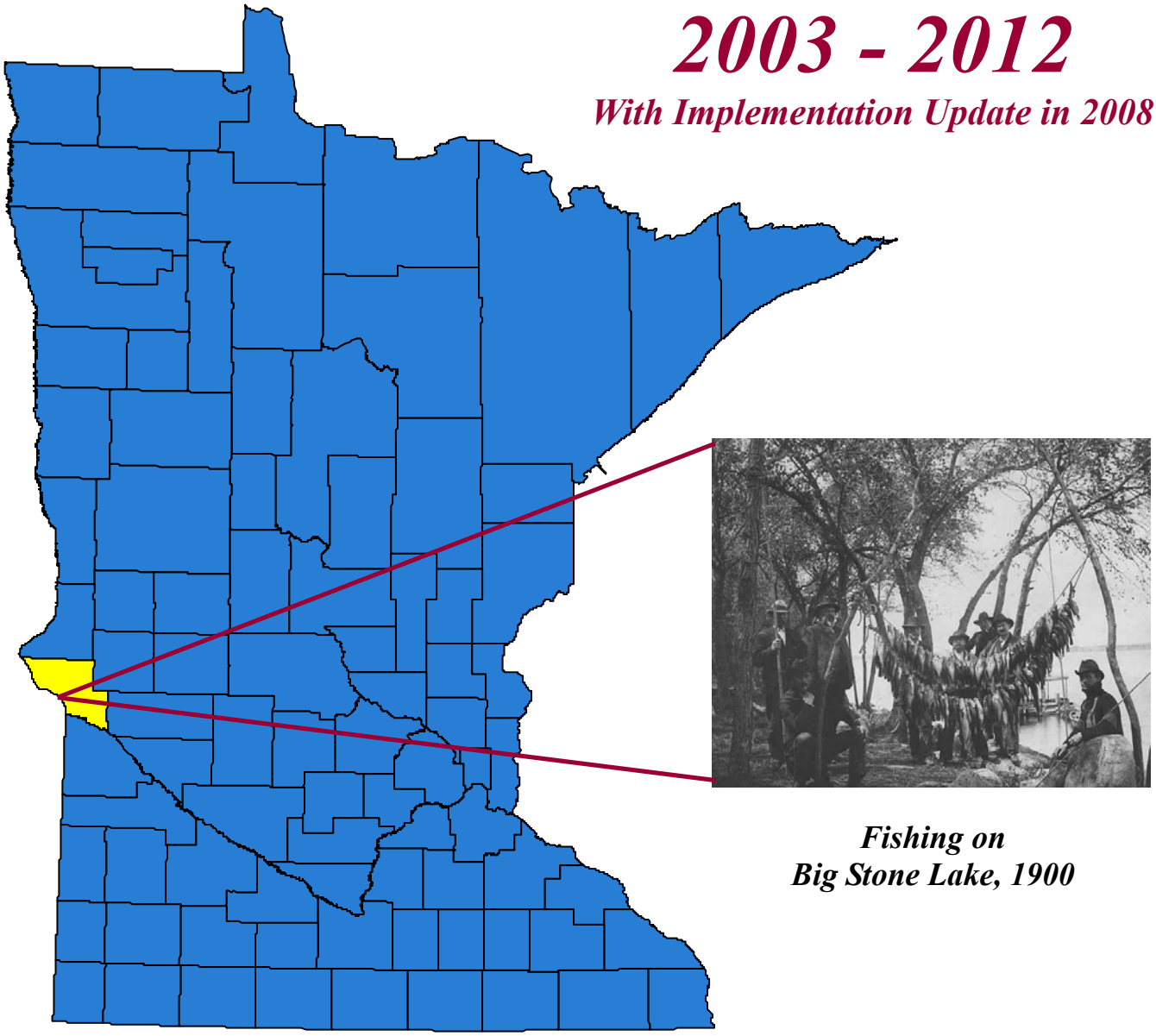
# Big Stone County

# Local Water Management Plan

## *2003 - 2012*

***With Implementation Update in 2008***



***Fishing on***
***Big Stone Lake, 1900***


***Prepared by***

***Midwest Community Planning, LLC, with assistance from***

***The Upper Minnesota Valley Regional Development Commission***

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# INTRODUCTION TO THE BIG STONE COUNTY COMPREHENSIVE LOCAL WATER MANAGEMENT PLAN

The Comprehensive Local Water Management Act (Minnesota Statutes Sections 103B.301 to 103B.355) encourages counties to develop and implement a comprehensive water plan. Pursuant to the requirements of the law, this Plan:

- Covers the entire area of the 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
- This Water Plan is a third generation plan that covers a ten-year period (2003 – 2013), with the Goals, Objectives and Action Steps covering a five-year period (2003 – 2008).

To ensure that these objectives are realized, the Comprehensive Local Water Management Act further specifies the basic contents of the comprehensive water plan to contain:

- A description of the existing and expected changes to the physical environment, land use and development in the county;
- Available information about the surface water, groundwater and related land resources in the county, including existing and potential distribution, availability, quality and use;
- Objectives for future development, use and conservation of water and related land resources, including objectives that concern water quality and quantity, and sensitive areas, wellhead protection areas, high priority areas for wetland preservation, enhancement, restoration, and establishment, storm water management for developing areas, and related land use conditions, and a description of actions that will be taken in affected watersheds or groundwater systems to achieve the objectives;
- A description of potential changes in State programs, policies, and requirements considered important by the county to management of water resources in the county;
- A description of conflicts between the comprehensive water plan and existing plans of other local units of government, if any conflict exists;
- A description of possible conflicts between the comprehensive water plan and existing or proposed comprehensive water plans of other counties in the affected watershed units or groundwater systems, if any potential conflict exists;

- A program for implementation of the plan that is consistent with the plan's management objectives and includes schedules for amending official controls and water and related land resources plans of local units of government to conform with the comprehensive water plan, and the schedule, components, and expected State and local costs of any projects to implement the comprehensive water plan that may be proposed, although this does not mean that projects are required by this section; and

- A series of 55 data items, ranging in content from the County's average annual precipitation to the areas threatened and endangered species. Many of these data items make simple reference to where the current information can be found (i.e., a website, phone number or governmental agency contact). Chapter Two contains a matrix of Big Stone County's 55 data items.

## Big Stone County Water Plan Contents

The Big Stone 2003 – 2013 Comprehensive Local Water Plan is divided into the following four chapters:

- **Chapter One: County Profile and Executive Summary**. This Chapter provides an introduction to the process used to develop the Big Stone County Water Plan. A brief County profile is included, along with a listing of some of the County's previous water planning accomplishments. Sections are also provided on the County's Clean Water Partnerships and watershed organizations.

- **Chapter Two: A Profile of the County's Water Resources**. This Chapter provides a profile of Big Stone County's 55 data items. The Data Items describe a number of the County's key water planning characteristics, ranging from annual precipitation to groundwater observation sites. The primary emphasis of Chapter Two is to describe what each Data Item is and explain how one can find the County's current information if needed.

- **Chapter Three: Water Planning Issues, Implications and Assessments**. This Chapter identifies Big Stone County's water planning issues and describes which ones are considered "high priority" between 2003 and 2008. An implication and assessment section is also included for each high priority issue. Some of the County's 55 data items that pertain to the County's high priority water planning issues are also found in this Chapter.

- **Chapter Four: Goals, Objectives and Action Steps**. This Chapter establishes Big Stone County's Goals, Objectives and Action Steps. These are based on each of the high priority water planning issues identified in Chapter Three. Big Stone County will implement the Goals and Objectives between 2003 and 2013. The Action Steps, however, will be implemented between 2003 and 2008. They will be simply updated in 2008 by crossing out Big Stone County's water planning accomplishments and creating new Action Steps to be pursued between 2008 and 2013.

# CHAPTER ONE:
# COUNTY PROFILE AND EXECUTIVE SUMMARY

***Chapter One Contains…***

Chapter One provides an introduction to Big Stone County and its Comprehensive Local Water Plan. This Chapter includes the following information:

- ✓ The Role of the County Board, Water Planning Committee and Citizen Participation
- ✓ Big Stone County's Population and Location
- ✓ Previous Big Stone County Water Plan Accomplishments
- ✓ Clean Water Partnerships/Watershed Projects
- ✓ Watershed Districts

## The Role of the County Board, Water Planning Committee and Citizen Participation

In January 2002, the Minnesota River Headwaters Joint Powers Board (consisting of Big Stone, Chippewa, Lac qui Parle, Pope and Swift Counties) cooperatively agreed to update the member counties' Comprehensive Local Water Plans. After reviewing a number of proposals, the Joint Powers Board entered into a contract with the local Regional Development Commission, the Upper Minnesota Valley Regional Development Commission (UMVRDC), to coordinate the development of the five individual water plans. The UMVRDC thereafter subcontracted with Midwest Community Planning, LLC, to assist with the planning, facilitation and writing portion of the contract (the UMVRDC remaining responsibilities included mapping and various data collection). Midwest Community Planning, LLC, then assisted the individual counties with developing the specific contents of this Water Plan.

The water planning process for Big Stone County started with a Public Informational Meeting, held on April 2, 2002. The primary purpose of the meeting was to invite the public, local governmental units and various governmental agencies to identify and discuss local water planning issues. The issues identified were then discussed during regular meetings with a Local Water Plan Committee (created by the Big Stone County Board of Commissioners). The Committee included the following participants:

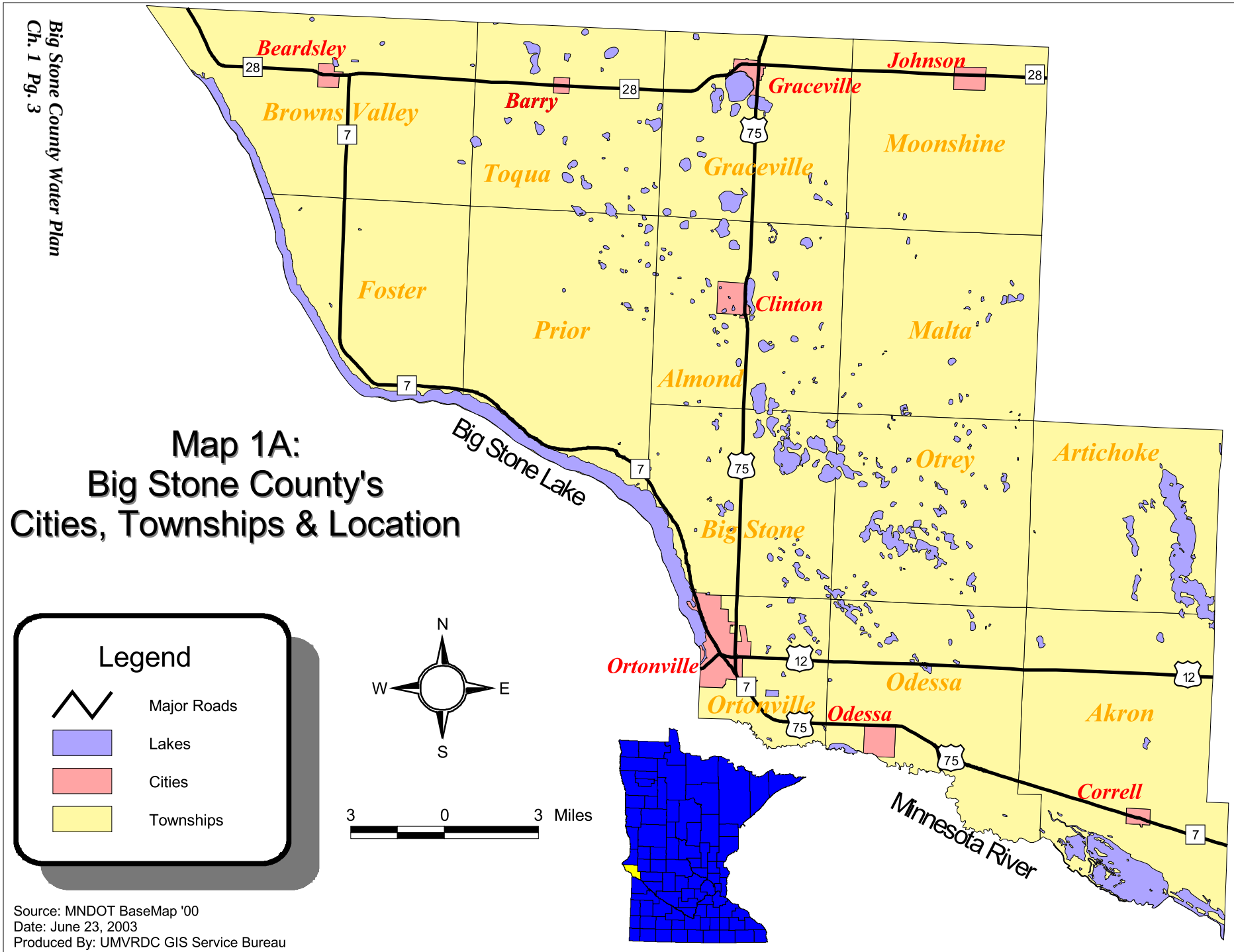
**Water Plan Committee Members:**

| | | | |
|---|---|---|---|
| John Cunningham | U of MN Extension | Dave Soehren | DNR – Wildlife |
| Don Diekman | Citizen | Wade Gillingham | MN PCA |
| David Sill | MN BWSR | Skip Wright | DNR – Waters |
| Norm Haukos | DNR – Fisheries | Mayti Sundheim | Bonanza Education Center |
| Jeanne Krueger | County Commissioner | Brett Wehrle | US Fish & Wildlife Refuge |
| Dave Torgerson | County Commissioner | Jon Roeschlien | Bois De Sioux Watershed |
| Mark Dybdahl | NRCS | Patricia Hyatt | Citizen |
| Wanda Holker | SWCD | Roger Sandberg | Citizen |
| Gary Hoffman | SWCD | Darren Wilke | Environmental Services |
| Steve Delehanty | US Fish & Wildlife | Citizens for Big Stone Lake (Citizens) | |
| Dianne Radermacher | Upper MN River Watershed District | | |

The first draft of the Comprehensive Local Water Plan went out for public review on September 20, 2002. This review process included the general public, local governmental units (i.e., cities and townships) and governmental agencies. A public hearing was held with the County Board on November 19, 2002, to solicit public comment and to discuss all of the written comments received during the public review period. The Water Planning Committee then met one more time to incorporate the public and governmental comments into the final draft water plan. On January 10, 2003, the final draft was submitted to the Board of Water and Soil Resources for final state agency 90-day review. The final Big Stone County Comprehensive Local Water Plan went for final approval by BWSR on May 28, 2003.

## Big Stone County's Population and Location

According to the 2000 Census, Big Stone County had 5,820 residents living in 2,377 households. The City of Ortonville is the County's largest City, with approximately 2,158 residents (Appendix A contains Big Stone County's complete demographic profiles, including the following: General Demographic Profile, Selected Social Characteristics Profile, Selected Economic Characteristics Profile and Selected Housing Characteristics Profile). The 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.




# 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

# Big Stone County's Previous Water Planning Accomplishments

The original Big Stone County Water Plan was approved in 1991 and updated in 1995. As a result, this Plan is considered Big Stone County's third generation Comprehensive Local Water Plan (CLWP). The entire Plan will cover a ten-year period (2003–2013), with the action steps (or implementation steps) coving a five-year period (2003–2008). In 2008, the action steps will need to be updated by simply crossing out the County's accomplishments and adding new action steps to be implemented between 2008 and 2013.

The CLWP is reviewed annually when the Natural Resource Block Grant reports are due. The Water Plan Advisory Committee makes recommendations on projects to be funded. A two-year work plan is then written based on the Committee's input and recommendations, with the County Board of Commissioners ultimately deciding where money will be spent.

Implementation progress is communicated to the public through the Environmental Newsletter, which typically goes out three times a year. It is also reviewed at the Water Plan Committee's meetings, which are held three to four times a year. At least one County Commissioner is usually present, who then reports back to the full County Board.

During this revision, the Water Plan Advisory Committee met regularly to review issues and priorities that should be addressed throughout the next ten years. A public informational meeting was held on April 2, 2002 where citizens discussed issues that should be addressed in the Plan. The following list contains a summary of some of Big Stone County's main water planning accomplishments during both its first and second generation Water Plans:

## First Generation Accomplishments, 1991-1995

**Education and Information**

- ✓ Realtor/Contractor Seminars
- ✓ Undesirable Vegetation Signs Established at Public Accesses
- ✓ Lakeshore Owners Educational Campaigns on Sewage Treatment
- ✓ Public Service Announcements on Water Quality/Proper Solid Waste Management
- ✓ Tree Planting Promotions

**Monitoring and Data Collection**

- ✓ Citizen Lake Monitoring/Secchi Disk Programs Initiated
- ✓ Random Individual Septic Treatment System Inspection on Big Stone Lake (33%)
- ✓ Wetland Restoration Benefits Study

**Inventory and Mapping**

- ✓ Road Salt Storage Inventory

**Land and Water Treatment**

- ✓ Well Sealing Cost Share Program
- ✓ Pesticide Collections

**Regulation, Ordinances and Planning**

- ✓ Shoreland Management Ordinance
- ✓ Land and Related Resources Management Ordinance
- ✓ Floodplain Management Ordinance
- ✓ Feedlot Task Force Established
- ✓ Delegated Feedlot County

**Technical Staff**

- ✓ Feasibility Study of Sewage Treatment Options along Big Stone Lake
- ✓ County Wide Cleanup Coordination

**Plan Coordination and Administration**

- ✓ Established Full Time Environmental Services Office to Implement Water Planning
- ✓ Created Water Plan Advisory Committee

**Miscellaneous**

- ✓ Member of the five county Minnesota River Headwaters Joint Powers Board
- ✓ Member of the thirty-seven county Minnesota River Basin Joint Powers Board

## Second Generation Accomplishments, 1995-2001

**Education and Information**

- ✓ Transportation for students to the Regional Environmental Fair (Annually)
- ✓ Matching Funds to Fourth Grade Class for Wetland Restoration Projects (Annually)
- ✓ Streambank Erosion Model Constructed
- ✓ *Environmental Newsletter* to County Residents (three to four times per year)
- ✓ Supporting Funds for the Bonanza Education Center
- ✓ Fair Booths on Feedlot Management, Solid Waste Management and Water Quality

**Inventory and Mapping**

- ✓ Level I Feedlot Inventory
- ✓ Gravel Pit Inventory

**Monitoring and Data Collection**

- ✓ Annual Rural Well Testing Program for Nitrates and Coliform Bacteria (4 Townships per year with Spring and Fall Rotation)

**Land and Water Treatment**

- ✓ Annual Household Hazardous Waste Collections (Annually)
- ✓ Matching Funds for Mound Systems in Correll to replace City Sewer Discharging to MN River
- ✓ Wetland Restorations the USF&W and Upper MN River Watershed District
- ✓ Manure Management Planning Program (Annually)
- ✓ Willow Posting for Severe Erosion Sites on Several County Lakes
- ✓ Environmental Trust Fund Grants for Voluntary Sewer or Feedlot Upgrades (Annually)
- ✓ Well Sealing Cost Share Program (Annually)

**Regulation, Ordinances and Planning**

- ✓ Feedlot Management Ordinance
- ✓ Aggregate Mining Ordinance

**Plan Coordination and Administration**

- ✓ Registered Employees for ISTS Inspection
- ✓ Certified in Demolition Landfill Operations
- ✓ Certified in Feedlot Management

**MDA State Revolving Loan**

Since 1995, the Minnesota Department of Agriculture has allocated $336,876 in Agriculture Best Management Practice Loans for Big Stone County. The County, in turn, has spent $342,217 on the following revolving loans:

- ✓ 11 for Conservation Tillage
- ✓ 39 for Septic Systems

## Summary of Water Planning Funds 1990-2002

| Grant Name | Amount | |
|---|---|---|
| NRBG-Water Plan 1990-2002 | $412,710.83 | |
| NRBG-Shoreland 1990-2002 | $ 37,568.51 | |
| NRBG-WCA | $ 87,500.00 | |
| NRBG-Feedlot | $ 34,063.00 | |
| NRBG-ISTS | $ 4,432.00 | |
| NRBG-Water Plan rolled into ETF | $ 18,584.88 | |
| **NRBG Total** | **$594,859.22** | |
| | | |
| Challenge Grants 1993 | $ 8,500.00 | |
| Challenge Grant 1994 | $ 38,750.00 | |
| Challenge Grant 1995-WCA | $ 3,500.00 | |
| -Feedlot | $ 7,500.00 | |
| **Challenge Grant Total** | **$ 58,250.00** | |
| | | |
| **Other Non-BS County Funds** | | |
| 1993 – Other County Match | $ 6,800.00 | Challenge Grant (Pope, Swift, Chippewa & Swift) |
| 1994 – Shoreland | $ 9,750.00 | DNR, Ortonville City, Graceville City |
| 1999 – Water Plan Match | $ 3,500.00 | SWCD |
| | | |
| **Big Stone County Matching Funds** | | |
| 1990-Water Plan (In Kind) | $ 3,600.00 | |
| 1993-2002 Water Plan | $ 14,423.00 | |
| 1994-1995 WCA | $ 10,000.00 | |
| 1993-1995 Challenge | $ 7,700.00 | |
| 2002-Feedlot | $ 7,500.00 | |
| 1995-Challenge Add'l Levy | $ 1,226.00 | |
| | | |
| HHW 1993 | $ 9,000.00 | |
| HHW Stipend from Kandiyohi 1993-2002 | $ 22,800.00 | |
| | | |
| **Water Plan Totals 1990-2002 =** | **$717,608.22** | |
| | | |
| SCORE Grant 1990-2002 | $712,502.00 | |
| | | |
| BSC Matching Funds | | |
| 1994-95 HHW Add'l Levy | $ 3,000.00 | |
| 2002 SCORE Add'lLevy | $ 20,000.00 | |
| 1993-2002 SCORE | $137,500.00 | |

# Big Stone County's
# Clean Water Partnerships/Watershed Projects

The Clean Water Partnership (CWP) Program was created in 1987 to address pollution problems associated with runoff from agricultural and urban areas. The program is funded by the Minnesota Pollution Control Agency (MPCA) and provides local governments with resources to protect and improve lakes, streams and groundwater.

CWP projects begin with a desire by a local government to improve a water resource that has been polluted by land-use-related activities. Local leadership and expertise, combined with technical and financial resources from the State, create an effective program for controlling pollution and restoring water quality.

Funding for CWPs is awarded in two phases. In the first, or resource investigation phase, a diagnostic study and implementation plan are completed. As part of the diagnostic study, local sponsors work with the MPCA to collect data and information on the water resource and its watershed. This information is used to identify pollution problems and their causes and define water quality goals and objectives. The final step of the resource investigation phase is the development of an implementation plan that identifies the combination of education, management practices and other activities needed to protect or restore water quality.

The second phase of a CWP, called project implementation, involves the implementation of Best Management Practices (BMPs) identified in the first phase. BMPs may include sedimentation ponds, manure management, conservation tillage, terraces, new ordinances, wetland restoration, fertilizer management, education or other methods designed to reduce nonpoint-source pollution.

Projects may be completed either partially or completely through the CWP program. To be eligible for CWP funding, the entire project must meet program requirements. This means that if the project sponsor intends to seek CWP funding for later phases, the MPCA must first approve a diagnostic study and an implementation plan.

The financial assistance available through the program falls into two categories: grants and low-interest loans. Grants are available for up to 50 percent of project costs. Loans can only be used for the project implementation phase and can cover the entire cost of implementation or supplement a grant. Local governments can also use loans to set up their own programs to provide pass-through loans to private parties. Local governments with the authority to generate cash revenues and adopt and enforce official controls are eligible to sponsor CWP projects and receive grant funding. To be eligible for a loan, a local government must also be able to secure the loan with a general obligation promissory note. In addition, the water of concern must be addressed in an approved local water plan.

According to the MPCA, the following two CWP projects have been funded in Big Stone County:

- ***Beardsley Groundwater Project.*** Phase I CWP of shallow drift aquifers in the Minnesota River Headwaters Watershed. The Project has been closed out. For more information, contact the MPCA project manager, Dave Well, at (651) 296-1251.

- ***Big Stone Lake Restoration Project.*** Phase II CWP of Big Stone Lake. The Project has been closed out. For more information, contact the MPCA project manager, Mark Tomasek, at (651) 296-7260.

## Watershed Districts

**Upper Minnesota River Watershed District**
342 NW 2nd Street
Ortonville, MN 56278
(320) 839-3411

The Upper Minnesota River Watershed District was formed on September 7, 1967. The District is located primarily in Big Stone County, with smaller areas in Lac qui Parle, Stevens, Swift and Traverse Counties. The mission of District is to "serve its residents by wisely and judiciously managing water, in a manner that sustains and enhances the social, economic and natural resources of the District. The District prefers the use of innovative water management methods, which recognize the unique agricultural, community, lake and stream and natural resources within the District. These innovative approaches as reflected by the policies of the District should be oriented toward ensuring the economic viability of the District's agriculture community."

Each of the Counties located within the Upper Minnesota River Watershed District plays a vital role in the District's activities. The Big Stone County Board of Commissioners appoints three of the District's Board Managers, while the County Board of Commissioners for Swift and Traverse Counties each appoint one Board Manager. Each appointed Board Manager must be a resident of the District and is prohibited from being a public official of the County, State or Federal government. Each Manager serves a three-year term, which is renewable by approval of the County Board of Commissioners.

To enforce its adopted rules and regulations, the Upper Minnesota River Watershed District utilizes a permit system. Permits are required for a wide variety of construction activities that affect the water resources of the District. Any individual landowner, public entity, or governmental unit that contemplates a project impacting the water resources of the District, must secure a permit. Permit applications are considered at the regular monthly meeting of the Board of Managers. Board members and office staff are available to assist applicants in the permitting process. In addition to "in house" assistance, staff regularly assist applicants in field investigations to obtain recommendations on construction techniques and use of best management practices.

**Bois De Sioux Watershed District**
1002 Broadway
Wheaton, MN 56296
(320) 563-4185

recreated from: ***http://www.mnwatershed.org/bois.htm***

The District is located in west central Minnesota and includes the entire drainage basin of the Bois de Sioux River located in Minnesota. 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.

   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.

## Lake Associations

A lake association is an organized group of people who have come together because of their common interest in a specific lake. Lake associations serve as an organized voice of their members to township and county government and are often a watchdog for enforcement of local ordinances. An association may monitor the condition of a lake, develop a lake management plan, educate shoreland property owners about individual and collective actions to protect a lake and provide

volunteers to assist in lake and watershed projects. They may also work with the Department of Natural Resources (DNR) to improve fish habitat or fish stocking, get permits for aquatic plant removal, or maintain a lake access. Listed below is the lone lake association in Big Stone County that is a member of the Minnesota Lakes Association. A contact person for the association has been provided for additional information.

**Citizens for Big Stone Lake**
Wilfred Hansen, 324 Park Avenue
Ortonville, MN 56278
(320) 839-3027

# CHAPTER TWO:
# BIG STONE COUNTY'S
# WATER PLANNING 55 DATA ITEMS

This Chapter describes each of the 55 data items outlined in the Board of Water and Soil Resource's (BWSR) Handbook for Comprehensive Local Water Planning. Most of the Data Items are presented in this Chapter, however, the primary emphasis is to describe how to find the data if needed. As a result, many of the Data Items provide a brief description of who to contact or which website to view if one is interested in acquiring the most current version of the information. There are also numerous references to Data Items presented in Chapter Three and the Appendices of this Plan.

## Data Item 1. Precipitation Gauging Stations
## Data Item 2. Total Precipitation
## Data Item 3. Seasonal Precipitation

Because of its location near the center of North America, Big Stone County is subject to a variety of air masses that affect the amount of precipitation that falls within the County. During the winter months, cold, dry continental polar air dominates the region. Hot, dry continental tropical air masses from the desert southwest, along with warm, moist maritime tropical air masses that originate over the Gulf of Mexico, are common during the summer months. The spring and fall months serve as transition periods between summer and winter, composed of alternate intrusions of air from various sources.

Precipitation within Big Stone County is monitored through an interagency cooperative effort between the Minnesota Department of Natural Resources (DNR), the Big Stone County Soil and Water Conservation District (SWCD) and the National Weather Service (NWS). The Big Stone County SWCD and the NWS are responsible for recording and compiling precipitation data at the local level. Once information is collected, it is then forwarded to the DNR's State Climatology Office, where it is further analyzed and entered into a statewide database.

There were seven precipitation gauging stations in operation in Big Stone County between 1996 and 2001. The Big Stone County SWCD had a network of six precipitation gauging stations, while the NWS had one monitoring station. The geographic location of each monitoring site along with the six-year total and seasonal precipitation information is shown in Table 2A. According to the Table, the County's annual average participation is around 25 inches, with slightly over 14 inches occurring in May through September.

Figure 2A shows a map of the State's average annual precipitation from data collected between 1961 and 1990. Notice that the northwestern corner of Big Stone County received an average of between 20 to 22 inches annually, with the rest of the County averaging between 22 to 24 inches. This is slightly lower than the 1996-2001 information presented in Table 2A.

**Table 2A:**
**Big Stone County's Precipitation Gauging Stations**

| Type | Township | Range | Section | 1996-2001 Annual Average | Growing Season (May-September) |
|---|---|---|---|---|---|
| SWCD | T121N | R46W | 9 | 22.48 | 14.03 |
| NWS | T122N | R44W | 14 | 25.97 | 15.07 |
| SWCD | T122N | R44W | 14 | 25.97 | 15.07 |
| SWCD | T123N | R46W | 25 | 22.64 | 14.36 |
| SWCD | T123N | R47W | 1 | 22.66 | 13.13 |
| SWCD | T123N | R48W | 8 | 24.85 | 15.36 |
| SWCD | T124N | R45W | 36 | 21.89 | 14.09 |
| | | | **1996-2001 Averages** | **25.11** | **14.36** |

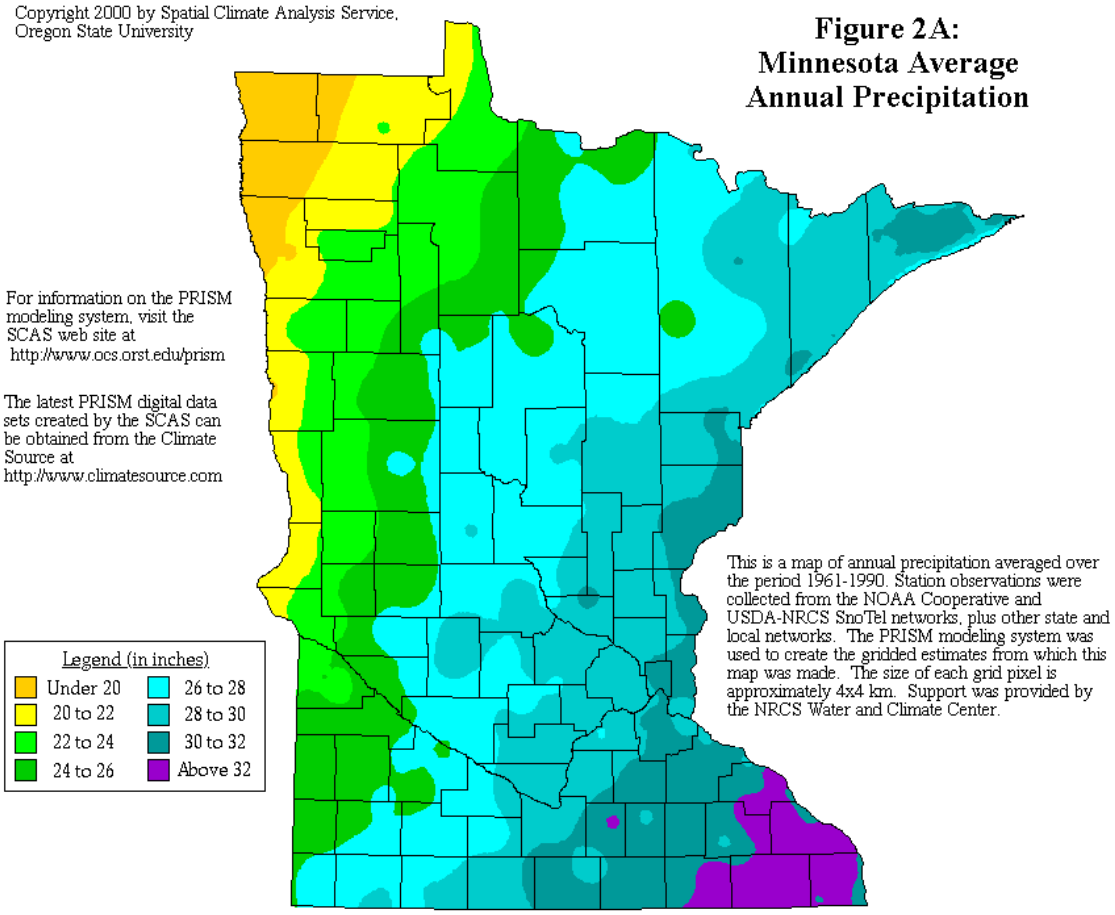



**Figure 2A:**
**Minnesota Average Annual Precipitation**

For more information on the County's climate, contact the State Climatology Office at (651) 296-4214 or visit their website at:

**www.climate.umn.edu**

## Data Item 4. Hydrogeology
## Data Item 5. Ground and Surface Water Interconnections and Recharge Areas

The southern half of Big Stone County was recently included in a Regional Hydrogeologic Assessment (RHA), along with Chippewa, Lac qui Parle and Swift Counties. A RHA is currently being developed for the northern half of Big Stone County (scheduled to be completed in 2003). A Regional Hydrogeologic Assessment is a formal study of an area's geology and groundwater resources, emphasizing the investigation of shallow geologic, groundwater and pollution sensitivity conditions. RHA's should not be confused with County Geologic Atlases, which investigate the properties and distribution of rocks and unconsolidated earth materials beneath the land surface. A Regional Hydrogeologic Assessment normally covers an area in size of between four to nine counties, while a Geologic Atlas is specific to one county. Each Regional Hydrogeologic Assessment or County Geologic Atlas produces a series of information and products, including the following:

- ✓ County Well Index Database
- ✓ Geology Maps
- ✓ Water Chemistry and Groundwater Maps
- ✓ Pollution Sensitivity Maps
- ✓ Geographic Information System Files
- ✓ Interpretive Reports

The Regional Hydrogeologic Assessment is an excellent source of information, however, local decision-makers and County staff need to have a better understanding of how to use it. The County's long-term goal is to actually use the RHA in the decision-making process. For example, it could be used to help locate a proposed water-intensive industry in an area of the County with suitable groundwater concentrations. In response to this issue, the County has created an Action Step in Chapter Four to learn how to interpret and use the RHA and other water-based information in the decision-making process (with State agency participation). For more information on Big Stone County's Regional Hydrogeologic Assessment, contact the Minnesota Geological Survey or the Department of Natural Resources at the following locations:

**Geology and Atlas Use**
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114-1057
(612) 627-4780
http://www.geo.umn.edu/mgs

**Groundwater and Pollution Sensitivity**
DNR Waters
500 Lafayette Road
St. Paul, MN 55155-4032
MN Toll Free 1-888-646-6367
http://www.dnr.state.mn.us

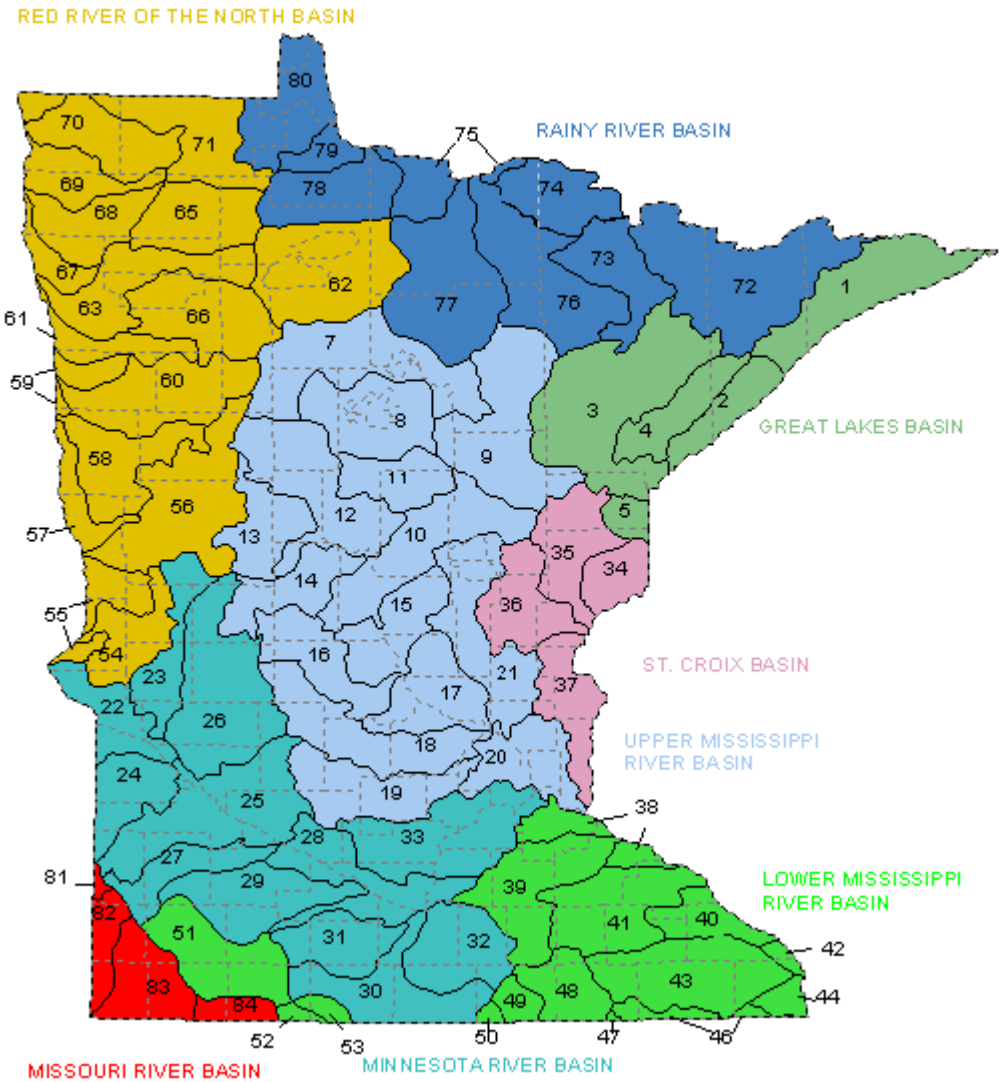
**Data Item 6. Watersheds**
**Data Item 11. Topographic Description of Watersheds**

Big Stone County is located within three major watersheds: the Bois de Sioux, Pomme de Terre and Upper Minnesota River (see Map 2A). Both the Pomme de Terre and Upper Minnesota River Watersheds are part of the Minnesota River Basin (see Figure 2B). The Bois de Sioux Watershed is part of the Red River of the North Basin. This section of the Water Plan provides a profile on each watershed, adopted from the following websites:

**Minnesota Pollution Control Agency**: http://www.pca.state.mn.us/water/basins/index.html

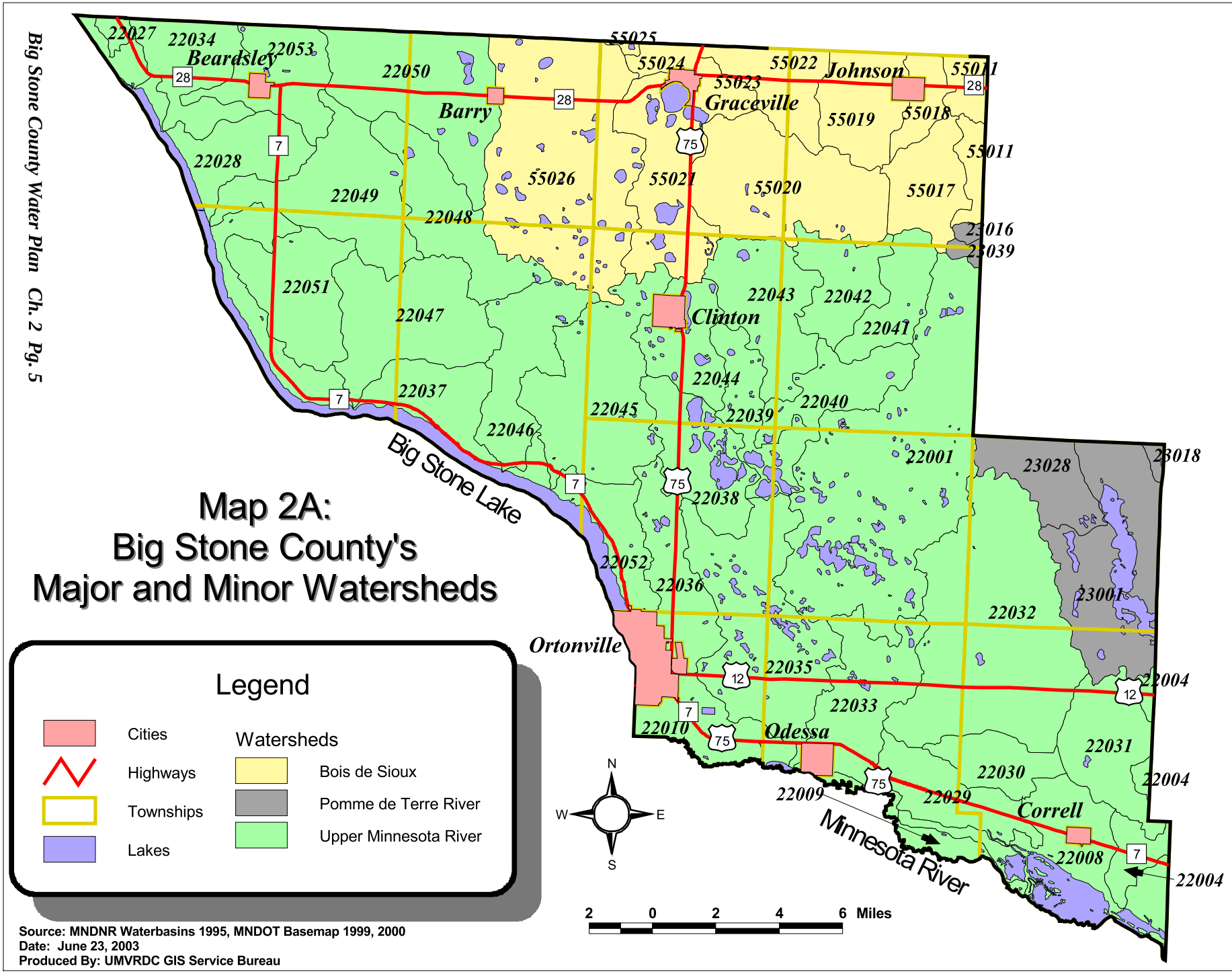
**Minnesota River Basin Data Center**: http://mrbdc.mankato.msus.edu/

**Figure 2B:**
**Minnesota River Basins**




**# 22 = Upper Minnesota River Watershed** **# 23 = Pomme de Terre Watershed**

**# 54 = Bois de Sioux Watershed**

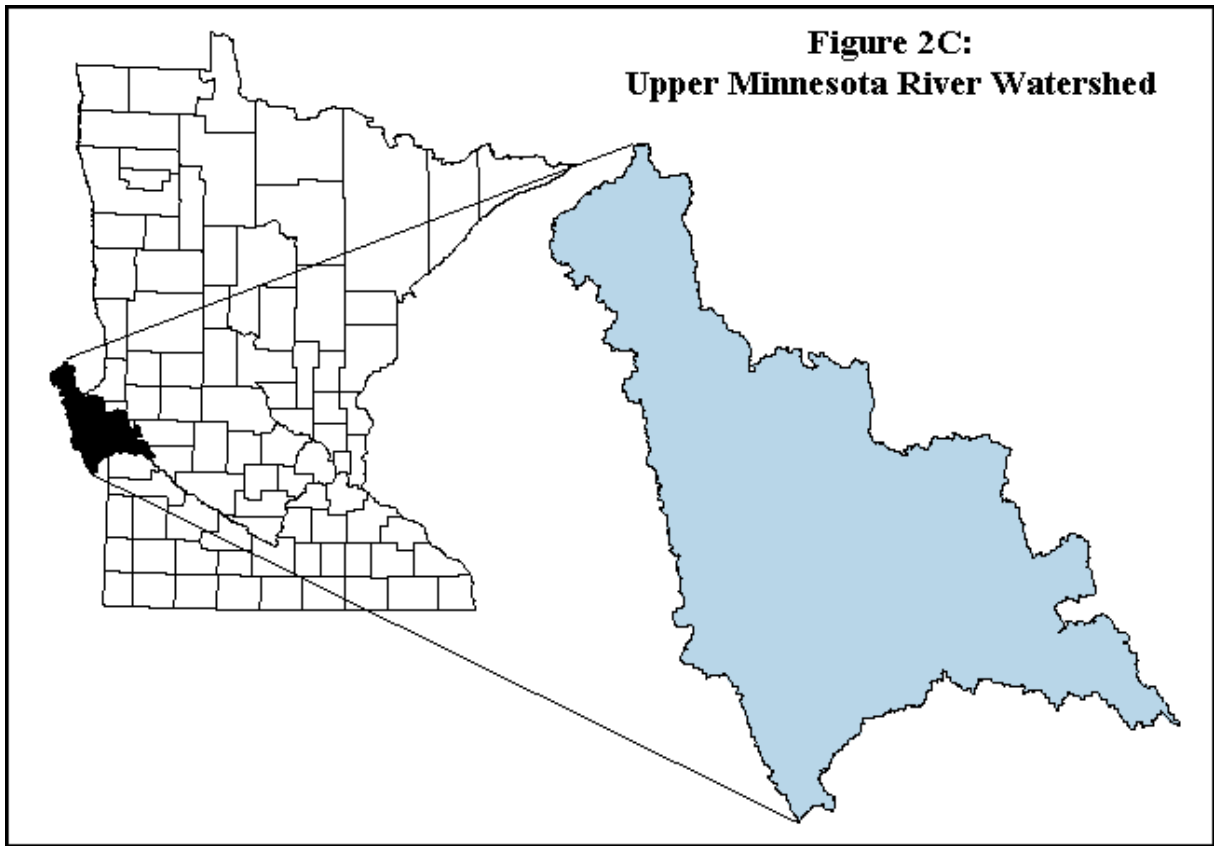



# Map 2A: Big Stone County's Major and Minor Watersheds

Source: MNDNR Waterbasins 1995, MNDOT Basemap 1999, 2000
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

**The Upper Minnesota River Watershed**

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




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

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

Tributaries draining the Coteau and entering the Upper Minnesota River from South Dakota include the Little Minnesota River - headwaters of Big Stone Lake and the Whetstone River. Alluvial deposits at the mouth of the Whetstone River formed a natural dam and originally impounded Big Stone Lake. In 1937, 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.

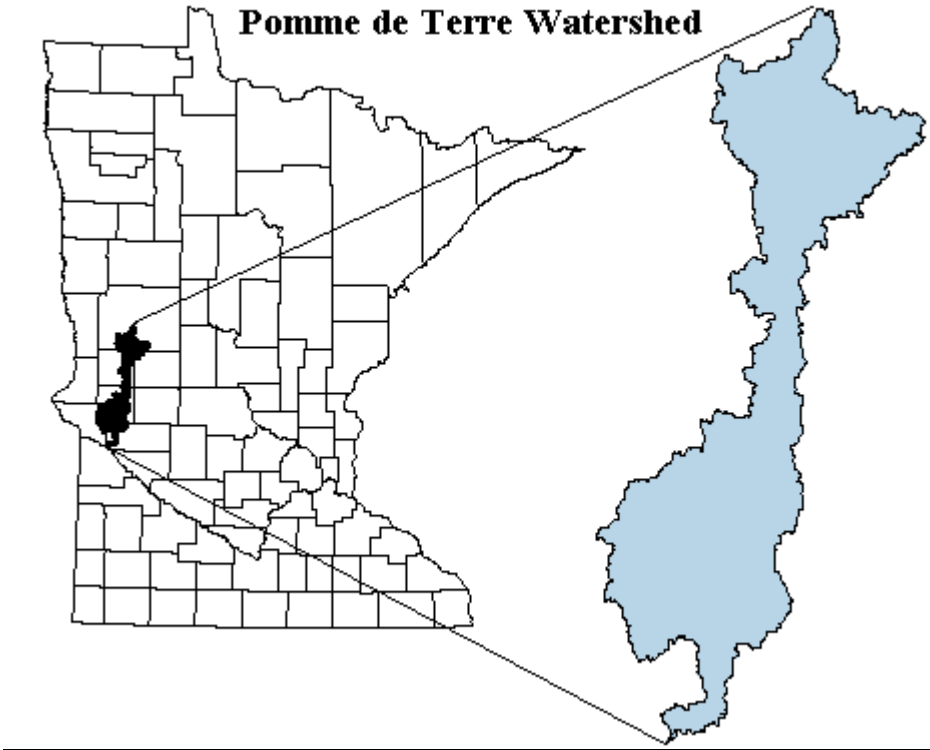
Land use within the Watershed is primarily agricultural, with 76% of the available acres utilized for production of grain crops, mainly corn and soybeans. Of these acres, approximately 15% have been tiled to improve drainage. The majority of the crop-lands (82%) are classified as moderately productive. As of 1994, approximately 8% of the agricultural acres within the Watershed were classified as grasslands enrolled in the Conservation Reserve Program (CRP), a voluntary federal program that offers annual rental payments to farmers in exchange for planting areas of grass and trees on lands subject to erosion. 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.

**The Pomme de Terre Watershed**

The Pomme de Terre River Watershed is also one of the twelve major watersheds in the Minnesota River Basin. It is located in west central Minnesota within Big Stone, Douglas, Grant, Otter Tail, Stevens and Swift counties (see Figure 2D). There are nine municipalities in the watershed, of which the City of Morris is the largest (5,068 residents according to the 2000 Census). The Pomme de Terre River Watershed is approximately 875 square miles or 559,966 acres. The Watershed is subdivided into 52 minor watersheds (or sub-watersheds). The minor watersheds range in size from 2,524 acres to 40,139 acres, with approximately 10,769 acres being the average size.

The Pomme de Terre River and its tributaries, public and private drainage systems, lakes and wetlands, all define the drainage network of the Watershed. The Pomme de Terre River flows from the north to its confluence with the Minnesota River near the City of Appleton in Swift County. The total distance of the stream network is 751 miles of which 616 miles are intermittent streams and 135 miles are perennial streams.

**Figure 2D:**
**Pomme de Terre Watershed**



Originating in lakes and ponds of the rugged, undulating to steep sloped (6- 45%) Alexandria Glacial Moraine, the Pomme de Terre River starts its journey as a distinct stream tumbling cool and clear from Stalker and Long Lakes in southern Otter Tail County. Bordered by wooded hills and grassy meadows, the Pomme de Terre River, while having no major tributaries, flows south through several lakes in Otter Tail, Grant and Stevens counties. Most of these lakes have small water-control dams in the outlets, which maintain various lake levels. In many stretches between lakes, the River meanders quietly through cattail and reed canary grass marshes.

Below the headwaters, the Pomme de Terre River enters the Northern Glaciated Plains Ecoregion. Drainage on the eastern side of the River comes off the Big Stone Moraine, characterized by landscapes that are gently sloping to moderately steep (6-12%), with well drained, silty and loamy soils. Water erosion potential within the Big Stone Moraine is generally classified as moderate. Waters falling on the western side of the basin drain the Fergus Falls Till Plain, an outwash plain that is nearly level to moderately sloping (0-6%), composed of poorly drained clayey and loamy soils. Slight to high water and wind erosion potentials exist across this section of the basin and are reflected by the character of the Pomme de Terre River below the City of Morris. South of this point, flowing through southern Stevens and eastern Swift counties, the River is bordered by eroding and muddy banks, becoming increasingly turbid before discharging into the Minnesota River at Marsh Lake. The River's overall gradient averages 3.5 feet per mile.

Land use within the Pomme de Terre River Watershed is primarily agricultural, accounting for approximately 81% of the area. Located in the northwest quadrant of the Minnesota River Basin, cropping systems in the Pomme de Terre Watershed are more diverse than those of other major watersheds draining the southwest and southeast quadrants. There are roughly one million cattle and three million hogs in the Minnesota River Basin, with 24% of the cattle and 14% of the hogs located within the northwest quadrant.

Within the Pomme de Terre River Watershed, corn and soybeans only account for approximately 50% of the crops grown on agricultural lands. Small grains, hay, and grasslands enrolled in the Conservation Reserve Program (CRP) make up the majority of the balance. In early 1996, it was estimated that 7% of the agricultural acres within the Pomme de Terre Watershed were enrolled in the CRP program. Cropped lands are generally classified as moderately productive (73%), although nearly 24% are ranked as low production acres.

**Bois de Sioux Watershed**

The Bois de Sioux Watershed 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.

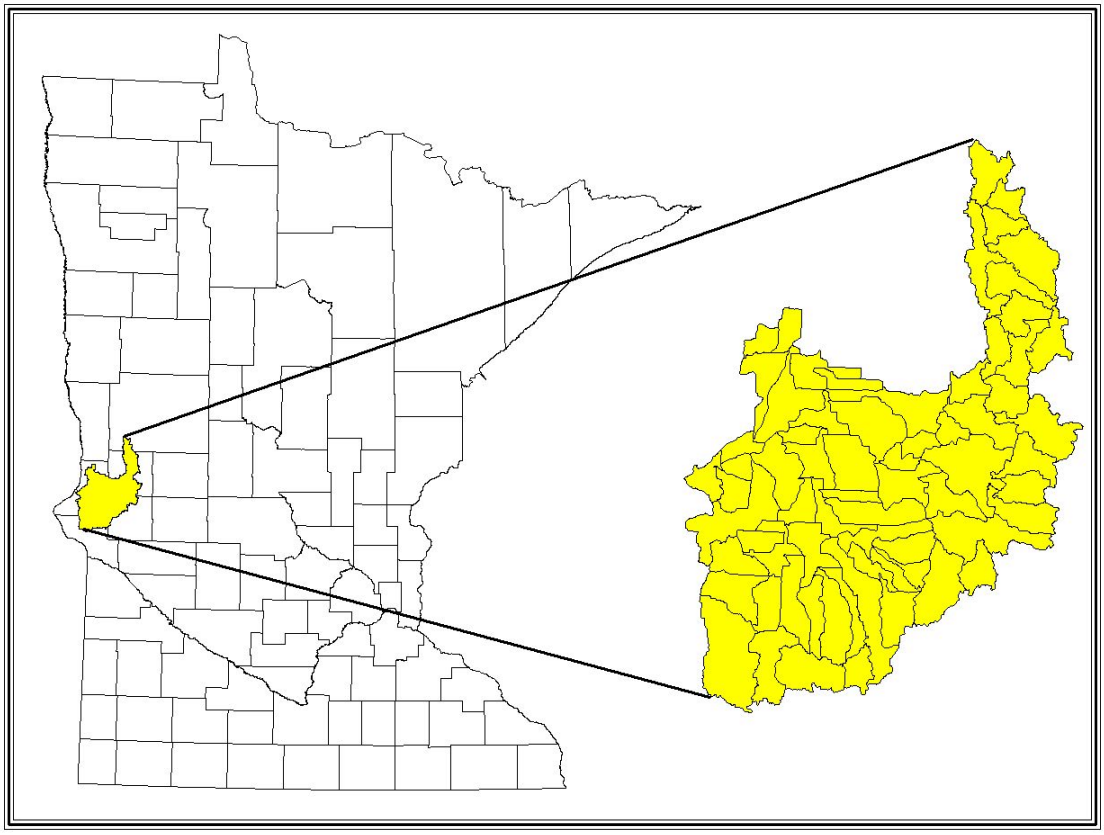
Three different ecoregions are included in the watershed: The Red River Valley Ecoregion, the Northern Glaciated Plains Ecoregion and the North Central Hardwood Forests Ecoregion.
The Red River Valley ecoregion encompasses most of the watershed in the north, central and western portions of the watershed. 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**



## Data Item 7. State Public Waters

***(see Chapter Three for Drainage Ditches, Dams and Control Structures)***

Public Waters are designated as such to indicate which lakes, wetlands and watercourses the Minnesota Department of Natural Resources (DNR), Division of Waters has regulatory jurisdiction over. The statutory definition of Public Waters can be found in Minnesota Statute 103G, Subdivision 15. The following water bodies and courses are given such a classification:

- All types 3, 4, and 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 ed.) that are 10 acres or more in size in unincorporated areas or 2½ acres or more in size in incorporated areas;
- Water basins assigned a shoreline management classification by the Commissioner of the DNR, under sections 103F.201 to 103F.221, except wetlands less than 80 acres in size that are classified as natural environment lakes;
- Waters of the State which have been determined to be public waters or navigable waters by a court of competent jurisdiction;
- Meandered lakes, excluding lakes that have been legally drained;
- Water basins previously designated by the Commissioner for management for a specific purpose, such as trout lakes and game lakes pursuant to applicable laws;
- Water basins designated as scientific and natural areas under Section 84.033;
- Water basins located within and totally surrounded by publicly owned lands;
- Water basins where the State of Minnesota or the Federal government holds title to any of the beds or shores, unless the owner declares that the water is not necessary for the purposes of the public ownership;
- Water basins where there is publicly owned and controlled access that is intended to provide for public access to the water basin;
- Natural and altered watercourses with a total drainage area greater than two square miles in area;
- Natural and altered watercourses designated by the Commissioner as trout streams; and
- Public Waters wetlands, unless the statute expressly states otherwise.

Detailed Public Waters maps are available for viewing at applicable county auditors offices, DNR Waters regional and area offices, DNR area fisheries offices, county Soil and Water Conservation District offices and planning and zoning offices. The maps may also be downloaded off the DNR website at:

**www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html**

## Data Items 8 & 9. Soils & Erosion-Prone Soils (also see data item 6 and Chapter 3)

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 soil associations that are classified as wind erosion prone. Map 3C in Chapter Three shows the location 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 (320-839-6149).

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.

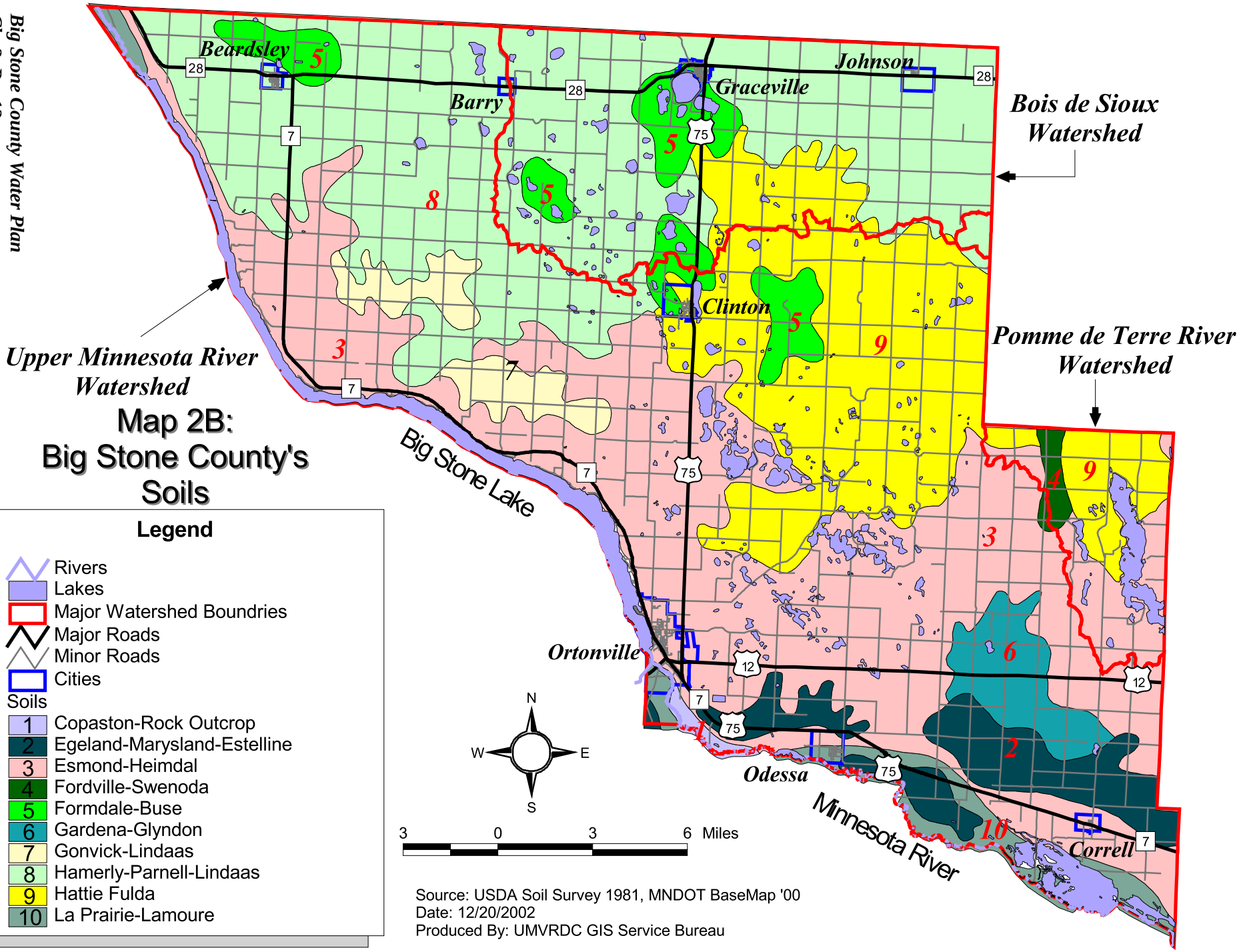
**High Priority Water Quality Problems** – "High priority water quality problems" means areas where sediment, nutrients, chemicals, or other pollutants discharge to Department of Natural Resources designated protected waters or to any high priority waters as identified in a comprehensive local water 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** (also refer to Data Item 6 and Chapter Three)

Water erosion results from soil being moved from its original location by the force of water to 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 3C in Chapter Three (placed there for the discussion on the County's erosion problems) identifies the water erosion prone Big Stone County soil associations that have K factors equal to or greater than 0.28.

**Wind Erosion** (also refer to Data Item 6 and Chapter Three)

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




# 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

Source: USDA Soil Survey 1981, MNDOT BaseMap '00
Date: 12/20/2002
Produced By: UMVRDC GIS Service Bureau

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 3C Chapter Three (placed there for the discussion on the County's erosion problems) identifies the wind erosion prone soil associations in the County.

## Data Item 10. Original Vegetation

The Minnesota Department of Natural Resources (DNR) has inventoried the original vegetation of Big Stone County through its Presettlement Vegetation Database. Presettlement vegetation was determined by analyzing the detailed maps and records of early surveyors (approximately 1895). The purpose of the database is to "analyze presettlement vegetation patterns for the purpose of determining natural community potential, productivity indexes, and patterns of natural disturbance". Map 2C presents the presettlement vegetation for Big Stone County.

## Data Item 11. Topography (see Data Item 6)

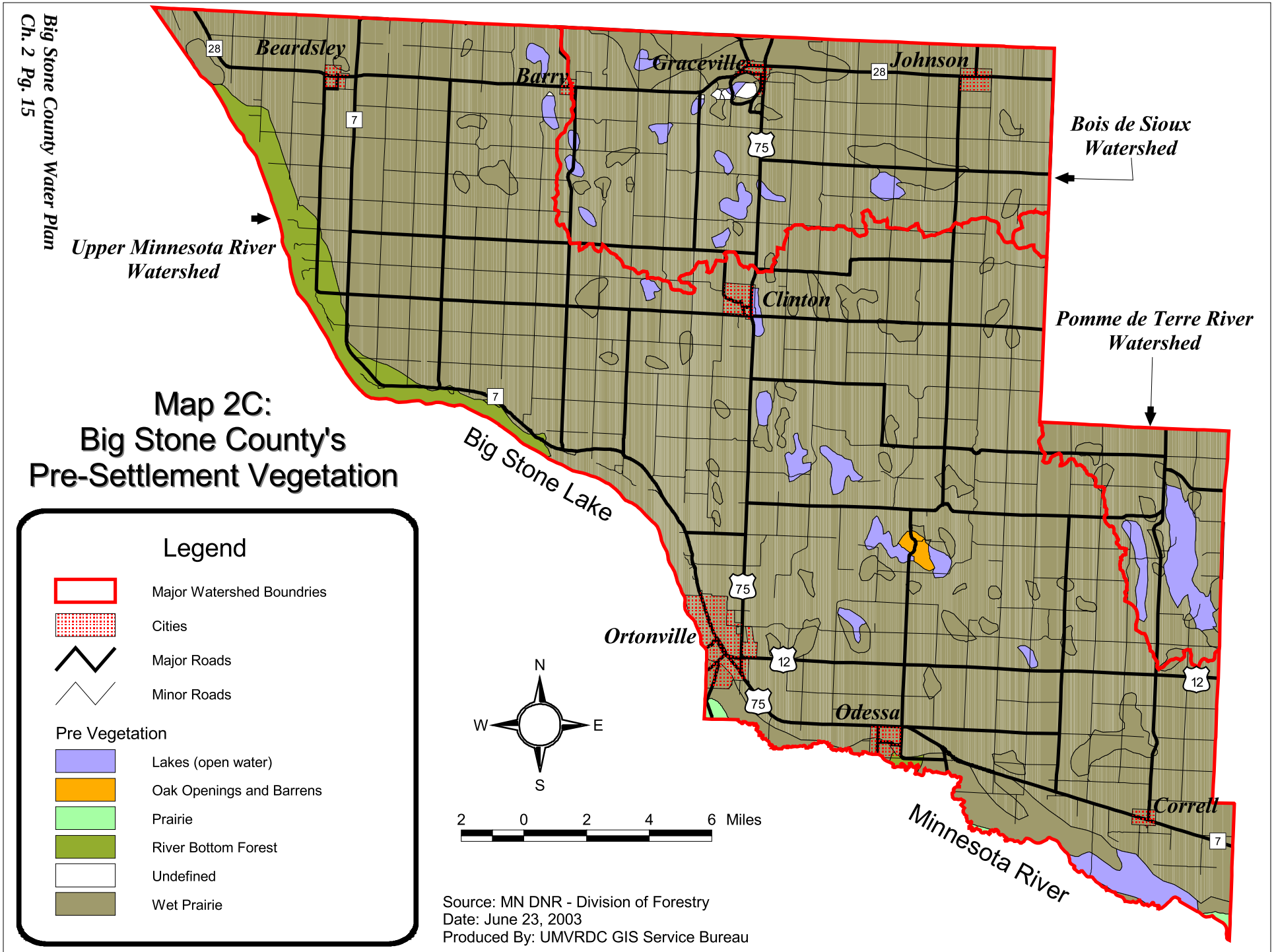
## Data Item 12. Land Use

As an update to the 1969 Land Use Inventory, the Minnesota Land Management Information Center (LMIC) conducted the Minnesota Land Use-Agricultural and Transition Areas Inventory in 1989. Land uses were interpreted using National Wetland Inventory Maps from the United States Fish and Wildlife Service, USDA-Farm Service Agency (FSA) low altitude 35-mm aerial photography and Landsat satellite imagery. The results of the Inventory are reproduced in Map 2D (the map corresponds with the text below).

The land cover classifications used in this project were derived from *A Classification Manual for Land Cover and Land Use in Minnesota,* produced in 1978 by the Minnesota State Planning Agency. The objective of the current classification scheme was to provide as much consistency as possible with the 1969 land use categories, while at the same time recognizing current user needs and better data sources. The following definitions describe the types of land use found in each classification scheme:

- **Urban and Industrial -** This category includes cities, towns and villages with place names. Small residential areas without USGS topographic map place names are classified as rural residential developments. The urban and industrial category also includes commercial, industrial or urban developments that are included within, or are directly associated with an urban area. Examples include manufacturing and processing plants, power plants, urban airports and waste treatment plants.

- **Farmsteads and Rural Residences -** Farmsteads include the farmhouse and adjoining farmyard areas. Farmsteads also include buildings such as machinery storage areas, grain storage facilities, corrals, livestock holding and feeding areas directly associated with the farmyard area. Rural residences are non-urban residences other than farmsteads. Rural residences include the residence, associated structures (such as garages and sheds), and the associated landscaped area. This category includes from one to four residences within close proximity, with no distinguishable, intervening, non-residential features.




# Map 2C: Big Stone County's Pre-Settlement Vegetation

## Legend

- Major Watershed Boundries
- Cities
- Major Roads
- Minor Roads

Pre Vegetation

- Lakes (open water)
- Oak Openings and Barrens
- Prairie
- River Bottom Forest
- Undefined
- Wet Prairie

Source: MN DNR - Division of Forestry
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

- **Cultivated Land -** Cultivated land includes those areas under intensive cropping or rotation, including periods when a parcel may be fallow. It represents land planted to forage or cover crop. The units exhibit linear or other patterns associated with current or relatively recent tillage.

- **Pasture and Hayland -** This category includes areas that show evidence of past tillage but do not now appear to be continuously cropped or in a crop rotation. Parcels in this unit include fields that are idle or abandoned and may or may not have been planted to a cover crop. In addition to displaying some evidence of past tillage, they usually are relatively uniform in vegetation.

- **Grassland -** This unit includes grasslands and herbaceous plants. It may contain up to one-third shrubs and/or tree cover. Areas may be small to extensive, and range from regular to very irregular in shape. They are often found between agricultural land and more heavily wooded areas, and along right-of-ways and drainages. These areas may be mowed or grazed, and range in appearance.

- **Deciduous Forest -** This classification includes areas with at least two-thirds of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but it is dominated by deciduous species. It includes woodlots, shelterbelts, and other planted areas.

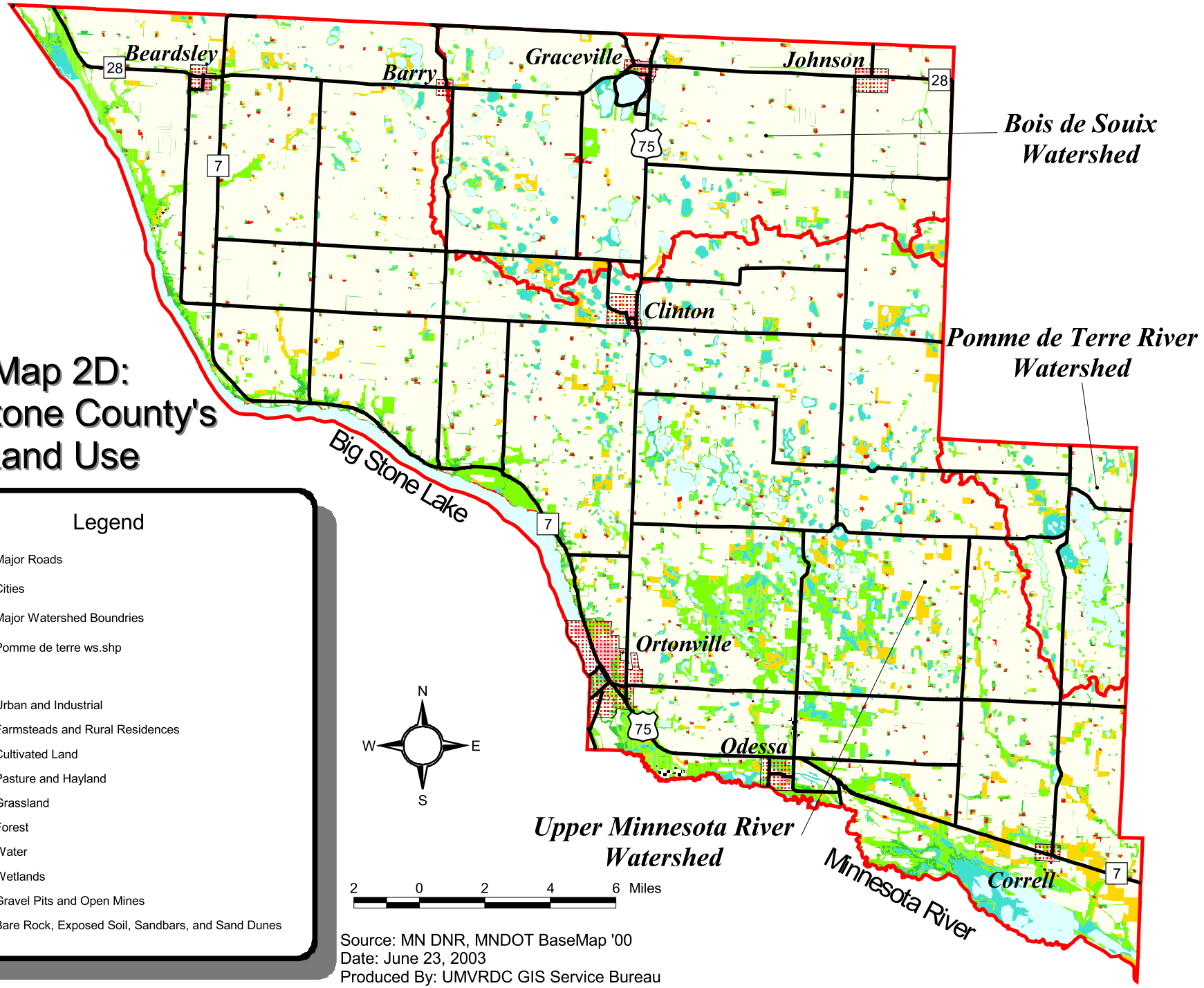
- **Water -** This category includes permanent water bodies, including lakes (U.S. Fish and Wildlife Service Lacustrine System 'L'), rivers, reservoirs, stock ponds and permanent palustrine open water. Intermittently exposed palustrine open water areas are included in this open water category when the photo evidence indicates that the area is covered by water the majority of the time.

- **Wetlands -** This category includes wetlands visible through photography, with an area of at least two acres. Wetlands boundaries are delineated from U.S. Fish and Wildlife Service National Wetland Inventory data. In cases where these boundaries have changed (such as for drained wetlands), the boundaries are determined from the current photography. U.S. Fish and Wildlife Service National Wetland Inventory types included in this category are semi-permanent palustrine emergent wetlands and areas of semi-permanent palustrine open water. These categories represent basins with deep-water emergents (primarily cattail, bulrush and whitetop) and open water inclusions. Where U.S. Fish and Wildlife Service data is not available, wetland classification will be based on the distribution of visible deep-water emergents and open water inclusions. Temporary, saturated, seasonal, and intermittently exposed palustrine wetlands will, in most cases, be mapped according to dominant cover type visible on the photography rather than as wetlands.

- **Gravel Pits and Open Mines -** This category includes areas stripped of topsoil with exposed substrate. Gravel pit areas that have been reclaimed either naturally or artificially are classified as the current cover type.

- **Bare Rock -** This category includes areas of rock outcrops that lack appreciable soil development or vegetative cover.

# Map 2D: Big Stone County's Land Use




## Legend

- Major Roads
- Cities
- Major Watershed Boundries
- Pomme de terre ws.shp

Land Use

- Urban and Industrial
- Farmsteads and Rural Residences
- Cultivated Land
- Pasture and Hayland
- Grassland
- Forest
- Water
- Wetlands
- Gravel Pits and Open Mines
- Bare Rock, Exposed Soil, Sandbars, and Sand Dunes

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

## Data Item 13. Public Water, Storm Sewer and Sanitary Sewer Systems

Table 2B identifies which Big Stone communities have public water, storm sewer and sanitary sewer systems. Map 2E shows the locations of the communities along with the major watershed boundaries.

**Table 2B:**
**Communities Served by Public Water,**
**Storm Sewer and Sanitary Sewer Systems**

| Community | Storm Sewer | Sanitary Sewer | Public Water | ISTS |
|---|---|---|---|---|
| **Beardsley** | | X | X | |
| **Barry** | | X | X | X |
| **Graceville** | X | X | X | |
| **Johnson** | | | X | X |
| **Clinton** | X | X | X | |
| **Ortonville** | X | X | X | |
| **Odessa** | X | X | X | |
| **Correll (Partial)** | X | | X | X |

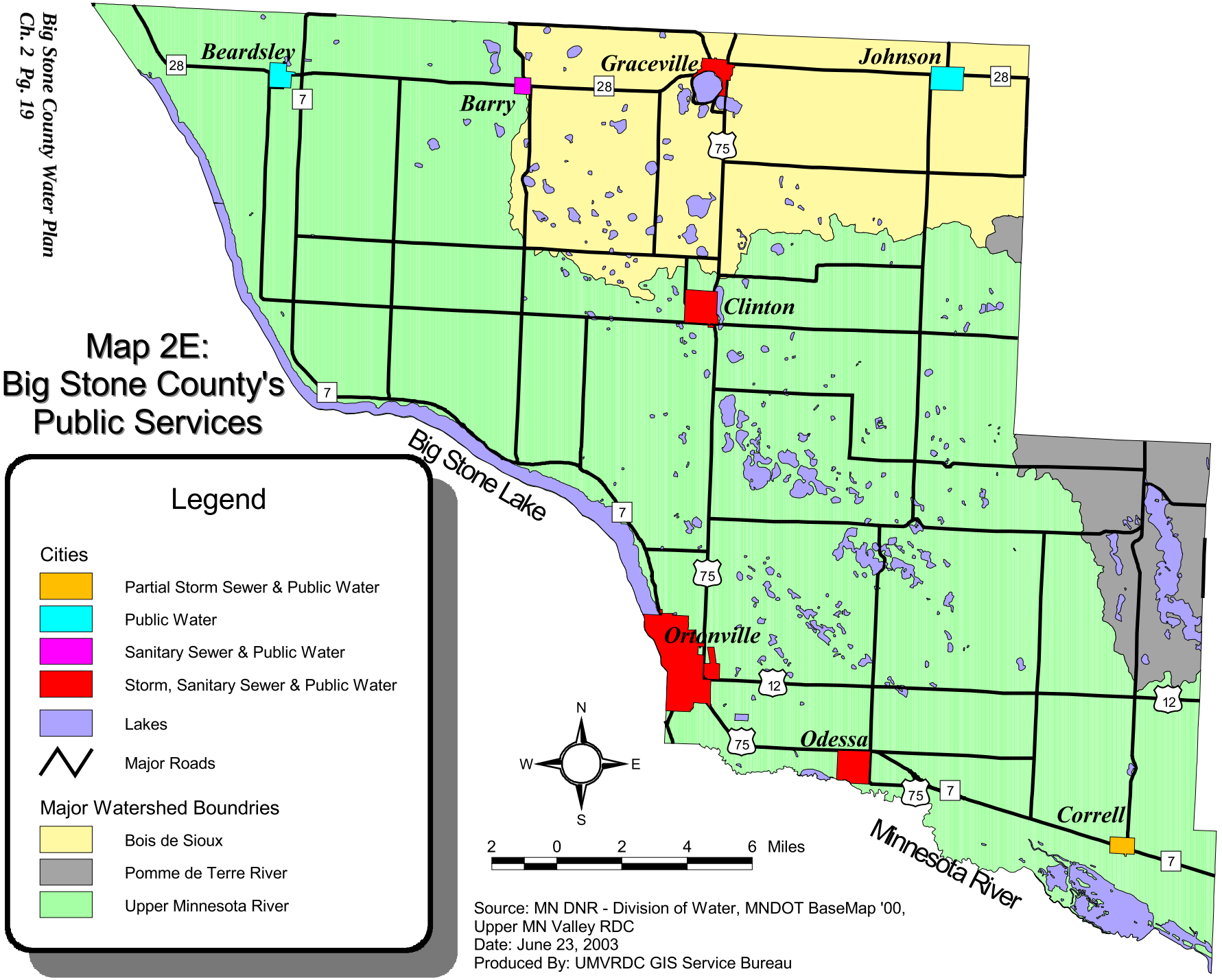
## Data Item 14. Community Public Water Supplies

Please refer to Chapter 3 for a discussion on Public Water Suppliers.

## Data Item 15. Land Ownership

In 1995, the Minnesota Land Management Information Center (LMIC), in conjunction with the Minnesota Department of Natural Resources (DNR), developed a computerized database of publicly owned lands in the State, called the Gap Analysis Project (GAP) Stewardship. Much of the data used to create the GAP Stewardship database was from the mid 1970s to the late 1980s, thus the accuracy of the database is limited. Another factor that limits the accuracy of this database is that tracts are only broken down by 40-acre blocks, thus land interest is only expressed when an agency owns more than 50 percent of a 40-acre tract. Map 2F displays the location of the publicly owned lands within the County.

# Map 2E: Big Stone County's Public Services




Source: MN DNR - Division of Water, MNDOT BaseMap '00,
Upper MN Valley RDC
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

## Data Item 16. Water Resource and Related Easements

Easements, whether short-term or perpetual, are commonly used to protect water quality, reduce soil erosion, and enhance fish and wildlife habitat. There are a variety of programs offered through local, State and Federal governmental agencies (see Appendix C for Big Stone County's Conservation Lands Summary). Among the most common programs offered are the Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM) Reserve Program, Wetland Reserve Program (WRP) and U.S. Fish and Wildlife Service easements. A brief discuss on each of these programs is provided below. For more information contact your local Board of Water and Soils Resources' Board Conservationist (currently David Sill in the Marshall office at 507-537-6060) or visit the following website:

**http://www.bwsr.state.mn.us/easements/index.html**

**Conservation Reserve Program (10-15 Year Contracts)**

The Conservation Reserve Program (CRP) offers landowners, operators and tenants the opportunity to voluntarily convert land with high erosion rates and other environmentally sensitive land to permanent vegetative cover. Permanent cover options include grasses and legumes, tree plantings and wildlife habitat. The program goals are to: reduce soil erosion, enhance fish and wildlife habitat, improve water quality, protect the soils on the nation's cropland base, demonstrate good land stewardship and improve rural aesthetics.

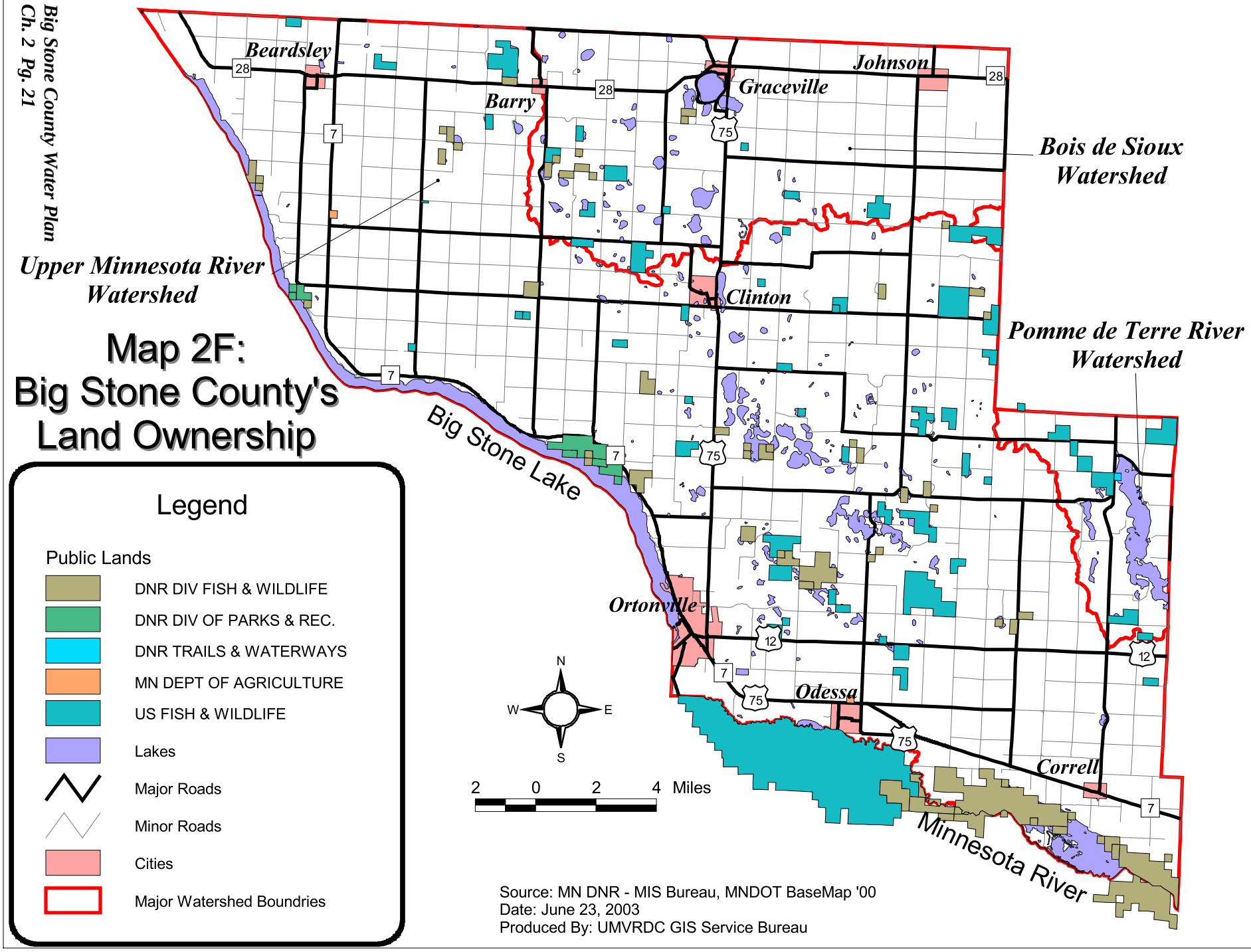
Eligible owners or operators may place highly erodible or environmentally sensitive land into a 10 to 15 year contract. The participant, in return for annual payments, agrees to implement a conservation plan approved by the local conservation district for converting highly erodible cropland or environmentally sensitive land to a less intensive use (i.e., cropland must be planted with a vegetative cover, such as perennial grasses, legumes, forbs, shrubs, or trees). The cropland must be owned or operated for at least 12 months prior to the close of the annual sign-up period, unless the land was acquired by will or succession or the Farm Service Agency (FSA) determines that ownership was not acquired for the purpose of placing the land in the conservation reserve.

**Conservation Reserve Enhancement Program (Perpetual/Limited)**

The Conservation Reserve Enhancement Program (CREP) is a unique combination of the State's RIM Program and the Federal CRP Program. CREP aims to improve the water quality of the Minnesota River, which in large part is degraded by runoff from marginal agricultural lands, floodplains, riparian areas and drained wetlands. CREP provides a unique opportunity for landowners along the Minnesota River to voluntarily remove these lands from agricultural production.

Through CREP, farmers are given an upfront State "bonus" payment, plus up to 15 years of guaranteed USDA annual payments, based on the value of the land. Funding for the program comes through a match of State and Federal dollars. The State of Minnesota is required to match Federal dollars (about $0.44 for every Federal dollar) for the placement of perpetual CREP easements on up to 100,000 acres in the 37-county Minnesota River Watershed. Approximately $163 million in federal funds were available through September 30, 2002.

# Map 2F: Big Stone County's Land Ownership




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

**Reinvest in Minnesota Reserve Program (Perpetual/Limited)**

The Reinvest in Minnesota (RIM) Reserve Program, administered by local SWCDs and BWSR, was one of the first State programs of its kind in the nation. RIM allows landowners to sell perpetual/limited easements for riparian lands, sensitive groundwater areas, wetland restoration areas (drained wetlands), marginal cropland and land for living snow fences. The payment rate for the program is based on 90% of the average market value of tillable land in the township. In addition, RIM Reserve provides cost share funds, often times 100%, for establishing appropriate conservation and wildlife habitat practices on easement lands.

Since its inception in 1986, funding for the program has been erratic, ranging from a high of $51 million, to a low of $3 million. Since it began, RIM Reserve has enrolled approximately 3,927 easements statewide, covering 126,567 acres, including 43,401 acres of wetland restoration and adjacent upland. The program has historically fostered partnerships with private organizations including Pheasants Forever, Ducks Unlimited and the Minnesota Waterfowl Association, as well as other government agencies, including the U.S. Fish and Wildlife Service (USFWS) and the Minnesota Department of Natural Resources (DNR).

**Wetland Reserve Program (Perpetual/ Limited)**

The Wetland Reserve Program (WRP) is a voluntary program through the USDA to restore and protect wetlands on private property. It provides an opportunity for landowners to receive financial incentives to restore or enhance wetlands on their property. Landowners can enroll in the WRP by one of the following three means:

- Permanent Easement. USDA will pay up to the appraised market value for the land and 100% of the cost of restoring wetlands and seeding of upland areas into native grasses and forbs.
- 30-Year Easement. USDA will pay 75% of the appraised market value for the land and 75% of the cost associated with wetland restorations and upland native grass seeding.
- Restoration Cost-Share Agreement. USDA will pay 75% of the cost of restoring a wetland in exchange for a minimum ten-year agreement to maintain the restoration. No land use payment is provided.

Any type of land that can be restored to a wetland at a reasonable cost is eligible for WRP, except for wetlands drained in violation of Swampbuster or land established to trees under the Conservation Reserve Program. Cost-share is available to restore:

- Wetlands cleared and/or drained for farming, pasture, or timber production;
- Upland areas around a restored wetland and;
- Drained wooded wetlands where hydrology will be restored.

Through the WRP the landowner continues to control access to the land and may lease the land for hunting, fishing, and other compatible recreational activities.

**U.S. Fish and Wildlife Service Easements (Perpetual)**

The U.S. Fish and Wildlife Service (USFWS) manages land enrolled in two types of conservation easement programs in Big Stone County: the Farmer's Home Administration Program (FmHA) and Wetland Easement Program. Under FmHA, when a landowner defaults on a loan, and that property contains wetlands, those wetlands receive protection. Protection may come in the form of a perpetual conservation easement or fee title transfer to a Federal or State fish and wildlife agency for management.

## Data Item 17. High, Mean and Low Flows of Streams

The Minnesota Department of Natural Resources (DNR) evaluates average annual stream flow by using Exceedence Value Ranges (EVRs). An exceedence value is a statistical measurement of stream flow based on historical discharge records. The value is the probability of the stream flow exceeding a certain value. For instance, a 50% exceedence value (sometimes written as Q50) indicates that the level of stream flow currently being reported at a gauging station has been equaled or exceeded 50% of the time during the period of record being used (which could be monthly or yearly). A 75% exceedence value (Q75) would be the level of stream flow at a particular gauging station that was equaled or exceeded 75% of the time during the period of record. A description of each EVR is given below.

- **Critical Flow (Q90-Q100):** A watershed is classified as having critical flow when its stream flow falls below the annual 90% exceedence value (Q90). If a watershed is classified as having critical flow, the DNR may, if necessary, restrict the appropriation of water from that watershed to conserve water for instream flow or other higher priority uses.
- **Low Flow (Q75-Q90):** A watershed is classified as having low flow when its stream flow is below the monthly 75% exceedence value (Q75), but still above critical flow.
- **Normal Flow (Q25-Q75)**: A watershed is classified as having normal flow when its stream flow is between the monthly 25% (Q25) and 75% (Q75) exceedence values.
- **High Flow (Q10-Q25):** A watershed is classified as having high flow when its stream flow is above the monthly 25% exceedence level (Q25).
- **Flood Flow (Q1-Q10):** A watershed is classified as having flood flow when its stream flow is at or above the flood stage set for that watershed by the National Weather Service (NWS).

Table 2C displays the mean annual EVRs for streams in Big Stone County by watershed (1996-2000). For more specific information relating to Big Stone County's climate, visit either of the following websites:

**http://www.climate.umn.edu/** or **http://mn.water.usgs.gov/wrd/index.html**

**Table 2C:**
**Mean Stream Exceedence Value Ranges (EVR)**
**Between 1996 and 2000 by Major Watershed**

| Watershed | 1996 EVR | 1997 EVR | 1998 EVR | 1999 EVR | 2000 EVR |
|---|---|---|---|---|---|
| **Bois de Sioux** | Q10-Q25 | Q1-Q10 | Q10-Q25 | Q1-Q10 | Q25-Q75 |
| **Pomme de Terre** | Q1-Q10 | Q1-Q10 | Q25-Q50 | Q10-Q25 | Q25-Q75 |
| **Upper Minnesota River** | Q1-Q10 | Q1-Q10 | Q10-Q25 | Q10-Q25 | Q25-Q75 |

## Data Item 18. Ordinary High Water Levels for Lakes

The boundary of protected waters and wetlands, for regulatory purposes, is defined by the Ordinary High Water Level (OHWL). The OHWL is the elevation delineating the highest water level which has been maintained for a sufficient period of time (enough to leave evidence on the landscape). Generally, it is the point where the natural vegetation changes from predominately aquatic to predominately terrestrial. Any work done below the OHWL is within the beds of public waters and is therefore subject to the permit authority of the Department of Natural Resources.

To find current OHWLs for a specific lake in Big Stone County, use the following steps:

1. Use the Department of Natural Resource's land finder feature on their website at:

   **http://www.dnr.state.mn.us/lakefind/index.html**

2. Type in the specific lake and/or county in the "FIND A LAKE" box.

3. Click "Get Lake Data".

4. Once the new page is loaded, find your lake name in the correct county (there may be more than one listed due to overlapping lake names…this is avoided if you typed in the county's name in step 2).

5. Click the checkmark under the "lake water levels" category.

6. The lake's OHWL will be listed next to "OHW" on the upper left side. Click the highlighted OHW for more information on Ordinary High Water Levels.

## Data Item 19. Permitted Surface Water Appropriations
## Data Item 22. Permitted Groundwater Appropriations

A listing of Minnesota DNR issued Water Appropriation Permits for Big Stone County is provided in Appendix B (The first page of Appendix B describes how to use the information). Water Appropriation Permits are required by the Minnesota DNR for withdrawals greater than 10,000 gallons per day or one million gallons per year. There are several exemptions from the permit requirements, including domestic uses serving less than 25 persons for general residential purposes, test pumping, reuse of water already authorized by a permit and certain agricultural drainage systems. All active water appropriation permit holders are required to measure monthly water use with an approved measuring device to an accuracy of 10% and report water use yearly. For more information on water appropriation permits, visit the DNR at the following website:

**http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/index.html**

## Data Item 20. State Protected Lake Levels and Stream Flows

The DNR is the regulatory agency in charge of establishing protected flows and lake levels within the State. The DNR has defined protected flow as "the amount of water required in the watercourse to accommodate instream needs such as water-based recreation, navigation, aesthetics, fish and wildlife habitat, water quality and needs by downstream higher priority users located in reasonable proximity to the site of appropriation." Protection flow for "instream needs" has been identified as a significant social and environmental issue. Instream flow protection is addressed in Minnesota Statutes, and permits issued for appropriation of water from streams or lakes may be limited in order to maintain and protect instream uses.

Although Minnesota is widely perceived as a water-rich state, local and statewide shortfalls are common. For instance, in 1988, Minnesota and much of the Upper Midwest experienced a severe to extreme drought, rivaling the drought conditions of 1933-1934. Wells went dry, streams had low or no flow, and the lack of adequate water supplies affected all users, out-of-stream and instream. Surface-water appropriators who had never before experienced water availability shortages, had their surface water appropriation permits suspended as early in the season as June.

As recently as the summer of 2000, serious thought was given to suspending appropriations. This was due to abnormally dry growing season over significant areas of Minnesota. The DNR notified water appropriators to plan ahead in case of permit suspensions. Heavy rainfall in early November, however, helped to replenish dehydrated topsoil, as well as streams and lakes.

For a list of current protected lake levels and stream flows in Big Stone County, contact the local DNR Hydrologist (Skip Wright at 796-6272). The following individual is currently the statewide contact:

**Dana Dostert, Data Management Hydrologist, (651) 297-3901 or**
**danadostert@dnr.state.mn.us**

## Data Item 21. Water Use Conflicts
## Data Item 23. Known Well Interference Problems

Increases in surface and groundwater use can lead to conflict. In such instances, domestic well owners and municipal water suppliers can file a water use complaint with the Department of Natural Resources (DNR). According to Minnesota Statutes 103G.261, domestic water use is the highest priority when the State's water supply is limited. If upon DNR investigation it is found that the water use conflict is the direct result of a nondomestic water user(s), water use restrictions may be imposed. For instance, the Water Appropriation Permit Program could consider imposing permit restrictions, based on the user's priority, water conservation measures and/or well improvements. In addition, the DNR Technical Analysis Program may assist the user(s) in evaluating alternative water supply sources.

When a high capacity well is pumping, a portion of the aquifer around it is dewatered in a pattern known as a cone of depression. Wells located within the cone of depression may experience lower water levels and have problems getting water. This condition is referred to as "well interference". Most well interference problems tend to be localized and short in duration, however, being without water is a major inconvenience and can cause damage to well pumps. Simply lowering the pump in the well or installing a new well pump can resolve many well interference problems. In some situations, however, it may become necessary to construct a new water supply well.

The DNR Well Interference Complaint Tracking Database lists only one well interference complaint that has occurred in Big Stone County. In this situation, the landowner worked out a satisfactory solution without local or state involvement. For more information regarding the County's well interference database, contact the DNR local water planning coordinator (currently John Fax) at 651-297-2404.

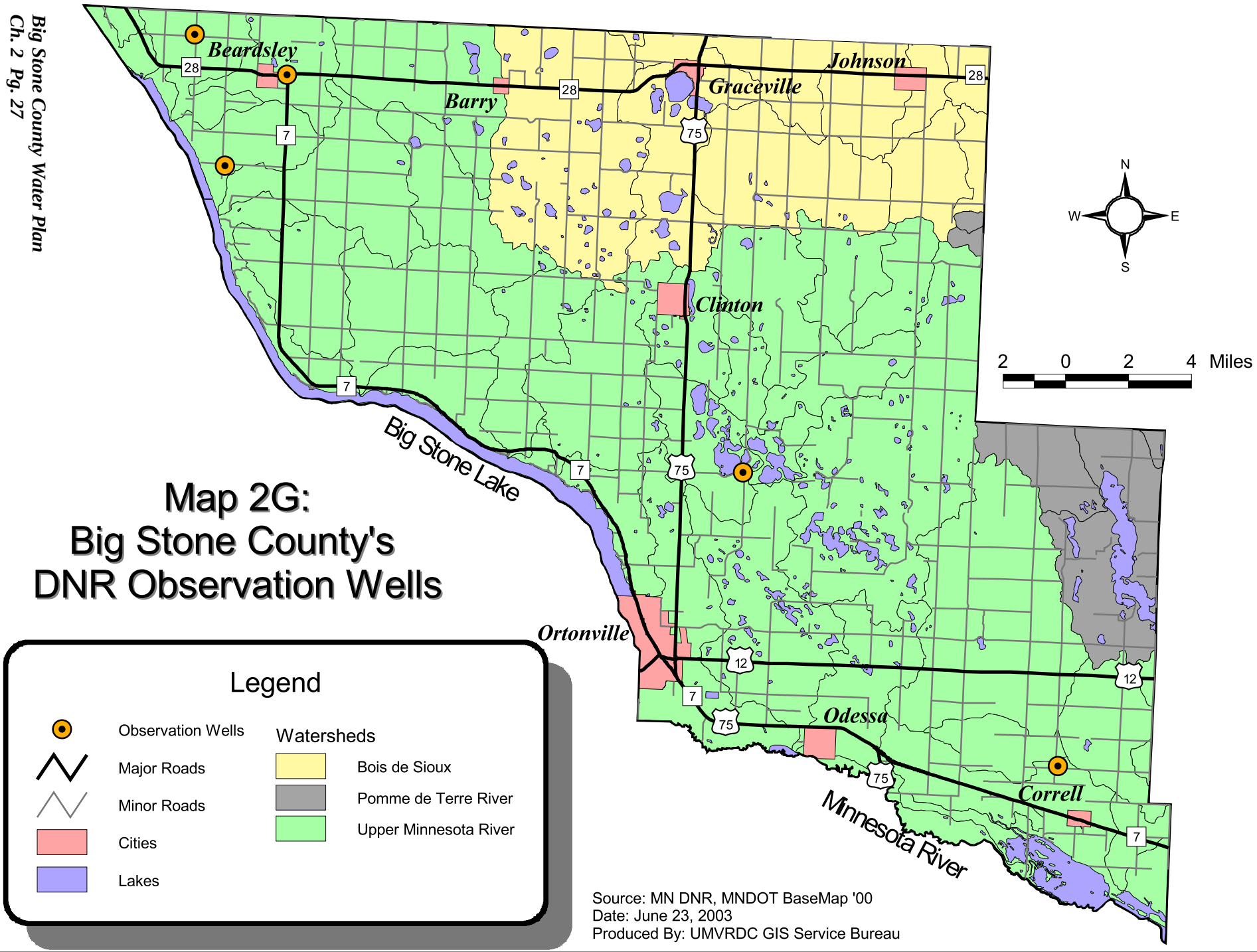
## Data Item 24. Observation Wells

The Minnesota Department of Natural Resources 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 Observation Well Program, groundwater levels are routinely measured in 700 wells statewide. Map 2G identifies the locations of the DNR observation wells within Big Stone County. 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 and detect significant changes.
- Provide data to resolve allocation problems.
- Identify target areas that need further hydrogeologic investigation, water conservation measures, or remedial action.

For more information on observation wells, visit the DNR website at:

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




# Map 2G: Big Stone County's DNR Observation Wells

## Legend

- Observation Wells
- Major Roads
- Minor Roads
- Cities
- Lakes

Watersheds

- Bois de Sioux
- Pomme de Terre River
- Upper Minnesota River

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

## Data Item 25. Water Quality Management Classifications

The Minnesota Pollution Control Agency (MPCA) establishes water quality standards for all waters of the State, both surface and underground. These standards are contained in Minnesota ***Rules*** Chapter 7050 (the MPCA's statutory authority to adopt water quality standards and to classify waters of the State is found in Minnesota ***Statutes*** Chapter 115). Water quality standards consist of beneficial uses and the numerical standards needed to protect those uses. The beneficial uses of water include drinking, protection of aquatic life, fishing and recreation, industrial, agriculture and wildlife use. Chapter 7050 is usually revised every three years. The current version became effective on February 14, 2000, and can be found at the State Revisor's following website:

**http://www.revisor.leg.state.mn.us/arule/7050/0470.html**

## Data Item 26. Surface Water Quality Data
## Data Item 27. Informal Water Quality Sources

There is a vast amount data that directly pertains to Big Stone County's water quality. The coverage of the data varies from the larger eco-regions of Minnesota, to detailed water quality data collected from local waters within the County. The purpose of this section is to introduce what kind and type of water quality information can be found (or could be found if someone wanted to collect it) regarding Big Stone County. For more information on the types of water quality data available, visit the following Minnesota Pollution Control Agency websites:

**http://www.pca.state.mn.us/water/lakeprograms.html or …/lakequality.html**

### Lake Water Quality Assessment Reports

The Lake Assessment Program (LAP) was developed in 1985 in response to requests from lake associations that were interested in cooperatively assessing the condition of their lake. Since 1985, the Minnesota Pollution Control Agency (MPCA) has conducted over 160 LAP studies. In addition to complete studies, the MPCA conducts a variety of other lake-monitoring (regional and trend studies) efforts that result in briefer reports. These include the following:

- Trend Reports are often follow-up studies to previously conducted LAP or other studies. Their primary focus is to assess trends in lake condition over time.
- Note Reports, as they are referred to, are brief LAP-like reports often prepared in response to lakeshore residents' concerns or as a part of oral presentations. These are brief reports that focus primarily on the current trophic status of the lake.
- Status reports are brief reports that serve to characterize the trophic status and trends of several lakes in a county.

Currently, there are no LAP studies available for lakes in Big Stone County. For more information on the program, visit:

**http://www.pca.state.mn.us/water/lakereport.html**

## Citizen Lake Monitoring Program

The Citizen Lake Monitoring Program (CLMP) is a cooperative program combining the technical resources of the Minnesota Pollution Control Agency (MPCA) and volunteer efforts of citizens statewide who collect water-quality data in lakes. CLMP volunteers collect water transparency data using an eight-inch, circular, all-white metal plate attached to a calibrated rope, called a Secchi disk. About once a week during the summer, volunteers boat to a designated spot on their lakes to collect transparency readings. The volunteer lowers the disk into the water until it is no longer visible and notes the depth from the markings on the rope. The disk is then lowered a little further and then raised back up until it is just visible. The second depth reading is averaged with the first, and a final number is recorded on a data sheet. At the end of summer, volunteers send their data sheets to the MPCA to be compiled with other water-quality data. Water transparency readings derived through the CLMP provides useful information concerning the lake's water quality. First, they indicate the amount of light penetration into a lake. Second, Secchi transparency provides an indirect measure of the amount of suspended materials in the water, which in many cases is an indication of the amount of algae in the water. Long-term transparency monitoring helps scientists detect signs of degradation to a lake. Generally, the earlier water-quality problems are detected, the easier and less expensive it is to restore the lake to its previous state.

Since 1973, two lakes in Big Stone County have been monitored through the Citizens Lake Monitoring Program: Big Stone and East Toqua Lakes. To view the specific water quality data regarding these lakes, visit the following MPCA website and do a search for Big Stone County:

**http://data.pca.state.mn.us/pca/clmp.html**

## Citizen Stream Monitoring Program

The Citizen Stream Monitoring Program (CSMP) combines the knowledge and commitment of interested citizens with the technical expertise and resources of the Minnesota Pollution Control Agency (MPCA) to develop a more comprehensive statewide network for monitoring Minnesota's 92,000 miles of streams. Any person or group willing to devote a small amount of time and energy to conduct simple stream checks on a regular basis can become a volunteer monitor with the MPCA. Approximately once a week during the summer months, monitors measure transparency, appearance, recreational suitability and stream stage on an established spot of a nearby stream. Monitors also measure precipitation on a daily basis.

For more information on the Citizen Stream Monitoring Program, including results for Big Stone County, visit the MPCA at the following website:

**http://www.pca.state.mn.us/water/streamsrivers.html**

You can also contact the Upper Minnesota River Watershed District at (320-839-3411) or the Bois De Sioux Watershed District at (320-563-4185) for specific water quality data and information.

**Total Maximum Daily Loads (also see Chapters Three & Four)**

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 surface and/or groundwater, while still allowing it to meet its designated uses (such as drinking water, fishing, swimming, irrigation or industrial purposes). Minnesota's statewide water quality standards and other provisions that protect water quality are found in Minnesota Rules Chapter 7050. Standards are broken down based upon water use classifications.

Many of Minnesota's water resources cannot currently meet their designated uses because of pollution problems from a combination of point and nonpoint sources. For each pollutant that causes a water body to fail to meet State water-quality standards, the Clean Water Act requires the states to conduct a Total Maximum Daily Load (TMDL) study. A TMDL study identifies all point and nonpoint sources of each pollutant in a water body, which fails to meet water-quality standards. Water-quality sampling and computer modeling determine how much each pollutant source must reduce its contributions to assure the standard is met in that water body. Rivers and streams may have several TMDLs, each one determining the limit for a different pollutant.

**Hypoxia Zone of the Gulf of Mexico**

Over the past two decades, scientists have studied the hypoxia zone of the Gulf of Mexico. The hypoxia zone is an oxygen depleted area of the Gulf, caused by excessive nitrogen and phosphorus loading from the Mississippi River. High levels of these nutrients cause excessive plankton growth, which in turn die and aerobically decompose. The result is an overall reduction in the level of dissolved oxygen in the Gulf, which can lead to fish kills and overall ecological instability.

In studying the hypoxia zone of the Gulf of Mexico, scientists have concluded that this area has increased dramatically over the last several years. Studies conducted by the Environmental Protection Agency (EPA) have identified agricultural production in the Upper Mississippi River Basin (Illinois, Iowa, Minnesota and Wisconsin) as the primary source of nitrates in the hypoxia zone.

Section 303 (d) of the Clean Water Act requires states to publish, every two years, an updated list of streams and lakes that are not meeting their designated uses because of excess pollutants. The list, known as the Section 303 (d) List of Impaired Waters, is based on violations of TMDL standards. The Big Stone County waters on the current list (July 2002) are presented in Chapter Three (the listing also appears in Chapter Four under the Reducing Priority Pollutants Goal).

**STORET**

STORET is a water quality data clearinghouse that is maintained by the Environmental Protection Agency (EPA), with help from the Minnesota Pollution Control Agency (MPCA). The EPA maintains two STORET data management system: the Legacy Data Center and STORET. The Legacy Data Center (LDC) contains historic water quality data dating back to the early part of the 20th century and collected up to the end of 1998. STORET contains data collected beginning in 1999, along with older data that has been properly documented and migrated from the LDC. To view Big Stone County's extensive STORET information, visit the EPA's website at:

**http://www.epa.gov/STORET/**

## Data Item 28. Groundwater Quality (also see Chapter Three)

**Minnesota Pollution Control Agency**

In 1989, the Minnesota Pollution Control Agency (MPCA) received a grant from the Legislative Commission on Minnesota Resources 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 between 1990 to 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, however, the Minnesota Pollution Control Agency continues to provide information on the program. For best results, visit their website at:

**http://www.pca.state.mn.us/water/groundwater/gwmap/**

**MDA Nitrate Water Testing Program** (visit http://www.mda.state.mn.us/)

In 1993, the Minnesota Department of Agriculture developed a “walk-in” style of water testing clinic 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 may also provide some broad information on the occurrence of nitrate ‘hotspots’ across the State; this could eventually aid in justifying 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.

## Data Items 29 & 30. Eroding Lands, Nonpoint Source Pollution and the Effects of Land Use and Cover on Runoff by Watershed Unit (also see Chapter Three for both Data Items)

Eroding lands are a major cause of nonpoint source pollution. In agricultural areas, the major nonpoint sources of pollutants are sediments, nutrients, pesticides, bacteria and oxygen-demanding substances. Each of these pollutants is discussed below. For a more complete discussion, view the Minnesota River Basin Plan (December 2001) at the following website:

**http://www.pca.state.mn.us/water/basins/mnriver/mnbasinplan.pdf**

### Sediment

Sedimentation resulting from eroding land is a major source of water pollution in Big Stone County. Sedimentation affects most surface water types: lakes, wetlands and streams. Sediment clogs drainage ways, fills basins, increases lake water turbidity and adversely affects spawning areas for fish. In addition, nutrients and chemicals attached to sediment can have adverse effects on water quality. Phosphate, attached to fine textured sediments, accelerates algae and plant growth in many lakes.

### Nutrients

Nutrients such as phosphorus, nitrogen and potassium are the essential part of plant growth in agriculture. They are normally added to the soil in the form of fertilizers, manure, or decaying vegetation. These nutrients, particularly phosphorus and nitrogen, can become pollutants when they are transported from eroding lands to surface and groundwater in runoff or are leached below the root zone.

### Pesticides

Pesticide is a term that covers a wide range of chemicals such as herbicides, insecticides and fungicides. Pesticides can wash off crops and fields and into lakes and streams, where they may be toxic to fish and other aquatic organisms. Pesticides can also adversely affect water resources if they are improperly stored or disposed of.

### Bacteria

Fecal coliform bacteria are prolific in the intestines of warm-blooded animals, including humans. Although these bacteria are not necessarily harmful, they are often associated with disease producing organisms or pathogens, which can cause diarrheal disease, infectious hepatitis, parasites and cholera. Common sources of bacteria are runoff or seepage from feedlots and failing septic systems.

### Oxygen-Demanding Substances

When oxygen-demanding pollutants enter a lake or stream from runoff, they can upset the delicate balance between oxygen-consuming organisms and the oxygen replenishing process. If oxygen is consumed faster than it is replenished, the oxygen content can fall below the level needed to support aquatic life. Pollutants, such as inadequately treated sewage, manure, crop residues and decaying organic matter such as leaves, create an oxygen demand on a lake or stream.

**Urban Pollutants**

Agriculture is not the only culprit of nonpoint source pollution. In urban areas, natural cover is removed, many areas are paved and natural channels are modified to remove runoff faster. This scenario creates more runoff, while reducing the opportunity for natural treatment. Urban runoff may contain oil drippings, fallout from auto emissions, sediment from construction sites, road salt, pet wastes, fertilizer, and pesticides from lawns and many other pollutants.

## Data Item 31. Irrigation Areas
## Data Item 32. Irrigation Over 1,000 Acres
## (also see Chapter Three for both Data Items)

Data available from the Minnesota DNR Water Appropriation Permit Index lists information and the location of permitted irrigation withdrawals in Big Stone County. Minnesota DNR water appropriation permits are required for withdrawals greater than 10,000 gallons per day or 1,000,000 gallons per year. All active water appropriation permit holders are required to measure monthly water use with an approved measuring device to an accuracy of ten% and report water usage yearly. Information concerning Water Appropriation Permits issued for irrigation purposes in Big Stone County can be found in Appendix B.

Sources for irrigation withdrawal include both surface waters and groundwater. Withdrawals from surface water potentially include lakes, streams, rivers, wetlands, ditches and dug pits. Row crops, such as corn and soybeans, are the predominant crops irrigated within the County. A concentration of row crops and irrigation on coarse textured soils significantly increases the potential of non-point source contamination of surface and groundwater. Highly water soluble agricultural chemicals and fertilizers, such as nitrates, are easily leached through the soil column to the aquifers beneath.

## Data Items 33 & 34. Public Drainage System

Please refer to Chapter Three

## Data Item 35. Potential Pollutant Sources

**Dumps and Sanitary Landfills**

The purpose of the Minnesota Landfill Cleanup Program is to ensure the proper closure and postclosure care at 106 closed, permitted municipal sanitary landfills in the State. There is currently one landfill in the program in Big Stone County. This site, closed in June 1990, is located one mile south of the intersection of Highways 28 and 7, just east of the City of Beardsley. The 20-acre site consists of 11 filled acres containing approximately 180,000 cubic yards of waste.

The Minnesota Pollution Control Agency also maintains an Open Dumps Inventory Database that can be viewed at the following website:

**http://www.pca.state.mn.us/programs/landfill_p.html**

**Federal Superfund Sites**

Currently, there are no Federal Superfund sites in Big Stone County. For more information on the Federal Superfund program, visit the following website:

**http://www.epa.gov/superfund/index.htm**

**Individual Sewage Treatment Systems (ISTSs)**

Individual Sewage Treatment Systems (ISTSs) are used for the treatment and disposal of wastewater from individual homes, clusters of homes, isolated communities, industries or institutional facilities. When properly functioning, ISTSs are an effective means of treating wastewater. However, if improperly designed, installed or maintained, ISTSs have the potential to adversely impact water quality. Human waste contains high concentrations of microorganisms and many chemicals, including carbon, nitrogen, phosphorus and salts. These pollutants not only represent a public health concern, but also can significantly degrade the quality of the environment.

The first State law addressing failing ISTSs went into effect in 1994. This legislation is known as the ISTS Act (Minnesota Rules, Chapter 7080). Chapter 7080 requires that all new construction and replacement of ISTSs meet minimum statewide standards. It also puts into place a method to systematically address the adequacy of existing systems through requiring upgrading of failing existing systems before construction of an additional bedroom. The following are the State's objectives in regulating sewage systems through Chapter 7080:

- Keep inadequately treated sewage away from human contact to prevent disease;
- Reduce levels of pathogenic bacteria and viruses discharged to the environment;
- Reasonably and cost-effectively prevent ground-water contamination;
- Develop clear direction for design, construction and maintenance of sewage-treatment facilities;
- Strive for cost-effective methods of sewage treatment to maintain or improve property values;
- Encourage personal responsibility for treating sewage; and
- Require all counties to adopt an ISTS ordinance.

For more information on ISTS rules and regulations, contact the Big Stone County Environmental Services at (320-839-3136).

## Data Item 36. Feedlots, Unsealed Abandoned Wells, Underground Storage Tanks and Permitted Wastewater Dischargers

**Feedlots**

Please refer to Chapter Three

**Abandoned Wells**

The Minnesota Groundwater Protection Act requires that the status and location of wells on a property be disclosed upon property sale to both the buyer and the Minnesota Department of Health (MDH). The Act applies to all types of wells, including wells used for drinking water, irrigation, commercial or industrial processing, heating or cooling, or monitoring. These wells include drive-point (sand point) wells, drilled wells and dug wells.

Well disclosure is a particularly useful tool in identifying unused or "abandoned" wells. Unused wells that have not been properly sealed can be a source of groundwater contamination, allowing surface water, contaminated water and improperly disposed of waste to reach sensitive aquifers below ground. In addition to being a potential pollution hazard, unused wells also pose a potential safety hazard for children and animals and a potential liability for the property owner.

Before signing an agreement to sell or transfer real property the seller must provide the buyer with a Well Disclosure Statement. The Statement must include the following information:

1. The legal description of the property and County;
2. A map showing the location of each well; and
3. Whether each well is in use, not in use, or sealed.

A well is "in use" if the well is functioning for some purpose. A well is "not in use" if the well is not functioning or is not capable of functioning, such as when the well pump on the well is disconnected, or when the well is no longer connected to a power supply. A well is "sealed" if the well has been filled with an approved sealing material by a licensed well contractor or a licensed well sealing contractor and the MDH has received a Well and Boring Sealing Record.

At the time of closing of the sale, the information on the Well Disclosure Statement, the name and mailing address of the buyer, and the quarter, section, township, and range of the property must be provided on a Well Disclosure Certificate. This form is available from many realtors, county recorders or district offices of the MDH. The seller or person authorized to act on behalf of the seller signs the certificate. In the absence of the seller's signature, the certificate is prepared and signed by the buyer or person authorized to act on behalf of the buyer. In the case of a contract-for-deed sale, the certificate is prepared and signed by the seller (grantor) or person authorized to act on behalf of the seller (grantor), if the contract is recorded at the beginning of the contract. When the contract is recorded at the fulfillment of the contract, the certificate is prepared and signed by the buyer (grantee) or person authorized to act on behalf of the buyer (grantee). Once completed, the Well Disclosure Certificate is filed along with the property deed at the County Recorders office.

If a well is not in use, the property owner has three options:

1. The well can be put back into use;
2. The well can be sealed by a licensed well contractor, or a licensed well sealing contractor; or
3. The property owner can apply for a maintenance permit.

For more information on abandoned wells, including a list of sealed wells in Big Stone County, contact the Big Stone County Soil and Water Conservation District at (320-839-6149 ex 3).

**Underground Storage Tanks**

The Minnesota Pollution Control Agency's (MPCA) Leaking Underground Storage Tank (LUST) Program was created to help prevent contamination caused by leaking tanks. This program focuses on technical assistance, inspections and outreach to achieve this objective. As a part of the program, leaking underground storage tanks throughout the State have been inventoried and entered into a database. A complete listing of underground storage tanks in Big Stone County (there are numerous) can be found at the following MPCA website:

**http://www.pca.state.mn.us/programs/lust_p.html**

**Permitted Wastewater Dischargers**

The National Pollution Discharge Elimination System (NPDES) is a Federal program established under the Clean Water Act, aimed at protecting the nation's waterways from point and nonpoint sources of pollution. In Minnesota, the NPDES program is administered by the Minnesota Pollution Control Agency (MPCA), under delegation from the U.S. Environmental Protection Agency (EPA). Under the program, any industrial, municipal or private-entity point source that proposes to discharge treated wastewater to surface waters of the state must apply for a permit. As part of the permitting process, NPDES permit applicants are required to submit information to the MPCA on design flows of the facility, the route that treated wastewater will travel to a surface-water body and a description of the existing treatment system of the system to be built.

In addition to issuing NPDES permits, the MPCA is also responsible for setting effluent limitations to protect water quality standards and the designated uses of waters of the State. All municipal and other point-source dischargers of sewage are required, at minimum, to provide secondary treatment. For a current listing of NPDES permits in Big Stone County, call the MPCA toll free at 800-657-3864 or visit the following MPCA website for more information on NPDES permits:

**http://www.pca.state.mn.us/programs/inpdes_p.html**

## Data Item 37. Hazardous Waste Generators

In Minnesota, commercial entities that produce any amount of hazardous waste are regulated as hazardous-waste "generators" with requirements that depend upon the amount of waste they produce. These requirements are part of the federal Resource Conservation and Recovery Act (RCRA) and Minnesota Hazardous Waste Rules, designed to protect people and the environment from the effects of improper management of hazardous wastes from commercial sources.

The primary users of this program are waste-producing industries, such as:

- ✓ Manufacturers
- ✓ Auto repair, printing or painting shops
- ✓ Metal finishing or electroplating shops

- ✓ Photo or X-ray processors
- ✓ Medical or dental clinics
- ✓ County, State and Federal agencies
- ✓ Waste consultants
- ✓ Dry cleaners

The MPCA and metropolitan county hazardous waste programs help achieve proper hazardous waste management through:

- ✓ Licensing, education and outreach activities;
- ✓ Working with various levels of government, industry associations and waste consultants;
- ✓ Providing technical assistance and training; and
- ✓ Implementing rules.

The MPCA regulates and provides assistance to generators in greater Minnesota. For more information, call the MPCA toll free at 800-657-3864 or visit the following MPCA website:

**http://www.pca.state.mn.us/programs/bau_p.html**

**Superfund Sites**

The Superfund sites in Minnesota are listed on the Minnesota Permanent List of Priorities (PLP). This list was approved by the MPCA in June 2001. The PLP lists 108 sites where investigation and cleanup are needed, cleanup is underway, or cleanup has been completed and long-term monitoring or maintenance continues. There are currently no Superfund sites located in Big Stone County. To view the statewide list, visit the following MPCA website:

**http://www.pca.state.mn.us/programs/superfund-summaries**

## Data Item 38. Special Geologic Conditions

See Data Items 4 and 5 and Chapter Three, page 4

## Data Items 39 & 40. Wetlands and Plans for Controlled Outlets

Wetlands are some of the most productive ecosystems in the world. Apart from filtering water before it enters aquifers, wetlands are the breeding sites of thousands of species of fish, shellfish, microorganisms, amphibians, reptiles, insects, invertebrates and birds. The term "wetlands" refers to low depressions in the landscape covered with shallow and sometimes intermittent water. Wetlands are also commonly referred to as marshes, swamps, potholes, sloughs, shallow lakes, and ponds. Some have surface water only in the springtime during thaws or after rainstorms, while others may form shallow lakes which rarely dry up.

There are three major sources of wetland inventory maps for Big Stone County, including the U.S. Fish and Wildlife Service (USFWS), Natural Resource Conservation Service (NRCS) and Minnesota Department of Natural Resources (DNR). The USFWS has identified wetlands through its National Wetlands Inventory. Wetlands located within cropland have been inventoried by the NRCS. Finally, the Minnesota DNR has identified wetlands as part of the Protected Waters Inventory.

Map 4H displays the USFWS National Wetlands Inventory for Big Stone County. Most of the County's wetlands were identified in the Inventory. This Inventory classifies the wetlands into eight "wetland types". Wetlands are differentiated by depth of water, vegetation and seasonal life-span. The definition of U.S. Fish and Wildlife Service wetland categories is provided below:

**Type 1: Seasonally Flooded Basins or Flats:** Soil is covered with water or is waterlogged during variable seasonal periods, but usually is well drained during much of the growing season. Vegetation varies greatly according to season and duration of flooding.

**Type 2: Inland Fresh Meadows:** Soil is usually without standing water during most of the growing season, but is waterlogged within at least a few inches of the surface. Vegetation includes grasses, sedges, rushes and various broad-leaf plants. Meadow may fill shallow basins, sloughs, or farmland sags, or these meadows may border shallow marshes on the landward side.

**Type 3: Inland Shallow Fresh Marshes:** Soil is usually waterlogged early during growing season; often covered with as much as six inches or more of water. Vegetation includes grasses, bullrushes, spike rushes and various other plants such as cattails, arrowheads, and smartweed. These marshes may nearly fill shallow lake basins or sloughs, or may border deep marshes on the landward side.

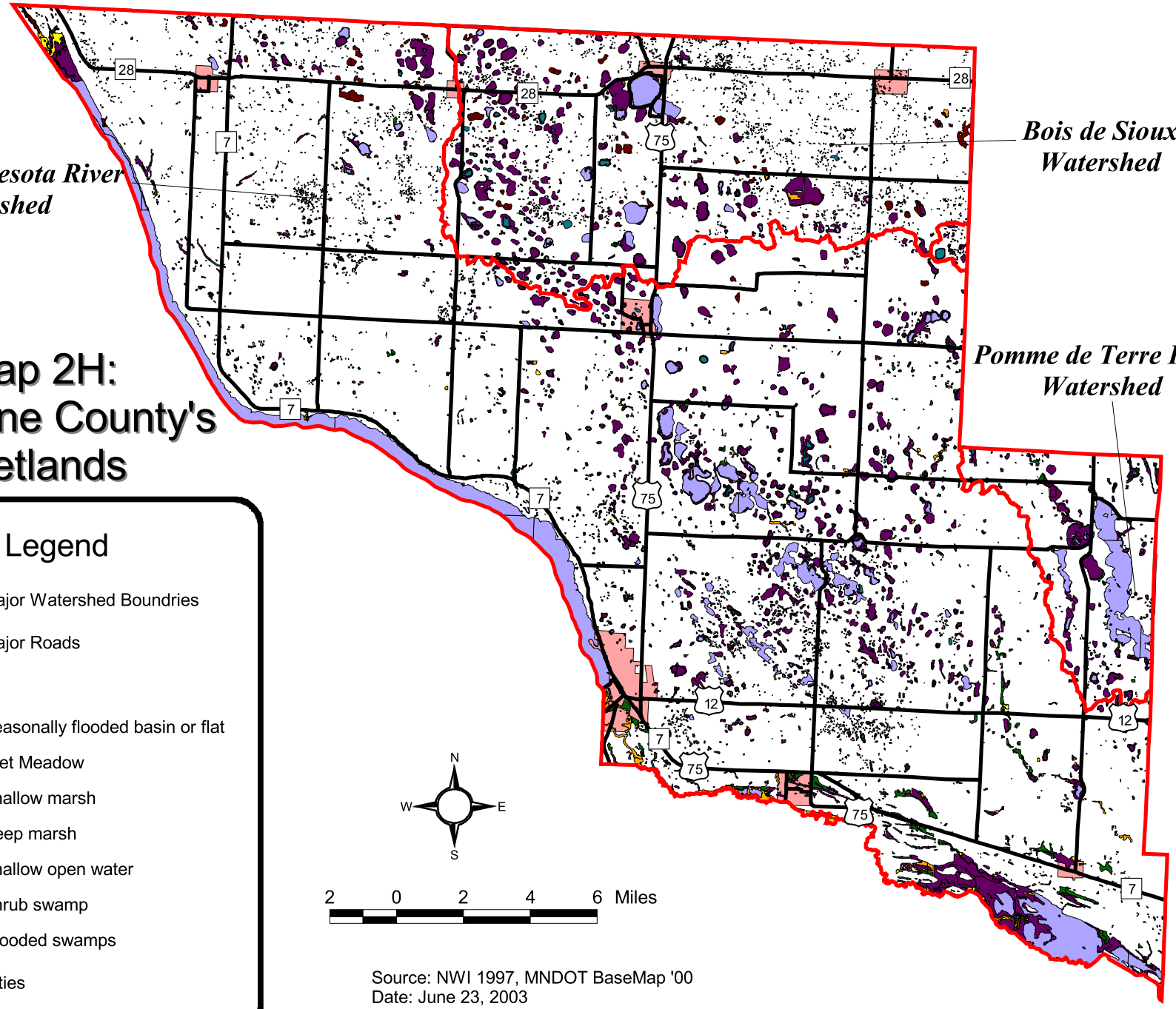
**Type 4: Inland Deep Fresh Marshes:** Soil is usually covered with six inches to three feet or more of water during the growing season. Vegetation includes cattails, reeds, bullrushes, etc. Deep marshes may completely fill shallow lake basins, potholes, limestone sinks and sloughs, or may border open water in such depressions.

**Type 5: Inland Open Fresh Water:** Shallow ponds and reservoirs are included in this type. Water is usually less than ten feet deep and fringed by a border of emergent vegetation similar to open areas of Type 4 Wetlands.

**Type 6: Shrub Swamps:** Soil is usually waterlogged during the growing season and is often covered with as much as six inches of water. Vegetation usually includes alders, willows, dogwood, etc. Swamps occur mostly along sluggish streams and occasionally on floodplains.

**Type 7: Wooded Swamps:** Soil is waterlogged within a few inches of the surface during the growing season and is often covered with as much as one foot of water.

**Type 8: Bogs:** Soil is usually waterlogged and supports a spongy covering of moss. Vegetation is woody, herbaceous or both.




# Map 2H: Big Stone County's Wetlands

## Legend

- Major Watershed Boundries
- Major Roads

Wetlands

- Seasonally flooded basin or flat
- Wet Meadow
- Shallow marsh
- Deep marsh
- Shallow open water
- Shrub swamp
- Wooded swamps
- Cities

Source: NWI 1997, MNDOT BaseMap '00
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

Wetlands are regulated by Federal, State and local agencies. At the Federal level, the U.S. Army Corps of Engineers (USACE) and the U.S. Department of Agriculture's Natural Resource Conservation Service (USDA-NRCS) have regulatory responsibilities. While USACE authority has been limited by the United States Supreme Court, work in wetlands determined to be waters of the United States under the Federal Clean Water Act requires a USACE permit. The Federal Farm Bill's "Swamp Buster" provision provides that a landowner who alters a wetland for agricultural purposes can lose eligibility for many USDA benefits, such as price support programs.

In 1991, the State Legislature passed the Wetlands Conservation Act (WCA) in order to establish a no-net-loss of wetlands policy for the State. The WCA requires anyone proposing to drain or fill a wetland must first try to avoid disturbing the wetland; second, to try to minimize any impact on the wetland; and finally, to replace any lost wetland acres, functions and values (this process is called sequencing in the law). 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. The Soil and Water Conservation District is the responsible agency for the administration of WCA in Big Stone County. The program is administered statewide by the Minnesota Board of Water and Soil Resources. WCA protects any wetland, regardless of its status on the National Wetland Inventory.

Minnesota law also provides two regulatory schemes for wetlands. Larger and deeper wetlands (type 3, 4 and 5 wetlands greater than 10 acres in rural areas and greater than 2.5 acres within municipalities) have been identified and cataloged as protected waters and wetlands. These basins were designated in the late 1970s and are regulated through the Department of Natural Resources, Division of Waters Protected Waters Program. The Protected Waters Program affords a high degree of protection to these basins, however, only wetland basins that are listed on the protected waters inventory are regulated under this program. This is regardless of whether they now meet the size and type requirements. Protected waters maps are available through the Big Stone County Planning and Zoning Office.

Wetlands provide many benefits to humans including the reduction of flooding by means of storage during high flows, filtration of pollutants and sediment, groundwater and aquifer recharge, wildlife habitat and aesthetic appeal. Much of the drainage of wetlands within the County occurred prior to the 1980s, when policies were enacted to prevent future wetland loss. The Minnesota Wetland Conservation Act (WCA), DNR Protected Waters, U.S. Army Corps of Engineers regulations and Swampbuster provisions of the USDA Farm Program, are examples of such policies. Wetland policies are discussed in greater detail in Data Items 7 and 41.

For more information on wetlands, visit the following websites:

The U.S. Fish and Wildlife Service at: **http://www.fws.gov/**

The Natural Resources Conservation Service at: **http://www.nrcs.usda.gov/**

Minnesota Association of Soil and Water Conservation Districts at: **http://www.maswcd.org/**

Board on Water and Soil Resources at: **http://www.bwsr.state.mn.us/wetlands/index.html**

## Data Item 41. U.S. Army Corps of Engineers, Section 404 (for the Wetland Conservation Act and Swampbuster, see Data Item 40).

The U.S. Army Corps of Engineers has been regulating activities in the nation's waters since 1890. Laws and court decisions to consider the full public interest in both protection and utilization of water resources have broadened this regulatory program. These regulatory activities and responsibilities are based on Section 10 of the Rivers and Harbors Act of 1899 [33 U.S.C. 403], which prohibits obstruction or alteration of navigable waters of the United States without a permit from the Corp of Engineers.

Section 404 of the Clean Water Act [33 U.S.C. 1344] prohibits discharge of dredged or fill material into waters of the United States without a permit from the Corps of Engineers. Waters of the United States include adjacent wetlands and tributaries to navigable waters of the United States and other waters where the degradation or destruction of which could affect interstate or foreign commerce. If a project involves discharge of dredged or filled material, the Corps will evaluate the proposed activity under the Section 404 guidelines prepared by the Environmental Protection Agency (EPA). These guidelines restrict discharge into aquatic areas where less environmentally damaging practical alternatives exist.

The Corps of Engineers and the EPA define wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas under these rules. Activities in wetlands that normally require permits include, but are not limited to:

- Placement of fill material
- Ditching activities when excavated materials is sidecast
- Levee and dike construction
- Land clearing involving relocation of soil material
- Land leveling
- Most road construction
- Dam construction

The Corp of Engineers must consider other Federal laws during permit review. These other laws include the National Environmental Policy Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Federal Power Act, the Wild and Scenic Rivers Act and the National Fishing Enhancement Act of 1984. For more information on the U.S. Army Corps of Engineers' wetland regulatory responsibilities, visit the following website:

**http://www.mvp.usace.army.mil/regulatory/**

## Data Items 42, 43 & 44. Floodplains, Flood Prone Areas & Flood Damages

In 1969, the Minnesota Legislature enacted the State Floodplain Management Act (Minnesota Statutes, Chapter 103F). This Act and sound floodplain management principles stress the need for a comprehensive approach to solving flood problems by emphasizing nonstructural measures, such as floodplain zoning regulations, flood insurance, flood proofing, flood warning and response planning. By law, Minnesota's flood prone communities are required to: adopt floodplain management regulations when adequate technical information is available to identify floodplain areas; and enroll and maintain eligibility in the National Flood Insurance Program (NFIP) so that the people of Minnesota may insure themselves from future losses through the purchase of flood insurance. In 1987, the Flood Plain Management Act was amended to establish a state cost-sharing grant program to help local government units plan for and implement flood hazard mitigation measures.

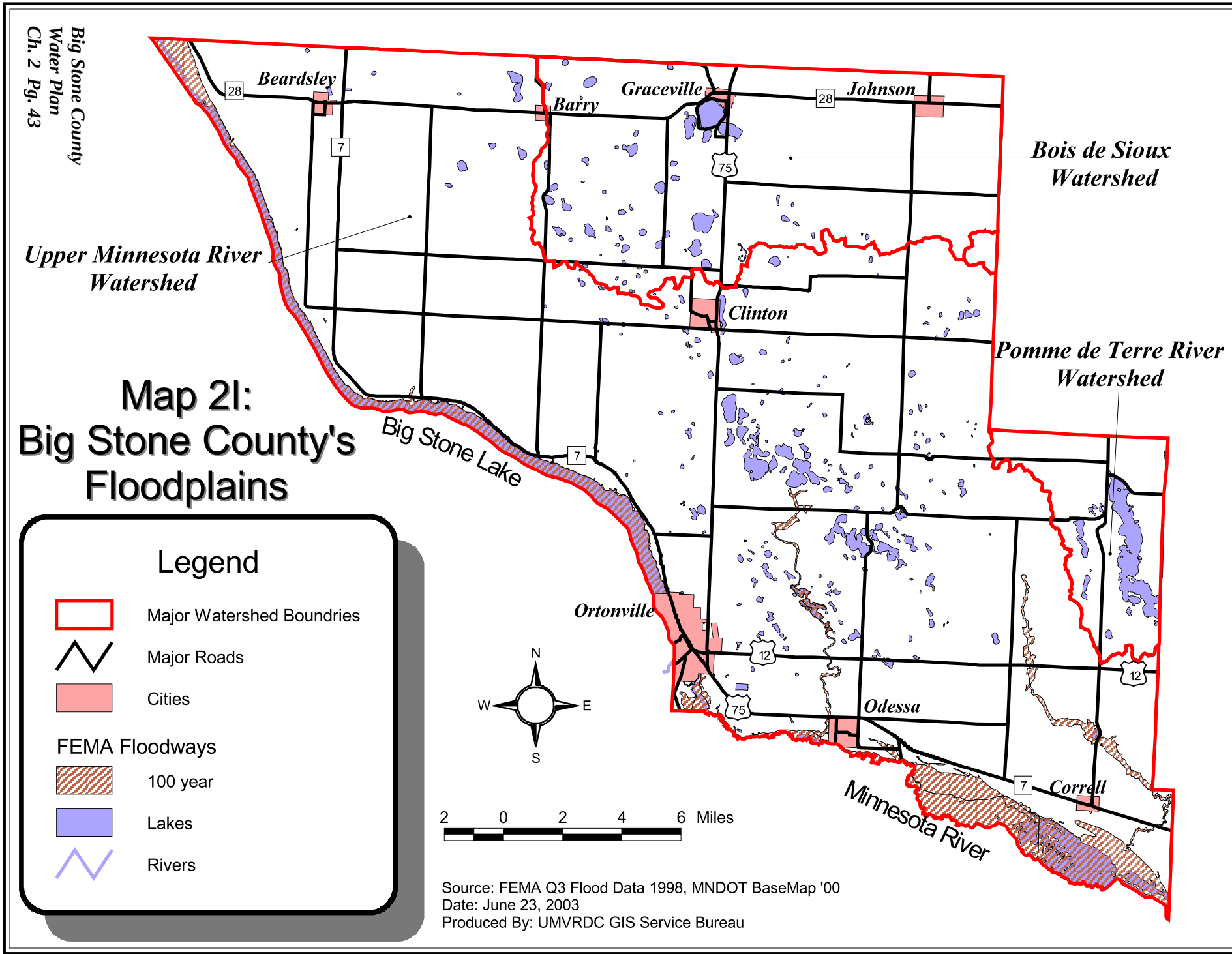
The Department of Natural Resources (DNR) is the state agency with overall responsibility for implementation of the State Flood Plain Management Act. They also serve as the coordinating agency for the National Flood Insurance Program and oversee the local enforcement of county or municipal floodplain ordinance. Local enforcement is generally through the county or municipal zoning official and the regional DNR hydrologist. Land use and building permits are strictly regulated within the floodplain. Local governments have the authority to issue conditional use permits only after a special administrative review. Big Stone County has also entered into the National Flood Insurance Program, offered through FEMA.

At the state level, the DNR has promulgated minimum standards for floodplain management entitled "Statewide Standards and Criteria for Management of Flood Plain Areas of Minnesota" (Minn. Rules 6120.5000 - 6120.6200). These standards have two direct applications: 1) all local floodplain regulations adopted after June 30, 1970, must be compliant with these standards; and 2) all state agencies and local units of government must comply with Minnesota Regulations in the construction of structures, roads, bridges or other facilities located within floodplain areas delineated by local ordinance. Local floodplain regulatory programs, administered by county government, predominately for the unincorporated areas of a county, and by municipal government for the incorporated areas of a county, must be compliant with federal and state floodplain management standards. Both federal and state standards identify the 100-year floodplain as the minimum area necessary for regulation at the local level. These regulations are intended to protect new development and modifications to existing development from flood damages when locating in a flood prone area cannot be avoided.

Structural flood control projects of the past, such as dikes, levees, reservoirs, or diversion channels, which kept flood waters away from developed property, are generally expensive and do not insure protection against flood damage to life and property. Current Federal and State regulations address comprehensive floodplain management to encourage wise land use as well as needed structural projects. Regulatory, nonstructural methods of flood control include floodplain zoning, flood insurance, building permits, flood proofing, flood warning systems and disaster planning.

Map 2I identifies the floodplains for Big Stone County. Flood Insurance Rate Maps (FIRM) and the Big Stone County Flood Insurance Study can be viewed at the Big Stone County Environmental Services Office at (320-839-3136). Detailed studies of flood prone areas are currently underway and shall be ready sometime in 2003.

# Map 2I: Big Stone County's Floodplains




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

**Flood Programs**

The Flood Damage Reduction Grant Assistance Program (FDR) was created by the Minnesota Legislature in 1987 to provide technical and financial assistance to local government units for reducing the damaging effects of floods. Under this program the state can make cost-share grants to local units of government for up to 50% of the total cost of a project. The goal of existing regulations and programs for flood damage reduction is to minimize the threat to life and property from flooding. In addition to property loss, people can be killed or injured fighting flood waters. The efforts of local governments to enforce their zoning ordinances and to sponsor projects and acquire or relocate flooded buildings have helped to reduce risk to lives and flood damages.

Currently, two different classes of grants are available through the FDR program. Small grants are for projects with a total cost of less than or equal to $300,000 (state share less than $150,000). Small grants are made directly by the DNR from funds appropriated by the Legislature. Large grants are for projects with a total cost greater than $300,000 (state share greater than $150,000). Large grant applications are received and prioritized by the DNR and then presented to the governor and the Legislature for consideration in a capital bonding bill. A project will be funded based on its rank after prioritization and the amount of program funding made available by the Legislature.

If a presidential disaster declaration has been issued in Minnesota, the Federal Emergency Management Agency pays for 75% of the cost of structural acquisition with the remaining 25% to be provided by the local governments. The FDR program will pay half the local share leaving the local government unit with only a 12.5% share. The FDR program will also pay for half of the 35% nonfederal share of federal flood hazard mitigation projects.

The repetitive flooding damage in certain areas of Minnesota has necessitated a program to mitigate the possibility of future damages. Since the FDR Program was instituted in 1987, a significant number of projects have been completed to minimize the threat of loss of life and property damage from flooding. Funds have been provided for floodplain analysis, structural acquisition, flood proofing, emergency levee analysis, storm sewer construction, and watershed analysis. Because of the way projects are prioritized, it is very important that the grant application thoroughly define the project and any alternatives that were also considered. Working with the DNR area hydrologist will improve your community's chances of presenting a successful project for grant assistance. If you have comments or questions about the priorities or procedures, please bring them to the attention of your DNR area hydrologist or the FDR coordinator at (612-296-4800).

## Data Items 45 & 46 Shoreland Ordinances and Protected Waters (also see Data Item 7)

The Minnesota Shoreland Management Act was initially implemented in 1969 to reduce the effect of uncontrolled and unplanned development on public waters, to maintain the economic value of shoreland property and to preserve the intrinsic qualities of natural shoreland and waters. As a result of this Act, Minnesota counties and specified municipalities were required to regulate land use and compatible development on public water shoreland through State approved shoreland zoning ordinances. In addition to the Shoreland Management Act, the State of Minnesota also regulates shoreland use through the 1969 Floodplain Management Act and the 1973 Minnesota Wild and Scenic Rivers Act.

In 1989, the Minnesota Department of Natural Resources (DNR) adopted revised statewide shoreland regulations. The revision required all units of government that were implementing shoreland controls to amend their shoreland ordinances within two years to conform with the State's revised regulations.

Local units of government that have a DNR approved shoreland ordinance include Big Stone County and the cities of Ortonville and Graceville. All ordinances are believed to be in compliance with the Minnesota Shoreland Management Act. For more information on shoreland regulations, contact the DNR's Shoreland Manager at 651-296-4800 or contact the Big Stone County Environmental Services Office at (320-839-3136).

## Data Item 47. Water-Based Recreational Lands
## Data Item 48. Public Water Accesses
## Data Item 49. State and Federal Wild and Scenic Rivers

A variety of interactive maps, including recreational, public accesses and state parks/trails maps, can be viewed and downloaded from the following Minnesota Department of Natural Resources website:

**http://www.dnr.state.mn.us/maps/index.html**

**Wild and Scenic Rivers**

The Minnesota State Wild & Scenic Rivers Program was established in 1973 to protect rivers which have outstanding natural, scenic, geographic, historic, cultural and/or recreational values. Six rivers in Minnesota have segments which are designated as wild, scenic, or recreational under the state program. The Minnesota River was added to Minnesota's Wild & Scenic Rivers Program in 1977. The designated stretch extends from Lac Qui Parle Dam to the City of Franklin (in Renville County). Each of the designated river segments in Minnesota has a management plan which outlines the rules and goals for that waterway. These rules work together with local zoning ordinances to protect the rivers from pollution, erosion, over-development, and degradation; factors which undermine the wild, scenic, and recreational qualities for which they were designated. The original management plan for this stretch of the Minnesota River was adopted in 1977. A community-based planning process to update this plan is expected to begin within the next few years. For more information on Wild and Scenic Rivers, visit the following websites:

**The Department of Natural Resources at:**

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

**or the National Wild and Scenic Rivers System at:**

http://www.nps.gov/rivers/

## Data Item 50. Wildlife Areas

### Wildlife Management Areas

The State Wildlife Management Area (WMA) Program was established in 1951 as an attempt to preserve wildlife habitat areas, primarily wetlands that were being destroyed by development and agricultural land uses. WMAs were incorporated as components of the Minnesota outdoor recreation system, which was established by the Minnesota Outdoor Recreation Act of 1975. The Act establishes an outdoor recreation system that will: 1) preserve an accurate representation of Minnesota's natural and historical heritage for public understanding and enjoyment; and 2) provide an adequate supply of scenic, accessible and useable lands and waters to accommodate the outdoor recreation needs of Minnesota's citizens. WMAs are managed for wildlife production and are open to public hunting and wildlife watching. According to Appendix C, Big Stone County has approximately 10,454 acres of WMAs (as of August 13, 2002).

### Waterfowl Production Areas

Waterfowl Production Areas (WPAs) are acquired and managed under the direction of the U.S. Fish and Wildlife Service (USFWS). WPAs aim to preserve wetlands and grasslands that are critical to waterfowl and other wildlife. These public lands were included in the National Wildlife Refuge System in 1966, through the National Wildlife Refuge Administration Act. Part of the money collected through purchasing a Duck Stamp in Minnesota goes toward the acquisition and maintenance of these areas. WPAs provide numerous recreational opportunities to the public, including hunting, fishing, trapping, wildlife observation and photography. The use of motorized vehicles, including snowmobiles and all-terrain vehicles, is generally prohibited in WPAs. For additional rules and regulations regarding WPAs, contact the USFWS at (320) 589-1001.

### Big Stone National Wildlife Refuge

Located two miles southeast of Ortonville, near the Minnesota-South Dakota border, Big Stone National Wildlife Refuge offers recreational opportunities to visitors throughout the year. The U.S. Army Corps of Engineers built a dam to create a large reservoir, and then, in 1975, transferred the land to the U.S. Fish and Wildlife Service. Through a cooperative agreement, the Corps still maintains the water control facilities, but the Service has management responsibility for all 11,521 acres of refuge lands.

A wide variety of habitats exist on the refuge, from the wet world of the river and the reservoir areas, to the dry world of the granite rock outcrops. Low-lying woodlands support migrating warblers and other song birds, as well as resident populations of deer and other mammals. Woodlands along the Minnesota and Yellowbank Rivers containing American elm, ash, box elder and silver maple provide old tree trunks with hollow cavities which are good nesting sites for wood ducks and hooded mergansers. Some non-native introduced species, such as the Russian olive, often are removed because of their tendency to spread into areas like "weeds." About 850 acres of refuge lands consist of low woodlands.

## Data Item 51. State Designated Trout Waters

Currently, there are no DNR designated trout lakes or streams in Big Stone County.

## Data Item 52. State Ecological and Management Classifications

The Minnesota Department of Natural Resources (DNR), Division of Fisheries, has developed several lake classification systems. Lake classification systems have been used to categorize lakes according to their general fish community composition, natural ecological condition and the most suitable species for which a lake can be managed. Fisheries managers use these lake classifications to prescribe lake management goals and objectives. Ecological and Management Classification systems, were the earliest classification systems developed by Fisheries managers and are still used to some extent today. More recently, *An Ecological Classification of Minnesota Lakes with Associated Fish Communities* was developed by DNR Fisheries. The older Ecological Classification system categorizes suitable fish populations that are adapted to the physical, chemical and biological features of a lake. The older Management Classification system categorizes the most important species, or combination of species, on which management efforts should be directed. The *Ecological Classification of Minnesota Lakes with Associated Fish Communities* categorizes lakes according to limnological variables including variables associated with lake size, lake depth and chemical fertility and length of the growing season.

For more information on, contact the DNR toll free at (888) MINN-DNR or the DNR's local fisheries staff at (320) 839-2656.

## Data Item 53. Biological Surveys

The Minnesota County Biological Survey (MCBS) began in 1987 as a systematic survey of rare biological features. The goal of the Survey is to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals and native plant communities. Native habitats surveyed by MCBS contribute to a sustainable economy and society because they:

- Provide reservoirs of genetic materials potentially useful in agriculture and medicine;
- Provide ecological services that contribute to the quality of air, soil and water;
- Provide opportunities for research and monitoring on landscapes, native plant communities, plants, animals and their relationships within the range of natural variation;
- Serve as benchmarks for comparison of the effects of resource management activities; and
- Are part of natural ecosystems that represent Minnesota's natural heritage and are sources of recreation, beauty and inspiration.

To date, the MCBS has added 13,414 new records of rare plants and animals to the Rare Features Database, Natural Heritage Information System (NHIS). Work for the Survey has been completed in 56 of Minnesota's 87 counties, including Big Stone County. For more information on the MCBS and how to order the Big Stone County MCBS Map, visit the following website:

**http://www.dnr.state.mn.us/ecological_services/mcbs/index.html**

**Data Item 54. Management Plans for Fish and Wildlife Areas**

Minnesota Department of Natural Resources (DNR) Fisheries personnel routinely survey lakes and streams. Data collected in the survey process includes the initial survey, resurveys, population assessments, reproduction checks and creel surveys. Information collected is often used to develop and revise Lake and Stream Management Plans (LSMP). LSMPs include long-range goals, operational plans, mid-range objectives, potential plans, primary and secondary species management and a narrative section. Plans are periodically revised as new data is collected and information from other sources becomes available.

During the process of conducting lake and stream surveys, the Minnesota DNR Fisheries has identified opportunities to not only improve fish and wildlife habitat, but also improve water quality. Opportunities identified by the DNR Fisheries include:

1. Storm water retention ponds, siltation basins, and restoration and development of wetlands in strategic locations that can provide waterfowl production and northern pike spawning.

2. Protection, preservation, and establishment of native emergent vegetation (i.e., cattails, bulrushes, etc.) yield water quality benefits, while providing fish and wildlife habitat.

3. Stabilization of shoreline utilizing buffer strips, riprap and other erosion and siltation prevention measures, could enhance natural spawning shoals and minimize turbidity.

4. Carp, and other undesirable fishes uproot vegetation and stir up bottom sediments and destabilize shoreline areas. Electric fish barriers and velocity culverts in strategic locations could minimize or prevent migration of undesirable fish species.

5. Winter aeration of marginal fish producing waters and stocking of desirable species can provide additional recreational opportunities, spread out/reduce angling pressure on existing resources and through biological control, reduce the abundance of undesirable fish.

6. Aquatic plant management, including the detection and control of exotic plant species (i.e., Eurasian Water Milfoil, Purple Loosestrife and Curled Pondweed).

7. Diversion of storm sewers, drainage tiles, county ditches and sewage treatment facilities away from lakes and streams into wetlands or though sedimentation basins.

Management of the County's fish resources is critical to the long-term sustainability of not only the resource itself, but the portion of the local economy that is dependant upon the sports fishing industry. One popular tool that has been used in the County to manage fish resources is winter aeration systems.

## Data Item 55. Unique and Rare Features/Species

The Federal Endangered Species Act of 1973 requires the U.S. Department of the Interior to identify species as endangered or threatened, according to a separate set of definitions, and imposes a separate set of restrictions pertaining to those species. Definitions for endangered, threatened and species of special concern are provided as follows:

- **Endangered Species -** A species is considered endangered if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.

- **Threatened Species -** A species is considered threatened if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.

- **Species of Special Concern -** A species is considered a species of special concern if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations.

Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895) requires the Minnesota Department of Natural Resources (DNR) to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of endangered, threatened and species of special concern is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the DNR to adopt rules that regulate treatment of species designated as endangered and threatened.

Minnesota's Endangered Species Statute and the associated Rules impose a variety of regulations pertaining to species designated as endangered or threatened. Under State regulations, a person may not take, import, transport, or sell any portion of an endangered or threatened species. However, these acts may be allowed through the issuance of a DNR permit. In addition, certain exemptions exist for agricultural lands and for the accidental, unknowing destruction of designated plants. Minnesota's Endangered Species Statute or associated Rules do not protect species of special concern

***The Natural Heritage Information System (NHIS)*** provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, natural communities, and other natural features. Its purpose is to foster better understanding and conservation of these features.

The most commonly used component of the system is the Rare Features Database. The Database began as a compilation of historical records from museum collections and published information. This has been supplemented with data from years of field work on Minnesota's rare features. Since 1986, our knowledge of Minnesota's rare features has increased substantially with the progress of the Minnesota County Biological Survey. Information from the Rare Features Database can be provided for review of land-use plans, impacts of specific development projects, research projects, and for other legitimate uses. The publication of exact locational information, however, may threaten the continued existence of some rare species.

For more information on Minnesota Threatened and Endangered Species, contact the Department of Natural Resources at the following website:

**http://www.dnr.state.mn.us/ecological_services/rare.html**

## Scientific and Natural Areas

Minnesota's Scientific and Natural Areas Program (SNA) preserves natural features and rare resources of exceptional scientific and educational value. The program's mission statement is to:

> *Preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations, for scientific study and public edification as components of a healthy environment.*

The SNA Program's goal is to ensure that no single rare feature is lost from any region of the State. This requires protection and management of each feature in sufficient quantity and distribution across the landscape. Big Stone County has the following two areas identified in the SNA program.

**The Bonanza Prairie SNA**
**Size:** 85 Acres
**Location:** 14 miles NW of Ortonville on MN Hwy 7, then 0.5 miles W, in the Bonanza Unit of Big Stone Lake State Park

Bonanza Prairie contains an example of undisturbed, glacial till hill prairie. From the hilltop, visitors have a spectacular view of the South Dakota prairie landscape. The gravelly, well-drained soils on the steep, west-facing slopes support dry prairie, dry to mesic prairie, and bur oak savanna plant communities. Prairie plants include little bluestem, purple coneflower, prairie thistle, prairie clover, silverleaf scurfpea, big bluestem, and grama grasses. Very rare species, prairie moonwort, Missouri milkvetch, and slender milkvetch, indicate the rich diversity of this prairie. Prescribed burning and extensive removal of trees and brush at this site have dramatically enhanced the prairie community. The best time to visit is late summer to see prairie plants in bloom and their attendant butterfly species.

**Clinton Prairie SNA**
**Size:** 160 Acres
**Location:** 6 miles West of Clinton on County Hwy 6

Clinton Prairie lies in a gently rolling ground moraine with broad, rounded swells and small, shallow depressions. The calcareous soils on this site were formed of glacial drift of the Des Moines Lobe, and the glacial till hill prairie community here is distinctive. While past usage as a hay meadow (and possibly as pasture land) have disturbed the prairie somewhat, it is an important remnant of gently rolling upland black soil prairie, now scarce in the region. Most surviving prairie in the area is on different landforms and soils. The rare powesheik skipper is found on many Minnesota prairies, yet is extremely limited in range; details of its life history remain unknown. The rare upland sandpiper and the endangered chestnut-collared longspur also occur here among diverse native grasses and flora. Summer is a good time to view butterflies and grasses; from spring through fall, visitors will see a range of prairie birds and invertebrates, including abundant orb spiders in their webs anchored among the grasses. Clinton Prairie was gifted by The Nature Conservancy to the State of Minnesota as an SNA.

# CHAPTER THREE:
# WATER PLANNING ISSUES, IMPLICATIONS AND ASSESSMENTS

This Chapter identifies Big Stone County's water planning issues and describes which ones are considered "high priority" between 2003 and 2008. An implication and assessment section is also included for each high priority issue. Specifically, this Chapter contains the following sections:

- ✓ **Issue Identification Process**
- ✓ **Public Informational Meeting Issues**
- ✓ **State Agency Water Planning Issues**
- ✓ **Water-Based Education Issues, Implications and Assessments**
- ✓ **Water Management Issues, Implications and Assessments**
- ✓ **Reducing Priority Pollutants Issues, Implications and Assessments**
- ✓ **Lakeshore and Surface Water Use Issues, Implications and Assessments**

## Issue Identification Process

The Big Stone water planning process included issues gathered at public informational meetings (see page 2), issues submitted by the various state and local governmental agencies (see page 3), and issues discussed by the County's Water Planning Committee (see below). After reviewing all of the identified issues, the Water Planning Committee prioritized all of the issues into the following four high priority categories:

***Water-Based Education*** – Water-based education is the most important component of all water planning activities. Most of the issues identified throughout the water planning process would be greatly improved by simply raising public awareness on the subject.

***Water Management*** – Managing the many components of water resources is Big Stone County's second high priority issue. This Chapter includes sections on drainage, groundwater and storm water resources.

***Reducing Priority Pollutants*** – One of the Water Plan's primary emphasis is to identify action steps to actually minimize or alleviate a number of priority pollutants. The Water Plan Committee decided to concentrate the majority of these efforts on the Stoney Run Sub-Watershed between 2003 and 2008, although most of the action steps will be administered countywide.

***Surface Water Use*** – The water planning process revealed a number of issues tied to the larger category of surface water use. This priority issue includes shoreland development, wetland restoration, inventorying land locked water basins for potential recreation opportunities, and developing a Recreation and Wildlife Plan.

## Public Informational Meeting Issues

The following issues where collected during a public informational meeting held on April 2, 2002. The purpose of the meeting was to give local residents, local governmental units and various governmental agencies the opportunity to identify and discuss local water planning issues.

**Groundwater Quality –** well sealing seems to be an urgent issue since the Soil and Water Conservation District spends $10,000 annually on cost-share for well sealing. Non-point source pollution was noted as an important issue, especially from phosphorus/nutrient overload from agricultural fertilizers, lawn fertilizers and manure. Underground storage tanks were also discussed. It was reported that most of the tanks have been removed and the ones remaining seem to be showing up on forfeited property. The County may end up cleaning up those situations. The City of Graceville showed a concern that new industries need to be analyzed in regards to water use to ensure adequate water supplies in the future. In addition, septic systems are being addressed with County's transfer of property requirements.

**Groundwater Quantity –** the quantity of groundwater in Big Stone County received minimal concern (the opinion was stated that the County has few commercial operations or feedlots which pose a threat).

**Surface Water Quality –** Big Stone County has a vast amount of surface water and wetlands. The general consensus was not necessarily to protect them but rather to maintain them while balancing issues related to drainage. Participants expressed the desire to maintain and repair the drainage system in order to protect the County's agricultural community. Many ideas were expressed to accomplish this: buffer strips, tiling, damming. All of these issues will affect sedimentation, erosion and non-point source pollution. There were questions regarding above ground storage tanks for agricultural uses…no dikes are currently required but may eventually.

**Surface Water Quantity –** It was discussed again that the County's ditch system is vital to helping surface water issues. Many of the ditches have small trees growing in them. Flood retention projects are also needed. Lannon Slough (by Graceville) needs to be drawn down so it can take the bounce of wet cycles. Some people expressed that this would be a better plan for flood retention than the Moonshine Lake Restoration Project.

**Water-Based Recreation –** the County has nice access to Big Stone Lake, however, the participants expressed their interest in pursuing funds for road upgrades. Tourism is vital for Big Stone County's economy and future. Wildlife easements are common. It was noted that the U.S. Fish and Wildlife Service, out of courtesy, brings easements to the County Board for approval (although the Board cannot deny them).

**Fish and Wildlife –** Big Stone County needs to focus on balancing habitat with agricultural needs. A concern was expressed over the loss of pheasant populations in the area.

**Related Land Use –** Scenic Byways were discussed (ways to improve them). Ideas expressed included: wildflowers in the right-of-way; enhance the look of Bonanza State Park; better maintenance of State Highway 7; and enhancing the Continental Divide signage. Organic farming was also mentioned as a value added agricultural opportunity. Gravel was also identified as a valuable resource, especially since the Minneapolis Metro Area is running out.

## State Agency Water Planning Issues

The following issues were collected during a five county state agency meeting held in Appleton, Minnesota, on April 8, 2002. The purpose of the meeting was to discuss issues relating to updating Big Stone, Chippewa, Lac qui Parle, Pope and Swift Counties individual water plans. Participants included the Board of Water and Soil Resources, Minnesota Department of Natural Resources, Minnesota Department of Agriculture, Minnesota Department of Health, U.S. Fish and Wildlife Service, Soil and Water Conservation Districts and respective County Water Planners. The Minnesota Pollution Control Agency could not attend but submitted comments in writing.

- ✓ Storm Water Management (i.e., encourage proper ordinances)
- ✓ Erosion Control Ordinance
- ✓ Shoreland Naturalization
- ✓ Wetland Plan (i.e., identification, drainage, restoration)
- ✓ Wellhead Protection Planning (MN Department of Health)
- ✓ Conservation Tillage (MN Department of Agriculture)
- ✓ Land-locked water bodies (i.e., drainage, wildlife/recreation)
- ✓ Better understanding of hydrogeology and aquifers (locate recharge areas)
- ✓ Water storage and buffers
- ✓ Drainage – map and manage them in the proper locations (clean & buffer)
- ✓ Identifying ditch and tile outlets
- ✓ Drained Wetland Inventory (Fish & Wildlife Service)
- ✓ Public Land (more education on the public benefits vs. loss of tax revenue)
- ✓ Use of County Biological Surveys
- ✓ Prescribed burning
- ✓ Feedlots (determining which ones are in critical areas)
- ✓ Total Maximum Daily Loads 303d list (MN Pollution Control Agency)
- ✓ Individual Sewage Treatment Systems
- ✓ Swim and fishable waters
- ✓ Eliminate potentially harmful bacteria in surface water
- ✓ Address groundwater vulnerability areas
- ✓ Better utilize Soil and Water Conservation District resources
- ✓ Create a comprehensive Floodwater Management Plan (mitigation/reduction)
- ✓ Emphasize quality (not necessarily quantity) wildlife habitat
- ✓ Promote willing wetland restorations
- ✓ Appreciate State and Federal lands as recreational and environmental assets
- ✓ Use buffers to reduce erosion and sedimentation (use incentives)
- ✓ Conduct a test program with rotational grazing of buffered areas
- ✓ Develop County Recreational Plans
- ✓ Convert open tiles to French inlets to reduce sedimentation
- ✓ Use GIS to map and plan
- ✓ Work to improve agency relationships/cooperation with local governments
- ✓ Work to minimize surface water conflicts
- ✓ Identify, protect and restore (where appropriate) native prairie grass
- ✓ Update zoning ordinances to provide good land use incentives

# Water-Based Education:
# Issues, Implications and Assessments

The Water Plan Committee recognized that water-based education is the most important component of all water planning activities. Most of the issues identified throughout the water planning process would be greatly improved by raising public awareness on the subject. In addition, it was recognized that Committee members, local decision-makers and the general public also need to know how to interpret and use existing data, reports and sources of information. As a result the high priority education issue for Big Stone County can be broken down into the following two categories:

1. ***Learning how to better understand and use existing informational sources***

2. ***Raising public awareness on key water planning issues***

## Education Issue 1:
## Learning How to Better Understand and Use Existing Informational Sources

**Regional Hydrogeologic Assessment**

A Regional Hydrogeologic Assessment (RHA) is a formal study of an area's geology and groundwater resources, emphasizing the investigation of shallow geologic, groundwater, and pollution sensitivity conditions. RHA's should not be confused with County Geologic Atlases, which investigate the properties and distribution of rocks and unconsolidated earth materials beneath the land surface (an Hydrogeologic Assessment normally covers an area in size of between four to nine counties, while a Geologic Atlas is specific to one county). The southern half of Big Stone County was recently included in a Regional Hydrogeologic Assessment, along with Chippewa, Lac qui Parle and Swift Counties. A RHA is currently being developed for the northern half of Big Stone County (scheduled to be completed in 2003).

Each Regional Hydrogeologic Assessment or County Geologic Atlas produces a series of information and products. These include the following:

- ✓ County Well Index Database
- ✓ Geology Maps
- ✓ Water Chemistry and Groundwater Maps
- ✓ Pollution Sensitivity Maps
- ✓ Geographic Information System Files
- ✓ Interpretive Reports

The Regional Hydrogeologic Assessment is an excellent source of information, however, local decision-makers and County staff need to have a better understanding of how to use it. The long-term goal is to actually use the RHA in the decision-making process. For example, it could be used to help locate a water-intensive industry in an area of the County with suitable groundwater concentrations. As a result of this issue, the County has created an Action Step to proactively learn how to best interpret and use water-based information in the decision-making process.

For more information on Big Stone County's Regional Hydrogeologic Assessment, contact the Minnesota Geological Survey or the Department of Natural Resources at the following location:

**Geology and Atlas Use**
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114-1057
(612) 627-4780
http://www.geo.umn.edu/mgs

**Groundwater and Pollution Sensitivity**
DNR Waters
500 Lafayette Road
St. Paul, MN 55155-4032
MN Toll Free 1-888-646-6367
http://www.dnr.state.mn.us

**Minnesota River Basin Plan** (*also see page 21 of this Chapter*)

The Minnesota River Basin spans over 37 counties, beginning from Big Stone Lake, emptying into the Mississippi River while traveling as far south as northern Iowa (a basin is the area of land drained by a river or lake and its tributaries; in this case the Minnesota River). In December 2001, the Minnesota Pollution Control Agency (MPCA) published the Minnesota River Basin Plan to identify pollution concerns and to help coordinate the various cleanup efforts. Specifically, the purpose of the Basin Plan is to…

> *"…guide and coordinate the activities of the MPCA, in conjunction with other agencies and organizations, in restoring or protecting the water resources of the Minnesota River Basin"* (Basin Plan, page 12).

One of the identified action statements of the Minnesota River Basin Plan is to generate and publish an annual "State of the Minnesota River" report. The purpose of the report would be to document annual monitoring results and analyze long-term trends. The latter is needed to establish a baseline for evaluations as time goes by. The problem is that few locals have been made aware of the purpose of the Minnesota River Basin Plan and how the County can assist with doing its part. Furthermore, the County is leery it will know how to interpret the technical data presented in the annual State of the Minnesota River reports. Nevertheless, the County has committed an action step to review the State of the Minnesota River report on an annual basis. In the era of numerous State agency cutbacks, agencies need to keep in proper perspective that many of their efforts fall short of being fully maximized due to a failure in properly communicating the results. In addition, the technical experts need to do a better job of assisting the County with learning how to use all the information on a day-to-day basis, especially during the land use decision-making process.

**Tax-Base Study**

Some land use decisions rest on the balancing question of "what impact it will have on the County's tax-base?" In order to make better educated land use decisions, the County has proposed an action step to conduct a Tax-Based Study, focusing on how different types of land uses impact the County's ability to equitably collect taxes. The Study would examine numerous tax-based questions, such as, "What is the difference between local, state and federal ownership?" and, "What is the fiscal impact of conservation lands, drained wetlands, restored wetlands, marginal agricultural land, etc.?" The emphasis of the Study would not be to produce a report that would be either "pro conservation" or "pro development", but simply a non-biased report on the relationship between land use and taxes.

**Education Issue 2:**
**Raising Public Awareness on Key Water Planning Issues**

The vast number of complicated water planning issues translates into a vast amount of overlapping educational efforts. This is understandable, simply by looking at the mere number of local, State and Federal agencies involved with various water planning issues and activities. Regardless, the vast amount of information leads to confusion, which is often compounded by the fact that water planning issues often evolve through a series of suitable "solutions." In short, what has been an acceptable solution in the past may not be acceptable solution today.

This problem will never fully disappear, although information sharing and modern technologies are closing a few of the gaps. The "simple" solution is to target one governmental agency to oversee the educational process. The problem, however, is that often local, State and Federal agencies have slightly different takes on the issues and the solutions. As a result, each agency is forced to produce their "unique" educational materials. Putting this important issue aside, one agency should take on the responsibility to assimilate all of the educational materials, assess the overlap, and target promotional efforts in an orderly fashion. As a result, Big Stone County created an action step to create an outline in October each year on how the Water Planning Committee and the County will focus extra-ordinary educational efforts on two to three important water planning issues over the upcoming year. The following Table identifies some of the organizations currently playing a major role in providing water-based education to Big Stone County residents:

**Table 3A: Big Stone County**
**Key Organizations Providing Water-Based Education**

| ***Organization*** | ***Contact*** |
|---|---|
| Big Stone County Environmental Service | (320) 839-3136; 20 SE 2nd St., Ortonville |
| Soil & Water Conservation District | (320) 839-6149; 342 NW 2nd St., Ortonville |
| Upper Minnesota River Watershed District | (320) 839-3411; 342 NW 2nd St., Ortonville |
| Bonanza Education Center | (320) 265-6944; Beardsley |
| University of Minnesota Extension (County Office) | (320) 839-2518; 20 SE 2nd St, Ortonville |
| Natural Resources Conservation Service | (320) 839-6149; 342 NW 2nd St., Ortonville |
| Minnesota Board of Water & Soil Resources | (507) 537-6374; www.bwsr.state.mn.us |
| Minnesota Department of Natural Resources | (320) 839-2656 Fisheries;<br>(320) 289-2493 Wildlife;<br>(320) 796-6272 Waters; www.dnr.state.mn.us |
| Minnesota Pollution Control Agency | (507) 537-7146; www.pca.state.mn.us |
| Minnesota Department of Health | (651) 215-5800; www.health.state.mn.us |
| Minnesota Geological Survey | (612) 627-4780; www.geo.umn.edu/mgs |
| Minnesota Department of Agriculture | (800) 967-2474; www.mda.state.mn.us |
| US Fish & Wildlife Services (Big Stone Refuge) | (320) 273-2191; www.fws.gov |
| Minnesota River Basin Data Center | (507) 389-5492; http://mrbdc.mankato.msus.edu/ |

# Water Management:
# Issues, Implications and Assessments

Most of the issues identified throughout the water planning process deal with the management of water resources in some fashion. The key problem is deciding on the proper approach to water management without greatly impeding on private property rights. Since this is difficult to accomplish, the progressive approach is to create as many "win-win" opportunities as possible for landowners. The Big Stone County Water Plan Committee decided to focus action steps on the following water management issues between 2003 and 2008:

1. ***Surface Water Management/Drainage***
2. ***Groundwater Protection***
3. ***Storm Water Management***

## Water Management Issue 1:
## Surface Water Management/Drainage

Drainage systems are widely used primarily to increase agricultural production where the topography of the landscape is nearly level and the soils are poorly drained. A drainage system is needed to control ponding and to lower the water table below the root zone. Open ditches drain much of the surface water and can be used as outlets for subsurface tile lines. Proper design and maintenance of drainage systems can improve and increase the productivity of the soil, therefore playing a vital role to both the agricultural community and the County's overall economy. Map 3A shows approximate location of Big Stone County's public drainage system. In addition, the Map also shows the location of the County's dams and control structures.

Typically, drainage systems are degraded by sediment, nutrients and bacteria. This, in turn, degrades the quality of County's other water features. To minimize this problem, landowners need to implement Best Management Practices (BMPs), such as filter strips, along the County's drainage ditches. Implementation of such practices not only improves the quality of the County's surface water, but it also reduces the need for expensive ditch cleanout and repair. Besides problems related to water quality, Big Stone County's drainage systems pose water quantity threats as well. Because ditches were designed to remove a large quantity of water in a short duration, flooding problems can and do occur, especially following major storm events and during the spring snowmelt. To minimize flooding impacts, increased upland storage is necessary to reduce the overall volume of water transported by the ditch system.

John Helland, a Legislative Analyst, wrote a legislative information brief titled, "The Drainage Issue", for the Minnesota House of Representatives in 1999. The following text contains key portions of the information brief:

> Drainage activity over the years has ebbed and flowed based on agricultural prosperity and the drought cycle. The activity peaked in the 1950s, and by the 1960s public policy had shifted toward an emphasis on wetland conservation. People began to question whether drainage was always in the public interest.

"The Drainage Issue" *continued*...

Federal and State law evolved toward acquisition and protection of wetlands. Water bank programs were created to pay landowners not to drain wetlands and to place them under easement. The federal Clean Water Act gave the U.S. Army Corps of Engineers permit control over the discharge of substances into wetlands. The 1985, 1990, and 1996 federal farm bills all contained significant wetland protection measures for landowners planting crops [consequently, the 2002 Farm Bill does as well]. Minnesota's law has changed during the last three decades by increasing the consideration of environmental measures before a drainage proceeding commences and imposing stricter protection of wetlands. This culminated in the State Wetland Conservation Act of 1991, which established a "no-net-loss" policy for Minnesota's remaining wetlands.

**Activity and Authority**

A 1985 estimate calculated that Minnesota had about five million acres of drained land. About 20 percent of the acreage was drained by tile pipes, conveying excess water from farm fields to collection ditches. The remaining 80 percent was drained by 27,000 miles of constructed drainage ditches.

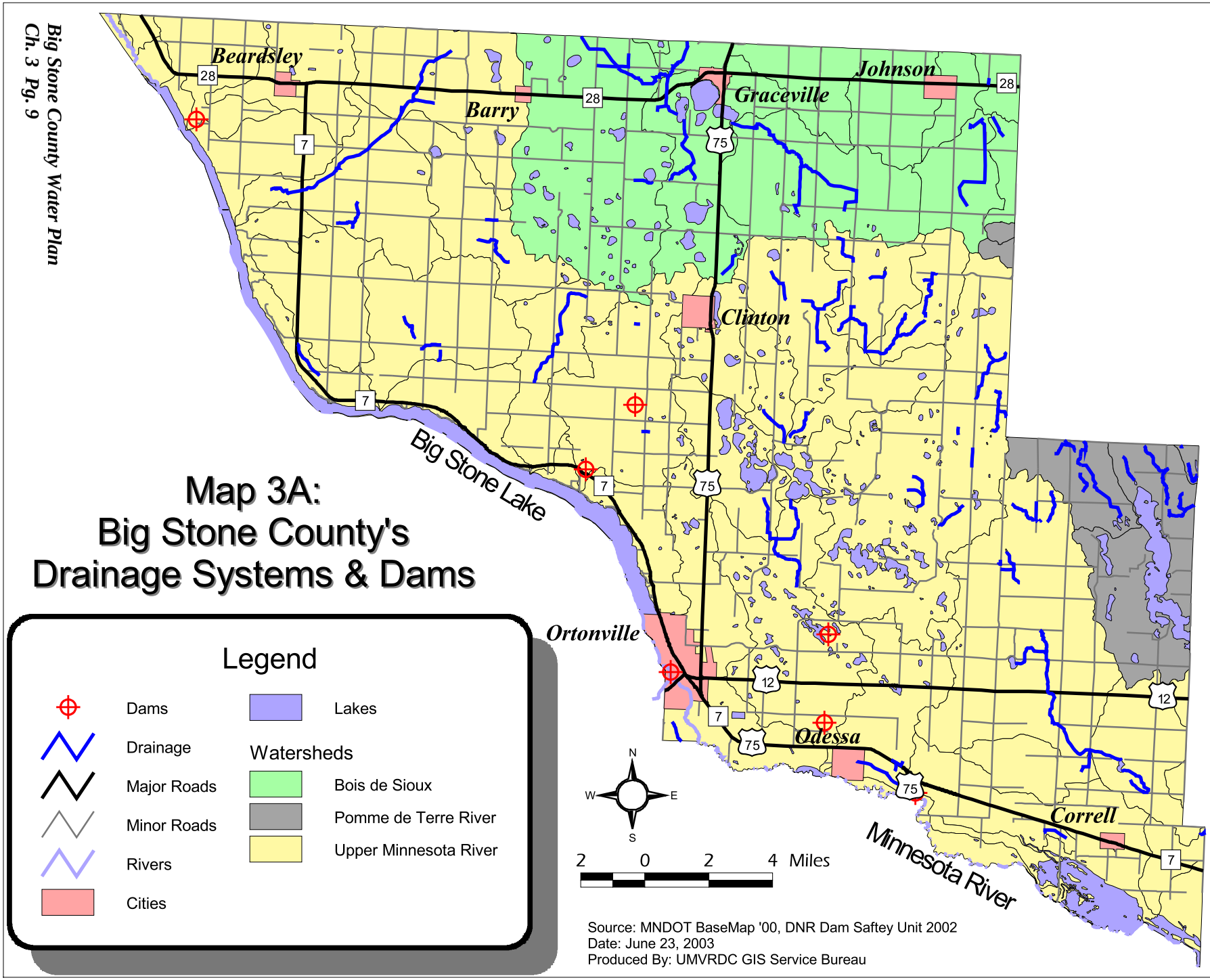
Drainage activity has tapered off in the last two decades. There are fewer individual farmers, and subsequently less interest in opening up new land to drain. The growing realization of public benefits of wetland protection, and accompanying laws, has slowed wetland drainage. Some drainage activity is taking place in the state's growing urbanization areas, including preparing for streets, roads, airports, and residential and industrial development.

General authority for public drainage is vested in the counties under Minnesota Statutes, chapter 103E, although some drainage systems are located in and under the supervision of a watershed district (Minn. Stat., Ch. 103D). Counties and watershed districts are more or less on their own in the interpretation of the drainage law, on a case-by-case basis. This has caused a growing lack of uniformity and standardization of drainage procedures among the counties and watershed districts.

**Issues**

Issues and concerns about public drainage have emerged among various interest groups during the 1990s. Some of the groups have expressed an interest in specific changes to the drainage law, or wholesale change to "modernize" it. Recently, the state Board of Water and Soil Resources sponsored a public drainage forum to identify and discuss the issues and concerns. The major concerns seem to be:

- There is a great need for more education on the drainage law, which is very process oriented, for all interested parties, but especially public officials who change and may be unfamiliar with the law. An information clearinghouse and specialized training program should be provided, and perhaps the University of Minnesota could construct a "drainage model" for demonstration purposes.




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

## Legend

- Dams
- Drainage
- Major Roads
- Minor Roads
- Rivers
- Cities
- Lakes

Watersheds

- Bois de Sioux
- Pomme de Terre River
- Upper Minnesota River

Source: MNDOT BaseMap '00, DNR Dam Saftey Unit 2002
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

"The Drainage Issue" *continued*...

- The buffer strips required to be placed along new drainage systems to prevent erosion need to be maintained and inspected. Minnesota Statutes, section E, requires the planting of a 16.5 foot wide permanent grass strip on each bank of a new or improved drainage ditch. However, the law doesn't reach 90 percent of previously existing public drainage ditches or private systems. According to a 1990 study, enforcement of the permanent grass strip is non-existent for the most part.

- The abandonment of a public drainage ditch is very hard to accomplish. The initiative must come from assessed landowners with a petition signed by at least 51 percent of the property owners assessed for the system. The petition must designate the drainage system proposed to be abandoned, and show that it is not of public benefit and utility. This has proved to be difficult as existing law is designed to increase drainage, not to reduce it. As a result, separate legislation often is introduced in legislative sessions to abandon a particular system.

- Repair of an existing drainage ditch sometimes is thought of as an improvement. Repairs are not intended to significantly increase the hydraulic efficiency or capacity of a ditch, or to extend and improve drainage benefits to the new land. If a ditch and repaired channel is maintained on a regular basis, major repair should not be required. However, many ditches are not maintained regularly and petitions for repair, with lesser standards, can sometimes cross the line and become an improvement.

- Some drain tile systems are overwhelming the capacity of existing ditch systems to handle water flow. Although some counties have conducted ditch inventories, there is a need for a statewide inventory and record keeping system. This would help public officials to have exact information on local drainage and be able to enforce the law better.

- The viewers' report in a drainage proceeding may be the single most important document; it lists three viewers' facts and findings. Viewers gather information that is used by the county board or watershed district to decide if a drainage project is feasible. It also identifies who will pay for construction and maintenance of the drainage system. The original establishment of benefits on a new system will affect all later repairs related to that system. Environmental criteria is required by Minnesota Statutes, section 103E.015, to be considered in a proposed drainage project. However, the law does not specify when it is to be done, so it often isn't accomplished at the beginning of the project but during the hearing stage. This can make a project more troublesome and costly.

Several ideas flowed from the drainage forum to improve the current situation:

- There should be a cost/benefit analysis of drainage on a countywide basis, not project-by-project.

- Best management practices on ditch systems, similar to existing agricultural efforts, would be a good boost to improve overall water quality.

- New technology in drain tile systems also may assist improved water quality and could be mandated.

- Perhaps compensation or other incentives should be provided to landowners in order to more easily abandon ditch systems no longer providing a public benefit.

- Engineers working on a proposed drainage system should immediately review the required environmental criteria to assess the impact after the project is initiated by petition and before it gets to the hearing stage.

**Future Drainage Efforts**

The Big Stone County Water Plan Committee discussed a number of issues similar to the ones identified in John Hellend's "The Drainage Issue" legislative brief, including the use of buffers to prevent erosion and the need to conduct cost/benefit analyses on the drainage system. The conversation led to the formation of a number of action steps to address both drainage and flooding issues and opportunities. The key ones are summarized below:

- ✓ Creating a Geographic Information System (GIS) layer for public drainage along with a database to assist with water management.

- ✓ Identifying water retention opportunities in the upstream reaches of the Upper Minnesota River Watershed.

- ✓ Conducting a cost/benefit analysis on new ditching and tiling projects and proposed ditch improvements.

- ✓ Seeking funds to create a drainage study, identifying financial incentives to improve the overall drainage where needed, with an emphasis on reducing the County's overall flooding potential. The foundation for this work has already been laid out in the Upper Minnesota River Watershed District Plan.

The foremost concern to the success of Big Stone County's water management in the future is properly educating local residents of the benefits of conducting a drainage management study. If it is perceived as a document that will dictate drainage improvements that will negatively affect private property rights, the drainage management study will be controversial. If the public and local officials, however, view a drainage management study as a means to both improve drainage and identify ways to compensate landowners, the project would go a long way towards helping protect the economy of Big Stone County and the agricultural community.

## Water Management Issue 2:
## Groundwater Protection

### Well Interference

When a high capacity well is pumping, a portion of the aquifer around it is dewatered in a pattern known as a cone of depression. Wells located within the cone of depression may experience lower water levels and have problems getting water if water levels are lower than the well pump. This condition, displayed in Figure 3A, is referred to as "well interference". Most well interference problems tend to be localized and short in duration, however being without water is a major inconvenience and can cause damage to well pumps. Lowering the pump in the well or installing a new well pump can resolve many well interference problems and, in severe situations, it may become necessary to construct a new well.

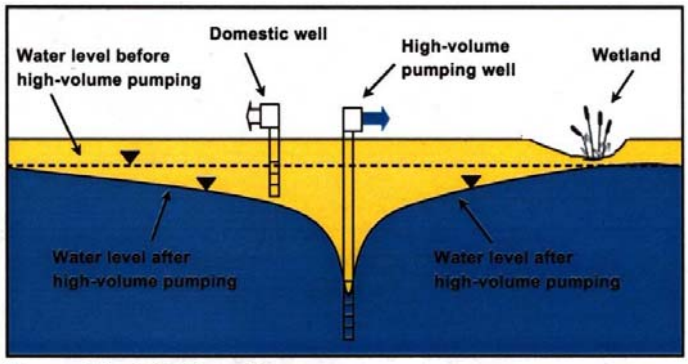


Figure 3A: Well Interference

Minnesota Statutes 103G.261 establish domestic water use as the highest priority of the State's water when supplies are limited. Procedures for resolving well interferences are defined by Minnesota Rules 6115.0730. Domestic well owners and municipal water suppliers that have problems obtaining water and believe the situation is due to the operation of a high capacity well that pumps in excess 10,000 gallons per day or 1,000,000 gallons per year can submit a well interference complaint to the DNR for investigation. Before the DNR will investigate a well interference complaint, however, the well owner must have the well inspected by a licensed well driller to determine if the water supply problems are related to the condition of the domestic well.

The DNR Well Interference Complaint Tracking Database lists only one well interference complaint that has occurred in Big Stone County. In this situation, the landowner worked out a satisfactory solution without local or state involvement.

### Observation Wells

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 observation well network program, groundwater levels are routinely measured in 700 wells statewide (refer to Chapter Two for Big Stone County's Observation Wells Map). 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 for local groundwater complaints.
- Provide data to resolve allocation problems.
- Identify target areas that need further hydrogeologic investigation, water conservation measures, or remedial action.

**Minnesota Department of Health**

The Minnesota Department of Health (MDH) monitors public water supplies under the Federal Safe Drinking Water Act. Public water supplies generally fall into three categories: 1) Community Public Water Supplies, 2) Nontransient Noncommunity Public Water Supplies and 3) Transient Noncommunity Public Water Supplies. The first two categories of public water supplies are tested regularly for 25 chemical and biological parameters. The third category is usually routinely tested for nitrate levels and bacteria only.

Under the 1989 Minnesota Groundwater Protection Act, MDH developed Health Risk Limits (HRL) for substances found to degrade groundwater through groundwater quality monitoring. A health risk limit is the concentration of a groundwater contaminant, or a mixture of contaminants, that can be safely consumed daily for a lifetime. HRL are expressed as a concentration in micrograms per liter, or calculated as a "hazard index." At the time of this printing, the Minnesota Department of Health is currently in the process of revising the Health Risk Limits for groundwater.

HRL reflect health effects data alone. They do not incorporate economic or technological factors such as treatment cost and treatment feasibility, as do Federal drinking water standards, the Maximum Contaminant Levels (MCL). Economic and technological factors, the protection of the environment and the health of non-human species are considered in other groundwater protection regulations. The health risk limit rules are unique in that they do not specify how health risk limits are to be applied.

The following are some of public health protection purposes the Minnesota Department of Health uses Health Risk Limits for:

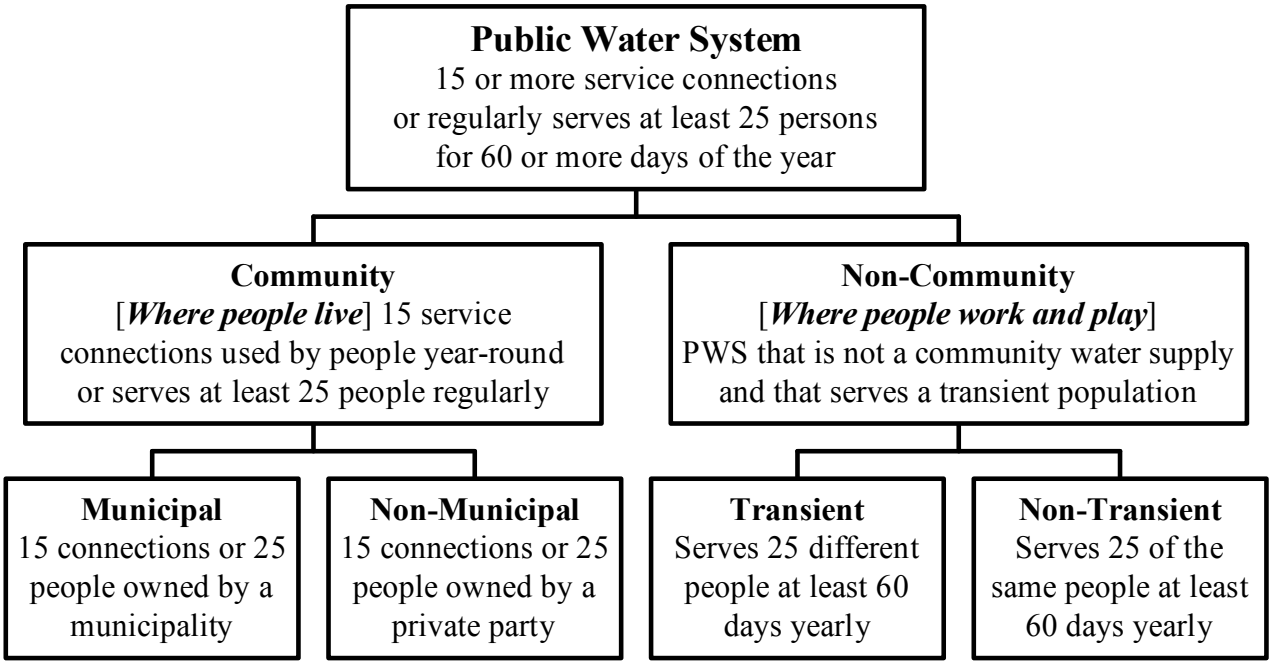
1. **Advice for Private Wells**. Because private wells are not regulated for contamination, HRL are used to evaluate contaminated wells and provide advice to consumers and well owners about the suitability of their water supply for consumption and other uses.
2. **Unregulated Contaminants in Public Water Supplies**. In instances where no Federal drinking water standard exists for a contaminant in public water supplies, HRL are used as criteria to evaluate options for reducing the community's exposure to the contaminant.
3. **Environmental Review**. The MDH uses health risk limits as criteria in environmental review projects. For example, monitoring data may be compared to HRL to evaluate potential impacts of a project on public health.

4. **Site Assessment Criteria**. The MDH's Site Assessment and Consultation Program uses HRL as criteria to evaluate potential site impacts on public health, to make recommendations on monitoring and mitigation.

## Community Public Water Supplies

The Minnesota Department of Health (MDH) defines a public water supply as a system that provides piped drinking water for human use to 15 or more service connections or regularly serves at least 25 people for 60 or more days a year. Public water supplies are separated into two main classes: community and non-community. Figure 3B provides a flowchart that shows how public water systems are categorized and defined. Table 3B on the next page lists Big Stone County's public water suppliers according to the Minnesota Department of Health (July, 2002). A complete listing of all water appropriations permitted through the Minnesota Department of Natural Resources can be found in Appendix B. A permit is needed for all withdrawals greater than 10,000 gallons per day or 1,000,000 gallons per year.

**Figure 3B:**
**Public Water System Categories and Definitions**




## Wellhead Protection

Wellhead protection, administered by the Minnesota Department of Health (MDH), is a means of safeguarding public water supply wells by preventing contaminants from entering the area that contributes water to the well or wellfield over a period of time. The wellhead protection area is determined by using geologic criteria, such as the physical characteristics of the aquifer and the effects which pumping has on the rate and direction of groundwater movement. A management plan is

developed for the wellhead protection area that includes inventorying potential sources of groundwater contamination, monitoring for the presence of specific contaminants, and managing existing and proposed land and water uses that pose a threat to groundwater quality.

**Table 3B:**
**Public Water Supplies**

| ID | Name | City | Contact | Phone |
|---|---|---|---|---|
| 1060002 | Beardsley | Beardsley | Keith Elrite | 320.265.6165 |
| 1060003 | Clinton | Clinton | Benny Basta | 320.325.5294 |
| 1060004 | Correll | Correll | George Korstjen | 320.596.2301 |
| 1060005 | Graceville | Graceville | Erv Firchau | 320.748.7107 |
| 1060006 | Johnson | Johnson | Donald Johnsrud | 800.996.3135 |
| 1060007 | Odessa | Odessa | Jim Nelson | N/A |
| 1060008 | Ortonville | Ortonville | Roger Anderson | 320.839.3780 |
| 1060009 | Big Stone Hutterite | Graceville | Elmer Hofer | 320.748.7961 |
| 1060010 | Lismore Hutterite Colony | Clinton | Elie Hofer | 320.325.5599 |
| **Transient Non-Community** | | | | |
| 5060005 | Graceville Golf Club | Graceville | Bob Lehman | 320.748.7557 |
| 5060008 | Toqua Lake County Park | Graceville | Richard Lane | 320.748.7207 |
| 5060013 | Club 7-75 | Odessa | Jay Sammon | 320.273.2339 |
| 5060014 | Rustling Elms Resort | Ortonville | Donna Johnson | 320.839.3845 |
| 5060021 | Big Stone State Park | Ortonville | Park Office | 320.839.3663 |
| 5060024 | Lakeshore RV Park | Ortonville | Dennis Dragt | 320.839.3384 |
| 5060025 | Big Stone Camp For Christ | Ortonville | Milton Jorgenson | 320.839.3001 |
| 5060026 | Mallard Point | Clinton | Tom Hoye | 320.265.6129 |
| 5060028 | Eidskog Lutheran Church | Ortonville | Shalom Kropfl | 320.839.2813 |

The long-term goal of the MDH is to implement wellhead protection measures for all public water supply wells. However, due to the large number of public water supply wells (13,000 statewide), the diversity of geologic conditions in Minnesota, and current resource constraints, wellhead protection will be implemented in phases. To accomplish this, all pubic water suppliers without a wellhead protection plan were assigned a ranking number by the MDH. The lower numbers represent wellhead plans that have higher priority. Chapter Four contains a listing of each public water supplier's wellhead protection status (and ranking number) under the Water Management Goal (Objective B).

All public water suppliers will be required to:

1. Maintain the isolation distances from potential contamination sources defined in the State Well Code;

2. Monitor the noncomplying sources located on their property; and
3. Report to the Minnesota Department of Health other violations to the isolation distance, or ask a local governmental unit to regulate these sources.

In addition to maintaining the isolation distances, owners of community and nontransient noncommunity, when either notified by the Minnesota Department of Health or when a new well is added to a municipal water supply system, must develop a wellhead projection plan which includes:

1. A map of the wellhead protection area;
2. A vulnerability assessment of the well and the wellhead protection area;
3. An inventory of potential sources of contamination within the wellhead projection area;
4. A plan to manage and monitor existing or proposed potential source(s) of contaminants; and
5. A water supply contingency strategy.

To protect existing groundwater quality, the County needs to continue to implement existing land use controls, such as the zoning and ISTS ordinances. The Water Plan has also identified in Chapter Four that the County will assist the MDH and public water suppliers as they develop and implement Wellhead Protection Plans. In addition, other groundwater action steps include identifying sensitive groundwater recharge areas and sealing abandoned wells (with a priority in Wellhead Protection Areas and other identified sensitive areas).

**Water Management Issue 3:**
**Storm Water Management in Developing Areas**

One of the leading sources of water pollution comes from storm water runoff. According to the Environmental Protection Agency's National Water Quality Inventory (EPA, 1996), 13 percent of impaired waters are affected by urban/suburban storm water runoff. The 1987 Amendments to the Clean Water Act required the U.S. Environmental Protection Agency (EPA) to develop regulations for storm water discharges. The National Pollutant Discharge Elimination System (NPDES) permitting authority was given to the Minnesota Pollution Control Agency (MPCA) to administer this federal program. The overall intent of the program was to reduce the amount of pollutants picked up by storm water and carried into storm sewers during rain or snow melt events.

Phase I of the EPA's Storm Water Program began in 1990 under revisions to the Clean Water Act. Phase I relies on NPDES permit coverage to address storm water runoff from the following sources:

1. "Large" municipal separate storm sewer systems generally serving populations of 100,000 people or greater;
2. Minneapolis and St. Paul construction activity disturbing five acres of land or greater; and
3. Ten categories of industrial activity.

Phase II was the next step in EPA's implementation efforts. It expanded the Phase I program by requiring an additional group of storm sewer operators in "urbanized areas" and operators of small construction sites (those that disturb between one to five acres) to implement storm water programs and policies. The actual "urbanized areas" were identified by the Pollution Control Agency.

Although no storm water system in Big Stone County were targeted for Phase II activities, the Water Plan Committee recognized that systematically addressing storm water concerns countywide is vital to improving the area's water resources. This was specifically identified under the County's Water Management Goal in Chapter Four (Objective C). Action steps include offering to cost-share a Storm Water Feasibility Study with the City of Ortonville and identifying storm water drains and outlets in a GIS database.

## Reducing Priority Pollutants: Issues, Implications and Assessments

The Water Plan Committee decided to concentrate a large majority of Water Plan's action steps listed in Chapter Four on efforts specifically designed to minimize or alleviate a number of priority pollutants. In addition, the Committee decided to identify the Stoney Run Sub-Watershed as its high priority area between 2003 and 2008, although most of the action steps will be administered countywide. The following three sections provide a description of how and why Big Stone County will address reducing priority pollutants:[1]

1. ***Total Maximum Daily Loads (TMDLs)***

2. ***Minnesota River Basin Plan and Local Watershed Projects***
    a. Dissolved Oxygen and Phosphorus
    b. Nitrogen
    c. Sediment and Erosion

3. ***Feedlots***

### Reducing Priority Pollutants Issue 1: Total Maximum Daily Loads (TMDLs)

The Clean Water Act requires states to publish, every two years, an updated list of streams and lakes that are not meeting their designated uses because of excess pollutants. The list, known as the 303(d) list, is based on violations of water quality standards and is organized by river basin. To facilitate this process, Total Maximum Daily Loads (TMDLs) where designed for a number or priority pollutants. These standards define how much of a pollutant can be in a surface and/or ground water while still allowing it to meet its designated uses, such as for drinking water, fishing, swimming, irrigation or industrial purposes.

The current 303(d) TMDL listing was published in July 2002. Since Big Stone County is located in two major river basins (mostly in the Minnesota River Basin, with a small northern part of the County draining into the Red River Basin), the following two 303(d) basin summaries pertain to water planning activities (MPCA 2002 303d List Cover Letter):

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[1] *It should be noted that much of the information presented in this section of the Water Plan and its corresponding Goals, Objectives and Action Steps found in Chapter Four ties in with information and efforts identified in the Minnesota Pollution Control Agency's Minnesota River Basin Plan (December 2001).*

In the **Minnesota River Basin**, there are 29 rivers and creeks that are impaired for one or more of the following pollutants: Low Dissolved Oxygen, impaired biota, mercury, fecal Coliform, turbidity, excess ammonia, Chloride, PCBs, and eutrophication. The Minnesota River has the most reaches listed for impairment in the Basin [totaling 46]. There are also 81 lakes listed with one or more of the following impairments: excess nutrients and mercury or PCBs in the water column and/or fish tissue. Altogether, there are 320 river reaches and lakes listed as impaired in this Basin.

In the **Red River Basin**, there are 20 rivers and creeks that are impaired for one or more of the following pollutants: Impaired biota, low Dissolved Oxygen, fecal Coliform, mercury, turbidity, excess ammonia, and PCBs. The Red River of the North has the most reaches listed for impairment in the Basin [totaling 32]. There are also 44 lakes listed with one or more of the following impairments: excess nutrients and mercury in the water column and/or fish tissue. Altogether, there are 168 river reaches and lakes listed as impaired in this Basin.

For each pollutant that causes a water body to fail to meet state water quality standards, the federal Clean Water Act requires the MPCA to conduct a TMDL. A TMDL study identifies both point and nonpoint sources of each pollutant that fails to meet water quality standards. Water quality sampling and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met. Rivers and streams may have several TMDLs, each one potentially determining the limit for a different pollutant.

Big Stone County has three water bodies identified on the July 2002, 303(d) TMDL listing of impaired waters. The text box below identifies these waters, along with when each was listed, the TMDL assessment ID number, the affected use, the pollutant and the estimated target start and completion date for the necessary TMDL study.

**Table 3C: Big Stone County's**
**303(d) TMDL Listing of Impaired Waters (July 2002)**

| Name | Year Listed | Assessment ID | Affected Use | Pollutant or Stressor | Target Start - Completion Date |
|---|---|---|---|---|---|
| Marsh Lake | 1998 | 07-0001 | Aquatic Life | Mercury | 2002 – 2015 |
| Artichoke Lake | 1998 | 07-0002 | Aquatic Life | Mercury | 2002 – 2015 |
| Minnesota River | 1994 | 07-0004 | Aquatic Life | Turbidity | 2004 – 2008 |

The Water Plan Committee identified working with the Minnesota Pollution Control Agency to get the County's waters off the 303(d) listing in Chapter Four's Action Steps. It was also clearly communicated by the Committee that they would like to learn more about the TMDL listing process and what role the Water Plan plays in getting waters off the listing. For more information on the TMDL process, visit the following website:

**http://www.pca.state.mn.us/water/tmdl.html**

**Reducing Priority Pollutants Issue 2:**
**Minnesota River Basin Plan and Local Watershed Projects**

Minnesota River Basin Plan, published by the Minnesota Pollution Control Agency in December 2001, identifies action steps to address pollution concerns throughout the 37 county Minnesota River Basin. Specifically, the purpose of the Basin Plan is to "*guide and coordinate the activities of the MPCA, in conjunction with other agencies and organizations, in restoring or protecting the water resources of the Minnesota River Basin"* (Basin Plan, page 12). The development of the Basin Plan consisted of a ten year process based on the efforts of numerous organization and individuals, including the following:

- ✓ Recommendations from the Minnesota River Citizen's Advisory Committee
- ✓ Recommendations from the Minnesota River Agricultural Team
- ✓ Input from stakeholders and citizens at public meetings
- ✓ Input from basin planning meetings
- ✓ Results form the Minnesota River Assessment Project
- ✓ Studies from other agencies and organizations
- ✓ Written comments on the Draft Basin Plan

The Minnesota River Basin Plan identifies goals, objectives and targets that were all created to have measurable environmental outcomes. The reducing priority pollutant goals, objectives and action steps identified in Chapter Four of this Water Plan were designed in part to tie into the ones outlined in the Minnesota River Basin Plan and Big Stone County's local Watershed Projects. More importantly, the Basin Plan and Watershed Projects provide technical information on the status of water quality by providing an analysis of the monitoring data and reports that have been collected throughout the Minnesota River Basin. The following information summarizes (and reproduces) the Basin Plan's implications and assessments that tie in with Big Stone County's Reducing Priority Pollutants Goal:

***Dissolved Oxygen and Phosphorus*** – The dissolved oxygen and phosphorous goals and objectives are included together because of the strong linkage between phosphorous levels in the Minnesota River and the dissolved oxygen concentrations in the lower reaches of the Minnesota River. Almost all the efforts identified [in the Basin Plan] toward reducing the biochemical oxygen demand and, therefore, maintaining dissolved oxygen concentrations in the River involve the reduction of phosphorous levels. To accomplish this, one of the Minnesota Pollution Control Agency's commitments is to provide assistance to local units of government in developing and using adequate watershed assessment information for identifying land use changes needed to reduce phosphorus loading. Phosphorus originates from several sources: Point-sources mainly come from municipal and industrial dischargers into surface waters; Non-point sources mainly come from agricultural fields, urban runoff, construction sites, feedlots and on-site septic systems.

***Nitrogen*** – Nitrite, nitrate, ammonia, organic nitrogen and nitrogen gas are all common forms of nitrogen. Nitrogen is most persistent in rivers and streams when in the form of nitrate-nitrogen. Nitrogen in the forms of nitrate and ammonia are of the greatest concern to water quality. The Minnesota Department of Agriculture has developed a Nitrogen Fertilizer Management Plan that contains both a voluntary BMP component and regulatory measures.

***Sediment and Erosion –*** The Minnesota River Assessment Project identified sediment as a pollutant concern in the Minnesota River. Sediment causes turbidity or cloudiness in the water that can limit light penetration and inhibit healthy plant growth on the river bottom. Sediment on the river bottom can destroy the habitat of fish and other aquatic life. Sediment is a significant carrier of other critical pollutants, including phosphorous and heavy metals. It can play a role in decreasing dissolved oxygen levels in the river due to warmer water temperatures resulting from the increased absorption of solar energy by the sediment in the water. Excessive turbidity is also an aesthetic impairment.

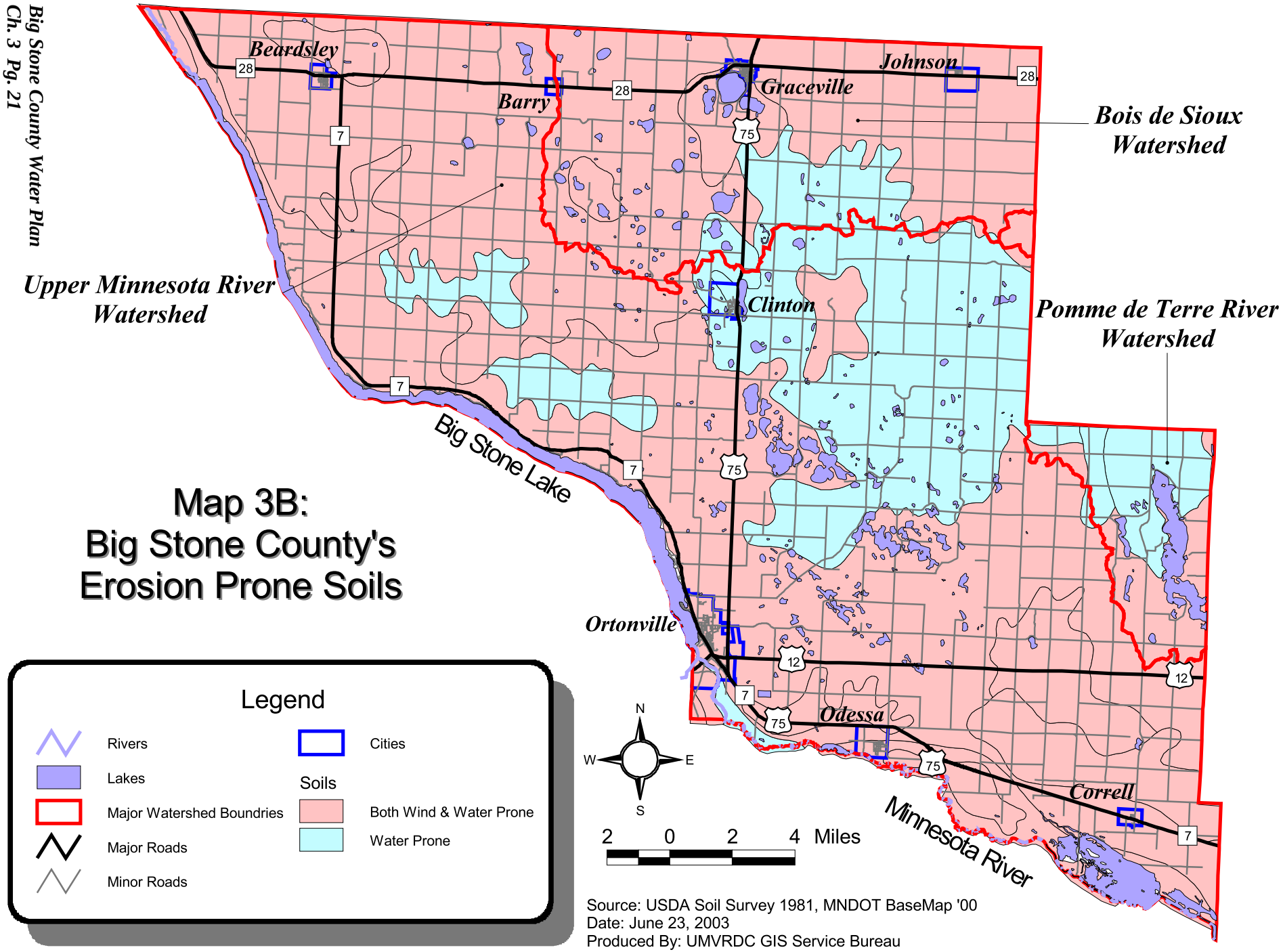
The gross estimate of riparian land use/cover made by the Board of Water and Soil Resources using information from the 100–100 Study by Mankato State University indicate that about half of the stream length in the Basin is in vegetative cover, while the other half is unprotected (i.e., cropped). Although specific estimates of total sediment contribution from agricultural land have not been made, based on the fact that agricultural comprises eighty percent of the Basin's land use, it is likely the largest contributor of sediment. Streambank erosion, however, can also contribute a large amount of sedimentation.

Due to the significance of the sedimentation issue, the Water Plan Committee identified numerous action steps in Chapter Four of this Water Plan devoted to properly addressing sedimentation problems. Many of the items will be the primary responsibility of both the Big Stone County Soil and Water Conservation District and the Natural Resource Conservation Service. These include, among other items, residue management, installing field windbreaks, sediment control basins and buffers along the County's ditches and streams.

## Reducing Priority Pollutants Issue 3: Feedlots

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 amended in 1974, 1978 and 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 by January 1, 2002. Registration was accomplished one of three ways: 1) the owner(s) can fill out information on an MPCA registration form and return it to the MPCA or, in a delegated county, the delegated county feedlot officer, 2) the owner(s) can fill out a permit application (if required to obtain a permit), or 3) the owner can be listed on a current (as of October 1, 1997) Level Two or Level Three inventory that also contains the required information and the inventory has been submitted to the MPCA, this serves as fulfilling the initial registration requirement. It is the owner's responsibility to ensure that his or her registration information has been forwarded to 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, thus being 1 animal unit. In comparison, it takes approximately 2.5 adult hogs to equal a 1000 pound cow. As a result, each adult hog is equal to a 0.4 animal unit. In other words, it takes 2.5 hogs to equal 1 animal unit.




# Map 3B: Big Stone County's Erosion Prone Soils

Source: USDA Soil Survey 1981, MNDOT BaseMap '00
Date: June 23, 2003
Produced By: UMVRDC GIS Service Bureau

Registration information must be updated at least once in every four-year period after January 1, 2002. The MPCA or delegated county will notify owners that they must re-register at least 90 days before their current registration expires. Also, the MPCA or delegated county will send the owner a receipt within 30 days of receiving the registration information from the owner.
Exemptions to registration**:**

- Owners of livestock facilities located on county fairgrounds were not required to register.
- Owners of pasture or grazing operations that have buildings or lots with a capacity of less than 50 animal units, or less than 10 animal units in shoreland areas, were not required to register.
- Owners of pasture or grazing operations that do not have buildings or open lots were not required to register.

Once registered, owners will be directed to obtain any needed permits. The requirement for a feedlot permit is dependant upon the size of the operation and whether or not a pollution hazard has been identified. Owners with less than 300 animal units are not required to have a permit for the construction of a new facility or expansion of an existing facility if construction is in accordance with the technical standards contained in Minnesota State Rules. For owners with 300 animal units or more, but less than 1,000 animal units, a streamlined short-form permit is required for construction activities. An Interim Permit is required for owners with 300 animal units or more, but less than 1,000 animal units, if a pollution hazard has been identified. Finally, a National Pollutant Discharge Elimination System (NPDES) permit or State Disposal System (SDS) permit is required for all feedlots with 1,000 animal units or more. NPDES and SDS permits must be issued by the MPCA. All other permits are issued by the County.

Owners of feedlots with less than 300 animal units, with passive manure-contaminated runoff from open lots, are encouraged to sign up for the 2005/2010 Open-lot Agreement. If an owner qualifies for the agreement, they will be allowed to phase in any needed corrections to pollution problems. Owners are required to install clean-water diversions, vegetated buffer areas or filter strips for manure-contaminated runoff to flow through, or other corrective measures by October 1, 2005.

Big Stone County is currently delegated to administer the MPCA feedlot program. The County has completed a Level One Feedlot Inventory. The Level One Inventory was done to identify the location of existing feedlots. The Level Two Feedlot Inventory would contain specific information, such as size and type of manure storage, on each feedlot within the County.

The Water Plan Committee identified a few key action steps to address feedlot concerns between 2003 and 2008. The most important action step involves creating a County Feedlot Strategy. This would be designed to protect the long-term viability of farming, to identify and address pollution concerns and to digitize the results into a Geographic Information System (GIS) database. The Water Plan Committee also expressed interest in having the County assist with bringing five feedlots into compliance with MPCA's rules every year.

# Surface Water Use:
# Issues, Implications and Assessments

Lakeshore development is mostly thought of being a problem for areas with a vast amount of lakes. This perception, however, is not always accurate, even in the heavily dominated agricultural counties of southwestern Minnesota. This is because no matter where people chose to live, often they want to live near the area's water resources. This reality is causing some lakeshore development concerns in Big Stone County. In addition, the Water Plan Committee echoed some of the concerns expressed at the County's Public Informational Meeting regarding the need to plan for more recreation and wildlife areas. As a result Big Stone County's surface water use issues can be broken down into the following categories:

1. ***Shoreland Development***

2. ***Recreation and Wildlife***

## Surface Water Use Issue 1:
## Shoreland Development

The Minnesota Department of Natural Resources (DNR) developed a shoreland classification system for Protected Waters, including lakes and rivers in the State. The classification system is based on development classes and affects all lakes greater than 25 acres (10 acres in municipalities) and rivers with a drainage area two square miles or greater. These standards set guidelines for the use and development of shoreland property including: a sanitary code, minimum lot size, minimum water frontage, building setbacks, building heights, and subdivision regulations. The Shoreland Management Act regulates all land within 1,000 feet of a lake and 300 feet of a river and the designated floodplain. The specific regulatory development classes are described below:

### Lakes

- **Natural Environment Lakes** usually have less than 150 total acres, less than 60 acres per mile of shoreline, and less than 3 dwellings per mile of shoreline. They may have some winterkill of fish; may have shallow, swampy shoreline; and are less than 15 feet deep.
- **Recreational Development Lakes** usually have between 60 and 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline, and are more than 15 feet deep.
- **General Development Lakes** usually have more than 225 acres of water per mile of shoreline and 25 dwellings per mile of shoreline, and are more than 15 feet deep.

### Rivers

- **Remote Rivers** are primarily in roadless, forested, sparsely populated areas in Northeast Minnesota.
- **Forested Rivers** are in forested, sparsely to moderately populated areas with some roads in northeast, southwest, and north-central Minnesota.
- **Transition Rivers** are a mixture of cultivated, pasture, and forested lands.

- **Agriculture Rivers** are in intensively cultivated areas, mainly southern and western areas of the State.
- **Urban Rivers** are in high-density residential, commercial, and industrial development areas.
- **Tributary Rivers** are all other rivers in the Protected (Public) Waters Inventory not classified above.

Table 3D lists the Statewide shoreline minimum standards for each lake and river development class. Notice that separate standards are in place for lakes that are sewered versus unsewered.

**Table 3D:**
**Statewide Shoreline Minimum Standards**

| **Sewered Lakes** | | | | | | |
|---|---|---|---|---|---|---|
| **Lake Class** | **Lakeshore** | | | | **Non-Lakeshore** | |
| | **Lot Width (ft)** | **Lot Area ($ft^2$)** | **Structure Setback (ft)** | **Impact Zone (ft)** | **Lot Width (ft)** | **Lot Area ($ft^2$)** |
| **Natural Environment** | 125 | 40,000 | 150 | 75 | 125 | 20,000 |
| **Recreational Development** | 75 | 20,000 | 75 | 37.5 | 75 | 15,000 |
| **General Development** | 75 | 15,000 | 50 | 25 | 75 | 10,000 |
| **Unsewered Lakes** | | | | | | |
| **Lake Class** | **Lakeshore** | | | | **Non-Lakeshore** | |
| | **Lot Width (ft)** | **Lot Area ($ft^2$)** | **Struc./ Sewer Setback (ft)** | **Impact Zone (ft)** | **Lot Width (ft)** | **Lot Area ($ft^2$)** |
| **Natural Environment** | 200 | 80,000 | 150/150 | 75 | 200 | 80,000 |
| **Recreational Development** | 150 | 40,000 | 100/75 | 50 | 150 | 40,000 |
| **General Development** | 100 | 20,000 | 75/50 | 37.5 | 150 | 40,000 |
| **Rivers** | | | | | | |
| **River Class** | **River Shoreland** | | | | | |
| | **Lot Width (ft)** | **Structure Setback (ft)** | **Impact Zone (ft)** | **Sewage Setback (ft)** | | |
| **Remote** | 300 | 200 | 100 | 150 | | |
| **Forested** | 200 | 150 | 75 | 100 | | |
| **Transition** | 250 | 150 | 75 | 100 | | |
| **Agricultural** | 150 | 50/100* | 25/50* | 75 | | |
| **Urban & Tributary** | 75/100* | 50/100* | 25/50* | 75 | | |

**Sewered/ Unsewered*
***Note:** Setbacks and Shoreland Impact Zone are measured from Ordinary High Water Levels.*

The State's shoreland classification system is only designed to provide minimum standards that need to be applied statewide. A County, however, can decide to exceed the minimum standards in a variety of different ways (see the text box below). The Big Stone County Water Plan Committee discussed the desire to examine the County's Shoreland Ordinance with an emphasis on increasing minimum lot size requirements and vegetation alteration restrictions. This is an actual action step found in Chapter Four (notice the Committee also expressed their interest in working with the Citizens for Big Stone Lake organization on this subject). One of the main concerns is that minimum standards may not be enough to fully accommodate a homeowner's long-term development needs. For example, many lake-lots cannot accommodate all of the desired structures along with proper sewage treatment and water supply areas. A secondary benefit of increasing the lot size requirements is that it would also increase the amount of open space found around lakeshores.

**Exceeding Lakeshore Development Standards:**
**The Meeker County Example**

Meeker County, with assistance from the Minnesota Department of Natural Resources (DNR), decided to create a fourth lake classification system for Protected Waters, called Natural Sensitive Lakes. These lakes are actually a subcategory of the Natural Environment Lakes classification that Meeker County has developed to protect the lakes that are more "wetland" in nature. Shoreland standards for these lakes are more restrictive for preservation purposes. The County simply examined all of the Natural Environment Lakes and separated them into two categories: small lakes versus small wetlands. Although the Meeker County Planning Commission and County Board expected some controversy in the planning process, they were pleasantly surprised that most Meeker County residents were fully behind their efforts. The main point in this example is not to suggest that Big Stone County should create a new lake classification, but rather to highlight the fact that Big Stone County can examine exceeding the State's minimum shoreland standards.

## Surface Water Use Issue 2:
## Recreation and Wildlife

### Recreation and Wildlife Plan

The Pubic Informational Meeting and the Big Stone County Water Plan Committee both revealed a number of water planning issues directed related to the availability and quality of the area's recreation and wildlife. One of the foremost issues was the question on whether or not Big Stone County is adequately prepared to address the area's growing recreation and wildlife demands. To address this concern, the Water Plan Committee wants to look into developing a Recreation and Wildlife Plan, which would assess the quality and quantity of existing resources and identify future needs (i.e., County Parks, trails, equipment, etc.). The Plan would identify potential funding mechanisms and establish a tentative implementation timeline. Related to this issue, the Water Plan Committee also created an action step to support the current Marsh Lake restoration efforts that would help to improve fishing, wildlife and recreational opportunities (see the next section for a description of the Marsh Lake situation).

**The Marsh Lake Opportunity**

Marsh Lake is a shallow 5,000 acre reservoir at the confluence of the Pomme de Terre and Minnesota Rivers. It forms part of the boundary between Big Stone, Lac qui Parle and to a minor extent Swift Counties. The Work Progress Administration created the reservoir in 1938 as part of a water conservation project. According to the U.S. Army Corps of Engineers, the project was never intended to be used for flood control. The creation of the Marsh Lake Dam provided increased fish and wildlife habitat, new Colonial Waterbird habitat, and associated recreational opportunities. Unfortunately, there were inherent ecological costs associated with the project. Natural river processes were disrupted, impacting sediment movement, floodplain function, fish movement and various aquatic habitats. Additionally, natural flooding and drying cycles were disrupted, reducing plant diversity and associated fish and wildlife benefits found in the area prior to the Dam.

Marsh Lake has also been subject to long-term degradation that is associated with the Dam and its design. As a result, the lake continues to evolve into a sterile, turbid basin where recreational, ecological and associated economic values are lost. In addition, land use changes and the rapid delivery of water into the system are causing larger and faster rises in lake elevation. This has increased sediment, nutrient and bacteria loadings. Carp thrive in this environment and along with wind driven wave action, their activities stir up sediments, uproot vegetation and prevent the growth of new vegetation. All of these factors work together to suppress the aquatic vegetation critical for improving water quality and providing fish and wildlife habitat. With declining habitat quality, the ability of Marsh Lake to sustain hunting, fishing and other recreational opportunities is being lost.

**Land-locked Basins**

Land-locked basins lack natural outlets. As a result, they have water levels that rise during wet periods and are slow to recede during dry conditions. Big Stone County has a large number of these basins due to its topography and a drainage system that is not as extensive as other agricultural counties in Minnesota. The wet conditions of the 1990s and high water levels in landlocked basins have caused numerous problems for local government and individual citizens: State, County and township roads have needed to be repaired, raised or closed; farmers have had to idle acres that were once farmable; and, some tiles no longer function because water levels are too high to drain into.

Often the solution to similar problems has been to drain basins with little or no consideration for downstream individuals, ecological damage or the recreational needs of the area. To find the best solution, however, it needs to be realized that draining these basins reduces the amount of floodwater storage and places an even greater strain on the County's already strained water management system, which ultimately causes conflicts between locals and upstream and down-stream residents. There are also recreational opportunities that need to be considered. The deeper, carp free areas that these basins provide is currently an untapped source of recreational opportunity. Draining of these basins often allows access of undesirable fish species; especially carp which are notorious for destroying habitats more desirable fish and wildlife need to sustain themselves.

Due to the importance of this issue, the Water Plan Committee created an action step to complete an inventory of land locked water basins throughout the County. Once this is accomplished, funding sources and/or land use incentives will be created to provide win-win opportunities for landowners to assist with addressing an important community need.

# Chapter Four:
# Goals, Objectives and Action Steps (*2003-2008*)

This Chapter establishes Goals, Objectives and Action Steps for each of the County's high priority issues identified in Chapter Three. In review, the County's four priority issues are:

***Education; Water Management; Reducing Priority Pollutants; and Surface Water Use***

**In addition to the four priority issues, Big Stone County has identified the Stoney Run Sub-Watershed as its primary emphasis for implementation activities between 2003 and 2013** (this Sub-Watershed is part of the Upper Minnesota River Watershed District). This does not mean, however, that implementation activities won't occur throughout the County.

## Chapter Definitions

Each of the action steps contained in this Chapter identifies who is responsible for its implementation, when the action step should occur, and an estimate on how much it will cost. For the purposes of this Chapter, the following abbreviations are used (**An *Asterisk, Underlined, and Bolded means lead action step responsibility**):

**CB** = County Board
**CS** = County Staff
**DA** = County Ditch Authority
**ES** = Environmental Services
**PZC** = Planning & Zoning Commission
**WP** = County Water Plan/Planner
**WPTF** = Water Planning Task Force
**BdS** = Bois de Sioux Watershed District
**PdT** = Pomme de Terre Watershed
**UMR** = Upper MN River Watershed District
**RDC** = Upper MN Valley Regional Development Commission

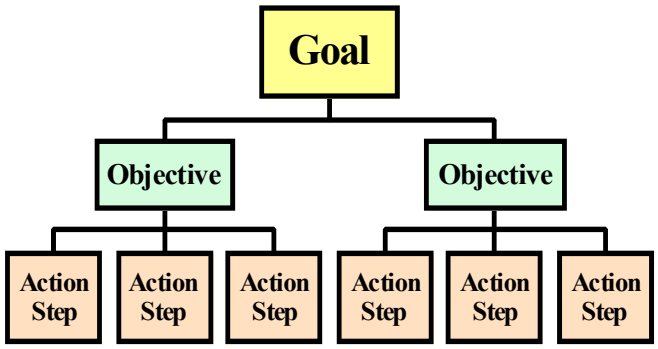
**BWSR** = Board on Water and Soil Resources
**DNR** = Department of Natural Resources
**FWS** = U.S. Fish & Wildlife Service
**ACE** = U.S. Army Corps of Engineers
**MDH** = Minnesota Department of Health
**MGS** = Minnesota Geological Survey
**MPCA** = Minnesota Pollution Control Agency
**NRCS** = Natural Resource Conservation Service
**SWCD** = Soil and Water Conservation District
**UMES** = University of MN Extension
**MDOT** = MN Department of Transportation
**BEC** = Bonanza Educational Center

Throughout the Comprehensive Water Plan, goals, objectives and action steps are defined in the following way:

**Goal:** A general, idealistic statement intended to be achieved at some undetermined future date.

**Objective:** Begin with an action verb and can be measurable if a date, dollar amount, etc. is included.

**Action Step:** Specific implementation steps that will be followed in order to achieve the County's Goals and Objectives.



# PRIORITY ISSUE: WATER RESOURCE EDUCATION

***EDUCATION GOAL: COLLECT, ANALYZE AND PROVIDE IMPORTANT WATER PLANNING INFORMATION.***

**Objective A:** Continue to support the various monitoring and information gathering efforts in order to better understand and assess water planning issues.

***Actions:***

1. Proactively work with various state agencies, watersheds and citizens to identify gaps in the County's knowledge and understanding about the condition and the County's water resources. Learn how to best interpret and use information in the decision-making process (i.e., the Regional Hydrogeologic Assessment, monitoring data, etc.).

   ***Who:*** ***__WP__**, WPTF, ES, BdS, MGS, DNR, UMR, SWCD, NRCS ***When:*** 2003-2008 ***Cost:*** $1,000

2. Continue to support watershed planning and implementation activities by providing financial and technical assistance.

   ***Who:*** ***__CB__**, WP, WPTF, ES, UMR SWCD, NRCS, DNR ***When:*** 2003-2008 ***Cost:*** $30,000

3. Continue support of the various water quality monitoring efforts throughout the County. Annually review MPCA's "State of the Minnesota River" report documenting annual monitoring results and long-term trends. Work with the Minnesota Pollution Control Agency to increase monitoring and reporting efforts locally. Looks for other ways to expand the monitoring network where needed.

   ***Who:*** ***__WPTF__**, WP, CWP, UMR, SWCD, ES, DNR, MPCA ***When:*** 2003-2008 ***Cost:*** $5,000

4. Periodically schedule the Upper Minnesota Valley Regional Development Commission to assist with the County's Geographic Information System (GIS) efforts, including training and data creation needs. Use GIS to track water planning data.

   ***Who:*** ***__CS__**, CB, ES, RDC, UMR SWCD, NRCS ***When:*** 2003-2008 ***Cost:*** $10,000

5. Conduct a study to examine how programs, conservation efforts and land use affects the County's tax-base. For example, what economic/social/environmental affect does it have if land is restored to a wetland or if a State or Federal agency has an easement on a piece of property?

   ***Who:*** ***__CB__**, WPTF, ES, DNR, UMR SWCD, FWS, NRCS & the Upper Minnesota Headwaters Joint Powers Board ***When:*** 2005 ***Cost:*** $10,000

**Objective B:** Raise public awareness on a number of key water-planning issues.

***Actions:***

1. Create an outline in October each year on how the Water Planning Task Force and Big Stone County will focus extra-ordinary educational efforts on two to three water planning issues in the upcoming year.

   ***Who:*** ***__WPTF__**, WP, ES, SWCD, CWP, WD ***When:*** Annually ***Cost:*** $2,500

2. Use sub-watershed monitoring efforts to determine where financial and educational assistance is needed most each year. If possible, target these areas for a specific period of time or until the need is reduced to a satisfactory level. To begin with, target the Stoney Run Sub-Watershed (in the Upper Minnesota River Watershed) between 2003-2008

   ***Who:*** ***__WPTF__**, WP, ES, SWCD, BdS, UMR, PdT ***When:*** Annually ***Cost:*** $5,000

3. Continue working with the school districts on monitoring water quality in rural wells by providing equipment and other resources as needed. Develop an informational campaign on private wellhead protection. Encourage them to monitor Big Stone Lake and the Minnesota River if possible.

   ***Who:*** ***__UMR__**, WP, ES, SWCD, BdS, MPCA ***When:*** Annually ***Cost:*** $10,000

4. Publish the Environmental Newsletter at least twice a year. Encourage the use of guest authors and submit the articles to be included in newspapers and other newsletters (i.e., MPCA, BWSR, Watershed Districts, Clean Water Partnerships, etc.).

   ***Who:*** ***__SWCD__**, WP, ES, CWP, WD, NRCS ***When:*** Annually ***Cost:*** $5,000

5. Develop and/or use existing Public Service Announcements on key water planning issues.

   ***Who:*** ***__ES__**, SWCD, NRCS ***When:*** 2003-2008 ***Cost:*** $10,000

6. Develop a water quality curriculum for K-12 and family at the Bonanza Education Center.

   ***Who:*** ***__BEC__**, ES, SWCD, WPTF ***When:*** Annually ***Cost:*** $5,000

7. Continue to contract with the Bonanza Education Center for Solid Waste Management education.

   ***Who:*** ***__ES__**, WPTF, BEC, CB ***When:*** Annually ***Cost:*** $10,000

# PRIORITY ISSUE: WATER MANAGEMENT

**WATER MANAGEMENT GOAL:** ***PROTECT AND IMPROVE WATER QUALITY AND QUANTITY THROUGH WATER MANAGEMENT.***

**Objective A:** Identify and properly address drainage and flooding issues and opportunities.

***Actions:***

1. Work with watersheds to help implement Best Management Practices along ditches and recognize ditches as being tributaries (part of the larger surface water system).

   ***Who:*** ***CB**, ES, UMR, PdT, BdS ***When:*** 2003 ***Cost:*** $25,000

2. Develop a Geographic Information System (GIS) layer for public drainage systems showing watershed boundaries, open ditches and tile lines. Continue to build a database with other GIS layers to assist with water management decision making.

   ***Who:*** ***CB**, RDC, ES, DA, UMR, PdT, BdS ***When:*** 2003 ***Cost:*** $25,000

3. Work with various agencies to increase water retention in upstream reaches of the watershed. Target the Stoney Run and County Ditch #2 Sub-Watersheds

   ***Who:*** ***UMR**, WPTF, DA, ES, ***When:*** 2004-2006 ***Cost:*** $5,000

4. Continue to develop and build a summary of drainage system data in an electronic format (including system name, watershed size, outlets to, date established, system type, repair history, improvement history, flow data, demonstration capacity, monitoring data, etc.).

   ***Who:*** ***UMR**, WPTF, DA, ES ***When:*** 2004-2006 ***Cost:*** $5,000

5. Conduct a cost/benefit analysis on new ditching and tiling projects and proposed ditch improvements, including quantity and quality issues prior to issuing approval. The analysis must include an assessment of the additional and cumulative contributions of additional drainage to downstream flooding and resulting changes in existing stream flow, to minimize excessive drainage, destruction of stream habitat, erosion and sedimentation, and water flow onto adjacent property.

   ***Who:*** ***UMR, BdS, PdT**, WPTF, DA, CB ***When:*** 2003-2006 ***Cost:*** $8,000

6. Seek available funds to create a drainage study, identifying financial incentives for landowners to improve drainage management throughout the County. The Plan would, among other items, assess water storage opportunities, erosion and sedimentation problems, drainage system enhancements and win-win opportunities for improving the County's overall drainage system with an emphasis on reducing the County flooding potential.

   ***Who:*** ***CB**, WP, ES, SWCD, WD, CWP, UMR ***When:*** 2004 ***Cost:*** $12,000

7. The County may accept and process eligible applications for wetland preservation on a countywide basis. A wetland so enrolled is exempt from property tax, however, the State of Minnesota has a mandated fund to reimburse the tax loss to the County.

   ***Who:*** ***ES** ***When:*** Annually ***Cost:*** $500

**Objective B:** Protect and improve the quality of groundwater in the County.

**BIG STONE COUNTY PUBLIC WATER SUPPLIERS**
**Wellhead Protection Status**
***(Information received from Minnesota Department of Health – June 2002)***

1. Public water suppliers currently in the wellhead protection program: Ortonville, Odessa, Beardsley.

2. Public water suppliers to be brought into wellhead protection program within the next five years and current phasing number: Big Stone Hutterite Colony (237).

3. Other public water suppliers and current phasing number: Graceville (857), Clinton (914), Correll (1025), Lismore Hutterite Colony (1056), Johnson (1056).

***Actions:***

1. Invite key state agencies to assist the County with learning how to interpret and use the Upper Minnesota River Basin Regional Hydrogeologic Assessment and other key groundwater information. Examine ways to incorporate groundwater information into the land use decision-making process.

   ***Who:*** ***WP,** MGS, DNR, MDH, CB, ES, WPTF, PZC ***When:*** Bi-annual ***Cost:*** $3,000

2. Work with the Minnesota Geological Survey and the Minnesota Department of Health on developing criteria to identify sensitive groundwater recharge areas. In addition, work with these agencies on developing land use incentives and possibly a protection strategy that can be incorporated in the County Zoning and Subdivision Ordinance.

   ***Who:*** ***ES,** WPTF, CS, PC, CB ***When:*** 2006 ***Cost:*** $2,000

3. Participate on wellhead/source water protection teams during the development and implementation of Wellhead Protection Plans. Examine and adopt key management strategies and review the Zoning Ordinance to look for innovative ways to assist with wellhead protection goals.

   ***Who:*** ***WP**, ES, MDH, UMR, BdS ***When:*** 2003-2008 ***Cost:*** $2,000

4. Show Wellhead Protection Areas (excluding the exact well location) on the County's Zoning Map and treat them as priority areas.

   ***Who:*** ***ES**, MDH, RDC, PZC ***When:*** 2003-2008 ***Cost:*** $500

5. Use GPS technology to help locate wells in Wellhead Protection Areas.

   ***Who:*** ***ES**, MDH, WP, RDC ***When:*** 2003-2008 ***Cost:*** $1,500

6. Prioritize sealing abandoned wells and promoting other Best Management Practices (BMPs) in Wellhead Protection Areas and other sensitive areas (i.e., Stoney Run Sub-Watershed, Floodplain, etc.).

   ***Who:*** ***SWCD**, MDH, WP, ES ***When:*** 2003-2008 ***Cost:*** $1,500

**Objective C:** Identify and properly address storm water issues.

***Actions:***

1. Offer to cost-share a Storm Water Feasibility Study with the City of Ortonville.

   ***Who:*** ***UMR**, RDC, ES, CB, SWCD ***When:*** 2004 ***Cost:*** $8,000

2. Identify storm water drains and outlets throughout the County and create a GIS database.

   ***Who:*** ***CB**, RDC, ES, WP ***When:*** 2005 ***Cost:*** $5,000

## PRIORITY ISSUE: REDUCING PRIORITY POLLUTANTS

**PRIORITY POLLUTANT GOAL: TO RESTORE, PROTECT AND MAINTAIN THE WATER QUALITY, BIODIVERSITY AND NATURAL BEAUTY OF BIG STONE COUNTY'S WATER RESOURCES.**
*Note: This section ties in with the MPCA's Minnesota River Basin Plan (December, 2001).*

**Objective A:** Work with the MPCA to get waters off the Clean Water Act's TMDL 303d list of impaired waters. Big Stone County's current listing (published July 2002):

| Name | Year Listed | Assessment ID | Affected Use | Pollutant or Stressor | Target Start - Completion Date |
|---|---|---|---|---|---|
| Marsh Lake | 1998 | 07-0001 | Aquatic Life | Mercury | 2002 – 2015 |
| Artichoke Lake | 1998 | 07-0002 | Aquatic Life | Mercury | 2002 – 2015 |
| Minnesota River | 1994 | 07-004 | Aquatic Life | Turbidity | 2004 – 3008 |

***Actions:***

1. Work with the Minnesota Pollution Control Agency to address impairments caused by mercury in Marsh Lake. Assist with both the development and implementation of specific action steps.

   ***Who:*** ***WP**, WPTF, CWP, MPCA ***When:*** 2003-2015 ***Cost:*** $Unknown

2. Work with the Minnesota Pollution Control Agency to address impairments caused by mercury in Artichoke Lake. Assist with both the development and implementation of specific action steps.

   ***Who:*** ***WP**, WPTF, CWP, MPCA ***When:*** 2003-2008 ***Cost:*** $Unknown

**Objective B:** Reduce priority pollutants to safe and manageable levels, including nitrates, phosphorus, bacteria, sediment and erosion. Implement strategies Countywide, but target the Stoney Run Sub-Watershed.

***Actions:***

1. Add 500 additional acres of buffers along ditches and streams to capture sediment as it leaves the field (using continuous CRP when possible). Enforce a minimum one-rod grassed area as it applies to drainage policy, but promote larger buffers in critical areas. Use $6,000 annually as a one-time incentive to establish buffers in priority areas (i.e., the Stoney Run Sub-Watershed, Wellhead Protection Areas, Floodplain, etc.). The Upper Minnesota River Watershed District would also like to target all public and private ditches greater than two feet deep with three foot bottom widths.

   ***Who:*** ***SWCD**, DA, NRCS, UMR, DNR ***When:*** 2003-2008 ***Cost:*** $50,000

2. Examine strengthening erosion control standards on new development (over one acre).

   ***Who:*** ***ES**, SWCD, WP ***When:*** 2003-2008 ***Cost:*** $5,000

3. Use the latest restoration techniques to increase habitat and recreational use while addressing bank erosion and sediment problems (Target Stoney Run Sub-Watershed).

   ***Who:*** ***SWCD**, NRCS, UMR, DNR ***When:*** 2003-2008 ***Cost:*** $200,000

4. Create management strategies for erosion on Long Tom and Artichoke Lakes.

   ***Who:*** ***WPTF**, DNR, ES, SWCD ***When:*** 2004-2006 ***Cost:*** $5,000

5. Conduct a tillage transect survey at least once every other year. Work to establish 15,000 new acres of conservation tillage.

   ***Who:*** ***NRCS**, SWCD, WP ***When:*** 2003-2008 ***Cost:*** $5,000

6. Design and install 10 miles of field windbreaks, 25 acres of shelterbelts, and 50 acres of wildlife planting, and 15 acres of critical area plantings.

   ***Who:*** ***SWCD** ***When:*** 2003-2008 ***Cost:*** $80,000

7. Construct five water and sediment control basins and establish 20 acres of waterways.

   ***Who:*** ***NRCS**, SWCD ***When:*** 2003-2008 ***Cost:*** $100,000

8. Encourage rotational grazing and apply 200 acres of planned grazing systems.

   ***Who:*** ***NRCS**, SWCD ***When:*** 2003-2008 ***Cost:*** $200,000

9. Promote well-sealing through advertisements in local papers, newspapers and in radio announcements. Use Water Plan funds, EQIP money and other programs to cost-share sealing high priority abandoned wells. Target wellhead protection areas.

   ***Who:*** ***SWCD**, NRCS ***When:*** 2003-2008 ***Cost:*** $50,000

10. Support the increase of rental rates for CRP. Examine a per acre cost-share program to implement along with CRP.

    ***Who:*** ***SWCD**, NRCS, UMR ***When:*** 2003-2008 ***Cost:*** $200,000

11. Continue to provide low interest loans and grant incentives to upgrade substandard Individual Sewage Treatment Systems. Cost-share $500 Countywide and $1,000 in high priority areas for voluntary upgrades (i.e., Wellhead Protection Areas, Floodplain, etc.).

    ***Who:*** ***ES**, SWCD, NRCS ***When:*** 2003-2008 ***Cost:*** $200,000

According to the Bois de Sioux Watershed District (BdSWD) draft plan, Big Stone County's Local Water Management Plan and Soil and Water Conservation District will work with BdSWD on the Traverse Lake Improvement Project by designing and installing the following:

- 2,000 Acres of increased conservation tillage
- 5 acres of new waterways
- 2 water and sedimentation control basins
- 2 miles of field windbreaks
- 5 acres of farmstead shelterbelts
- 3 acres of wildlife plantings
- 50 acres of buffer strips
- Restoring Moonshine Lake
- Restoring 50 additional acres of wetlands

In addition, the BdSWD will help controll runoff from the feedlots located within the Bois de Sioux Watershed portion of Big Stone County.

**Objective C:** Help protect the long-term viability of feedlots, address pollution concerns and minimize non-agricultural conflicts.

***Actions:***

1. Assist five feedlots per year to help bring them into compliance with MPCA's rules.

   ***Who:*** ***ES**, MPCA, WP, WPTF, NRCS, SWCD ***When:*** 2003-2008 ***Cost:*** $300,000

2. Help plan feedlot runoff control systems as needed, including Nutrient Management Plans and Best Management Practices. Assist with the MPCA's objective of having proper MPCA permits and Manure Management Plans on 100 percent of feedlots with 1,000+ animal units.

   ***Who:*** ***ES**, MPCA, SWCD, NRCS ***When:*** 2004-2008 ***Cost:*** $4,000

3. Develop a County Feedlot Strategy to protect the long-term viability of farming, to address pollution concerns and to minimize non-agricultural conflicts. Complete a Level II Feedlot Inventory and digitize the results into GIS.

   ***Who:*** ***CB**, ES, RDC, SWCD ***When:*** 2003-2008 ***Cost:*** $10,000

## PRIORITY ISSUE: LAKESHORE AND SURFACE WATER

**LAKESHORE AND SURFACE WATER GOAL:** ***TO ENSURE THAT BIG STONE COUNTY CONTINUES TO PROVIDE A SAFE AND CLEAN ENVIRONMENT FOR LIVING AND WATER-BASED ACTIVITIES.***

**Objective A:** Proactively work to identify and address surface water issues.

***Actions:***

1. Continue the Wetland Restoration Project with the Ortonville Fourth Grade Class.

   ***Who:*** ***UMR**, DNR, FWS, ES ***When:*** 2004-2006 ***Cost:*** $5,000

2. Revise the Shoreland Ordinance to improve erosion management. Examine increasing minimum lot sizes and vegetation alteration restrictions. Create a policy with Citizens for Big Stone Lake on lakeshore development.

   ***Who:*** ***CB**, ES, PZC ***When:*** 2004 ***Cost:*** $2,000

3. Conduct a drained lake and wetland inventory to be used in conjunction with flood control and watershed restoration efforts.

   ***Who:*** ***BdS**, FWS, NRCS, DNR, SWCD ***When:*** 2004-2006 ***Cost:*** $5,000

4. Explore the advantages restoring Moonshine Lake (a wetland restoration) in the Bois de Sioux Watershed District. Look for financial incentives for affected landowners.

   ***Who:*** ***FWS** ***When:*** 2004-2006 ***Cost:*** $5,000

5. Complete an inventory of land locked water basins that could provide additional recreational opportunities. Seek funds to pursue projects, with an emphasis on finding money or incentives for willing landowners to cooperate.

   ***Who:*** ***DNR**, FWS ***When:*** 2004-2006 ***Cost:*** $5,000

6. Support the Marsh Lake restoration efforts that will improve fishing, wildlife and recreational opportunities.

   ***Who:*** ***DNR**, ACE, FWS ***When:*** 2004-2006 ***Cost:*** $5,000

7. Seek technical and financial assistance to install fish barriers in Stoney Run to address the problem caused by the blowout on the Long Tom Lake Dam in 1997.

   ***Who:*** ***DNR**, WPTF ***When:*** 2004-2006 ***Cost:*** $5,000

8. Explore the possibility of developing a Recreation and Wildlife Plan that would assess the quality and quantity of existing resources and identify future needs (County Parks, canoe access points, support of public ownership of water resources, etc.).

   ***Who:*** ***CB**, WPTF, DNR, FWS ***When:*** 2007 ***Cost:*** $8,000

# CHAPTER FIVE:
# PLAN ADMINISTRATION

Chapter Five contains information on plan administration, including plan implementation, schedule, implementation timeline, intergovernmental conflicts, major plan amendment procedure, minor plan amendment procedure, incorporating amendments into the Plan and general Water Plan information.

## Plan Implementation

Managing Big Stone County's water resources is a complicated task, involving many local, State and Federal agencies, as well as private 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.

Big Stone County will ensure coordination and implementation of its Comprehensive Local Water Plan through its established Water Planning Committee. The Committee will meet regularly to review progress, identify emerging problems, opportunities and issues and continue to direct the implementation of the Plan. The Committee will be supported by the County Board appointed Water Plan Coordinator. The Coordinator shall administer the implementation of this Plan, coordinate the Water Plan Committee's activities, write grant proposals, prepare annual work plans and reports, and conduct other activities as specified by the Big Stone County Board of Commissioners.

## Implementation Timeline

Coordination of the Comprehensive Local Water Plan activities will commence with the County Board adoption of the Plan. These activities will be conducted throughout the planning period identified as April 1, 2003 through April 1, 2013. The Water Plan's Goals, Objectives and Action Steps, however, will need to by updated by April 1, 2008. This is due to the realization by Big Stone County and the Board of Water and Soil Resources that creating a ten-year implementation schedule is nearly impossible to accomplish. As a result, this Water Plan is a ten-year Plan with five-year action steps.

## Intergovernmental Conflicts

At this time, there are no known conflicts between the Big Stone County Comprehensive Local Water Plan, and the plans of other local units of government. In the event of an intergovernmental conflict, the Big Stone County Board of Commissioners shall request the Big Stone County Water Planning Committee to intervene and informally negotiate resolution of the conflict. If the Water Planning Committee does not resolve the conflict, the County shall petition the Board of Water and Soil Resources (BWSR) for a contested case hearing.

**Major Plan Amendment Procedure**

The Big Stone County Comprehensive Local Water Plan is intended to extend through April 1, 2013. The County may prepare proposed amendments to the Plan prior to this date, however, the Plan will be updated, including any proposed plan amendments, before April 1, 2013.

The following procedures will be used by Big Stone County to deal with proposed major amendments to the County Comprehensive Local Water Plan:

A. When issues are brought to the attention of the County with regard to the need for amendments to its adopted County Comprehensive Local Water Plan, the County will refer that person, group, local unit of government, or agency to the County's Water Planning Committee.

B. The Big Stone County Water Planning Committee will review the issue and may, if necessary, undertake studies or investigations to gather information relating to the issue. After reviewing the issue, the County Water Planning Committee will determine whether the County Comprehensive Local Water Plan should be amended.

C. If the County Water Planning Committee determines that the County Comprehensive Local Water Plan should be amended, it will make recommendations to the County Board. The County Board shall approve or disapprove the proposed amendment.

After development, but before final adoption by the County Board, a proposed amendment to the County Comprehensive Local Water Plan must be submitted for local review and comment in the following manner. The County must submit the proposed plan amendment to all local units of government wholly or partly within the County, the applicable regional development commission (if any), each contiguous county and watershed management organization, and other counties or watershed management organizations within the same watershed unit and groundwater system that may be affected by the proposed plan amendment.

A local unit of government must review the proposed amendment and its existing water and land-related land resources plan or official controls and in its comments describe in a general way, possible amendments to its existing plans or official control, and an estimate of the fiscal or policy effects that would be associated with those amendments, to bring them into conformance with the proposed plan amendment. A county or watershed management organization within the same watershed unit or groundwater system must review the proposed plan amendment and describe in its comments possible conflicts with its existing or proposed comprehensive water plan and suggest measures to resolve the conflicts. The Regional Development Commission must review the proposed amendment under Section 462.391, Subdivision 1.

Comments from local review must be submitted to the County Board within 60 days after receiving a proposed plan amendment for comment, unless the County Board determines that good cause exists for an extension of this period and grants an extension. The County Board must conduct a public hearing on the proposed plan amendment pursuant to Section 375.51 after the 60-day period for local review and comment is completed, but before it is submitted to the State.

After conducting the public hearing but before final adoption, the County Board must submit the proposed plan amendment, all written comments, a record of the public hearing, and a summary of changes incorporated in the proposed plan amendment as a result of the review process to the BWSR for review. The BWSR must complete the review within 90 days after receiving the proposed County Comprehensive Local Water Plan amendment and support document. The BWSR must consult with the Departments of Agriculture, Health, Natural Resources, Pollution Control, Planning Agency, Environmental Quality and other appropriate State agencies during the review.

The BWSR may disapprove a proposed County Comprehensive Local Water Plan amendment if it determined the amendment is not consistent with State law or the principles of sound hydrologic management, effective environmental protection and efficient management. If the amendment is disapproved, the BWSR must provide a written statement for its reasons for disapproval. The disapproved County Comprehensive Local Water Plan amendment must be revised by the County Board and resubmitted for approval by the BWSR within 120 days after receiving notice of disapproval, unless the BWSR extends the period for good cause. The decision of the BWSR to disapprove the amendment may be appealed by the county to District Court.

A County Board must adopt and begin implementation of its amended County Comprehensive Local Water Plan within 120 days after receiving notice of approval of the amendment from the BWSR.

**Minor Plan Amendment Procedure**

If a revision/amendment to the Big Stone County Comprehensive Local Water Plan is considered to be minor in nature, the following revision process will be followed:

A. The Big Stone County Board of Commissioners will receive a recommendation from the Big Stone County Water Planning Committee for an amendment to the Water Plan.

B. At the Board of Commissioners' meeting where the amendment is introduced, the County will hold a public hearing to explain the amendments and publish a legal notice of the hearing at least ten (10) days before the date of the hearing.

C. The County will send copies of the amendments to the BWSR Board Conservationist assigned to Big Stone County for review and comment.

**Incorporating Amendments into the Plan**

All amendments adopted by the County will be printed in the form of replacement pages for the Comprehensive Local Water Plan. Each page will show deleted text as stricken and new text as underlines on draft amendments, as needed, and include the effective date of the amendment. The County will maintain a distribution list of agencies and individuals who have received a copy of the Comprehensive Local Water Plan and the County shall distribute copies of the amendment(s) within thirty days of adoption.

**General Water Plan Information**

***For more information on Water Plan in general, contact the following:***

The Minnesota Board of Water and Soil Resources
One West Water Street, Suite 200
Saint Paul, MN 55107
(651) 296-3767; Fax (651) 297-5615; TTY (800) 627-3529
http://www.bwsr.state.mn.us/

***For more information on this Water Plan, contact the following:***

Big Stone County Environmental Services
20 SE 2nd Street
Ortonville, MN 56278
(320) 839-3136

# Appendix A:

# Census Profiles

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## Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic Area: Big Stone County, Minnesota

[For information on confidentiality protection, nonsampling error, and definitions, see text]

| Subject | Number | Percent |
|---|---|---|
| **Total population** | **5,820** | **100.0** |
| **SEX AND AGE** | | |
| Male | 2,824 | 48.5 |
| Female | 2,996 | 51.5 |
| Under 5 years | 277 | 4.8 |
| 5 to 9 years | 366 | 6.3 |
| 10 to 14 years | 474 | 8.1 |
| 15 to 19 years | 449 | 7.7 |
| 20 to 24 years | 190 | 3.3 |
| 25 to 34 years | 458 | 7.9 |
| 35 to 44 years | 818 | 14.1 |
| 45 to 54 years | 762 | 13.1 |
| 55 to 59 years | 302 | 5.2 |
| 60 to 64 years | 330 | 5.7 |
| 65 to 74 years | 639 | 11.0 |
| 75 to 84 years | 525 | 9.0 |
| 85 years and over | 230 | 4.0 |
| Median age (years) | 43.6 | (X) |
| 18 years and over | 4,374 | 75.2 |
| Male | 2,085 | 35.8 |
| Female | 2,289 | 39.3 |
| 21 years and over | 4,218 | 72.5 |
| 62 years and over | 1,588 | 27.3 |
| 65 years and over | 1,394 | 24.0 |
| Male | 586 | 10.1 |
| Female | 808 | 13.9 |
| **RACE** | | |
| One race | 5,800 | 99.7 |
| White | 5,729 | 98.4 |
| Black or African American | 10 | 0.2 |
| American Indian and Alaska Native | 30 | 0.5 |
| Asian | 24 | 0.4 |
| Asian Indian | 1 | - |
| Chinese | - | - |
| Filipino | 1 | - |
| Japanese | - | - |
| Korean | 6 | 0.1 |
| Vietnamese | 6 | 0.1 |
| Other Asian [1] | 10 | 0.2 |
| Native Hawaiian and Other Pacific Islander | - | - |
| Native Hawaiian | - | - |
| Guamanian or Chamorro | - | - |
| Samoan | - | - |
| Other Pacific Islander [2] | - | - |
| Some other race | 7 | 0.1 |
| Two or more races | 20 | 0.3 |
| ***Race alone or in combination with one or more other races:*** [3] | | |
| White | 5,746 | 98.7 |
| Black or African American | 15 | 0.3 |
| American Indian and Alaska Native | 43 | 0.7 |
| Asian | 26 | 0.4 |
| Native Hawaiian and Other Pacific Islander | - | - |
| Some other race | 11 | 0.2 |

| Subject | Number | Percent |
|---|---|---|
| **HISPANIC OR LATINO AND RACE** | | |
| **Total population** | **5,820** | **100.0** |
| Hispanic or Latino (of any race) | 20 | 0.3 |
| Mexican | 14 | 0.2 |
| Puerto Rican | - | - |
| Cuban | - | - |
| Other Hispanic or Latino | 6 | 0.1 |
| Not Hispanic or Latino | 5,800 | 99.7 |
| White alone | 5,719 | 98.3 |
| **RELATIONSHIP** | | |
| **Total population** | **5,820** | **100.0** |
| In households | 5,647 | 97.0 |
| Householder | 2,377 | 40.8 |
| Spouse | 1,416 | 24.3 |
| Child | 1,684 | 28.9 |
| Own child under 18 years | 1,419 | 24.4 |
| Other relatives | 72 | 1.2 |
| Under 18 years | 15 | 0.3 |
| Nonrelatives | 98 | 1.7 |
| Unmarried partner | 59 | 1.0 |
| In group quarters | 173 | 3.0 |
| Institutionalized population | 155 | 2.7 |
| Noninstitutionalized population | 18 | 0.3 |
| **HOUSEHOLD BY TYPE** | | |
| **Total households** | **2,377** | **100.0** |
| Family households (families) | 1,611 | 67.8 |
| With own children under 18 years | 689 | 29.0 |
| Married-couple family | 1,416 | 59.6 |
| With own children under 18 years | 564 | 23.7 |
| Female householder, no husband present | 125 | 5.3 |
| With own children under 18 years | 92 | 3.9 |
| Nonfamily households | 766 | 32.2 |
| Householder living alone | 719 | 30.2 |
| Householder 65 years and over | 401 | 16.9 |
| Households with individuals under 18 years | 699 | 29.4 |
| Households with individuals 65 years and over | 880 | 37.0 |
| Average household size | 2.38 | (X) |
| Average family size | 2.97 | (X) |
| **HOUSING OCCUPANCY** | | |
| **Total housing units** | **3,171** | **100.0** |
| Occupied housing units | 2,377 | 75.0 |
| Vacant housing units | 794 | 25.0 |
| For seasonal, recreational, or occasional use | 433 | 13.7 |
| Homeowner vacancy rate (percent) | 5.3 | (X) |
| Rental vacancy rate (percent) | 20.4 | (X) |
| **HOUSING TENURE** | | |
| **Occupied housing units** | **2,377** | **100.0** |
| Owner-occupied housing units | 2,022 | 85.1 |
| Renter-occupied housing units | 355 | 14.9 |
| Average household size of owner-occupied units | 2.44 | (X) |
| Average household size of renter-occupied units | 1.98 | (X) |

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

## Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: Big Stone County, Minnesota

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

| Subject | Number | Percent |
|---|---|---|
| **SCHOOL ENROLLMENT** | | |
| **Population 3 years and over enrolled in school** | **1,443** | **100.0** |
| Nursery school, preschool | 130 | 9.0 |
| Kindergarten | 75 | 5.2 |
| Elementary school (grades 1-8) | 696 | 48.2 |
| High school (grades 9-12) | 429 | 29.7 |
| College or graduate school | 113 | 7.8 |
| **EDUCATIONAL ATTAINMENT** | | |
| **Population 25 years and over** | **4,050** | **100.0** |
| Less than 9th grade | 467 | 11.5 |
| 9th to 12th grade, no diploma | 382 | 9.4 |
| High school graduate (includes equivalency) | 1,627 | 40.2 |
| Some college, no degree | 835 | 20.6 |
| Associate degree | 279 | 6.9 |
| Bachelor's degree | 344 | 8.5 |
| Graduate or professional degree | 116 | 2.9 |
| Percent high school graduate or higher | 79.0 | (X) |
| Percent bachelor's degree or higher | 11.4 | (X) |
| **MARITAL STATUS** | | |
| **Population 15 years and over** | **4,704** | **100.0** |
| Never married | 962 | 20.5 |
| Now married, except separated | 3,034 | 64.5 |
| Separated | 33 | 0.7 |
| Widowed | 431 | 9.2 |
| Female | 359 | 7.6 |
| Divorced | 244 | 5.2 |
| Female | 114 | 2.4 |
| **GRANDPARENTS AS CAREGIVERS** | | |
| **Grandparent living in household with one or more own grandchildren under 18 years** | **2** | **100.0** |
| Grandparent responsible for grandchildren | 2 | 100.0 |
| **VETERAN STATUS** | | |
| **Civilian population 18 years and over** | **4,371** | **100.0** |
| Civilian veterans | 594 | 13.6 |
| **DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION** | | |
| **Population 5 to 20 years** | **1,341** | **100.0** |
| With a disability | 97 | 7.2 |
| **Population 21 to 64 years** | **2,798** | **100.0** |
| With a disability | 432 | 15.4 |
| Percent employed | 54.2 | (X) |
| No disability | 2,366 | 84.6 |
| Percent employed | 81.6 | (X) |
| **Population 65 years and over** | **1,266** | **100.0** |
| With a disability | 485 | 38.3 |
| **RESIDENCE IN 1995** | | |
| **Population 5 years and over** | **5,551** | **100.0** |
| Same house in 1995 | 4,156 | 74.9 |
| Different house in the U.S. in 1995 | 1,380 | 24.9 |
| Same county | 726 | 13.1 |
| Different county | 654 | 11.8 |
| Same state | 404 | 7.3 |
| Different state | 250 | 4.5 |
| Elsewhere in 1995 | 15 | 0.3 |

| Subject | Number | Percent |
|---|---|---|
| **NATIVITY AND PLACE OF BIRTH** | | |
| **Total population** | **5,820** | **100.0** |
| Native | 5,774 | 99.2 |
| Born in United States | 5,764 | 99.0 |
| State of residence | 4,545 | 78.1 |
| Different state | 1,219 | 20.9 |
| Born outside United States | 10 | 0.2 |
| Foreign born | 46 | 0.8 |
| Entered 1990 to March 2000 | 12 | 0.2 |
| Naturalized citizen | 26 | 0.4 |
| Not a citizen | 20 | 0.3 |
| **REGION OF BIRTH OF FOREIGN BORN** | | |
| **Total (excluding born at sea)** | **46** | **100.0** |
| Europe | 24 | 52.2 |
| Asia | 3 | 6.5 |
| Africa | - | - |
| Oceania | - | - |
| Latin America | 6 | 13.0 |
| Northern America | 13 | 28.3 |
| **LANGUAGE SPOKEN AT HOME** | | |
| **Population 5 years and over** | **5,551** | **100.0** |
| English only | 5,289 | 95.3 |
| Language other than English | 262 | 4.7 |
| Speak English less than "very well" | 135 | 2.4 |
| Spanish | 49 | 0.9 |
| Speak English less than "very well" | 19 | 0.3 |
| Other Indo-European languages | 199 | 3.6 |
| Speak English less than "very well" | 112 | 2.0 |
| Asian and Pacific Island languages | 8 | 0.1 |
| Speak English less than "very well" | 4 | 0.1 |
| **ANCESTRY (single or multiple)** | | |
| **Total population** | **5,820** | **100.0** |
| *Total ancestries reported* | *7,071* | *121.5* |
| Arab | - | - |
| Czech[1] | 100 | 1.7 |
| Danish | 133 | 2.3 |
| Dutch | 136 | 2.3 |
| English | 227 | 3.9 |
| French (except Basque)[1] | 139 | 2.4 |
| French Canadian[1] | 44 | 0.8 |
| German | 2,858 | 49.1 |
| Greek | - | - |
| Hungarian | 2 | - |
| Irish[1] | 544 | 9.3 |
| Italian | 26 | 0.4 |
| Lithuanian | - | - |
| Norwegian | 1,387 | 23.8 |
| Polish | 141 | 2.4 |
| Portuguese | 5 | 0.1 |
| Russian | 20 | 0.3 |
| Scotch-Irish | 33 | 0.6 |
| Scottish | 23 | 0.4 |
| Slovak | 2 | - |
| Subsaharan African | - | - |
| Swedish | 663 | 11.4 |
| Swiss | 37 | 0.6 |
| Ukrainian | 2 | - |
| United States or American | 228 | 3.9 |
| Welsh | 20 | 0.3 |
| West Indian (excluding Hispanic groups) | - | - |
| Other ancestries | 301 | 5.2 |

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

## Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: Big Stone County, Minnesota

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

| Subject | Number | Percent |
|---|---|---|
| **EMPLOYMENT STATUS** | | |
| **Population 16 years and over** | **4,612** | **100.0** |
| In labor force | 2,657 | 57.6 |
| Civilian labor force | 2,657 | 57.6 |
| Employed | 2,517 | 54.6 |
| Unemployed | 140 | 3.0 |
| Percent of civilian labor force | 5.3 | (X) |
| Armed Forces | - | - |
| Not in labor force | 1,955 | 42.4 |
| **Females 16 years and over** | **2,411** | **100.0** |
| In labor force | 1,240 | 51.4 |
| Civilian labor force | 1,240 | 51.4 |
| Employed | 1,192 | 49.4 |
| **Own children under 6 years** | **341** | **100.0** |
| All parents in family in labor force | 220 | 64.5 |
| **COMMUTING TO WORK** | | |
| **Workers 16 years and over** | **2,457** | **100.0** |
| Car, truck, or van - - drove alone | 1,769 | 72.0 |
| Car, truck, or van - - carpooled | 272 | 11.1 |
| Public transportation (including taxicab) | 12 | 0.5 |
| Walked | 158 | 6.4 |
| Other means | 12 | 0.5 |
| Worked at home | 234 | 9.5 |
| Mean travel time to work (minutes)[1] | 15.7 | (X) |
| **Employed civilian population 16 years and over** | **2,517** | **100.0** |
| **OCCUPATION** | | |
| Management, professional, and related occupations | 852 | 33.8 |
| Service occupations | 443 | 17.6 |
| Sales and office occupations | 523 | 20.8 |
| Farming, fishing, and forestry occupations | 52 | 2.1 |
| Construction, extraction, and maintenance occupations | 284 | 11.3 |
| Production, transportation, and material moving occupations | 363 | 14.4 |
| **INDUSTRY** | | |
| Agriculture, forestry, fishing and hunting, and mining | 338 | 13.4 |
| Construction | 176 | 7.0 |
| Manufacturing | 153 | 6.1 |
| Wholesale trade | 154 | 6.1 |
| Retail trade | 242 | 9.6 |
| Transportation and warehousing, and utilities | 155 | 6.2 |
| Information | 48 | 1.9 |
| Finance, insurance, real estate, and rental and leasing | 109 | 4.3 |
| Professional, scientific, management, administrative, and waste management services | 76 | 3.0 |
| Educational, health and social services | 682 | 27.1 |
| Arts, entertainment, recreation, accommodation and food services | 127 | 5.0 |
| Other services (except public administration) | 140 | 5.6 |
| Public administration | 117 | 4.6 |
| **CLASS OF WORKER** | | |
| Private wage and salary workers | 1,582 | 62.9 |
| Government workers | 425 | 16.9 |
| Self-employed workers in own not incorporated business | 496 | 19.7 |
| Unpaid family workers | 14 | 0.6 |

| Subject | Number | Percent |
|---|---|---|
| **INCOME IN 1999** | | |
| **Households** | **2,407** | **100.0** |
| Less than $10,000 | 297 | 12.3 |
| $10,000 to $14,999 | 211 | 8.8 |
| $15,000 to $24,999 | 430 | 17.9 |
| $25,000 to $34,999 | 452 | 18.8 |
| $35,000 to $49,999 | 500 | 20.8 |
| $50,000 to $74,999 | 350 | 14.5 |
| $75,000 to $99,999 | 95 | 3.9 |
| $100,000 to $149,999 | 46 | 1.9 |
| $150,000 to $199,999 | 17 | 0.7 |
| $200,000 or more | 9 | 0.4 |
| Median household income (dollars) | 30,721 | (X) |
| With earnings | 1,681 | 69.8 |
| Mean earnings (dollars)[1] | 35,766 | (X) |
| With Social Security income | 992 | 41.2 |
| Mean Social Security income (dollars)[1] | 10,142 | (X) |
| With Supplemental Security Income | 112 | 4.7 |
| Mean Supplemental Security Income (dollars)[1] | 5,787 | (X) |
| With public assistance income | 114 | 4.7 |
| Mean public assistance income (dollars)[1] | 2,193 | (X) |
| With retirement income | 298 | 12.4 |
| Mean retirement income (dollars)[1] | 26,516 | (X) |
| **Families** | **1,641** | **100.0** |
| Less than $10,000 | 98 | 6.0 |
| $10,000 to $14,999 | 85 | 5.2 |
| $15,000 to $24,999 | 242 | 14.7 |
| $25,000 to $34,999 | 307 | 18.7 |
| $35,000 to $49,999 | 427 | 26.0 |
| $50,000 to $74,999 | 325 | 19.8 |
| $75,000 to $99,999 | 89 | 5.4 |
| $100,000 to $149,999 | 45 | 2.7 |
| $150,000 to $199,999 | 14 | 0.9 |
| $200,000 or more | 9 | 0.5 |
| Median family income (dollars) | 37,354 | (X) |
| Per capita income (dollars)[1] | 15,708 | (X) |
| ***Median earnings (dollars):*** | | |
| Male full-time, year-round workers | 27,857 | (X) |
| Female full-time, year-round workers | 20,123 | (X) |

| Subject | Number below poverty level | Percent below poverty level |
|---|---|---|
| **POVERTY STATUS IN 1999** | | |
| **Families** | **128** | **7.8** |
| With related children under 18 years | 86 | 12.2 |
| With related children under 5 years | 31 | 15.2 |
| **Families with female householder, no husband present** | **44** | **31.0** |
| With related children under 18 years | 39 | 34.5 |
| With related children under 5 years | 15 | 51.7 |
| **Individuals** | **681** | **12.0** |
| 18 years and over | 463 | 11.0 |
| 65 years and over | 112 | 8.8 |
| Related children under 18 years | 207 | 14.5 |
| Related children 5 to 17 years | 170 | 14.6 |
| Unrelated individuals 15 years and over | 228 | 26.1 |

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

## Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: Big Stone County, Minnesota

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

| Subject | Number | Percent |
|---|---|---|
| **Total housing units** | **3,171** | **100.0** |
| **UNITS IN STRUCTURE** | | |
| 1-unit, detached | 2,579 | 81.3 |
| 1-unit, attached | 45 | 1.4 |
| 2 units | 61 | 1.9 |
| 3 or 4 units | 25 | 0.8 |
| 5 to 9 units | 68 | 2.1 |
| 10 to 19 units | 69 | 2.2 |
| 20 or more units | 72 | 2.3 |
| Mobile home | 240 | 7.6 |
| Boat, RV, van, etc | 12 | 0.4 |
| **YEAR STRUCTURE BUILT** | | |
| 1999 to March 2000 | 32 | 1.0 |
| 1995 to 1998 | 89 | 2.8 |
| 1990 to 1994 | 119 | 3.8 |
| 1980 to 1989 | 201 | 6.3 |
| 1970 to 1979 | 483 | 15.2 |
| 1960 to 1969 | 309 | 9.7 |
| 1940 to 1959 | 740 | 23.3 |
| 1939 or earlier | 1,198 | 37.8 |
| **ROOMS** | | |
| 1 room | 38 | 1.2 |
| 2 rooms | 94 | 3.0 |
| 3 rooms | 290 | 9.1 |
| 4 rooms | 481 | 15.2 |
| 5 rooms | 536 | 16.9 |
| 6 rooms | 543 | 17.1 |
| 7 rooms | 424 | 13.4 |
| 8 rooms | 375 | 11.8 |
| 9 or more rooms | 390 | 12.3 |
| Median (rooms) | 5.8 | (X) |
| **Occupied housing units** | **2,377** | **100.0** |
| **YEAR HOUSEHOLDER MOVED INTO UNIT** | | |
| 1999 to March 2000 | 242 | 10.2 |
| 1995 to 1998 | 441 | 18.6 |
| 1990 to 1994 | 408 | 17.2 |
| 1980 to 1989 | 448 | 18.8 |
| 1970 to 1979 | 388 | 16.3 |
| 1969 or earlier | 450 | 18.9 |
| **VEHICLES AVAILABLE** | | |
| None | 195 | 8.2 |
| 1 | 711 | 29.9 |
| 2 | 965 | 40.6 |
| 3 or more | 506 | 21.3 |
| **HOUSE HEATING FUEL** | | |
| Utility gas | 524 | 22.0 |
| Bottled, tank, or LP gas | 870 | 36.6 |
| Electricity | 461 | 19.4 |
| Fuel oil, kerosene, etc | 436 | 18.3 |
| Coal or coke | 22 | 0.9 |
| Wood | 41 | 1.7 |
| Solar energy | - | - |
| Other fuel | 11 | 0.5 |
| No fuel used | 12 | 0.5 |
| **SELECTED CHARACTERISTICS** | | |
| Lacking complete plumbing facilities | 8 | 0.3 |
| Lacking complete kitchen facilities | 41 | 1.7 |
| No telephone service | 37 | 1.6 |

| Subject | Number | Percent |
|---|---|---|
| **OCCUPANTS PER ROOM** | | |
| **Occupied housing units** | **2,377** | **100.0** |
| 1.00 or less | 2,353 | 99.0 |
| 1.01 to 1.50 | 20 | 0.8 |
| 1.51 or more | 4 | 0.2 |
| **Specified owner-occupied units** | **1,445** | **100.0** |
| **VALUE** | | |
| Less than $50,000 | 853 | 59.0 |
| $50,000 to $99,999 | 461 | 31.9 |
| $100,000 to $149,999 | 78 | 5.4 |
| $150,000 to $199,999 | 24 | 1.7 |
| $200,000 to $299,999 | 14 | 1.0 |
| $300,000 to $499,999 | 15 | 1.0 |
| $500,000 to $999,999 | - | - |
| $1,000,000 or more | - | - |
| Median (dollars) | 41,900 | (X) |
| **MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS** | | |
| With a mortgage | 662 | 45.8 |
| Less than $300 | 21 | 1.5 |
| $300 to $499 | 207 | 14.3 |
| $500 to $699 | 241 | 16.7 |
| $700 to $999 | 130 | 9.0 |
| $1,000 to $1,499 | 33 | 2.3 |
| $1,500 to $1,999 | 23 | 1.6 |
| $2,000 or more | 7 | 0.5 |
| Median (dollars) | 580 | (X) |
| Not mortgaged | 783 | 54.2 |
| Median (dollars) | 220 | (X) |
| **SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999** | | |
| Less than 15.0 percent | 777 | 53.8 |
| 15.0 to 19.9 percent | 224 | 15.5 |
| 20.0 to 24.9 percent | 148 | 10.2 |
| 25.0 to 29.9 percent | 85 | 5.9 |
| 30.0 to 34.9 percent | 57 | 3.9 |
| 35.0 percent or more | 137 | 9.5 |
| Not computed | 17 | 1.2 |
| **Specified renter-occupied units** | **314** | **100.0** |
| **GROSS RENT** | | |
| Less than $200 | 106 | 33.8 |
| $200 to $299 | 65 | 20.7 |
| $300 to $499 | 83 | 26.4 |
| $500 to $749 | 5 | 1.6 |
| $750 to $999 | 6 | 1.9 |
| $1,000 to $1,499 | - | - |
| $1,500 or more | - | - |
| No cash rent | 49 | 15.6 |
| Median (dollars) | 231 | (X) |
| **GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999** | | |
| Less than 15.0 percent | 93 | 29.6 |
| 15.0 to 19.9 percent | 27 | 8.6 |
| 20.0 to 24.9 percent | 45 | 14.3 |
| 25.0 to 29.9 percent | 28 | 8.9 |
| 30.0 to 34.9 percent | 20 | 6.4 |
| 35.0 percent or more | 50 | 15.9 |
| Not computed | 51 | 16.2 |

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

# Appendix B:

# DNR Water Appropriation Permits

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# WATER APPROPRIATION PERMIT INDEX KEY

Minnesota DNR Water Appropriation permits are required for withdrawals greater than 10,000 gallons per day or one million gallons per year.

## Use Codes

**WATERWORKS**
211. Municipal
212. Private waterworks (trailer courts, small housing units)
213. Commercial and Institutional (business, industry, hospital)
214. Cooperative waterworks
215. Fire protection
216. Campgrounds, waysides, highway rest areas
217. Rural Water Districts
219. Waterworks

**POWER GENERATION**
221. Hydro power
222. Steam power cooling-once through
223. Steam power cooling-wet tower
224. Steam power cooling-ponds
225. Steam power-other than cooling
226. Nuclear power plant
229. Power generation

**AIR CONDITIONING**
231. Commercial building A/C
232. Institutions (school, hospital)
233. Heat pumps
234. Coolant pumps
235. District heating/cooling
239. Once-through heating or A/C
238. Air conditioning

**INDUSTRIAL**
241. Agricultural processing (food & livestock)
242. Pulp and paper processing
243. Mine processing (not sand & gravel washing)
244. Sand and gravel washing
245. Sewage treatment
246. Petroleum-chemical processing, ethanol
247. Metal processing
248. Non-metallic processing (rubber, plastic, glass)
249. Industrial processing

**TEMPORARY** (12 months or less)
251. Construction (non-dewatering)
252. Construction (dewatering)
253. Pipeline & tank testing
254. Landscape watering
255. Pollution containment
256. Water level maintenance
257. Livestock waste treatment
258. Temporary ag irrigation
259. Temporary

**WATER LEVEL MAINTENANCE**
261. Basin (lake) level
262. Mine dewatering
263. Quarry dewatering
264. Sand/gravel pit dewatering
265. Tile drainage and pumped sumps
266. Dewatering
269. Water level maintenance

**SPECIAL CATEGORIES**
271. Pollution containment
272. Aquaculture (hatcheries, fisheries)
273. Snow making
274. Peat fire control
275. Livestock watering
276. Pipeline and tank testing
279. Special Categories

**NON-CROP IRRIGATION**
281. Golf course
282. Cemetery
283. Landscaping/athletic fields
284. Sod farm
285. Nursery
286. Orchard
289. Non-crop irrigation

**MAJOR CROP IRRIGATION**
290. Major crop irrigation
296. Wild rice irrigation

* indicates Multi-Use Permits

### Resource Codes
1 - Ground Water
2 - Lake
3 - Stream/River
4 - Ditch
5 - Dug Pit/Holding Pond
6 - Quarry/Mine/Gravel Pit
7 - Wetland

### Status Codes
1 - Active
2 - Standby
3 - Abandoned
4 - Terminated

### Fee Codes
E - Exempt from Fees
N - Non-Profit

### County Codes

| | | |
|---|---|---|
| 1 Aitkin | 30 Isanti | 59 Pipestone |
| 2 Anoka | 31 Itasca | 60 Polk |
| 3 Becker | 32 Jackson | 61 Pope |
| 4 Beltrami | 33 Kanabec | 62 Ramsey |
| 5 Benton | 34 Kandiyohi | 63 Red Lake |
| 6 Big Stone | 35 Kittson | 64 Redwood |
| 7 Blue Earth | 36 Koochiching | 65 Renville |
| 8 Brown | 37 Lac Qui Parle | 66 Rice |
| 9 Carlton | 38 Lake | 67 Rock |
| 10 Carver | 39 Lake of the Woods | 68 Roseau |
| 11 Cass | 40 Le Sueur | 69 St. Louis |
| 12 Chippewa | 41 Lincoln | 70 Scott |
| 13 Chisago | 42 Lyon | 71 Sherburne |
| 14 Clay | 43 McLeod | 72 Sibley |
| 15 Clearwater | 44 Mahnomen | 73 Stearns |
| 16 Cook | 45 Marshall | 74 Steele |
| 17 Cottonwood | 46 Martin | 75 Stevens |
| 18 Crow Wing | 47 Meeker | 76 Swift |
| 19 Dakota | 48 Mille Lacs | 77 Todd |
| 20 Dodge | 49 Morrison | 78 Traverse |
| 21 Douglas | 50 Mower | 79 Wabasha |
| 22 Faribault | 51 Murray | 80 Wadena |
| 23 Fillmore | 52 Nicollet | 81 Waseca |
| 24 Freeborn | 53 Nobles | 82 Washington |
| 25 Goodhue | 54 Norman | 83 Watonwan |
| 26 Grant | 55 Olmsted | 84 Wilkin |
| 27 Hennepin | 56 Otter Tail | 85 Winona |
| 28 Houston | 57 Pennington | 86 Wright |
| 29 Hubbard | 58 Pine | 87 Yellow Medicine |

## Big Stone County

| Permit # | Inst | Permittee | Use | CO | Twp | Rng | Sec | QQQQ | Water shed | Well Unique | Resource Code/Name | Permitted Acres | Permitted GPM | Permitted MG/Y | Reported Pumping 1997 | Reported Pumping 1998 | Reported Pumping 1999 | Reported Pumping 2000 | Reported Pumping 2001 | Stat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 764089 | - 1 | MEYER JR, LEONARD | 290 | 6 | 120 | 44 | 1 | CACC | 22 | 107364 | 1 QBAA | 235 | 1,000 | 78.3 | 17.5 | 0.3 | 22.7 | 25.9 | 28.3 | 1 |
| 844140 | - 1 | CORRELL, CITY OF | 211 | 6 | 120 | 44 | 3 | BCD | 22 | 214061 | 1 QBAA | | 120 | 3.0 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 1 |
| 894190 | - 1 | KOECKERITZ, CAROL | 290 | 6 | 120 | 44 | 12 | DAB | 22 | 454041 | 1 QBAA | 130 | 800 | 42.3 | | 7.4 | 4.8 | 3.6 | 4.6 | 1 |
| 764420 | - 1 | ROLFSMEIER, DERALD | 290 | 6 | 121 | 44 | 35 | ADDD | 22 | 131715 | 1 QBAA | 160 | 1,000 | 64.1 | 24.7 | 19.7 | 32.1 | 20.8 | 25.8 | 1 |
| 754271 | - 1 | WINGER, ROBERT | 290 | 6 | 121 | 44 | 35 | DCBB | 22 | 121534 | 1 QBAA | 200 | 1,000 | 65.0 | 4.0 | 8.0 | 13.2 | 10.4 | 17.5 | 1 |
| 701324 | - 1 | SCHIRM, KEITH | 290 | 6 | 121 | 44 | 36 | ACAA | 22 | 214222 | 1 QBAA | 160 | 1,000 | 53.0 | 2.4 | 4.8 | 7.8 | 14.4 | 18.2 | 1 |
| 774257 | - 4 | ODESSA, CITY OF | 211 | 6 | 121 | 45 | 29 | ADA | 22 | 583078 | 1 QWTA | | 400 | 11.0 | 3.0 | 3.8 | 5.8 | 2.0 | 1.7 | 1 |
| 774257 | - 3 | ODESSA, CITY OF | 211 | 6 | 121 | 45 | 29 | ADAA | 22 | 102890 | 1 QWTA | | 400 | 11.0 | 3.0 | 3.8 | 5.8 | 2.0 | 1.7 | 1 |
| 774163 | - 1 | ORTONVILLE, CITY OF | 281 | 6 | 121 | 46 | 4 | B | 22 | | 2 BIG STONE LAKE | 70 | 300 | 26.0 | 8.9 | 13.1 | 12.2 | 16.2 | 11.5 | 1 |
| 814165 | - 6 | ORTONVILLE, CITY OF | 211 | 6 | 121 | 46 | 16 | BCAB | 22 | 233057 | 1 QBAA | | 1,320 | 175.0 | 60.6 | 67.2 | 79.2 | 58.7 | 63.8 | 1 |
| 814165 | - 7 | ORTONVILLE, CITY OF | 211 | 6 | 121 | 46 | 16 | BCAB | 22 | 233067 | 1 QBAA | | 1,320 | 175.0 | 38.1 | 47.3 | 39.7 | 53.7 | 57.2 | 1 |
| 764024 | - 1 | ORTONVILLE STONE CO | 244 | 6 | 121 | 46 | 26 | D | 22 | | 3 MINNESOTA | | 400 | 4.6 | | | | | | 1 |
| 884241 | - 1 | BENTSEN LAKE INC | 296 | 6 | 122 | 46 | 12 | ABA | 22 | | 2 BENTSEN LAKE | | 750 | 4.2 | | | | | | 1 |
| 904114 | - 1 | BENTSEN LAKE INC | 241 | 6 | 122 | 46 | 12 | BAD | 22 | | 2 BENTSEN LAKE | | 2,100 | 38.1 | | | | | | 1 |
| 560373 | - 1 | DRAGT, DENNIS D | 286 | 6 | 122 | 46 | 32 | | 22 | | 2 BIG STONE LAKE | 27 | 400 | 4.4 | | | | | | 1 |
| 774558 | - 1 | ANDERSON, CURTIS | 290 | 6 | 122 | 47 | 4 | BBCB | 22 | 132369 | 1 QBAA | 80 | 600 | 26.6 | | | | | | 1 |
| 844122 | - 1 | CLINTON, CITY OF | 211 | 6 | 123 | 46 | 16 | D | 22 | 240650 | 1 QBAA | | 500 | 26.0 | | 19.7 | 20.9 | 23.6 | 18.6 | 1 |
| 844122 | - 2 | CLINTON, CITY OF | 211 | 6 | 123 | 46 | 16 | D | 22 | 240651 | 1 QBAA | | 500 | 26.0 | 24.6 | | | | | 1 |
| 784118 | - 1 | KVATUM, EDWIN | 290 | 6 | 123 | 48 | 16 | ADB | 22 | 133067 | 1 QBAA | 160 | 1,000 | 64.1 | 19.4 | 15.8 | | 10.8 | 7.2 | 1 |
| 864024 | - 1 | JOHNSON, VILLAGE OF | 211 | 6 | 124 | 45 | 3 | CDCB | 55 | 174429 | 1 KRET | | 80 | 2.0 | 0.3 | 0.4 | 0.3 | 0.2 | 0.3 | 1 |
| 844126 | - 1 | GRACEVILLE, CITY OF | 211 | 6 | 124 | 46 | 9 | AAB | 55 | 240770 | 1 QBAA | | 200 | 34.0 | 28.5 | 27.0 | 20.0 | | | 1 |
| 844126 | - 2 | GRACEVILLE, CITY OF | 211 | 6 | 124 | 46 | 9 | AAB | 55 | 194405 | 1 QBAA | | 200 | 34.0 | | | | 24.1 | 23.4 | 1 |
| 834052 | - 1 | GRACEVILLE GOLF CLUB | 281 | 6 | 124 | 46 | 16 | ACC | 55 | | 1 | 10 | 250 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 |
| 914140 | - 1 | GRACEVILLE GOLF CLUB | 281 | 6 | 124 | 46 | 16 | BDD | 55 | 444468 | 1 KRET | 25 | 50 | 8.0 | | | | | | 1 |
| 894097 | - 1 | BIG STONE HUTTERIAN BRETHREN | 290 | 6 | 124 | 46 | 30 | AAC | 55 | | 2 LAKE LEO | 35 | 300 | 11.4 | 1.0 | 1.2 | | | | 1 |
| 954273 | - 1 | KLEINDL, MARK | 256 | 6 | 124 | 47 | 15 | | 55 | | 7 | | 2,000 | 125.0 | 38.2 | 25.7 | | | | 1 |
| 874117 | - 1 | BEARDSLEY, CITY OF | 211 | 6 | 124 | 48 | 17 | ABB | 22 | 214056 | 1 QBAA | | 120 | 18.4 | 12.0 | 12.0 | 12.0 | 13.8 | 18.0 | 1 |
| 834132 | - 1 | HOLTZ, DARRELL | 290 | 6 | 124 | 48 | 17 | CDC | 22 | 150522 | 1 | 155 | 800 | 62.1 | 17.0 | 28.8 | 27.4 | 22.8 | 33.1 | 1 |
| 994205 | - 1 | KELLEN, KENNETH | 275 | 6 | 124 | 48 | 22 | DCD | 22 | 517058 | 1 QBAA | | 40 | 3.7 | | | | | | 1 |
| 784156 | - 1 | MINNERS, LEONARD | 290 | 6 | 124 | 48 | 29 | BDDD | 22 | 133089 | 1 KRET | 425 | 1,800 | 138.0 | 113.1 | 86.0 | 64.3 | 48.3 | 93.9 | 1 |
| 844084 | - 1 | DIEKMAN, DONALD | 290 | 6 | 124 | 48 | 33 | CBD | 22 | 181196 | 1 | 280 | 1,000 | 115.0 | 47.4 | 38.4 | 37.4 | 34.5 | 48.1 | 1 |

# Appendix C:

# Conservation Lands Summary

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# CONSERVATION LANDS SUMMARY

**BWSR Prepared: 8/13/02**

***Note: Shaded areas indicate CREP counties.**

| COUNTY | CRP ACRES | CONTINUOUS CRP ACRES | CREP ACRES | RIM | RIM WRP | WRP | TOTAL RESOURCE ACRES | CROPLAND ACRES | PERCENT ENROLLED | OTHER DATA: USF&W EASEMENTS/ ACQUISITIONS | OTHER DATA: DNR WMA | OTHER DATA: DNR PARKS | OTHER DATA: COUNTY SIZE TOTAL ACRES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AITKIN | 131.9 | 360.8 | 0.0 | 61.8 | 0.0 | 0.0 | 554.5 | 77,034.8 | 0.7% | 69.86 | 52,458.00 | 15,516.00 | 1,275,757 |
| ANOKA | 160.2 | 204.3 | 0.0 | 0.0 | 0.0 | 0.0 | 364.5 | 44,632.9 | 0.8% | 0.00 | 17,458.00 | 0.00 | 285,069 |
| BECKER | 30,149.4 | 2,425.5 | 0.0 | 135.4 | 0.0 | 80.0 | 32,790.3 | 307,783.7 | 10.7% | 13,051.33 | 6,650.00 | 4,026.43 | 925,043 |
| BELTRAMI | 17,863.1 | 158.0 | 0.0 | 206.5 | 0.0 | 0.0 | 18,227.6 | 143,724.5 | 12.7% | 0.00 | 192,509.00 | 1,783.49 | 1,954,893 |
| BENTON | 804.7 | 1,135.9 | 0.0 | 423.2 | 0.0 | 0.0 | 2,363.8 | 133,396.9 | 1.8% | 0.00 | 1,945.00 | 0.00 | 264,211 |
| BIG STONE | 6,536.8 | 1,567.2 | 712.9 | 567.9 | 20.6 | 536.5 | 9,941.9 | 251,987.0 | 3.9% | 18,427.81 | 10,454.00 | 1,111.18 | 338,272 |
| BLUE EARTH | 6,242.9 | 2,445.3 | 5,546.2 | 486.3 | 291.3 | 675.6 | 15,687.6 | 392,239.0 | 4.0% | 1,025.63 | 4,354.00 | 2,759.80 | 489,715 |
| BROWN | 7,489.0 | 2,888.1 | 4,730.8 | 885.9 | 0.0 | 606.0 | 16,599.8 | 335,790.0 | 4.9% | 0.00 | 2,769.00 | 833.88 | 395,590 |
| CARLTON | 274.1 | 210.3 | 0.0 | 0.0 | 0.0 | 0.0 | 484.4 | 52,479.7 | 0.9% | 0.00 | 3,659.00 | 10,304.96 | 559,738 |
| CARVER | 2,003.6 | 318.0 | 261.5 | 535.7 | 23.6 | 162.2 | 3,304.6 | 137,077.9 | 2.4% | 219.00 | 772.00 | 472.50 | 240,442 |
| CASS | 668.2 | 59.0 | 0.0 | 53.3 | 0.0 | 0.0 | 780.5 | 80,935.2 | 1.0% | 43.00 | 18,338.00 | 654.27 | 1,544,115 |
| CHIPPEWA | 7,637.4 | 3,978.1 | 7,704.0 | 1,156.1 | 149.7 | 133.0 | 20,758.3 | 326,760.0 | 6.4% | 283.70 | 11,361.00 | 0.32 | 376,390 |
| CHISAGO | 615.9 | 211.2 | 0.0 | 59.6 | 0.0 | 0.0 | 886.7 | 97,257.4 | 0.9% | 0.00 | 8,951.00 | 7,664.74 | 283,021 |
| CLAY | 40,744.1 | 2,566.3 | 0.0 | 1,526.3 | 0.0 | 0.0 | 44,836.7 | 524,605.4 | 8.5% | 13,679.31 | 6,102.00 | 1,308.42 | 674,342 |
| CLEARWATER | 9,667.5 | 593.1 | 0.0 | 251.5 | 150.9 | 0.0 | 10,663.0 | 125,931.3 | 8.5% | 843.00 | 4,652.00 | 24,177.09 | 658,995 |
| COTTONWOOD | 8,299.4 | 2,573.9 | 3,079.2 | 1,267.6 | 65.0 | 48.0 | 15,333.1 | 360,943.0 | 4.2% | 3,137.45 | 6,287.00 | 0.00 | 415,027 |
| CROW WING | 612.7 | 40.7 | 0.0 | 0.0 | 0.0 | 0.0 | 653.4 | 60,183.3 | 1.1% | 0.00 | 4,755.00 | 6,211.78 | 739,776 |
| DAKOTA | 1,763.1 | 2,116.1 | 0.0 | 93.1 | 0.0 | 0.0 | 3,972.3 | 207,049.0 | 1.9% | 73.95 | 3,350.00 | 2,530.97 | 374,970 |
| DODGE | 2,175.9 | 1,318.8 | 0.0 | 45.4 | 0.0 | 0.0 | 3,540.1 | 226,715.9 | 1.6% | 0.00 | 754.00 | 310.64 | 281,152 |
| DOUGLAS | 30,390.7 | 1,588.0 | 2,449.8 | 1,184.6 | 23.6 | 22.3 | 35,659.0 | 236,375.0 | 15.1% | 15,634.81 | 4,449.00 | 1,291.41 | 460,928 |
| FARIBAULT | 2,620.6 | 1,048.0 | 3,859.8 | 868.6 | 0.0 | 41.0 | 8,438.0 | 415,041.0 | 2.0% | 938.77 | 2,889.00 | 0.00 | 461,613 |
| FILLMORE | 15,424.1 | 2,362.4 | 0.0 | 296.3 | 0.0 | 0.0 | 18,082.8 | 346,876.0 | 5.2% | 0.00 | 1,641.00 | 3,072.32 | 551,443 |
| FREEBORN | 6,432.0 | 4,232.1 | 638.9 | 491.7 | 1,539.6 | 1,221.7 | 14,556.0 | 390,339.0 | 3.7% | 1,775.25 | 1,485.00 | 1,617.37 | 461,946 |
| GOODHUE | 8,052.9 | 1,151.1 | 0.0 | 805.4 | 0.0 | 0.0 | 10,009.4 | 305,255.3 | 3.3% | 0.00 | 4,349.00 | 2,854.78 | 499,078 |
| GRANT | 14,148.3 | 11,821.5 | 417.2 | 633.2 | 0.0 | 114.7 | 27,134.9 | 293,726.0 | 9.2% | 13,498.93 | 3,539.00 | 0.00 | 368,557 |
| HENNEPIN | 724.8 | 356.0 | 0.0 | 158.9 | 0.0 | 4.0 | 1,243.7 | 58,618.2 | 2.1% | 0.00 | 67.00 | 915.73 | 388,090 |
| HOUSTON | 15,087.2 | 1,252.9 | 0.0 | 1,459.6 | 0.0 | 161.0 | 17,960.7 | 149,239.1 | 12.0% | 0.00 | 346.00 | 1,224.08 | 363,930 |
| HUBBARD | 1,980.1 | 228.9 | 0.0 | 0.0 | 0.0 | 0.0 | 2,209.0 | 80,716.7 | 2.7% | 0.00 | 3,927.00 | 5,031.24 | 639,514 |
| ISANTI | 812.0 | 207.8 | 0.0 | 63.5 | 0.0 | 0.0 | 1,083.3 | 106,567.7 | 1.0% | 0.00 | 4,915.00 | 0.00 | 288,723 |
| ITASCA | 711.9 | 308.8 | 0.0 | 0.0 | 0.0 | 0.0 | 1,020.7 | 30,959.4 | 3.3% | 0.00 | 8,996.00 | 4,684.65 | 1,872,320 |
| JACKSON | 5,448.3 | 2,364.1 | 490.1 | 1,446.9 | 52.6 | 249.2 | 10,051.2 | 397,517.0 | 2.5% | 3,978.47 | 5,051.00 | 551.68 | 460,250 |
| KANABEC | 180.2 | 148.5 | 0.0 | 181.2 | 0.0 | 0.0 | 509.9 | 71,727.1 | 0.7% | 0.00 | 9,421.00 | 0.00 | 341,274 |
| KANDIYOHI | 31,451.7 | 2,749.8 | 3,379.2 | 2,991.5 | 88.7 | 50.8 | 40,711.7 | 377,217.0 | 10.8% | 17,425.42 | 3,409.00 | 3,233.40 | 551,859 |
| KITTSON | 96,286.5 | 5,764.5 | 0.0 | 379.2 | 0.0 | 0.0 | 102,430.2 | 468,948.4 | 21.8% | 0.00 | 56,024.00 | 3,751.30 | 706,925 |
| KOOCHICHING | 57.9 | 55.9 | 0.0 | 0.0 | 893.1 | 0.0 | 1,006.9 | 41,861.3 | 2.4% | 0.00 | 1,014.00 | 87.14 | 2,017,005 |
| LAC QUI PARLE | 25,098.9 | 4,955.1 | 8,259.4 | 966.3 | 64.9 | 0.0 | 39,344.6 | 410,614.0 | 9.6% | 5,563.69 | 20,941.00 | 752.40 | 498,310 |
| LAKE of the WOODS | 3,664.3 | 262.0 | 0.0 | 0.0 | 0.0 | 202.8 | 4,129.1 | 90,825.5 | 4.5% | 0.00 | 158,429.00 | 3,604.10 | 1,138,938 |
| LE SUEUR | 11,565.2 | 3,417.4 | 1,099.5 | 1,207.0 | 170.8 | 60.0 | 17,519.9 | 210,106.0 | 8.3% | 452.24 | 3,141.00 | 382.51 | 303,008 |
| LINCOLN | 32,580.4 | 4,158.1 | 3,132.7 | 496.5 | 55.2 | 0.0 | 40,422.9 | 278,292.0 | 14.5% | 1,147.18 | 8,476.00 | 0.00 | 351,283 |
| LYON | 13,475.5 | 2,500.0 | 4,823.6 | 1,075.1 | 164.2 | 0.0 | 22,038.4 | 387,950.0 | 5.7% | 1,834.36 | 9,524.00 | 2,235.53 | 462,067 |
| MCLEOD | 1,767.4 | 1,779.1 | 860.8 | 647.2 | 130.3 | 0.0 | 5,184.8 | 255,423.0 | 2.0% | 1,690.93 | 2,709.00 | 0.00 | 323,347 |
| MAHNOMEN | 22,172.7 | 1,585.3 | 0.0 | 0.0 | 0.0 | 0.0 | 23,758.0 | 160,028.8 | 14.8% | 10,346.33 | 10,142.00 | 0.00 | 373,523 |
| MARSHALL | 202,854.3 | 2,352.1 | 0.0 | 422.9 | 118.4 | 829.0 | 206,576.7 | 806,892.8 | 25.6% | 0.00 | 114,496.00 | 404.40 | 1,161,043 |
| MARTIN | 2,405.5 | 781.7 | 3,893.8 | 655.8 | 117.9 | 0.0 | 7,854.7 | 411,001.0 | 1.9% | 263.65 | 2,547.00 | 0.00 | 466,598 |
| MEEKER | 13,618.5 | 2,086.7 | 0.0 | 1,538.1 | 242.3 | 0.0 | 17,485.6 | 277,071.1 | 6.3% | 6,906.82 | 2,657.00 | 0.00 | 412,467 |
| MILLE LACS | 330.6 | 405.3 | 0.0 | 295.4 | 0.0 | 0.0 | 1,031.3 | 86,682.7 | 1.2% | 0.00 | 36,590.00 | 11,798.85 | 435,718 |
| MORRISON | 4,881.2 | 1,474.6 | 0.0 | 871.6 | 0.0 | 0.0 | 7,227.4 | 237,828.8 | 3.0% | 0.00 | 5,615.00 | 776.89 | 737,760 |
| MOWER | 405.2 | 3,303.8 | 0.0 | 808.1 | 427.4 | 131.5 | 5,076.0 | 381,563.5 | 1.3% | 0.00 | 1,603.00 | 1,188.62 | 454,995 |
| MURRAY | 13,141.4 | 5,104.6 | 2,539.6 | 572.6 | 0.0 | 0.0 | 21,358.2 | 388,780.0 | 5.5% | 1,302.18 | 8,661.00 | 998.65 | 460,659 |
| NICOLLET | 1,841.4 | 2,040.1 | 1,107.0 | 1,798.9 | 100.7 | 1,080.9 | 7,969.0 | 234,169.0 | 3.4% | 0.00 | 4,392.00 | 470.58 | 298,528 |
| NOBLES | 1,986.2 | 4,346.6 | 0.0 | 224.0 | 0.0 | 0.0 | 6,556.8 | 399,175.8 | 1.6% | 547.65 | 3,712.00 | 0.00 | 462,630 |
| NORMAN | 45,936.0 | 3,039.8 | 0.0 | 1,115.7 | 0.0 | 0.0 | 50,091.5 | 481,471.4 | 10.4% | 1,120.00 | 6,189.00 | 0.00 | 561,574 |
| OLMSTED | 13,490.8 | 627.0 | 0.0 | 201.3 | 47.9 | 0.0 | 14,367.0 | 253,019.3 | 5.7% | 0.00 | 3,231.00 | 0.00 | 418,726 |
| OTTER TAIL | 67,672.9 | 12,028.5 | 708.5 | 850.4 | 95.4 | 418.8 | 81,774.5 | 630,658.7 | 13.0% | 33,679.73 | 11,681.00 | 13,095.72 | 1,423,923 |

| COUNTY | CRP ACRES | CONTINUOUS CRP ACRES | CREP ACRES | RIM | RIM WRP | WRP | TOTAL RESOURCE ACRES | CROPLAND ACRES | PERCENT ENROLLED | OTHER DATA: USF&W EASEMENTS/ ACQUISITIONS | OTHER DATA: DNR WMA | OTHER DATA: DNR PARKS | OTHER DATA: COUNTY SIZE TOTAL ACRES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PENNINGTON | 76,020.8 | 1,257.5 | 0.0 | 38.0 | 0.0 | 0.0 | 77,316.3 | 302,391.9 | 25.6% | 0.00 | 3,229.00 | 0.00 | 395,629 |
| PINE | 133.7 | 158.5 | 0.0 | 0.0 | 0.0 | 0.0 | 292.2 | 129,121.2 | 0.2% | 0.00 | 2,888.00 | 41,436.19 | 917,133 |
| PIPESTONE | 8,270.4 | 4,101.2 | 217.3 | 401.1 | 0.0 | 0.0 | 12,990.0 | 242,801.0 | 5.4% | 0.00 | 2,101.00 | 230.12 | 298,515 |
| POLK | 149,427.5 | 3,137.4 | 0.0 | 304.4 | 0.0 | 7,357.1 | 160,226.4 | 1,000,145.9 | 16.0% | 13,281.15 | 21,198.00 | 0.00 | 1,279,437 |
| POPE | 31,695.9 | 3,180.4 | 4,833.8 | 2,456.7 | 389.1 | 2.3 | 42,558.2 | 285,591.0 | 14.9% | 21,677.19 | 3,136.00 | 2,459.03 | 458,938 |
| RED LAKE | 47,290.3 | 283.2 | 0.0 | 232.9 | 0.0 | 0.0 | 47,806.4 | 205,985.9 | 23.2% | 0.00 | 2,264.00 | 0.00 | 277,184 |
| REDWOOD | 9,711.7 | 2,340.1 | 7,615.4 | 3,838.0 | 242.0 | 28.0 | 23,775.2 | 510,646.0 | 4.7% | 0.00 | 4,966.00 | 0.00 | 564,173 |
| RENVILLE | 6,948.2 | 1,850.1 | 8,838.4 | 4,325.0 | 327.4 | 684.3 | 22,973.4 | 575,177.0 | 4.0% | 982.80 | 1,234.00 | 117.33 | 631,718 |
| RICE | 14,110.1 | 1,342.9 | 0.0 | 1,060.9 | 202.3 | 339.0 | 17,055.2 | 224,642.0 | 7.6% | 634.24 | 2,569.00 | 3,255.42 | 329,901 |
| ROCK | 530.3 | 1,081.9 | 0.0 | 464.5 | 0.0 | 0.0 | 2,076.7 | 257,380.9 | 0.8% | 11.00 | 487.00 | 1,830.98 | 309,146 |
| ROSEAU | 132,846.4 | 856.1 | 0.0 | 34.0 | 0.0 | 91.0 | 133,827.5 | 549,220.0 | 24.4% | 0.00 | 94,051.00 | 2,957.44 | 1,074,125 |
| ST. LOUIS | 265.9 | 72.8 | 0.0 | 0.0 | 0.0 | 0.0 | 338.7 | 61,532.8 | 0.6% | 0.00 | 5,514.00 | 9,762.65 | 4,312,019 |
| SCOTT | 1,945.7 | 849.8 | 118.2 | 780.3 | 0.0 | 23.0 | 3,717.0 | 105,357.4 | 3.5% | 204.21 | 1,768.00 | 4,459.08 | 235,501 |
| SHERBURNE | 709.0 | 540.1 | 0.0 | 0.0 | 0.0 | 51.0 | 1,300.1 | 93,107.0 | 1.4% | 0.00 | 1,086.00 | 0.00 | 288,256 |
| SIBLEY | 1,868.2 | 1,263.8 | 953.4 | 1,260.8 | 13.3 | 218.7 | 5,578.2 | 323,296.0 | 1.7% | 965.40 | 1,662.00 | 822.54 | 384,128 |
| STEARNS | 27,715.8 | 3,934.6 | 0.0 | 735.7 | 0.0 | 211.4 | 32,597.5 | 511,176.8 | 6.4% | 10,518.01 | 5,027.00 | 0.00 | 889,248 |
| STEELE | 5,996.8 | 3,540.4 | 211.7 | 1,126.0 | 863.4 | 389.3 | 12,127.6 | 231,158.0 | 5.2% | 460.11 | 1,650.00 | 1,436.30 | 276,467 |
| STEVENS | 8,430.7 | 5,594.2 | 984.4 | 1,160.9 | 0.0 | 20.0 | 16,190.2 | 315,465.0 | 5.1% | 10,783.01 | 2,675.00 | 0.00 | 368,346 |
| SWIFT | 25,376.4 | 6,471.5 | 6,095.2 | 1,503.0 | 0.0 | 519.8 | 39,965.9 | 400,611.0 | 10.0% | 9,445.99 | 9,363.00 | 214.85 | 481,440 |
| TODD | 14,958.9 | 1,142.0 | 0.0 | 55.8 | 38.5 | 0.0 | 16,195.2 | 272,395.9 | 5.9% | 818.85 | 9,502.00 | 0.00 | 626,752 |
| TRAVERSE | 2,728.6 | 9,022.7 | 721.4 | 321.5 | 372.6 | 0.0 | 13,166.8 | 335,488.0 | 3.9% | 5,250.00 | 1,209.00 | 0.00 | 375,277 |
| WABASHA | 9,070.7 | 425.5 | 0.0 | 777.2 | 0.0 | 0.0 | 10,273.4 | 183,650.9 | 5.6% | 0.00 | 6,085.00 | 211.11 | 351,360 |
| WADENA | 2,739.1 | 1,673.4 | 0.0 | 218.8 | 0.0 | 0.0 | 4,631.3 | 113,085.2 | 4.1% | 0.00 | 5,087.00 | 0.00 | 347,597 |
| WASECA | 4,828.3 | 3,004.4 | 1,895.6 | 723.0 | 95.0 | 0.0 | 10,546.3 | 235,099.0 | 4.5% | 0.00 | 2,088.00 | 0.00 | 276,934 |
| WASHINGTON | 709.4 | 39.3 | 0.0 | 20.6 | 0.0 | 0.0 | 769.3 | 68,738.4 | 1.1% | 0.00 | 1,873.00 | 3,867.36 | 270,637 |
| WATONWAN | 2,810.0 | 1,746.2 | 2,750.2 | 577.8 | 56.1 | 0.0 | 7,940.3 | 251,650.0 | 3.2% | 225.07 | 1,284.00 | 0.00 | 281,242 |
| WILKIN | 12,695.5 | 2,288.3 | 0.0 | 443.6 | 0.0 | 337.9 | 15,765.3 | 407,405.9 | 3.9% | 2,505.43 | 5,510.00 | 0.00 | 481,178 |
| WINONA | 8,228.1 | 820.1 | 0.0 | 354.5 | 10.1 | 0.0 | 9,412.8 | 186,347.5 | 5.1% | 0.00 | 22,706.00 | 7,060.60 | 410,310 |
| WRIGHT | 5,796.8 | 1,035.8 | 0.0 | 674.4 | 0.0 | 79.0 | 7,586.0 | 220,989.5 | 3.4% | 2,938.42 | 4,245.00 | 1,760.50 | 457,171 |
| YELLOW MEDICINE | 14,629.2 | 7,170.5 | 5,622.9 | 1,554.0 | 0.0 | 62.0 | 29,038.6 | 424,077.0 | 6.8% | 1,194.67 | 5,087.00 | 1,358.43 | 488,646 |
| **STATE TOTAL** | **1,481,025.9** | **187,283.4** | **100,552.4** | **57,906.5** | **7,643.9** | **17,242.8** | **1,851,654.9** | **23,062,798.6** | **8.0%** | **250,856.00** | **1,115,380.00** | **226,929.75** | **51,393,478** |

Prepared: 8/13/02/2002

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FSA Date: 06/30/02

BWSR Date: 7/10 /2002