessment program. A number of livestock producer groups in the state have specific programs that are available to their members. The Livestock Environmental Quality Assurance (LEQA) program is available to all livestock producers in Minnesota. LEQA is an on-farm environmental assessment and results in a water quality score for a farm.

As ecosystem services are better defined, producers that participate in an on-farm environmental assessment may be better situated to participate in future water quality or ecosystem services trading markets.

What resources may be available to accomplish the actions?

- MDA Ag BMP Loan Program
- Sustainable Ag Loan Program
- NRCS Cost Share Programs
- BWSR Cost Share Funds
- MPCA 319 Grants
- Minnesota Rural Finance Authority Loans
- Livestock Environmental Quality Assurance Program (LEQA)

What area(s) of the county is high priority?

Feedlots with open lots in shoreland or near sensitive water features and land where manure is applied in shoreland or near sensitive water features. Pasture areas located adjacent to shoreland areas.

Contacts/Resources:

MDA Livestock Resources

MPCA Feedlot Program

University of Minnesota Manure Management and Air Quality Education and Research

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Agricultural Land Management

Why is it important the plan focus on this concern?

The MDA recommends voluntary approaches to addressing soil loss and soil erosion issues and offers some suggestions as outlined below to engage agricultural producers in your county. Many advances have been made over the past decades to assist crop and livestock producers in managing their lands, including both from a technological and scientific standpoint. Advancements have also been made in recent years regarding seed technology, nutrient placement and timing of application, crop physiology research and overall land management, including improved soil and water management techniques. However, on certain soils, steep slopes, hydrologic settings or unique landscape features, there may be a need for additional voluntary measures to be implemented.

What actions are needed? What resources may be available to accomplish the actions?

The water plan should consider including discussion about how to further encourage voluntary initiatives, such as the use of:

• Enhanced use of Precision Agricultural Technologies (PCT). While adoption of PCT has been widely adopted and accepted by many agricultural producers, there may be additional opportunities to further encourage the voluntary use of PCT in various agricultural settings of the county.

• Cover crops when appropriate. The use of cover crops may not be conducive to every crop rotation or landscape setting. However, certain cover crops can be beneficial for soil quality improvements, erosion control and soil fertility.

• Innovative residue management techniques that are crop rotation appropriate and designed to fit the needs of individual farming operations.

• Survey tools. The MDA developed a diagnostic tool a number of years ago called Farm Nutrient Management Assessment Process (FANMAP) to get a clear understanding of existing farm practices regarding agricultural inputs such as fertilizers, manures and pesticides. The use of FANMAP or other survey tools may be useful in certain areas of the county when working on a minor watershed basis. Contact the MDA for more specifics about how FANMAP can be used in your county.

• Enhanced promotion of buffer strips, filter strips, water and sediment and control basins and grassed waterways in areas with steep slopes, coarse soils and other high priority areas. The MDA realizes that resources are needed to accomplish promotional and educational initiatives to encourage the adoption of these types of practices. Your county may want to partner with other local units of government in promoting higher levels of adoption for the above mentioned BMPs.

What area(s) of the county is high priority?

All agricultural areas of the county. Specifically important for areas with steep slopes or coarse soils.

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Targeting of BMPs, Aligning Local Plans and Engaging Agriculture

Why is it important the plan focus on this concern?

Technical, financial and staff resources are becoming more difficult to retain and obtain. As resources are scarce, the targeting of agricultural BMPs and conservation structures to the most vulnerable areas of the landscape is critical. The goal should be to target conservation practices to the areas of the landscape where they will be most effective to meet local and regional water quality and ecosystem goals and objectives.

New tools and technologies are making it possible to target conservation practices to specific areas of the landscape. State agencies are working together to support the development of new technologies and to make them available to local partners through training and online resources. This area of research is developing and more tools such as digital terrain analysis, are made available each year. These resources should be used whenever possible. A multi-faceted approach to implementing BMPs on the landscape is an important component of preserving, conserving, enhancing and sustaining water and natural resources. It is recommended that consideration be given towards further developing and enhancing relations with all local conservation partners to align goals, objectives and outcomes of local plans to meet local water quality goals.

It is recommended that the authors of the local water plan continually review and acknowledge areas of shared concern and opportunity between complementary plans and to foster new partnerships. Considerations should be given for further engaging the agricultural sector while developing new plans or updating existing plans. Agricultural producers involved with local TMDL implementation plans, local water management plan advisory committees, NRCS local workgroups and other local committees can provide additional insight into agricultural landscape management.

What actions are needed?

- Utilize targeting tools and technologies to locate BMPs and conservation structures using the targeting tools.
- Consider and implement multifaceted approaches to working with agricultural producers.
- Further engage local partners on conservation implementation such as NRCS staff, local conservation groups, lake associations, etc.
- Foster new relationships with the agricultural sector or enhance existing relations. Consider joint meetings of NRCS local work groups and local water management plan advisory committees.

What resources may be available to accomplish the actions?

Agricultural producers are key stakeholders in working with local, state and federal agencies on implementing positive changes within the agricultural landscape. The Clean Water Fund Activities website was developed to encourage producers to become involved at the local level with impaired waters issues.

The Minnesota Conservation Funding Guide provides more detailed information about funding opportunities. This guide complements, but does not replace the customized local expertise available via SWCDs and other local units

of government to landowners throughout Minnesota. The guide provides contact information for Minnesota's 90 local SWCDs and other organizations that help landowners plan and implement conservation.

The Minnesota Agricultural Water Resource Center may be able to provide additional expertise on engaging agricultural producers in your county.

What area(s) of the county is high priority?

All areas of the county.

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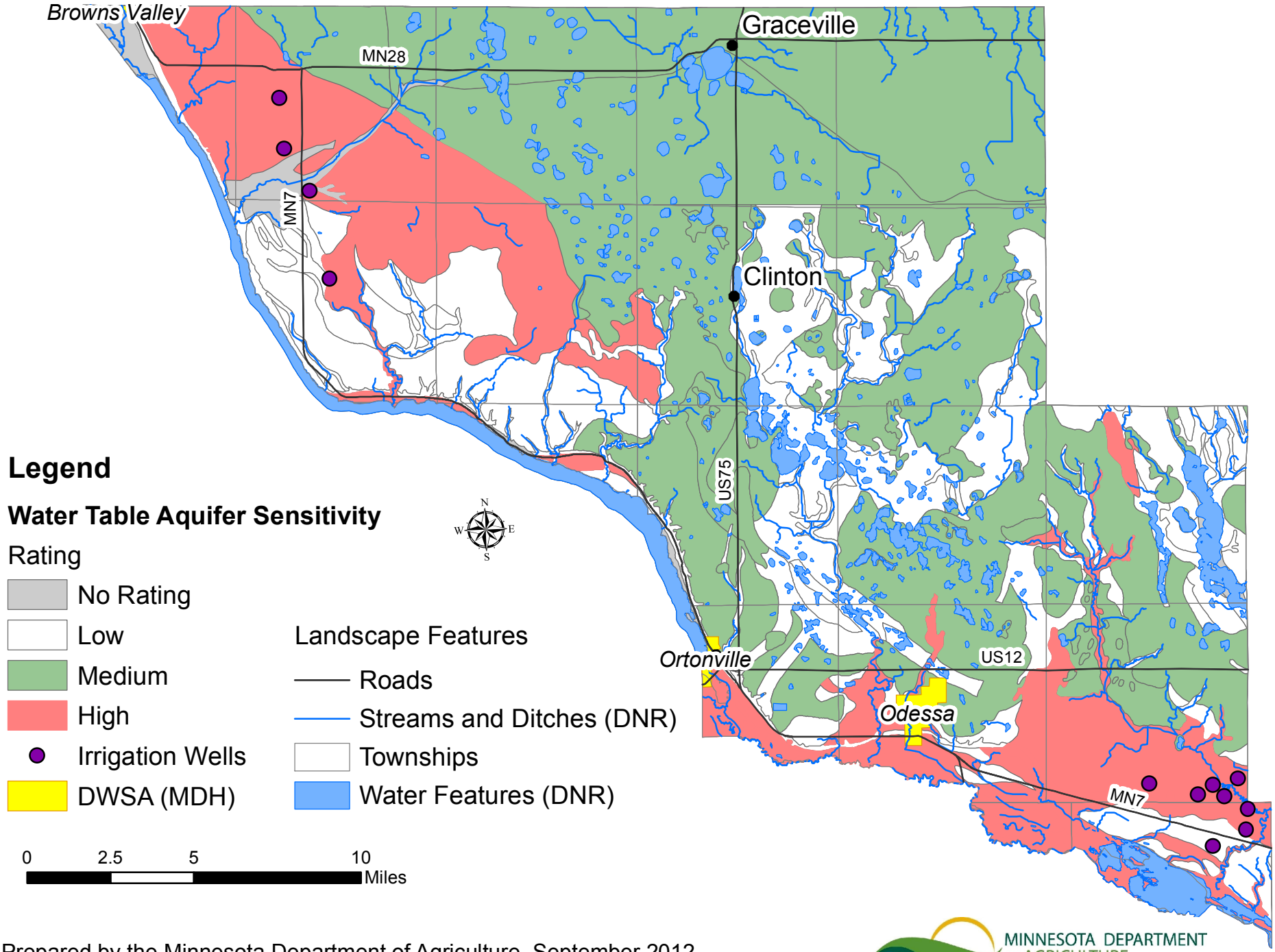
BIG STONE COUNTY WATER TABLE AQUIFER SENSITIVITY

Water Table Aquifer Sensitivity based on Sediment Association of Minnesota Geormophology (DNR, 1997)



Prepared by the Minnesota Department of Agriculture, September 2012

MINNESOTA DEPARTMENT OF AGRICULTURE

Minnesota Pollution Control Agency

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September 4, 2012

Mr. Matthew Johnson
Midwest Community Planning, LLC
P.O. Box 541
Willmar, MN 56201

RE: Big Stone County Priority Concerns
Local Water Management Program

Dear Mr. Johnson:

The Minnesota Pollution Control Agency (MPCA) is pleased to provide priority concerns for consideration in Big Stone County's (County) Local Water Management (LWM) planning efforts. We trust these priority concerns will be helpful with developing the forthcoming Priority Concerns Scoping Document (PCSD) and Local Water Management (LWM) Plan.

1. Impaired Waters/Total Maximum Daily Loads

The federal Clean Water Act requires states to adopt water quality standards to protect the nation's waters. These standards define how much of a pollutant can be in a surface and/or groundwater while still allowing it to meet its designated uses, such as for drinking water, fishing, swimming, irrigation or industrial purposes. Many of Minnesota's water resources cannot currently meet their designated uses because of pollution problems from a combination of point and nonpoint sources.

Addressing impaired waters in LWM plans is voluntary. However, the MPCA strongly encourages counties to consider how their LWM plans address impaired waters, as identified on the "Final List of Impaired Waters" available on MPCA's website at:
http://www.pca.state.mn.us/water/tmdl/tmdl-303dlist.html#finallist

It is suggested the LWM Plan:

- identify the priority the County places on addressing impaired waters, and how the County plans to participate in the development of total maximum daily load (TMDL) pollutant allocations and implementation of TMDLs for impaired waters;
- include a list of impaired waters and types of impairment(s) (see table below);
- identify the pollutant(s) causing the impairment (see table below);
- address the commitment of the County to submit any data it collects to MPCA for use in identifying impaired waters, provide plans, if any, for monitoring as yet unmonitored waters for a more comprehensive assessment of waters in the County; and
- describe actions and timing the County intends to take to reduce the pollutant(s) causing the impairment, including those actions that are part of an approved implementation plan for TMDLs

Regional TMDL reports for mercury have been approved by the U.S. Environmental Protection Agency (EPA.) Therefore, MPCA recommends counties address waters listed for pollutants/stressors other than mercury in their LWM plans.

The 2010 list of Impaired Waters in the County is provided in the table below.

Clean Water Act Section 303 [d] List of Impaired Waters in the County.

Reaches

Assessment Unit	ID	Impaired Use	Impairment Cause	Impairment Status
Minnesota River: Big Stone Lk to Whetstone R	07020001-506	AqCons	Mercury in Fish Tissue	TMDL Approved
Minnesota River: Whetstone R to Yellow Bank R	07020001-503	AqCons	Mercury in Fish Tissue	TMDL Approved
Minnesota River: Yellow Bank R to Marsh Lk	07020001-511	AqCons	Mercury in Fish Tissue	TMDL Approved
Stony Run Creek: Unnamed cr to Minnesota R	07020001-531	AqLife	Fishes Bioassessments	TMDL Required
Twelvemile Creek, West Branch: T125 R46W S33, south line to Twelvemile Cr	09020102-511	AqLife	Oxygen, Dissolved	TMDL Required

Lakes

Assessment Unit	ID	Impaired Use	Impairment Cause	Impairment Status
Marsh	06-0001-00	AqCons	Mercury in Fish Tissue	TMDL Approved
Artichoke	06-0002-00	AqCons	Mercury in Fish Tissue	TMDL Approved
Big Stone	06-0152-00	AqCons	Mercury in Fish Tissue	TMDL Approved
East Toqua	06-0138-00	AqCons	Mercury in Fish Tissue	TMDL Approved
Long Tom	06-0029-00	AqCons	Mercury in Fish Tissue	TMDL Approved

The County should consider participating with other units of government in the watershed to develop and implement TMDL implementation plans once TMDL studies receive final approval from the EPA. Grant funding applications for TMDL impaired water implementation projects may request citations from local water plans identifying water bodies as County priorities. This documented commitment by a County may improve an applications ranking and ultimately the County's ability to secure implementation funding.

MPCA Environmental Data Access System
The water quality section of MPCA's Environmental Data Access (EDA) system allows visitors to find and download data from surface water monitoring sites located throughout the state. Where available, conditions of lakes, rivers or streams that have been assessed can be viewed. We encourage the County to visit this site for water quality monitoring data which may be useful with LWM planning efforts: http://www.pca.state.mn.us/data/edaWater/index.cfm

Areas of the County that should be considered priority waters are the impaired water bodies and reaches of impaired water bodies on the Clean Water Act 303 [d] TMDL List. We believe the County should consider impaired waters as a top priority for discussion in the LWM Plan.

2. Watershed Approach
Since 2007, the MPCA has been assessing waters by the process known as the Watershed Approach (http://www.pca.state.mn.us/index.php/water/water-types-and-programs/surface-water/watershed-approach/watershed-approach.html) as recommended by the Clean Water Council and directed by the Minnesota Legislature http://www.pca.state.mn.us/index.php/view-document.html?gid=6125.

The Watershed Approach is a 10-year rotation for addressing waters of the state on the level of Minnesota's major watersheds.

The Watershed Approach process begins with the intensive watershed monitoring and assessment phase of the project area that is at the 8 digit hydrologic scale. The MPCA and its partners have begun implementing this approach referred to as the Watershed Restoration and Protection (WRAP). WRAPs that are currently underway or scheduled for the County are the Pomme de Terre River WRAP project which began this approach in 2007, and the Upper Minnesota River is scheduled to start in 2015. The MPCA encourages the County to incorporate the Watershed Approach and WRAPs from these watersheds once completed.

The Watershed Approach focuses on the watershed's condition as the starting point for water quality assessment, planning, implementation, and measurement of results. This approach may be modified to meet local conditions, based on factors such as watershed size, landscape diversity and geographic complexity. This approach will ultimately lead to a more comprehensive list of impaired and non-impaired waters. This list will be used to develop TMDLs and restoration strategies for impaired waters as well as protection strategies for non-impaired waters. The development of strategies will rely greatly on County participation and counties will likely be asked to provide priority management zones (PMZs) to target restoration and protection activities. Targeted PMZs will be an important step toward receiving funding for implementation activities. Communication and coordination between counties located in the WRAP watersheds will be essential to develop a comprehensive and effective implementation plan.

Recommended actions include monitoring and gathering data and information. MPCA employs an intensive watershed monitoring schedule that will provide comprehensive assessments of all of the major watersheds on a 10-year cycle. This schedule provides intensive monitoring of streams and lakes within each major watershed to determine overall health of the water resources, to identify impaired waters, and to identify those waters in need of additional protection to prevent future impairments. It is suggested that the LWM Plan address Surface Water Assessment Grants and additional County monitoring that may be used in the WRAP.

- **Assess the data.** Based on results of intensive watershed monitoring in step one, MPCA staff and its partners conduct a rigorous process to determine whether or not water resources meet water quality standards and designated uses. Waters that do not meet water quality standards are listed as impaired waters. It is suggested that the LWM Plan address data submittal and representation to participate in the assessment process for use in the WRAP.

- **Establish implementation strategies to meet standards.** Based on the watershed assessments, a TMDL study with restoration and/or protection strategy is completed. Existing LWM plans and water body studies are incorporated into the planning process. It is suggested that the LWM Plan address participation in development of restoration and protection strategies developed through the WRAP as well as priority management zones.

- **Implement water quality activities.** Included in this step are all traditional permitting activities, in addition to programs and actions directed at nonpoint sources. Partnerships with state agencies and various local units of government, including watershed districts, municipalities, and soil and water conservation districts, will be necessary to implement these water quality activities. It is suggested that the LWM Plan address implementation of restoration and protection strategies once developed through the WRAP.

It is suggested the County maintain the current relationships with the Pomme de Terre River Watershed Project group and the Upper Minnesota River Watershed District for continued participation in the watershed project efforts. Financial resources for coordination and communication between counties could include, but not be limited to, grants from the Clean Water Fund (CWF), Clean Water Partnership (CWP), Surface Water Assessment Grant (SWAG), Legislative Citizen Commission on Minnesota Resources (LCCMR), and Section 319. Technical assistance could be sought from an advisory group of local and state agency staff, local decision makers and landowners.

High priorities by year (start-completion) include: Pomme de Terre River (2007-2012) and Upper Minnesota River (2015-2019).

3. Agricultural Drainage Management

The MPCA recognizes the importance of agricultural drainage for maintaining crop production in Big Stone County. However, agricultural drainage can have unintended consequences on the hydrology and water quality of Big Stone County lakes and rivers. Public and private drainage systems provide a direct conduit for transport of pollutants such as nutrients, pesticides, and herbicides to water bodies degrading their recreational, aesthetic and functional value. In addition, drainage short-circuits the landscape's water storage potential resulting in flashier river systems with higher peak flows. The higher flows result in bank and channel erosion as the streams adjust to the increased energy and force. The down cutting and widening of the channel limits stream access to the natural floodplain reducing sediment deposition and increasing sediment transport.

The LWM Plan prescribes several practices to mitigate the effects of agricultural drainage including wetland restorations, alternative tile intakes and vegetated filter strips. The MPCA recommends that the County develop a comprehensive Drainage Management Plan (DMP) that addresses present and future drainage needs as well as methods to mitigate the unintended consequences as described above. To ensure the DMP is maintained and utilized, the MPCA recommends it be incorporated into the County local water management plan and that it include explicit language that the County drainage authority

should consult the plan with any petition to improve a public drainage system and consider options for mitigating increases in flow volume. A concerted effort by local decision makers, local and state agencies and landowners will be necessary to ensure sufficient drainage for crop production while maintaining and improving Big Stone County water quality.

Financial resources for development of a comprehensive DMP could include but not be limited to grants from the CWF, LCCMR, and Section 319. Technical assistance for development of the plan could be sought from the state Drainage Management Team and/or an advisory group of local and state agency staff, local decision makers, and landowners.

High priority areas would include impaired water bodies and reaches of impaired water bodies on the Clean Water Act 303 [d] TMDL List, though any area with high resource value waters should be considered.

4. General Update of LWM Plan Information Relative to MPCA Programs
Some terminology on MPCA programs is out of date (ex. STORET is now EQUIS; individual sewage treatment system (ISTS) is now subsurface sewage treatment system (SSTS).

It is recommended to update MPCA information and terminology as needed.

Resources that may be available to accomplish this action include MPCA's website (www.pca.mn.us), and appropriate program staff.

If we may be of further assistance, please contact Mark Hanson in the Marshall Regional Office at 507-476-4259 or Dave L. Johnson in the St. Paul Office at 651-757-2470.

Thank you and we look forward to reviewing the forthcoming PCSD and LWM Plan.

Sincerely,

Rebecca J. Flood

Rebecca J. Flood
Assistant Commissioner

RJF/DLJ:kb

cc: Darren Wilke, Big Stone County
Jeff Nielsen, Minnesota Board of Water and Soil Resources
Lee Ganske, Minnesota Pollution Control Agency, Mankato Office
Mark Hanson, Minnesota Pollution Control Agency, Marshall Office

Your Agency/Organization: Minnesota Board of Water and Soil Resources (BWSR)

Submitted by (name): David Sill Submitted on: 9/14/12 (via e-mail)

1. Top Priority Concern: <u>Erosion and sediment control; nutrient management on agricultural land</u>

Why is it important the plan focus on this concern (include or cite relevant data)? According to the "2003 – 2012 Big Stone County Comprehensive Local Water Plan", the single largest land use in the County is cultivated agricultural land--approximately 75%. Farming practices change over the decades. What once was a diversified agricultural landscape is now primarily cash grain operations. Cash grain operations tend to have soils that are more susceptible to water and/or wind erosion, which can and do impact the quality and quantity of surface and ground water resources. The rivers, shallow lake/wetlands and streams of the County (and Minnesota) depend on best management practices to be implemented on these lands so water quality degradation from sediment of eroding lands does not occur. To provide for the long-term productive capacity of the County's soil resource base (and the quality of surface water), these agricultural soils need to be protected.

Agricultural runoff can be a significant source of nutrient loading to surface and ground waters. Commercial fertilizers as well as animal waste (manure) from livestock and hog producers are utilized for crop production on agricultural land. Proper application of commercial fertilizer and animal waste is critical in reducing loss of these nutrients to receiving waters. Preventing soil loss due to erosion and attached phosphorous from entering receiving waters will help to improve water quality.

The Minnesota Pollution Control Agency continues to update its <u>Impaired Waters listing</u>, which includes specific reaches of surfaces waters in the county. Implementation of best management practices are needed to protect and keep the productive soils in place, provide for proper utilization of chemical fertilizers and animal waste, and to retain precipitation on the land that aids in the control of surface water runoff.

What actions are needed?

- Continue and accelerate the promotion and marketing of state and federal conservation program opportunities to land owners/users – identifying priority waters and landscapes to target.
- Increase the assistance to landowners in implementing agricultural best management practices (structural and land use change).
- Continue and accelerate *technical assistance* to landowners planning and implementing agricultural best management practices within targeted watershed, sub watershed, or minor watershed areas.
- Continue the participation with watershed management projects and groups to pool financial and technical resources utilizing water quality and quantity monitoring data and trends, and targeting knowledge.
- Educating the land owners and users to follow University of Minnesota nutrient management recommendations.
- Regarding non field erosion - investigate, gather and record gully and bank survey information via local monitoring data from watershed districts (Upper Minnesota River, Bois de Sioux) or the Pomme de Terre River watershed project regarding high priority erosion sites.
- Utilize LiDAR analysis to identify critical erosion areas, catchment areas, etc. to help prioritize and target implementation activity.

What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)

- USDA Farm Bill conservation provisions administered by NRCS (Natural Resources Conservation Service) and FSA (Farm Service Agency) at the county level.
- State Cost Share Program, Re-Invest in Minnesota Reserve (RIM) Program, etc. through local SWCD.
- State Clean Water Fund Program opportunities available through the County and local SWCD.
- State Revolving Loan Fund through Minnesota Department of Agriculture.
- Possible private grant opportunities.
- Conservation/implementation programs through Minnesota Pollution Control Agency.
- Ongoing educational opportunities provided by the University of Minnesota, Minnesota Department of Agriculture.
- Information available through MN Pollution Control Agency, MN Dept. of Agriculture, University of MN.

What areas of the county are high priority? Meet with local partners (Upper MN River Watershed District, Bois de Sioux WD, Pomme de Terre River Watershed Project, the SWCD and federal partners to identify targeted, priority areas (stream reaches/sub watersheds) for implementation - using any available monitoring results, data or trends.

2. **Second Priority Concern: Feedlot Management and Non-conforming Subsurface Septic Treatment Systems**

Why is it important the plan focus on this concern (include or cite relevant data)? The "2003 – 2012 Big Stone County Comprehensive Local Water Plan" identifies feedlots and Individual Septic Treatment Systems (ISTS), also called subsurface septic treatment systems (SSTS), as potential pollution sources in the County. These pollution sources if improperly managed will contribute to the nutrient and contaminate loading of water resources in the County. The County has capable staff in place to provide assistance to land owners for both resource issues. This assistance is a critical component in properly managing water resources. There are MN Statues in place that provide for enforcement actions to address problems associated with feedlots and non-conforming septic systems. Enforcement action must take place as warranted, *but* incentives and assistance to obtain voluntary compliance is a better approach. Financial incentives opportunities are available. The County needs to continue to seek out these opportunities to help bring the land owners in to compliance.

What actions are needed?

- Continue to be a Feedlot Program delegated county.
- Accelerate County/SWCD staff assistance in engaging and assisting feedlot operators.
- Complete a Level III feedlot inventory utilizing Clean Water funding assistance.
- Continue to implement the County's SSTS Program.
- Continue to provide County staff to administer the SSTS Program and assist land owners.
- Seek out Federal, State and other funding sources to provide cost-share assistance and loan program assistance to land owners/users.
- Educate the land owner/user and general public on feedlot and SSTS issues and health effects as well as water quality concerns.
- Review and revise local ordinances as needed.

What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)

- Technical: NRCS, SWCD, Technical Service Area (area SWCD engineering), private.
- Financial: Federal Farm Bill, State Cost Share, MN Clean Water Fund, MN Pollution Control Agency programs (Federal 319 program opportunities), MN Department of Agriculture Loan program.

What areas of the county are high priority? Note areas identified on the Impaired Waters list for fecal or E-coli and nutrients. Use any available monitoring data, trends or inventory information. (*For feedlot issues a Level III feedlot inventory would provide prioritization of problem areas.)* Also note – when seeking grant funding for these activities a riparian location will be a higher priority.

3. **Third Priority Concern: Drainage water management planning / drainage system maintenance and repair**

Why is it important the plan focus on this concern (include or cite relevant data)? According to the "2003 – 2012 Big Stone County Comprehensive Local Water Plan", there is a system (miles) of county open public ditches in the County. Many of these systems probably date back to the early 1900s and require repair and maintenance. In many cases the systems were not designed for the current drainage volume. Private drainage of agricultural lands adds many miles of drainage ditches and underground tile that tie to the county's public system. The waters of these public (county) and private drainage systems make their way to streams and lakes, in turn impacting the water quality of these water resources.

Many counties are beginning to complete a systematic redetermination of benefits for each of their county drainage systems. Big Stone County should consider this also.

Drainage systems that require repair can make use of new drainage water management technologies that can aid in flood water control and water quality improvement as well as address the drainage needs for agriculture. Properly maintained drainage systems support the productive capability and erosion protection of soils.

What actions are needed?

- Continue and accelerate the promotion and marketing of conservation buffers.
- Continue to promote and market State and Federal conservation programs (RIM, CRP, WRP, etc.).
- Develop and implement a plan to complete a systematic redetermination of benefits for each county drainage system.
- Continue to use and update a GIS-based county-wide public drainage system inventory to be used to compliment management efforts and use as a tool for current and future water resources management efforts.
    - Additional information could include identifying systems that are overloaded, areas needing filter/buffer strips, potential wetland restorations/water storage areas, potential sites via landowner expressed interest for drainage water management bmps, etc.
- Market and implement Drainage Water Management – Conservation Drainage bmps to land users.
- Select and assess several drainage systems to learn more about the water quality of each system.
- Overview the economic benefits and concerns of these selected systems.
- Identify areas of these systems that are overloaded and research the creation of water storage areas.
- Manage these systems at the watershed scale when repairs, maintenance or improvements are being considered.
- Seek out information from other county drainage authorities regarding management of their drainage systems.
- Make use of technologies that aid in flood water reduction and water quality improvement in the design and implementation of public drainage system repair and maintenance.
- Provide information and assistance to private drainage system operators to include technologies used on public drainage systems.

What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)

- Long-term set-aside programs such as RIM, CRP, WRP via local NRCS and SWCD office.
- Clean Water Fund application opportunities via County and local SWCD.
- Watershed Districts (UMRWD and Bois de Sioux WD) and Watershed projects (Pomme de Terre River).
- Utilize local ditch authority funding mechanism.
- University of MN Research and Outreach Centers (Waseca, Lamberton, and Morris).
- MN Department of Agriculture / Conservation Drainage (contact Mark Dittrich).
- University of MN Agricultural Engineering Department.
- MN Board of Water and Soil Resources Drainage Engineering staff.

What areas of the county are high priority? County-wide application – <u>but I would encourage some identification of several priority or targeted county drainage systems that will be your focus over the next 5-10 years. Where do you want to place emphasis in the next 5-10 years – I would identify it as part of this priority concern.</u>

4. Fourth Priority Concern: <u>Address accelerated runoff impacts via Wetland Restoration, Protection and Enhancement / Water Storage</u>

Why is it important the plan focus on this concern (include or cite relevant data)? Like many other agricultural counties, most of the pre-settlement wetlands were drained beginning in the early 1900s (the start of public ditching) and probably reached its peak in the mid-1900s. This effort was for the purpose of land improvement. We now know that wetlands and flood plains provide for a wide range of functions including: helping to control flooding; purifying waters by recycling nutrients, filtering pollutants, and reducing siltation; controlling erosion; sustaining biodiversity and providing habitat for plants and animals; recharging groundwater, augmenting water flow, and storing carbon.

Gains have been made in restoring lost wetlands through the efforts of the local SWCD and County, the Watershed Districts, State and Federal partners, landowners and sportsman groups via conservation programs and state/federal wetland protection programs. These efforts need to continue to balance ongoing land use demands from agricultural and development pressures. Retaining water on the landscape in the watershed by wetland protection and restoration, other water storage opportunities, and restoring existing flood plain connectivity will help address priority concerns of erosion control and storm water quantity and quality.

What actions are needed?

- Continue and accelerate the promotion and marketing of wetland preservation and restoration programs (RIM, CRP, WRP, etc.) – develop a strategy / priorities for drained wetland restoration.
- Continue administering the MN Wetland Conservation Act.

- Continue educational efforts on the function and value of wetlands.
- Consider targeted inventory and identification of high priority areas for wetland restoration/enhancement/water storage.
- Continue administration of shore land and flood plain ordinances.
- Identify and target natural corridors to be enhanced or protected – increase/restore floodplain connectivity.
- Determine protection level for targeted areas through local ordinance development and voluntary conservation programs.
- Focus stream bank restorations in headwater areas.
- Partner with the Watershed District on water storage and flood damage reduction projects.

What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)

- Long-term set-aside programs such as RIM, CRP, WRP (Wetland Reserve Program) via local NRCS and SWCD office.
- Clean Water Fund grant opportunities.
- Wetland Inventory Guidebook - June 1991, available through MN BWSR and MN DNR (Dept. of Natural Resources).
- Watershed District and Watershed Project opportunities.

What areas of the county is high priority? This can be determined more thoroughly as inventories and assessments are completed. I would encourage some targeted watershed or sub watershed areas to be identified for this priority concern and 5-10 year implementation window.

Other Considerations.

When developing the county's Priority Concerns Scoping Document that will be distributed for state agency review and comment, don't forget to add a brief section that talks about implementing the County's ongoing programs and ordinances. Although these ongoing programs and ordinances may not be among the selected priority concerns for the next five or ten years, implementing them will work hand-in-hand with the selected priority concerns to protect and improve the natural resources of the county.

Note:

To have a useful, fundable plan (i.e. receive competitive grant funds) targeting and prioritization of priority concerns, and goals and actions will be needed. You will not be successful if your plan reflects implementation with a county wide or even watershed wide emphasis. A more targeted approach will be necessary!

Big Stone County 2012 Local Water Plan
Priority Concerns Input Form

Please save a copy and email to Matthew Johnson, Midwest Community Planning, LLC midwestplanning@gmail.com by September 14, 2012

Your Agency/Organization: Big Stone Soil & Water Conservation District

Submitted by (name): Blayne Johnson- District Technician

1. Top Priority Concern: Water Quality

Why is it important the plan focus on this concern (include or cite relevant data)? Protecting our ground and surface water is essential for providing healthy and sustainable water for future generations.

What actions are needed? Targeting more priority locations and concentrating upcoming efforts and funding on establishing a standard for future involvement.

What resources may be available to accomplish the actions? Clean Water Funds are available, Outdoor heritage funding, grants, non-profit organizations, others.
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority? MN River Watershed Area. All tributaries directly impacting Big Stone Lake.

2. Second Priority Concern: Erosion Control

Why is it important the plan focus on this concern (include or cite relevant data)? To control downstream sediment flow to reduce rate of loss to prevent shoreline, habitat and property destruction.

What actions are needed? Buffers, rain gardens, less water movement throughout the county, increased conservation awareness to educate public on what is happening/needs to be done.

What resources may be available to accomplish the actions? Clean Water Funds, grants, non-profit organizations, volunteer, lake associations, private land owner involvement.
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority? All water bodies, lakes, streams and ditches.

3. Third Priority Concern: Loss of habitat

Why is it important the plan focus on this concern (include or cite relevant data)? Habitat loss not only effects our wildlife but also relates to future practices for areas available to sustain rising environmental impacts.

What actions are needed? Replace, restore and/or addition of permanent habitat locations; trees, buffers, filter strips.

What resources may be available to accomplish the actions? Clean Water Funds, grants, non-profits, land owner involvement, lake associations.
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority? Land located next to or adjacent to water bodies.

Big Stone County 2012 Local Water Plan
Priority Concerns Input Form

Please save a copy and email to Matthew Johnson, Midwest Community Planning, LLC
midwestplanning@gmail.com by September 14, 2012

Your Agency/Organization: CITIZENS FOR BIG STONE LAKE

Submitted by (name): CHARLES MOELLER, PRES.

1. Top Priority Concern: TO MAINTAIN LEVEL STABILITY AND IMPROVE WATER QUALITY ON BIG STONE LAKE.

Why is it important the plan focus on this concern (include or cite relevant data)?

WE HAVE EXPERIENCED CONSIDERABLE FLOODING IN RECENT YEARS.

What actions are needed?

IMPROVE UPSTREAM CONTROL + BUFFERING, RESTORE THE WHETSTONE RIVER TO ITS ORIGINAL CHANNEL.

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

UPPER MINNESOTA RIVER WATERSHED DISTRICT - DIANNE RADERMACHER ADMINISTRATOR

BIG STONE COUNTY CONSERVATION DISTRICT - NRCS

What areas of the county are high priority?

WESTERN EDGE - BORDERING BIG STONE LAKE

2. Second Priority Concern:

REVIEW CURRENT DRAINAGE POLICIES

Why is it important the plan focus on this concern (include or cite relevant data)?

MAINTAIN WETLANDS - CONTROL WATER FLOW

What actions are needed?

ESTABLISH A COUNTY-WIDE POLICY.

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

MODELS FROM OTHER COUNTIES AND STATES

What areas of the county are high priority?

ENTIRE COUNTY

3. Third Priority Concern:

Why is it important the plan focus on this concern (include or cite relevant data)?

What actions are needed?

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority?

Big Stone County 2012 Local Water Plan
Priority Concerns Input Form

Please save a copy and email to Matthew Johnson, Midwest Community Planning, LLC midwestplanning@gmail.com by September 14, 2012

Your Agency/Organization: Toqua Township

Submitted by (name): Mark Kleindl (Clerk)

1. Top Priority Concern:

Why is it important the plan focus on this concern (include or cite relevant data)?

Improve drainage system to avoid future flooding

What actions are needed?

2 miles worth of ditch

What resources may be available to accomplish the actions? FEMA - landowners + Watershed both Upper Minn + Bois de Sioux
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority?

Toqua Township

2. Second Priority Concern:

Why is it important the plan focus on this concern (include or cite relevant data)?

What actions are needed?

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority?

3. Third Priority Concern:

Why is it important the plan focus on this concern (include or cite relevant data)?

What actions are needed?

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority?

Big Stone County 2012 Local Water Plan
Priority Concerns Input Form

Please save a copy and email to Matthew Johnson, Midwest Community Planning, LLC
midwestplanning@gmail.com by September 14, 2012

Your Agency/Organization: Graceville

Submitted by (name): Scott Bauer

1. Top Priority Concern: Lake Toqua

Why is it important the plan focus on this concern (include or cite relevant data)? The Lake has been filling with dirt the past ten years. Algae growth has been extreme.

What actions are needed? Ditch 8 needs filter strips, Other areas also could be looked at for this. Golf Coarse chemical run-off, city storm sewer run-off issues.

What resources may be available to accomplish the actions? Soil and Water Conservation District. Public knowledge might help. Others unknown.
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority? Graceville and Moonshine Townships

2. Second Priority Concern: Ditch 4 and 12 mile creek

Why is it important the plan focus on this concern (include or cite relevant data)? They are the outlet to all run-off in the north end of Big Stone County

What actions are needed? Ditch needs cleaning, 12 mile needs cleaning , filter strips etc. to help with water quality down stream

What resources may be available to accomplish the actions? unknown
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority? Graceville township, Traverse County

3. Third Priority Concern:

Why is it important the plan focus on this concern (include or cite relevant data)?

What actions are needed?

What resources may be available to accomplish the actions?
(include contact names, funding sources, partnerships, citizen volunteers, etc.)

What areas of the county are high priority?

Appendix C:

Public Review and Adoption Documents

Minnesota Board of Water & Soil Resources

Date: August 27, 2013

To: Darren Wilke, Big Stone County Environmental Office

From: David Sill, BWSR Board Conservationist

RE: Comments – *Draft* Big Stone County Local Water Management Plan for Public Hearing

Enclosed are my comments regarding the Big Stone County Local Water Management Plan draft document (2014 – 2023) which was noticed for public hearing on September 3, 2013:

- Page iv – Executive Summary – I would suggest adding a list of the Big Stone County Water Plan task force members at the beginning of the Executive Summary.
- Prairie Plan – prairie core area map – Plan Consultant requested a reminder to include this map in the assessment section or appendix of the plan document; consultant has an electronic version of this map available.
- Conservation Lands Summary – Statewide Table – On August 1, 2013 BWSR updated this table highlighting conservation lands throughout the state broken down by county. I would suggest adding this reference information in the appendix of your plan. I have attached this document for your use.
- Page 2-24 – in the first paragraph on this page you mention the Pomme de Terre WRAP is currently underway. Actually this WRAP is completed!
- Page 2-42 – second paragraph – where you write --- One of the categories in the last BWSR Clean Water Fund competitive grant RFP (FY2013) was: <u>Clean Water Conservation Drainage Management Grants</u> – the purpose of these grants ….
  This is correct wording and I would leave the text as written. *You may want to add this:* However for FY2014 and on - the installation of conservation practices on drainage systems are still eligible, in the future however they simply will be part of a larger category of Clean Water Funds called <u>BWSR Projects and Practices</u> and not a separate grant program.
- Page 3-6, Action 1.B.1d - Suggest re-writing to say --- Continue to participate in the completed WRAP in the Pomme de Terre River Watershed.
- Page 3-7, Action 1.B.3.c – Enroll 320 acres into filter strips. Comment - <u>320 acres</u> seems like a really high acreage figure for Dry Wood Creek. Are you sure this estimated number is correct?
- Page 3-22, Action 4.K.1.a – possibly re-word this action. Do you mean secure funding <u>*which would include*</u> technical assistance……..
- Page 3-26, Action 5.M.3.c – Suggest re-writing to say – Participate fully in the Watershed Restoration and Protection Strategy (WRAP) process – UMRW beginning in 2015; BdS in progress; PdT completed.

- Page 4-2 – paragraph one – Please re-write --- the water plan coordinator position is not housed within the SWCD!
- Page 4-3 – 4-6 – Table 4A seems to need some additional work and thought. Please work with plan consultant to add more implementation year targets and High, Medium, Low priority designation. (Suggest working with plan consultant - see similar table in the Pope County Water Plan for detail level.)

c: Matthew Johnson, Midwest Community Planning

Big Stone County

Water Plan Public Hearing

~ September 3, 2013 ~

	Please Sign In	*Representing*
1.	Michelle Knutson	Auditor
2.	Wade Athey	Board
3.	Wally Wulff	Board
4.	Joe Berning	Board Chair
5.	Roger Sandberg	Board
6.	Bill Watson	Attorney
7.	Darren Wilke	Env. officer
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18.		

OCT 15 2013

Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

October 9, 2013

Mr. Jeff Nielson
Board of Water and Soil Resources
261 Highway 15 South
New Ulm, MN 56073-8915

RE: Big Stone County Local Water Management Plan Amendment

Dear Mr. Nielson:

The Minnesota Pollution Control Agency (MPCA) has reviewed the Local Water Management (LWM) Plan (Plan) for Big Stone County (County). The following is submitted for consideration by the Board of Water and Soil Resources (BWSR) on the LWM Plan:

- The LWM Plan does not violate any statutory or rule requirement administered by the MPCA.
- The MPCA recommends BWSR approve the entire plan submitted.
- The MPCA would like to offer the following comments for BWSR's consideration when reviewing and acting on this LWM Plan update.

Each major watershed within the County will go through or have gone through the Watershed Approach. This approach is on an 8 digit hydrological watershed scale. The process focuses on the watershed's condition as a starting point for water quality assessment, planning, implementation, and measurement of results. This will possibly lead to more impaired waters in the watersheds and in the County. Strategies will need to be developed to restore the impaired waters and to protect those that are not impaired. Communication and coordination between counties located in the watersheds will be essential to develop a comprehensive and effective set of strategies that can be implemented. Through the local water planning process, the County has demonstrated their commitment to take part in planning to protect and improve the water resources in the County.

The LWM Plan should be revised so that all of the tables, figures, and maps are labeled consistently throughout the document.

Page 2-20

- It is stated that the Pomme de Terre River flows through Big Stone County; however, this is not the case. This should be correct.
- The third line from the bottom of the last paragraph either needs to be removed or have a hyperlink.

The section describing the Pomme de Terre River Watershed Water Quality needs to be updated. A fecal coliform bacteria Total Maximum Daily Load (TMDL) Report and a turbidity TMDL Report have been approved along with a corresponding implementation plan. Each project has a webpage and should be visited for information to update this section. The Pomme de Terre Major Watershed Restoration and Protection Plan also needs to be updated to the Watershed Restoration and Protection Strategies (WRAPS). This process is currently taking place so the "proposed" in the first line on page 2-25 should be removed.

- http://www.pca.state.mn.us/pyri9c7
- http://www.pca.state.mn.us/hqzq9c9

Page 2-27

- This table needs to be corrected. The impaired cause for the impaired reach on Stoney Run Creek is Fish Bioassessment and the impaired reach of Twelve Mile Creek is not in Big Stone County.

Page 2-31

- The fourth line in the Upstream Sources paragraph talks about "this TMDL". The only approved TMDL in the County is for mercury which does not apply to the discussion. This needs to be clarified.

In Chapter 3, Section B, under Stakeholders, Pomme de Terre River Watershed Project (PdTWP) should be revised to Pomme de Terre River Assocation (PdTRA). This should remain consistent throughout and be revised in Section C.

There are a few action items that include developing monitoring databases and web mapping tools. The water quality section of MPCA's Environmental Data Access (EDA) system allows visitors to find and download data from surface water monitoring sites located throughout the state. We encourage the County to visit and utilize this site for water quality monitoring data which may be useful with future water management efforts:
http://cf.pca.state.mn.us/water/watershedweb/wdip/search_more.cfm.

The MPCA suggests that BWSR be included as a stakeholder for the action items that involve implementing Best Management Practices.

Action 1.B.1 should have the acronym WRAPS updated to Watershed Restoration and Protection Strategies.

Action 2.F.5.b is not part of the Pomme de Terre River Watershed; please revise this action so that it is incorporated into the correct watershed.

If we may be of further assistance, please contact Katherine Pekarek-Scott in the MPCA's Willmar Regional office at 320-441-6973.

Sincerely,

Rebecca J. Flood
Assistant Commissioner

RJF/DL:kb

cc: Katherine Pekarek-Scott
Denise Leezer

Final Draft

Big Stone County **Local Water Management Plan Update**

Agency/organization **MN Department of Agriculture**

Submitted by (name): Robert Sip (phone) 651-319-1832 (email) rob.sip@state.mn.us

Submission deadline: October 11, 2013

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1. **The MN Department of Agriculture has reviewed the final draft of the water management plan for Big Stone county. The following is submitted for the Board's consideration regarding the priority concerns selected:**

   ☒ The plan does not violate any statutory or rule requirements administered by our agency.

   ☐ The plan violates M.S. administered by our agency. *Explanation of statute violation:* _____

   ☐ The plan violates M.R. administered by our agency. *Explanation of rule violation:* ____

2. **The MN Department of Agriculture recommends the board:**

   ☒ Approve the entire plan as submitted

   ☐ Disapprove the entire plan as submitted

   ☐ Disapprove parts of the plan as cited: ____

3. **The MN Department of Agriculture would like to offer the following comments for the board's consideration when reviewing and acting on this local water plan update:**

Page VII of the document states, "Participating with implementing the MN Prairie Plan goals/objective to have 40% grassland and 20% wetland coverage in key corridors." There are also references to the MN Prairie Plan on pages 2-50 and 2-51. The MDA encourages Big Stone County to further review where prime soils or important agricultural soils are located in relation to where potential new grassland and wetland areas would be located in key corridors.

The MDA is not opposed to grassland/wetland restoration or easement programs that set land aside as long as the lands are strategically prioritized and targeted. However, the MDA encourages Big Stone County to utilize prime soils information that is available via the USDA Web Soil Survey (WSS). A general soils map is provided on Page 2-37 and an erosion prone soils map is provided on Page 2-39 of the draft plan. The map below is a snapshot of a priority corridor area outlined in the MN Prairie Plan that crosses in the southeast portion of Big Stone County.

Below is a map of a portion of southeast Big Stone County that highlights "prime soils" according to the USDA WSS. Two separate soils data tables are also provided that show prime soils or crop equivalency rating. As a note crop equivalency ratings are no longer used and Crop Productivity Indices are now used.

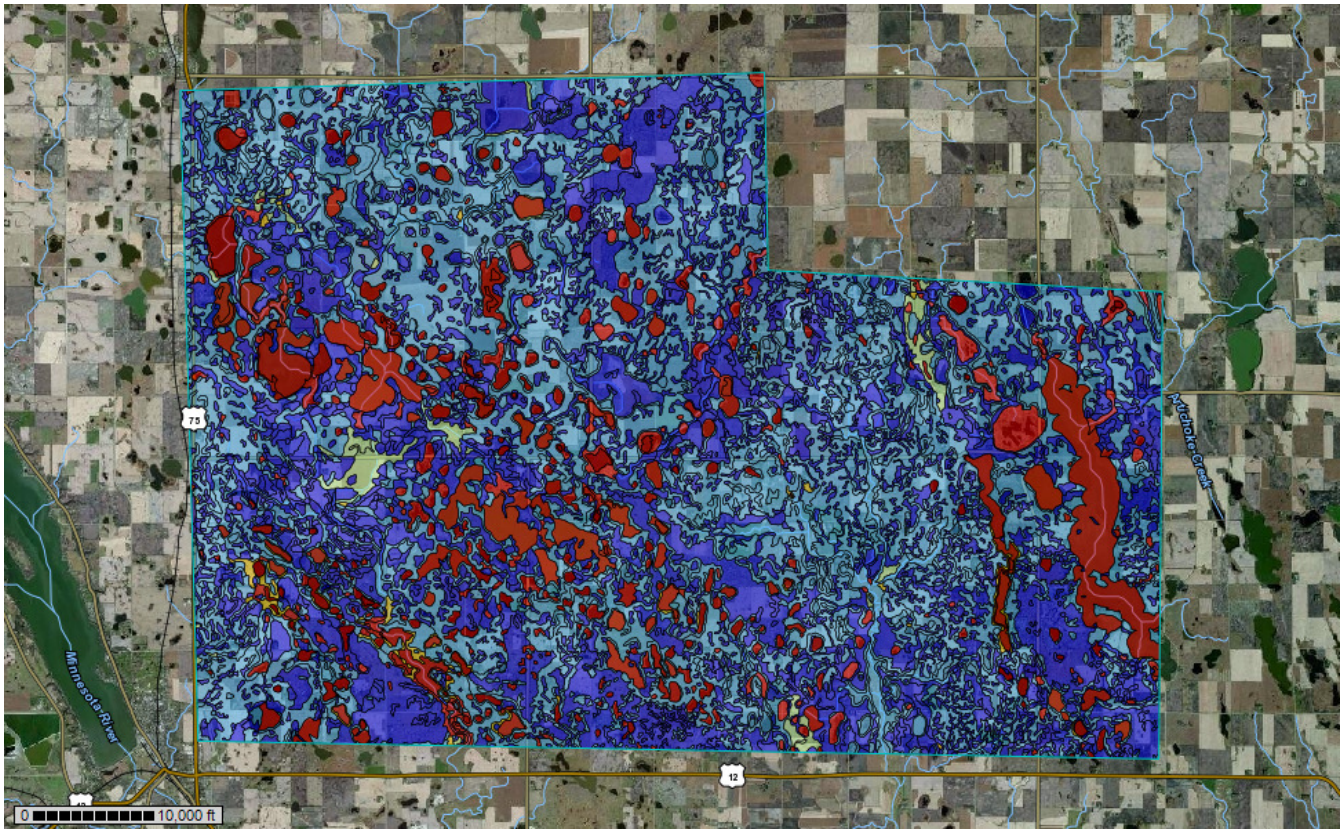


TABLE 1. Summary by Map Unit — Big Stone County, Minnesota (MN011)

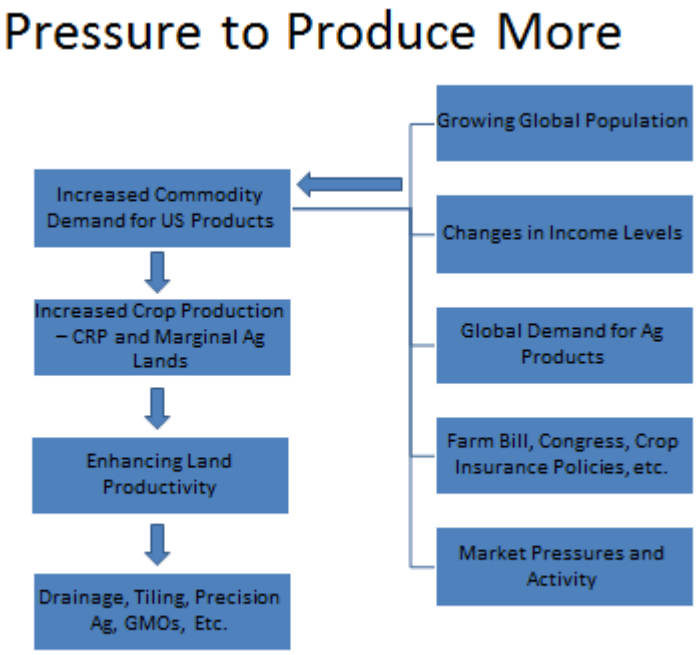
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
26	Aazdahl clay loam	100	450.7	0.5%
34	Parnell silty clay loam	86	707.7	0.8%
36	Flom silty clay loam	92	1,010.1	1.1%
51	La Prairie silt loam	91	127.8	0.1%
60	Glyndon silty clay loam	89	352.0	0.4%
70	Svea loam	99	2,281.2	2.5%
127B	Sverdrup fine sandy loam, 1 to 6 percent slopes	49	15.5	0.0%
137	Dovray silty clay	82	588.2	0.7%
171B	Formdale clay loam, 2 to 4 percent slopes	99	146.2	0.2%
180	Gonvick loam	98	8.8	0.0%
184A	Hamerly loam, 1 to 3 percent slopes	89	1,365.1	1.5%
184B	Hamerly loam, 3 to 6 percent slopes	87	724.9	0.8%
185B	Hattie silty clay, 1 to 4 percent slopes	80	14,767.7	16.5%
185C	Hattie silty clay, 4 to 10 percent slopes	75	2,422.0	2.7%
192A	Estelline silt loam, 0 to 2 percent slopes	75	4.3	0.0%
192B	Estelline silt loam, 2 to 6 percent slopes	70	11.0	0.0%
210	Fulda silty clay	86	5,297.4	5.9%
236	Vallers clay loam	90	2,236.6	2.5%
246	Marysland clay loam	65	464.1	0.5%
276	Oldham silty clay	86	2,074.5	2.3%
288D	Esmond loam, 12 to 18 percent slopes	43	469.2	0.5%
293A	Swenoda sandy loam, 0 to 2 percent slopes	95	6.9	0.0%
293B	Swenoda sandy loam, 2 to 6 percent slopes	93	38.1	0.0%
296B	Fram loam, 1 to 4 percent slopes	90	4,630.4	5.2%
314	Spottswood loam	65	9.9	0.0%
339	Fordville loam	64	32.6	0.0%
344	Bigstone silty clay loam	77	1,366.7	1.5%
347	Malachy loam	66	98.1	0.1%
373B	Renshaw loam, 0 to 6 percent slopes	54	347.9	0.4%
402B	Sioux loam, 1 to 6 percent slopes	33	32.6	0.0%
402E	Sioux loam, 6 to 35 percent slopes	16	16.6	0.0%
410	Athelwold silt loam	80	4.9	0.0%
418	Lamoure silty clay loam	78	934.1	1.0%
437D	Buse clay loam, 12 to 18 percent slopes	63	68.2	0.1%
450	Rauville silty clay loam	20	13.9	0.0%
494B	Darnen loam, 1 to 6 percent slopes	99	644.2	0.7%
694B	Zell silt loam, 2 to 8 percent slopes	77	465.1	0.5%
787	Fram-Vallers-Parnell complex	89	8,214.3	9.2%
814	Hamerly-Lindaas complex	88	1,049.7	1.2%
827B	Esmond-Heimdal loams, 2 to 6 percent slopes	84	15,499.0	17.3%
827C2	Esmond-Heimdal loams, 6 to 12 percent slopes, eroded	75	5,087.3	5.7%
900	Hamerly-Aazdahl-Lindaas complex	91	279.9	0.3%
915B	Formdale-Buse clay loams, 4 to 6 percent slopes	92	188.5	0.2%
915C2	Buse-Formdale clay loams, 6 to 12 percent slopes, eroded	76	333.3	0.4%
922	Hamerly-Parnell complex	88	568.0	0.6%
1030	Udorthents-pits, gravel complex	0	41.3	0.0%
1817F	Esmond loam, 18 to 45 percent slopes, bouldery	4	156.4	0.2%
1916	Lindaas silty clay loam	85	316.1	0.4%
1940	Bigstone silty clay loam, ponded	5	7,431.9	8.3%
1949	Gardena silt loam	100	771.7	0.9%
1994	Embden loam	93	108.1	0.1%
M-W	Water, miscellaneous	0	43.1	0.0%
W	Water	0	5,363.5	6.0%
Totals for Area of Interest			89,653.5	100.0%

Table 2. Summary by Map Unit — Big Stone County, Minnesota (MN011)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
26	Aazdahl clay loam	All areas are prime farmland	450.7	0.5%
34	Parnell silty clay loam	Prime farmland if drained	707.7	0.8%
36	Flom silty clay loam	Prime farmland if drained	1,010.1	1.1%
51	La Prairie silt loam	Prime farmland if protected from flooding or not frequently flooded during the growing season	127.8	0.1%
60	Glyndon silty clay loam	All areas are prime farmland	352.0	0.4%
70	Svea loam	All areas are prime farmland	2,281.2	2.5%
127B	Sverdrup fine sandy loam, 1 to 6 percent slopes	Farmland of statewide importance	15.5	0.0%
137	Dovray silty clay	Prime farmland if drained	588.2	0.7%
171B	Formdale clay loam, 2 to 4 percent slopes	All areas are prime farmland	146.2	0.2%
180	Gonvick loam	All areas are prime farmland	8.8	0.0%
184A	Hamerly loam, 1 to 3 percent slopes	All areas are prime farmland	1,365.1	1.5%
184B	Hamerly loam, 3 to 6 percent slopes	All areas are prime farmland	724.9	0.8%
185B	Hattie silty clay, 1 to 4 percent slopes	All areas are prime farmland	14,767.7	16.5%
185C	Hattie silty clay, 4 to 10 percent slopes	Farmland of statewide importance	2,422.0	2.7%
192A	Estelline silt loam, 0 to 2 percent slopes	All areas are prime farmland	4.3	0.0%
192B	Estelline silt loam, 2 to 6 percent slopes	All areas are prime farmland	11.0	0.0%
210	Fulda silty clay	Prime farmland if drained	5,297.4	5.9%
236	Vallers clay loam	Prime farmland if drained	2,236.6	2.5%
246	Marysland clay loam	Prime farmland if drained	464.1	0.5%
276	Oldham silty clay	Prime farmland if drained	2,074.5	2.3%
288D	Esmond loam, 12 to 18 percent slopes	Not prime farmland	469.2	0.5%
293A	Swenoda sandy loam, 0 to 2 percent slopes	All areas are prime farmland	6.9	0.0%
293B	Swenoda sandy loam, 2 to 6 percent slopes	All areas are prime farmland	38.1	0.0%
296B	Fram loam, 1 to 4 percent slopes	All areas are prime farmland	4,630.4	5.2%
314	Spottswood loam	All areas are prime farmland	9.9	0.0%
339	Fordville loam	All areas are prime farmland	32.6	0.0%
344	Bigstone silty clay loam	Prime farmland if drained	1,366.7	1.5%
347	Malachy loam	All areas are prime farmland	98.1	0.1%
373B	Renshaw loam, 0 to 6 percent slopes	Not prime farmland	347.9	0.4%
402B	Sioux loam, 1 to 6 percent slopes	Not prime farmland	32.6	0.0%
402E	Sioux loam, 6 to 35 percent slopes	Not prime farmland	16.6	0.0%
410	Athelwold silt loam	All areas are prime farmland	4.9	0.0%
418	Lamoure silty clay loam	Prime farmland if protected from flooding or not frequently flooded during the growing season	934.1	1.0%
437D	Buse clay loam, 12 to 18 percent slopes	Not prime farmland	68.2	0.1%
450	Rauville silty clay loam	Not prime farmland	13.9	0.0%
494B	Darnen loam, 1 to 6 percent slopes	All areas are prime farmland	644.2	0.7%
694B	Zell silt loam, 2 to 8 percent slopes	All areas are prime farmland	465.1	0.5%
787	Fram-Vallers-Parnell complex	Prime farmland if drained	8,214.3	9.2%
814	Hamerly-Lindaas complex	All areas are prime farmland	1,049.7	1.2%
827B	Esmond-Heimdal loams, 2 to 6 percent slopes	All areas are prime farmland	15,499.0	17.3%
827C2	Esmond-Heimdal loams, 6 to 12 percent slopes, eroded	Farmland of statewide importance	5,087.3	5.7%
900	Hamerly-Aazdahl-Lindaas complex	All areas are prime farmland	279.9	0.3%
915B	Formdale-Buse clay loams, 4 to 6 percent slopes	All areas are prime farmland	188.5	0.2%
915C2	Buse-Formdale clay loams, 6 to 12 percent slopes, eroded	Farmland of statewide importance	333.3	0.4%
922	Hamerly-Parnell complex	All areas are prime farmland	568.0	0.6%
1030	Udorthents-pits, gravel complex	Not prime farmland	41.3	0.0%
1817F	Esmond loam, 18 to 45 percent slopes, bouldery	Not prime farmland	156.4	0.2%
1916	Lindaas silty clay loam	Prime farmland if drained	316.1	0.4%
1940	Bigstone silty clay loam, ponded	Not prime farmland	7,431.9	8.3%
1949	Gardena silt loam	All areas are prime farmland	771.7	0.9%
1994	Embden loam	All areas are prime farmland	108.1	0.1%

Table 2. Summary by Map Unit — Big Stone County, Minnesota (MN011)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
M-W	Water, miscellaneous	Not prime farmland	43.1	0.0%
W	Water	Not prime farmland	5,363.5	6.0%
Totals for Area of Interest			89,653.5	100.0%

On Page 2-40, the following statement is made at the bottom of the page: "Due to recent high crop prices, an increasing amount of farmland is being tiled. This presents itself the opportunity to install new conservation drainage systems and to make improvements to the existing system. The newer systems can be designed to reduce nutrient losses and also positively affect the timing of flows into surface waters."

The MDA encourages Big Stone County to include the schematic below or something similar to further illustrate that crop prices are not the only factor that may cause increases in tiled farmland. There should also be discussion to differentiate the amount of native prairie vs. land coming out of CRP that is now being tiled.