# Vermillion River Watershed Joint Powers Organization

## Watershed Plan

November, 2005

Vermillion River Watershed Joint Powers Organization
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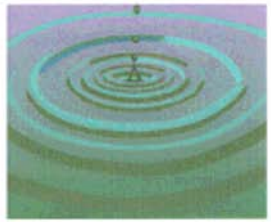

**Date:** **January 26, 2006**

**To:** **State and Federal Agencies, City and Townships in the Watershed, Other Parties that provided input to the Plan**

**Subject:** **Vermillion River Watershed Joint Powers Organization Plan Distribution**

On behalf of the Vermillion River Watershed Joint Powers Board (JPB), we are pleased to announce the approval and adoption of the *Vermillion River Watershed Joint Powers Organization Watershed Plan* (Plan). The Plan was prepared in accordance with Minnesota Statute 103B.231, and Minnesota Rules 8410. The Minnesota Board of Water and Soil Resources (BWSR) approved the Plan on October 26, 2005, and the JPB adopted the Plan on November 3, 2005.

Enclosed is a copy of the Plan on CD. You are entitled to one paper copy of the Plan. There will be a $40 charge for additional paper copies. If you would like a paper copy, please return the enclosed post card indicating the number of copies you want, or contact Dee Jarvis at 952.891.7032 or via email at dee.jarvis@co.dakota.mn.us. You will be invoiced when additional copies of the Plan are mailed. The entire Plan will also be posted to the Vermillion River Watershed web site at http://www.co.dakota.mn.us. If you need further assistance obtaining the plan, please call 952.891.7000.

Thank you for your support of the Vermillion River Watershed!

Sincerely,

Joseph A. Harris, Chair

Bob Vogel, Vice Chair

Paul Krause, Secretary/Treasurer

# Vermillion River Watershed Joint Powers Organization

# Watershed Management Plan

Approved by: The Minnesota Board of Water and Soil Resources on
**October 26, 2005**

Adopted by: The Vermillion River Watershed Joint Powers Board on
**November 3, 2005**

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The Vermillion River Watershed Planning Commission was instrumental in the development of this draft Plan.



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If you need further assistance in obtaining a copy of the plan, please call 952.891.7000.

# Table of Contents

## Table of Contents (continued)

## List of Figures

Page

## List of Figures (continued) Page

## List of Figures (continued)



## List of Tables

## List of Tables (continued) Page

This Plan was prepared under the guidance of the Vermillion River Watershed Joint Powers Board and the Vermillion River Watershed Planning Commission.

## Joint Powers Board Members:

Dakota County Commissioner Joseph Harris, Chair
Scott County Commissioner Bob Vogel, Vice Chair
Dakota County Commissioner Paul Krause, Secretary/Treasurer

## Watershed Planning Commission Members:

| 2004 Members | 2005 Members |
|---|---|
| Hank Tressel, Chair | Henry Zweber, Chair |
| Henry Zweber, Vice Chair | Kevin Chamberlain, Vice Chair |
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| Kevin Chamberlain | Christy Fogarty |
| Terry Holmes | Terry Holmes |
| David Luick | David Luick |
| Gerald Ristow | Dave Moran |
| Faith Siebenaler | Michael Kennedy |

## Acronym Glossary

| | | | |
|---|---|---|---|
| BMP | Best Management Practice | MDA | Minnesota Department of Agriculture |
| BWSR | Minnesota Board of Water and Soil Resources | MDH | Minnesota Department of Health |
| CAMP | Citizen-assisted lake monitoring program | MGS | Minnesota Geological Survey |
| CIP | Capital improvements program | MDNR | Minnesota Department of Natural Resources |
| CLMP | Citizen Lake Monitoring Program | MPCA | Minnesota Pollution Control Agency |
| COE | U.S. Army Corps of Engineers | MUSA | Metropolitan Urban Service Area |
| CREP | Conservation Reserve Enhancement Program | NFIP | National Flood Insurance Program |
| CRP | Conservation Reserve Program | NPDES | National Pollutant Discharge Elimination System |
| CSMP | Citizen Stream Monitoring Program | NRBG | Natural Resources Block Grant |
| CTP | Cooperating Technical Partners | NRCS | Natural Resource Conservation Service |
| DEM | Digital Elevation Model | NWI | National Wetland Inventory |
| DFIRM | Digital Flood Insurance Rate Map | OHWL | Ordinary High Water Level |
| EAW | Environmental Assessment Worksheet | PCB | Polychlorinated Biphenyl |
| EIS | Environmental Impact Statement | PWI | Protected Waters Inventory |
| EPA | U.S. Environmental Protection Agency | PWP | Permanent Wetland Preserve Program |
| FCA | Fish Consumption Advisory | RFPE | Regulatory Flood Protection Elevation |
| FEMA | Federal Emergency Management Agency | RIM | Re-Invest In Minnesota |
| FIRM | Flood Insurance Rate Maps | RMP | Resource Management Plan |
| HANS | Hastings Area Nitrate Study | SMSC | Shakopee Mdewakanton Sioux Community |
| ISTS | Individual Sewage Treatment System | SWCD | Soil and Water Conservation District |
| LID | Low Impact Development | SWPPP | Storm Water Pollution Prevention Plans |
| LGU | Local Government Unit | TAG | Technical Advisory Group |
| LWP | Local Water Plan | TMDL | Total Maximum Daily Load |
| MCES | Metropolitan Council Environmental Services | USDA | United States Department of Agriculture |
| USFWS | United States Fish and Wildlife Service | | |
| USGS | United Stated Geological Survey | | |

| | | | |
|---|---|---|---|
| UST | Underground storage tank | | |
| WCA | Wetland Conservation Act | | |
| WD | Watershed District | | |
| WHEP | Wetland Health Evaluation | | |
| WHPA | Wellhead Protection Areas | | |
| WMO | Watershed Management Organization | | |
| WWTP | Wastewater treatment plant | | |

# EXECUTIVE SUMMARY

This Vermillion River Watershed Management Plan (Plan) describes how the Vermillion River Watershed Joint Powers Organization (VRWJPO) will address activities in the Metropolitan Area's largest watershed. This Plan is intended as a guide to be used over the next ten years (until 2015). This Plan strives to integrate stakeholder needs with VRWJPO capabilities, while recognizing Vermillion River Watershed (Watershed) physical characteristics. It was a challenging planning exercise, because the ideas, wants and needs of local citizens and governments are as diverse as the land uses within the Watershed and the issues facing it. Many of the issues that can impact a watershed are evident in this Watershed, including: rapid suburban growth; intensely worked agricultural land; water quality impairments; designated trout stream areas; and high levels of nitrates in the groundwater.

The Executive Summary provides a history of the Watershed, lists basic Watershed statistics, describes the planning process, identifies organizational purposes, defines Plan terms, highlights priority Watershed issues, and identifies VRWJPO goals. Data and information from a variety of studies and assessments of the Watershed are discussed in this Plan; and, additional information is included as appendices. Additionally, the Plan provides an extensive set of maps illustrating numerous Watershed features.

## Vermillion River Watershed Location and History

The Watershed is located in the southwest part of the Twin Cities Metropolitan Area, encompassing 335 square miles in central Dakota County and extreme southeast Scott County. The headwaters of the Vermillion River (River) are located in New Market Township in Scott County. From there, the River flows northeast through central Dakota County to the City of Hastings where the River drops 90 feet at a falls. East of Hastings, the river splits: one branch flows north to the Mississippi River; the other branch flows south, paralleling the Mississippi River for 20 miles through Ravenna and Welch Townships before joining the Mississippi River near the City of Red Wing in Goodhue County. The Vermillion is the only river in Minnesota that has mouths that flow both north and south. There is a 420-foot elevation change between the source and the mouth of the Vermillion River. Table ES.1 provides some basic Watershed statistics.

| Table ES.1: General Vermillion River Watershed Information | |
|---|---|
| Area: | 335 square miles |
| Stream Length: | 38 miles (Main Branch) |
| Tributary to: | Mississippi River |
| Land Use: | Agricultural, with suburban areas and small urban growth centers |
| Number of Communities: | 21 |
| Number of Counties: | 2 |
| Trout Designation: | About 49 stream miles (main stem & tributaries) |

The Vermillion River, often referred to as a "prairie river," is a relatively slow flowing river that winds its way through alternating rural agricultural and developing suburban areas, through cultivated fields and pasture lands, forested areas and suburban backyards. The Vermillion River supports a naturally reproducing population of trout. A portion of the main branch of the river and some of its tributaries, beginning in the southeast corner of Lakeville and central Eureka Township and stretching east through Farmington and Empire Township to a

point just east of Highway 52 in Vermillion Township, have been designated as trout streams by the Minnesota Department of Natural Resources.

Although the Vermillion River is healthy enough to support trout, the U.S. Environmental Protection Agency lists it as impaired for high levels of fecal coliform bacteria from the headwaters to the falls in Hastings. This stretch of the river is also high in nitrates. Downstream of the falls, the Vermillion River is listed as impaired due to high turbidity (cloudiness), PCBs and mercury.

**Table ES.2: Communities wholly or partly within the Watershed:**

Apple Valley, City of
Burnsville, City of
Castle Rock Township
Coates, City of
Douglas Township
Elko, City of
Empire Township
Eureka Township
Farmington, City of
Hampton, City of
Hampton Township
Hastings, City of
Lakeville, City of
Marshan Township
New Market, City of
New Market Township
Nininger Township
Ravenna Township
Rosemount, City of
Vermilion, City of
Vermillion Township

All or part of 21 cities and townships are included in the Watershed area (Table ES.2). In 1984, these 21 communities signed a Joint Powers Agreement to manage the Watershed. In August 2000, the original watershed management organization dissolved and Dakota and Scott Counties became statutorily responsible for managing the Watershed.

The VRWJPO is administered through a Joint Powers Agreement (JPA) signed by Dakota and Scott Counties in September 2002. The JPA allows for a three-member Joint Powers Board composed of two Dakota County Commissioners and one Scott County Commissioner.

A nine-member, citizen advisory Watershed Planning Commission supports the Joint Powers Board, and was instrumental in the development of this Plan, as was a long list of local, State and federal agency and organization representatives who were involved in providing comments throughout the Plan drafting process (Table ES.3). Citizens were invited to participate in the Plan development process via the VRWJPO website and public meetings.

**Table ES.3: Regional, State and Federal Agencies and Organizations Involved in Plan Development:**

Dakota County Environmental Mgmt. Dept.
Dakota Co. Soil & Water Conservation Dist.
Elko/New Market Joint Sewer Board
Friends of the Mississippi River
Metropolitan Council
MN Board of Water and Soil Resources
MN Dept. of Agriculture
MN Dept. of Health
MN Dept. of Natural Resources
MN Dept. of Transportation
MN Farm Bureau
MN Pollution Control Agency
Natural Resource Conservation Service
Scott County Natural Resources Dept.
Scott Co. Soil & Water Conservation Dist.
Sierra Club

Dakota and Scott Counties jointly fund the administration and activities of the VRWJPO. Based on tax capacity, Dakota County contributes 96.5% and Scott County contributes 3.5% of total VRWJPO management costs. Dakota County and Scott Counties established special tax districts within their portions of the Watershed to provide the primary mechanism for funding their shares of the VRWJPO's costs.

## Watershed Management Purposes

The Metropolitan Surface Water Management Act states that the purposes of watershed management organizations and water management programs are (Minn. Stat. Chapter 103B.201) to:

1. Protect, preserve, and use natural surface and groundwater storage and retention systems.
2. Minimize public capital expenditures needed to correct flooding and water quality problems.
3. Identify and plan for means to effectively protect and improve surface and groundwater quality.
4. Establish more uniform local policies and official controls for surface and groundwater management.
5. Prevent erosion of soil into surface water systems.
6. Promote groundwater recharge.
7. Protect and enhance fish and wildlife habitat and water recreational facilities.
8. Secure the other benefits associated with the proper management of surface and groundwater.

In 1992, the Board of Water and Soil Resources (BWSR) developed rules (Minnesota Rules Chapter 8410) for the content of watershed management plans. The rules require, among other items, more specificity in citizen participation, control of erosion and sedimentation, wetland assessment, and the design of new storm water conveyance, ponding, and treatment systems. The rules also require the establishment of the necessary authorities to ensure implementation of programs.

## Watershed Management Plan Term Definitions

Certain terms used in a variety of plan documents can be confusing because they are used differently from document to document. For the purposes of this Plan, the following Plan terms have the meanings indicated in Table ES.4.

**Table ES.4: Vermillion River Watershed Management Plan Term Definitions**

| **Terms** | **Definitions/Explanations** | **Examples (see Plan for specific information)** |
|---|---|---|
| Issue (problem) | *"a point, matter, or question to be disputed or decided"*<br>An issue is an identified problem or concern that exists in the Watershed. | Water quality: Vermillion River water quality is impaired. |
| Goal (achieved outcome) | *"an objective or end that one strives to attain"*<br>A goal is what the VRWJPO wants to ultimately | Improve Vermillion River water quality such that the River is removed from the MPCA's impaired waters list. |

| | | |
|---|---|---|
| | achieve long-term in addressing Watershed issues. The JPO's goals should be stated in a format that indicates a measurable outcome. | The impaired waters list is based on the exceedence of certain water quality thresholds, which is what makes this a measurable goal. |
| Policy (supporting or underlying philosophy) | *"a principle, plan or course of action, as pursued by a government, organization, individual, etc."*<br>A policy should express the JPO's philosophy about certain watershed management concepts. What does the VRWJPO support; what does the VRWJPO value? | The VRWJPO supports research-based projects to improve river water quality.<br>The VRWJPO supports surface water quality improvement as a means to improve groundwater quality. |
| Objective (measurable outcome) | *"real; actual;… designating a kind of test;… something aimed at or striven for"*<br>Answers the question: "How are we going to measure our goal?" | Reduce fecal coliform bacteria levels in river water by 25%.<br>This objective is more specific than the goal and the percentage provides the measure of success. |
| Action (strategy or activity) | *"the doing of something; an act or thing done"*<br>An action should be an actual activity, something specific the VRWJPO intends to do to achieve its goals and objectives, and address its issues. | Adopt riparian vegetation standards that require buffers along the main channel of the River, specified tributaries, lakes, ponds and wetlands in the Watershed.<br>Distribute non-point source pollution brochures to landowners living on waterbodies in the Watershed. |
| Standards | "*something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value, quality, etc."*<br>A standard is used to set a level of excellence, protection or attainment; it is used as a measure of adequacy. | Vegetative buffers will be maintained adjacent to high quality wetlands. |
| Rules | *"an authoritative regulation for action, method, procedure, arrangement, etc. …. a complete set of code or regulations."*<br>The legal language or framework used to apply and enforce standards. | A stormwater management plan and a permit are required for land disturbing activities that include more than one acre of impervious surface. |

## Watershed Issues

As stated in Table ES.4, Watershed issues are problems or concerns that have been identified that need attention and the implementation of corrective measures. Eight Watershed issues are addressed throughout this Plan, accompanied by background data and information (see Section 3):

- River flow volumes have increased
- Surface water quality is threatened or impaired
- Vermillion River channel/corridor is impacted and sensitive to change
- Sensitive resources are present and/or threatened or impaired
- Groundwater quality is threatened or impaired
- Additional development is expected
- Data for making informed decisions is limited
- Public awareness about water resources in the Watershed and appropriate stewardship is limited.

## Watershed Goals

There are eight goal areas identified in Section 4 of this Plan. The goal areas are not designed to specifically match the eight issues identified above; however, the VRWJPO intends to address the issues by achieving a combination of the goals and objectives in the Plan. Table ES.5 is the list of Plan goals:

| **Table ES.5: Vermillion River Watershed Joint Powers Organization Goals** |
|---|
| Surface Water Quantity: Manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the Watershed. |
| Surface Water Quality: Protect and enhance surface water quality in the Vermillion River Watershed. |
| Open Space and Recreational Uses: Develop or improve recreational, fish and wildlife, and open space areas in conjunction with water quality improvement projects. |
| Wetlands and Habitat:<br>• Maintain and enhance, where possible, the functions and values of existing wetlands and habitats within the Watershed.<br>• Promote the restoration and/or creation of wetlands. |
| Groundwater: Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes. |
| Land Use Management: Protect and conserve water resources by promoting sustainable growth, integrated land use and land use planning, rural land conservation methods that reduce non-point sources of pollution from agricultural lands, and water resource management. |
| Floodplains: Manage and protect the floodplains of the Watershed from encroachment. |
| Education: Offer programs, educational opportunities, and information that facilitate an understanding of watershed principles. |

## Watershed Standards and Rules

Minnesota Statutes Chapter 103B.211 gives the VRWJPO the authority of a watershed district, under Minnesota Statutes Chapter 103D.341 to regulate the use and development of land in the Vermillion River Watershed, when one or more of the following conditions exist:

- A local government does not have an approved and adopted local water management plan, or has not adopted the implementation program described in the plan;
- A permit application to a local government would require an amendment or variance from the adopted local water management plan or implementation program; and/or
- The local government has authorized the VRWJPO to require permits for the use and development of land within its jurisdiction.

The VRWJPO will ensure this Plan's implementation by establishing standards and adopting them as a minor amendment to this Plan. The standards are a primary performance/objective/outcome mechanism for Plan implementation. The VRWJPO will also develop rules, which are the legal language/framework to apply and enforce the standards. The main reasons for the VRWJPO to develop standards and rules are to:

- Establish standards for incorporation into local ordinances;
- Form the basis for oversight of local ordinance implementation;
- Administer a watershed permitting program;
- Establish criteria for approval of local plans; and
- Form the basis for watershed-based NPDES general or individual permits.

Through this Plan and amendments, the VRWJPO Joint Powers Board (JPB) will decide how extensive the VRWJPO's regulatory function will be. The VRWJPO will implement a consultative decision-making process to develop standards and rules, using consultation with other entities, but with final decisions made by the JPB.

The VRWJPO can develop performance-based and/or prescriptive-based standards. Performance-based standards/rules specify an outcome. For example, 60% phosphorus removal will be achieved. How this standard is achieved is not specified, and can vary based on individual factors in individual municipalities. Prescriptive-based standards/rules prescribe the activities designed to achieve an outcome. For example, water quality treatment ponds will be installed according to NURP criteria. This standard establishes how an outcome will be achieved through a specific type of design – there is no choice regarding how the outcome will be achieved.

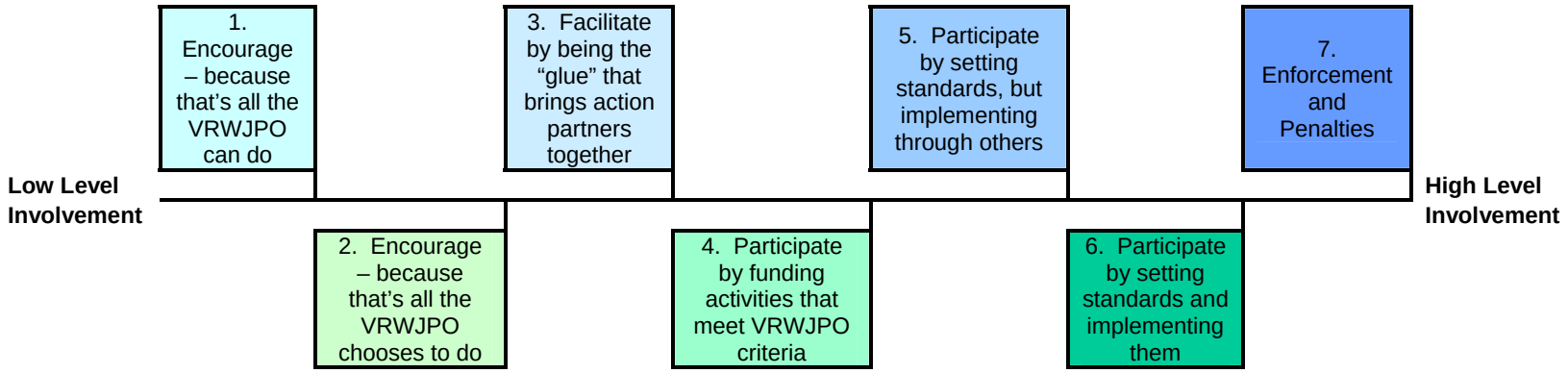
The standards and rules adopted by the VRWJPO will apply to local governments. Local governments will need to adopt local plans with equivalent rules, programs or ordinances within two years of the VRWJPO Plan adoption. The term "equivalent" will be defined early in the standards development process. Local government rules, programs, and ordinances can be more restrictive than the

VRWJPO standards and rules. The standards and rules will also apply to landowners, developers, industries, and local transportation authorities via permits for new development, redevelopment, and other land disturbing activities.

Standards

The VRWJPO can adopt varying levels of standards, depending on JPB decisions regarding desired levels of regulatory function and the importance of implementing various portions of this Plan. The Standards Continuum (Figure ES.1) shows the standards approaches available to the JPB.

**Figure ES.1: Watershed Standards Continuum**




The points along the standards continuum are fairly self-explanatory; however, additional detail is provided here:

1. Examples of where the VRWJPO would not have authority include: Federal and State projects, endangered and threatened species, and wildlife game harvest limits.
2. Examples of areas where the VRWJPO would likely defer to other government entities include: floodplain and sewage treatment permitting, landfill operations, and feedlot permitting.
3. The VRWJPO could provide the "glue" to bring other entities together by facilitating groups that would develop educational efforts, local stormwater plan contents, grant applications, and research.
4. Funding options for the VRWJPO to provide for certain Watershed activities including: easements, cost-share on projects, loans and matching funds.
5. The VRWJPO could set standards that would be implemented by other entities (e.g., cities, townships, Dakota and Scott Counties), including: standards for runoff rate, volume, infiltration, and thermal thresholds; buffers; and low impact development practices.

6. Implementation by the VRWJPO where other entities do not have the authority to implement a standard, do not have the capacity to implement the standard, refuse to implement the standard, or it makes more sense for the VRWJPO to implement the standard.
7. Enforcement would require developing a process for the VRWJPO to provide oversight of other entities' implementation decisions and oversight of Watershed-specific requirements. The VRWJPO would conduct periodic audits and selected decision reviews, and be responsible for permits, site inspections and fees. Penalties would focus on the consequences of not complying with VRWJPO standards and rules, and could include: civil fines, increased fees, criminal proceedings, and moratoriums.

The VRWJPO anticipates establishing a variety of standards. General standards may be needed for administrative processes, technical criteria, financial controls and enforcement procedures. The VRWJPO will strive to make these and all other standards understandable, achievable, adaptable and enforceable. The framework for developing the standards will include a review of current goals, objectives and policies; identification of current rules and regulations; identification of gaps; and development of a framework and philosophy related to current standards and identified gaps.

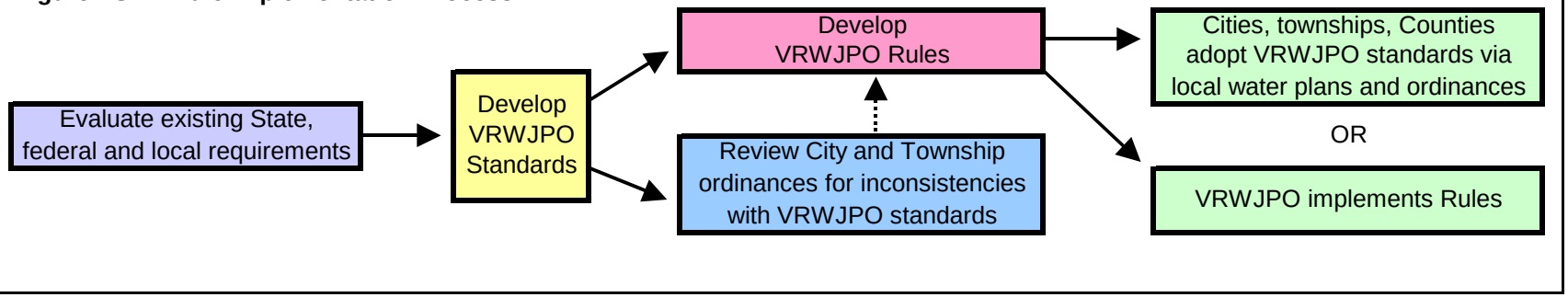
Rules

The general structure of the Watershed rules will include: policies, regulations, criteria, exhibits, maintenance provisions and exceptions. The following is a typical outline of rules:

Policy statement
Relationship w/local governments and State/federal programs
A. Definitions
B. Procedural requirements
C. General standards
D. Stormwater management
E. Erosion and sediment control
F. Floodplain alteration
G. Wetlands
H. Bridge and culvert crossings
I. Drainage alterations
J. Groundwater
K. Security
L. Variances
M. Appeals
N. Enforcement
O. Fees

Figure ES.2 is a flow chart illustrating the VRWJPO process of rule implementation.

**Figure ES.2: Rule Implementation Process**




The JPB may adopt rules following a public notice and hearing. The rules must be submitted to the Minnesota Board of Water and Soil Resources (BWSR) for review and comment. The BWSR's review is considered advisory. The VRWJPO must publish a notice of hearings and adopted rules in one or more legal newspapers in Dakota and Scott Counties. The VRWJPO must file adopted rules with the Dakota and Scott County recorders. The rules must also be mailed to the governing bodies of each community in the Watershed. Cities and townships will be notified by the VRWJPO when a rule or regulation affects land or water within their boundaries.

## Plan Organization

This Plan document is about the Vermillion River Watershed and its management, and therefore, much of the information presented is technical. Background information regarding scientific terms and processes is provided where practical; and a term glossary and acronym list are provided at the back of the document. Readers are encouraged to consult area professionals or professional references for more information as necessary.

The Plan is divided into the following sections:

Executive Summary. Provides a general overview of the VRWJPO and the Watershed, the Metropolitan Surface Water Management Act and the components of this plan.

Section 1: Existing and Future Environment, provides existing and historical background and inventory information regarding the physical, biological and human environment of the Watershed.

Section 2: Water Resources (or Hydrologic Systems), presents current and historic information regarding climate, aquifers, wetlands, lakes, rivers, streams, and flood plains; water quantity; and water quality.

Section 3: Issues Identification, provides an overview of the priority issues (the problems, concerns and needs) identified during the planning process that the VRWJPO intends to address during the next ten years. The issues are broken out into two groups, those that should be addressed during the next five years, and those to be addressed beyond the first five years.

Section 4: Goals, Policies, Objectives and Actions, presents and describes the Plan framework (goals, policies, objectives and actions) adopted by the Joint Powers Board to address the priority issues identified in Section 4. The goals are general and represent what the VRWJPO wants to accomplish long-term. The objectives are more specific, measurable statements of what the VRWJPO wants to achieve. The policies define the VRWJPO's approach to Watershed management. And, the actions describe the specific activities the VRWJPO will undertake to achieve its goals and objectives. A Reason Statement is included for each goal, and each objective is accompanied by a Rationale.

Section 5: Vermillion River Watershed Joint Powers Organization (VRWJPO) Governance and Administrative Authority, presents the structure of the VRWJPO, its regulatory controls and financial mechanisms. This section also provides State and local regulatory framework and regulatory controls tables.

Section 6: Vermillion River Watershed Joint Powers Organization (VRWJPO) Plan, Review, Adoption, Update, and Revision, provides plan review, approval and adoption procedures, the Plan update process, and Plan revision and amendment procedures.

Section 7: Local Water Management Plans, discusses the relationship between the Watershed Plan and local water management plans, requirements for local water management plans, and VRWJPO review of local water plans.

Section 8: Implementation Program, describes the implementation of this Plan and its impact on residents and local governments. This section provides an implementation program table or Capital Improvement Program (CIP) for the Watershed.

# SECTION 1: EXISTING AND FUTURE ENVIRONMENT

## 1.0 INTRODUCTION

The Vermillion River Watershed (Watershed) is located in the southeast portion of the seven-county, Minneapolis-St. Paul, Metropolitan Area (Figure 1.1). Encompassing 335 square miles, the headwaters are located in southeastern Scott County, and the majority of the Watershed is located in the central portion of Dakota County (Figure 1.2). The Watershed includes all or portions of 21 cities and townships (Table 1.1).

**Table 1.1: Local Government Units in the Vermillion River Watershed**

| Cities/Area (sq mi)* | | Townships/Area (sq mi)* | | Rural Towns/Area (sq/mi)* | |
|---|---|---|---|---|---|
| Apple Valley | 15.35 | Castle Rock | 20.53 | Coates | 1.38 |
| Burnsville | 1.41 | Empire | 34.34 | Hampton | 1.24 |
| Farmington | 11.63 | Marshan | 34.68 | Elko | 1.15 |
| Rosemount | 35.35 | New Market | 16.45 | New Market | 0.50 |
| Lakeville | 31.52 | Vermillion | 34.21 | Vermillion | 1.00 |
| Hastings | 10.73 | Douglas | 7.61 | | |
| | | Eureka | 25.00 | | |
| | | Hampton | 11.15 | | |
| | | Nininger | 16.95 | | |
| | | Ravenna | 22.35 | | |

* Area within the watershed

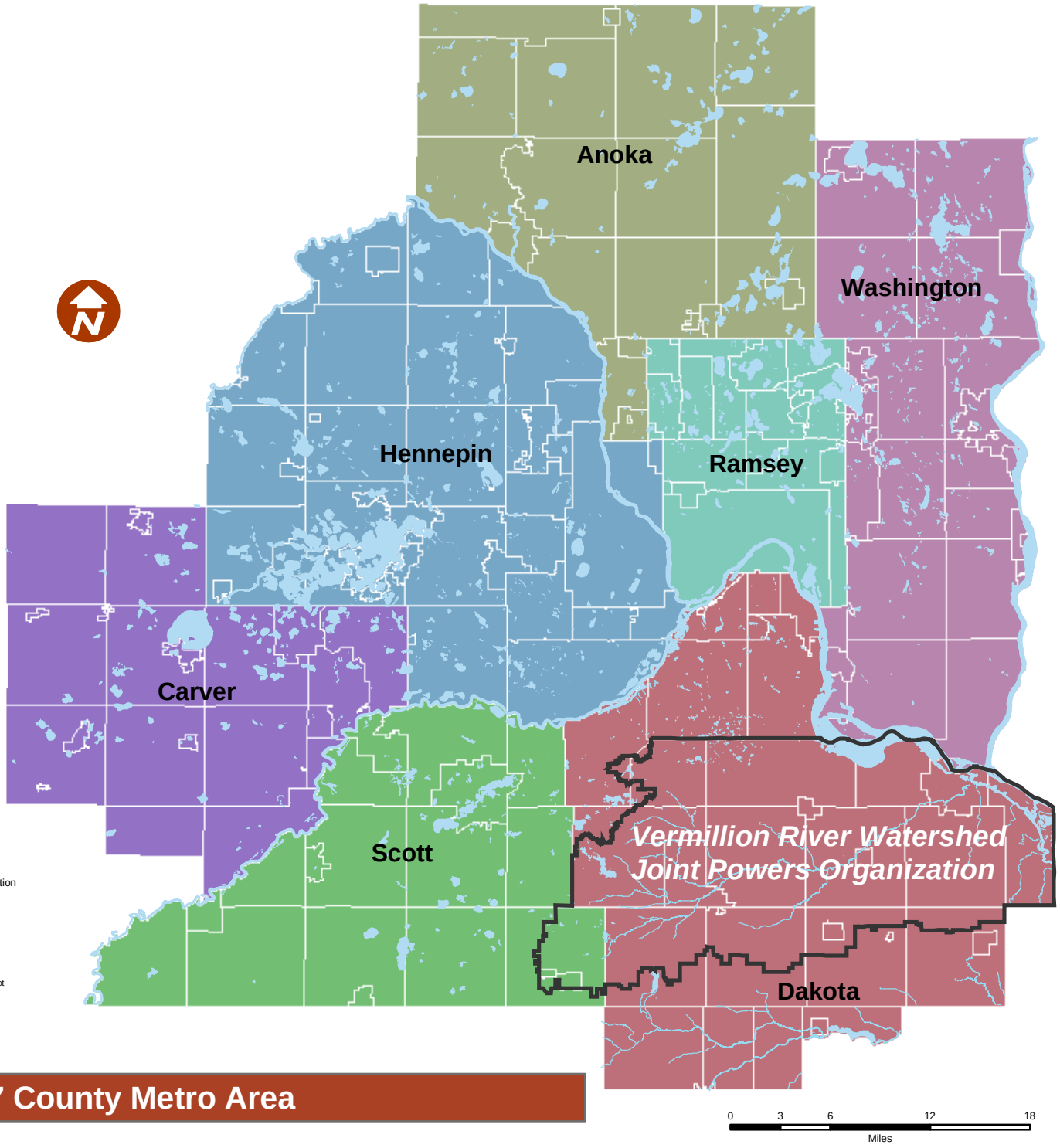
An understanding of existing conditions in the Watershed is critical in determining the objectives and standards that best protect Watershed resources and meet communities' needs. This section summarizes the physical, biological, and human environment; Section 2 concentrates on the hydrologic system. The Physical Environment subsection describes the physical setting, geomorphology, bedrock geology, and soils in the Watershed. The Biological Environment subsection describes pre-settlement vegetation, and sensitive resources. The Human Environment subsection gives a brief history of land use and growth patterns, anticipated future growth patterns, recreational uses, wastewater treatment, solid waste management, and potential environmental hazards.

## 1.1 PHYSICAL ENVIRONMENT

Geologic processes have determined the physical environment of the Watershed over the course of millions of years. The distribution of bedrock, unconsolidated sediments, landforms, and structural features in the Watershed are the geologic backbone on which the biological and human environments exist. The characteristics of the physical environment ultimately determine the availability of natural resources, the susceptibility of resources to pollution, and the success of living organisms in the Watershed.

Figure: 1.1

VRWJPO




Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004

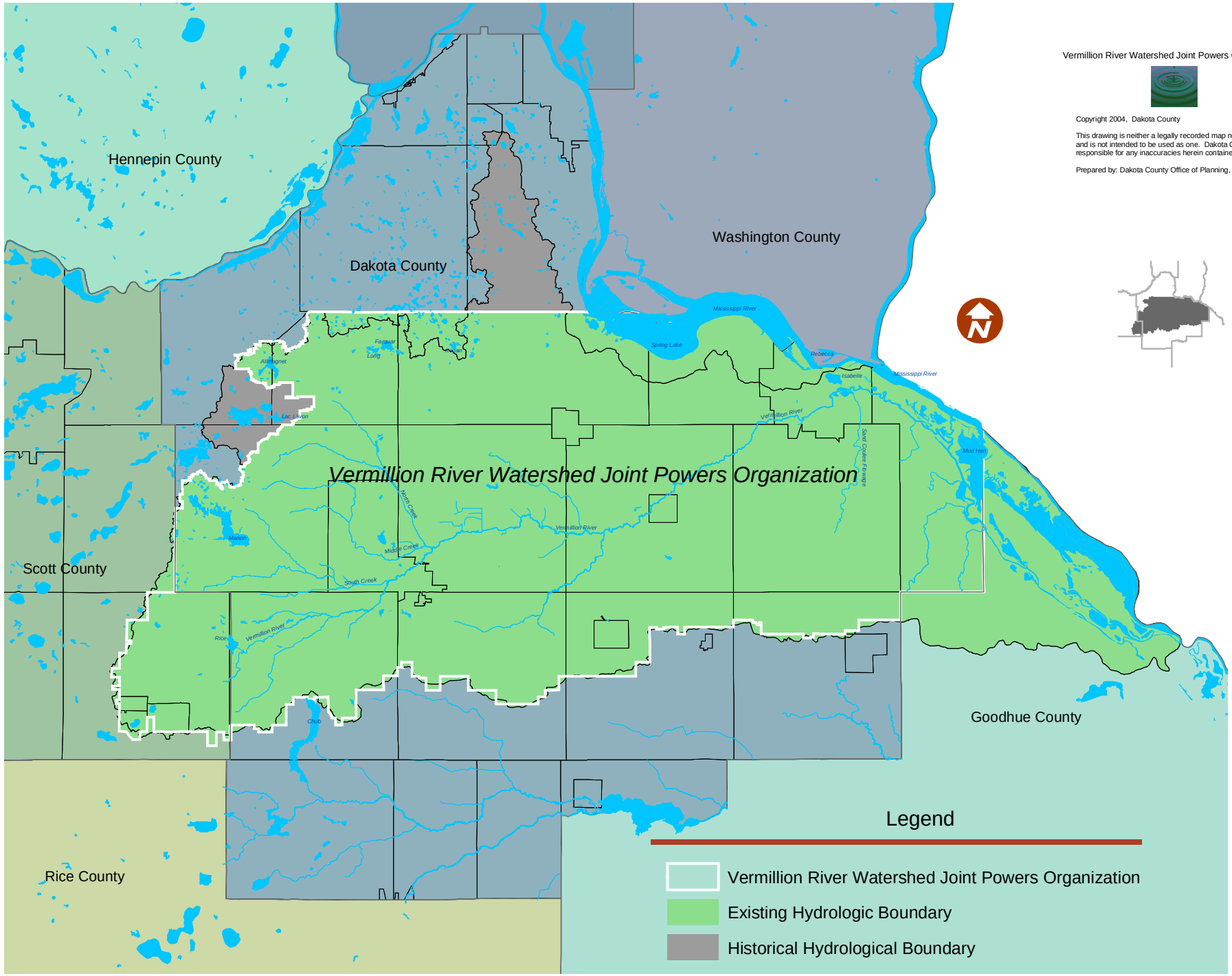
## 7 County Metro Area

VRWJPO

Figure: 1.1

Figure: 1.2

VRWJPO




Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004

# Vermillion River Watershed

VRWJPO

Figure: 1.2

### 1.1.1 Geomorphology and Surficial Geology

Throughout time, the forces of wind, water, and ice have modified the landscape of the Watershed. The most influential process to shape the topography of the Watershed was the movement of continental ice sheets. During the Pleistocene Epoch (between 2 million and 10,000 years ago), glaciers repeatedly covered most of Minnesota. The last glaciation, or Ice Age, occurred approximately 20,000 years ago. Glaciers and ice sheets are very effective at shaping the landscape through erosion and deposition of material. The landforms and surficial sediments of the Watershed are dominated by glacial landforms and sediment (Figure 1.3).

The northwestern portion of the Watershed is located in the Eastern St. Croix Moraine, and the southwestern portion of the Watershed is located in the Prior Lake Moraine. Moraines form at the edge of a glacier (moraines are masses of rocks, gravel, sand, clay, etc. carried and deposited directly by glaciers). The Eastern St. Croix Moraine and the Prior Lake Moraine mark the limit of the former Superior Lobe and Des Moines Lobe, respectively (lobes are finger-shaped glaciers that develop at the edge of continental ice sheets). Moraine areas consist of rolling to steep hills and closed depressions where lakes and wetlands are common. The sediments of moraine areas are a complex assortment of till (a mixture of sand, silt, clay, pebbles, cobbles, and boulders), silt and sand lenses, and sand and gravel deposits. The till of the Superior Lobe is red and has a coarse texture (sandy loam). The till of the Des Moines Lobe is gray to yellowish brown and has a fine texture (loam).

Outside moraine areas, the landscape still shows the effects of glaciation. A till plain extends away from the Prior Lake Moraine in the west-central portion of the Watershed. This till plain is composed of a thin layer of Des Moines Lobe till covering the sediments from older glaciations. The topography of this area is characterized by long rolling hills. The predominant geomorphic features in the Watershed are outwash plains and valleys. Outwash (sand, gravel, and other sorted sediments) blanketed the landscape as water from the melting glaciers drained away. Outwash from the Superior Lobe forms a large plain that extends over much of the Watershed area. The sands and gravels of the outwash plain become thinner and finer in texture farther away from the moraine. The outwash associated with the Des Moines Lobe cuts across the Superior outwash plain in broad valleys. The sands and gravels of the outwash valleys also become thinner and finer eastward away from the moraine. The outwash plain and the outwash valleys are very subtle topographic features. They appear on the landscape as nearly level topography and terraces.

Dissecting and crossing the glacial geomorphology of the Vermillion River Watershed is the more recent geomorphology associated with modern streams and rivers. Locally, the Vermillion River and its tributaries have their own floodplains, terraces (abandoned floodplains due to down-cutting), and associated landforms (meanders, bars, natural levees, etc.). The Mississippi River along the eastern edge of the Watershed has a wide floodplain and three distinct terrace levels. The fluvial (or river) sediments of these floodplains and terraces are poorly bedded (arranged or deposited in layers), moderately sorted materials deposited by the rivers and streams during flood stage. The fluvial sediments of the Mississippi River are much thicker than those of the Vermillion River.

Figure: 1.3

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Vermillion River Watershed Joint Powers Organization



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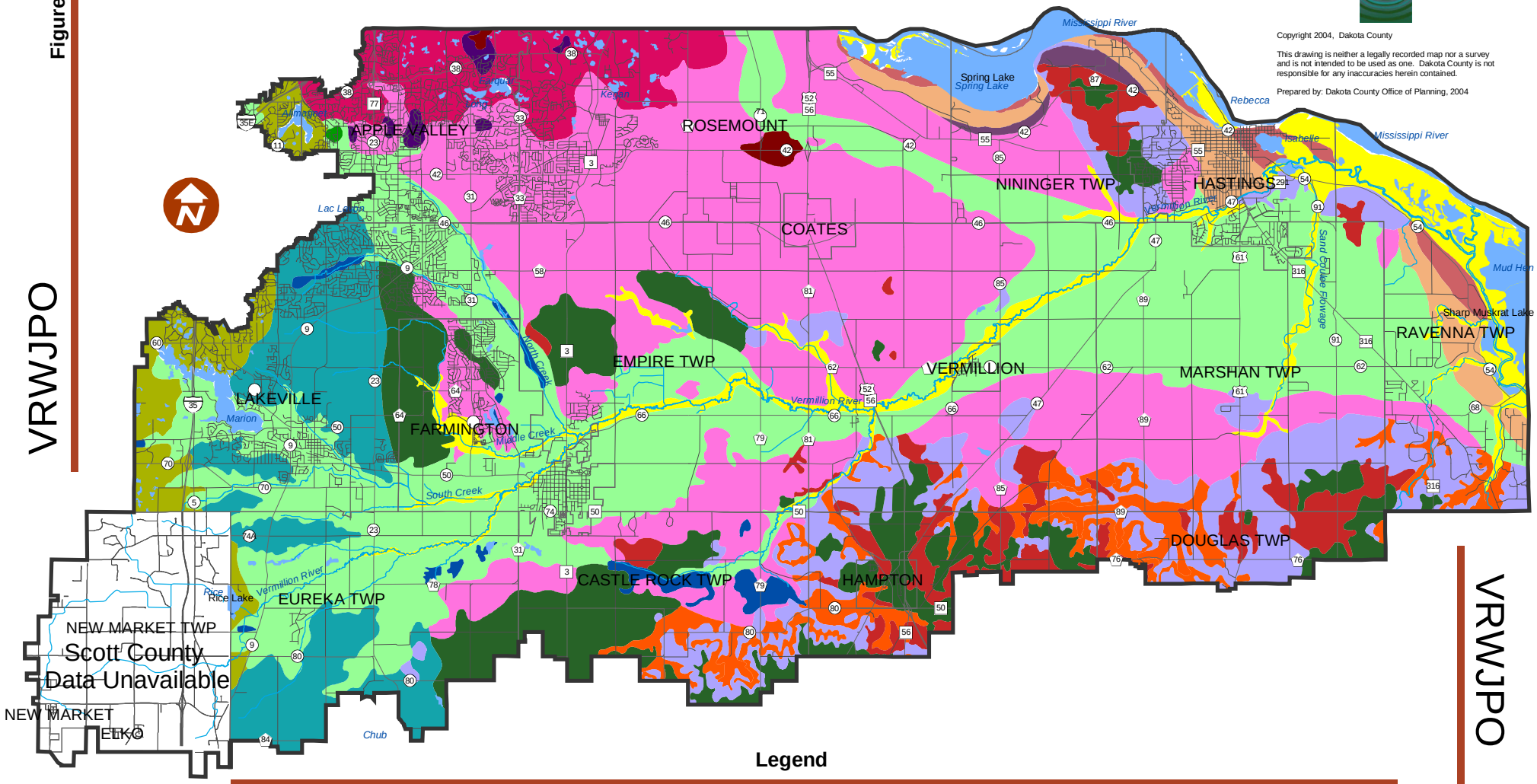


## Legend

- Organic Deposits
- Floodplain Alluvium
- Colluvium
- Slopewash Sand
- Lower Terraces
- Middle Terraces
- Upper Terraces
- Des Moines Lobe Outwash
- Des Moines Lobe Mixed Outwash
- Des Moines Lobe Ice-Contact Stratified Deposits
- Des Moines Lobe Till
- Des Moines Lobe Mixed Till
- Des Moines Lobe Thin-Mantled Till
- Des Moines Lobe Thin-Mantled Outwash
- Superior Lobe Outwash
- Superior Lobe Ice-Contact Stratified Deposits
- Superior Lobe Till
- Superior Lobe Glacial Lake Sand
- Pre-Late Wisconsinan Drift
- Pre-Late Wisconsinan Outwash
- Pre-Late Wisconsinan "Old Gray" Till
- Pre-Late Wisconsinan "Old Gray" Outwash
- Bedrock
- Water

# Surficial Geology

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

0 1 2 4 6
Miles

VRWJPO

Figure: 1.3

### 1.1.2 Bedrock Geology and Structure

Beneath the surficial sediment and landforms described in the previous subsection is the bedrock surface (Figure 1.4). The depth to bedrock in the Watershed varies from 0 (where it is exposed on the land surface) to more than 400 feet (Figure 1.5). The varying resistance of bedrock units to weathering determines the shape of the bedrock surface (Figure 1.6 Bedrock Profile). Shales and poorly cemented sandstones break down rapidly, while limestones and dolostones are more resistant. Resistant rock units become high points in the bedrock topography, while the less resistant rock units become low areas. The most significant topographic features on the bedrock surface in the Watershed are the buried bedrock valleys. These valleys developed under ancient drainage patterns, independent of modern drainage. Sediments from advancing and retreating glaciers filled the valleys and obscured the bedrock topography, creating the modern landscape. The largest of these valleys is located in the eastern portion of the Watershed. This valley is filled with outwash from the last ice age and is believed to be an ancient Mississippi River course.

The bedrock units underlying the Watershed are sedimentary rocks (formed by the deposit of sediment) of marine origin. The Watershed is on the southeastern edge of the Twin Cities Basin and the rock in the Watershed dips toward the north and west. The dominant structural features in the Watershed associated with the Twin Cities Basin are the Vermillion Anticline (a fold, convex upward) and the Empire Fault. Both the anticline and the fault are oriented geographically from the northeast to the southwest almost parallel to the course of the modern Vermillion River. These structural features are not expressed on the land surface, but can be seen in bedrock outcrops along the Mississippi River bluffs above the City of Hastings.

Bedrock units serve as a storage place for water and are often used by humans as a source of drinking water. The aquifers associated with the bedrock units of the Watershed are discussed in Section 2.

### 1.1.3 Soils

When geologic materials are exposed on the Earth's surface, the rocks and minerals disintegrate and decompose (weather). The most important product of this weathering process is soil.

Soils are described based on their physical and chemical properties. Soil classification systems are used to group soils of similar properties and to provide a systematic means of mapping. For the purposes of this Plan, the soils of the Watershed are classified into their hydrologic soil group (HSG). This classification system is based on infiltration (water movement into soil) and transmission (water movement through soil) rates. A soil's HSG classification describes its potential to produce runoff. The four hydrologic soil groups are listed below (USDA, 1955). The groups range from low runoff potential (Group A) to high runoff potential (Group D).

Figure: 1.4

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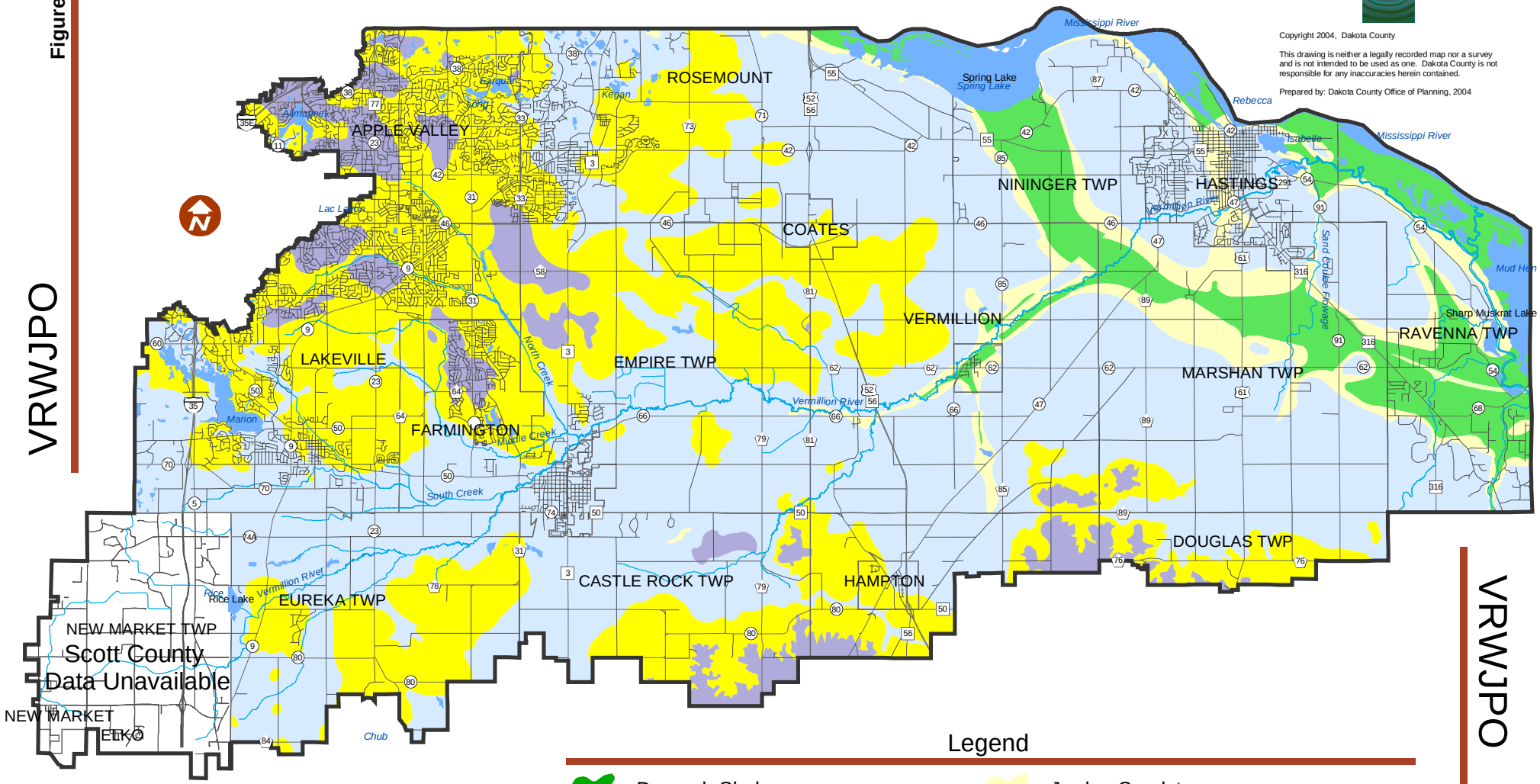


## Legend

- Decorah Shale
- Platteville and Glenwood Formations
- St. Peter Sandstone
- Prairie du Chien Group
- Jordan Sandstone
- St. Lawrence and Franconia Formations
- Ironton and Galesville Sandstones

# Bedrock Geology

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

0 1 2 4 6
Miles

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Figure: 1.4

Figure: 1.5

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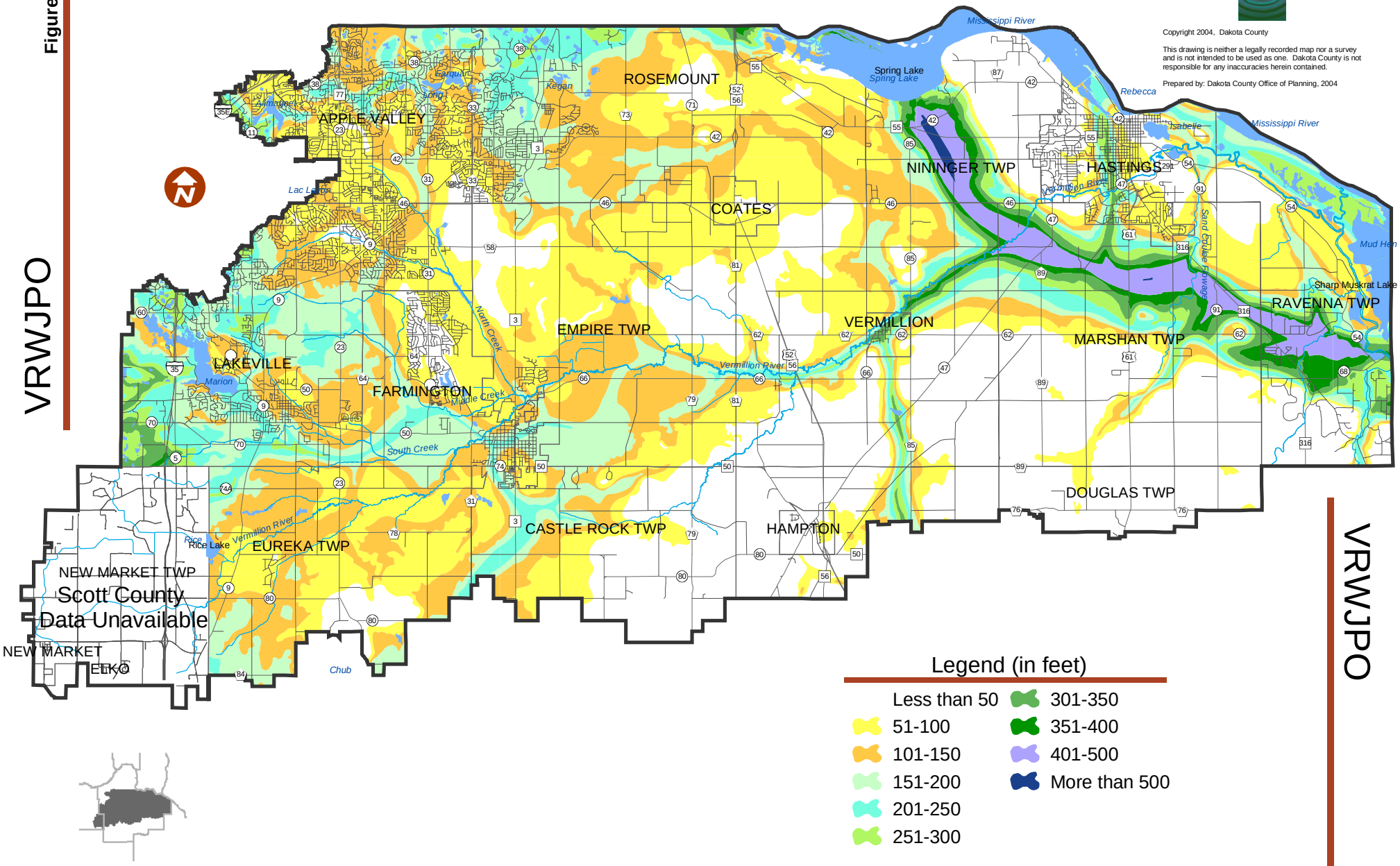


## Legend (in feet)

| | |
|---|---|
| Less than 50 | 301-350 |
| 51-100 | 351-400 |
| 101-150 | 401-500 |
| 151-200 | More than 500 |
| 201-250 | |
| 251-300 | |

0 1 2 4 6

Miles

# Depth to Bedrock

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

VRWJPO

Figure: 1.5

- ***Group A***: Well- to excessively drained soils. High infiltration rate even when thoroughly wetted. Transmission > 0.30 inches per hour.
- ***Group B***: Moderately well- to well- drained soils. Moderate infiltration rates when thoroughly wetted. Transmission between 0.15 and 0.30 inches per hour.
- ***Group C***: Soils with impeding layer to downward movement. Low infiltration rates when thoroughly wetted. Transmission between 0.05 and 0.15 inches per hour.
- ***Group D***: Soils with almost impervious material at or near the surface. Very low infiltration rates when thoroughly wetted. Transmission between 0 and 0.05 inches per hour.

The majority of the Watershed's soils are well-drained, silty or loamy soils with occasional sandy areas. These soils fall into Groups A and B. Areas of low infiltration (Groups C and D) are generally isolated in river and tributary floodplains, and lower and flatter areas of the upper Watershed. New Market Township represents the only place in the Watershed where a large percentage of the land is classified as Groups D and/or C (Figure 1.7). The Vermillion River Volume Study, completed September 2002 by Montgomery Watson Harza, identified high infiltration rate soils and assessed infiltration as a management tool. A more detailed review of the study is provided in Section 2. This study found, however, that high infiltration soils cover much of the Watershed (Figure 1.8) and developed a map that shows future development on these high infiltration soils (Figure 2.12 in Section 2).

The relationship of a soil's HSG to its landscape position is also important in delineating wetlands and determining a soil's susceptibility to erosion. Wetland, or former wetland, areas are characterized by hydric soils, soils that are "saturated, flooded, or ponded long enough during the growing season to develop anaerobic (no oxygen) conditions in the upper part" (U.S. Soil and Conservation Service, 1987). Areas with low infiltration rates (Groups C and D) and flatter topography are likely wetlands, but wetlands may also form anywhere the water table is at or near the surface, regardless of soil texture. The distribution and nature of the Watershed's wetlands are described in Section 2, but also shown as hydric soils in Figure 1.9. Erosion potential is a combination of a soil's infiltration rate, texture, drainage, and slope. Areas with low infiltration rates and steep slopes have soils that are more likely to erode, but even soils with high infiltration rates are likely to erode on steep slopes (Figure 1.10).

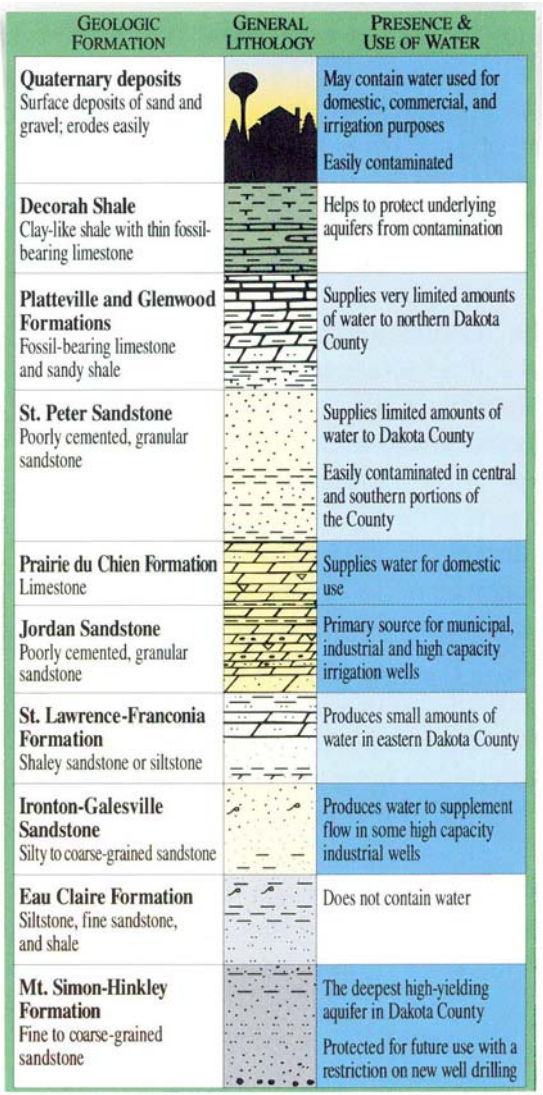

Figure 1.6

For more detailed and site-specific information, see the Soil Surveys of Dakota and Scott Counties.

Figure: 1.7

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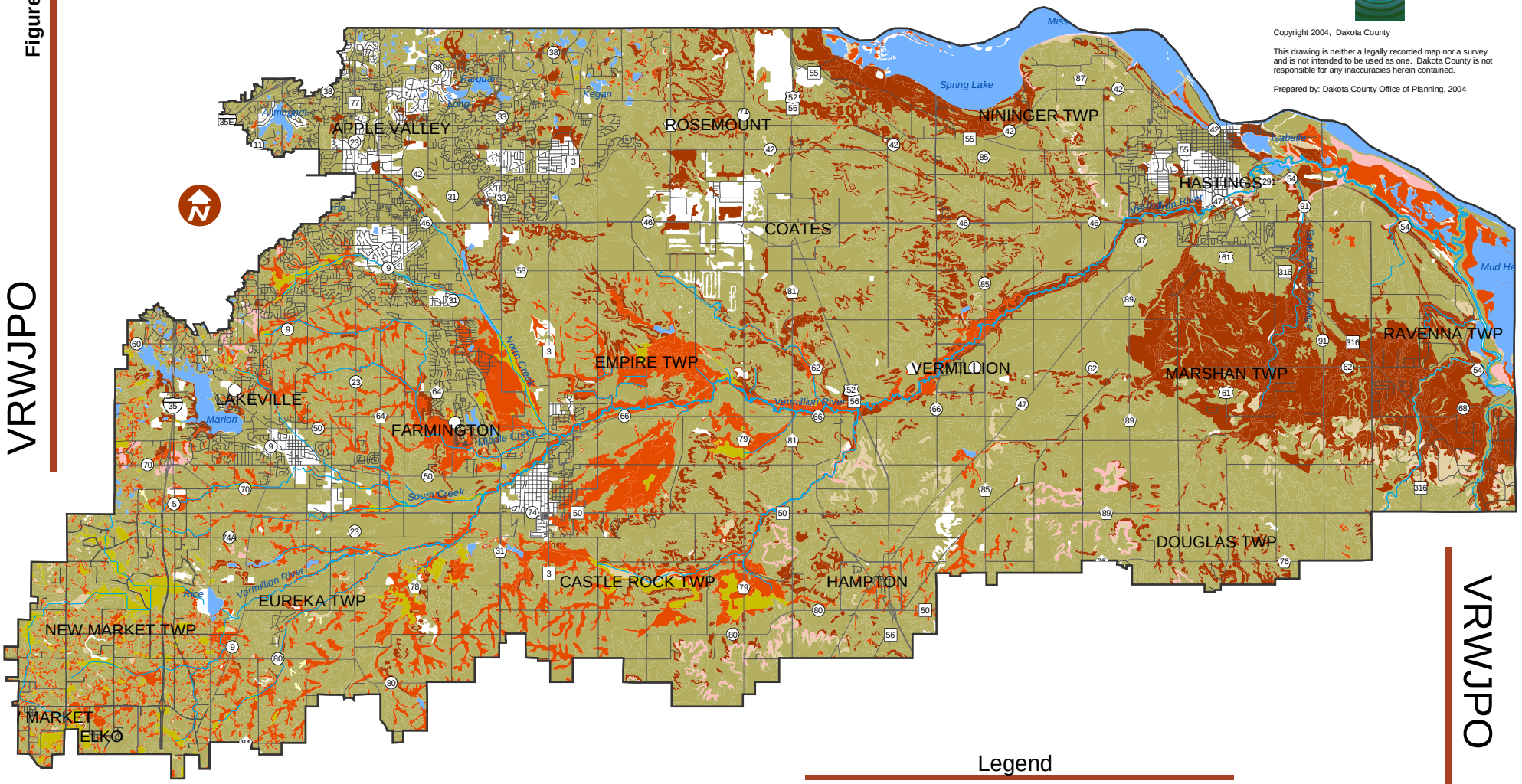


## Legend

- A -Sand, Loamy Sand
- A/D -Combination
- B -Silt Loam, Loam
- B/D -Combination
- C -Sandy Clay Loam
- C/D -Combination
- D -Clay Soils
- No Value: Urban, Mining, etc.

0 1 2 4 6

Miles

# Hydrologic Soil Groups

VRWJPO

Figure: 1.7

Figure: 1.8

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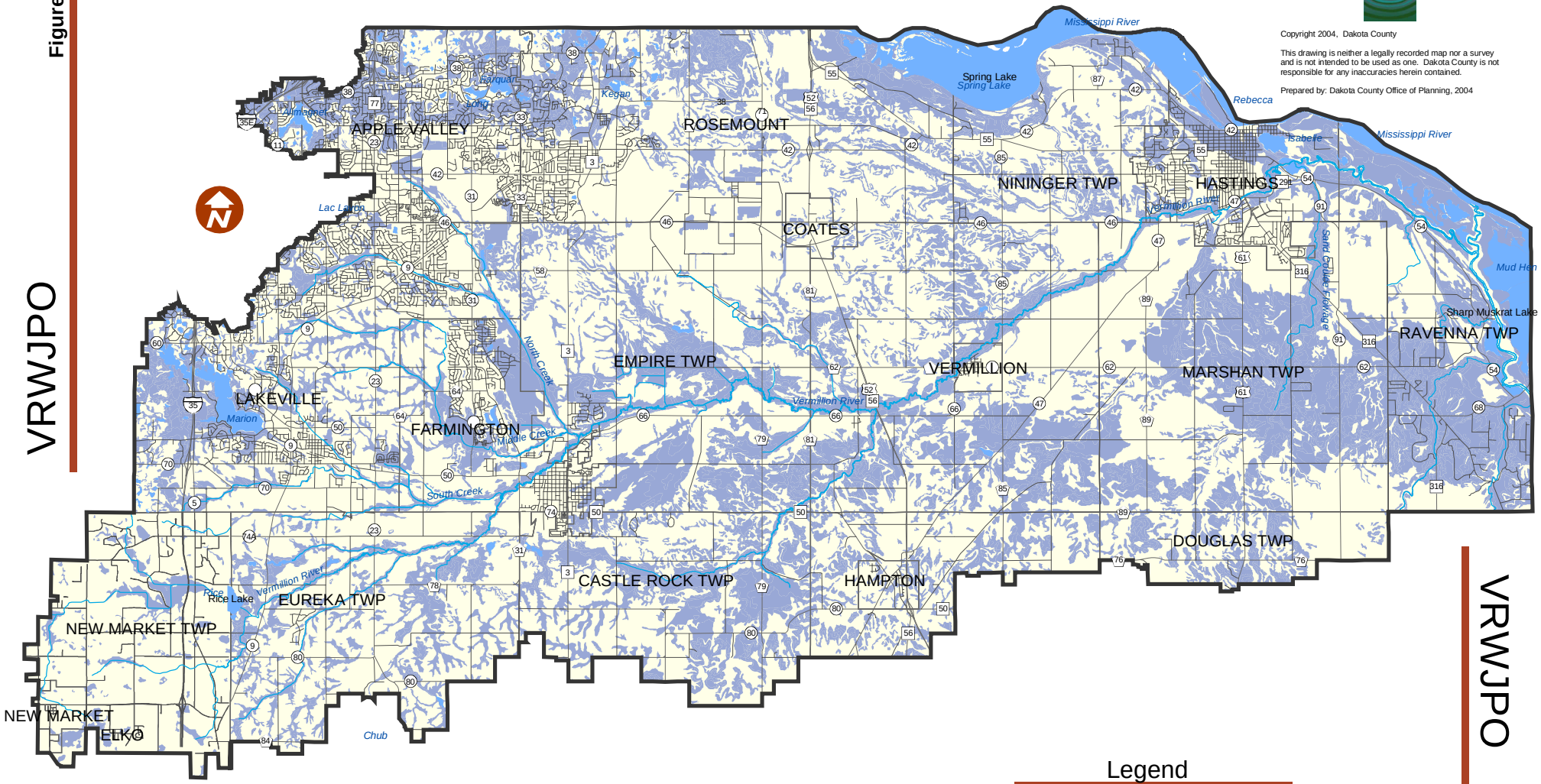


Legend

High Infiltration Soil

0 1 2 4 6

Miles

# High Infiltration Soils

VRWJPO

Figure: 1.8

Figure: 1.9

VRWJPO

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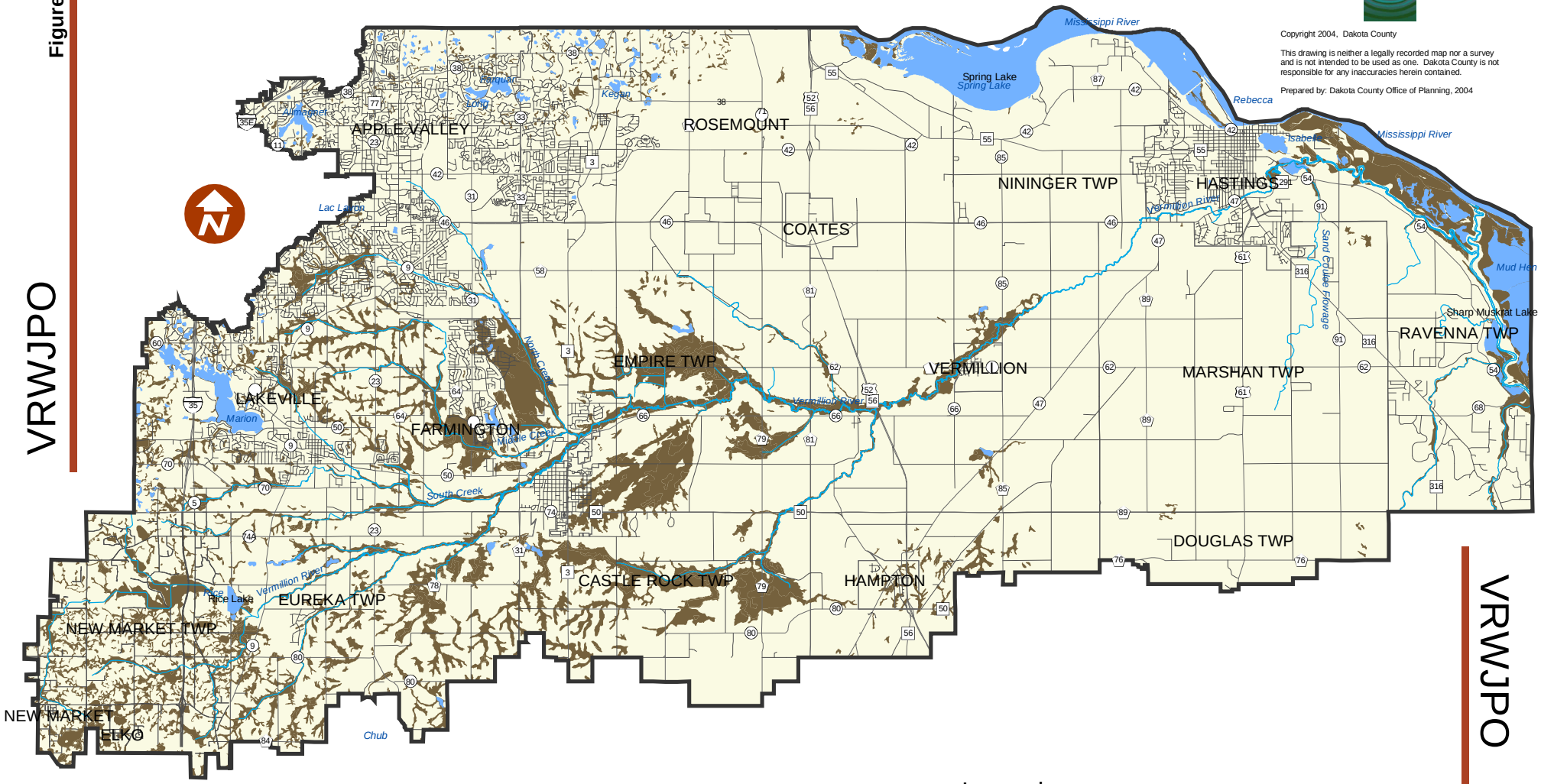


Legend

Hydric Soils

# Hydric Soils

0 1 2 4 6

Miles

VRWJPO

Figure: 1.9

Figure: 1.10

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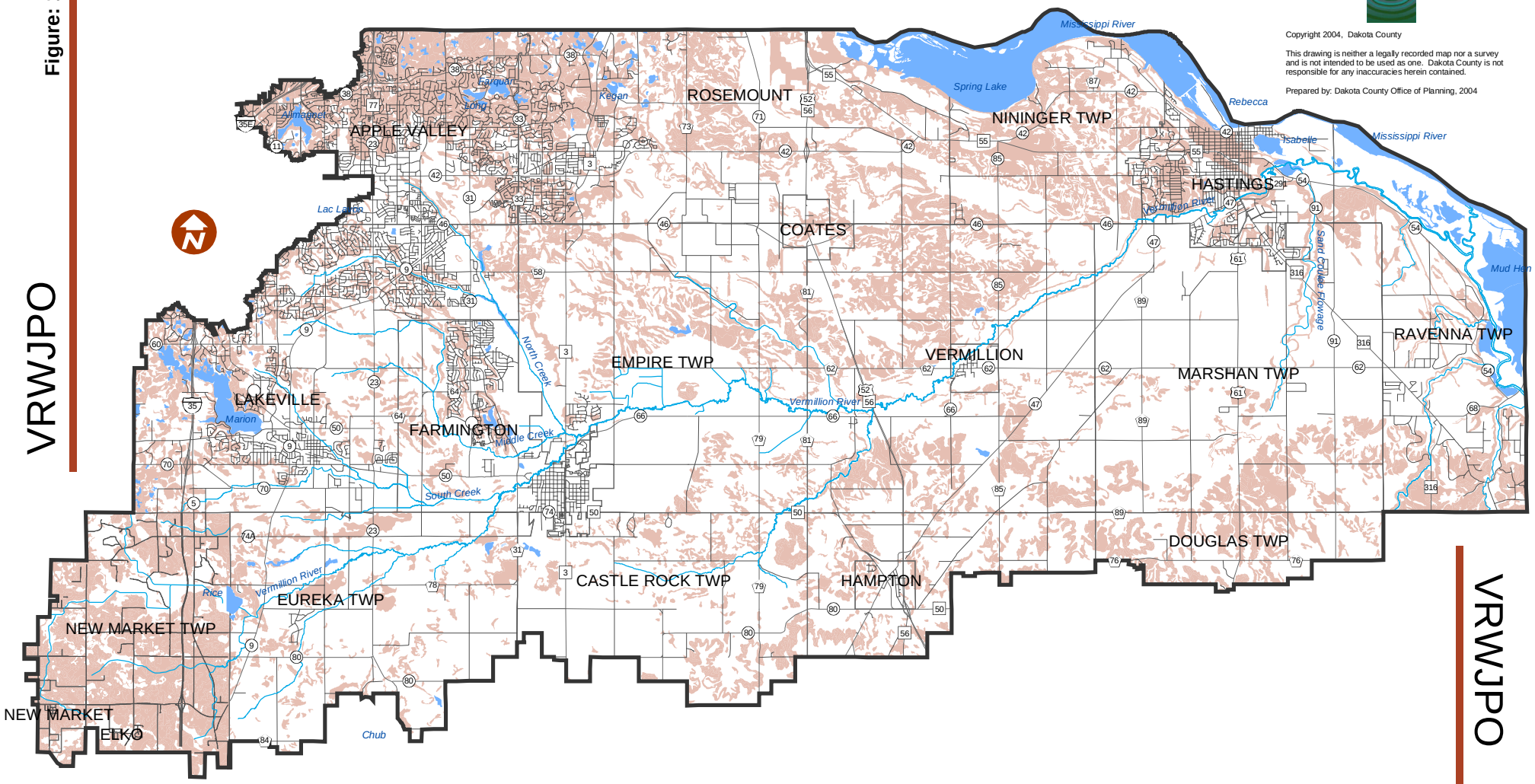


## Legend

Highly Erodible Soils

0 1 2 4 6

Miles

# Highly Erodible Soils

VRWJPO

Figure: 1.10

## 1.2 BIOLOGICAL ENVIRONMENT

The biological environment of the Watershed consists of all of the plants and wildlife living within its boundaries. This subsection presents the biological environment of the Watershed in terms of pre-settlement vegetation, and the remaining sensitive habitats and communities.

### 1.2.1 Pre-Settlement Vegetation

Prior to European settlement in Dakota County, the natural biological communities of the Watershed were very different (Figure 1.11). The majority of the Watershed is a mixture of vegetative communities. Oak and aspen savannas were the primary communities, but areas of tall grass prairie and maple-basswood forest were common. Bur oak savanna was common along the northern and western edge of the Watershed on the rolling topography of the St. Croix and Prior Lake Moraines. Tall grass prairie covered most of the areas of glacial outwash in the Watershed where the topography is nearly level. Maple-basswood communities were limited to areas of steep, dissected ravines and areas adjacent to the Mississippi River.

The extreme northwestern portion of the Watershed was basically one definable landform with a uniform and dominant pre-settlement vegetation community of hardwoods, such as oak woodland and maple-basswood forest. The maple-basswood forest contained elm, basswood, sugar maple, bur oak, ironwood, red oak, and aspen trees. The oak woodlands contained a mix of aspen, red oak, bur oak, and white oak.

The natural vegetation communities of the Watershed have been drastically altered by agriculture and urbanization. Only remnants of pre-settlement vegetative communities still exist today.

### 1.2.2 Sensitive Habitats and Communities

Sensitive resources in the Watershed have been identified by a number of studies and inventories. These are discussed in relation to natural communities and rare species, trout streams, Scientific and Natural Areas, State Wildlife Management Areas, the Mississippi River Critical Area, and the Vermillion River bottoms. These features are summarized on Figure 1.12 and discussed on the following pages. As the human population of the Watershed increased, natural ecosystems declined. Natural habitats have been converted to agricultural and urban land uses. As a consequence of these actions, remaining natural areas are small and fragmented.

***Natural communities and rare species.*** In 1987, the Minnesota County Biological Survey began systematically mapping the location of natural communities and rare species. Natural communities are groups of plants and animals that interact with each other and their environment in ways not greatly altered by humans or introduced species. The survey of Dakota County was completed in 1994; Scott County was completed in 1997.

Figure: 1.11

VRWJPO

Vermillion River Watershed Joint Powers Organization



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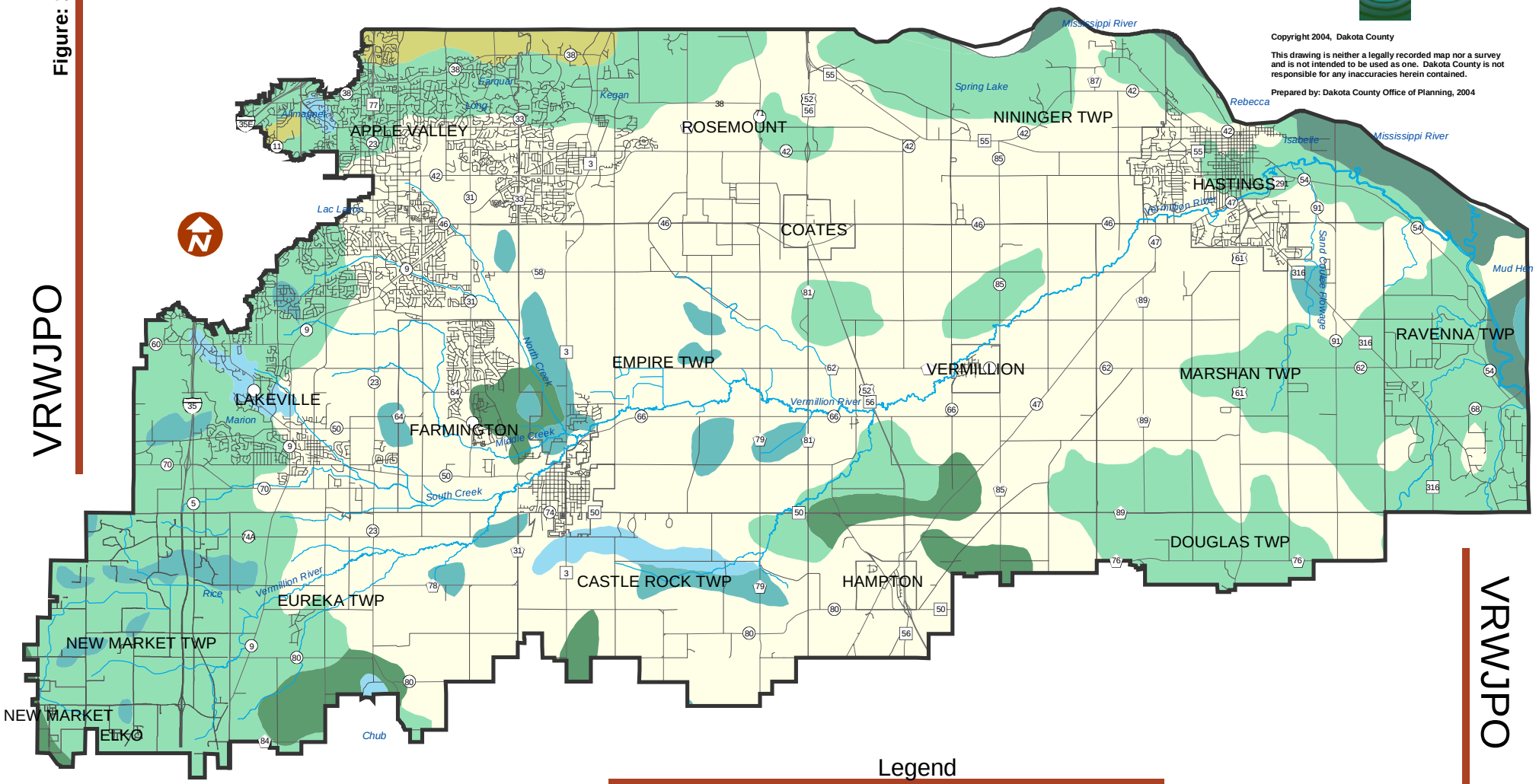



## Legend

- Prairie
- Wet Prairie
- Brush Prairie
- Aspen-Oak
- Oak Openings and Barrens
- Big Woods (Oak, Maple, Basswood, Hickory)
- River Bottom Forest
- water

0 1 2 4 6
Miles

# Pre-settlement Vegetation

VRWJPO

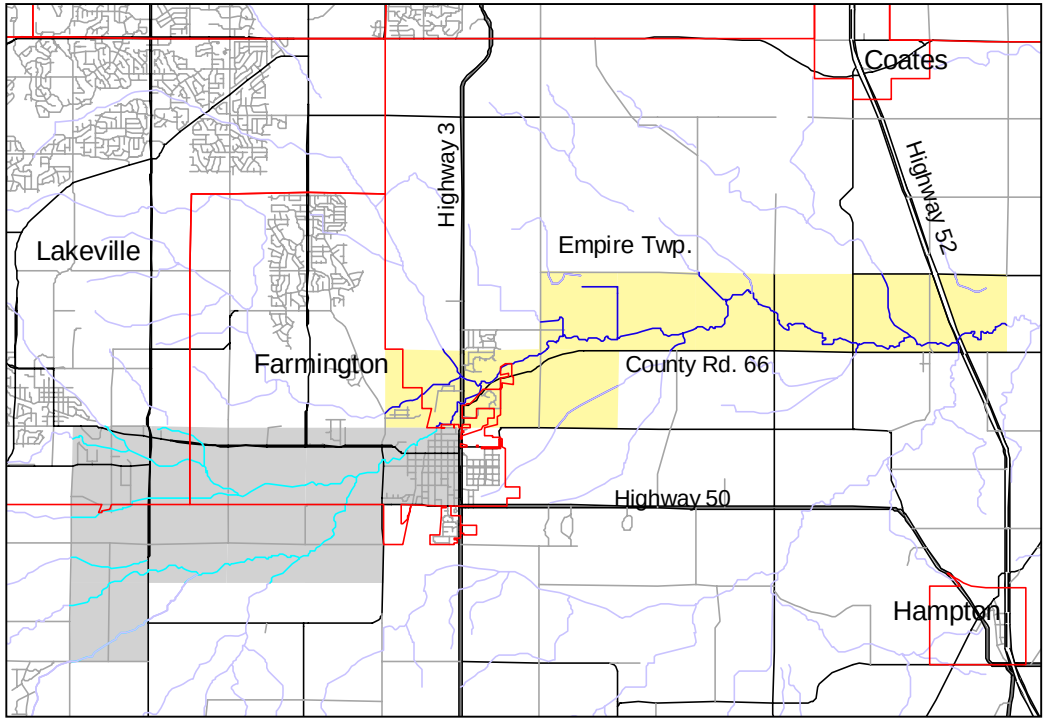
Figure: 1.11

The majority of the land area within the Watershed has been disturbed either by urbanization or agriculture; however, some natural communities have survived intact. The largest natural community still in existence today is the 3,000-acre floodplain forest along the Mississippi River in Ravenna Township. The Watershed still contains very small, isolated patches of natural prairie communities. The largest of these is located in the northeast quarter of Marshan Township. Slightly larger, isolated patches of oak forest remain scattered throughout the Watershed, and several unaltered wetland communities also remain (see Section 2).

Within these ecosystems live many flora and fauna that are considered rare in Minnesota. Rare plant species are generally associated with the remaining prairie and forest natural communities. Rare species of animals are scattered throughout the Watershed, but are more common in rural areas. For a complete list of rare species still found in Dakota and Scott Counties, see Appendix A.

***Trout Streams.*** The Minnesota Department of Natural Resources (MDNR) designated 25 stream miles of the Vermillion River and its tributaries as trout waters in 1988 (Minn. Stat.§ 97C.005). The Metro Region Trout Committee identified the Vermillion River and the South Creek tributary in a 1996 report as one of five high priority trout streams within the metro area. The Vermillion River Assessment (March 1999) determined that brown trout inhabited South Creek and the entire section of the Main Branch of the River from just upstream of the confluence with South Creek east to Highway 52. Temperature records indicated that within those sections of the River, conditions were generally optimum for growth and had low stress ranges for brown trout (see Appendix A). The Vermillion River Assessment also determined that the trout were naturally reproducing in the River and ranging throughout that area. Because of suitable water temperatures and habitat, and the presence and abundance of trout, an additional 20.5 river miles of the Vermillion were also designated as trout waters by MDNR in 2003. Figure 1.13 shows the extent of designated trout waters on the Vermillion River. The grey section represents the reaches designated in 1988 and the yellow section represents the reach designated in 2003.

**Figure 1.13**



Extra protection for a designated trout stream is provided through special fishing regulations set by the MDNR and qualifies the River for MDNR Trout Stamp dollars for habitat improvement projects. Additionally, the Minnesota Pollution Control Agency sets stricter water quality standards for designated trout streams. Those standards include no material increase in temperature and lower levels for turbidity (10 NTU vs. 25 NTU) and for un-ionized ammonia (16µg/l vs. 40µg/l).

The extent to which a stream reach is designated as trout water includes all of the river reach and its tributaries located within a township section. This clarification for anglers came as a result of a lawsuit by Trout Unlimited in 1990 and required the MDNR to expand its protected waters regulations to include sections of two stream reaches that were directly tributary to the section originally designated in 1988.

***Hastings Scientific and Natural Area.*** In 1969, the Minnesota Legislature created the Scientific and Natural Areas (SNA) Program through the MDNR. The mission of the SNA is to preserve and perpetuate the ecological diversity of Minnesota's natural heritage. The program protects landforms, fossil remains, plant and animal communities, rare and endangered species, and other biotic features or geologic formations for scientific study and public education.

Currently, only one scientific and natural area is located in the Watershed (Figure 1.12). The Hastings SNA contains two forest communities. One is an upland hardwood forest dominated by old growth red oak, sugar maple, and basswood. The other is a floodplain forest dominated by cottonwood, green ash, and silver maple. In addition to the hardwood forests at the site, there is great diversity in the undergrowth plant species including the rare snow trillium (*Trillium nivale*).

***State Wildlife Management Areas.*** Minnesota's Wildlife Management Area (WMA) system was created in 1951 to protect wetlands. Since that time, the WMA system has grown to include uplands, prairies, and woodlands. WMAs are public lands owned by the MDNR that are managed for wildlife and wildlife-based recreation. They are part of the State's outdoor recreation system and impose fewer restrictions than scientific and natural areas.

Currently, there are three WMAs located in the Watershed (Figure 1.12). The largest of these is the Gores Pool WMA located along the Mississippi River in Ravenna Township. The Hastings WMA and the Spartine WMA in Scott County are much smaller in size.

***Mississippi River Critical Area/Mississippi National River and Recreation Area.*** The Mississippi River is one of the world's greatest rivers and is part of one of the most complex ecosystems on the planet. The Mississippi River is essential to the ecological health of the North American continent due to its diverse array of fish, wildlife, and plants. The Mississippi River corridor serves as a critical migration pathway for millions of birds and is rich in nationally significant cultural resources. A working river, the Mississippi provides a vital commercial transportation link to national and international markets by allowing safe, low-cost movement of bulk commodities in river barges (Comprehensive Management Plan, Mississippi National River and Recreation Area, 1995).

Figure: 1.12

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Vermillion River Watershed Joint Powers Organization



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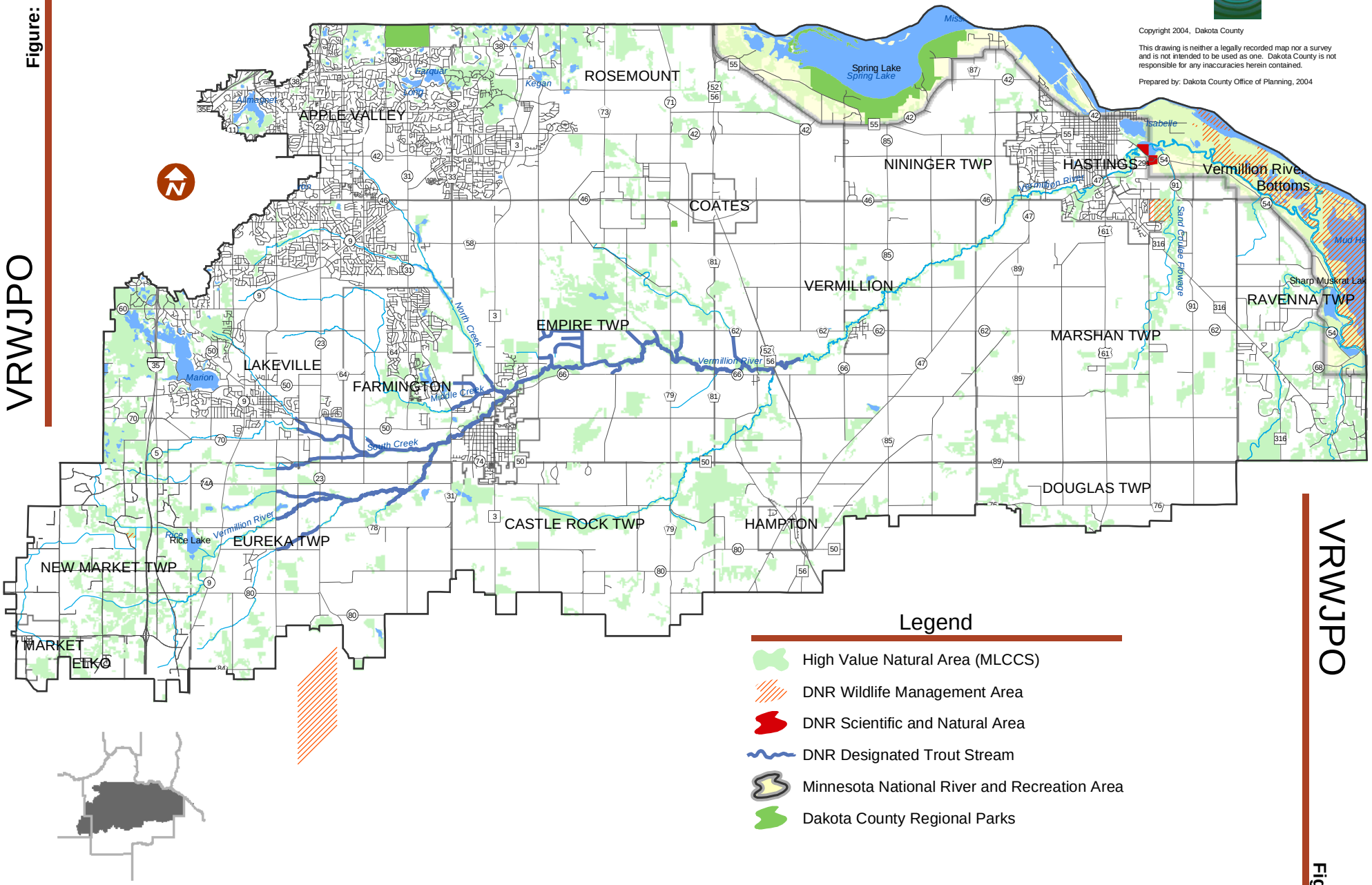


## Legend

- High Value Natural Area (MLCCS)
- DNR Wildlife Management Area
- DNR Scientific and Natural Area
- DNR Designated Trout Stream
- Minnesota National River and Recreation Area
- Dakota County Regional Parks

0 1 2 4 6

Miles

# Sensitive and Natural Areas

VRWJPO

Figure: 1.12

The Mississippi River corridor (Figure 1.12) was designated as a State Critical Area in 1976 and as the Mississippi National River and Recreation Area (MNRRA), a unit of the National Park Service, in 1988. The MNRRA includes 72 miles of the Mississippi River, 4 miles of the Minnesota River, and approximately 54,000 acres of public and private land and water in five Minnesota counties. This area stretches from the cities of Dayton (Hennepin County) and Ramsey (Anoka County) to just south of Hastings at the eastern border of Dakota County and Ravenna Township. The Minnesota River segment extends from just east of the Interstate 494 river bridge between Bloomington and Eagan, to the rivers confluence with the Mississippi River. Part of this area is included in the eastern edge of the Watershed. The Governor's Executive Order 79-19 contains the State's Critical Area standards and guidelines required to be followed by local units of government, State agencies, and regional agencies when preparing or updating plans. Additionally, a Comprehensive Management Plan for the MNRRA was approved in 1995. Following this plan's requirements is voluntary. In 1999, Dakota county adopted a Mississippi River Critical Area Plan as part of the Dakota County 2020 Comprehensive Plan.

***Vermillion River Bottoms.*** As the glaciers melted away, a braided-stream system dominated the Mississippi River Valley. A remnant of the old river system is the Vermillion River bottoms. The Vermillion River bottoms are a mix of river and lake habitat, floodplain forests, and emergent marsh. Located downstream of the Peavey Mill Dam and Highway 61 in Hastings, this area is one of the largest (42.5 square miles) floodplain forests on the Mississippi River in southeastern Minnesota. Several rare species, including the red-shouldered hawk, the cerulean warbler, and the bald eagle can also be found here (MDNR).

***Parks.*** Dakota County operates and maintains two regional parks located partly or wholly within the Watershed: 1) a portion of Lebanon Hills Regional Park located in Apple Valley; and 2) Spring Lake Park Reserve located in Nininger Township and Rosemount. Lebanon Hills Regional Park is the largest, at around 2,000 acres, a majority of which lies north of the Watershed boundary in Eagan within the Gun Club Lake Watershed. Many undisturbed lakes and marshes are sprinkled throughout the woodlands and meadows of this year-round park. Spring Lake Park Reserve is located on the bluffs overlooking the Mississippi River, and is rich in cultural, natural and geologic value.

## 1.3 HUMAN ENVIRONMENT

This subsection explores historic, present, and projected population and land use patterns in the Watershed.

### 1.3.1 Historic Background

The Watershed was the home of the Dakota people of the Sioux Nation for thousands of years prior to European settlement. Although the land technically became part of the United States in the 1805 Louisiana Purchase, it was not until the United States established a fort in 1819 that permanent settlement by Americans and Europeans was possible. Shortly after building Fort Snelling in 1824 at the junction of the Mississippi and Minnesota Rivers, French-Canadian fur traders established Mendota, the first European

settlement in present day Dakota County. The area was still under the control of the Sioux Nation during the first half of the 19th century. Then in 1851, the federal government took control of the land west of the Mississippi River and south of the Minnesota River when the Sioux signed a treaty ceding 21 million acres of land to the U.S. government. Settlement proceeded rapidly in 1853 following subsequent treaties with the Sioux that opened the Minnesota Territory for European settlement. Initially, settlement was focused along river corridors. With its proximity to the Mississippi, Minnesota, and St. Croix Rivers, Dakota County drew many of the early pioneers. By the 1900 Federal Census, the population of Dakota County and Scott County had grown to 21,733 and 15,147 people, respectively. The 2000 Census estimates the population of Dakota and Scott Counties as 355,900 and 89,500, respectively.

### 1.3.2 Historic Land Use

Historically, the fertile river valleys of Dakota County made raising livestock and crops easy and profitable. By the early part of the 20th century, over 80% of the land in the County was being actively farmed. The practice of farming resulted in the removal of native vegetation, draining of wetlands, and the modification of river and stream channels within the Watershed. Small agricultural centers such as Farmington, Hastings, Lakeville, and Rosemount developed during the days of early settlement. The agricultural land use pattern remained the most significant land use pattern in the Watershed until World War II.

In the 1950s, development of federal highway and home mortgage credit programs led to the earliest subdivisions along major freeway and highway corridors. Single-family homes became the dominant land use development pattern in the 1950s and 1960s. In the 1970s and 1980s, this development pattern led to infill development with increased high density residential, commercial, and industrial land use. The increased urbanization focused in the northwest portion of the Watershed led to decreased water quality, increased groundwater consumption, and further modification of the natural drainage system.

### 1.3.3 Present Land Use

Present land use within the Watershed is influenced by several factors: proximity to the Minneapolis/St. Paul Metropolitan Area, transportation routes, wastewater systems, and local government planning and zoning. In areas of rapid population growth, like Dakota and Scott Counties, land use changes rapidly as development occurs. Therefore, the term “present land use” represents a snapshot of actual land cover and developed areas (Figure 1.14).

The predominant land use pattern in the Watershed is agriculture, interspersed with suburban areas and smaller urban growth centers. Growth in the area has resulted in increased urbanization of the northwest portion of the Watershed. Parts of Burnsville, Apple Valley, Rosemount, Lakeville, and Farmington have dense residential, commercial, and industrial land use. All of Burnsville and Apple Valley and portions of the other four cities are included in the Metropolitan Urban Service Area (MUSA). As such, metropolitan services and facilities are or will be provided. Areas of urban growth beyond the MUSA boundary are evident in Lakeville, Farmington, and Hastings. Local controls in these cities provide planned growth in an effort to ensure the compatibility of land use types and the efficient use of public services and facilities.

Figure: 1.14

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Vermillion River Watershed Joint Powers Organization



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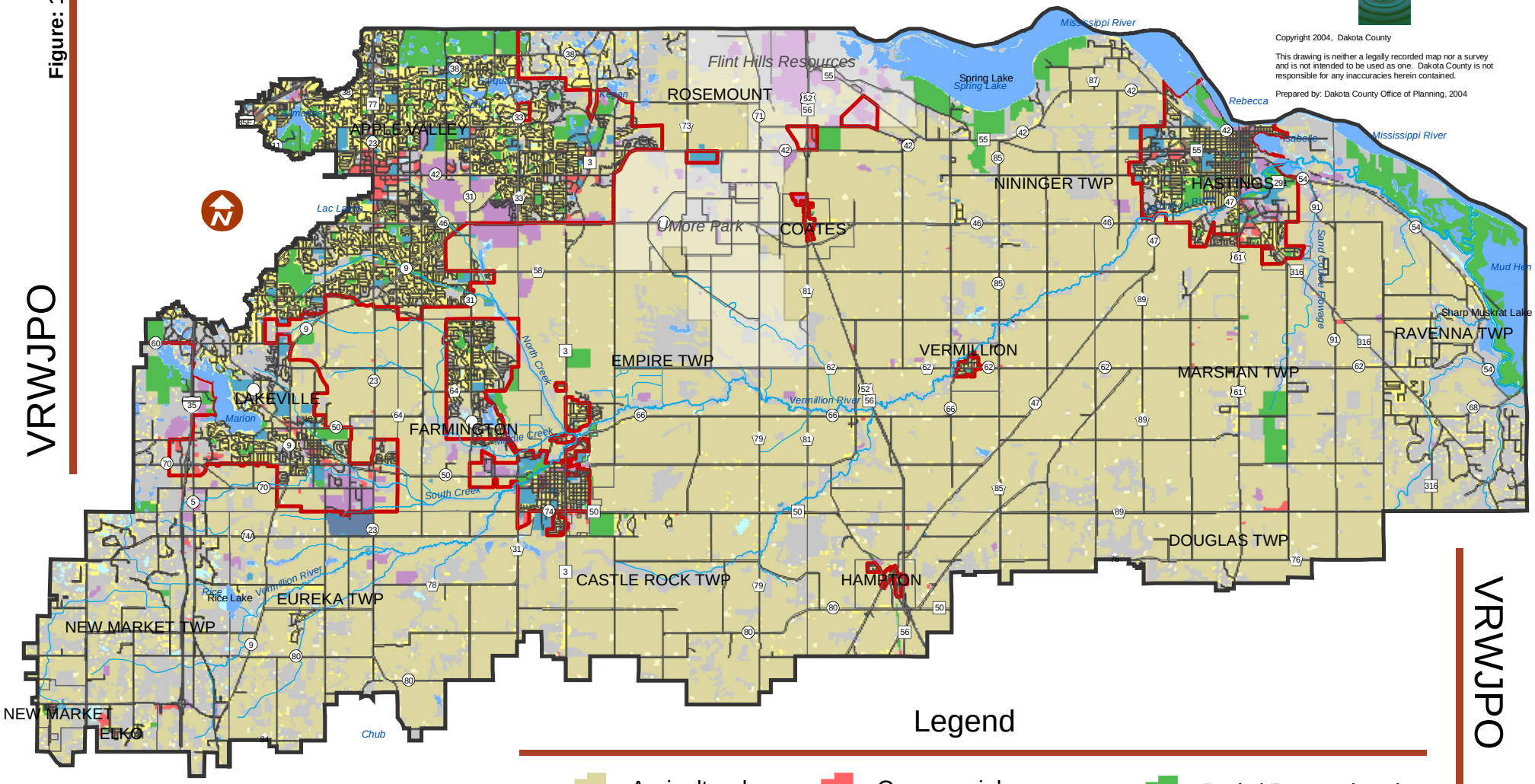


## Legend

- Agricultural
- Farmstead
- Single Family
- Multifamily
- Commercial
- Mixed Use Residential
- Industrial
- Institutional
- Park / Recreational
- Airport
- Undeveloped
- Water
- MUSA Boundry

0 1 2 4 6

Miles

# 2000 Land Use

VRWJPO

Figure: 1.14

Flint Hills Resources and the University of Minnesota each own large tracts of land in the Watershed (Figure 1.14). Flint Hills Resources operates an oil refinery and petroleum industries on its property. Nearly 3,400 of Flint Hills Resources' 4,200 acres lie within the Watershed in Rosemount. The University of Minnesota owns just over 7,700 acres of land in Rosemount and Empire Township, known as UMore Park. The University land is used for experimental agriculture and portions of it are leased to a variety of small business. These large landowners represent opportunities for possible partnerships for the betterment and protection of Watershed resources.

### 1.3.4 Projected Land Use

The populations of Dakota and Scott Counties are expected to continue to increase in the future. The southeastern suburbs are expected to be one of the largest growth regions for the Twin Cities Metropolitan Area. As this population increase occurs, the portion of land used for residential, commercial, and industrial uses will also increase (Figure 1.15). A majority of the Metropolitan Urban Service Area (MUSA) development will be seen in the western portion of Rosemount, and eastern portions of Lakeville and Farmington into western Empire Township. It is expected that the total population in the Watershed could increase significantly by 2030. Estimations by the Metropolitan Council predict close to 133,000 more people. Converting farmland and open space into other land uses results in increases in the amount of impervious surfaces. Since impervious surfaces decrease the amount of water that infiltrates into the ground, there is the potential for decreased groundwater recharge, increased surface runoff and increased risk of water resource contamination. Therefore, increasing urbanization is a major consideration in the management strategies of the Watershed (see Section 5).

A majority of the land use in the Watershed is agricultural in nature and will remain so into the 2020s. For some of this agricultural land, high-capacity irrigation wells withdraw a total annual average of 3.3 billion gallons of water from local aquifers (Figure 1.16) (see Section 2, Water Resources, for more information).

Although there are over five times the number of high-capacity agricultural irrigation wells, the average municipal supply well pumps over ten times more water per year than the average irrigation well, at over twenty times the rate. Annually, municipal supply wells withdraw an average of 3.5 billion gallons of water from groundwater resources. Although this is comparable to the amount of water withdrawn for irrigation (3.3 billion gallons), urbanized areas generally have a greater water demand per capita than rural areas. As urban areas and population continue to expand, the demand on local groundwater resources will also continue to increase. The consumption of groundwater that occurs in urban areas can lead to several water quantity problems. Figure 1.17 shows the location of a variety of wells throughout the Watershed (see Groundwater in Section 2, for more well information).

### 1.3.5 Recreational Facilities

The landscape and water resources of the Watershed are important for their recreational value. In addition to natural areas, there are many parks and open spaces that offer numerous opportunities for people to interact with the natural environment. City and

Figure: 1.15

VRWJPO

Vermillion River Watershed Joint Powers Organization



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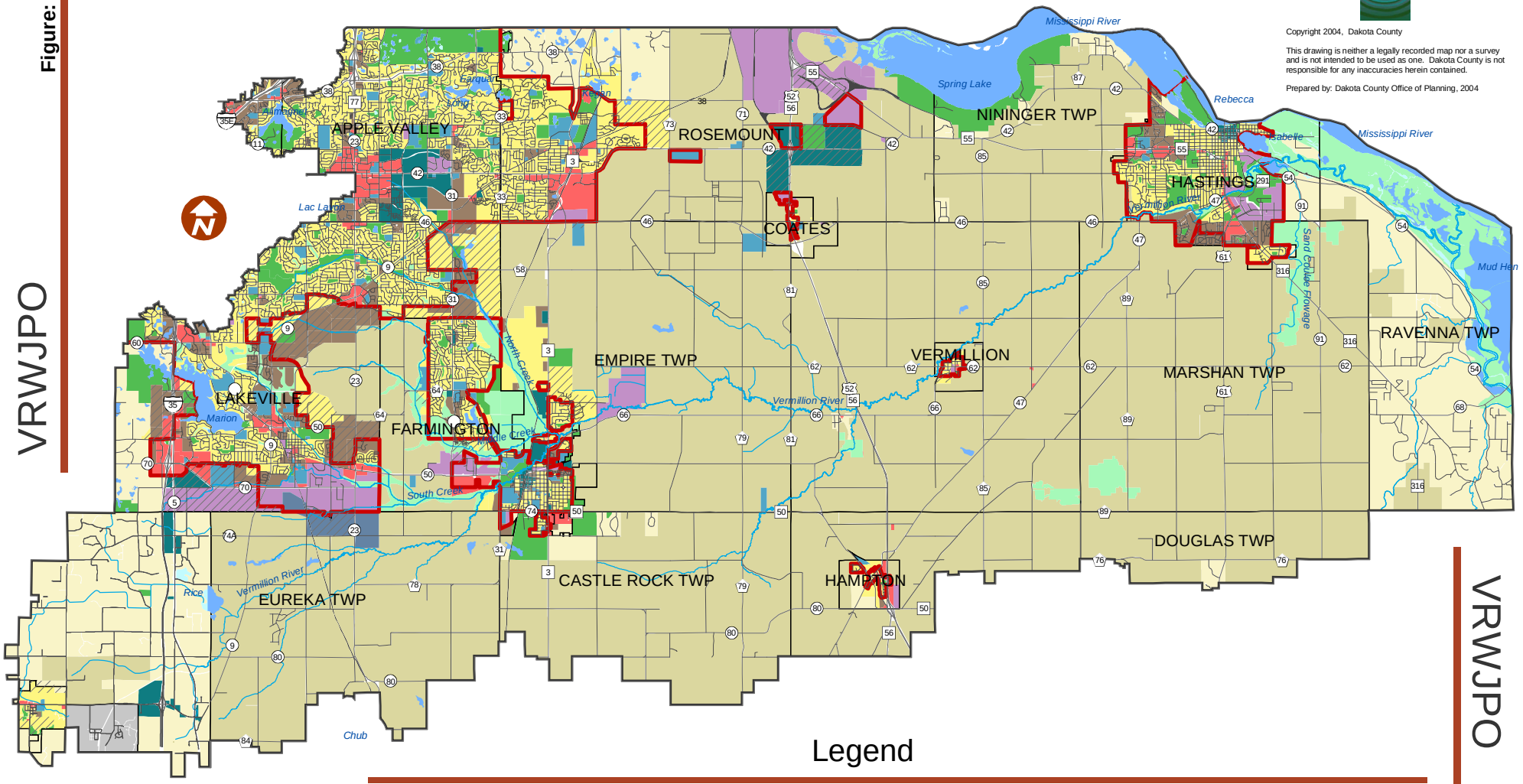


## Legend

- Agricultural
- Rural Residential
- Single Family Residential
- Multi-Family Residential
- Commercial
- Industrial
- Mixed Use - Single Units
- Institutional
- Park and Recreation
- Open Space
- Airport
- Vacant or No Data
- MUSA 2020
- MUSA Boundry

0 1 2 4 6

Miles

# Planned Land Use

VRWJPO

Figure: 1.15

Figure: 1.16

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Vermillion River Watershed Joint Powers Organization



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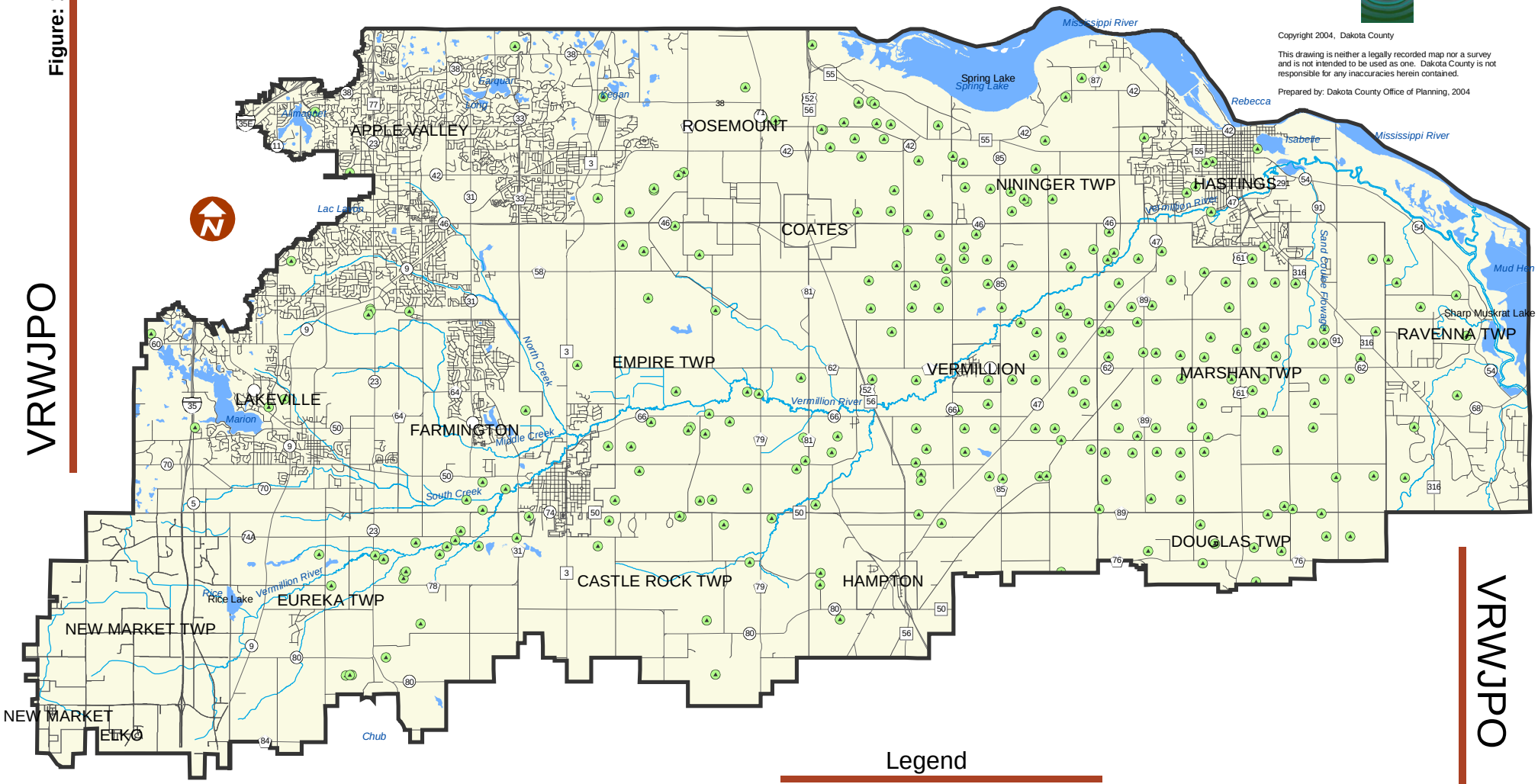


## Legend

- Registered Irrigation Wells

# Registered Irrigation Wells

0 1 2 4 6

Miles

VRWJPO

Figure: 1.16

Figure: 1.17

VRWJPO

Vermillion River Watershed Joint Powers Organization



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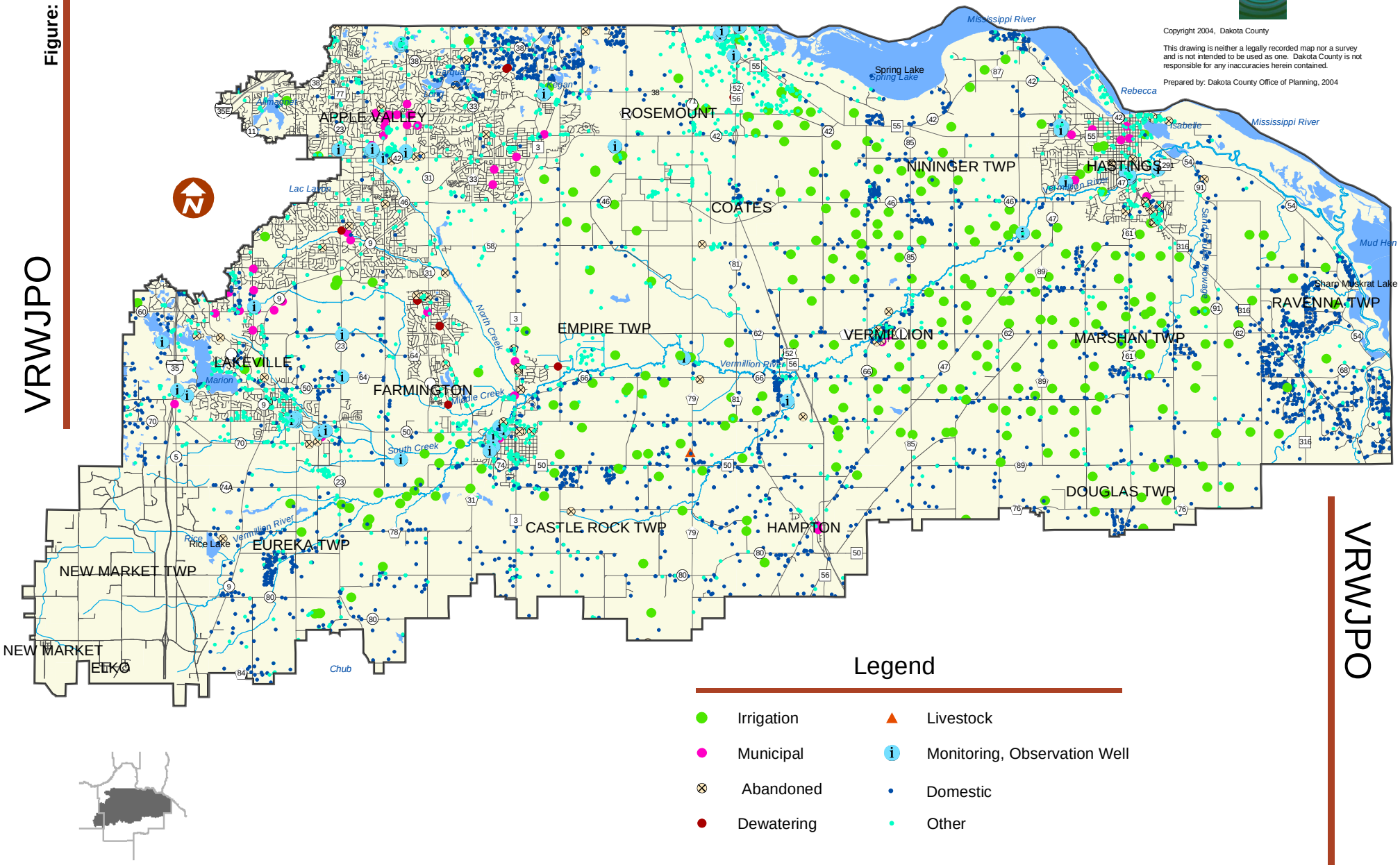


## Legend

- Irrigation
- Municipal
- Abandoned
- Dewatering
- Livestock
- Monitoring, Observation Well
- Domestic
- Other

0 1 2 4 6

Miles

# Well Inventory

VRWJPO

Figure: 1.17

Figure: 1.18

VRWJPO

Vermillion River Watershed Joint Powers Organization



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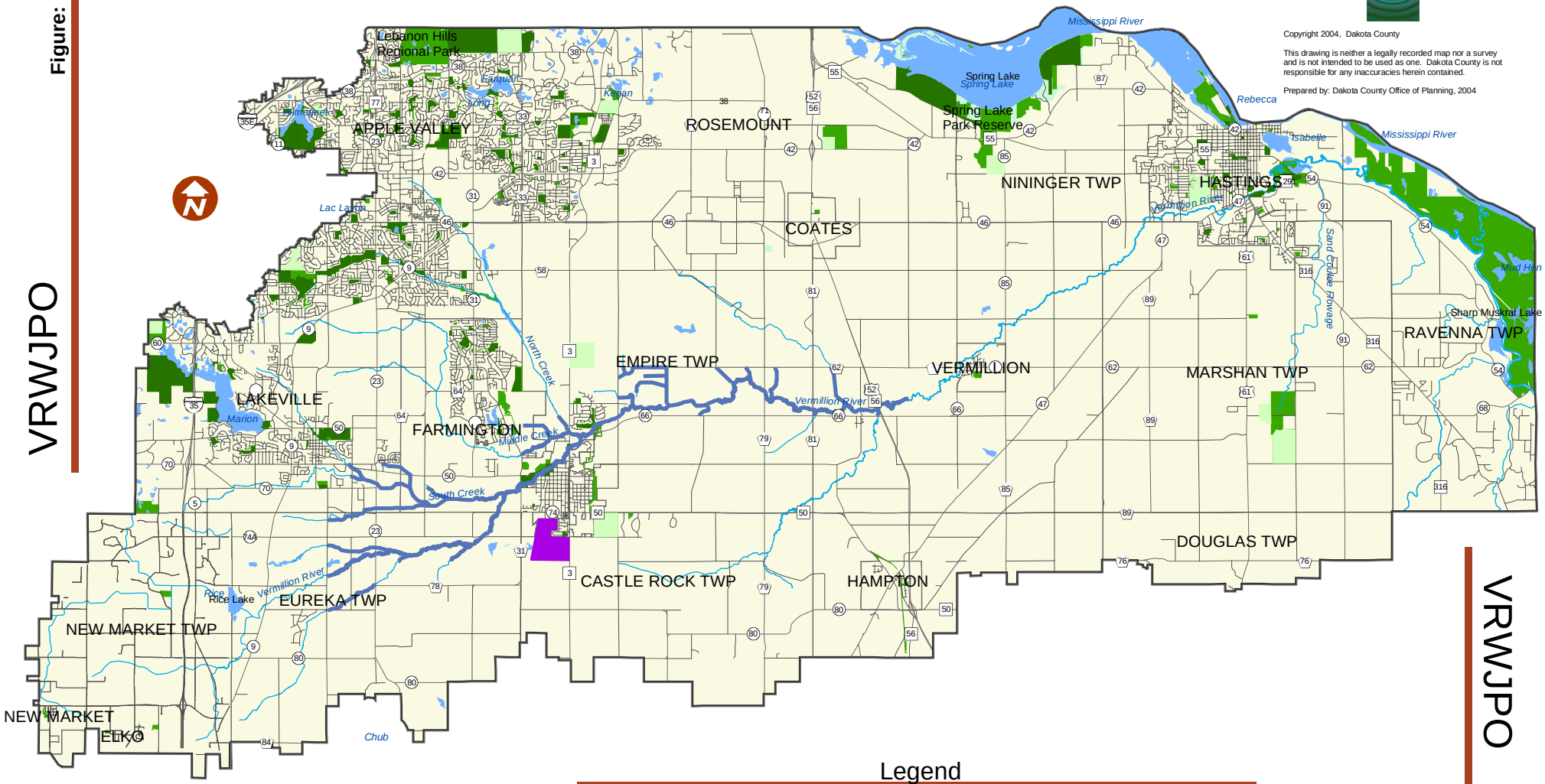


## Legend

- DNR Designated Trout Stream
- Recreational Landuse (MLCCS)
- Fairgrounds
- Parks
- Golf Courses

0 1 2 4 6

Miles

# Recreational Facilities

VRWJPO

Figure: 1.18

County parklands are scattered throughout the Watershed (Figure 1.18). Together, they offer a wide variety of recreational opportunities including camping, picnicking, sporting, interpretive, and other activities.
The water resources of the Watershed also offer many recreational opportunities. The lakes in the Watershed provide areas for fishing, swimming, and boating. Characteristics of area lakes are discussed in more detail in Section 2.

The Vermillion River was listed as impaired for swimming in 1998 due to excessive levels of fecal coliform bacteria from the headwaters to the Hastings Dam. The MPCA does not recommend swimming or wading in areas with the following fecal coliform counts:

"Fecal coliform organisms: Not to exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 400 organisms per 100 milliliters. The standard applies only between April 1 and October 31." (Minn. Rules Chapter 7050.0222, Subp. 2. Class 2A Waters, aquatic life and recreation)

The trout in stretches of the Vermillion River and some of its tributaries make the River popular for fishing; however, public access to the River is limited. River canoeing and kayaking are also recreational activities engaged in, particularly in the lower reaches of the River below the falls in Hastings and the Vermillion River bottoms.

### 1.3.6 Aggregate Mining

There are high-quality aggregate deposits (sand, gravel, and bedrock) within the Watershed (Figure 1.19). Aggregate extraction can impact the land and water resources in the Watershed, especially when gravel mine and quarry activities occur at or below the water table. Water levels within mines and quarries are directly linked to the groundwater system. For additional discussion on aggregate mining, see the discussion on aquifers in Section 2. For a snapshot of where mining is occurring today, see Figure 1.20.

### 1.3.7 Wastewater Treatment

Municipal wastewater treatment systems use a significant amount of water resources in the Watershed. There are six wastewater treatment plants located in the Watershed (Figure 1.20 and Table 1.2). The largest discharger to the Vermillion River is the Empire Wastewater Treatment Plant (WWTP). This plant opened in 1979 with a design capacity of 6 mgd (million gallons per day) to replace three outdated facilities in Lakeville, Farmington, and Apple Valley. Due to plant expansions, the Empire WWTP currently has a treatment capacity of 12 mgd. The plant serves five communities and approximately 100,000 people. The treated wastewater is regularly monitored. Information on the monitoring and quality of the wastewater from the Empire WWTP can be found in Section 2. The Metropolitan Council Environmental Services (MCES) plans to double the size of the Empire WWTP to 24 mgd by 2005. Recognizing that the discharge volume increase from this expansion could be detrimental to the Vermillion River, the MCES will stop discharging to the River and pump the treated wastewater through an outfall pipe and discharge it directly into the Mississippi River

Figure: 1.19

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Vermillion River Watershed Joint Powers Organization



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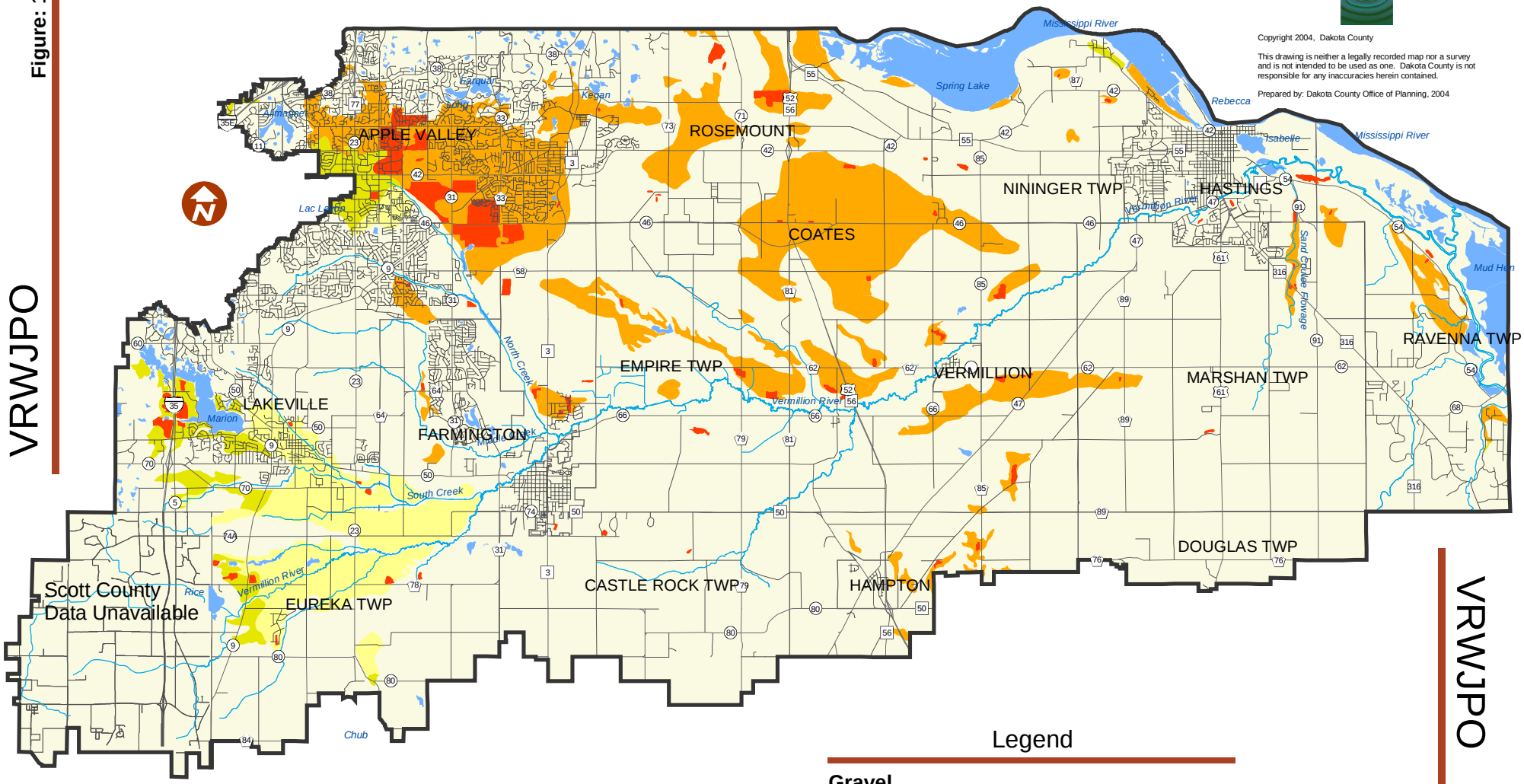


## Legend

**Gravel**

- Good Quality <20 Feet from Water Table
- Good Quality >20 Feet from Water Table
- Ex Quality >20 Feet from Water Table
- Quarry

0 1 2 4 6

Miles

# Aggregate

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

VRWJPO

Figure: 1.19

Figure: 1.20

VRWJPO

Vermillion River Watershed Joint Powers Organization



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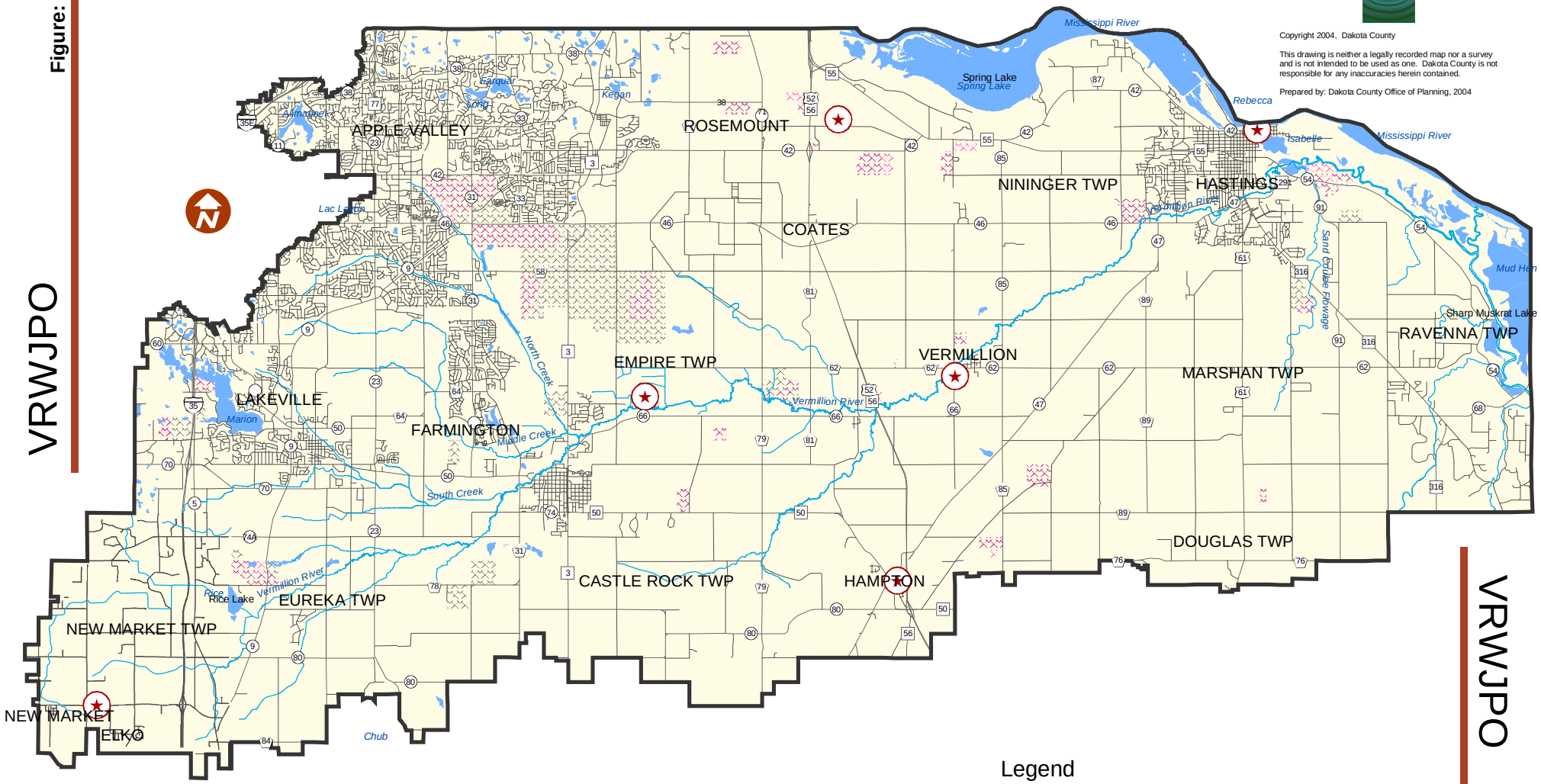


## Legend

- Active Mines
- Misc. Mining (Proposed and Recently Completed)
- Waste Water Treatment Plants

0 1 2 4 6

Miles

# Mining and Wastewater Treatment

VRWJPO

Figure: 1.20

in Rosemount. The targeted date to end discharge to the Vermillion River is the end of 2007; however, projected delays could push ending plant discharge to the River into 2008.

**Table 1.2: Vermillion River Watershed Wastewater Treatment Plant Information**

| Plant Name | Operator | Discharge Waterbody | Current Capacity | Planned Expansions |
|---|---|---|---|---|
| Empire | Metropolitan Council Environmental Services (MCES) | Main Branch of Vermillion River | 12 mgd[1] (24 mgd by 2005) | Double size by 2005, remove discharge to Vermillion River and pipe it directly to the Mississippi River |
| Rosemount | MCES | Mississippi River | 1.28 mgd[1] | Replacement with a lift station, forcemain, and interceptor |
| Hastings | MCES | Mississippi River | 2.34 mgd[1] | None |
| Elko/New Market | Cities of Elko and New Market | Main Branch of Vermillion River | 95,000 gpd[2] | Phased expansion to 0.735 mgd[1]; Met Council interceptor to replace existing plant by 2010. |
| Hampton | City of Hampton | South Branch of Vermillion River | 100,870 gpd[2, 3] | None |
| Vermillion | City of Vermillion | Main Branch of Vermillion River | 54,000 gpd[2] | None |

1) mgd = Million gallons per day
2) gpd = Gallons per day
3) Lagoon with no discharge December through March

Individual sewage treatment systems (ISTS or septic systems) are found throughout the Watershed outside of municipally sewered areas. When installed and maintained properly, septic systems are efficient in the treatment and disposal of wastewater. Because septic systems discharge directly into the ground, there is an increased risk of groundwater contamination from improperly designed or maintained systems. It is a conservative estimate that approximately 40 percent of the ISTS in the Watershed are failing systems. Failing and outdated ISTS were implicated as the primary source of fecal coliform bacteria contamination in the Vermillion River in a 2004 Vermillion River study. Evidence of contamination related to septic system failure has been found in groundwater in the Hastings area (Section 2 and Appendix B). In 1994, the Minnesota Legislature passed the ISTS Act (Minn. Stat. § 115.55 and 115.56). The purpose of this Act was to address serious human health concerns related to failing septic systems. ISTS Act requirements are adopted and enforced locally by counties, townships, and cities. See Appendix C for local ISTS staff contacts.

Figure: 1.21

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Vermillion River Watershed Joint Powers Organization



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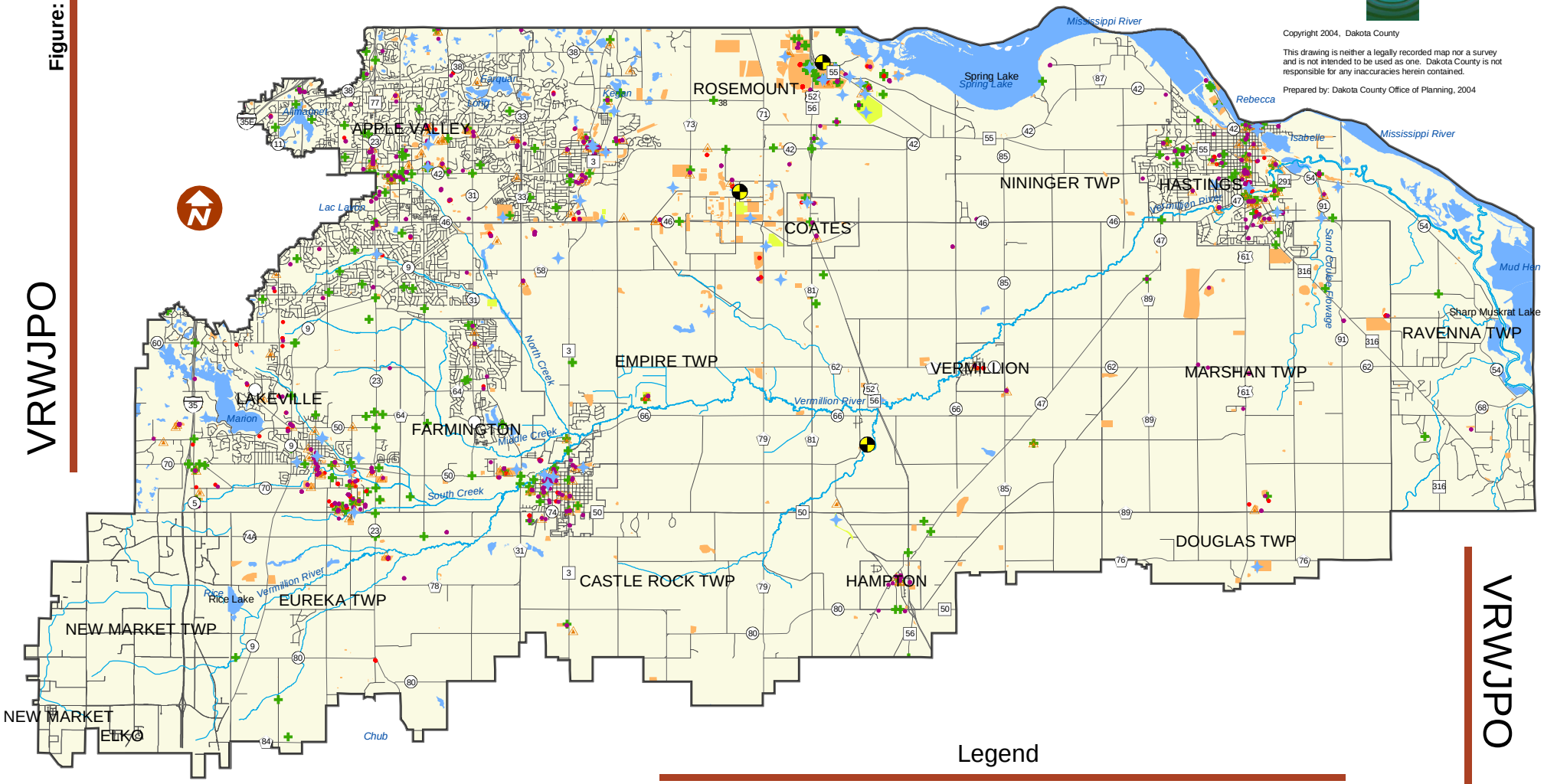


## Legend

- MPCA MES site
- Superfund Site
- MPCA Spills
- MPCA Registered Tank
- Leaking Underground Storage Tank
- Hazardous Waste Generator

Dump Site

- Unregulated Facility
- Regulated Waste Facilty

0 1 2 4 6

Miles

# Environmental Hazards

VRWJPO

Figure: 1.21

### 1.3.8 Solid Waste, Hazardous Waste and Waste Sites

Solid waste may contain harmful chemicals, toxic substances, and pathogens (bacteria and viruses) that have the potential to contaminate water resources. Solid waste is regulated in the Watershed under Dakota County Ordinance No. 110 and Scott County Ordinance No. 2. These ordinances require that the Counties license all solid waste disposal facilities (Figure 1.21). The currently operating landfills, although lined per State Statute when they were constructed, have the long-term potential to contaminate water resources.
Waste disposal in unlicensed facilities is prohibited with the exception of backyard composting and restricted land disposal on agricultural lands (Dakota County only, see Ordinance No. 110). The improper on-site disposal of waste by landowners and illegal dumping of waste throughout the Watershed are of greatest concern because of the potential to pollute water resources.

Materials exhibiting chemical or physical properties that may pose a threat to public health or the environment are considered hazardous waste. Substances such as solvents, paints, chemicals, acids, oil, lead acid batteries, heavy metals, fertilizers, pesticides and other materials fall into this waste category. Companies, sites, or people that handle hazardous waste for use, storage, transport or disposal are considered generators. Hazardous waste is regulated under Dakota County Ordinance No. 111 and Scott County Ordinance No. 12. In 2003, there were 1,288 hazardous waste generators that have registered in the Dakota County portion of the Watershed (Figure 1.21). Simply because a site is registered as a hazardous waste generator does not imply that a release of materials has occurred; however, these sites do represent locations where a higher risk of contamination exists.

MPCA remediation sites are locations where harmful or potentially harmful substances are accidentally or through legal or illegal activity released into the environment (Figure 1.21). Cleanups are coordinated between the County and the MPCA. There are a variety of different sites in the Watershed that fall into this category:

- ***Superfund Sites:*** Abandoned or uncontrolled hazardous waste sites where the release or potential release of hazardous substances poses a risk to human health or the environment. The MPCA has identified five superfund sites in the Watershed.
- ***Monitored Environmental Sites:*** Environmental sites that are monitored under a variety of MPCA and EPA programs. These sites represent locations where monitoring, cleanup (mandatory and voluntary), or investigation of harmful materials is occurring. There are 59 MES sites located within the Watershed.
- ***Storage Tank Systems:*** Whether above or belowground, tank systems used for the storage of harmful materials have the potential to become environmental hazards if spills or leaks occur. The EPA estimates that 35% of underground storage tanks develop leaks. There are 1,535 storage tank systems (active and removed) and 158 leaking underground storage tanks registered in the Watershed.
- ***Spills:*** Spills of hazardous substances can occur anytime during the handling, storage, or transportation process. These direct releases into the environment often require immediate, emergency response. Under Minn. Stat. § 115.061, it is the duty of every citizen to report the spill of materials that might cause harm to the environment (with the exception of petroleum spills under five gallons). There have been 625 spills between 5 and 100,000 gallons reported in the Watershed.

At locations throughout the Watershed, hazardous materials were released or the land use activities increase the risk of hazardous material releases into the natural environment. There are 786 dumpsites (including all types currently known to exist) in the Watershed. The location and nature of these sites are monitored by various government agencies. During the early 1990s, the Dakota County Environmental Management Department initiated the Waste Sites Program. Since that time, a comprehensive Waste Sites Inventory of all known waste sites in Dakota County has been assembled. The number of potential environmental hazard sites in the Watershed is constantly changing as new sites are reported and old sites are cleaned up (Figure 1.21).

### 1.3.9 Animal Feedlots

Animal feedlots are defined as "a lot or building or combination of lots and buildings intended for the confined feeding, breeding, raising, or holding of animals and specifically designed as a confinement area in which manure may accumulate. Or, where the concentration of animals is such that a vegetative cover cannot be maintained within the closure. Open lots used for the feeding and rearing of poultry (poultry ranges) shall be considered to be animal feedlots. Pastures shall not be considered animal feedlots" (Minn. Rules 7020.0300) (Figure 1.22). Because of the high density of animals and lack of vegetation, these areas can contaminate waterbodies with animal waste, sediment, and other pollutants. The MPCA first adopted rules governing feedlots in 1971 (amended 1974, 1978 and 2000). The regulatory feedlot program may be conducted through an arrangement between the MPCA and county governments. Dakota and Scott Counties are designated feedlot permitting counties, where a county-appointed feedlot officer assumes the responsibility and leadership for implementing rules and regulations for feedlots of up to 1,000 animal units. With the rural nature of the Watershed, feedlots and the manure produced could be a significant water quality management issue. The Vermillion River Watershed Fecal Coliform Bacteria Study (May 2004) found that individual sewage treatment systems (ISTS) were the highest contributor to the fecal coliform bacteria problem in the Vermillion River, followed by manure applied to fields, urban runoff, and feedlot runoff, respectively. In other words, feedlots were not as great a contributor to the problem as the manure produced by livestock and spread as fertilizer on farm fields. The proper management of manure and its application as a fertilizer will be important in reducing the level of fecal coliform bacteria in the River.
`

Figure: 1.22

VRWJPO

Vermillion River Watershed Joint Powers Organization



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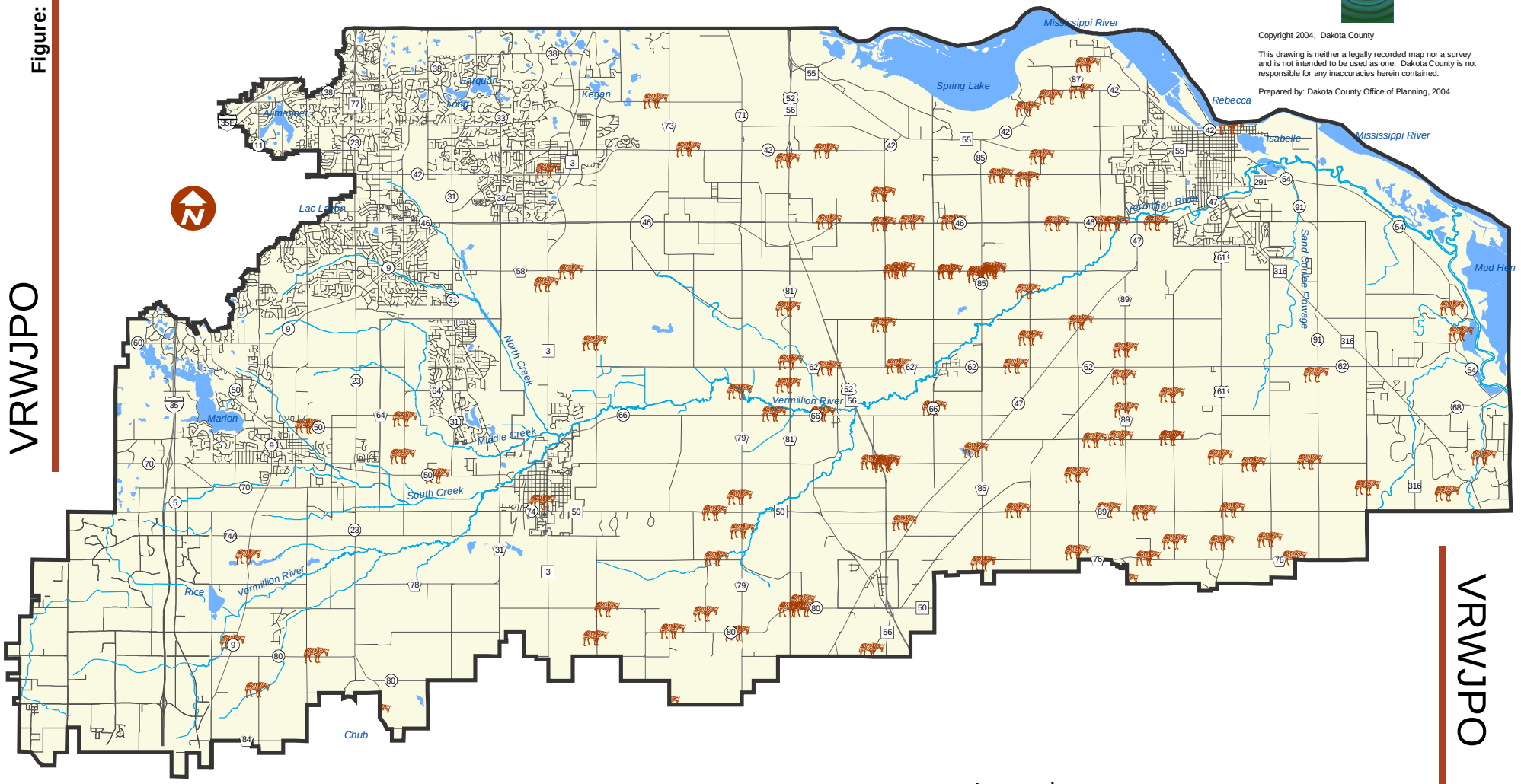


Legend

Feedlots

# Feedlots

0 1 2 4 6

Miles

VRWJPO

Figure: 1.22

# SECTION 2: WATER RESOURCES (or HYDROLOGIC SYSTEMS)

## 2.0 INTRODUCTION

This section describes the hydrologic/water features and characteristics of the Vermillion River Watershed (Watershed). The information presented goes beyond the standard inventory of features, and includes summary information from a number of existing reports and studies concerning management strategies. The information presented provides a basic understanding of the influence of the hydrologic cycle on the current state of the Vermillion River, as well as the foundation for making management decisions. The hydrologic systems of the Watershed are very complex and inter-related. However, for the purposes of presentation, this section is divided into three subsections: 1) Climate, 2) Surface Water Resources, and 3) Groundwater.

## 2.1 CLIMATE

In the United States, the National Oceanic and Atmospheric Administration (NOAA) is the central agency in charge of collecting and interpreting climatic information. The National Weather Service (a division of NOAA) has collected over 110 years of climate data for the Vermillion River Watershed.

Terminology Note: When the term "normal" is used to describe climatic, it refers to the average of the past 30 years (current official time period is 1971-2000) not the entire available climate record (1891-2001). This description denotes that climate changes over time. For example, the normal climatic conditions in 1942 are not necessarily the same as normal conditions for today.

### 2.1.1 Temperature

The temperature régime of the Watershed is characterized by warm summers and cold winters. The normal annual temperature is 44.4° F. The coldest temperatures occur in January (normal monthly temperature = 11.6° F), and the warmest temperatures occur in July (normal monthly temperature = 71.8° F) (Table 2.1). Annual temperatures fluctuate through time, but there has been an overall trend of warming over the past century. Temperature régimes are important factors in determining not only the form but also the amount of precipitation falling in a given time. In general, the warmer the year, the more precipitation that falls.

**Table 2.1: 1971-2000 Temperature Normals in the Vermillion River Watershed (ºF)**

| Weather Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Farmington | 13.1 | 20.1 | 32.2 | 47.2 | 60.1 | 68.5 | 72.2 | 69.8 | 61.2 | 49.3 | 32.6 | 18.6 | 45.4 |
| Rosemount | 10.1 | 17.1 | 30.3 | 45.3 | 57.5 | 67.0 | 71.0 | 68.6 | 59.9 | 48.2 | 30.9 | 15.9 | 43.5 |
| Hastings | 11.5 | 18.4 | 30.3 | 45.6 | 58.0 | 67.6 | 72.1 | 70.0 | 60.7 | 48.7 | 32.1 | 17.7 | 44.4 |
| MSP Airport | 13.1 | 20.1 | 32.1 | 46.6 | 59.3 | 68.4 | 73.2 | 70.6 | 61.0 | 48.7 | 32.5 | 18.7 | 45.4 |

### 2.1.2 Precipitation

The Watershed normally gets the equivalent of 31.42 inches of water in rain and snow annually. Precipitation events occur throughout the four seasons; however normally, the wettest months are June through August (4.54 inches) and the driest months are December through February (Table 2.2). Similar to the temperature records, annual precipitation amounts fluctuate from year to year and show the same increasing trend over the past century. This precipitation trend can probably be attributed to the warming trend because of the close correlation between the two climatic variables.

**Table 2.2: 1971-2000 Precipitation Normals in the Vermillion River Watershed (inches)**

| Weather Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Farmington | 0.92 | 0.74 | 1.95 | 2.65 | 3.61 | 4.48 | 4.13 | 4.54 | 3.14 | 2.21 | 2.02 | 1.04 | 31.43 |
| Rosemount | 1.22 | 0.86 | 2.25 | 2.87 | 4.00 | 4.60 | 4.68 | 4.63 | 3.50 | 2.52 | 2.34 | 1.13 | 34.60 |
| Hastings | 0.88 | 0.63 | 1.67 | 2.76 | 3.36 | 4.12 | 4.42 | 4.01 | 3.09 | 2.19 | 1.97 | 0.82 | 29.92 |
| MSP Airport | 1.04 | 0.79 | 1.86 | 2.31 | 3.24 | 4.34 | 4.04 | 4.05 | 2.69 | 2.11 | 1.94 | 1.00 | 29.41 |

### 2.1.3 Design Storms

It is important to use appropriate, consistent and commonly accepted precipitation amounts for the design of hydrologic features in the Watershed. Rainfall frequency and duration information for the Minneapolis/ St. Paul Metropolitan Area is commonly taken from the U.S. Department of Commerce's Weather Bureau Technical Paper No. 40 (TP-40); however, another more recent source of data is the Illinois State Water Survey's *Rainfall Frequency Atlas of the Midwest (1992).* The statistically derived data are used for determining critical storms that represent varying design conditions or levels of service (Table 2.3). Additional references include the National Oceanic and Atmospheric Administration's Technical Memorandum *NWS Hydro-35:5 – to 60-Minute Precipitation Frequency for the Eastern and Central United States (June 1977),* and the Metropolitan Council's *Precipitation Frequency Analysis for the Twin Cities Metropolitan Area (January1995*).

**Table 2.3: Dakota County Rainfall for Durations from 15 Minutes to 24 Hours and Return Periods from 1 to 100 Years**

| Return Frequency | 24-Hr | 12-Hr | 6-Hr | 3-Hr | 2-Hr | 1-Hr | 30-Min | 15-Min |
|---|---|---|---|---|---|---|---|---|
| 1-Year | 2.3 | 2.0 | 1.7 | 1.5 | 1.3 | 1.1 | 0.8 | 0.6 |
| 2-Year | 2.8 | 2.5 | 2.1 | 1.8 | 1.7 | 1.3 | 1.1 | 0.8 |
| 5-Year | 3.6 | 3.1 | 2.7 | 2.3 | 2.1 | 1.7 | 1.3 | 1.0 |
| 10-Year | 4.1[(1)] | 3.6 | 3.1 | 2.6 | 2.4 | 1.9 | 1.5 | 1.1[(2)] |
| 25-Year | 4.8 | 4.1 | 3.6 | 3.0 | 2.8 | 2.2 | 1.8 | 1.3 |
| 50-Year | 5.3 | 4.6 | 3.9 | 3.4 | 3.0 | 2.5 | 1,9 | 1.4 |
| 100-Year | 5.8 | 5.0 | 4.3 | 3.7 | 3.3 | 2.7 | 2.1 | 1.5 |

[(1)] 10% annual chance of occurrence; there is a 10% annual chance of a 24-hour duration rain event that produces 4.1 inches of precipitation.
[(2)] 10% annual chance of occurrence; there is a 10% annual chance of a 15-minute duration rain event that produces 1.1 inches of precipitation.

Source: Rainfall Frequency Atlas of the Midwest (F.A. Huff and J.R. Angel, 1992)

## 2.2 SURFACE WATER RESOURCES

This subsection describes the surface water resources of the Watershed, first in terms of topography and drainage of the Vermillion River and its tributaries, and second, through an inventory of public ditches, lakes, protected waters and wetlands, and a description of Vermillion River floodplain and channel conditions. This subsection then reviews and summarizes past studies and information regarding water quantity and quality.

Topography and Drainage. The hydrologic system is defined in terms of the Watershed's drainage network and includes streams, wetlands, lakes, floodplains, and ditches. The Watershed drainage pattern is typical of a glaciated area comprised of moraines and outwash plains (see Section 1, Geomorphology and Surficial Geology). The western part of the Watershed has varied topographical features. The eastern portion flattens out into a level outwash plain (Figure 2.1). The drainage system is composed of the main waterway, the Vermillion River, several tributaries, intermittent streams, and a few man-made ditches. Figure 2.1 shows the major Watershed drainage features, including subwatershed boundaries, lakes, streams, and drainage ditches. Wetland and floodplain maps are presented later in this section.

The main stem of the Vermillion River begins in New Market Township in southeastern Scott County and flows generally northeast across Dakota County to its confluence with the Mississippi River to the north in Hastings and to the south near Red Wing. The Vermillion River is the only river in Minnesota that has mouths that flow both north and south. The Vermillion River is approximately 38 miles long and drops approximately 420 feet from its source to its mouth, including a 90-foot drop at the falls in Hastings. Portions of the Vermillion River are designated as trout waters under Minnesota Statutes § 97C.005, Special Management Waters.

Several tributaries enter the Vermillion River throughout the Watershed. One major tributary is the South Branch that originates in Castle Rock Township and joins the main stem of the Vermillion River in southwestern Vermillion Township. Middle Creek, North Creek, and South Creek enter the Vermillion River from the north and west near Farmington. The northeast corner of Rosemount, the northern half of Nininger Township and the northwest portion of Hastings are actually outside the hydrologic boundary of the Watershed, but within the Vermillion River Watershed Joint Powers Organization's legal boundary, and drain directly to the Mississippi River. In addition, there are many smaller tributaries and water bodies that are considered "Waters of the State" as defined in State statute and rule.

Information regarding storm sewer drainage systems and resulting discharge rates can be found in individual local government stormwater management plans where available.

Public Ditches. Only one public ditch, Scott County Ditch 12, is within the Watershed. The ditch remains under the administration of Scott County. There are no public ditches within the Dakota County portion of the Watershed.

Figure: 2.1

VRWJPO

Vermillion River Watershed Joint Powers Organization



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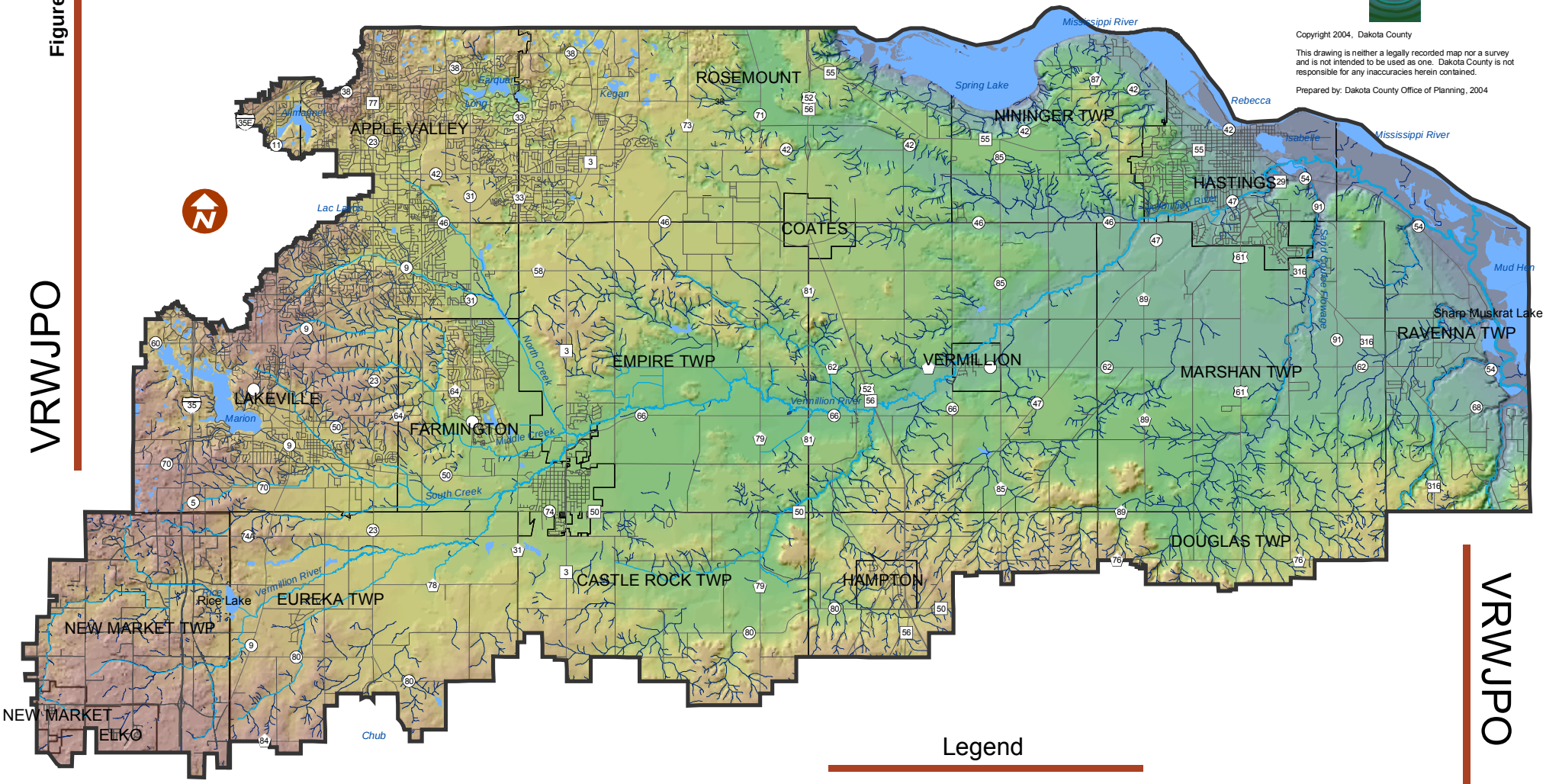



Legend

Elevation

High : 1230

Low : 640

Subwatershed Boundary

Intermittent Streams

0 1 2 4 6

Miles

# Topography and Drainage

VRWJPO

Figure: 2.1

Lakes. There are a number of lakes and wetlands in the Watershed, located primarily in the northwest, extreme western and extreme eastern portions of the Watershed. The eastern area lakes are located adjacent to the Mississippi River and floodplain in Hastings and Ravenna Township. The largest lake, not associated with the Mississippi River, is Lake Marion in Lakeville. This lake has a surface area of approximately 540 acres. Table 2.4 lists the physical features of the lakes in the Watershed. Water quality data is presented in a subsequent section.

**Table 2.4: Physical Lake Characteristics**

| MDNR – ID # | Lake | Max. Depth (feet) | Surface Area (acres) | Public Boat Access |
|---|---|---|---|---|
| 19-0021 | Alimagnet | 9 | 109 | (Canoe only) |
| 19-0023 | Farquar | 6.0 | 74 | No |
| 19-0004 | Isabelle | 6.0 | 99 | No |
| 19-0011 | Kegan | NA | 41 | No |
| 19-0026 | Marion | 17 | 540 | Yes |
| 19-0022 | Moeller (Long) | NA | 36 | No |
| 19-0003 | Rebecca | 15 | 77 | Yes |
| 70-0001 | Rice | NA | 85 | No |
| 19-0005 | Spring (Mississippi River Pool 2) | 17 | 1,839 | Yes |
| -- | Mudhen | NA | NA | NA |
| -- | Sharp Muskrat | NA | NA | NA |

Source: MDNR Sportsman Guide
NA Not available

Protected Waters and Wetlands. The "protected" waters and wetlands of the Watershed are those that have been inventoried by the Minnesota Department of Natural Resources (MDNR) (Figure 2.2). All Type III, IV, and V wetlands, as defined in the United States Fish and Wildlife Service (USFWS) Circular No. 39 (1971 edition), were inventoried. The definition of public waters (Minn. Stat. § 105.37, Subp. 14) includes wetlands that are 10 or more acres in size in unincorporated areas, and 2.5 or more acres in size in incorporated areas.

The USFWS has also compiled wetland maps as part of the National Wetland Inventory (NWI) (Figure 2.3). NWI maps identify wetland Types I through VIII, regardless of size, and therefore provide a more complete wetland area accounting. The NWI map for the Watershed is on file with the municipalities. Local municipalities should also be consulted for wetland inventories and classifications. Many of the municipalities in the Watershed have completed Wetland Management Plans included detailed inventories and classifications.

Floodplain. The Federal Flood Insurance Program has delineated the Watershed's floodplains and includes floodway and flood fringe areas that would be inundated during a 100-year flood event. The 100-year floodplain, as defined by the Flood Insurance Program for flood insurance purposes, is provided in Figure 2.4, which shows many of the tributaries as unnumbered zone A.

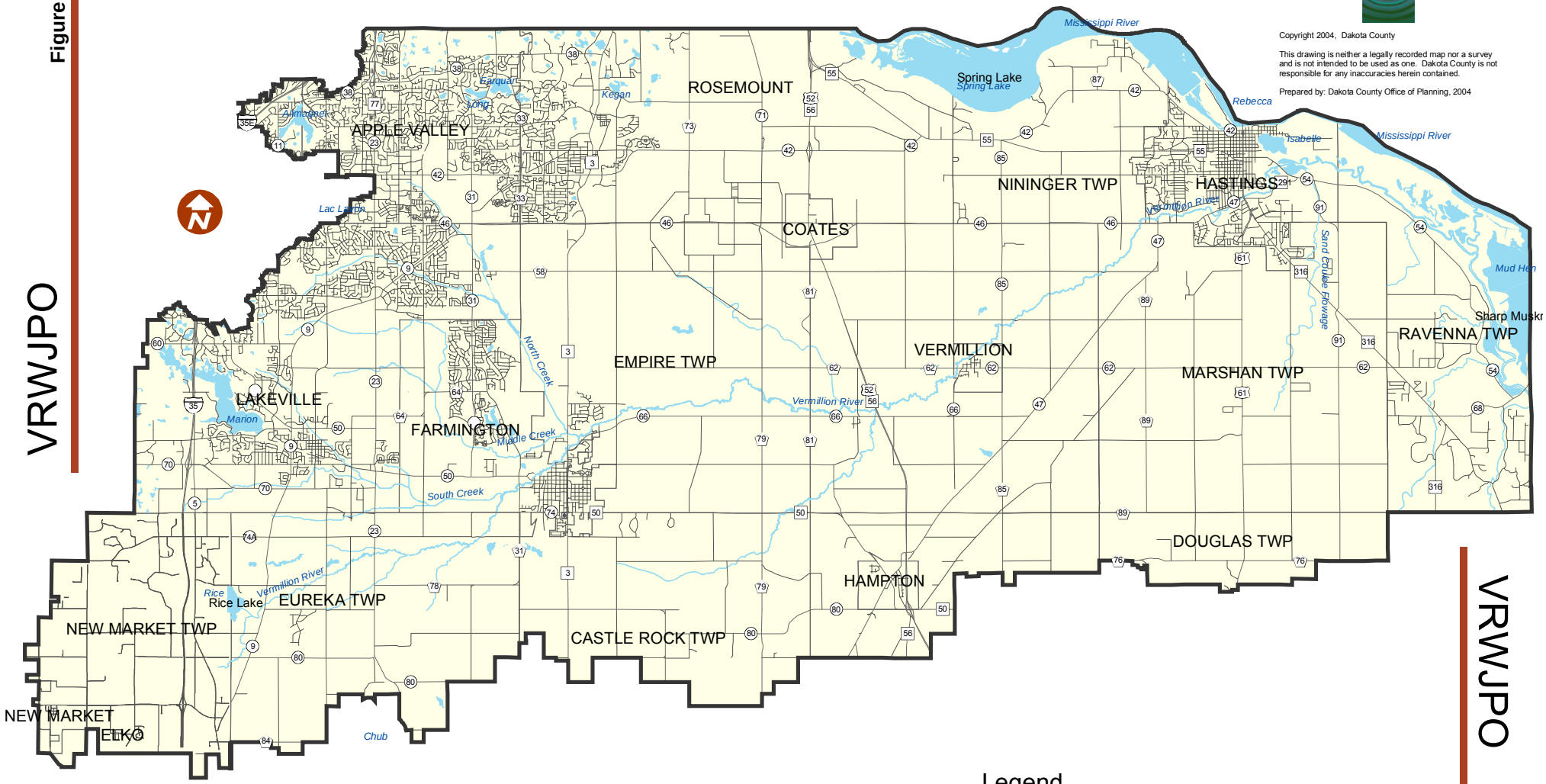
Figure: 2.2

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




Legend

DNR protected waters

# DNR Protected Waters Inventory

0 1 2 4 6

Miles

VRWJPO

Figure: 2.2

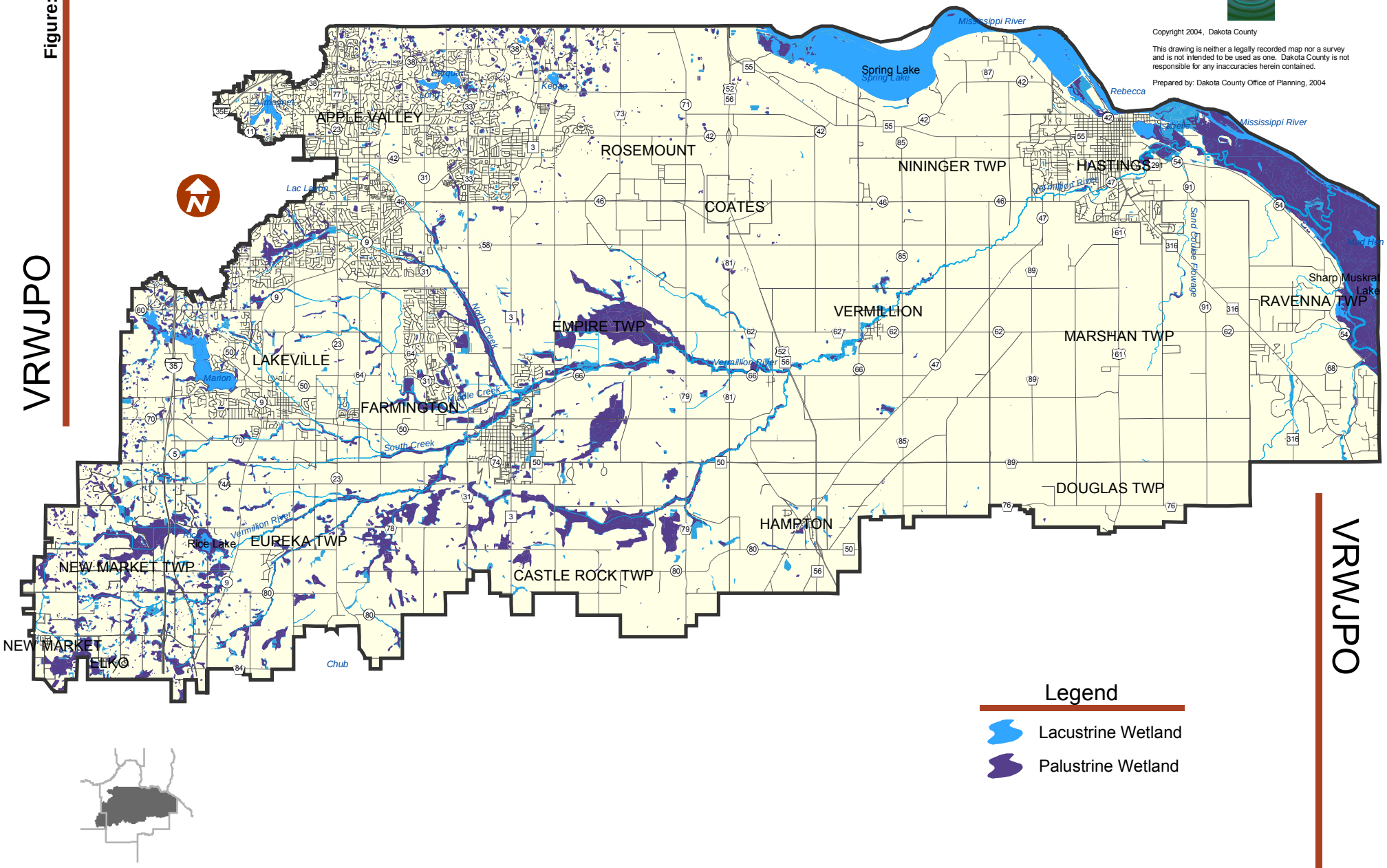
Figure: 2.3

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




# Wetlands

VRWJPO

Figure: 2.3

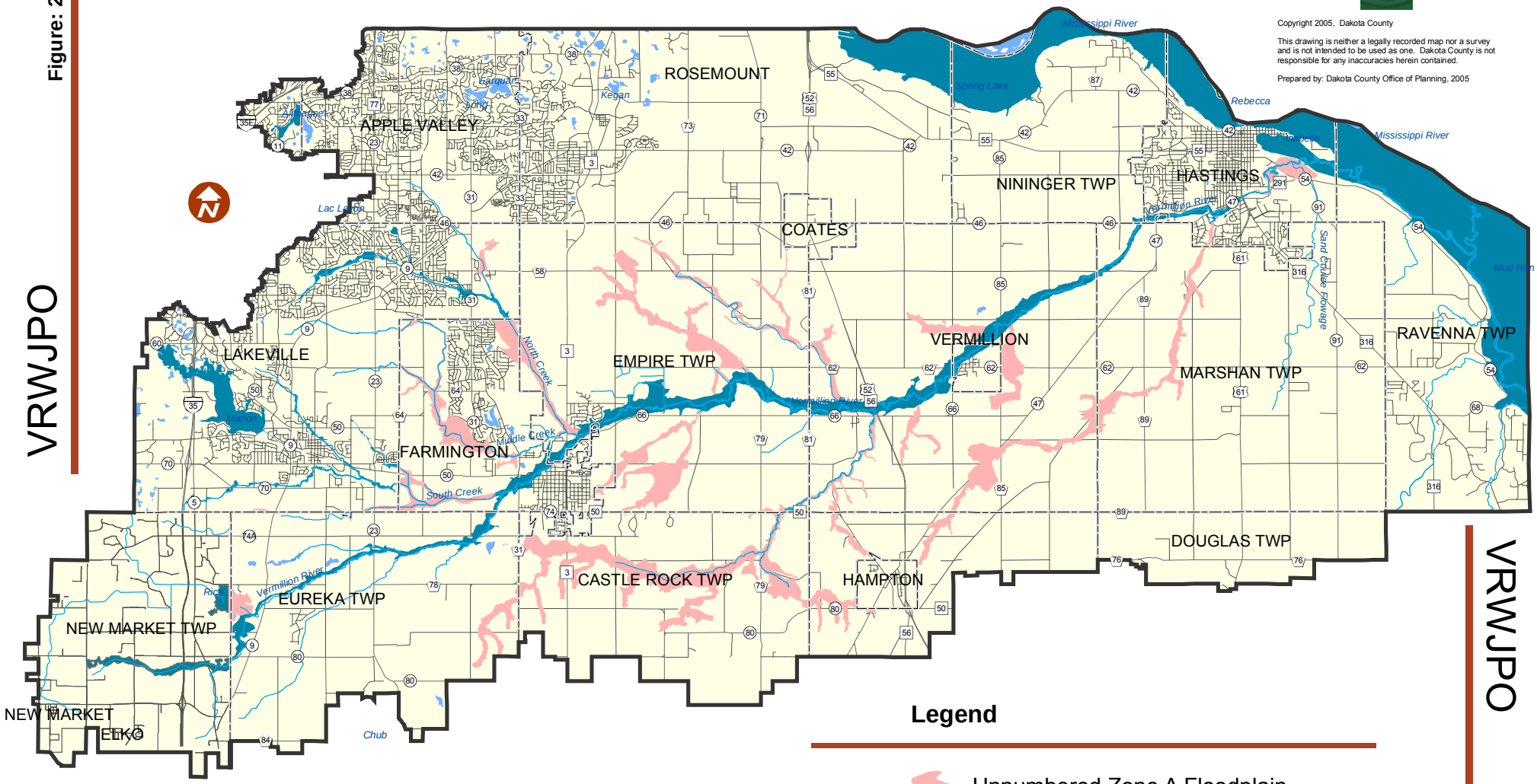
Figure: 2.4

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2005




# 100 - Year Floodplain

VRWJPO

Figure: 2.4

Detailed studies for floodplain determination have been completed for most of these tributaries. However, the studies have not been formally reviewed and approved by the Federal Emergency Management Agency (FEMA). Detailed information on these areas is available from the Dakota County Office of Planning, the Scott County Natural Resource Department and the MDNR Area Hydrologist. Individual Flood Insurance Studies and the resultant maps are on file at the MDNR and are available from FEMA. Flood Insurance Study maps for unincorporated townships in Dakota County can also be viewed at the Office of Planning in Apple Valley, and at the Scott County Natural Resources Department for New Market Township.

Vermillion River Channel Conditions. A Vermillion River Assessment was completed in 1999 to evaluate the physical and biological condition of the Vermillion River. This study consisted of river reconnaissance, morphology descriptions and fish community sampling (including brown trout). Details can be found in the Vermillion River Assessment report, and the MDNR (1999) and its associated appendices. A summary of the major findings taken from the Executive Summary of the report is given here.

The Vermillion River has a wide variety of stream types, land uses, and geologic materials scattered throughout its large watershed. Much of the River has been altered, degraded, or is in transition; however, several sections of the River have good channel stability. A 1959 report by the Minnesota Department of Conservation stated that almost the entire River downstream from Vermillion Township was pastured, and bank erosion was moderate to severe. The Vermillion River had poor water quality, poor riparian vegetation, and did not support trout as it once had. Since that time, wastewater treatment facilities have improved, riparian vegetation quality has improved, and the amount of grazing and pasture with access to the River has decreased. However, the main channel is still overwide or is incising (deepening), which causes near vertical banks, bank sloughing, and further widening. The River has also lost a lot of its sinuosity (winding and curving); tributaries in particular have been subject to straightening and ditching.

The stream types identified along the main branch of the River are very sensitive to disturbance, have very high sediment supplies, and have a high potential for streambank erosion. This is primarily due to the gravel and sand dominated nature of area soils and streambank material. For these stream types, the quality and type of riparian vegetation has a significant controlling influence on bank erosion and channel stability. This is because the sand and gravel dominated soils are not strongly consolidated (held together) by the presence of organic matter and finer textured particles, leaving root structure as the primary factor holding these soils together against erosive forces.

The worst streambank and channel stability problems are in the middle reaches of the River to the bluff at Hastings. Problems are manifested in these areas as a result of a number of factors:

- Very high bank erosion potential for stream types identified and the unconsolidated gravel and sand streambank materials
- Past and current grazing practices that have changed the streamside riparian vegetation
- Increased flow volumes and flow durations at or near bankfull
- Past channel alterations (channelization).

The effects of grazing and conversion to pasture along the Vermillion River are largely from past activities. Of the 40 reaches where field assessments were completed, only five were open to grazing in 1999. However, many of the reaches still had grass dominated riparian vegetation presumably from past conversion to pasture. Some non-native grasses lack the rooting depth and density necessary to stabilize the unconsolidated streambank soils. The ideal riparian community for the Vermillion River includes a mix of trees, shrubs, forbs, and native grasses (e.g., Big Blue Stem and Switch Grass) with a variety of rooting depths.

Several highly eroded stream bank sections along the Vermillion River and its South Creek tributary have been repaired through the efforts of the MDNR, Dakota County Soil and Water Conservation District, Friends of the Mississippi River and the Metropolitan Council. The properties where the repairs have occurred are listed in Table 2.5.

**TABLE 2.5**

| Erosion Repair Property | Community Location | Section Location |
|---|---|---|
| ***Vermillion River*** | | |
| Endres Property | Hastings | 32 |
| Bauer Property | Marshan Township | 6 |
| Lindell/Mamer Property | Marshan Township | 6 |
| Girgen Property | Vermillion | 15 |
| Quade Property | Vermillion Township | 21 |
| Klaus Property | Vermillion Township | 19 |
| Stegmeier Property | Empire Township | 21 |
| Metropolitan Council Property | Empire Township | 21 (multiple locations) |
| Finden Property | Empire Township | 30 |
| ***South Creek*** | | |
| City of Lakeville/Dakota County | Lakeville | 33 & 34 (multiple locations) |
| Atlas Transport | Lakeville | 33 |

### 2.2.1 Surface Water Quantity

Surface water quantity, in terms of Vermillion River flows, has been the subject of a number of studies and reports. In fact, the study of this issue continues with Joint Powers Organization (JPO) flow monitoring efforts. Current flow monitoring station locations are shown on Figure 2.5. This section reviews some of the studies, provides an initial assessment of the JPO provisional flow monitoring data, and describes what is known about sources of water to the River (including wastewater treatment plant discharges). Studies reviewed include the:

- 1974 Flood Hazard Analysis by the U.S. Department of Agriculture Soil Conservation Service
- 1998 U.S. Army Corps of Engineers HEC-1 Model Analysis

- 2000 Draft Vermillion River Watershed Management Plan
- 2002 Vermillion River Volume Study by Montgomery Watson Harza

1974 Flood Hazard Analysis. This analysis provides flood hazard information for the main branch of the River. Pertinent report information is summarized here.

The report notes that local residents stated the Vermillion River goes out of its banks almost every year, but there is limited documentation of these events. It also noted that floods occurred in September 1938, April 1952, April 1965, March 1966, and March 1969, with the April 1965 flood being the largest known.

The report estimated that a 100-year frequency flood would inundate 2,700 acres in the study area. Within the City of Farmington, 186 acres would be flooded, affecting 11 residences, one commercial establishment, and the wastewater treatment plant. Within the City of Vermillion, 114 acres would be flooded, affecting two residences and the wastewater treatment plant. Additionally, the report identified one residence subject to flooding within Empire Township, approximately 2 miles upstream from the City of Vermillion. Fifteen roads, three railroads, and all or parts of ten rural farmsteads were also identified as subject to flooding.

One important thing to note in the report is that flooding can occur during periods of excessive runoff from snowmelt, rainfall, or a combination of the two. Spring is the main flood season; however, floods due to intense thunderstorms may occur at other times.

1998 U.S. Army Corps of Engineers (COE) HEC-1 Modeling. The COE St. Paul District performed a hydrologic study of the Vermillion River using the HEC-1 model. The HEC-1 model was calibrated by adjusting the model's input parameters to produce flows that match the adopted discharge frequency curve at the USGS Empire gauge. The period of record used for developing the discharge frequency curve was a systematic record of 27 years over a 54-year historic period (1942-1945, 1965, and 1974-1995). The model was then verified by reconstituting a major storm event corresponding to about a 100-year storm for a 10-hour duration that occurred in September 1992 (page 42, 1998 Vermillion River Hydrologic Study). The timing of the computed peak at Empire was also near the observed peak. Using the model, 100-year existing and future condition discharges were reported for various subwatershed/runoff discharge points (Table 2.6). The future conditions model did not include any stormwater management practices.

Current and Future Land Use. Development in the Watershed upstream of Empire is nearing the threshold where resultant imperviousness affects runoff. Statistical tests by the COE did not show a significant increasing trend for annual peak flows; however, total annual flow volume at Empire did show a statistically significant increasing trend, due to a combination of land use changes in the upstream reaches and climate variability.

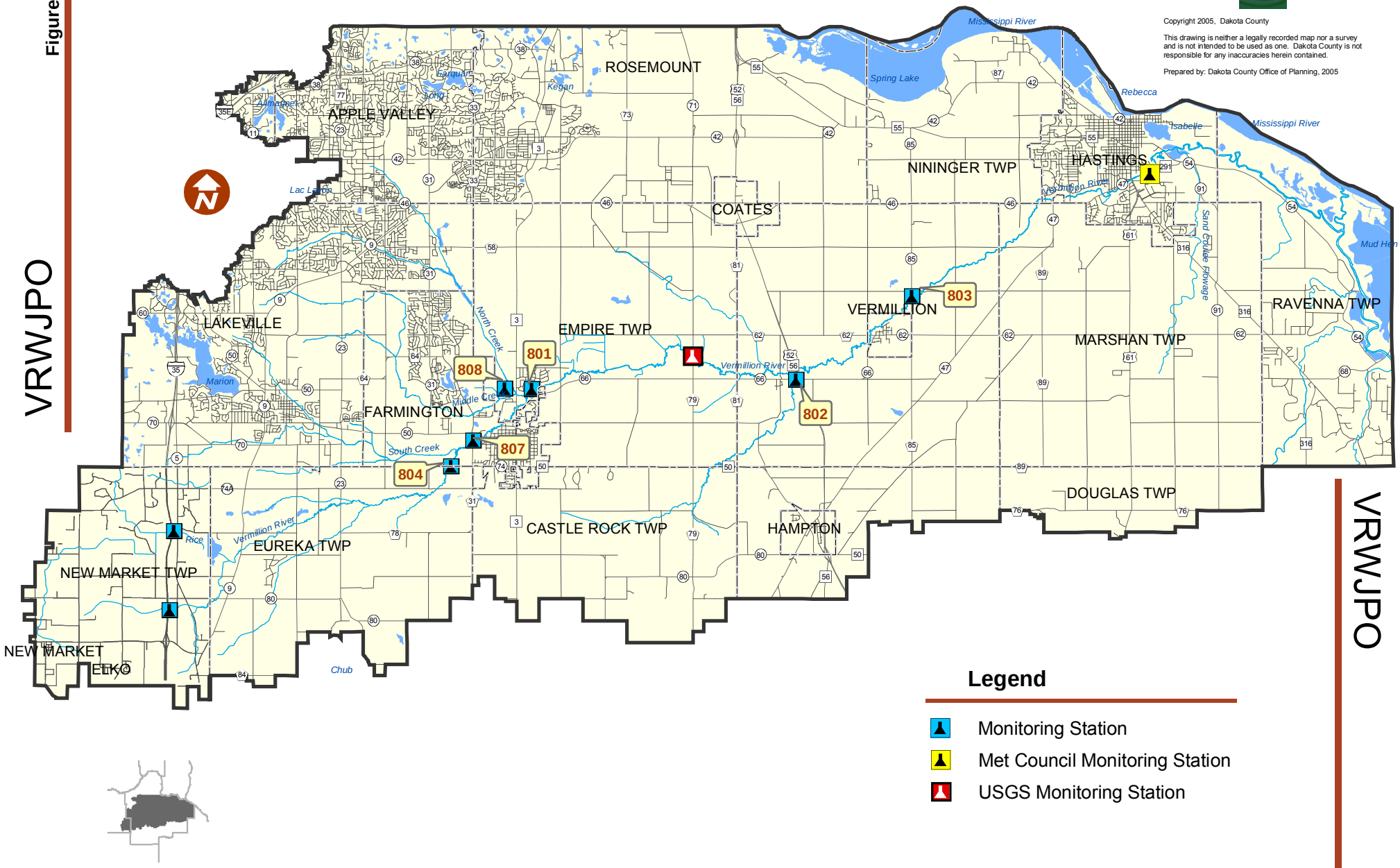
Figure: 2.5

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2005




## Legend

- Monitoring Station
- Met Council Monitoring Station
- USGS Monitoring Station

0 1 2 4 6

Miles

# Water Flow Monitoring Stations

VRWJPO

Figure: 2.5

A trend analysis of precipitation and flow volumes upstream from the Empire gauge was completed to see if these volumes are increasing over time. Figure 2.6 shows the annual volumes. Linear regression lines were fit to the data to see if any trends could be seen. Figure 2.7 shows that yearly precipitation volumes in the metro area. Concurrently, flow volumes measured at the Empire gauge are also increasing; however, the slope of this trend line is steeper than that for precipitation, indicating flow volumes are increasing at a higher rate than precipitation. If flow volumes are assumed to be due only to precipitation (ignores groundwater and WWTP flow impacts), about 16% of precipitation became river flow in the mid-1970s. Using the fitted curve, that value is over 30% in the late 1990s. (Figures 2.6 and 2.7 Source: Draft Vermilion River Watershed Plan, 2000, VRWMO.)

**Table 2.6: 100-Year COE HEC-1 Discharges, cfs* (w/o any future stormwater mgmt.)**

| Discharge Points[1] | Existing | 2040 Future[2] | % Increase |
|---|---|---|---|
| EL (Inflow to Lake Vermillion) | 991 | 991 | 0 |
| VR1 (Inflow to Lake Vermillion) | 639 | 639 | 0 |
| Outflow from Lake Vermillion | 1,039 | 1,039 | 0 |
| VR2 | 1,618 | 1,628 | 1 |
| South Creek | | | |
| SC1B | 372 | 539 | 45 |
| SC1D | 1,074 | 2,261 | 111 |
| SC1C | 1,907 | 3,384 | 77 |
| UNNC | 232 | 384 | 66 |
| UNSC | 498 | 1,735 | 248 |
| SC2A | 544 | 1,752 | 222 |
| SC2B | 2,128 | 3,801 | 79 |
| SC2 | 2,753 | 4,927 | 79 |
| Vermillion River Confluence with South Creek | 2,868 | 4,805 | 68 |
| VR3 | | | |
| VR4 | 2,879 | 4,780 | 66 |
| | 1,628 | 4,424 | 172 |
| Middle Creek | | | |
| MC1A | 285 | 806 | 183 |
| MC1B | 183 | 296 | 62 |
| MC1C | 143 | 260 | 82 |
| MC2A | 780 | 1,797 | 130 |
| MC2 | 1,275 | 2,441 | 91 |
| North Creek | | | |
| NC1A | 874 | 1,213 | 39 |
| NC1B | 340 | 970 | 185 |
| NC1 (NC1A,B hydrographs combined) | 1,185 | 2,110 | 78 |
| NC2 | 1,635 | 2,869 | 75 |
| PW (Prairie Waterway) | 364 | 369 | 1 |
| Vermillion Confluence with Middle and North Creeks and PW | 5,089 | 8,325 | 64 |
| VR5 | 5,284 | 8,244 | 56 |
| T1 | 355 | 367 | 3 |
| Vermillion Confluence with T1 | 5,514 | 8,518 | 54 |
| VR6 | 5,536 | 8,534 | 54 |
| VR7 | 5,562 | 8,381 | 51 |
| T2 | 445 | 480 | 8 |
| Vermillion Confluence with T2 | 5,850 | 8,741 | 49 |
| VR8 | 5,850 | 8,741 | 49 |

(continued on the next page…)

A 15-year moving average of annual precipitation at Minneapolis-St. Paul International Airport shows an increasing trend from approximately 1960 to 1996 (Figure 2.7). This change, WWTP flows, groundwater interaction, and other variables need to be better understood before the impact of land use changes on annual flow volume can be quantified.

**Table 2.6 (continued): 100-Year COE HEC-1 Discharges, cfs***

| Discharge Points[1] | Existing | 2040 Future[2] | % Increase |
|---|---|---|---|
| South Branch Vermillion River | | | |
| SB1 | 646 | 646 | 0 |
| SB2 | 550 | 550 | 0 |
| SB3 | 1,421 | 1,421 | 0 |
| Vermillion Confluence at SB | 7,085 | 9,664 | 36 |
| VR9 | 7,109 | 9,347 | 31 |
| T3 | 670 | 729 | 9 |
| Vermillion Confluence at T3 | 7,558 | 9,869 | 31 |
| VR10 | 7,669 | 10,022 | 31 |

(1) Discharge points are located at watershed outlets and confluences
(2) Future condition is for the year 2040 with no stormwater management practices implemented and is presented for comparison purposes only
cfs = cubic feet per second

Development in the Watershed will increase percent imperviousness, reduce infiltration, and likely result in more efficient channels for stormwater runoff conveyance. The result of development is a higher total volume of runoff, a reduced peaking time, and a higher peak discharge. Table 2.6 shows how the future condition HEC-1 model predicts increased peak discharges for each subwatershed when no stormwater management practices are implemented.

**Figure 2-6**
**Comparison of Total Annual Volume through Empire Gauge and Total Annual Precipitation Volume in the Subwatershed**

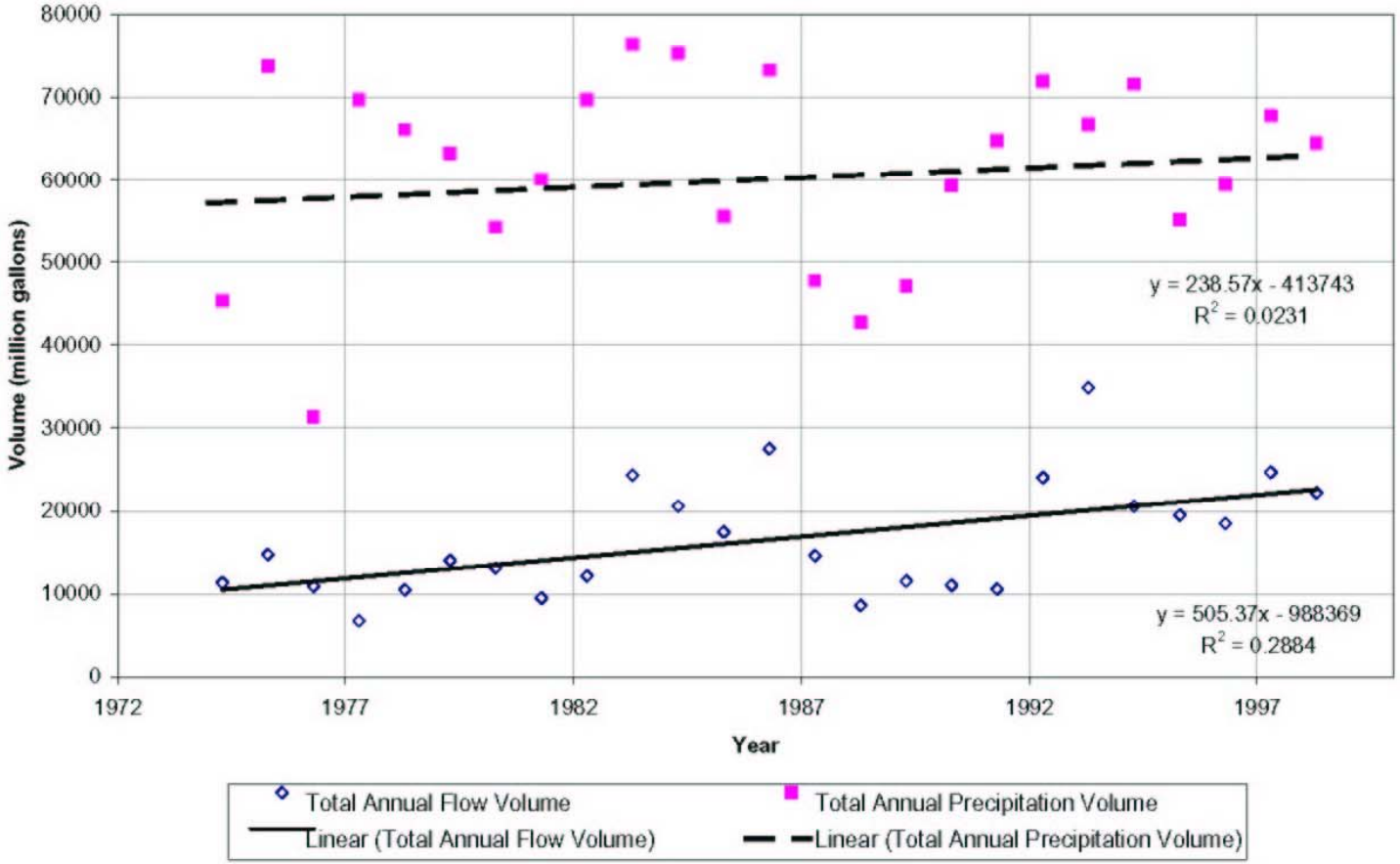
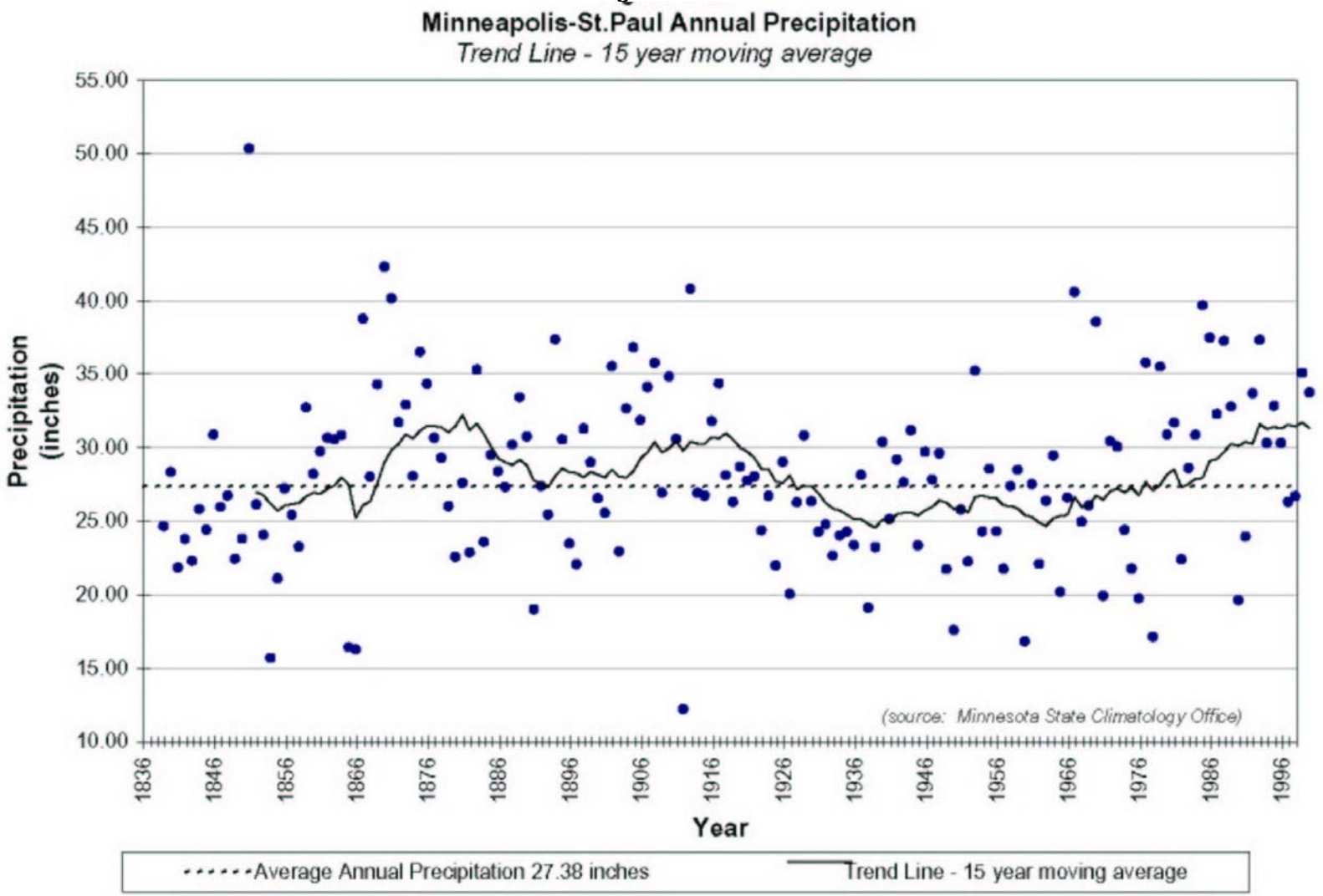


**Figure 2-7**


Minneapolis-St.Paul Annual Precipitation
Trend Line - 15 year moving average
Precipitation (inches)
55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
1836
1846
1856
1866
1876
1886
1896
1906
1916
1926
1936
1946
1956
1966
1976
1986
1996
Year
(source: Minnesota State Climatology Office)
Average Annual Precipitation 27.38 inches
Trend Line - 15 year moving average

HEC-1 Report Recommendations. The HEC-1 report made the following recommendations to identify areas that should be addressed in future Watershed studies:

- Detailed survey information should be collected to more accurately predict the storage-outflow relationship at Rice and Vermillion Lakes.
- Cross sections, culverts, and bridge openings should be surveyed and modeled in a HEC-2 hydraulic model. Using HEC-2, a relationship between storage and outflow can be determined. The storage outflow relationship should be incorporated into the HEC-1's Modified Puls routing procedure.
- The rating curve at Hastings should be verified with a hydraulic analysis.
- Continuous rainfall gauges and stream flow gauges should be maintained within the Watershed. The rainfall and stream flow data should be recorded with accurate clock times, taking into account daylight savings time.
- Channels within MC1 should be monitored. With actual streamflow records and storm rainfall, the unit hydrograph parameters calculated with the regional equation can be evaluated.
- A detailed GIS analysis of the lower portion of the Watershed is recommended.
- Very heavy rains fell across the Watershed between June 23 and June 28, 1998, with multi-day totals exceeding 8 inches reported in Scott County. The peak discharge recorded at Empire was near 4,000 cfs, and the peak discharge recorded at ConAgra was 2,465 cfs. This large summer rainfall event should be reconstituted with the HEC-1 model.

For the full discussion of the HEC-1 model and methodology, see the Vermillion River Watershed Hydrologic Study by the U.S. Army Corps of Engineers, St. Paul District.

2000 Draft Vermillion River Watershed Management Plan. During development of the 2000 draft plan for the former Watershed Management Commission (WMC), the WMC's engineer performed additional analyses using the COE HEC-1 model to help develop stormwater management strategies for the Watershed. These additional analyses focused on changes from existing to future conditions. The basic finding was that implementation of the following strategies would control future 100-year critical storm floodplain conditions at existing conditions.

- Implement existing stormwater management plans for Apple Valley, Farmington, Lakeville and Rosemount (Figure 2.8).
- Require release of the 100-year future conditions peak flow at the 25-year existing peak flow with new development for portions of New Market Township, the City of New Market, Eureka, Castle Rock, Empire, and Vermillion Township's (Figure 2.8).
- Require release of the 100-year future conditions peak flow at the existing conditions 100-year peak flow for the Cities of Coates, Hastings, and Vermillion; and portions of Nininger, Vermillion, Hampton, Marshan, and Douglas and Ravenna Townships.
- No rate control by the Watershed Organization for the downstream portions of the Cities of Rosemount and Hastings, and Nininger and Vermillion Townships.
- Construction of two detention facilities in Farmington that provide a regional benefit.

This overall strategy was designed to sequence flood flows from the Watershed such that downstream waters were allowed to move out of the Watershed quickly, while upstream flows are significantly detained.

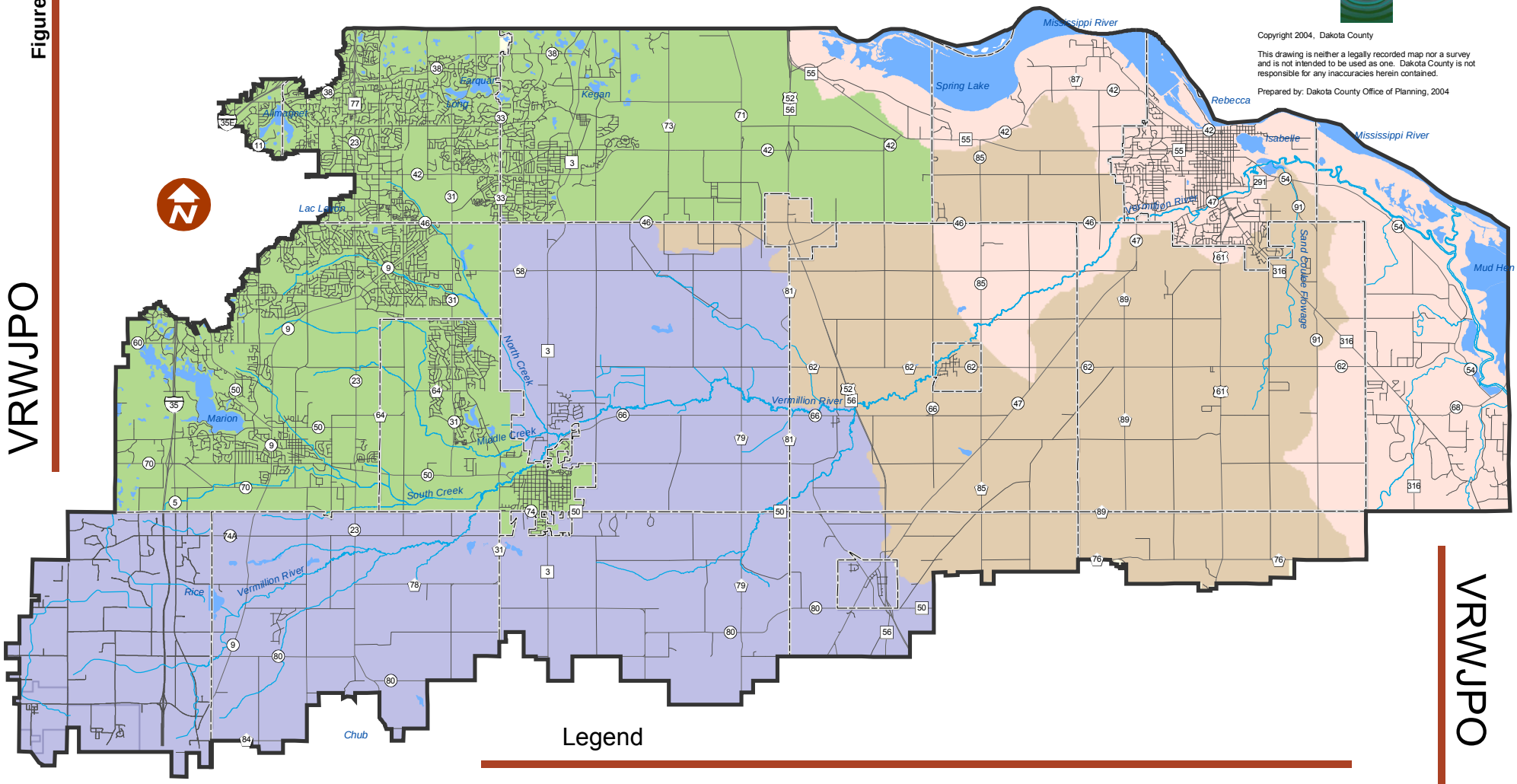
Figure: 2.8

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




# Stormwater Management Strategies

VRWJPO

Figure: 2.8

2002 Vermillion River Volume Study. The 2002 Volume Study also assessed issues related to flow volumes and their management. Previous studies largely focused on the issues related to, and the management of, peak flows related to flood events. Assessment of flow volumes is important to issues of stream morphology and perceived issues heard from the public that the River is flowing full more frequently and for longer durations than historically. The following provides a summary of the Volume Study and its findings.

The Volume Study focused on the following questions:

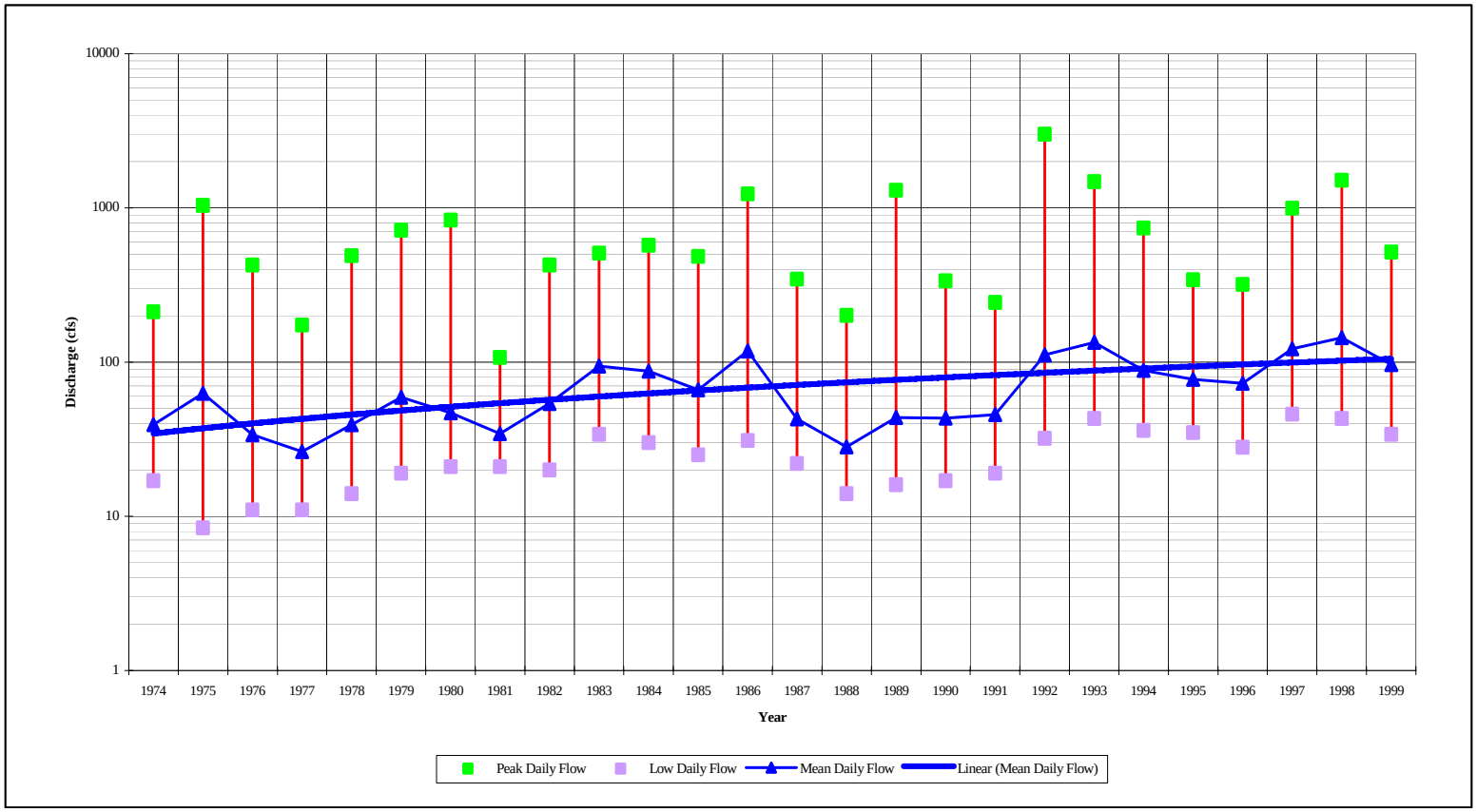
- Has stream flow volume increased/changed in the Vermillion River?
- Has the frequency of bankfull flow increased in the Vermillion River?
- Will flow volumes continue to change with increased development?
- What are the effects of different levels of stormwater management?
- What are the management implications for future channel morphology?
- Where will infiltration technologies be effective?

Answers to these questions are discussed here along with a discussion of the limitations of the analysis. The basis for much of the analysis was statistical analysis of historical stream flow gauging records, particularly records from the Empire USGS gauge, and the COE HEC-1 model, which was calibrated for flow volumes with selected storms.

Has stream flow volume increased/changed in the Vermillion River? The Volume Study found that the volume of flow in the River has increased over the 25-year period from 1974 to 1999 at the Empire USGS gauge (Figure 2.9). Runoff volume has increased on a year-to-year basis, and for each season during the 25-year study period. However, precipitation has also increased; the 1990s was one of the wettest decades on record (Climate subsection). To account for precipitation, runoff-to-rainfall ratios were calculated (Figure 2.10). Using a trend line, this effort showed that in the late 1970s, roughly 15% of rainfall was converted to runoff, while in the late 1990s it appears that roughly 30% of rainfall became runoff. This increase is due to multiple factors. Some of the increase is from increased wastewater discharge volumes, some from urban development and increased impervious surfaces, some from drainage practices, and some is also likely due to the increased rainfall and wet conditions of the 1990s. Wetter conditions during high rainfall periods consume retention and abstraction storage such that greater fractions of the next rainfall event become runoff.

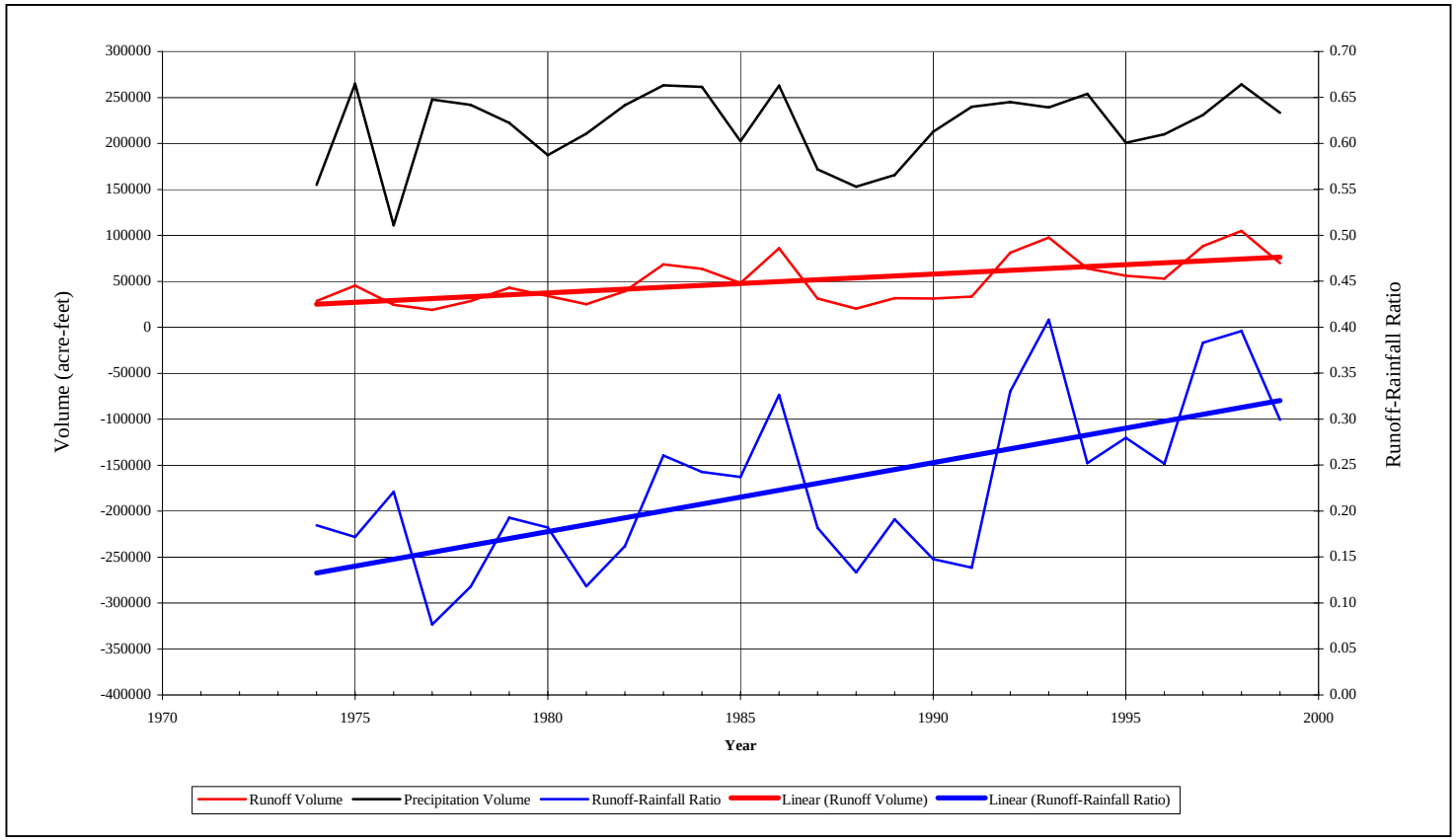
Has the frequency of bankfull flow increased in the Vermillion River? Bankfull flow is the flow that just fills the channel to the top of its banks and is the point where water begins to overflow onto a floodplain. Bankfull flows typically occur approximately once every 1.5 years. In highly developed areas, the recurrence interval tends to be between 1.1 to 1.2 years. Bankfull flow is an important channel morphology variable and is thought to be one of the main factors affecting channel form (shape and size). Changes to the bankfull flow can disrupt channel equilibrium with sediment transport and thus channel stability and erosion. The Volume Study found that the frequency of bankfull flows has increased over the 25-year study period (Figure 2-11). This increase, in combination with the findings of the 1999 Vermillion River Assessment, which found poor riparian conditions along much of the River, and that the predominant channel types were highly susceptible to erosion, explains much of the current channel instability.

**Figure 2.9: Vermillion River Annual Mean Flow and Range at the Empire Gauge**



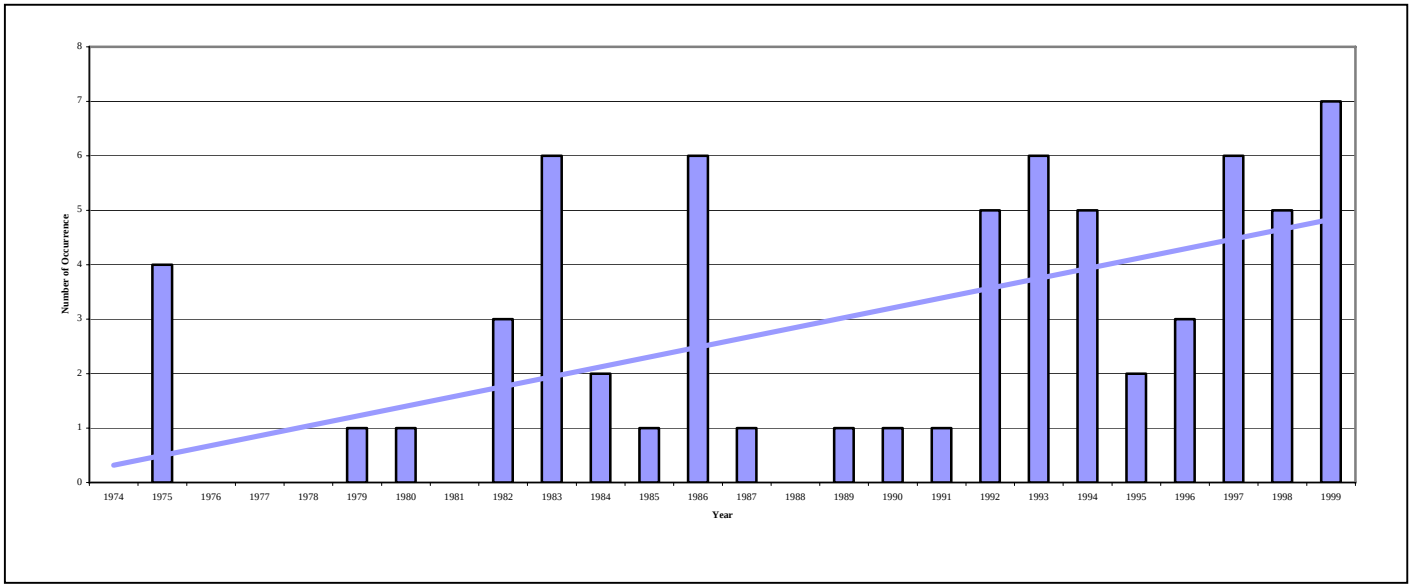

Source: Vermillion River Volume Study, 2002, Montgomery Watson Harza)

**Figure 2.10: Vermillion River Historical Volume Analysis – Annual at the Empire Gauge**




Source: Vermillion River Volume Study, 2002, Montgomery Watson Harza

**Figure 2.11: Frequency of Flow at or Near Bankfull Capacity in the Vermillion River at the Empire Gauge**




Source: Vermillion River Volume Study, 2002, Montgomery Watson Harza

Will flow volumes continue to change with increased development? Model simulation results show that both flow volumes (Table 2.7) and peak flows (Table 2.8) in the River are expected to decrease with stormwater management and increase without stormwater management.

What are the effects of different levels of stormwater management? Simulations were completed to assess the different levels of wastewater/stormwater (ww/sw) management. These levels included:

1. Implementation of the stormwater management plans for the Cities of Apple Valley, Lakeville, Farmington and Rosemount. Plans considered also include Lakeville's South Creek Management Plan, and the Empire WWTP Master Plan that will remove the plant discharge from the Vermillion River in 2005 (now may not be until 2007). The flow from the WWTF constitutes about one-third of the flow in the River under low flow conditions.
2. Implement ww/sw management plans and infiltration of an additional .5-inch of precipitation on all future developed lands.
3. Implement ww/sw management plans and infiltration of an additional 1-inch of precipitation on all future developed lands.
4. Implement ww/sw management plans and infiltration of an additional 1.5-inches of precipitation on all future developed lands.
5. Implement ww/sw management plans and infiltration of an additional 2-inches of precipitation on all future developed lands.

**Table 2.7: Predicted Existing and Future Conditions Vermillion River Flow Volumes (acre-feet) With Varying Levels of Stormwater Management for 2-Year, 5-Year and 100-Year Storm Events**

| Gauge | Current Baseline | Future w/ stormwater mgmt.* | Future w/o stormwater mgmt.** | 0.5-inch *** | 1.0-inch *** | 1.5-inch *** | 2.0-inch *** |
|---|---|---|---|---|---|---|---|
| *2-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 3544.1 | 3393.5 | 3834.8 | 3364.8 | 3154.4 | 3039.8 | 2943.6 |
| USGS (Empire) | 2429.5 | 2293.4 | 2780.0 | 2279.6 | 2112.0 | 2038.1 | 1969.2 |
| 801 | 1111.0 | 894.7 | 1233.0 | 894.7 | 894.7 | 894.7 | 894.7 |
| 802 | 309.9 | 316.6 | 316.6 | 309.9 | 299.2 | 288.9 | 274.1 |
| 807 | 842.9 | 884.4 | 1028.7 | 873.6 | 770.7 | 725.8 | 710.3 |
| *5-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 5948.6 | 5772.9 | 6570.5 | 5742.0 | 5254.0 | 4984.0 | 4770.3 |
| USGS (Empire) | 3832.0 | 3598.3 | 4439.1 | 3577.6 | 3232.0 | 3043.7 | 2898.9 |
| 801 | 1567.1 | 1224.1 | 1751.9 | 1224.1 | 1224.1 | 1224.1 | 1224.1 |
| 802 | 576.8 | 591.1 | 591.1 | 576.8 | 555.2 | 530.9 | 497.8 |
| 807 | 1371.8 | 1435.5 | 1738.5 | 1418.4 | 1178.0 | 1032.1 | 969.9 |
| *100-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 18203.0 | 17737.0 | 19566.0 | 17680.0 | 16730.0 | 15859.0 | 15153.0 |
| USGS (Empire) | 10696.0 | 10157.0 | 11995.0 | 10118.0 | 9354.8 | 8693.2 | 8101.6 |
| 801 | 6487.3 | 2802.9 | 3835.2 | 2802.9 | 2802.9 | 2802.9 | 2802.9 |
| 802 | 2126.3 | 2163.5 | 2163.5 | 2126.3 | 2072.2 | 2005.4 | 1916.6 |
| 807 | 4550.3 | 4593.3 | 5379.5 | 4557.9 | 3996.1 | 3445.5 | 3037.0 |

* Refers to conditions where local stormwater management plans for several cities and related plans are implemented.
** Refers to conditions where no further implementation of local stormwater management plans is occurring beyond existing implementation. While unlikely, this scenario is factored in for comparison purposes.
*** Refers to implementation of local stormwater management plans that result in the heading-indicated, increased levels of runoff control beyond current estimated levels

**Table 2.8: Predicted Existing and Future Conditions Vermillion River Peak Flows (cfs) With Varying Levels of Stormwater Management for 2-Year, 5-Year and 100-Year Storm Events**

| Gauge | Current Baseline | Future w/ stormwater mgmt.* | Future w/o stormwater mgmt.** | 0.5-inch *** | 1.0-inch *** | 1.5-inch *** | 2.0-inch *** |
|---|---|---|---|---|---|---|---|
| *2-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 719.1 | 574.3 | 862.1 | 561.9 | 502.3 | 468.5 | 415.5 |
| USGS (Empire) | 614.7 | 465.2 | 807.6 | 456.4 | 411.5 | 392.3 | 369.1 |
| 801 | 378.6 | 208.0 | 485.6 | 208.0 | 208.0 | 208.0 | 208.0 |
| 802 | 56.0 | 59.3 | 59.3 | 56.0 | 51.7 | 47.3 | 40.8 |
| 807 | 132.4 | 117.0 | 237.3 | 110.6 | 90.6 | 81.5 | 76.2 |
| *5-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 1454.7 | 1269.5 | 1766.6 | 1250.1 | 1150.0 | 1087.7 | 1025.1 |
| USGS (Empire) | 1182.5 | 985.6 | 1471.9 | 971.1 | 889.6 | 844.2 | 802.0 |
| 801 | 765.2 | 468.8 | 932.8 | 468.8 | 468.8 | 468.8 | 468.8 |
| 802 | 165.3 | 172.2 | 172.2 | 165.3 | 156.6 | 146.6 | 132.3 |
| 807 | 326.6 | 266.1 | 540.0 | 254.9 | 219.3 | 203.0 | 192.3 |
| *100-Year Storm Events* | | | | | | | |
| MCES (Hastings) | 6193.1 | 5478.2 | 7033.4 | 5426.3 | 5177.8 | 4995.4 | 4814.0 |
| USGS (Empire) | 4468.0 | 3701.3 | 5392.6 | 3661.8 | 3446.8 | 3333.8 | 3208.0 |
| 801 | 2476.6 | 1827.7 | 2800.7 | 1827.7 | 1827.7 | 1827.7 | 1827.7 |
| 802 | 809.5 | 828.6 | 828.6 | 809.5 | 787.4 | 757.9 | 718.0 |
| 807 | 1525.2 | 1232.5 | 2079.4 | 1206.7 | 1111.1 | 1057.9 | 1021.3 |

* Refers to conditions where local stormwater management plans for several cities and related plans are implemented.
** Refers to conditions where no further implementation of local stormwater management plans is occurring beyond existing implementation. While unlikely, this scenario is factored in for comparison purposes.
*** Refers to implementation of local stormwater management plans that result in the heading-indicated, increased levels of runoff control beyond current estimated levels

Simulation results are presented in Tables 2.7 and 2.8. Findings of the model simulations include:

- Implementation of the current wastewater/stormwater management plans reduces both peak flows and runoff volumes to less than existing conditions for all storms assessed at most locations. The 1.5-inch infiltration requirement in the South Creek Management Plan can produce up to a 125 acre feet (ac-ft) reduction of surface runoff volume per rain event, for every 1,000 acres of newly developed land (depending on the rainfall amount, intensity, duration and timing). The elimination of the Empire WWTP discharge of 8 mgd (million gallons per day) results in a flow volume reduction of about 25 ac-ft per day.
- Implementation of an additional .5-inch of infiltration provides small additional reductions in peak flows and runoff volumes at most locations.
- Implementation of 1.0 to 2.0-inches of infiltration provide linearly increasing reductions in peak flows and runoff volumes at all locations.
- The greatest percent reductions from existing conditions for the infiltration scenarios is with the smaller storms (i.e., the 2-year and 5-year storms, versus the 100-year storms).

What are the management implications for future channel morphology? The return frequency for a rainfall event producing the channel-forming discharge under Existing Conditions is 1.5 years, or a 67% chance of occurrence in any given year. The return frequency for Future Conditions without implementation of wastewater/stormwater management plans is 1.37 years, a 6% higher chance of occurring in any given year when compared to existing conditions results. With implementation of all the various levels of stormwater management, the frequency of bankfull flow decreases compared to existing conditions. For example, the bankfull flow frequency under future conditions with implementation of the wastewater/stormwater management plans was estimated at 1.64 years, a decrease of 5.9% from existing conditions; and the frequency under future conditions with implementation of the wastewater/stormwater management plans and 2 inches of infiltration was estimated at 1.79 years, a decrease of 10.9% from existing conditions. In general, these decreases in return intervals are small (6-11%) and the study concluded that these decreases are expected to have little effect on the current channel-forming processes. However, with implementation of the various wastewater/stormwater management strategies, future channel geomorphology changes will not be of the magnitude of the historical channel migration. In addition, infiltration helps protect streams by preserving groundwater recharge, maintaining groundwater discharges to the stream, controlling stream temperatures, and reducing the volume of runoff. Finally, reducing the return interval of channel forming flows, while promoting infiltration in the Watershed, minimizes future hydrologic/stream flow changes that will help the stream to develop channel types that are stable and provide quality habitat.

Where and/or will infiltration technologies be effective? Achievability of volume reduction benefits in the previous scenarios was assessed in the study by mapping areas in the Watershed with high infiltration capacity soils, and overlaying this map with the future conditions map (Figure 2.12). The results of this analysis showed that 72% of all areas zoned to undergo development coincide with high-infiltration soils. The study concludes that reasonably efficient infiltration measures may provide a significant level of volume and peak flow reductions, and that they will be most effective in the Cities of Elko, Lakeville, Apple Valley, and Farmington, and in New Market, Castle Rock and Eureka Townships.

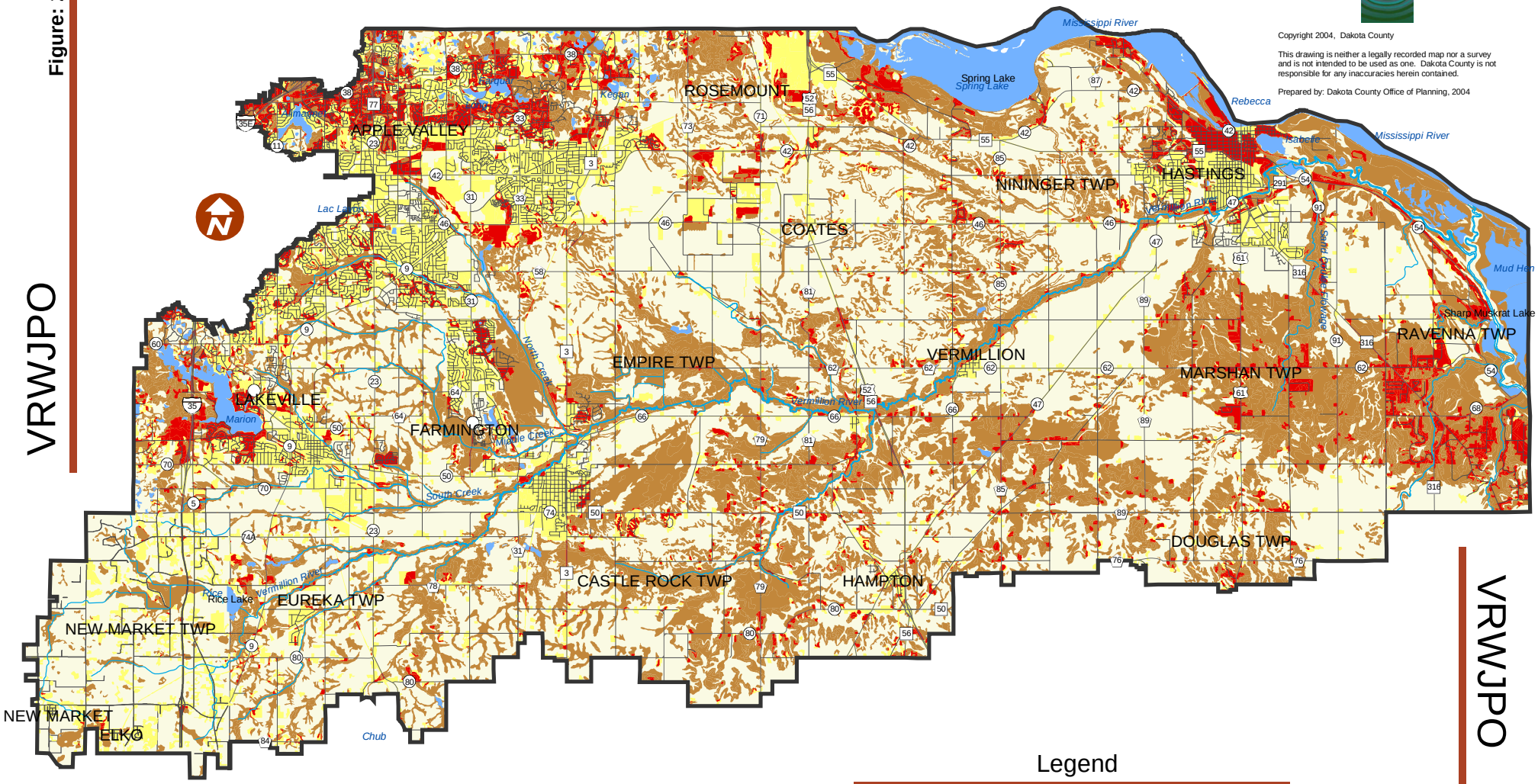
Figure: 2.12

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




## Legend

- Urban Land Use on High Infiltration Soil
- Urban Land Use (MLCCS)
- High Infiltration Soil

0 1 2 4 6

Miles

# Development on High Inflitration Soil

VRWJPO

Figure: 2.12

Limitations of the study. Results of the study are based on modeling. Models are tools designed to approximate the system; but there are always uncertainties. The modeling should be viewed as a tool for assessing management strategies, not as a perfect answer. Also, analyses in the study were completed as single storm events. The effects of prolonged wet periods and back-to-back storms were not simulated. Location selection and maintenance of stormwater facilities is also very important. Model results assume that systems will function as designed and will be maintained. The study also looked at soil types over a large scale; site specific conditions need to be considered. In general, surface-based local infiltration systems are best implemented for loam or coarser soil types.

Sources of Flow

Stream Flows. For more information on water quantity in the Vermillion River see the following:

- U.S. Geological Survey website for real-time and historical flow data: http://mn.waterdata.usgs.gov/nwis/uv/?site_no=05345000&PARAmeter_cd=00065,00060
- Hastings Area Nitrate Study, Dakota County, 2003
- Vermillion River Volume Study, September 2002

Water quantity or flow, has been measured on the Vermillion River in a variety of locations over the years. The River at Blaine Avenue has been monitored by the U.S. Geologic Survey (USGS) since 1973 (Table 2.9). Flow has also been measured at Highway 61 in Hastings since 1994 by the Metropolitan Council Environmental Services (MCES) (Table 2.10), and at 6 sites throughout the Watershed since 1998 by the former watershed management commission and the current Joint Powers Organization (VRWJPO) (Figures 2.13 and 2.5).

**Table 2.9: Annual Mean Streamflow in the Vermillion River at USGS Empire Gauge (cfs)**

| Year | Flow (cfs) | Year | Flow (cfs) | Year | Flow (cfs) |
|---|---|---|---|---|---|
| 1973 | 43.3 | 1983 | 94.4 | 1993 | 135 |
| 1974 | 39.4 | 1984 | 87.4 | 1994 | 88.3 |
| 1975 | 62.7 | 1985 | 66.2 | 1995 | 77.4 |
| 1976 | 33.8 | 1986 | 118 | 1996 | 72.8 |
| 1977 | 26.2 | 1987 | 42.9 | 1997 | 122 |
| 1978 | 39.3 | 1988 | 28.1 | 1998 | 144 |
| 1979 | 59.1 | 1989 | 43.7 | 1999 | 96.2 |
| 1980 | 47.0 | 1990 | 43.3 | 2000 | 69.9 |
| 1981 | 34.3 | 1991 | 45.7 | 2001 | 83.0 |
| 1982 | 53.9 | 1992 | 112 | | |

Note: cfs = cubic feet per second

**Table 2.10: Annual Mean Streamflow in the Vermillion River at Highway 61(cfs)**

| Year | Flow (cfs) |
|---|---|
| 1994 | 134.3 |
| 1995 | 112.1 |
| 1996 | 90.7 |
| 1997 | 172.7 |
| 1998 | 207.4 |
| 1999 | 145.5 |
| 2000 | 86.2 |
| 2001 | 135.4 |
| 2002 | 283.3 |

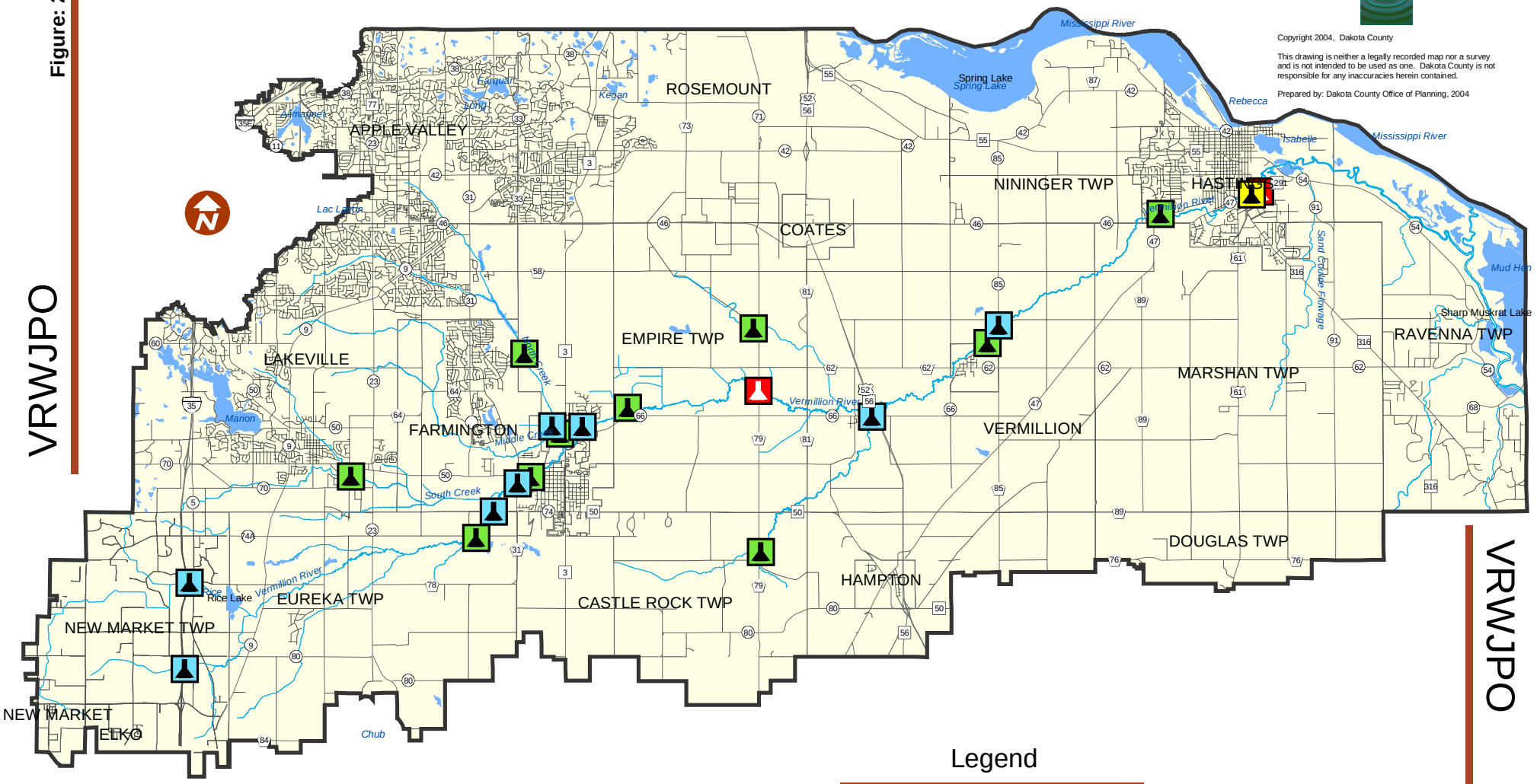
Figure: 2.13

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




## Legend

- USGS Monitoring Station
- Vermillion River Watch
- JPO Monitoring Station
- MCES Monitoring Station

0 1 2 4 6

Miles

# Water Quality Monitoring Stations

VRWJPO

Figure: 2.13

The 2003 Dakota County Hastings Area Nitrate Study found that the Vermillion River loses water to the groundwater between the Cities of Vermillion and Hastings. This "losing" reach of the River was also documented in the COE hydrology study. Future monitoring will help to more specifically identify the "losing" reach of the River.

Data from the VRWJPO monitoring network is still provisional in nature; however, it gives an indication of the flow or volume of water coming from the major tributaries in the Watershed (Table 2.11, Figure 2.14). Future work on the rating curves (determining the flow from the stage data) will continue and will help solidify this data. Additionally, the flow data will be paired with the water quality data to calculate pollutant loadings from the various subwatersheds. In the future, the VRWJPO monitoring network will be used to show trends and changes in water quality and quantity in the subwatersheds.

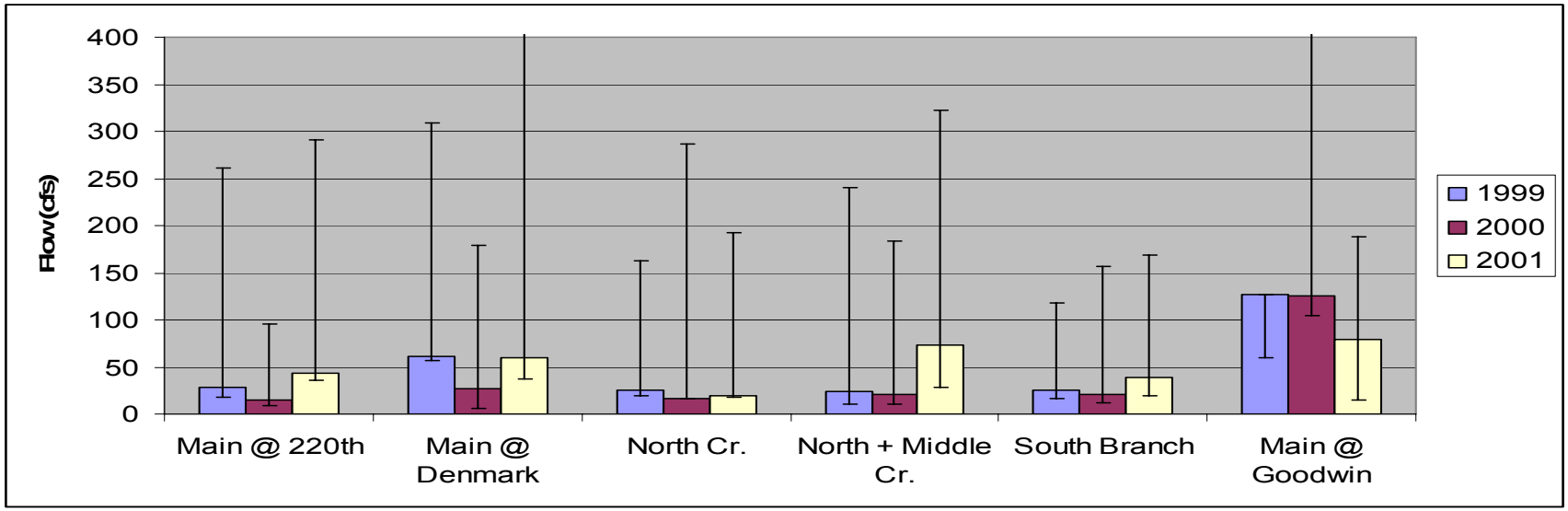
These results show that for 1999 and 2000, Middle Creek did not add much to the mean flow beyond that contributed by North Creek, as shown by the North Creek and the North plus Middle Creek stations. However, in 2001, it appears that Middle Creek contributed substantial flows. Mean flow in the main stem upstream of the confluence with North and Middle Creeks was about twice the flow of North and Middle Creeks in 1999, was only slightly higher in 2000, and was lower in 2001. This type of variability shows the need for long-term flow records before definitive conclusions can be made.

**Table 2.11: Provisional Mean Flow Data from the Vermillion River Joint Powers Organization Monitoring Network (cfs)**

| **Site** | **804: Main @ 220th** | **807: Main @ Hwy. 31** | **808: North Creek** | **801: North + Middle Cr.** | **802: South Branch** | **803: Main @ Goodwin** |
|---|---|---|---|---|---|---|
| Year | 1999 | | | | | |
| Period of Record | March – Nov. | March – Nov. | June – Nov. | July – Nov. | March – Nov. | June – Nov. |
| Mean | 28.5 | 61.7 | 25.2 | 23.3 | 25.65 | 127.0 |
| Minimum | 10.7 | 4.8 | 6.3 | 13.4 | 8.6 | 66.8 |
| Maximum | 232.5 | 247.9 | 138.1 | 217.6 | 92.5 | Na |
| Year | 2000 | | | | | |
| Period of Record | March – Oct. | March – Oct. | June – Oct. | March – Oct. | March – Oct. | March – July |
| Mean | 14.8 | 27.4 | 16.8 | 20.4 | 20.9 | 125.9 |
| Minimum | 6.4 | 21.0 | 0.8 | 10.5 | 8.7 | 20.9 |
| Maximum | 80.2 | 151.1 | 270.1 | 163.7 | 136.0 | 665.4 |
| Year | 2001 | | | | | |
| Period of Record | March – Nov. | March – Nov. | March – Nov. | March – Nov. | March – Nov. | June – Nov. |
| Mean | 44.0 | 59.9 | 19.4 | 72.9 | 39.1 | 79.6 |
| Minimum | 8.1 | 22.8 | 2.0 | 44.8 | 20.3 | 65.2 |
| Maximum | 247.4 | 437.2 | 173.7 | 249.8 | 129.7 | 107.9 |

Note: Discrepancies in data may be due to the difference in the period of record for each site.

**Figure 2.14: Provisional Mean Flow Data from the VRWJPO Monitoring Network 1999 – 2001**
(Bars represent range (minimum and maximum flow), columns present the mean flow)




Wastewater Treatment Plant (WWTP) Flows. There are six WWTPs located in the Watershed: Rosemount, Hastings, Empire, Vermillion, Hampton, and Elko/New Market. All but Rosemount and Hastings discharge to either the Main or South Branch of the Vermillion River. WWTP characteristics are summarized in Table 1.2, Section 1.

As seen in Table 1.2, 90% of the total wastewater discharged into the Vermillion River is from the Empire WWTP. The capacity of this plant is currently 12 million gallons per day (mgd) or 18.5 cubic feet per second (cfs). However, the plant is currently discharging 8 to 9 mgd, or 12.5 to 13.9 cfs. Analyses completed for the 2000 Draft Watershed Management Plan showed that the Empire WWTP average discharge of 12.5 cfs in 1997 represented approximately 15% of the total flow in the River at the USGS Empire gauge; however, the plant's discharge can constitute about one-third of the flow in the River under low flow conditions (about 40 cfs). This flow will be removed when plant upgrades are completed and a new outfall pipe is constructed to the Mississippi River by 2005.

Additionally, the Elko/New Market area in Scott County is expected to experience significant growth and studies are being conducted to determine the feasibility of expanding the wastewater service area of the Empire WWTP to include this area. There are also plans to upgrade and expand the Elko/New Market plant to allow for continued growth in these cities. The first phase of the expansion increased the plant's capacity from a design average wet weather flow of 95,000 gpd, to a design average wet weather flow of 181,000 gpd. The ultimate design average wet weather flow will be established in increments to a total of 724,000 gpd by 2010.

### 2.2.2 Water Quality

The quality of various water bodies in the Watershed has been monitored by a number of agencies over the years. Some of this information has been analyzed and used to support trout stream designations (e.g., temperature data) determine wastewater treatment facility permit limitations, determine lake clean-up efforts, and identify impaired waters. Available water quality information is summarized in this section; topics include: impaired waters, wastewater treatment plant flows, fecal coliform bacteria, monitoring programs.

Impaired Waters in the Vermillion River Watershed. There are several waterbodies in the Watershed that are on the Impaired Waters List developed by the Minnesota Pollution Control Agency (MPCA) and submitted to the U.S. Environmental Protection Agency (EPA) (Table 2.12) and (Figure 2.14_1). For each of these impairments, a total maximum daily load (TMDL) study is required. TMDLs are a study of pollution sources; allowable loads are calculated and allocated to each source so the waterbody will meet its intended use (such as swimming).

**Table 2.12: Waterbodies in the Vermillion River Watershed included in the Final 2004 Impaired Waters List**

| Waterbody and Reach | Pollutant | Affected Use | TMDL Start//Completion Targets |
|---|---|---|---|
| Vermillion River (Headwaters to Hastings) | Fecal Coliform Bacteria | Swimming | Completion by Dec. 2003 |
| Vermillion River (Hastings to mouth) | Turbidity | Aquatic Consumption | 2003//2007 |
| Vermillion River (Hastings to mouth) | PCBs | Aquatic Consumption | 1999//2011 |
| Vermillion River (Hastings to mouth) | Mercury | Aquatic Consumption | 1999//2011 |
| Long Lake | Excessive Nutrients | Swimming | 2007//2011 |
| Farquar Lake | Excessive Nutrients | Swimming | 2007//2011 |
| Marion Lake | Mercury/PCBs | Aquatic Consumption | 1999//2011 |
| Alimagnet Lake | Excessive Nutrients | Aquatic Recreation | 2005//2009 |

Two TMDL studies have been initiated in the Watershed. A TMDL for turbidity for the lower portion of the Vermillion River south of Hastings began in 2004. The MPCA selected a contractor to begin studying existing data and developing a monitoring plan. Subsequent study phases will include monitoring and modeling. The turbidity TMDL is expected to take about 2 years to complete.

The second TMDL is the Regional TMDL Study for fecal coliform bacteria in the Lower Mississippi River Basin in Minnesota initiated by the MPCA in 1999. The Dakota County Soil and Water Conservation District (SWCD) provided project management for a study that began as a local TMDL, and was incorporated as a technical report supporting the regional fecal coliform TMDL for southeast Minnesota. The regional TMDL is complete, but has been challenged. Work on the fecal coliform issue for the Vermillion River is

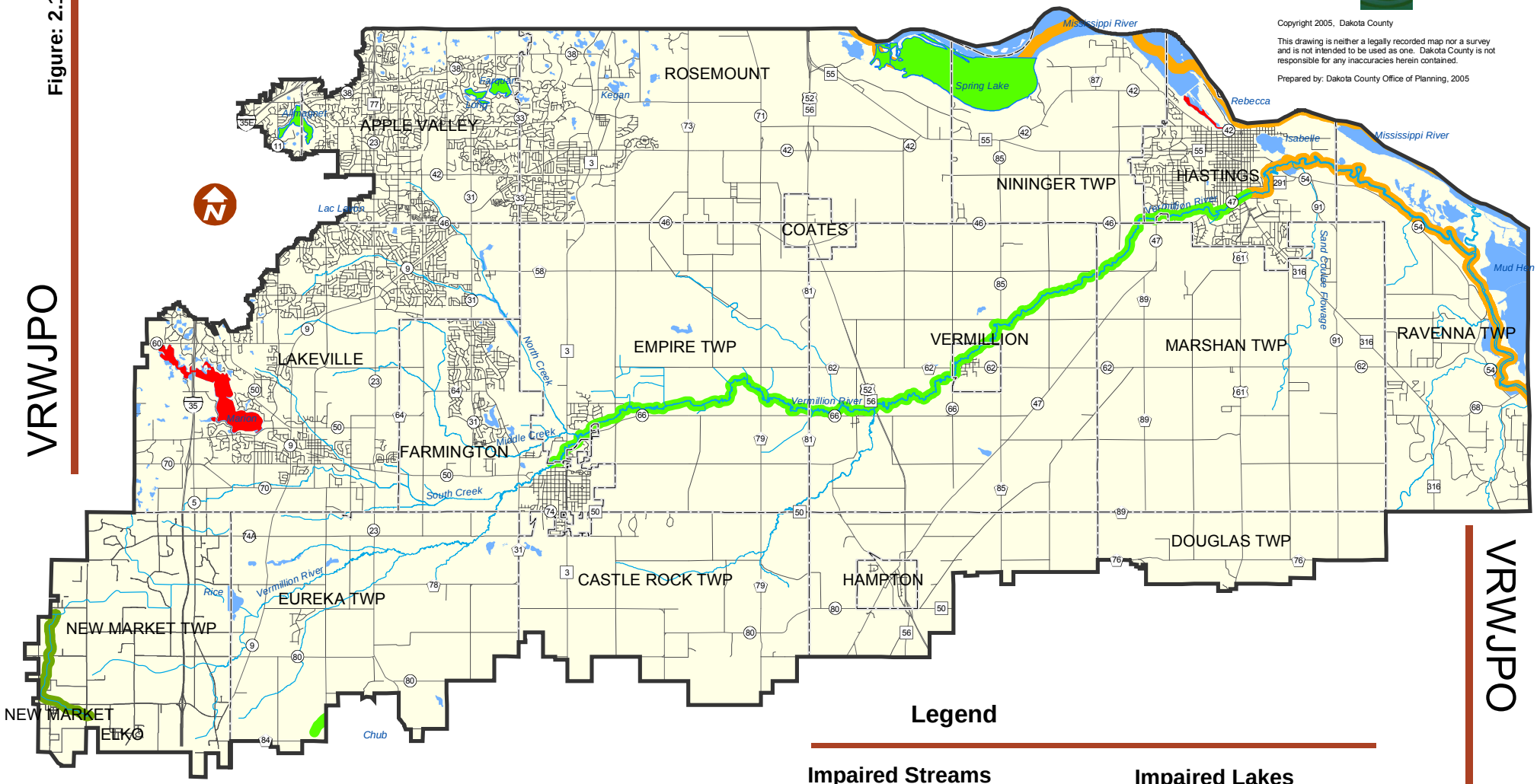
Figure: 2.14.1

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2005




## Legend

### Impaired Streams

- Aquatic Life (None)
- Aquatic Recreation
- Aquatic Life and Recreation
- Aquatic Life and Consumption
- Aquatic Life, Recreation,Consumption

### Impaired Lakes

- Aquatic Recreation
- Aquatic Consumption
- Aquatic Rec and Consumption

0 1 2 4 6

Miles

# Impaired Waters - 2006

VRWJPO

Figure: 2.14.1

continuing. The Dakota County SWCD has issued the final technical report for the Vermillion River fecal coliform bacteria study. The report includes specific management efforts for the Vermillion River not included in the regional TMDL. A summary of the fecal coliform data collected for the study is provided here.

Fecal Coliform Bacteria and the TMDL. In 1998, the Vermillion River, from Empire Township to Hastings, was officially listed as impaired for swimming due to high bacteria levels, when it was added to the Federal Clean Water Act 303(d) list. In order to determine the sources of the pollution and find ways to alleviate the contamination, the MPCA funded a TMDL study.

Fecal coliform bacteria are indicator organisms – harmless bacteria usually associated with pathogens transmitted by fecal contamination, but that are more easily sampled and measured. The bacteria are found in the intestines of warm-blooded animals (including humans) and their existence in a waterbody suggests the presence of fecal matter and associated harmful bacteria, viruses and protozoa (e.g., giardia, certain E. Coli strains, cryptosporidium, etc.). The State and federal water quality standard for fecal coliform bacteria in surface water is 200 organisms per 100 milliliters (ml) of water, as a geometric mean of at least five samples in any calendar month from March 1 to October 31 (Minn. Rules Chapter 7050). Drinking water must contain zero fecal coliform bacteria. Typically, unimpacted waterbodies contain only trace amounts of fecal coliform (usually less than 10% of the State standard). Bacteria levels higher than the State standard are considered dangerous for human contact.

Fecal coliform contamination in surface water can originate from a variety of sources, including wastewater treatment plants and other point sources, and non-point sources such as leaking or non-conforming individual sewage treatment systems, runoff from feedlots or fields with land-applied manure, livestock in waterbodies, pet waste, and wildlife.

The data used in the study were derived from approximately 900 samples, collected from 28 different sites throughout the Watershed, by a variety of agencies. SWCD staff and trained adult citizen volunteers took the majority of the samples, which were collected during periods of low flow and during rain and snowmelt events from March to October in 1999 through 2002.

The data indicate that, on average, most of the water sampled greatly exceeded the bacteria standard with the highest levels found in Middle Creek and the lowest levels found in the main stem of the Vermillion River at Cedar Avenue (Figure 2.15). However, data also indicate a significant increase in bacteria levels during runoff events (Figure 2.16). The bacteria data, together with detailed land use and land cover information, and anecdotal information, was reviewed and considered by a panel of technical experts and local stakeholders to determine the relative amount of contamination coming from various sources in each of nine subwatersheds. The land use data inspected included the location of individual septic systems, feedlots (including the number of animal units), agricultural fields, pastures, natural areas, residential areas, and commercial/industrial areas. Wastewater treatment plant discharges were also considered.

After considering all of the available data and information, the technical and stakeholder panel decided on the most likely high, moderate, and low contributors of bacteria in each subwatershed (Table 2.12).

**Table 2.12: Relative Load in Subwatersheds and Overall Ranking of Sources**

| Source | Eureka | Middle Creek | South Creek | North Creek | South Branch | Farmington | Empire | Goodwin | Hastings | Overall Ranking[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| Livestock in water | Low | High | Low | NA | Mod | Low | Low | Mod | Low | 1.3 |
| Feedlots | Mod | High | Low | NA | Mod | NA | Low | Mod | Mod | 1.4 |
| ISTS | Mod | Mod | Low | Low | High | Mod | High | Mod-High | High | 2.2 |
| Manure Application | Mod | High | Mod | Low | Low | Mod | Mod | Mod | Mod | 1.9 |
| WWTP | Mod | NA | NA | NA | Low | NA | Low | Low-Mod | NA | 0.6 |
| Urban | Low | Mod | Mod | High | Low | Mod | Low | Low | Low | 1.5 |
| Wildlife | Low | Low | Low | Low | Low | Low | Low | Low | Low | 1.0 |

[1] Overall ranking was calculated by taking the average of the scores where NA (not applicable) = 0, low = 1 point, moderate (mod) = 2 points, and high = 3 points.

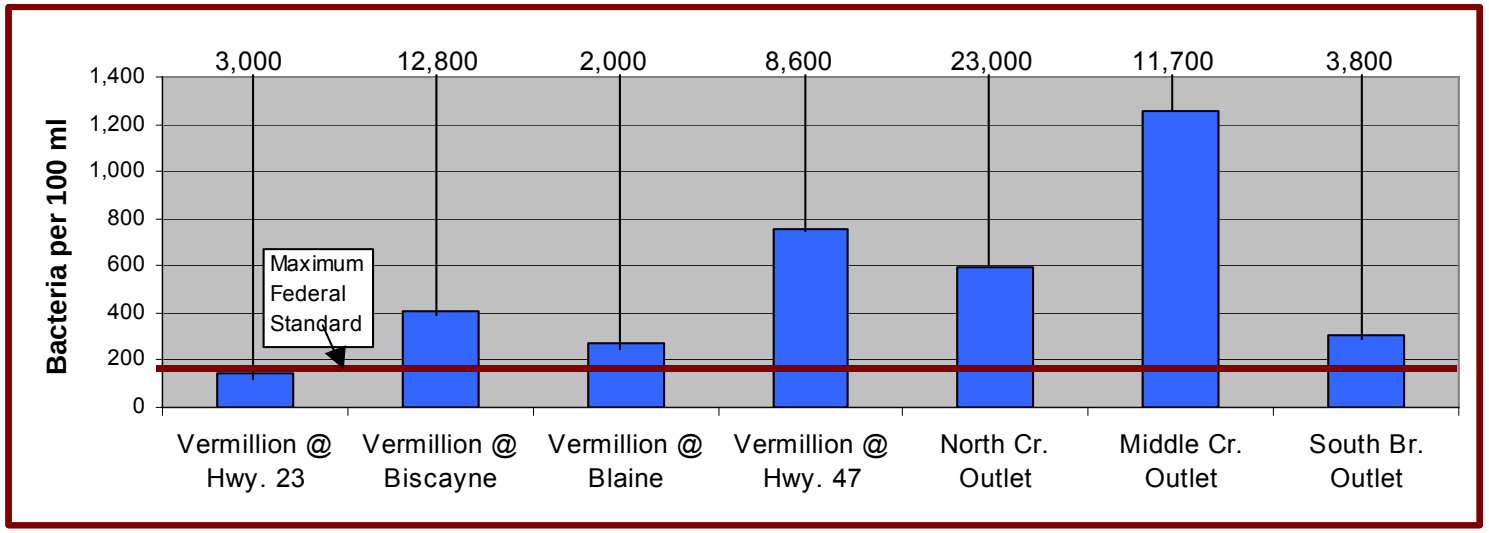



**Figure 2.15: Vermillion River Geometric Mean Fecal Coliform Bacteria Levels (bars) and Maximum Measured Levels (numbers at top of graph) 1999 – 2000.**

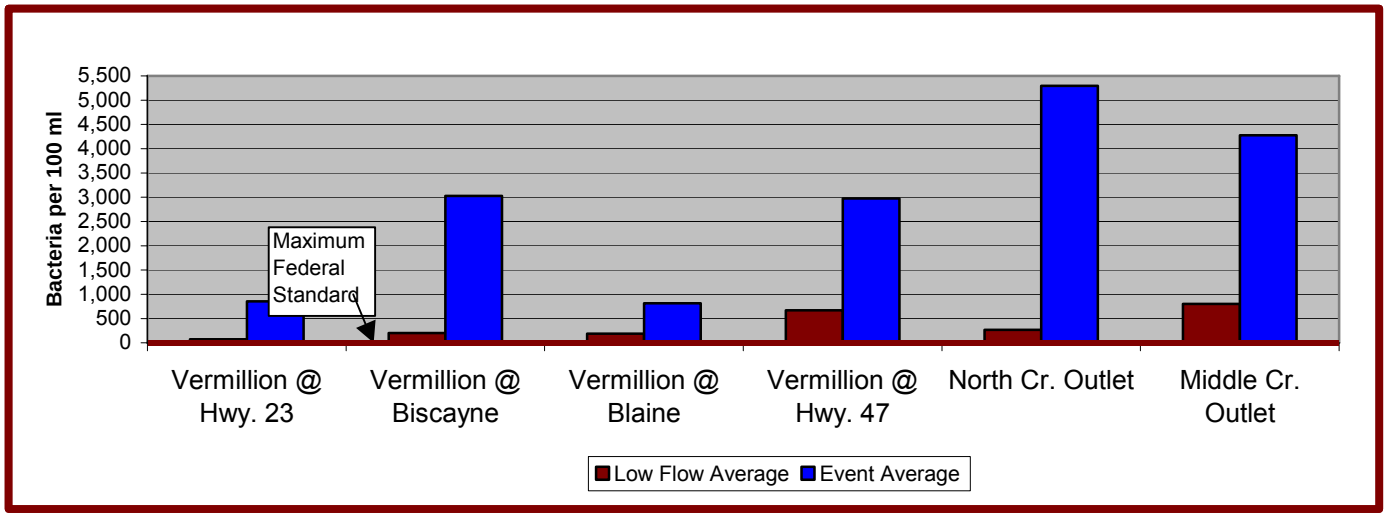



**Figure 2.16: Vermillion River Geometric Mean Fecal Coliform Bacteria Levels During Periods of Low Flow and During Runoff Events (snowmelt and rainfall) 1999 – 2000**

Additional Stream and River Water Quality Data. Water quality has been monitored in the Vermillion River and its tributaries by a variety of agencies over the years. The Minnesota Pollution Control Agency (MPCA) monitored the River at Farmington in the mid-1970s. In 1981, the MPCA established a Milestone Monitoring Site (long-term monitoring location) on the Vermillion River at Blaine Avenue (Highway 79). Since then, the site has been monitored for various parameters and monitoring continues there today. The Metropolitan Council Environmental Services (MCES) also established long-term monitoring sites along the Vermillion River. In 1995, the MCES also established a permanent water quality and quantity monitoring station just above the waterfall at the Con Agra Mill in Hastings (at Highway 61). Here, an automated sampler collects samples throughout a runoff event. Grab samples are also taken during periods of low flow. In 2000, the former Watershed Management Commission began a water quality monitoring program at six sites in the Watershed at the same location as the six flow gauging stations. The current Vermillion River Watershed Joint Powers Organization (VRWJPO) continues to monitor at these locations. Nutrients, solids, bacteria, and other parameters have been measured since 2000 through grab samples taken during periods of low flow and runoff events. Much of the monitoring information from these efforts has gone into the impaired waters assessments discussed above. However, a comprehensive review of all the available data has not been completed, but is anticipated to begin in 2005. A summary of the VRWJPO and MCES monitoring results are briefly presented here. An assessment of temperature data for the Vermillion River was completed as part of the *Proposed Trout Stream Designation – Vermillion River, Dakota County* available from the Minnesota Department of Natural Resources.

VRWJPO Monitoring. The following information on water quality was taken from the data collected through the VRWJPO monitoring network. Data from the MCES site at Highway 61 in Hastings were also included in a few figures for a more complete picture of the condition of the Watershed. These data give an indication of current water quality conditions, but do not represent trends over time.

Water quality will continue to be monitored through the VRWJPO monitoring network and the MCES and MPCA monitoring programs in the foreseeable future. Further analysis of water quality data is warranted, including an analysis of loadings and a look at trends from sites monitored over several decades.

Total phosphorus concentrations, although slightly above the EPA criteria of 0.1 mg/L (milligrams per liter), are below the ecoregion mean of 0.25 mg/L at all sites, except the Vermillion River at Goodwin Avenue (Figure 2.17). There is little or no significant difference in total phosphorus concentrations among the five sites upstream of Goodwin Avenue, nor is there a significant difference among the years (2000 – 2002). Concentrations were found to be slightly higher in 2002, probably due to the high number of storm event samples taken that year. Total phosphorus concentrations at Goodwin Avenue and Highway 61 are 3 to 5 times higher than upstream sites (Figure 2.17). One obvious reason for this difference is because over 121,500 and 168,000 acres of the Watershed drain to these two sites in the River, respectively. In addition, these sites are downstream of the WWTPs at Empire and Vermillion. Total phosphorus and dissolved phosphorus concentrations from the Vermillion River upstream and downstream of the Empire WWTP (1984 – 1993) were analyzed by the U.S. Geological Survey. The River downstream of the Empire WWTP was found to have significantly higher phosphorus levels. The Empire WWTP does not currently have phosphorus removal treatment processes. However, with completion of the Empire WWTP Master Plan, the facility will have phosphorus removal and the discharge will be removed from the Vermillion River.

Total phosphorus concentrations increased significantly during runoff events at all sites except at Goodwin (Figure 2.18). This indicates that although much phosphorus is coming from the point source of the WWTP, there are considerable amounts of phosphorus also washing off the land during storms and snowmelt. At Goodwin Avenue, dilution is probably the factor keeping runoff phosphorus levels similar to average levels.

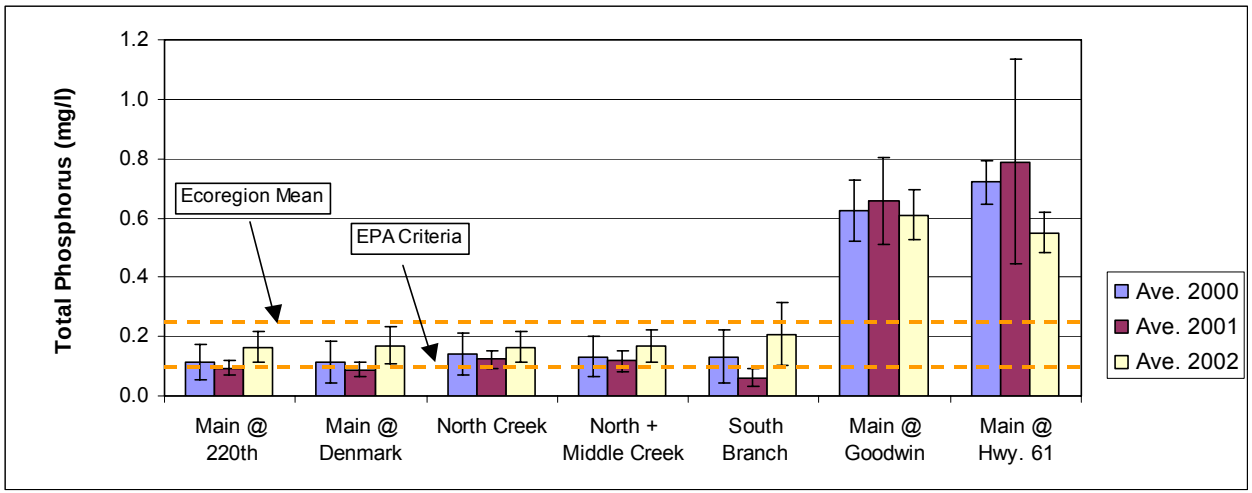



**Figure 2.17: Average Total Phosphorus Concentrations and 95% Confidence Intervals Measured at VRWJPO Monitoring Sites and One MCES Monitoring Site (Highway 61).**

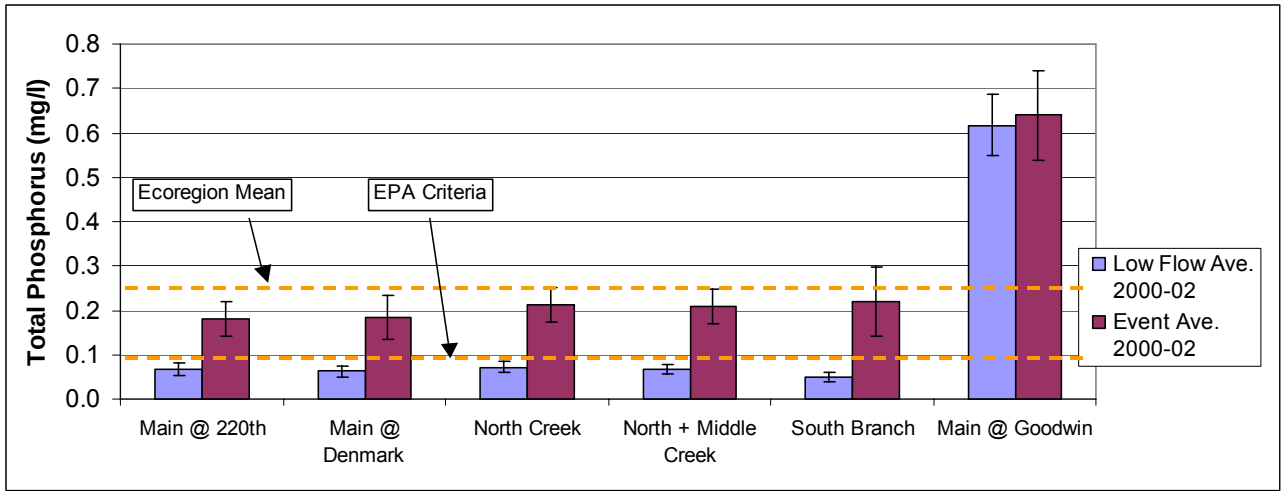



**Figure 2.18: Average Total Phosphorus Concentrations and 95% Confidence Intervals Measured During Runoff Events and Periods of Low Flow at VRWJPO Monitoring Sites**

Nitrogen has been monitored through VRWJPO monitoring network sites and the MCES site at Highway 61. Although there is no State standard for nitrates in surface water, the drinking water standard for nitrate is 10 mg/L. A study of minimally impacted streams in the Western Corn Belt Plains ecoregion of Minnesota found mean nitrate concentrations of about 4.2 mg/L. Although the Vermillion River lies within Western Corn Belt Plains ecoregion, the geology of the Vermillion River more closely resembles the driftless ecoregion (southeastern Minnesota) or the North Central Hardwood Forests ecoregion. This means Vermillion River's water chemistry should more closely resemble the water chemistry of streams in the driftless or North Central Hardwood Forests ecoregion. In the North Central Hardwood Forests ecoregion, streams have a mean nitrate concentration of around 0.08 mg/L. The Hastings Area Nitrate Study (HANS) found that nitrates in the Vermillion River probably enter the groundwater west of Hastings, thus impacting wells in the Hastings area (see HANS discussion in the Groundwater subsection). Figure 2.19 shows that nitrates in the Vermillion River are highest at the outlet of the South Branch, and on the main stem at Goodwin Avenue and Highway 61. The Empire WWTP is known to discharge nitrogen into the River and could be a significant source of nitrates at Goodwin and Highway 61. Nitrate levels stay the same or decrease during runoff events (Figure 2.20). This indicates that nitrates may be entering the River via groundwater (and the WWTP) during low flow and that dilution helps to decrease levels during rain events.

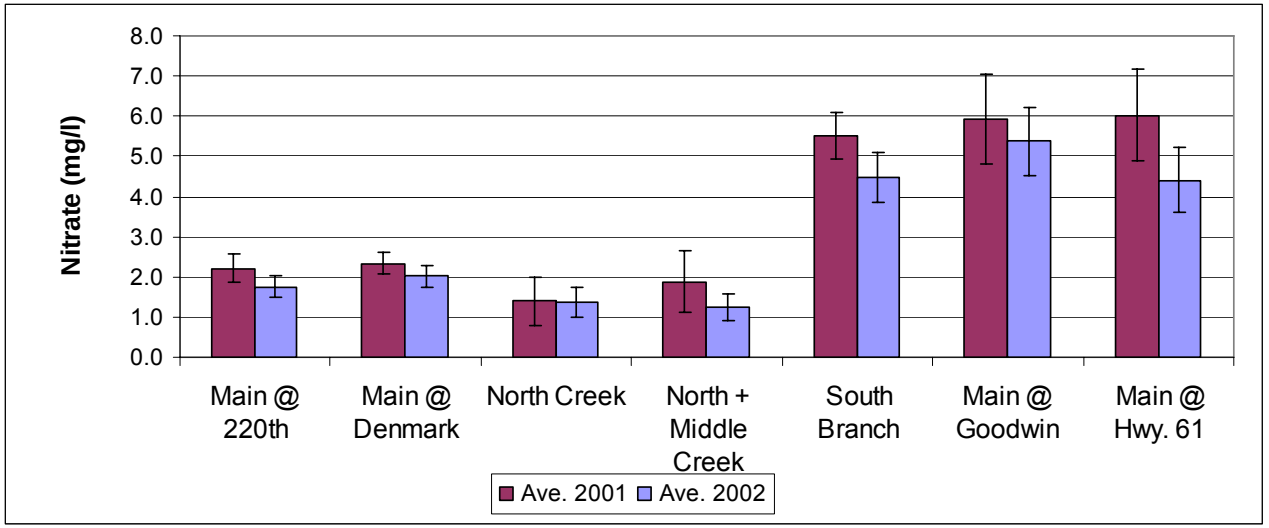



**Figure 2.19: Average Nitrate Concentrations and 95% Confidence Intervals Measured at VRWJPO Monitoring Sites and One MCES Monitoring Site (Highway 61).**

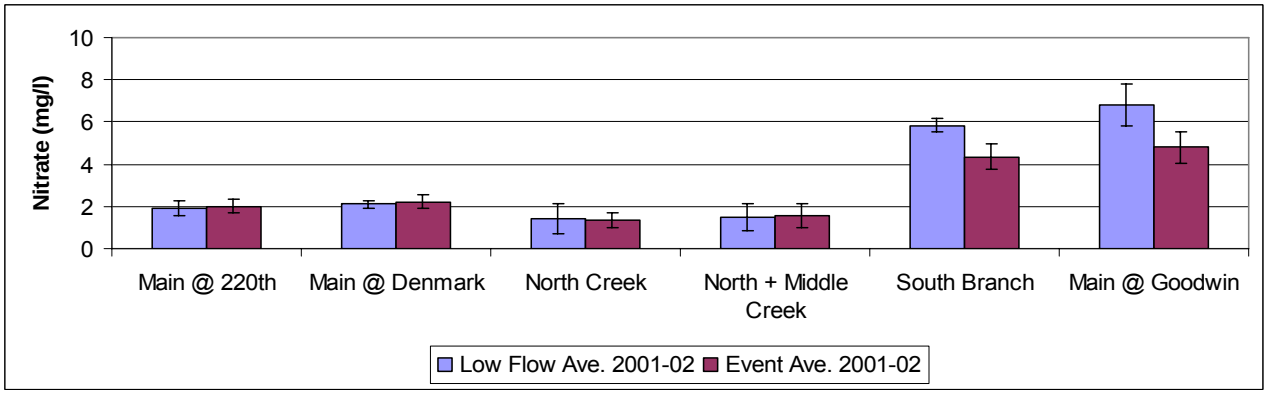



**Figure 2.20: Average Nitrate Concentrations and 95% Confidence Intervals Measured During Runoff Events and Periods of Low Flow at VRWJPO Monitoring Sites**

Ammonia is a form of nitrogen. In its un-ionized form, it is toxic to fish and other aquatic life at certain levels. The State standard for un-ionized ammonia is 0.016 mg/L in designated trout streams and 0.04 mg/L in all other streams. Un-ionized ammonia concentrations did not exceed the State standard at any of the monitoring locations. Un-ionized ammonia levels have, however, exceeded State standards/permitted levels in the discharge from the Elko-New Market WWTP. The Elko/New Market Sewer Board is working to mitigate this problem.

Turbidity was measured during the 2001 and 2002 monitoring seasons at VRWJPO monitoring network sites and the MCES site at Highway 61. The State standard for turbidity in designated trout streams is 10 NTU (Nephelometric Turbidity Units) and the standard in all other streams in 25 NTU. In general, the River and its tributaries are below the State standard except during runoff events (Figures 2.21 and 2.22).

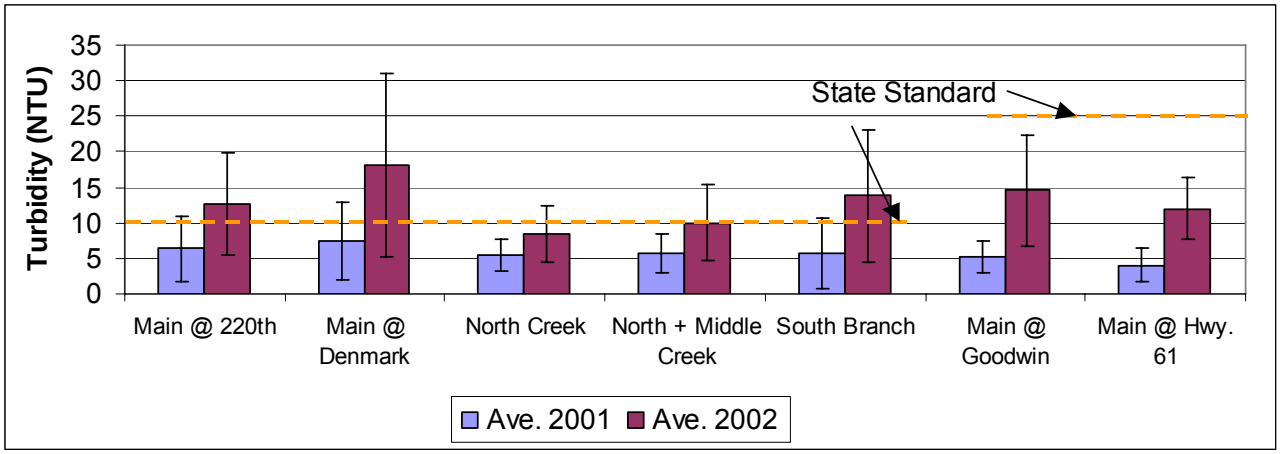



**Figure 2.21: Average Turbidity and 95% Confidence Intervals Measured at VRWJPO Monitoring Sites and One MCES Monitoring Site (Highway 61).**

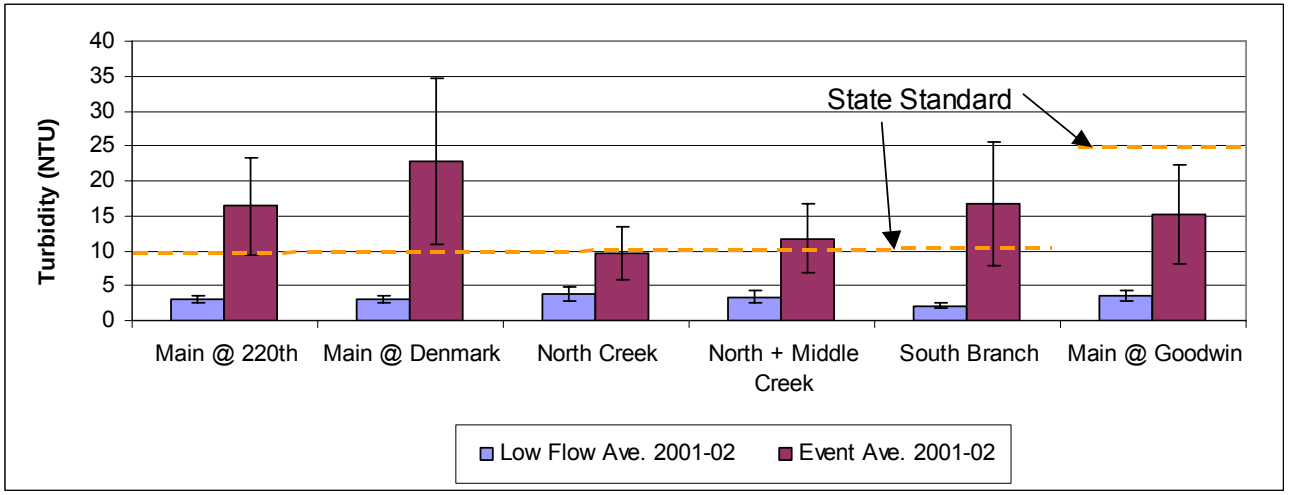



**Figure 2.22: Average Turbidity and 95% Confidence Intervals Measured During Runoff Events and Periods of Low Flow at the VRWJPO Monitoring Sites.**

Total and volatile suspended solids were measured during the 2000 – 2002 monitoring seasons at VRWJPO monitoring sites and the MCES site on Highway 61. Total suspended solids did not vary significantly and levels were usually below or only slightly above the ecoregion mean of 26 mg/L (Figure 2.23). The levels of solids increased further downstream at Goodwin Avenue and Highway 61. Solids also increased significantly during runoff events (Figure 2.24), but were only slightly above the ecoregion mean.

The pH measured during sampling at VRWJPO monitoring sites averaged 8.0 in 2001 and 2002. This is at the high end, but within the State standard range (6.5 – 8.5 in trout streams and 6.5 – 9.0 in all other streams). The average alkalinity measured at VRWJPO monitoring network sites ranged from 175 to 232 mg/L $CaCO_3$. This is within the range of hard water (150 – 330 mg/L $CaCO_3$).

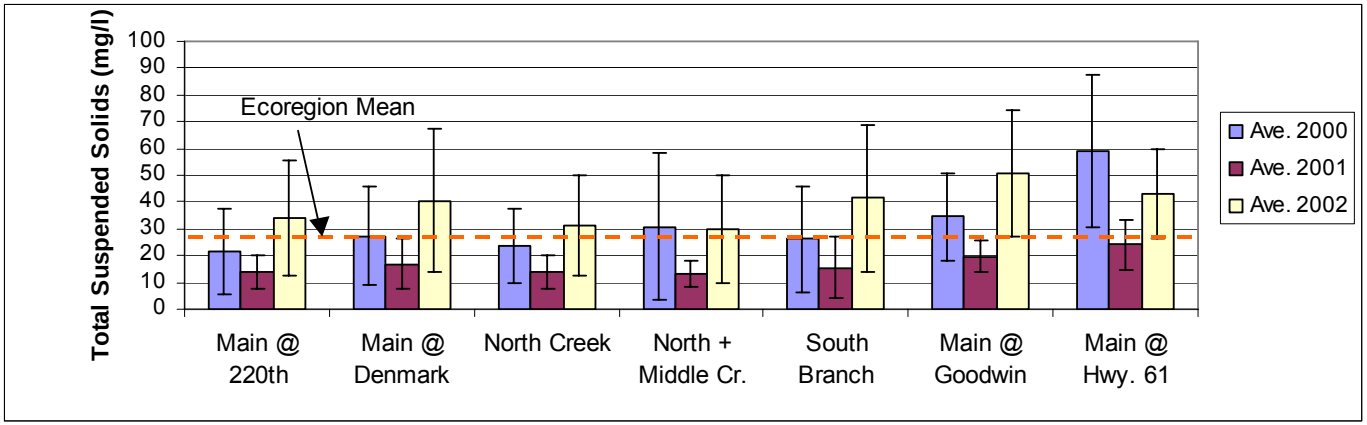



**Figure 2.23: Average Total Suspended Solids Concentrations and 95% Confidence Intervals Measured at VRWJPO Monitoring Sites and One MCES Monitoring Site (Highway 61).**

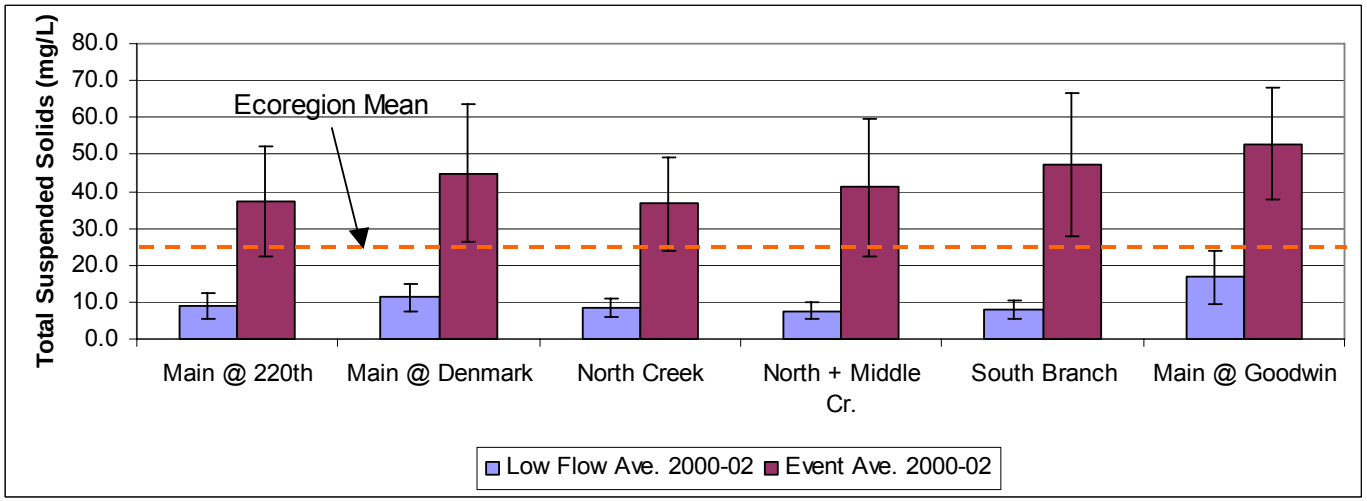



**Figure 2.24: Average Total Suspended Solids Concentrations and 95% Confidence Intervals Measured During Runoff Events and Periods of Low Flow at the VRWJPO Monitoring Sites.**

Metropolitan Council Environmental Services (MCES) Monitoring. Water quality has been monitored at four sites along the Vermillion River by MCES: at Highway 61 near the ConAgra building or Peavy Dam in Hastings (River Mile 2.0); in Hastings (Highway 47 at River Mile 2.7); at Blaine Avenue in Empire Township, just downstream of the Empire WWTP (River Mile 15.6); and in Farmington at Biscayne Avenue (River Mile 20.6).

Table 2.14 summarizes some of the water quality parameters that have been monitored from 1993-2002. Data for fecal coliform bacteria, which are also monitored by MCES, are being included in the Vermillion River Watershed Fecal Coliform Bacteria Study completed by the Dakota County SWCD (see discussion on page 2). For some parameters in the MCES database, there are few values available. There is also not much

**Table 2.14: Vermillion River Historical Water Quality, MCES Monitoring Data**

| Parameter | River Mile | | | |
|---|---|---|---|---|
| | 2.0[1] | 2.7[2] | 15.6[3] | 20.6[4] |
| DO, mg/L | | | | |
| Mean | 10.8 | 10 | 9.3 | 9.6 |
| Min | 7.8 | 6.4 | 4.9 | 5.9 |
| Max | 12.9 | 14.6 | 13.5 | 14.8 |
| Period | 1996 | 1993-2002 | 1993-2002 | 1993-2002 |
| Number | 3 | 377 | 395 | 394 |
| Suspended Solids, mg/L | | | | |
| Mean | 48 | -- | 12.2 | 9.5 |
| Min | 2 | -- | 2 | 1 |
| Max | 214 | -- | 79 | 88 |
| Period | 1995-2002 | -- | 1993-2002 | 1993-2002 |
| Number | 143 | -- | 243 | 243 |
| Turbidity, NTU | | | | |
| Mean | 9.5 | 5.7 | 4.6 | 4.3 |
| Min | 0.8 | 1.1 | 1.3 | 1 |
| Max | 90 | 93 | 38 | 35 |
| Period | 1996,1998-2002 | 1993-2002 | 1993-2002 | 1993-2002 |
| Number | 91 | 380 | 397 | 243 |
| Nitrate, mg/L | | | | |
| Mean | 4.7 | -- | 4.5 | 1.9 |
| Min | 0.11.54 | -- | 0.08 | 0.05 |
| Max | 412.6 | -- | 14.2 | 16.1 |
| Period | 1995-201996,1998-2002 | -- | 1993-2002 | 1993-2002 |
| Number | 103 | -- | 242 | 243 |
| Total Phosphorus, mg/L | | | | |
| Mean | 0.55 | -- | 0.64 | 0.09 |
| Min | 0.14 | -- | 0.01 | 0.01 |
| Max | 4 | -- | 2 | 1.55 |
| Period | 1995-2002 | -- | 1993-2002 | 1993-2002 |
| Number | 141 | -- | 242 | 242 |

Continued on next page…

recent data for the site at River Mile 2.7. With the initiation of monitoring at River Mile 2.0 in the mid-1990s, most of the parameters were deleted at River Mile 2.7.

**Table 2.14 (continued): Vermillion River Historical Water Quality, MCES Monitoring Data**

| Unionized Ammonia[5] mg/L | | | | |
|---|---|---|---|---|
| Mean | 0.0006 | 0.0009 | 0.0007 | 0.0006 |
| Min | 0.0001 | $3.7x10^{-12}$ | $6.3x\ 10^{-12}$ | $2.11x10^{-12}$ |
| Max | 0.0015 | 0.05 | 0.176 | 0.0073 |
| Period | 1996 | 1993-2002 | 1993-2002 | 1993-2002 |
| Number | 4 | 372 | 154 | 389 |

[1] Hastings at the ConAgra building. Note Samples at this site reflect a mix of grab and composite samples,
while other sites only had grab samples. Differences between this site and other may be a result of the mix
of sample types as well as other factors.
[2] Hastings at Highway 47
[3] Empire Township at Blaine Avenue
[4] Farmington at Biscayne Avenue
[5] Calculated from Total Ammonia, pH and temperature data for each site and sample date. More than 30% of the total ammonia concentrations were less than the detection limit for all sites except site 2.0. Assumed total ammonia equal to the detection limit for calculating the mean. Therefore, calculated means are likely higher than actual mean concentrations.

Review of the MCES data in Table 2.22 shows that nutrient concentrations (i.e., nitrate and total phosphorus) generally increase from above the Empire WWTP at River Mile 20.6 to below the plant at River mile 15.6. This increase may be from treatment plant discharges. There are currently no standards for nitrate or phosphorus. The WWTP denitrifies for ammonia, but does not have nutrient removal for phosphorus. With implementation of the Empire WWTP Master Plan, however, phosphorus removal will be added and the discharge to the Vermillion River will be discontinued. Presumably this will lower phosphorus and nitrate concentrations in the River below the existing discharge.

MCES turbidity data is similar to the VRWJPO data in that average values are below appropriate State standards [10 NTU (Nephelometric Turbidity Units) for trout waters and 25 NTU for other areas], with maximum observed values exceeding the standards.

MCES dissolved oxygen (DO) data shows the water quality standard of 5.0 mg/L for class 2B non-trout waters is met at River Mile 2.7. At River Miles 15.6 and 20.6, the DO standard for class 2A trout waters of 7.0 mg/L is generally met as shown by the averages. However, there are some concentrations below the standard as shown by the minimum concentrations. It may be valuable to complete a frequency distribution to assess how frequently this occurs.

Un-ionized ammonia data is similar to the VRWJPO data discussed previously where concentrations were generally below applicable water quality standards. Exceptions include one high value at River Mile 2.7 and one at River Mile 15.6.

It should be noted that calculated mean concentrations do not give a good indication of total load traveling through the River system. This is, in part, because total quantities depend on flow rate as well as concentration. In addition, these measures are often discrete points in time and space that should ideally be integrated over the season or year to accurately reflect load contributions. For this reason, the MCES began a cost-shared outlet monitoring program at River Mile 2.0. The outlet monitoring program is partially funded through a $4,000 stipend issued to each cooperator to perform the monitoring; the MCES pays the lab and equipment costs. The program's purpose is to determine the relative pollutant load contribution of the Vermillion River to the Mississippi River. Flow is monitored continuously during the ice-free season at the VR-1 stream station, located just downstream from Highway 61 near the Con Agra building in Hastings. Samples are analyzed for total phosphorus, dissolved phosphorus, total suspended solids, volatile suspended solids, chemical oxygen demand, chlorides, sulfates, metals, nitrogen, ammonia, hardness, alkalinity, and turbidity.

#### 2.2.2.1 Lakes

Data Sources. There are only a handful of lakes located within the Watershed; and water quality data for these lakes is limited. Most lake water quality data was collected under the Citizen Lake Monitoring Program (CLMP), a volunteer effort directed by the MPCA, and the Citizens Assisted Monitoring Program (CAMP), directed by the MCES. Several municipalities have also participated in lake water quality monitoring. Table 2.15 lists Watershed lakes and summarizes current lake water quality data sources.

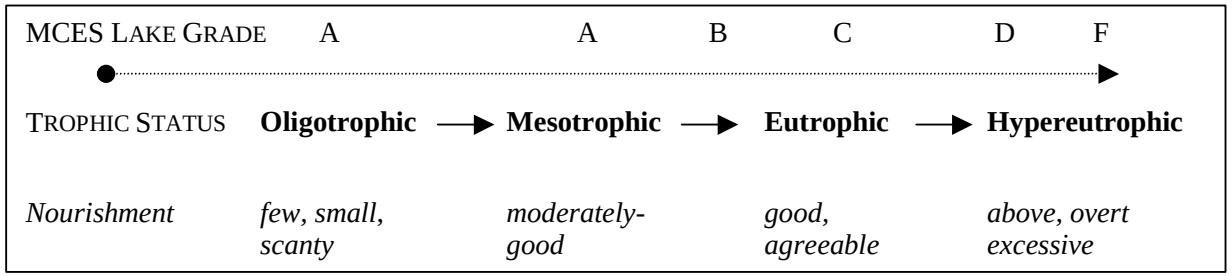
**Table 2.15: Vermillion River Watershed Lakes Data Sources**

| Resource | Data Source | Programs |
|---|---|---|
| Alimagnet Lake | Full diagnostic-feasibility study in 1991; CAMP data; city data; MPCA | City of Apple Valley Stormwater Management Plan in effect<br>City of Burnsville Water Resources Plan in effect |
| Lake Isabelle | MCES | Several citizen efforts have been put forth to the City of Hastings for improving the lake |
| Lake Marion | CAMP data; city data; MPCA | City of Lakeville Stormwater Management Plan in effect |
| Farquar Lake | CAMP data; city data; MPCA | City of Apple Valley Stormwater Management Plan in effect |
| Mudhen Lake[1] | No data available | None |
| Spring Bank Lake[1] | No data available | None |
| Sharp Muskrat Lake[1] | No data available | None |
| Kegan Lake | No data available | None |
| Moeller (Long) Lake | No data available | None |
| Lake Rebecca | No data available | None |
| Rice Lake | No data available | None |

[1] The Minnesota Pollution Control Agency and the Minnesota Department of Natural Resources are currently collecting water quality and flow information as part of a study on these lakes that began in 1995.

Mudhen, Spring Bank, and Sharp Muskrat are Mississippi River floodplain lakes; no water quality data is available for them. Lake Rebecca is also a floodplain lake; however, some monitoring information is available. These lakes are most likely shallow and behave as river-influenced wetlands.

Trophic State. Lake water quality is often described by its "trophic" or nourishment status. For low concentrations of nutrients (oligotrophic), there is little available nourishment, hence, little aquatic life including fish. If there is too much (hypereutrophic), the excessive nourishment often results in excessive algal growth. Moderate amounts (mesotrophic) are generally considered ideal for recreational purposes. The following schematic illustrates the relationships between trophic status and MCES lake grade.




Trophic State Indices (TSI) are calculated based on certain water quality indicators to determine where the lake fits on this continuum. These indicators are phosphorus concentration, chlorophyll-a concentration, and Secchi depth. Phosphorus (P) is often the limiting nutrient for plant growth in lake systems. Additions of P (e.g., external P inputs) will therefore enhance plant growth, including algae. Chlorophyll-a is a green pigment in algae. Measuring chlorophyll-a concentration gives an indication of how abundant algae is in a waterbody. Secchi depth is a measure of water transparency (how deep you can see through the water column). Murky and cloudy lakes have low Secchi depth readings. TSIs are calculated based on relationships between these indicators and trophic status. Higher TSIs correspond to higher nutrient status. Table 2.17 lists past water quality status of monitored lakes.

As can be seen in Table 2.17, most of the lakes where data was available are eutrophic and have a "C" grade for their quality, except for Lake Isabelle, which is hypereutrophic and receives an "F." Lakes receiving a "C" are considered to have average water quality for the Metropolitan Area and are generally recreationally impaired. One of the primary factors contributing to the eutrophic condition of the lakes is their shallow nature. It is well-documented that shallow lakes typically have higher nutrient concentrations.

Alimagnet Lake. This lake was studied extensively for a full Diagnostic/Feasibility Study (DFS) in 1991, and has also been periodically monitored by volunteers (CAMP) and the MPCA since 1990. Details of the DFS can be found in the "Cities of Apple Valley and Burnsville Final Report on the Diagnostics/Feasibility Study of Alimagnet Lake," 1991.

In the 1991 DFS, Alimagnet Lake was determined to be impaired for swimming, boating, recreational fishery, and aesthetics. The lake was found to be phosphorous limited, prone to severe algal blooms in mid summer, inundated with nuisance curly-leaf pondweed (*P. crispus*), and subject to winter fishkills due to low dissolved oxygen (DO) levels. It was shown that a 30% reduction in

external phosphorous load (440 lbs/yr) was necessary to meet the in-lake water quality criteria goals established. Table 2.16 lists the water quality criteria goals and 1991 monitoring results. The City of Apple Valley initiated another Diagnostic Feasibility study in the spring of 2003. The study was completed in the spring of 2004.

**Table 2.16: Alimagnet Lake Water Quality Goals and Status, 1991 Clean Lakes Study**

| | Total Phosphorus (µg/l) | Chlorophyll-a (µg/l) | Secchi Depth (m) |
|---|---|---|---|
| Water Quality Criteria Goals | 81 | 27 | 1.5 |
| 1991 monitored | 165 | 48 | 0.6 |

**Table 2.17: Water Quality Summary for Vermillion River Watershed Lakes**

| **Alimagnet Lake: 109 acres, 5-foot average depth** | | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1997** | **1998** | **1999** | **2000** | **2001** | **2002** |
| TSI-P[(a)] | 64 | 67 | 74 | 73 | 69 | 73 |
| TSI-CHl-a[(b)] | 62 | 64 | 71 | 69 | 66 | 67 |
| TSI-SD[(c)] | 57 | 56 | 63 | 70 | 65 | 70 |
| Average TSI | 61 | 62 | 69 | 71 | 67 | 70 |
| Trophic Status | Eutrophic | Eutrophic | Hypereutrophic | Hypereutrophic | Hypereutrophic | Hypereutrophic |
| MCES Lake Grade | C | C | D | D | D | D |
| **Farquar Lake: 63 acres, 4.6-foot average depth** | | | | | | |
| TSI-P[(a)] | -- | 68 | 74 | 70 | 82 | 79 |
| TSI-CHl-a[(b)] | -- | 71 | 71 | 67 | 84 | 81 |
| TSI-SD[(c)] | -- | 60 | 63 | 70 | 73 | 73 |
| Average TSI | -- | 66 | 69 | 69 | 80 | 78 |
| Trophic Status | -- | Hypereutrophic | Hypereutrophic | Hypereutrophic | Hypereutrophic | Hypereutrophic |
| MCES Lake Grade | -- | D | D | D | F | F |
| **Lake Marion (south bay): 589 acres, variable depth** | | | | | | |
| TSI-P[(a)] | -- | -- | 52 | 49 | 50 | 57 |
| TSI-CHl-a[(b)] | -- | -- | 59 | 46 | 56 | 56 |
| TSI-SD[(c)] | -- | -- | 50 | 46 | 49 | 49 |
| Average TSI | -- | -- | 54 | 47 | 52 | 54 |
| Trophic Status | -- | -- | Eutrophic | Mesotrophic | Eutrophic | Eutrophic |
| MCES Lake Grade | -- | -- | B | B | B | C |

[(a)] Trophic State Index based on Phosphorus concentration
[(b)] Trophic State Index based on Chlorophyll-a concentration
[(c)] Trophic State Index based on Secchi Transparency depth

Lake Marion. Water quality was evaluated in the City of Lakeville Stormwater Management Plan (Barr Engineering, July 1995) and is currently being monitored by the City of Lakeville. Water quality goals for Lake Marion include swimming, boating, recreational fishing, and aesthetics. It is considered impaired for all of these functions for at least a portion of the summer. Due to its shallow nature, Lake Marion mixes periodically during the summer (intermictic) leading to nutrient recycling. However, water quality, shown previously in Table 2.17, has remained fairly stable over time.

Floodplain Lakes. There are indications that high phosphorous loads from the Vermillion River may be impacting the water quality of floodplain lakes that lie outside of the VRWJPO management area. However, due to their location, potential interaction with the Mississippi River may also be a contributing factor. Under these circumstances, phosphorous load is a regional issue due to the complex interaction between the Vermillion River below Hastings and the Mississippi River. The Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Natural Resources (MDNR) began a water quality and flow monitoring study on some of these lakes in 1995. Results are presented in an Office Memorandum from MPCA to MDNR dated May 7, 1999, titled *"Observations on Vermillion River Floodplain Lakes Water Quality Survey: 1998 Data*," which is available from the MPCA Lake Assessment page of its website www.mpca.state.mn.us/water/lake/report.html#goodhue "Vermillion River Floodplain Lakes Status Report."

#### 2.2.2.2 Empire Wastewater Treatment Plant (WWTP)

The Empire WWTP is potentially the largest point load contributor to the Vermillion River, since it is the largest quantity discharger. It represents approximately 15% of annual flow in the Vermillion River; and during low flow conditions, can constitute about one-third of the total flow in the River.

Empire WWTP pollutant loads to the Vermillion River were assessed in 1995, based on monitored concentrations and flow volumes at the WWTP and River outlet. Although the Empire WWTP contributed minimal TSS (total suspended solids), VSS (volatile suspended solids), and COD (chemical oxygen demand), almost all the phosphorus load (both total and dissolved phosphorus) at the outlet could be attributed to the WWTP. There are currently no permit limits for phosphorus discharge from the Empire WWTP. With implementation of the Empire WWTP Master Plan, however, phosphorus removal will be added to operations and the discharge will be removed from the Vermillion River by the end of 2007 or sometime in 2008.

Analysis of 1992 through 2002 permit data shows that the Empire WWTP did not generally exceed its discharge permit limits (Table 2.18). The fecal coliform criterion is 200 organisms/100 ml (milliliters) of water as a geometric mean of at least 5 samples per month March through October. The Empire WWTP has not exceeded this limit. Most values from the treatment plant discharge are in the range of 10 to 20 organisms/100ml, much less than in-stream concentrations and criteria. Therefore, it is unlikely that the Empire WWTP has a significant effect on Vermillion River water quality with respect to fecal coliforms. Low contributions of fecal coliforms are expected since the Empire WWTP disinfects (chlorinates) water prior to discharge.

Before 1996, the Empire WWTP arithmetic monthly mean limit for $NH_3$-N (ammonia as an indicator for nitrogen) was 1 mg/L (milligrams per liter). After 1996, seasonal permit limits were established. From 1992 through 2002, $NH_3$-N permit limits were exceeded only once (in 1994), but the concentration and load were still below the 1996 seasonal permit limit value. In general, $NH_3$-N discharge concentrations were less than 10% of the permit limit value. Phosphorous discharge does not have set permit limits but concentration monitoring is required. The average monthly mean concentration from 1998 through 2002 was 4.6 mg/L.

**Table 2.18: Empire WWTP Discharge Summary 1992-2002 (Ranges of Values and Exceedences)**

| Parameter | Year | Permit Limit Arithmetic Mean | Units | Number of Exceedences |
|---|---|---|---|---|
| TSS (total suspended solids) | 1992-94<br>1995-97<br>1998-02 | 10/20[(1)]<br>10/30[(1)]<br>20/30[(1)] | mg/L<br>mg/L<br>mg/L | None<br>None<br>None |
| $NH_3$-N (ammonia as an indicator for nitrogen) | 1992-95<br>1996-97<br>1998-02 | 1<br>2.1-7.5[(5)]<br>2.1-4.5[(5)] | mg/L<br>mg/L<br>mg/L | 1<br>None<br>None |
| BOD (biochemical oxygen demand) | 1992-95<br>1996-97<br>1998-02 | 10/20[(1)]<br>10-40<br>10-25[(5)] | mg/L<br>mg/L<br>mg/L | None<br>None<br>None |
| pH (measure of acidity) | 1992-97<br>1998-02 | 6-9<br>6-9 | s.u.<br>s.u. | 2<br>1 |
| Fecal Coliforms | 1992-97<br>1998-02 | 200[(4)]<br>200[(4)] | #/100 ml<br>#/100 ml | None<br>None |
| DO[(2)] (dissolved oxygen) | 1992-95<br>1996-97<br>1998-02 | 4<br>7-6<br>7-6 | mg/L<br>mg/L<br>mg/L | None<br>None<br>None |
| TP (total phosphorus) | 1992-97 | None | mg/L | NA[(3)] |

(1) First number is monthly arithmetic mean, second is maximum7-day arithmetic mean
(2) DO criteria are minimum permit limits
(3) NA = not applicable
(4) Geometric Mean
(e) Varies seasonally

#### 2.2.2.3 Vermillion River Watch Program

Vermillion River Watch Program volunteers work in partnership with the Dakota County Soil and Water Conservation District and communities to determine the health of the Vermillion River and its tributaries and to identify or implement stewardship activities to protect and enhance the River. Program goals include: building awareness and appreciation of the Vermillion River and its ecology, establishing baseline water quality data, and investigating the effects of specific land uses on water quality in the Vermillion River. The program uses student and adult volunteers to collect physical, chemical, and biological data consistent with national River Watch protocol.

Each spring and fall, volunteer monitors collect data used to document the annual and spatial health of the Vermillion River. Consistencies in sampling protocols and site locations provide accurate scientific data to resource professionals and city officials, who use the data to advise efforts in water quality protection and city development planning. Figure 2.32 shows the monitoring locations for the River Watch program. Through the program, students gain an essential field biology experience, while integrating their work into local environmental and political issues; students are involved in an out- of-classroom experience that provokes inquiry, water resource appreciation and community extension activities. The Vermillion River Watch Program is funded by the VRWJPO.

#### 2.2.2.4 Wetland Health Evaluation Program (WHEP)

The WHEP began in 1997 as a wetland volunteer monitoring project. Today, the WHEP is a unique program that brings citizen volunteers, non-profits, local government and State and federal agencies together in a comprehensive effort to monitor and improve wetlands and educate local communities on wetland health.

The WHEP's inception dates back to the early 1990s with research by scientists at the Minnesota Pollution Control Agency (MPCA) in cooperation with the U. S. Environmental Protection Agency (EPA) to develop bioassessment criteria for the nation's wetlands. MPCA staff recognized the need to involve citizens in this process. In 1996, the MPCA partnered with National Audubon to pilot a volunteer wetland bioassessment project.

Volunteer teams sample the wetlands selected by their sponsor, doing one monitoring sample for invertebrates and another for vegetation on each wetland. WHEP consists of three parts: monitoring, outreach and wetland improvement.

- Monitoring. WHEP monitoring includes: training, collection and recording of data; data interpretation; and presentation of data back to local communities. Citizen volunteers participate in a community based monitoring team. A team leader with a background in the natural sciences leads each team. The team leader works with a staff person of the sponsoring city or watershed organization to provide coordination between the team and the sponsor.

- **Outreach.** The WHEP provides educational outreach activities related to wetland health. These include a Wetland Exploration Series each spring, participation in the Mississippi River Gallery exhibit at the Science Museum of Minnesota and presentations at local and national conferences. WHEP volunteers and team leaders present to a variety of community groups. The School of Environmental Studies, a public high school, uses a modified version of WHEP to study local wetlands as a part of student projects.

- **Wetland Improvement.** The WHEP is committed to involving volunteers in projects that directly improve wetland health. WHEP volunteers participated in the restoration of Cedar Pond in Eagan. WHEP is currently working with the Shoreland Volunteer Program of the University of Minnesota Extension Service to train volunteers in wetland restoration. Trained volunteers will work with their local communities to restore and improve the health of area wetlands.

## 2.3 GROUNDWATER RESOURCES

This groundwater resources subsection describes area aquifers and the findings of the Hastings Area Nitrate Study (HANS). The focus of the VRWJPO, in terms of groundwater quality and quantity, is the interaction between the Vermillion River and groundwater resources, rather than general groundwater issues already addressed by other State and local agencies.

### 2.3.1 Aquifers

The human population of the Vermillion River Watershed (Watershed) is dependant on the region's aquifers for almost 100% of the water it uses. The geologic units underlying the Watershed serve as an important source of groundwater. Below the water table, the pore spaces, cracks, and voids in sediments and rock are filled with water. An aquifer is a geologic unit that can store and transmit enough water to reasonably supply wells. Just like surface waterbodies, an aquifer has inputs, outputs, and storage capacity. Water can enter an aquifer through percolation of surface water, injection wells, and/or flow from other aquifers. Water exits an aquifer through discharge to surface waters (base flow) and other aquifers or by withdrawals from wells. The aquifers underlying the Watershed are shown in Figure 2.25.

Water from lakes, rivers, and wetlands moves down into aquifers, and water from aquifers discharges into surface water features. Pollutants can be and are exchanged between surface and groundwater features in the Watershed. Although each may move and store water differently, surface and groundwater systems do not operate independently of one another. Therefore, protection of the quality and quantity of the Watershed's surface water resources is vital to protecting the quality and quantity of the Watershed's groundwater resources and vice versa.

The uppermost aquifer (surficial aquifer) in the Watershed is located in the unconsolidated sediments left behind by glaciers. These Quaternary aquifers (see Figure 2.26) are not used for municipal or public supply, but are a significant source of water for private

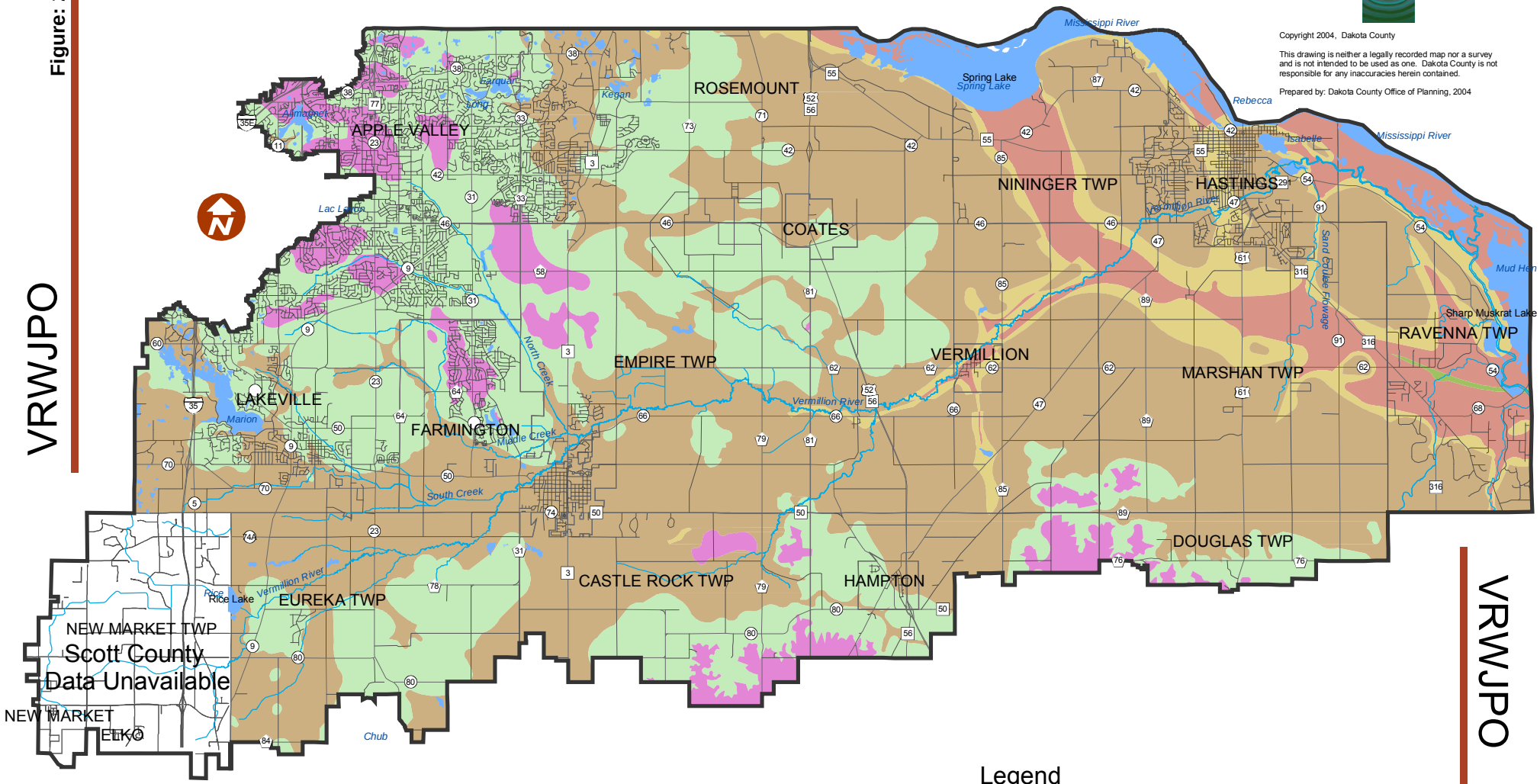
Figure: 2.25

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




## Legend

- Decorah Shale
- Ironton and Galesville Sandstones
- Platteville and Glenwood Formations
- St. Peter Sandstone
- Prairie du Chien Group
- Jordan Sandstone
- St. Lawrence and Franconia Formations

# Aquifers

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

0 1 2 4 6

Miles

VRWJPO

Figure: 2.25

domestic and irrigation wells. The surficial aquifer is also the source of groundwater that maintains the cool water temperatures in the Vermillion River that support trout. Because the thickness of glacial sediments varies dramatically across the Watershed, the saturated thickness (depth of material where all pore spaces are filled with water) of the Quaternary aquifers varies from 0 to over 200 feet. The potential yield (the maximum rate at which water can be withdrawn from an aquifer without unacceptably changing the characteristics of the aquifer) varies naturally with the saturated thickness of the Quaternary aquifers from less than 5 gallons per minute in the shallowest areas to over 2,000 gallons per minute in the thickest areas (the buried valleys). Since the majority of the Quaternary aquifers are composed of sand and gravel, water can move very quickly through them (transmissivities of up to and over 100,000 to 200,000 gallons per foot per day). Combining the high movement rates with the proximity to surface activities make these aquifers highly sensitive to pollution. High nitrate concentrations related to farming practices and failing septic systems have been recorded in the Quaternary aquifers in the Watershed (Appendix B). Pesticide pollution is also common.

Bedrock aquifers are often named for the rock unit in which they occur and therefore have the same stratigraphic relationships (see Figure 2.26). The uppermost bedrock units in the Watershed, the Platteville and St. Peter formations, occur discontinuously primarily in the northwestern region of the Watershed. Both of these formations are usually dry or locally contain an unreliable aquifer. The Platteville is used for several domestic wells around Crystal Lake (outside the VRWJPO Watershed boundary), but evidence indicates that it recharges locally from the lake. The St. Peter is used for domestic wells and is sometimes combined with the underlying Prairie du Chien - Jordan aquifer in higher capacity wells. Recharge into the St. Peter is greatest where the Glenwood Formation is missing and sands overlay the aquifer. Local recharge areas for groundwater in the Watershed are the Crystal Lake, Lakeville, and Murphy-Hanrehan Park Reserve regions of the Watershed.

The most significant and widely used aquifer in the Watershed is the Prairie du Chien – Jordan aquifer. This aquifer is composed of two geologic units (a dolomite and a sandstone, respectively) with differing hydrologic characteristics that act as a single aquifer over a large region. (Note: Recent research has indicated that the Prairie du Chien and Jordan units act as separate aquifers. Well construction in Dakota County is based on them being separate aquifers.) The saturated thickness of this aquifer reaches well over 300 feet in the Watershed. The potential yield of the Prairie du Chien-Jordan is similar to that of the Quaternary aquifers, ranging from under 500 gallons per minute to over 2,500 gallons per minute. The Minnesota Geological Survey has designated the majority of the Prairie du Chien - Jordan under the Watershed to be highly to very highly sensitive to contamination. The sensitivity rating is based on the geologic characteristics of the overlying rock and sediment to absorb and hold contaminants, dilute contaminants to below standard levels (Appendix D), and control the rate that contaminants can move into and through aquifers. In areas rated as having high sensitivity, contaminants can reach the aquifer on a time scale on the order of weeks to years. Areas with very high sensitivity ratings are places where contaminants can enter the aquifer in a matter of hours to months.

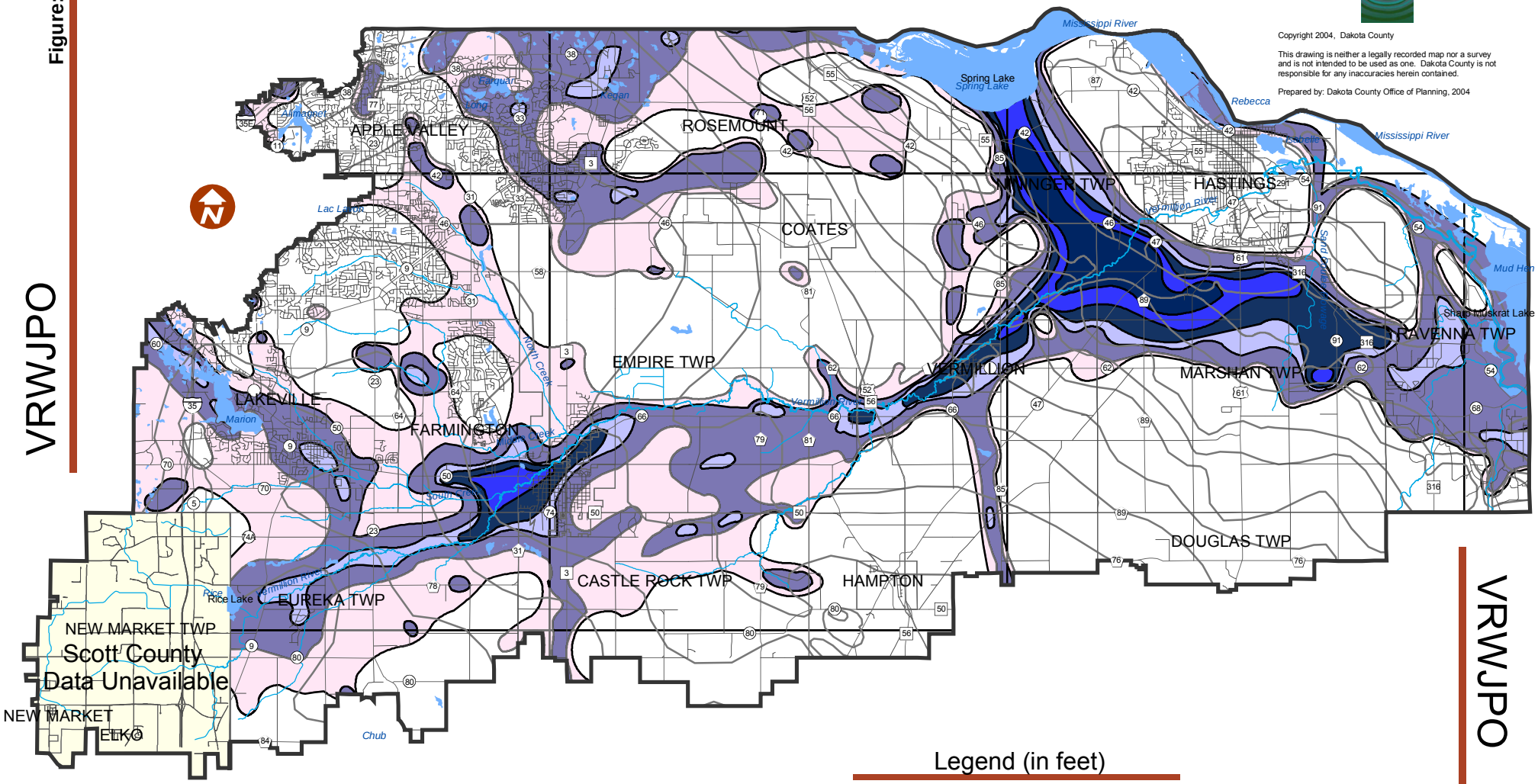
Figure: 2.26

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2004




## Legend (in feet)

- less than 5
- 5 to 50
- 50 to 250
- 250 to 500
- 500 to 1000
- 1000 to 2000
- OVER 2000
- WATER

0 1 2 4 6

Miles

# Quaternary Hydrography

Derived from the Geologic Atlas of Dakota Coiunty, Minnesota Geological Survey,1990.

VRWJPO

Figure: 2.26

Below the Prairie du Chien – Jordan are the St. Lawrence - Franconia and the Ironton – Galesville Formations. The St. Lawrence formation is considered to be an aquatard or confining layer (a geologic layer that retards vertical water flow), but it does produce small amounts of water in some locations. The Franconia is a low to moderate yield (<200gpm) sandy dolomite aquifer, and the Ironton – Galesville is a thin sandstone aquifer (about 50 feet thick) in the Watershed. Neither aquifer serves as a significant source of groundwater for the Watershed's population.

The deepest, high-yield aquifer available in the Watershed, the Ironton – Galesville, is separated from the nearest aquifer by 200 feet of the Eau Claire Formation, a confining layer (a geologic unit with little or no permeability). Under normal conditions, the Mt. Simon – Hinckley aquifers are hydraulically isolated. Because of the pristine and isolated nature of these aquifers, appropriations from the Mt. Simon – Hinckley aquifer are addressed directly in State Statute (Minn. Stat. 103G.271, Subd. 4a). The Minnesota Department of Natural Resources (MDNR) is not allowed to issue permits for this aquifer in metropolitan counties unless it is for potable (drinking) water, there is no alternative source, and a water conservation plan is included in the permit. The potential yield of this aquifer is calculated to be between 650 and 1,800 gallons per minute, and several communities in the Watershed use this aquifer for their municipal supply. As a result of these wells, the Mt. Simon – Hinckley aquifer is artificially recharged from the overlying aquifers locally changing the flow direction and water chemistry of the Mt. Simon – Hinckley.

### 2.3.2 The Hastings Area Nitrate Study and the Vermillion River

Nitrate is the most common form of non-point source groundwater pollution, especially in the Corn Belt of the Midwestern United States. Nitrate is also a strong indicator that human activities are affecting water quality and that other contaminants may be present.

The effect of nitrate on human health is a concern, because in environments affected by human activity, nitrate can accumulate to unhealthy levels. In particular, infants whose drinking water contains more nitrate than the drinking water standards of 10mg/L can develop methemoglobinemia ("blue baby" syndrome), which is characterized by blueness around the mouth, hands and feet, and sometimes trouble breathing, diarrhea, and vomiting, and can even lead to convulsions and death. Methemoglobinemia is a condition where hemoglobin (the red blood pigment) is unable to effectively carry oxygen to the tissues. Excessive levels of nitrate have also been linked to some cancer risks, birth defects, genetic damage, and other glandular disorders (e.g., hyperthyroidism, insulin-dependent diabetes).

Dakota County conducted a Clean Water Partnership (CWP) project to determine the cause and extent of nitrate contamination in the groundwater in the downstream areas of the Vermillion River Watershed – the City of Hastings and surrounding townships. Although the Hastings Area Nitrate Study (HANS) was a groundwater study, it developed valuable information regarding water quality in the Vermillion River, sources of nitrate contamination in surface water as well as groundwater, and the nature of groundwater/surface water interactions in the Watershed.

Dakota County's partners in the HANS were:

- City of Hastings
- Minnesota Department of Health (MDH)
- Minnesota Department of Agriculture (MDA)
- Dakota County Soil and Water Conservation District (SWCD), and
- Metropolitan Council.

In order to quantify and map patterns of elevated nitrate in the City of Hastings and the surrounding townships, the County and its project partners gathered and analyzed data on:

- Private and public drinking water quality
- Surface water quality
- Farming practices
- Sewage treatment conditions
- Geology
- Soils
- Groundwater flow patterns.

The HANS found that the major source of nitrate contamination was row-crop agriculture, although strong evidence of sewage contamination was also found.

Dakota County staff became aware of increasing nitrate levels in the City of Hastings municipal water supply while also noting (through the County's well regulation program) increasing numbers of private drinking water wells with elevated nitrate levels. The City of Hastings and the residents of the surrounding townships derive 100% of their drinking water from groundwater. Hastings started the siting process for a new municipal well in 1997, to help meet growing demand. Two test wells were drilled into the Jordan aquifer, and both wells showed levels of nitrate at approximately 8 mg/L (milligrams per liter). The drinking water standard is 10 mg/L. The city tested five private wells within the search area for the new municipal well and found elevated nitrate levels ranging from 12 to 16 mg/L. In May 1999, just before the HANS began, the MDH closed Hastings Municipal Well #6 for several weeks, after samples contained average nitrate concentrations of 10.5 mg/L. Nitrate levels in the other municipal wells have been below the drinking water standard, but have shown steady increases over the last ten years.

Results from the HANS private drinking water well samples justified the concerns that originally prompted the study; more than half of the wells had high nitrate levels, with 26% exceeding the drinking water standard of 10 mg/L, and another 26% in the "elevated" range of 3 to 10 mg/L. The Hastings municipal well results were below the drinking water standard, but ranged from 2.1 to 8.5 mg/L.

Farm Nutrient Management Assessment Program. In order to characterize and quantify the area's agricultural practices related to nitrate, the MDA conducted a Farm Nutrient Management Assessment Program (FANMAP). In a FANMAP study, the MDA conducts extensive, one-on-one, confidential interviews with farmers in the area, to learn in detail how many acres they farm, the crops they grow, the livestock they raise, their fertilizer and pesticide application practices, irrigation, and manure management practices. From the FANMAP results, County staff learned that corn and soybeans, grown in rotation, are more dominant in the area than expected (69% of the acreage), while potato acreage was less than expected (7%). Farmers in the area were found to be following University of Minnesota-recommended Best Management Practices for both fertilizer and pesticide use. Finally, feedlots were eliminated as a significant source of nitrate, because relatively few livestock were raised within the study area.

Indicator Compounds. In order to differentiate between the potential sources of nitrate, a representative subset (20%) of the samples from the private wells was analyzed for certain compounds that were considered tracers in addition to nitrate. Specifically, the samples were analyzed for caffeine as a tracer for sewage affecting the water and for certain agricultural pesticides (and pesticide metabolites) as tracers for row crop farming effects. Caffeine was selected as a tracer for wastewater contamination because it does not occur naturally in groundwater and the only known source is through human consumption.

Caffeine was detected in 89% of the samples, and pesticides (or pesticide metabolites) were detected in 70% of the samples. All of the samples had at least one of the two types of contaminants. The pesticides and caffeine were found in a sample of Hastings municipal water at levels comparable to those found in private wells in the surrounding area. Because caffeine was more widely detected than nitrate, it was not directly correlated to nitrate levels.

In contrast, the relationship was extremely strong between well nitrate levels and pesticide levels. From this, County staff concluded that the major source of nitrate in the study area was row crop agriculture. Even though the FANMAP indicated that farmers in the area are following Best Management Practices, the area's soil and geological conditions are working against them.

Vermillion River Information Derived from HANS. The Vermillion River passes through the study area and is considered a possible transport mechanism for nitrate contamination. To investigate this, three sets of monitoring wells were installed along the River: upstream of the buried bedrock valley (just downstream of the City of Vermillion), over the buried bedrock valley (in Marshan Township), and downstream of the valley (within the City of Hastings) to study water and nitrate level differences between surface water and groundwater (see Monitoring Well Locations, Figure 2.27). The results indicate that the relationship between the River and the groundwater is complex and changes along the course of the River.

Groundwater-surface water interactions. In the three miles between the upstream and buried bedrock valley wells, the groundwater table drops approximately 70 feet, where the ground surface only drops 8 to 15 feet. In the two miles between the buried bedrock valley and downstream wells, the groundwater table is approximately level, where the ground surface drops 15 feet. In some time periods, the groundwater table is higher at the downstream wells in Hastings than at the buried bedrock valley wells (see Changes in Water Table, Figure 2.28).

The monitoring well results indicate that: upstream of the buried bedrock valley, the groundwater table is higher than the River, so groundwater flows into the River; but, where the River crosses the valley, the groundwater table drops sharply. Over the valley, the River is "perched," with little interaction with the groundwater below; but further downstream, within the City of Hastings, the River loses water into the groundwater. Based on these observations (Figure 2.29), and referring to the Dakota County Geologic Atlas, it appears that the Vermillion River/groundwater interactions change where the River enters the City of Hastings and the surficial geology changes from mixed outwash to older glacial deposits and Karst limestone.

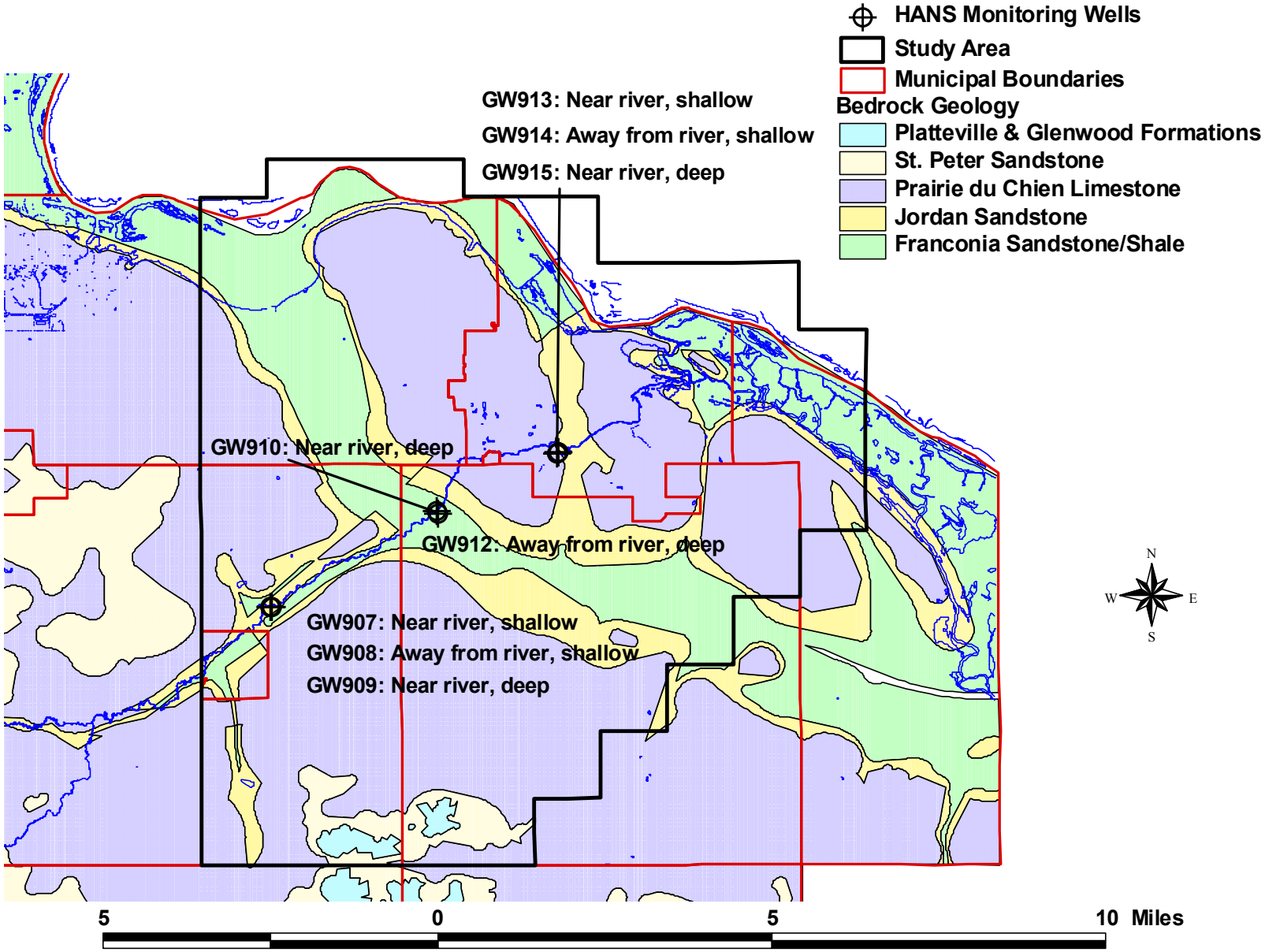
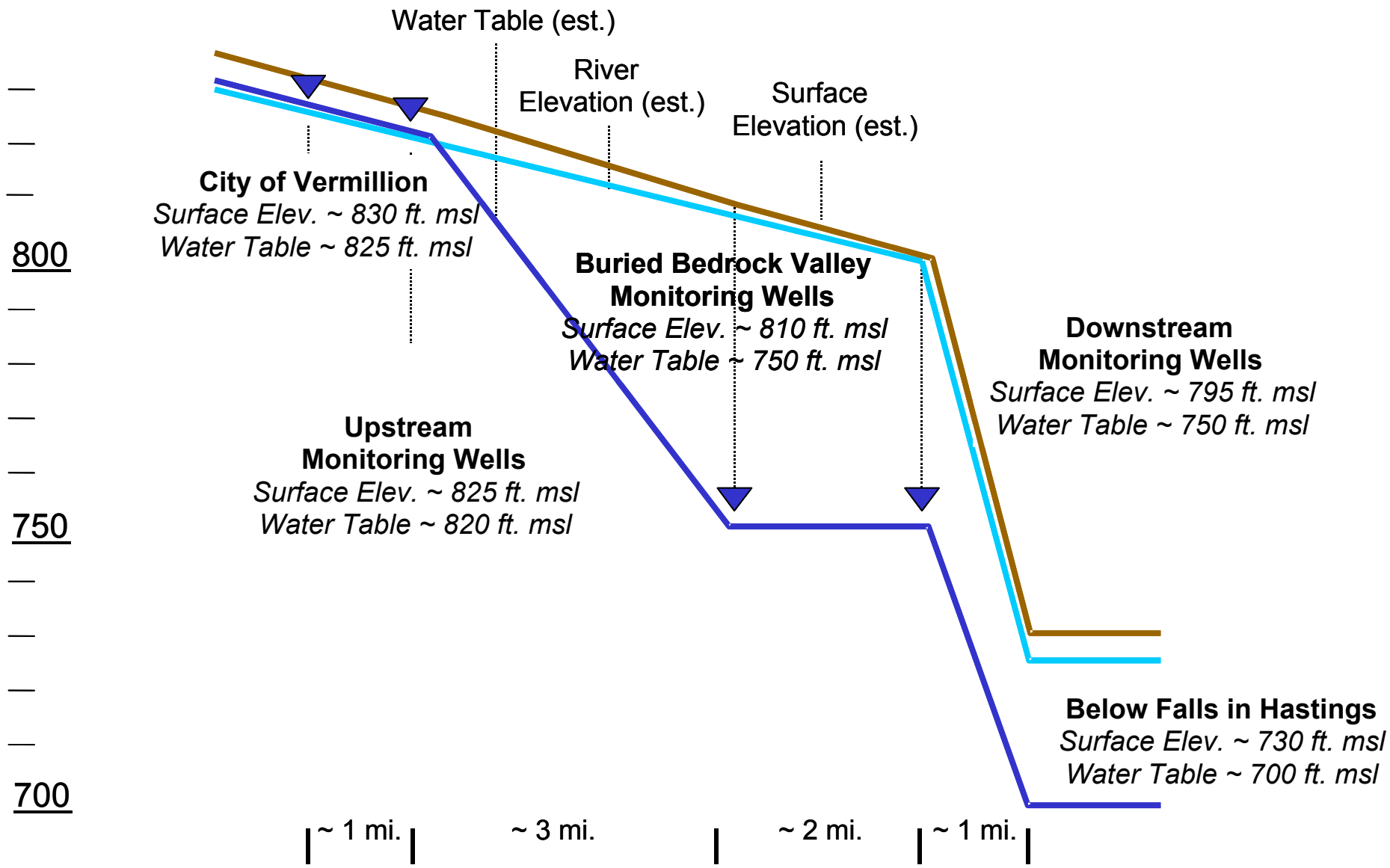



Figure 2.27

Derived from the Dakota County Geographic Atlas, Minnesota Geolgical Survey, 1990

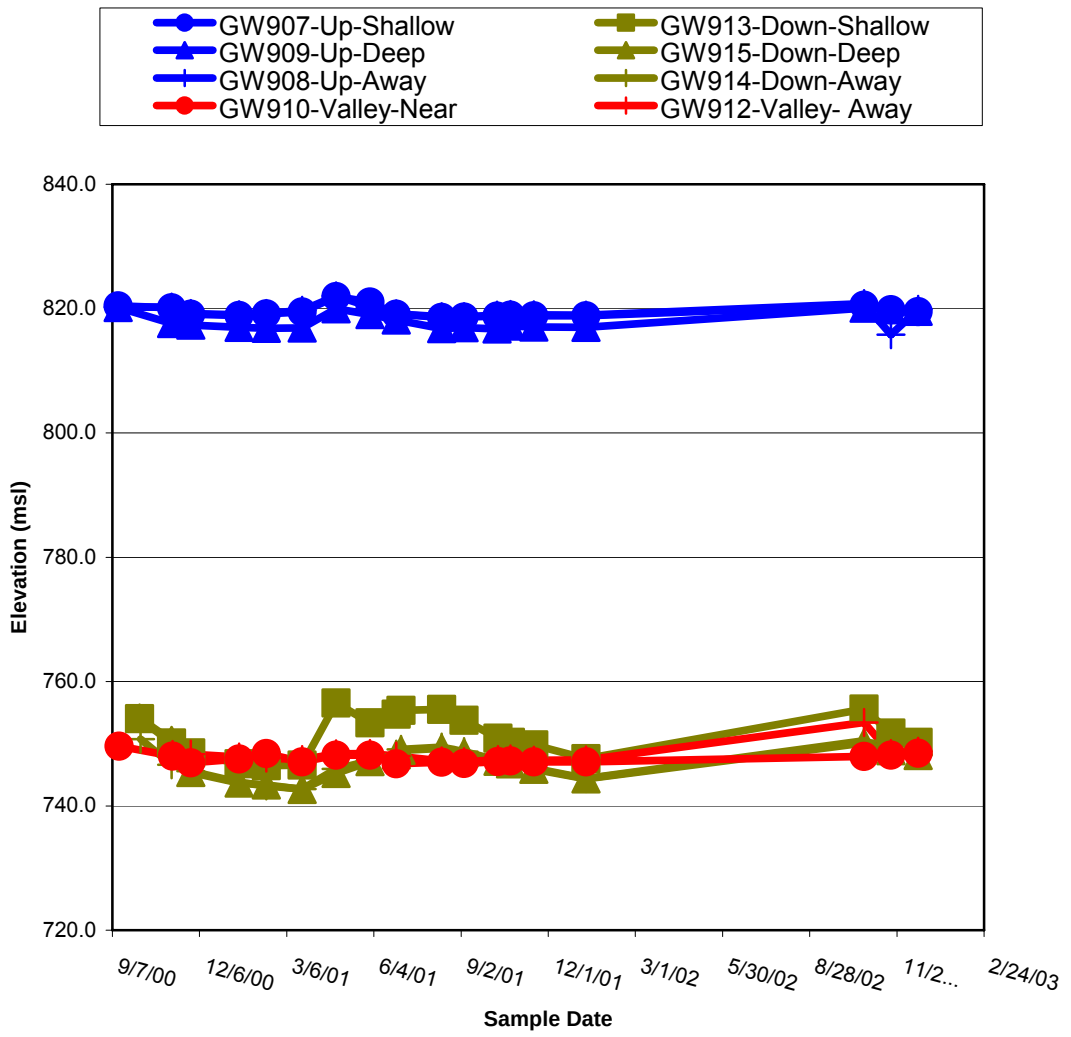



**HANS Figure 2.28**

**Changes in Water Table vs. Vermillion River Between Vermillion and Hastings**

Derived from the Dakota County Geographic Atlas, Minnesota Geolgical Survey, 1990

**Figure 2.29: Static Water Levels (msl) Groundwater in Monitoring Wells over Time**

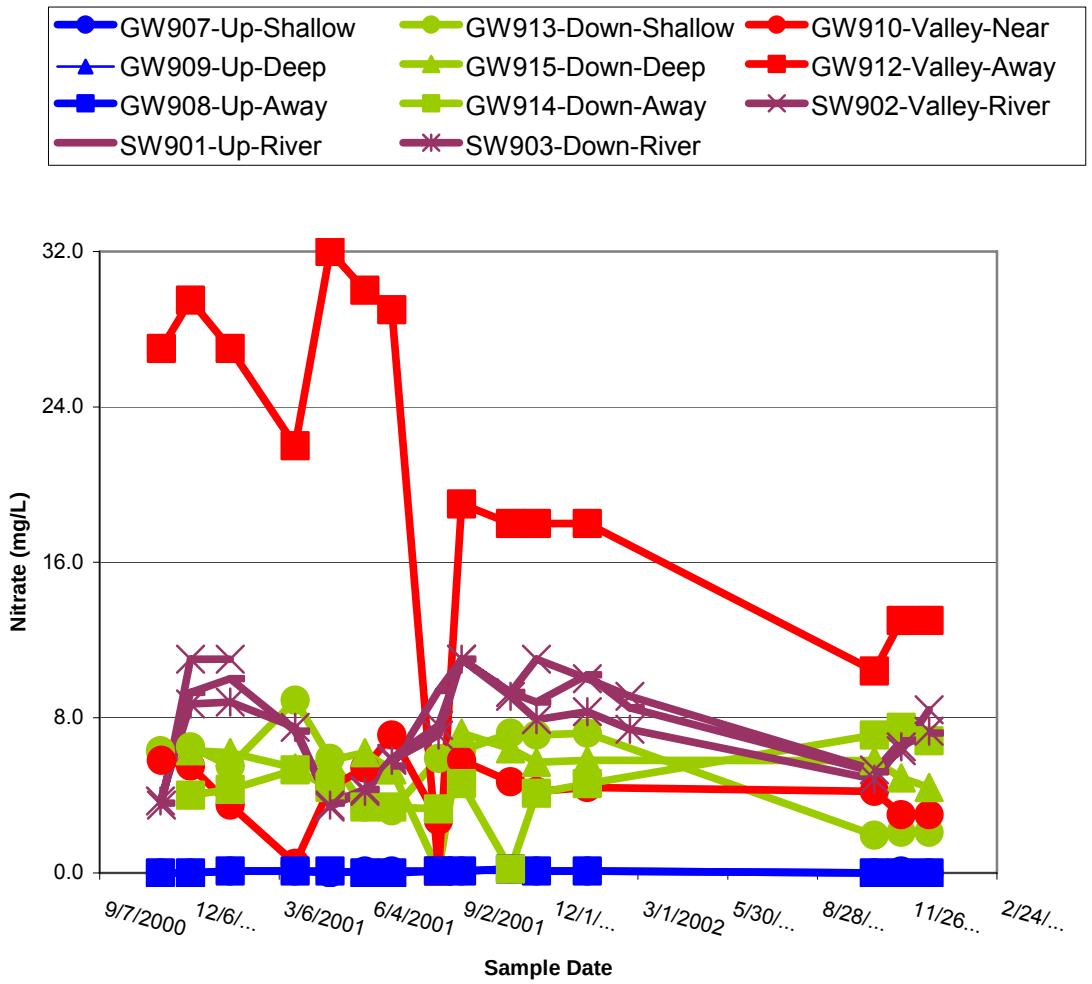



Nitrate Results. At the same time that static water levels were measured in each monitoring well, nitrate samples were taken from the well and from the adjacent river. These results are shown in Figure 2.30 (following page).

Also, the Dakota County SWCD has been monitoring the Vermillion River for nitrate, fecal coliform bacteria, and other water quality parameters since February 2000. The Metropolitan Council has been monitoring river water quality upstream and downstream of the Empire WWTP since the treatment plant was constructed in the 1970s. The nitrate results from the SWCD, Metropolitan Council, and the HANS monitoring wells are shown in the Vermillion River 2000-2002 Nitrate Results map and chart. Based on nitrate results, these groundwater and surface water monitoring sites can be grouped as follows:

1) The upstream monitoring wells [median results of 0.0 to 0.2 mg/L (milligrams per liter)];
2) River samples taken upstream of the Empire WWTP (median results of 1.06 to 2.07 mg/L);
3) River samples taken downstream of the Empire WWTP, the downstream wells,

**Figure 2.30: Monitoring Well Nitrate Levels Over Time**




and the buried bedrock valley well near the River (median results of 4.4 to 8.4 mg/L); and

4) The buried bedrock valley well away from the River (GW912, median results of 19.0 mg/L); this well is adjacent to an irrigated cornfield.

These nitrate results are consistent with the water level results in indicating that the Vermillion River appears to be contributing to the nitrate in the groundwater within the City of Hastings, but not upstream of the City.

Nitrate in the Vermillion River appears to be coming from:

1) Excess fertilizer from row-crop agriculture throughout the Watershed upstream of the City of Vermillion, leaching into the groundwater, then seeping into the River;
2) Surface runoff of excess fertilizer from row-crop agriculture in all of the Watershed, but especially flowing into the South Branch;
3) The Empire WWTP; and
4) Leachate from individual sewage treatment systems.

As the River flows through the City of Hastings, it loses a great deal of nitrate-bearing water to the groundwater, which supplies the City's municipal water.

In 1991, the MPCA began the Ground Water Monitoring and Assessment Program (GWMAP) to establish baseline groundwater quality in principal drinking water aquifers in Minnesota. From 1992 through 1996, groundwater samples were collected and analyzed for a variety of ions and constituents. This survey included several samples from groundwater aquifers in Dakota County. The aquifers sampled and the number of samples taken are shown in Table 2.19.

**Table 2.19: GWMAP Dakota County Aquifers Sampled**

| Aquifer | Number of GWMAP Samples |
|---|---|
| Prairie du Chien | 8 |
| Jordan | 7 |
| St. Peter | 3 |
| Quaternary Water Table | 5 |
| Quaternary Buried Artesian | 1 |

The Prairie du Chien-Jordan aquifer is composed of carbonate rock overlaying the Jordan sandstone. It is generally low in dissolved solids, although levels of iron, manganese, and total nitrates can be locally high and exceed drinking water criteria. Only aluminum consistently exceeded drinking water criteria limits.

The St. Peter aquifer is composed of white, fine to medium sand and is not often used for municipal drinking water because it yields less and it is shallower than the Prairie du Chien-Jordan aquifer. Samples from the St. Peter exceeded iron, lead, and aluminum criteria.

The quaternary water table aquifer is primarily composed of alluvium and glacial drift. Groundwater samples in this aquifer had localized high levels of dissolved solids, aluminum, iron, manganese, and total nitrates that exceeded drinking water criteria.

### 2.3.3 Groundwater Sensitivity and Supply

Aquifers within the Watershed are also shown in Figure 2.31, Geologic Column of Dakota County. Of those shown, the Prairie du Chien-Jordan aquifer is primarily used for water supply. Uses include domestic and municipal water supplies as well as high capacity irrigation wells. Figures 2.32 and 2.33 show the location and volume (respectively) of water pumped from wells with MDNR Water Appropriation Permits (see Projected Land Use, Section 1.3.4, for more information on wells in the Watershed).

Figure 2.31

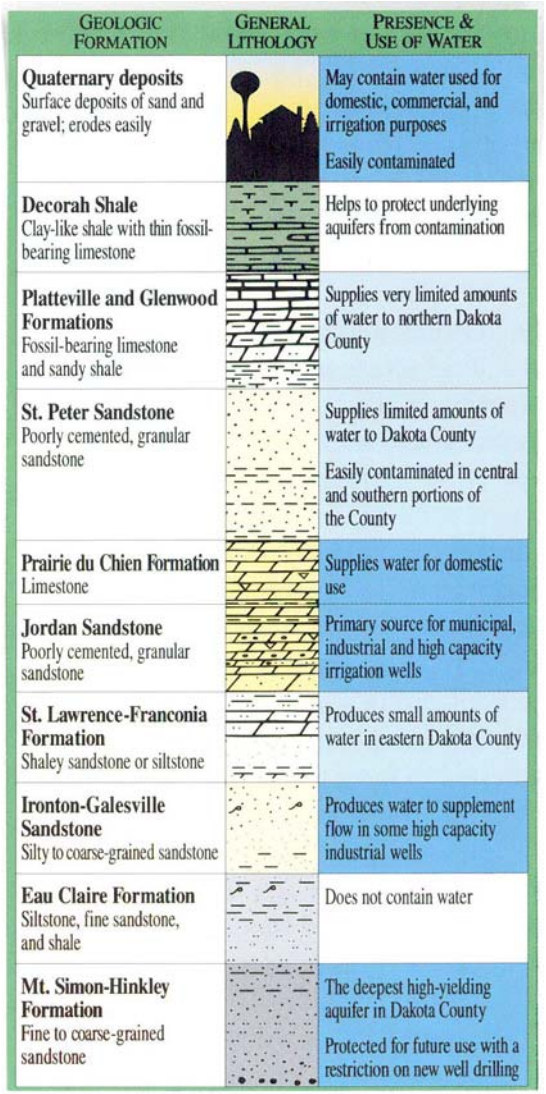


Figure: 2.32

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Vermillion River Watershed Joint Powers Organization



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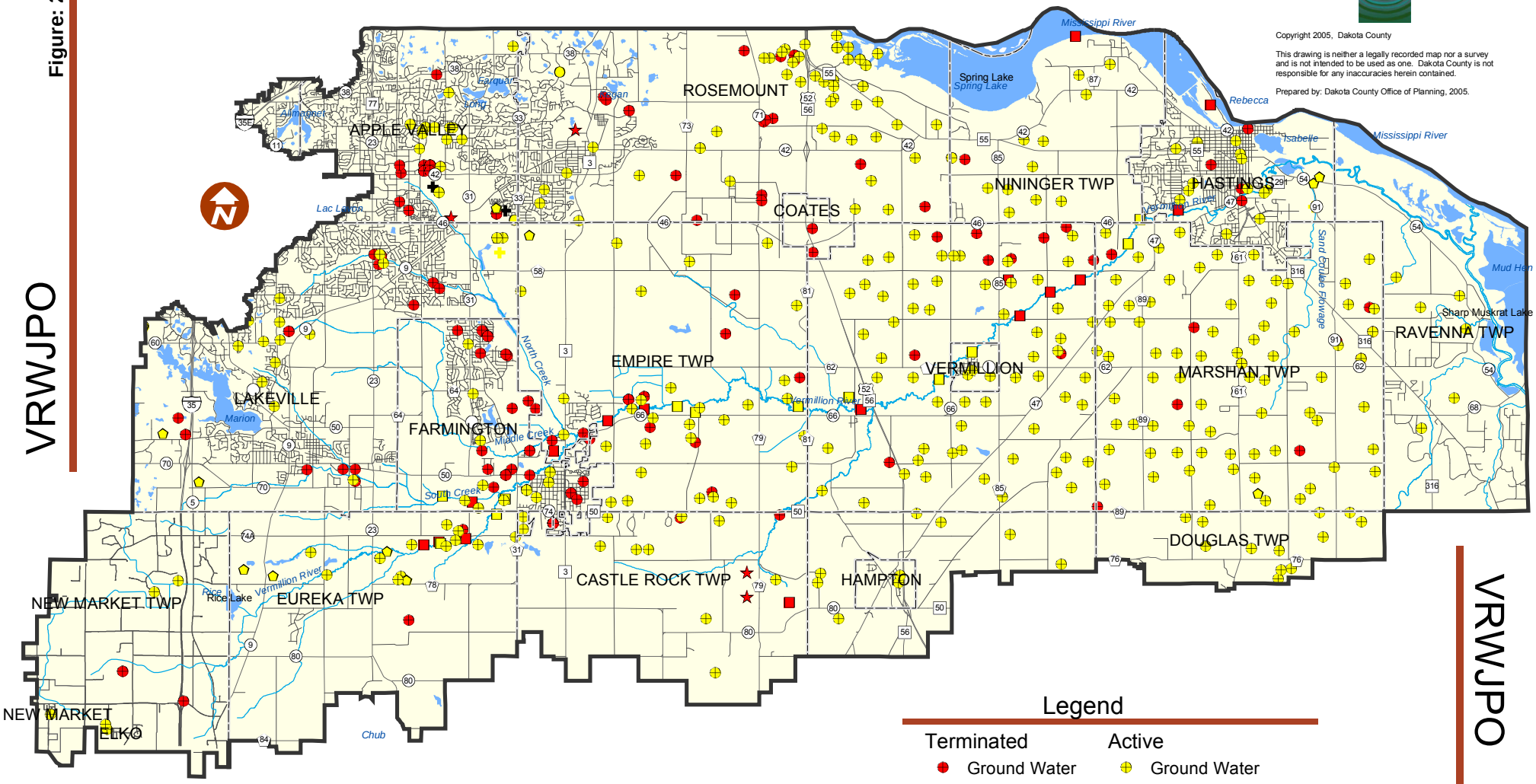



## Legend

| Terminated | Active |
|---|---|
| Ground Water | Ground Water |
| Lake | Lake |
| Stream/River | Stream/River |
| Ditch | Ditch |
| Dug Pit | Dug Pit |
| Quarry/Gravel Pit | Quarry/Gravel Pit |
| Wetland | Wetland |

0 1 2 4 6

Miles

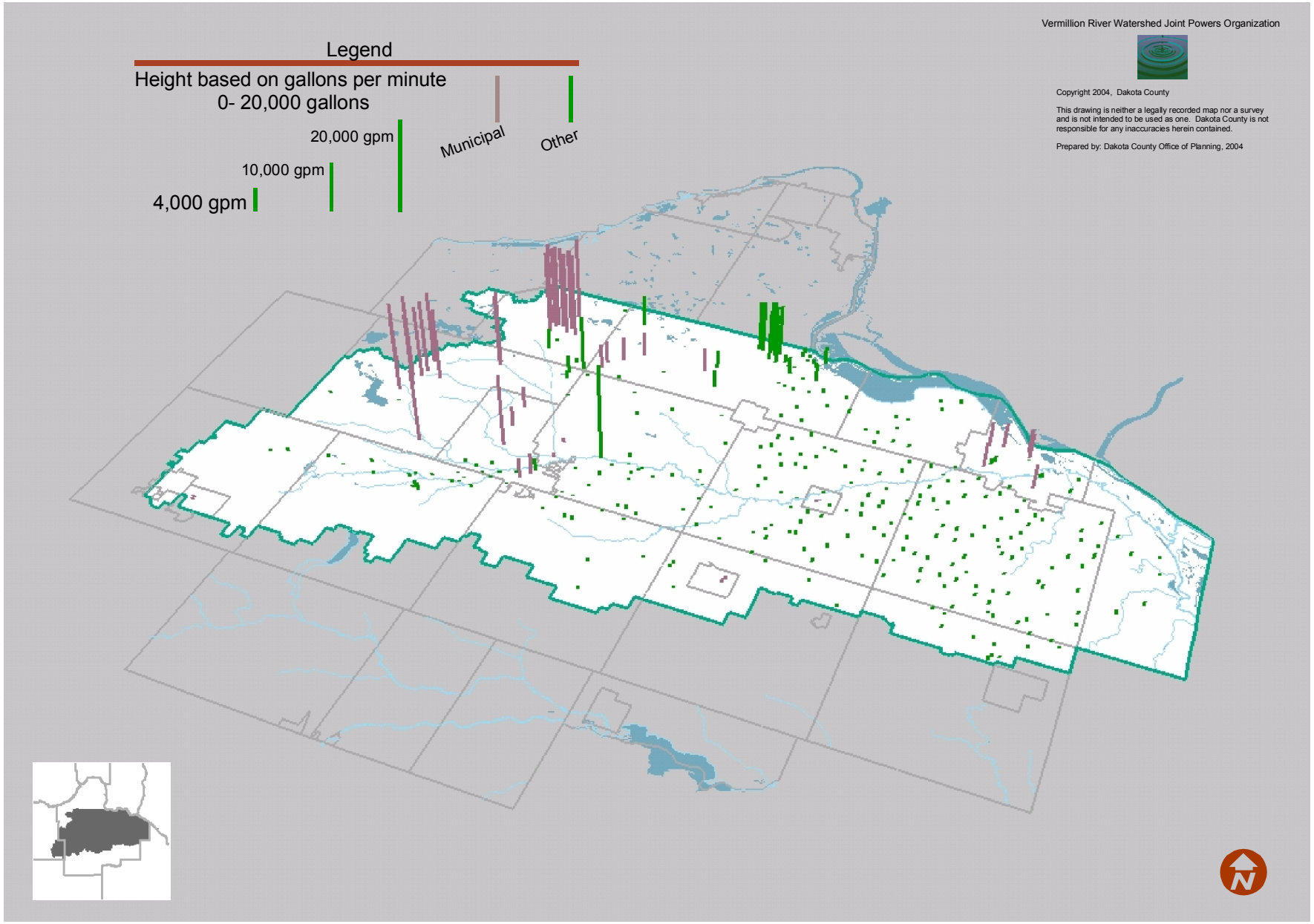
# DNR Water Appropriation Permit Locations

VRWJPO

Figure: 2.32

Figure: 2.33

VRWJPO




## DNR Water Appropriation Permit Volumes

VRWJPO

Figure: 2.33

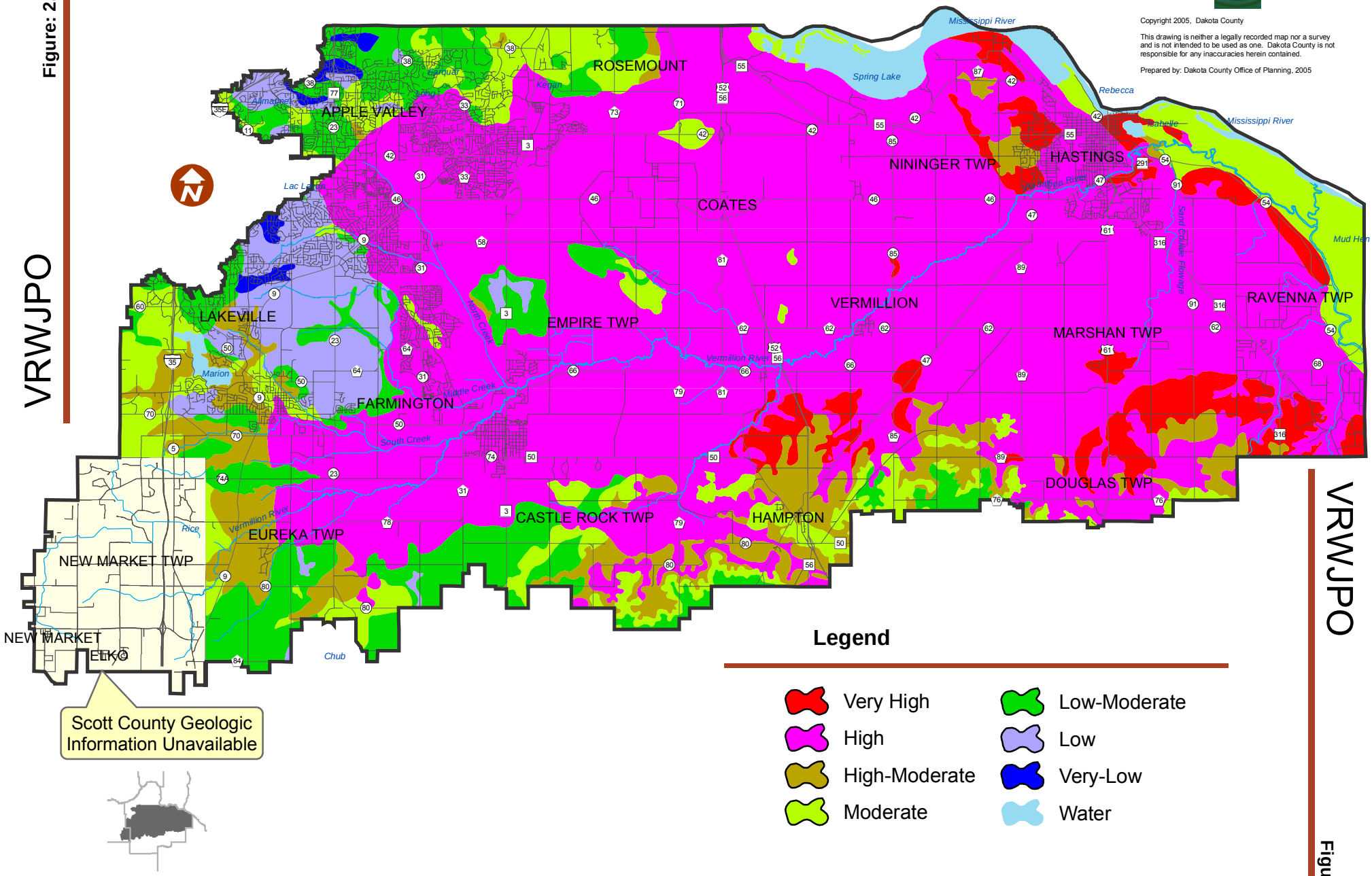
Figure: 2.34

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2005




## Legend

- Very High
- High
- High-Moderate
- Moderate
- Low-Moderate
- Low
- Very-Low
- Water

0 1 2 4 6

Miles

# Groundwater Sensitivity

Derived from the Geologic Atlas of Dakota County, Minnesota Geological Survey,1990.

VRWJPO

Figure: 2.34

Groundwater supply sources within the Watershed are generally small with permitted volumes of less than 1,800 million gallons per year (see map). Many of these wells occur within the lower Watershed or along sections of the Vermillion River. A few larger suppliers are located in Apple Valley and near Rosemount. These water supply locations are situated in areas with high sensitivity to groundwater contamination.

When groundwater sensitivity to contamination is high, chemicals such as nitrates can quickly enter the groundwater. Impacts depend on many factors including climate, land use, proximity, and type of contaminant. Much of the land use in the lower Watershed is irrigated agriculture. The speed of transport for pollutants to reach groundwater is generally weeks to years for this region (Figure 2.34). Irrigation hastens the transport of soluble chemicals such as nitrates. A study by the MPCA (Nitrate in Minnesota Groundwater: A GWMAP Perspective, September 1998) found that nitrate levels in groundwater under agricultural lands could be 8 to 21 times higher than groundwater under non-developed lands. Development also was correlated with elevated groundwater nitrate that was 3 and 13 times higher for sewered and non-sewered districts, respectively.

Additionally, the bedrock rift valley may act as a conduit in the Watershed and allow even deeper and faster transport of contaminants to groundwater. This complicated situation has contributed to high levels of nitrates in the aquifers that provide much of the drinking water throughout the Watershed.

Because of localized high groundwater aquifer nitrate levels, nitrate testing clinics were conducted by the Minnesota Department of Agriculture near Farmington in 1997 and 1998. Citizens could bring in samples of their drinking water for confidential nitrate testing. Most samples were from wells in the lower Watershed and a total of 253 water samples were tested. Values as high as three to four times the drinking water criteria (10 mg/L) were found in some wells. In fact, 19% of all samples exceeded the criteria. Table 2.20 provides a summary of the results.

**Table 2.20: Minnesota Department of Agriculture Nitrate Clinic Summary for Dakota County**

| Clinic | # of Samples | Nitrate Concentration Detected | | | # of Exceedences* |
|---|---|---|---|---|---|
| | | Min. mg/L | Max. mg/L | Median mg/L | |
| 1997 | 66 | 0 | 27 | 0.9 | 14 |
| Jun., 1998 | 115 | 0 | 41 | 0 | 15 |
| Aug., 1998 | 72 | 0 | 34 | 0.8 | 19 |

* Over 10 mg/L

### 2.3.4 Groundwater Interactions with Surface Water

In 1995, the USGS compiled a report on surface water and groundwater interactions along the Vermillion River. Details can be found in, "Hydrology and Relation of Selected Water-Quality Constituents to Selected Physical Factors in Dakota County, Minnesota, 1990-1991," (USGS 1995). Monitoring wells were installed at five locations and three depths (in-stream, shallow water table, deep water table) to measure water depth and quality. Monitoring locations were near North Creek at the confluence with the main branch, near

the main branch downstream from North Creek, near the South Branch at the confluence with the main branch, near an unnamed tributary draining the University of Minnesota Umore Park (Rosemount Research Center) subwatershed in Rosemount at the confluence with the main branch, and near the main branch just west of Hastings. The deep water table information was not monitored at the last site; therefore, most of the study area was located in the upper Watershed.

North Creek. Hydrology data indicate that North Creek is generally a "gaining" reach (fed by groundwater). In addition, the shallow water table is augmented by deeper groundwater. Stream water quality in this section will be highly influenced by groundwater quality, especially during periods of low precipitation. It is likely that cooler groundwater temperatures are responsible for maintaining cool reach temperatures that may support brown trout. However, groundwater contamination could contaminate Vermillion River surface water in North Creek. Nitrate concentrations were low in all water fractions, but specific conductance (a measure of dissolved solids) was very high in the water table near the stream.

South Branch. Like North Creek, South Branch is also a "gaining" reach with similar considerations. Nitrate concentrations, however, were much higher than in North Creek, except deep in the water table. Since water is flowing from groundwater to the creek, nitrates that leach into the water table aquifer are being delivered to the South Branch.

Rosemount. The Rosemount tributary is an intermittent stream and a "losing" reach; in other words, water infiltrates from the stream to the groundwater. In-stream nitrate concentrations were low, but water table nitrates increased with depth. In this situation, it is likely that surface and shallow water table transported nitrate is leaching into groundwater.

Vermillion River. The upper Watershed section of the Vermillion River at a point below the Empire WWTP is a slightly "gaining" reach, while the section closer to Hastings is a "losing" reach. The losing section is close to the intersection of the Watershed with the underlying bedrock rift valley discussed previously. Nitrate concentrations in the upper section of the Vermillion River main branch follow a pattern similar to the South Branch. In the lower section, data is incomplete but suggests that in-stream nitrates are transported (lost) to groundwater as indicated in the HANS stated earlier.

It is obvious that surface water interacts with groundwater in the Watershed. However, because of the complicated geology, high sensitivity to groundwater contamination, linkages between land use practices and groundwater contamination, and lack of sufficient monitoring data, impacts of this interaction are not fully understood. Evidence does suggest that:

- Irrigated agriculture, and to a lesser extent, non-sewered development, could be contributing to nitrates in groundwater.

- High sensitivity to groundwater contamination conditions enhances the lower Watershed's susceptibility to nitrates from irrigated agriculture.

- Interactions between surface and groundwater vary along the upper and lower sections of the Watershed. Cold water inputs to the River help maintain temperatures suitable for brown trout.

- Complicated geology (bedrock rift valley) requires detailed monitoring in order to understand contributions and water quality processes.

Other sources of information on groundwater resources within the region include:

- Dakota County Groundwater Protection Plan (2000)
- Scott County Groundwater Protection Plan (1999)
- Minnesota Geologic Survey (Dakota and Scott County Geologic Atlases)
- United States Geologic Survey
- Minnesota Department of Natural Resources
- Minnesota Pollution Control Agency
- Minnesota Department of Health

## ADDITIONAL REFERENCES


Minnesota Department of Agriculture, "Summary Statistics of the 1998 Nitrate Water Testing Clinics, Appendix 2," 1999

Minnesota Department of Agriculture, "Summary Statistics of the 1992 Nitrate Water Testing Clinics Survey No. 1," 1998

Minnesota Pollution Control Agency, "County Well Sampling Results GWMAP." Minnesota Pollution Control Agency. "Nitrate in Minnesota Groundwater: A GWMAP Perspective," September 1998

Minnesota Pollution Control Agency, "Baseline Water Quality of Minnesota's Principal Aquifers," March 1998

USGS Water Data Report MN-97-1, "Water Resources Data, Minnesota, Water Year 1997"

USGS Water Resources Investigation Report 94-4207, "Hydrology and Relation of Selected Water-quality Constituents to Selected Physical Factors in Dakota County, Minnesota, 1990-91," 1995

USGS Water Resources Investigation Report 97-4107, "Water Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin – Nitrogen and Phosphorus in Streams, Streambed Sediment, and Groundwater," 1971-94.

# SECTION 3: ISSUES IDENTIFICATION

## 3.0 Introduction

This section identifies and describes issues facing the Vermillion River Watershed (Watershed). These issues were identified through the resource inventories described in Sections 1 and 2, past studies, and workshops and public meetings held during preparation of the draft plan by the former watershed organization. Planning workshops held in 1998, and more recently in 2003 and 2004 with local and State agencies were also instrumental in identifying issues. Issues listed are fairly comprehensive because of the multiple mechanisms used to solicit input.

The intent of this section is to describe and define issues so that the Joint Powers Board and Watershed Planning Commission can make informed choices. Numerous organizations are responsible for management of water within the Watershed, not just the Joint Powers Board. Responsibilities in terms of goals and objectives, priorities, and implementation strategies selected by the Joint Powers Board for addressing the issues are presented in Sections 4 and 5.

Significant issues are listed below. Undoubtedly, there are additional issues that have not yet surfaced. New issues can be added and discussed at monthly Watershed Planning Commission and Joint Powers Board meetings as part of the on-going Watershed management process.

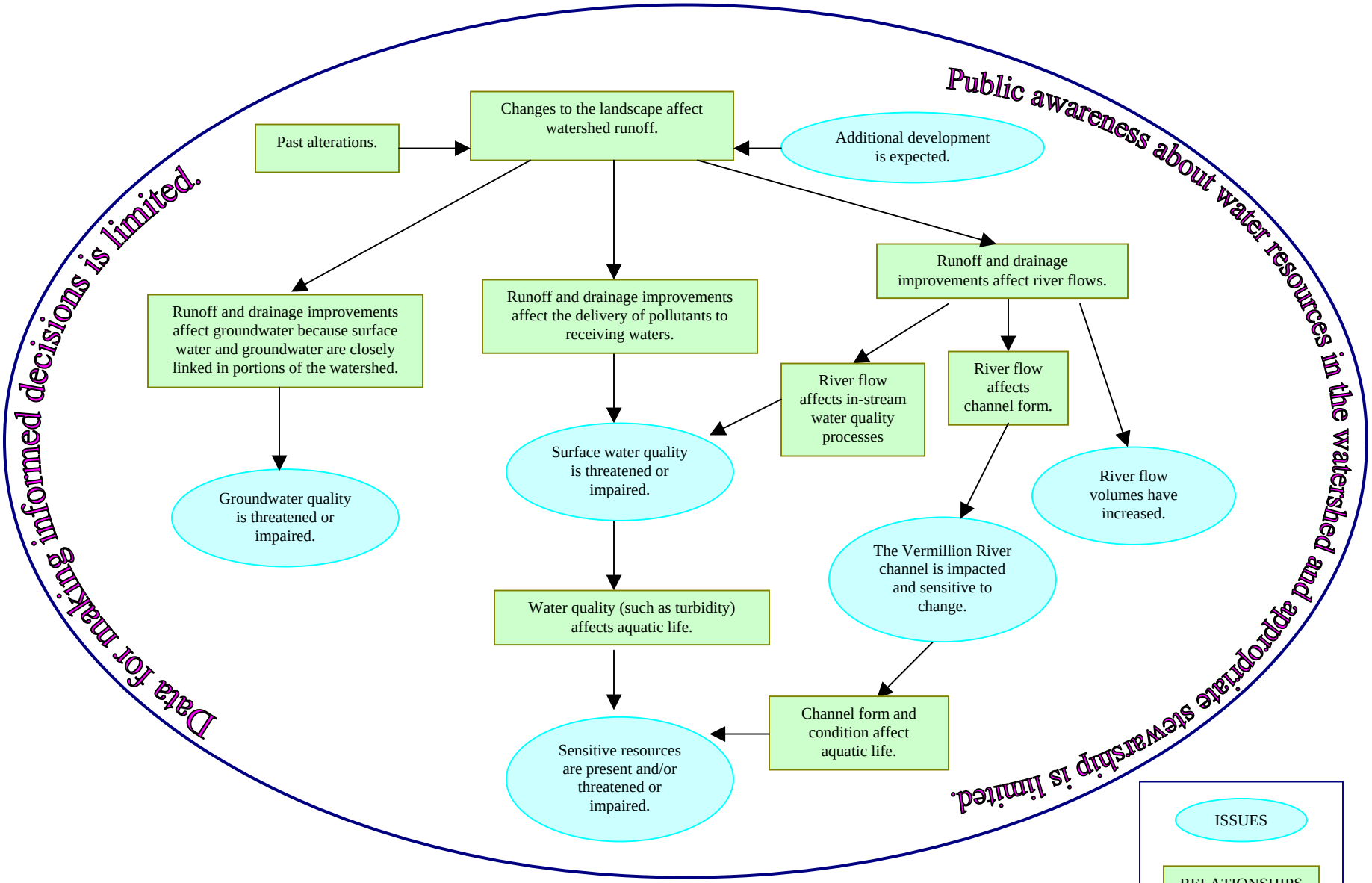
## 3.1 Issues

The primary issues identified include:

3.1.1 River flow volumes have increased
3.1.2 Surface water quality is threatened or impaired
3.1.3 Vermillion River channel/corridor is impacted and sensitive to change
3.1.4 Sensitive resources are present and/or threatened or impaired
3.1.5 Groundwater quality is threatened or impaired
3.1.6 Additional development is expected
3.1.7 Data for making informed decisions is limited
3.1.8 Public awareness about water resources in the Watershed and appropriate stewardship is limited.

A discussion of each issue is presented here. Many of the issues are interrelated. The most notable interrelationship is the hydrology of the Vermillion River (River) and the potential changes associated with anticipated urban development. The interrelationships are complicated; however, it is important to understand the basic relationships presented in Figure 3-1.

**Figure 3.1. Vermillion River Watershed Conceptual Issues Model***




**This model is intended to be conceptual and describes only basic relationships.*

It is also important to understand that current impacts and impairments identified in the issues are a reflection of past and current activities in the watershed. These past activities include agriculture, urbanization and wastewater management. As the Watershed changes in the future, it is anticipated that agricultural land will be converted to urban land uses. Thus, much of the following discussion focuses on the issues associated with this change. However, agriculture will continue to be a significant land use in the Watershed and must play a role in managing current impacts and impairments.

### 3.1.1 Issue: River Flow Volumes Have Increased

As discussed in Section 2, increases in River flows have been documented by:

- The 1998 U.S. Army Corps of Engineers (COE) study,
- The 2000 draft Watershed Management Plan, and
- The 2002 Vermillion River Volume Study conducted by Montgomery Watson Harza.

Downstream residents have also expressed concern about this issue. The challenge regarding this issue is in assessing the causes of the increased flow. As discussed in Section 2, the increased flow is likely caused by a combination of factors, including: increased precipitation, agricultural drainage practices, runoff from urban development, and expanded wastewater treatment plant discharges. In the future, additional development is expected in the Watershed; however, wastewater discharge will be decreasing. Hydrologic modeling completed by the COE, and modeling completed for the 2000 draft plan, and the Volume Study all showed that peak flows and volumes will increase if this development is completed without adequate stormwater management.

These same studies assessed various stormwater management strategies. Hydrologic modeling completed for the 2000 draft plan assessed ways of controlling increases in peak flood levels (i.e., 100-year storm), while the 2002 Volume Study assessed mechanisms for controlling flow volume increases for a number of storm sizes. In addition, with implementation of the Metropolitan Council Environmental Services Master Plan for the Empire Wastewater Treatment Plant (WWTP), approximately 25 acre-feet/day of discharge will be removed from the River. However, it is anticipated that discharge from the Elko/New Market Wastewater Facility will increase in the near future. The results of these efforts and studies show that it is possible to prevent further increases, and, to some extent, decrease overall flow volumes.

### 3.1.2 Issue: Surface Water Quality is Threatened or Impaired

Portions of the Vermillion River (River) and two lakes in the Watershed are on the Minnesota Pollution Control Agency (MCPA) 303(d) list of impaired waters, including:

- The Vermillion River, from the headwaters to Hastings, is impaired for aquatic recreation due to excessive fecal coliform bacteria. Although the River is impaired, citizens use the River for recreational purposes such as wading, swimming, kayaking and canoeing. (This is an issue because it brings them in direct contact with contaminated water.)
- The Vermillion River, from Hastings to Red Wing, is impaired for aquatic life due to turbidity (cloudiness), and excessive PCBs and mercury.
- Long Lake is impaired for aquatic recreation due to excessive nutrients.
- Farquar Lake is impaired for aquatic recreation due to excessive nutrients.
- Lake Marion is impaired for aquatic consumption due to mercury.
- Alimagnet Lake is impaired for aquatic recreation due to excessive nutrients.

For each of these impairments, a total maximum daily load (TMDL) study is required. TMDLs are a process by which the sources of the pollutant are studied and allowable loads are calculated and allocated to each source so that the waterbody will meet its intended use (e.g., swimming). The MPCA is responsible for completing TMDLs. It is unclear who is responsible for implementing the daily load reductions resulting from the TMDLs. As discussed in Section 2, the fecal coliform bacteria study, which became a part of a regional fecal coliform bacteria TMDL, is complete; the turbidity TMDL is underway. The Joint Powers Board will need to determine the watershed organization's role in TMDL studies and implementation.

In addition to the existing impaired waters, water quality is threatened by runoff from expected new development. Some of this threat may be offset by improvements expected following removal of the Empire WWTP discharge from the River. It is expected that phosphorus and nitrate concentrations in the River below the WWTP will decrease. However, impacts of runoff on River temperatures affects aquatic life, particularly trout, which is an important local issue associated with urban development.

High concentrations of nitrate in the Vermillion River and other surface waters are a concern because surface water interacts with groundwater in the Watershed. High nitrate levels in drinking water are already an issue (see Section 3.1.5).

### 3.1.3 Issue: The Vermillion River channel/corridor is impacted and sensitive to disturbance

The 1999 Vermillion River Assessment found numerous streambank and channel stability problems, and that the stream types along the Main Branch are very sensitive to disturbance, providing high sediment supplies and having a very high potential for streambank erosion. For the stream types found, the quality and type of riparian vegetation has a significant controlling influence on bank erosion. Along the River, much of the streamside vegetation has been altered and converted to non-native grass. Non-native grasses do not have the rooting depth and density necessary to stabilize unconsolidated streambank soils. This susceptibility to change, along with riparian community alterations and changes in flow volume and duration, has contributed to channel instability.

There is also channel instability along the tributaries to the Main Branch, particularly gully erosion along the bluff at the eastern end of the Watershed.

### 3.1.4 Issue: Sensitive resources are present and/or are impaired

Section 1 identified a number of sensitive habitats and communities in the Watershed, including designated trout stream areas, natural communities, rare species, and wetlands. The designated trout stream area was recently expanded and trout populations appear to be good. Trout may be threatened, however, by anticipated urban development, if the development is not completed with appropriate, protective stormwater management mechanisms. Other sensitive resources, such as natural communities, rare species, and wetlands, have been largely depleted or have been substantially altered throughout the Watershed. The 1999 Dakota County 2020 Comprehensive Plan estimates that 80% to 90% of the original wetlands in the County have been drained or filled, and that only 2% or 9,400 acres of ruminant natural communities remain in the County. The largest natural community still in existence is the 3,000-acre floodplain forest along the Mississippi River in Ravenna Township called the Vermillion River Bottoms. Rare plants are generally associated with the remaining natural prairie and forest communities. Rare species of animals are scattered throughout the Watershed, including the Loggerhead Shrike, which makes its home in the central portion of the Watershed in Dakota County.

### 3.1.5 Issue: Groundwater quality is threatened or impaired

Cities and residents throughout the Watershed derive their drinking water from groundwater. High nitrates have been documented in groundwater and wells in the eastern portions of the Watershed near the City of Hastings. The results from one study of private drinking water wells found that more than half the wells had high nitrate levels (see Section 2 for additional detail):

- 26% exceeded the drinking water standard for nitrate of 10 mg/L (milligrams per liter);
- Another 26% were in the “elevated” range of 3 to 10 mg/L; and
- All City of Hastings municipal wells were below the drinking water standard, but ranged from 2.1 mg/L to 8.5 mg/L.

Additionally, the Minnesota Department of Health (MDH) closed Hastings Municipal Well #6 for several weeks in May 1999 after samples contained average nitrate levels of 10.5 mg/L.

Surface water interacts with groundwater in the Watershed. However, because of the complicated geology, high sensitivity to groundwater contamination, linkages between land use practices and groundwater contamination, and lack of sufficient monitoring data; impacts of this interaction are not fully understood. Evidence from the studies discussed in Section 2 suggests that:

- Irrigated agriculture, and to a lesser extent non-sewered development, could be contributing to nitrates in groundwater.

- High sensitivity to groundwater contamination conditions enhance the lower Watershed's susceptibility to nitrates from irrigated agriculture.
- Interactions between surface and groundwater vary along the upper and lower sections of the Watershed. Cold-water inputs to the River help maintain temperatures suitable for brown trout.
- Complicated geology (bedrock rift valley) requires detailed monitoring in order to understand groundwater contributions and losses, and water quality processes.

The high sensitivity of groundwater to contamination and the known interaction between the Vermillion River and groundwater, in combination with additional development expected in the Watershed, means that groundwater could be threatened not only by nitrates but by other pollutants as well. A study by the MPCA (Nitrate in Minnesota Groundwater: A GWMAP Perspective, September 1998) found that nitrate levels in groundwater under agricultural lands was higher than groundwater under non-developed lands, but also that development was correlated with elevated groundwater nitrate levels in sewered and non-sewered areas. Urban development also introduces other pollutants. Areas of high sensitivity to groundwater contamination may not be suitable for stormwater management practices that use infiltration, especially in municipal well recharge/wellhead protection areas. Industrial and vehicle fueling facilities are examples of land uses that could pose significant potential hazards to groundwater protection in high sensitivity areas.

### 3.1.6 Issue: Additional development is expected

As discussed in Section 1, additional development in the Watershed is expected, including: residential, commercial and industrial buildings and facilities; additional groundwater supply use; additional aggregate mining; additional wastewater; and increased recreational needs. These are discussed separately in the following text.

Additional residential, commercial and industrial buildings and facilities. Development significantly changes local surface drainage patterns. Impervious surface covers soils that would otherwise infiltrate water, and natural drainage ways are replaced with storm sewers, paved channels, ditches, and other artificial drainage devices. Impervious surfaces and artificial drainage increase the volume and accelerate the rate of surface runoff reaching receiving waters. The effects of higher runoff volumes and rates on water resources are higher flows, flooding, erosion, and adverse impacts on aquatic habitats (Figure 3-1).

In addition to changing the hydrology in an area, development also increases the potential for pollution of water resources. Because the human population is concentrated, more materials are manufactured, consumed, and disposed of in developed areas. Not only is the number of possible pollutants increased, but also the opportunities for them to be released into the environment. Large quantities of wastewater and solid waste are generated in developed areas that must be treated and/or disposed. Construction sites

disturb land and can result in substantial erosion. Erosion rates can be 20,000 to 40,000 times higher at construction sites than vegetated areas. After construction, impervious surfaces are likely places for the deposition of contaminants from vehicles, industry, lawn care, pets, sediment, organic litter (e.g., grass clippings), and trash. These contaminants are more likely to reach water resources because there is more surface runoff to transport pollutants and there are fewer natural filtration systems (like vegetation and wetlands) to remove pollutants.

Additional Groundwater Use. Urban and rural areas in the Watershed use water from local aquifers to supply residents and businesses. A majority of the land use in the Watershed is agricultural in nature and will remain so into the 2020s. For some of this agricultural land, high-capacity irrigation wells withdraw a total annual average of 3.3 billion gallons of water from local aquifers (see Section 2, Water Resources, for more information).

Although there are over five times the number of high-capacity agricultural irrigation wells, the average municipal supply well pumps over ten times more water per year than the average irrigation well, at over twenty times the rate. Annually, municipal supply wells withdraw an average of 3.5 billion gallons of water from groundwater resources. Although this is comparable to the amount of water withdrawn for irrigation (3.3 billion gallons), urbanized areas generally have a greater water demand per capita than rural areas. As urban areas and population continue to expand, the demand on local groundwater resources will also continue to increase. The consumption of groundwater that occurs in urban areas can lead to several water quantity problems, some of which were discussed under the previous heading.

Additional Aggregate Mining. As discussed in Section 2, there are excellent natural aggregate deposits of sand, gravel, and bedrock – a valuable natural resource – within the Watershed. Mining of these materials can often occur down to a level at or below the water table. Water levels within mines and quarries can be directly linked to the groundwater system. In some cases, in order to remove water so mining can continue, de-watering methods are used to lower the water table in and around the mine. By lowering the natural water table, vegetation and nearby wetland habitats can be impacted. For the Vermillion River, dewatering could potentially diminish groundwater discharges to the River that supply cold water necessary for trout.

Additional Wastewater. Additional development means increased wastewater. The Metropolitan Council recently completed a facility plan for the Empire WWTP that will eliminate wastewater discharges from that facility to the Vermillion River in 2007 or 2008. However, growth in the Elko/New Market area is expected and there are plans to upgrade and expand the Elko/New Market plant, which may include temporarily increasing discharge to the Vermillion River. The Metropolitan Council is preparing an interceptor plan for the Elko/New Market plant that will eliminate discharge from the plant by 2010.

Increased Recreational Needs. The landscape and water resources of the Watershed provide important recreational value. With increasing development and population in the Watershed, demand for water-based recreation will increase. According to MDNR

information, there is inadequate public access to public water resources, such as the Vermillion river and its tributaries, Farquar Lake, Long Lake and Lake Alimagnet, to meet the current and future recreational demand. Public input while preparing the 2000 draft watershed management plan revealed an interest in being able to canoe the Vermillion River, and a desire for more public access to the River.

### 3.1.7 Issue: Data for making informed decisions is limited

The hydrology and issues facing the Watershed are complicated and interrelated. Good information of recent origin is necessary for making informed decisions. Although, there is much information on the Watershed (see Sections 1 and 2), and a number of recent studies, additional information is needed to reduce uncertainty and to track effective management efforts to support adaptive management. Specific data collection needs and some of the on-going/new efforts include:

- The need for a better understanding of surface water and groundwater interactions. This began with Phase 1 of the Hastings Area Nitrate Study (HANS); Phase 2 began in 2005.
- Determining the location of groundwater recharge areas and their interrelationship with surface water is necessary to protect the cold-water fishery, maintain stream base-flows, improve water quality, and protect the ecological integrity of the Vermillion River. Stormwater management, greenway planning, and development are intertwined. The *Vermillion River Headwaters Groundwater Recharge Area Inventory* will provide the real-world information and guidance necessary to protect surficial groundwater resources and cold-water fisheries.
- The need for a better understanding of the magnitude of sources of water within the Watershed. This began with the existing river gauge network; however, additional years of data are needed before definitive conclusions can be made.
- The need for a better understanding of turbidity, mercury and PCB impairments of the River. Current data is sufficient to identify impairment, but not to diagnose the causes and the water quality mechanisms involved. The MPCA is starting to collect additional information on turbidity and PCBs in 2004.
- The need for a better understanding of the “thermal quality” of the River and the impact of land disturbing activities and other actions on River temperature. Thermal monitoring is underway and past data is available, but more data is needed to predict the impacts of watershed changes on River temperature.
- The need to track the effectiveness of implementing the recommendations of the Vermillion River Fecal Coliform TMDL Study.
- The need to periodically assess the health of aquatic communities and sensitive biological resources. The Vermillion River Watch, the Wetland Health Evaluation Project and the MnDNR frequently complete biological monitoring efforts.
- The need for on-going surface and groundwater monitoring to identify trends and problems before they become severe, and to track overall effectiveness of management efforts so they can be adapted and improved. As discussed in Section 2, the Joint Powers Organization currently has a water quality monitoring program operated in conjunction with the gauge network. However,

it is anticipated that Metropolitan Council Environmental Services monitoring efforts will be scaled back once the Empire WWTP discharge is removed.

### 3.1.8 Issue: Public awareness about water resources in the Watershed and appropriate stewardship is limited

Public awareness of Watershed issues has increased significantly in recent years. The efforts of the Dakota County Soil and Water Conservation District, University of Minnesota Extension Service – Dakota County, Friends of the Mississippi River, the Minnesota Department of Natural Resources, and the Metropolitan Council have increased awareness. However, many residents and local officials, with responsibility for land use decisions, remain unaware that they live in the Vermillion River Watershed, and that what they do on the landscape affects water quality and flow in the River. Many residents are also unaware of the existence of the Vermillion River Watershed Joint Powers Organization (VRWJPO), and the Joint Powers Board's authority, responsibilities and roles.

### Summary

Eight primary issues are identified for the Vermillion River Watershed. These issues are interrelated, as shown in simple form in Figure 3-1. The VRWJPO goals, objectives and priorities, with respect to these issues, are discussed in Sections 4 and 5.

# SECTION 4: GOALS, POLICIES, OBJECTIVES, AND ACTIONS

## 4.0 INTRODUCTION

Vermillion River Watershed Joint Powers Organization (VRWJPO) roles and responsibilities in watershed management are multi-faceted. The VRWJPO has a regulatory role in establishing standards and requirements for managing resources in the Watershed, and in implementing and enforcing the standards and requirements if local governments are not doing so on their own. The VRWJPO will cooperate with other agencies in the administration and enforcement of its regulatory programs. The VRWJPO will work with local governments to implement the Watershed standards. Additionally, the VRWJPO will take an active role in educating Watershed residents and businesses in proper, environmentally protective land use and land management.

Section 4 of the Plan identifies the general ***goals*** of the VRWJPO and a ***rationale*** for each goal with respect to its broad categories of concern (listed below). The general ***policies*** defining the VRWJPO's approach to management in each of the categories are also identified. For each of the goals, more specific ***objectives*** are listed; and, for each of the objectives, several action steps (***actions****)* have been identified that will allow the VRWJPO to achieve the objectives. Therefore, Section 4 is simply a compilation of the goals, rationales, policies, objectives and actions for each of the following VRWJPO areas of concern:

4.1 Surface Water Quality

4.2 Surface Water Quantity

4.3 Groundwater

4.4 Wetlands and Habitat

4.5 Floodplains

4.6 Land Use Management

4.7 Open Space and Recreational Areas

4.8 Education.

## 4.1 SURFACE WATER QUALITY

**Goal –** Protect and enhance surface water quality in the Vermillion River Watershed.

**Rationale –** The Vermillion River is a primary cultural, aesthetic, and recreational resource within the Watershed. The Vermillion River is the only trophy trout stream located in the Metropolitan Area. Additionally, the many lakes, ponds, wetlands, and River tributaries provide aesthetic and recreational value, as well as recharge opportunities for area aquifers. Surface water quality must be improved and protected to sustain the beneficial uses of the waterbodies in the Watershed, including wildlife habitat (e.g., cold-water fishery), drinking water recharge, and water based recreation.

Major reaches of the Vermillion River have been included on the Minnesota Pollution Control Agency's (MPCA) impaired waters (303(d)) list. Much of the main stem of the River, west (upstream) of Hastings, is listed as impaired by fecal coliform bacteria; and the reach from below the falls at Hastings to the Mississippi River is listed as impaired by turbidity, mercury, and PCBs. Recreational use – swimming, wading, etc – of the Vermillion River and its tributaries is restricted because of poor water quality. Additional desirable features of the river, including its cold-water fishery, are also threatened. The Vermillion River loses water to local aquifers in its lower reaches, which affects the quality of the groundwater. Further impairments may exist that have not yet been detected through monitoring, and, additional degradation is likely as land use changes occur.

Infiltration of high-nitrate surface water from the Vermillion River has been identified as a factor in high nitrate levels in the groundwater supply of the City of Hastings, and a concern for residents with wells located close to the River.

Given the current surface water and groundwater impairments and the threats posed by further urbanization of the watershed, it is critical that the VRWJPO make every effort to protect the Vermillion River, its tributaries, and other upstream water bodies.

**Policies**

1. The condition of water bodies in the Watershed included on the MPCA impaired waters [303(d)] list must be improved so that these waterbodies can be removed from the 303d list.
2. The Vermillion River will be safe for human contact (i.e., swimmable) within 10 years.
3. Local governments, agricultural users and developers will be responsible for effectively managing stormwater.
4. Responsibility for enforcing water quality and stormwater management standards developed through this Plan will be assumed by the VRWJPO where local governments are deemed to be non-implementing entities (see Administration section for more information).
5. A reduction in runoff rates will be supported and promoted by the VRWJPO.

6. Use of existing natural retention and detention areas for stormwater management to maintain or improve existing water quality will be encouraged by the VRWJPO throughout the Watershed.
7. Land use planning, policies and controls that maintain sustainable, high-quality surface water resources will be supported by the VRWJPO.

**Objectives**

**Surface Water Quality Objective 1 –** Work with the MPCA and other agencies to develop and implement Total Maximum Daily Load (TMDL) studies on all impaired water bodies, including, but not limited to those included on the 303(d) list. [Rationale: Water quality improvement is a central mission of the VRWJPO; therefore, the organization should be active in TMDL studies and implementation (e.g., the Dakota County Regional TMDL Study for fecal coliform bacteria in the Lower Mississippi River Basin, which includes the Vermillion River fecal coliform bacteria study report, and the Vermillion River TMDL study for turbidity below the Hastings Dam)].

**Action 1** – Actively participate in the TMDL process (e.g., study sponsorship, participation in public meetings, education, liaison activities, and assistance in seeking and providing funding).

**Action 2** – Determine appropriate responsibilities in implementing load reduction measures identified in TMDL studies.

**Surface Water Quality Objective 2 –** Continue and improve the water quality monitoring program for the Vermillion River and its major tributaries. (Rationale: Protecting the River requires data to determine strategies and successes. The current level of monitoring may not be adequate to manage the entire Watershed.)

**Action 1** – Expand and enhance water quality monitoring in the Watershed.

**Action 2** – Collect, organize, and interpret water quality monitoring data.

**Action 3** – Continue to fund the Vermillion River Watch program.

**Action 4** – Collect information on the location of agricultural drainage installations (tile systems) and the effect of these systems on downstream waters.

**Action 5** – Monitor runoff from urban and agricultural areas, and determine the sources of pollutants of concern.

**Action 6** – Make water quality monitoring data available via website or other means and summarize data for public information purposes.

**Surface Water Quality Objective 3 –** Establish implementation programs on a subwatershed basis through establishing water quality goals and evaluating the effectiveness of management activities on affected water bodies. (Rationale: Sources and loadings will vary with location; implementation is required, but should be aimed at maximum effectiveness within a given subwatershed. Water body classification helps set reasonable goals for individual water bodies and guides public investment in the protection and restoration of water quality.)

**Action 1** – Coordinate with cities, townships, and other agencies and groups to conduct an inventory of existing and desired uses for major water bodies within the Watershed.

**Action 2** – Analyze monitoring data, identify trends, identify data gaps, and target areas or subwatersheds with water quality issues.

**Action 3** – Develop a management framework for water bodies, based on existing statutory classifications, desired uses, existing conditions, and the priorities of the VRWJPO.

**Action 4** – Where water quality does not support desired uses, prepare and implement subwatershed plans to meet required water quality.

**Action 5** – Implement a program to establish buffers along major waterways wetlands, and other water bodies.

1. Inventory, map, and prioritize water features with existing buffers and those in need of buffers.
2. Determine appropriate buffer locations and widths according to: priorities within each subwatershed, type of waterbody, and adjacent land use.
3. Coordinate buffer configuration and acquisition efforts with the Dakota County Farmland & Natural Areas Program, the Scott County SWCD buffer program, and similar or related local, state, or federal programs.
4. Implement the buffer program through cost sharing with other voluntary programs and through requirement of local ordinances that mandate creation of buffers as part of approval of developments and land-disturbing activities (see Action 6 under Objective 5).

**Surface Water Quality Objective 4 –** Monitor management of recreational lakes. (Rationale: Cities are already active in management of lakes (e.g., Alimagnet, Farquar). These are important local features but may have limited impact on the overall Watershed due to limited outflow.)

**Action 1** – Identify and prioritize recreational lakes that are to be the responsibility of the VRWJPO.

**Action 2** – Review the status of lake water quality and management plans on at least a five-year basis as part of VRWJPO planning.

**Action 3** – Work with local units of government to develop management framework that assigns roles and responsibilities for implementation of lake management projects.

**Action 4** – If problems or shortcomings exist, work with affected municipalities to address problems through regulation, education, and/or implementation of capital projects.

**Action 5** – Collaborate with Soil and Water Conservation Districts (SWCD), federal, State and local programs to cost share for lake shore restoration projects undertaken by landowners.

**Action 6** – Collaborate with cities and townships to monitor lakes, including participation in citizen volunteer monitoring efforts such as CAMP and CLMP.

**Surface Water Quality Objective 5 –** Minimize water quality impacts (including thermal impacts) from land disturbing activities, including new development and redevelopment (urban/rural), road construction, agricultural production, and other rural uses. (Rationale: Water quality impacts from development are best mitigated in the development stage, rather than as retrofits. Some communities may not be providing adequate review of water quality impacts during planning phases.)

**Action 1** – Review federal, State, and local agency programs and designations related to water quality and identify where additions or changes are needed.

**Action 2 –** Develop Watershed standards as a minor amendment to this Plan. These standards will include requirements for water quality treatment (possibly on a subwatershed basis) that are based on analyses from Objectives 2 and 3, will include requirements for addressing thermal impacts, will address preservation of riparian buffers, will possibly include measures for minimizing nitrate contamination in surface waters, and will require the use of best management practices (BMPs), including erosion/sedimentation control practices consistent with the National Pollutant Discharge Elimination System (NPDES) Phase II Rule. (This action will fill in where cities/townships are not required to complete an NPDES MS4 permit.) The VRWJPO will take a leadership role in exploring a watershed-based approach to NPDES Phase II MS4 permitting.

**Action 3** – Develop and adopt official rules to implement the standards set in Action 2. During the rule-making process, the VRWJPO will work with the local units of government to incorporate the VRWJPO standards into their stormwater management plans, ordinances and other controls. During this rule-making process, the VRWJPO will:

1. Assist the townships with development of a model ordinance that incorporates the VRWJPO standards,
2. Review of existing local ordinances, to check for gaps between local standards and VRWJPO standards,
3. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, if the plans include any of the following conditions:
    - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
    - Diversions
    - Intercommunity flows (to or from)

- Project site size of 40 acres or more.

**Action 4** –During the interim period between VRWJPO rule adoption (March 2007) and local government adoption of ordinances and controls, the VRWJPO will, in LGUs without Local Water Plans approved by the VRWJPO:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, prior to the local government issuing a permit, if the plans include any of the following conditions:
    - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
    - Diversions
    - Intercommunity flows (to or from)
    - Project site size of 40 acres or more
    - Other proposed activities, as identified in the VRWJPO rules.

The VRWJPO may also conduct other selected project reviews in order to evaluate the implementation of local units of government's ordinances and permitting programs.

The VRWJPO envisions three categories of permitting responsibility following adoption of the VRWJPO rules:

Category 1. VRWJPO responsible for all permitting.

Category 2. Local governments responsible for all permitting

Category 3. Local governments responsible for all permitting, with VRWJPO permitting required under certain circumstances.

Following VRWJPO rule adoption, the VRWJPO will evaluate local government ordinances to determine if they match the VRWJPO Standards. If a local government's ordinances are found to be insufficient (i.e., do not meet the VRWJPO Standards), the VRWJPO will implement a permitting program in that community (Category 1).

If a local government incorporates the VRWJPO Standards into its ordinances and controls, and demonstrates compliance with the VRWJPO Standards, that local government will be responsible for permitting of certain proposed land alteration plans (Category 2). The VRWJPO will require local governments responsible for permitting to submit some proposed land alteration plans to the VRWJPO for review and comment each year through a VRWJPO evaluation program. Land alteration plans with the following conditions are particularly important to the VRWJPO for review:

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Projects that are adjacent to or appear to impact major waterways or unique natural resources

All land alteration plans that require an amendment to or a variance from the adopted Local Water Plan must be submitted to the VRWJPO for review and approval or denial as prescribed by Minn. Stat. 103B.211.

The VRWJPO will enforce its permits and rules as allowed by Minnesota Statutes 103B and 103D. The VRWJPO may also evaluate local government permitting programs. If these evaluations show non-compliance with the VRWJPO's Standards and/or the local government's ordinances, the VRWJPO will implement a permitting program in that local government.

The VRWJPO may establish special subtaxing districts to collect funds to cover its cost to implement the permitting program in communities where the VRWJPO has permitting authority. As an alternative to setting up special subtaxing districts, the VRWJPO will consider collecting permit fees to offset the costs of implementing the permitting program.

**Action 5 –** Require city and township stormwater plans to include documentation adequate to ensure that urban runoff will meet VRWJPO water quality standards and not adversely affect the Vermillion River, its major tributaries and other waterbodies.

**Action 6 –** Require cities and townships to develop stormwater plans and ordinances that ensure that the costs of constructing, operating, and maintaining stormwater management systems for new development are fairly allocated so as not to unduly burden local governments or the VRWJPO (development pays for itself).

**Action 7 –** Monitor emerging technologies for protecting the cold-water fishery, including reducing thermal impacts to streams from stormwater runoff, and constructing or sponsoring construction of demonstration or research projects that show promise to protect the cold-water fishery.

**Action 8 –** Develop and implement an incentive program to encourage implementation of additional (beyond what is required) BMPs.

**Surface Water Quality Objective 6 –** Ensure stormwater management systems are maintained. (Rationale: Maintenance of ponds and channels helps maintain water quality and avoid erosion and sedimentation.)

**Action –** Establish stormwater management system maintenance standards for cities and townships within the Watershed.

**Surface Water Quality Objective 7 –** Monitor individual NPDES permits for point source discharges in the Watershed. (Rationale: Point source discharges to the Vermillion River and/or its tributaries can have a significant impact on the water quality of Watershed water resources.)

**Action 1 –** Inventory individual NPDES point source permits in the Watershed. Identify the permits the VRWJPO should monitor.

**Action 2 –** Review water quality standards for the identified NPDES permits. Determine if there are gaps between the permit standards and what the VRWJPO believes is needed to protect Watershed water resources.

**Action 3 –** If there are gaps, develop recommendations and/or options for addressing the gaps/deficiencies, such as new water quality standards (e.g., thermal standards) to apply to these point sources.

**Action 4 –** Review NPDES permit applications, renewals, revisions, etc. and comment on aspects of the permit application that impact the water resources in the Watershed. Suggest additional or modified standards to MPCA, when/if appropriate.

**Action 5 –** Review annual monitoring reports of wastewater discharge facilities within the Vermillion River Watershed.

## 4.2 SURFACE WATER QUANTITY

**Goal –** Manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the Watershed.

**Rationale –** Monitoring indicates that the Vermillion River is receiving increased quantities of runoff. Downstream residents are concerned about greater frequency and duration of high water. In addition to these direct impacts, increases in rate and volume can have indirect impacts including:

- The erosive power of this increased runoff damages stream channels, making them unstable (the 1999 Vermillion River Assessment found the Vermillion River is highly susceptible to channel changes and erosion)
- Channel erosion degrades in-stream habitat.
- Erosion causes sedimentation problems at downstream locations where water velocity slows down.
- Unstable stream channels and degraded water quality and stream habitat have the ability, over time, to depress land values, damage property, endanger high value structures and render prime building locations unbuildable, directly impacting the health, safety and welfare of watershed residents.
- Unstable channels undermine bridges, clog culverts, and can damage infrastructure, requiring costly repairs and ensuing legal problems for both public agencies and private individuals.
- Water quantity increases usually correspond to a decrease in water quality. Stormwater can carry a variety of pollutants that can affect downstream areas and groundwater.

Our understanding of the hydrology of the Vermillion River and other surface waters in the Watershed must continue to improve in order to effectively address these and other impacts and concerns.

**Policies**

1. A reduction in runoff volumes will be supported and promoted.
2. Use existing natural retention and detention areas for stormwater management to maintain or improve existing water quality.
3. Stormwater will be managed to minimize erosion.
4. Support for and participation in sedimentation removal projects following completion of a feasibility study that identifies the sediment source(s).
5. Outlets from landlocked basins will be allowed, provided such outlets are consistent with State and federal regulations, and the downstream impacts, riparian impacts, and habitat impacts of such outlets have been analyzed and no detrimental impacts result.

**Objectives**

**Surface Water Quantity Objective 1 –** Advance the understanding of the hydrology of the Vermillion River. (Rationale: A better understanding of the hydrology can produce better, more cost-effective management strategies and help avoid costly errors.)

**Action 1 –**Monitor and document the surface water origins of Vermillion River flows, based on actual flows from treatment plants and River tributaries (Note: groundwater origins are addressed in Section 4.3 – Groundwater).

**Action 2 –** Seek funding for monitoring network.

**Action 3 –** Monitoring data will be used, when needed, to calibrate and refine hydrologic models.

**Action 4 –** Develop and implement a program to monitor streambank stability along the Vermillion River and its major tributaries (North Creek, South Creek, Middle Creek, South Branch, and Etter Creek).

**Surface Water Quantity Objective 2 –** Minimize impacts of runoff from land disturbing activities including new development and redevelopment (urban/rural), road construction, agricultural production, and other rural uses and preserve a viable cold-water fishery by developing stormwater rate and volume control techniques. (Rationale: Increases in rate, volume and duration of runoff can degrade streams; increases in impervious surfaces are correlated with the loss of aquatic habitat.)

**Action 1 –** Provide funding for staff time or contracted services to provide oversight and guidance to assist developers in planning and designing onsite water management practices to meet VRWJPO standards.

**Action 2 –** Develop Watershed standards as a minor amendment to this Plan. These standards will be based on hydrologic/ hydraulic modeling results, research guidance documents (e.g., BMPs manuals), monitoring data, other agency standards and practices, etc. The standards will include requirements for controlling stormwater runoff by minimizing impervious surface, maximizing infiltration, requiring cities and townships to control stormwater rates crossing municipal boundaries, and creating

stormwater storage that addresses not only peak flows for extreme events, but takes into account the cumulative effects of runoff volume, and will include stormwater rate control requirements.

**Action 3 –** Compile design and guidance documents for stormwater management within the Watershed.

**Action 4** – Develop and adopt official rules to implement the standards set in Action 2. During the rule-making process, the VRWJPO will work with the local governments to incorporate the VRWJPO standards into their stormwater management plans, ordinances and other controls.

**Action 4** – During the interim period between VRWJPO rule adoption (March 2007) and local government adoption of ordinances and controls, the VRWJPO will, in LGUs without a Local Water Plan approved by the VRWJPO:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, prior to the local government issuing a permit, if the plans includes any of the following conditions:
    - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
    - Diversions
    - Intercommunity flows (to or from)
    - Project site size of 40 acres or more
    - Other proposed activities, as identified in the VRWJPO rules.

The VRWJPO may also conduct other selected project reviews in order to evaluate the implementation of local units of government's ordinances and permitting programs.

The VRWJPO envisions three categories of permitting responsibility following adoption of the VRWJPO rules:

Category 1. VRWJPO responsible for all permitting.

Category 2. Local governments responsible for all permitting

Category 3. Local governments responsible for all permitting, with VRWJPO permitting required under certain circumstances.

Following VRWJPO rule adoption, the VRWJPO will evaluate local government ordinances to determine if they match the VRWJPO Standards. If a local government's ordinances are found to be insufficient (i.e., do not meet the VRWJPO Standards), the VRWJPO will implement a permitting program in that community (Category 1).

If a local government incorporates the VRWJPO Standards into its ordinances and controls, and demonstrates compliance with the VRWJPO Standards, that local government will be responsible for permitting of certain proposed (Category 2). The VRWJPO will require local governments responsible for permitting to submit some proposed land alteration plans to the VRWJPO for review and comment each year through a VRWJPO evaluation program. Land alteration plans with the following conditions are particularly important to the VRWJPO for review:

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Projects that are adjacent to or appear to impact major waterways or unique natural resources

All land alteration plans that require an amendment to or variance from the adopted Local Water Plan must be submitted to the VRWJPO for review and approval or denial as prescribed by Minn. Stat. 103B.211.

The VRWJPO will enforce its permits and rules as allowed by Minnesota Statutes 103B and 103D. The VRWJPO may also evaluate local government permitting programs. If these evaluations show non-compliance with the VRWJPO's Standards and/or the local government's ordinances, the VRWJPO will implement a permitting program in that local government.

The VRWJPO may establish special subtaxing districts to collect funds to cover its cost to implement the permitting program in communities where the VRWJPO has permitting authority. As an alternative to setting up special subtaxing districts, the VRWJPO will consider collecting permit fees to offset the costs of implementing the permitting program.

**Action 5 –** Require city and township stormwater plans to include documentation adequate to ensure that urban runoff will meet VRWJPO water quality standards and not adversely affect the Vermillion River, its major tributaries and other waterbodies.

**Action 6 –** Develop and implement an incentive program to encourage implementation of additional (beyond what is required) BMPs.

**Surface Water Quantity Objective 3 –** Mitigate and reduce the impact of past increases in stormwater discharge on downstream conveyance systems.

**Action 1 –** Identify River corridor reaches for streambank erosion reduction projects, and restore damaged stream banks at priority locations, taking advantage of partnerships and cost-sharing whenever possible.

**Action 2 –** Collaborate with Soil and Water Conservation Districts (SWCD), federal, State and local programs to cost share for streambank restoration projects undertaken by landowners.

**Action 3 –** Complete a feasibility study that identifies sources of sedimentation in the Vermillion River and its major tributaries. Implement sediment removal projects based on results of feasibility study.

**Action 4 –** Seek opportunities to retrofit existing developments with low impact development techniques, in partnership with cities and other units of government.

**Surface Water Quantity Objective 4 –** Reduce soil erosion (sheet and rill, wind erosion, gully and streambank erosion) on rural land to the recommended "T" value (the maximum rate of soil erosion that will maintain a high level of long-term crop production) or below by requiring implementation of rural best management practices (BMPs).

**Action 1 –** Promote participation in existing local, State, and federal agriculture and conservation programs [e.g., Environmental Quality Incentives Program (EQIP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), MN Cost Share Program, Dakota County Farmland & Natural Areas Program, Conservation Security Program, Wildlife Habitat Incentives Program (WHIP), Farm and Ranch Lands Protection Program, Conservation Reserve Program (CRP)] and to identify rural areas needing the most assistance.

**Action 2 –** Collaborate with other agencies to provide best management practices (BMPs) information in targeted rural areas.

**Surface Water Quantity Objective 5 –** Address known flooding/erosion problems that cross jurisdictional boundaries and address other boundary issues (e.g., inflows from Goodhue County into Ravenna and Douglas Townships, boundary issues with Gun Club Lake WMO, Lower Mississippi River WMO, and other WMOs, Lebanon Hills Park/Minnesota Zoo), and diversion/alteration of watershed flows in local water management plans.

**Action 1 –** Document intergovernmental hydrology.

**Action 2 –** Establish a workgroup to study issues.

**Action 3 –** Establish agreements and funding to address priority issues.

**Surface Water Quantity Objective 6 –** Address gully erosion problems in the Watershed.

**Action 1 –** Identify, inventory, and prioritize gully erosion problems in the Watershed (e.g., gully erosion within communities directly tributary to the Mississippi and Vermillion Rivers below the falls in Hastings).

**Action 2 –** Work cooperatively with other government entities to address identified gully erosion problems in the Watershed.

## 4.3 GROUNDWATER

**Goal –** Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes.

**Rationale –** The Vermillion River and its major tributaries are affected by, and affect, the regional groundwater system in various ways:

- In the upper reaches, the groundwater discharge to the River keeps water quality high and helps sustain a trout fishery.
- In the lower reaches, the River loses water to local aquifers, thus influencing groundwater quantity and quality.
- Infiltration of high-nitrate surface water from the Vermillion River has been identified as a factor in high nitrate levels in the water supply of the City of Hastings. This is also a concern for residents with wells located close to the river.
- Inadequate septic systems (discussed here as a groundwater issue) are suspected to be a major source of fecal coliform contamination of the Vermillion River.

The areas of Dakota and Scott Counties within the Watershed rely almost exclusively on groundwater for domestic, municipal, agricultural and industrial water supplies. The significant increase in population and resulting increase in impervious surface in the two Counties has and will continue to put increased pressure on groundwater supplies. As development continues, demand for groundwater will increase, and at the same time, groundwater recharge areas will be lost.

The Minnesota Department of Natural Resources (MDNR) and the Minnesota Department of Health (MDH) have significant regulatory programs for drinking water quality, but do not have watershed management authority.

The Dakota and Scott County Groundwater Protection Plans are incorporated into this Plan by reference.

### Policies

1. Groundwater quality should not be sacrificed to manage surface water. Holding ponds, animal watering ponds, wetlands and other water storage areas must be designed to protect groundwater.
2. The relationship between surface water and groundwater will be understood, and contaminated surface water will be prevented from entering groundwater supplies to the greatest extent possible.
3. Infiltration of stormwater and resulting groundwater recharge will be promoted where it is feasible and does not pose a threat to groundwater quality.
4. Groundwater monitoring, inventory, studies, and permitting programs should be increased and/or enhanced cooperatively by local, regional, State and federal agencies and organizations.

5. Critical groundwater recharge areas (especially those areas that support the Vermillion River cold-water fishery) should be identified, defined, and protected from harmful land use activities and practices.
6. Land use planning, policies and controls that maintain a sustainable source of high-quality groundwater will be supported.

**Objectives**

**Groundwater Objective 1 –** Continue monitoring and research on the Vermillion River Watershed groundwater system and development of groundwater management strategies. (Rationale: Understanding the groundwater system is the key to managing it. The VRWJPO must be an active partner in data collection and modeling efforts, especially as they affect the flow of the River and the River's impact on the quality and quantity of the water supply.)

**Action 1** – Collaborate with other agencies to develop and implement a groundwater monitoring system along the Vermillion River to better understand surface water/groundwater interactions.

**Action 2** – Collaborate with other agencies to develop and implement a groundwater monitoring system throughout the Watershed to monitor changes in groundwater levels and contaminants.

**Action 3** – Assess nitrogen application rates in high infiltration areas of the watershed and strive for nitrogen application rate reductions, starting in the targeted areas.

**Action 4** – Collect information on the location of agricultural drainage installations and their effects on nitrate concentrations (and other pollutants of concern) in surface water and groundwater resources.

**Action 5** – Identify natural and unnatural conduits from the ground surface to the groundwater (e.g., Karst features) that have the potential to introduce pollutants into drinking water and develop management strategies to protect groundwater in these areas.

**Action 6** – Use collected data, identify needed research, and seek partnerships with other entities to develop and implement collaborative groundwater projects and programs [e.g., Hastings Area Nitrate Study (HANS) future phases, Vermillion River Headwaters Groundwater Study].

**Action 7** – Provide annual budget funding to leverage other funds and collaborate with other entities.

**Groundwater Objective 2 –** Avoid reductions in the base flow of the River and its tributaries, and reductions in "normal" water levels of lakes and wetlands, due to increased appropriations. (Rationale: Withdrawal of water from aquifers potentially reduces flow to surface waters and/or increases downward leakage and reduces yield available to the River and its tributaries. Many cities with new wells have already instituted water conservation plans; other cities and non-public suppliers may not have conservation plans.)

**Action 1 –** Review current water conservation standards and practices and develop standards for the Watershed by 2005.

**Action 2 –** Collaborate with other agencies to develop a water conservation guidance document and provide this guidance document to cities and agriculture-related agencies and groups.

**Action 3 –** Implement an educational campaign to distribute Watershed water conservation standards and monitoring requirements to public and non-public water suppliers by 2006.

**Action 4 –** Encourage public and non-public water suppliers to institute phased water conservation techniques through education, monitoring, and development and implementation of standards by 2008. VRWJPO will provide assistance to public and non-public water suppliers to develop standards by 2007.

**Action 5 –** Develop a program to determine the most effective water conservation techniques for water supplies and local waters.

**Action 6 –** Encourage development of local water conservation plans as required by the Minnesota Land Planning Act.

**Action 7 –** Work with the Minnesota Department of Natural Resources (MDNR) and Southwest Metro Groundwater Workgroup to address well interference and water appropriation issues in the Watershed.

**Action 8 –** If requested, provide education to local governments and residents regarding the hydrologic cycle, groundwater, groundwater/surface water interactions, groundwater recharge areas, and groundwater conservation.

**Groundwater Objective 3 –** Eliminate discharges of fecal coliform bacteria and minimize discharges of nitrate and other pollutants to groundwater and surface waters of the Watershed. (Rationale: The Vermillion River is on the MPCA impaired waters (303(d)) list for fecal coliform bacteria; failing septic systems are suspected as a major source of contamination. Failing septic systems and agricultural practices are major sources of the high nitrate levels in the River and are contributing to degradation of drinking water supplies. Some communities may not have adequate regulation of septic systems. Abandoned wells are likely a significant source of pollutant transmitted from surface to ground water.)

**Action 1 –** Encourage local governments and rural subdivision developers to install community wells and septic systems, when feasible, as a method to reduce pollution potential and increase groundwater resource management; include educating developers and local government representatives as a part of this action.

**Action 2 –** Work with the Minnesota Pollution Control Agency (MPCA) and local governments to develop watershed standards and requirements for community wells and septic systems.

**Action 3 –** Work with LGUs and others to develop an information piece about wells and septic systems to distribute to developers and well and septic contractors.

**Action 4 –** Educate land use authorities about community wells and septic systems.

**Action 5 –** Develop a model zoning ordinance to promote community wells and septic systems.

**Action 6 –** Require communities to adopt and implement an inspection program for septic systems within the Watershed.

**Action 7 –** Support the counties' efforts to inventory failing and non-compliant septic systems and jointly prioritize areas for septic system upgrades.

**Action 8 –** Consider alternatives to upgrade non-compliant septic-systems, including:

- Support of focused enforcement of ISTS requirements, in potential partnership with other units of government; and/or
- Utilization or development of a cost-share or loan program to implement septic system upgrades within the Watershed, in potential partnership with the counties, Community Development Agencies, MPCA, etc.

**Action 9 –** Support Minnesota Department of Health (MDH) development of standards for pesticide degradates and mixtures.

**Action 10 –** Inventory abandoned wells in key/sensitive areas for potential groundwater contamination.

**Action 11 –** Provide cost-share funding to seal abandoned wells in key/sensitive areas for potential groundwater contamination.

**Groundwater Objective 4 –** Use Dakota County Well Management database and Scott County well index database in plan and permit reviews, and provide education (e.g., landowner outreach). (Rationale: Poorly constructed and unsealed wells are a potential source of infiltration for contamination into drinking water aquifers.)

**Action –** Assist counties in developing and distributing general well and well sealing information, or distribute existing information pieces, and identify opportunities to make landowners aware of general well information and well sealing programs

**Groundwater Objective 5 –** Implement or assist in implementing the VRWJPO's priority strategies and objectives from the Dakota and Scott County Groundwater Protection Plans by 2009. [Rationale: Watershed management plans are required to address County groundwater plans. Groundwater protection is important in the Watershed because of the interaction between the Vermillion River and groundwater (e.g., Hastings area groundwater nitrate level problems).]

**Action 1 –** Identify priority strategies and objectives in both County Groundwater Protection Plans (e.g., defining groundwater recharge areas).

**Action 2 –** Develop a strategy/action that supports or corroborates the implementation of County Plan objectives, but that does not duplicate County efforts, and implement these actions (e.g., model ordinance to protect recharge areas).

**Groundwater Objective 6 –** Support the Minnesota Department of Health (MDH) and other State, regional and local agencies in implementing wellhead protection programs and plans within the Watershed through policies and actions contained in this Plan. (Rationale: Wellhead protection zoning helps protect drinking water supplies.)

**Action 1 –** Encourage communities in the Watershed to – within five years – assure that non-compliant Individual Sewage Treatment Systems (ISTS) located in wellhead protection areas are upgraded.

**Action 2 –** Support the implementation of best management practices (BMPs) for wellhead protection areas.

**Groundwater Objective 7 –** Distribute (and develop or assist in developing, if necessary) educational materials or support programs that provide information on groundwater and how land use impacts our drinking water supply.

**Action 1 –** Develop (or assist in developing) and distribute groundwater protection areas information. The VRWJPO will use existing information and modify/create new information only if necessary.

**Action 2 –** Research the issue of infiltration impacts on groundwater and develop a consistent approach to protecting areas sensitive to groundwater contamination.

**Groundwater Objective 8 –** Support and assist in groundwater research, regulation and education.

**Action 1 –** Collaborate with State and local agencies to provide groundwater monitoring data/information and use the data/information to develop targeted educational messages.

**Action 2 –** Work with partners to develop a distribution strategy to get the right information to the right public and private sector groups.

**Action 3 –** Encourage cities and townships to work with the Minnesota Department of Health (MDH) and Dakota and Scott Counties to periodically assess the vulnerability of groundwater used for drinking water supplies.

## 4.4 WETLANDS AND HABITAT

**Goals –** Maintain and enhance, where possible, the functions and values of existing wetlands and habitats within the Watershed.

Promote the restoration and/or creation of wetlands.

**Rationale –** Wetlands and adjacent upland areas provide a variety of functions, including:

- Filtering pollutants and trapping sediment
- Providing fish and wildlife habitat

- Slowing and storing flood water
- Recharging groundwater
- Serving as groundwater outlets to recharge streams, and
- Providing recreational areas.

Wetlands also provide value (including social, economic, aesthetic and ecological benefits) that the public places on specific wetlands. These functions and values are important to the overall character of the Watershed and specifically benefit the major water bodies of the Watershed.

There are existing programs that protect wetlands through no-net loss policies. These include the Wetland Conservation Act (WCA), the DNR public waters program, and the Corps of Engineers 404 program. However, many wetlands were already drained or filled prior to adoption of these laws. Where wetlands have been lost, creating new wetlands or restoring lost wetlands would provide additional benefit. The Watershed's focus should be on areas that are critical to the Vermillion River.

The upland green space areas adjacent to wetlands are integral to wetlands achieving full value.

**Policies**

1. Work to achieve no net loss of wetland quantity, quality and biological diversity in the Vermillion River Watershed.
2. Wetland replacements will occur in the same subwatershed whenever possible and must occur within the VRWJPO; new wetlands will provide equal or greater functions and values at the replacement ratio dictated by the Wetland Conservation Act.
3. Avoidance of direct or indirect wetland disturbance will be required for all developments and land disturbing activities, in accordance with State and federal requirements and approved local wetland management plans.
4. Buffers, acting as filter strips, will be required around every wetland based on its management classification.
5. Wetlands will be protected from chemical, physical, biological, or radiological changes so as to prevent significant adverse impacts to the following designated wetland uses: maintaining biological diversity, preserving wildlife habitat, providing recreational opportunities, erosion control, groundwater recharge, low flow augmentation, stormwater retention, stream sedimentation, and aesthetic enjoyment, as specified in Minnesota Rules 7050.0210, Subp. 13a.
6. Fragmentation of natural areas and corridors will be avoided when feasible, and mitigated when unavoidable at equal value.
7. Impacts to locally and regionally significant natural areas will be avoided when feasible or mitigated when unavoidable at equal value.
8. High priority natural areas identified through the land cover mapping done for the Dakota County Farmland & Natural Area Program, the Dakota County Biological Survey, the Scott County Biological Survey, and other inventories will be the tools used to evaluate development proposals and set preservation goals to protect high-quality habitat for plants and animals.

9. Implementation of the Dakota County Farmland & Natural Areas Program will be supported as a means to improve water quality in the Watershed.

**Objectives**

**Wetlands and Habitat Objective 1 –** Require local governments to develop and implement Comprehensive Wetland Management Plans. [Rationale: Local plans can guide Wetland Conservation Act (WCA) and Corps of Engineers 404 implementation and achieve greater functions and values than regulation alone.]

These plans must follow the guidelines of the Wetland Conservation Act (Minnesota Rules 8420.0650). Acceptable federal and State programs related to wetlands should include the following components:

1. An inventory of functions and values using MNRAM 3 or equivalent methodology.
2. On the basis of functions and values, a classification of wetlands in management categories to set priorities for wetland protection and use.
3. Defined and prioritized opportunities for wetland restoration, creation or enhancement.

**Action –** Support and/or assist local governments in the development and implementation of Comprehensive Wetland Management Plans.

**Wetlands and Habitat Objective 2 –** Require local governments to adopt land use and development ordinances to complement existing wetland protection regulations. (Rationale: WCA, MDNR Public Waters and Corps of Engineers 404 programs effectively limit wetland impacts destruction, but preservation requires complementary land use practices.)

These land use ordinances must include the following components:

1. Established standards for wetland buffers. Buffer widths should vary based on the quality of the wetland, and should consider land use, soil type, and topography.
2. Preservation and protection of high-priority wetland areas.

**Action –** Support and/or assist local governments in the development of the above ordinances.

**Wetlands and Habitat Objective 3 –** Identify and pursue wetland restoration opportunities within the Watershed. (Rationale: Many wetlands have been drained or filled; restoration of wetlands will increase available functions and values.)

**Action 1 –** Identify priority wetland restoration project opportunities.

**Action 2 –** Explore and implement partnership opportunities and implement priority restoration projects. As part of the funding process, the VRWJPO will provide incentives to landowners and local governments for restoration projects.

**Wetlands and Habitat Objective 4 –** Protect existing fish and wildlife habitat areas and promote the development of additional fish and wildlife habitat areas. (Rationale: VRWJPO activities and requirements, along with other water and land preservation programs, will reserve significant amounts of land from development and agriculture; these areas can be managed for wildlife benefits.)

**Action 1 –** Coordinate with other agencies and organizations to develop or enhance wildlife habitat corridors that connect open space, stream corridors, lake buffers, wetland buffers and stormwater management facilities. (See also Surface Water Quality Objective 3, Action 6.)

**Action 2 –** Coordinate with conservation agencies and other organizations to supplement their fish and wildlife habitat protection and enhancement efforts and programs.

**Action 3 –** Provide cost-share funds, if available, to encourage fish and wildlife habitat protection and enhancement, and the development of habitat inventories.

**Action 4 –** Evaluate fish and wildlife habitat areas to prioritize the acquisition of easements over floodplains. (See also Floodplain Objective 3, Action3.)

**Action 5 –** Require communities to obtain conservation easements over critical habitat areas during development. The VRWJPO will strongly consider requiring developers to set aside critical habitat at the time of development or contribute to a dedicated fund for critical habitat preservation. Local units of government have used similar approaches before for similar programs (e.g. open space preservation). Critical habitat will be defined during the standards development process. The definition will be based on the Dakota County Farmland and Natural Areas Program, and other biological inventories or assessments.

**Action 6 –** Coordinate habitat and wetland programs (e.g., A VRWJPO incentive program for wetland restoration, Dakota County's Farmland & Natural Areas Program, local wetland plans) to help produce a continuous corridor, especially along the Vermillion River and its major tributaries.

**Wetlands and Habitat Objective 5 –** Protect sensitive habitats and communities, and rare species. (Rationale: Section 1 of this Plan describes sensitive habitats and communities and lists rare species in Dakota and Scott Counties. The VRWJPO has a responsibility to be mindful of the impacts of its programs on sensitive habitats and rare species.)

**Action 1 –** Require local water management and wetland plans to include known sensitive habitats and communities, and rare species, and take reasonable measures to avoid impacts to these areas.

**Action 2 –** Review projects and plans with an awareness of sensitive habitats and communities, and rare species, as listed in this Plan or otherwise available (e.g., County Biological Survey or other biological inventories).

**Wetlands and Habitat Objective 6 –** Assist in public education efforts regarding the fish and wildlife of the Vermillion River Watershed. (Rationale: Public value of wildlife expenditures needs to be explained and justified to the public).

**Action 1 –** Support signage and other location-specific education practices in public open spaces of the Vermillion River corridor.

**Action 2 –** Distribute (and develop or assist in developing, if necessary) educational materials or support programs that provide information on the fish and wildlife resources of the Vermillion River and the steps being taken to preserve habitat.

**Action 3 –** Provide support to local communities to continue the Wetland Health Evaluation Program.

## 4.5 FLOODPLAINS

**Goal –** Manage and protect the floodplains of the Watershed from encroachment.

**Rationale –** Protecting floodplains from encroachment preserves the natural function of the floodplain, thereby protecting human life and property from flood damage. Note: The Wisconsin DNR estimates avoiding 1% of flood damages saves $1.5M/yr.

**Policies**

1. The natural function of the floodplain as a floodwater storage area should be protected from encroachment.
2. Work to maintain no net loss of floodplain storage.
3. Floodplains will be managed to maintain critical 100-year flood storage volumes.
4. Local Water Plans will include a provision that restricts construction of new structures to sites above flood prone areas.
5. Local governments will adopt floodplain zoning regulations consistent with Dakota and Scott County water resource plans and ordinances.
6. Upstream floodwater storage should be maximized.
7. Accumulated sediment should be removed from flood storage facilities prior to reaching 50 percent of the storage area's capacity.
8. Infiltration in appropriate floodplain areas should be increased through increased vegetated areas and reduced impervious surfaces.
9. Local governments will adopt policies for designation of flood/stormwater storage areas.

**Objectives**

**Floodplain Objective 1 –** Require adoption of shoreland and floodplain ordinances that are compatible with existing County and State ordinances. (Rationale: Floodplain ordinances are the main tool for preserving floodplains. Dakota and Scott Counties enforce floodplain ordinances in unincorporated areas. Some cities may not have adequate floodplain ordinances.)

**Action 1** – Review the status of local floodplain and shoreland ordinances.

**Action 2** – Work with local governments that lack adequate ordinances to develop and adopt ordinances compatible with VRWJPO, County, and State requirements.

**Floodplain Objective 2 –** Require local governments to identify and protect Watershed floodplains. (Rationale: Many floodplains are not identified on current FEMA maps. Identifying floodplains is the first step toward managing them.)

**Action 1** – Encourage local participation in the National Flood Insurance Program.

**Action 2** – Require local stormwater management plans to identify 100-year floodplains for all water bodies, and be consistent with the counties' revised FEMA floodplain maps.

**Action 3** – Require local governments to establish minimum building elevations for any structures allowed in the floodplain.

**Action 4** – Require cities and townships to obtain flood and drainage easements and easements for maintenance access and over emergency overflow routes during development and/or building permit processes.

**Action 5** – Coordinate with responsible government units to ensure that structures are properly located relative to the floodplain before permits are issued.

**Action 6** – Conduct an inventory of "grandfathered structures" within floodplain setbacks.

**Action 7** – Assist local governments in developing, if necessary, and distributing educational materials regarding floodplain locations, protection, and floodplain land use and land alteration restrictions.

**Floodplain Objective 3 –** Limit floodplain alterations in order to obtain "no net loss" of floodplain storage, and including the preservation, restoration and management of floodplain wetlands. (Rationale: This is a stricter requirement than basic floodplain ordinances. The basic floodplain law allows reduction in floodplain storage as long as the water conveyance capacity of the stream is preserved; the storage of stormwater in the floodplain is generally beneficial; the loss of storage should be compensated.)

**Action 1** – Ensure that local governments require compensatory storage for future filling or structures within the floodplain.

**Action 2** – Create a policy to guide the proportion of local and Watershed financial contributions to flood storage projects (e.g., Farmington basin that would serve more than one community).

**Action 3 –** Establish a funding program to obtain easements within floodplains to prevent and minimize flood damages, preserve the thermal integrity of the stream, and reduce and prevent sedimentation.

## 4.6 LAND USE MANAGEMENT

**Goal –** Protect and conserve water resources by promoting sustainable growth, integrated land use and land use planning, rural land conservation methods that reduce non-point sources of pollution from agricultural lands, and water resource management.

**Rationale –** The protection of water resources and the establishment of a variety of new and ongoing land uses (e.g., development, agriculture, mining) can complement each other if standards are set and measures taken before problems occur. New and innovative growth, land use, and water resource management elements can be incorporated into agricultural and developing or developed areas to create positive water resource protection and conservation outcomes. Integrated land use promotes the occurrence of several, compatible uses on one parcel or overlapping land uses or uses in close proximity to each other. For example, integrated land use planning considers the full range of resources and values present on public land and aims to blend or coordinate management strategies and implementation requirements across jurisdictions. These land use and planning techniques could help conserve water resources and promote compatible growth that is protective of Watershed resources.

**Policies**

1. The orderly and planned expansion of the Metropolitan Urban Service Area (MUSA) to accommodate growth in a flexible, connected and efficient manner will be supported.

2. The presence of environmentally sensitive natural resource areas should guide land use management decisions.

3. The impacts of land disturbing activities on water resources, including cumulative impacts, should be considered for each proposed activity before the activity occurs.

4. Stormwater best management practices must be identified as part of the development approval process.

5. The retirement of marginal agricultural land through local, State and federal easement programs will be supported.

6. Continued Dakota and Scott County delegated feedlot permitting programs will be supported.

7. Coordination with other entities (e.g., Dakota and Scott SWCDs, NRCS) to reduce non-point source pollution from agricultural activities will be supported.

8. Agricultural standards will be developed to address gaps in existing agricultural programs and regulations.

**Objectives**

**Land Use Management Objective 1 –** Require land disturbing activities including new development and redevelopment (urban/rural), road construction, agricultural production, and other rural uses within the Watershed to address impacts on water resources, including cumulative impacts.

**Action 1 –** While conducting environmental reviews [e.g., Environmental Assessment Worksheets (EAW), Alternative Urban Area Reviews (AUAR) and Environmental Impact Statements (EIS)] and reviewing local plan amendments, the VRWJPO will evaluate the impacts of proposed and existing land uses on surface water and groundwater resources in the Watershed.

**Action 2 –** Assist local governments within the Watershed in developing criteria to consider potential off-site impacts (e.g., how far downstream to evaluate, what types of problems to look for).

**Action 3 –** Require development plans to consider impacts on local natural resources and corresponding receiving waters.

**Action 4 –** Work with local governments to:

1. Inventory road crossings
2. Identify opportunities for flood control, water quality improvement, and channel/stream restoration initiatives
3. Set standards for managing stormwater and culvert flows on road and other public improvement projects.

**Land Use Management Objective 2 –** Coordinate the implementation of the Vermillion River Watershed Management Plan with the implementation of the Dakota and Scott County Comprehensive Plan updates.

**Land Use Management Objective 3 –** Reduce non-point source pollution from agricultural activities through education, incentives and initiatives.

**Action 1** – Encourage Dakota and Scott Counties to update and maintain their feedlot inventories.

**Action 2** – Assist Dakota and Scott Counties, where appropriate, in implementing/administering their delegated county feedlot permitting programs.

**Action 3** – Assist State and local agencies in providing technical assistance to feedlot operators and other agricultural landowners whose operations are causing pollution problems. Assist agencies and/or feedlot operators and other agricultural landowners in obtaining grants to correct/mitigate pollution problems.

**Action 4** – Assist State and local agencies in the distribution of research data, information and case studies showing how to reduce non-point source pollution from agricultural land by implementing best management practices (BMPs).

**Action 5** – Coordinate with State, local and federal agencies to identify tiled farmland and potential point and non-point pollution sources.

**Action 6** – The VRWJPO will identify the resource-based voids/gaps in existing local, State and federal agricultural/rural incentive and regulatory programs, and will seek to build on and fill voids in these programs. The VRWJPO will identify locations where conservation plans are most needed. The VRWJPO will require agricultural/rural landowners to complete and implement conservation plans to enhance eligibility for conservation programs, provide flexibility in meeting regulatory requirements, and/or to participate in VRWJPO cost-share programs. For example, if a project would be eligible for 50% cost-share funds through the NRCS EQIP, the landowner would be eligible for additional VRWJPO funding through completion and implementation of a conservation plan. The VRWJPO will work with the USDA, the SWCD, and other organizations to assist landowners in completing conservation plans for these lands, and will assist in implementing conservation plans in these targeted areas, through incentive programs, cost share programs, and other measures (such as purchase of no-till drills). The VRWJPO's assistance will be focused on agricultural erosion control and water quality improvement measures, including, but not limited to:

- No-till practices
- Residue management practices
- Temporary cover crop plantings to provide erosion control from fall through spring (harvest through planting)
- Buffers
- Filter strips
- Livestock exclusion
- Feedlot best management practices.

**Action 7** – Develop standards for agricultural/rural lands to fill identified resource-based voids/gaps in existing agricultural/rural programs and regulations. These standards will be incorporated into this Plan through a minor plan amendment. These standards will include requirements for conservation plans. These standards could address drainage, buffers, soil loss, nutrient applications, and pesticide use.

**Action 8** – Develop and adopt official rules to implement the standards set in Action 7. During the rule-making process, the VRWJPO will work with the local units of government to incorporate the VRWJPO standards into their stormwater management plans, ordinances and other controls. During this rule-making process, the VRWJPO will:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, prior to the local government issuing a permit, if the plans includes and of the following conditions:
    - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more

**Action 9 –** During the interim period between VRWJPO rule adoption (March 2007) and local government adoption of ordinances and controls, the VRWJPO will, in LGUs without a Local Water Plan approved by the VRWJPO:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, prior to the local government issuing a permit, if the plans includes any of the following conditions:
   - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
   - Diversions
   - Intercommunity flows (to or from)
   - Project site size of 40 acres or more
   - Other proposed activities, as identified in the VRWJPO rules.

The VRWJPO may appeal the community's approval of a project, if the VRWJPO believes the project is not consistent with the community's local water management plan. The VRWJPO will use these selected project reviews as informal audits of the local units of government's ordinances and permitting programs.

The VRWJPO envisions three categories of permitting responsibility following adoption of the VRWJPO rules:

Category 1. VRWJPO responsible for all permitting.

Category 2. Local governments responsible for all permitting

Category 3. Local governments responsible for all permitting, with VRWJPO permitting required under certain circumstances.

Following VRWJPO rule adoption, the VRWJPO will evaluate local government ordinances to determine if they match the VRWJPO Standards. If a local government's ordinances are found to be insufficient (i.e., do not meet the VRWJPO Standards), the VRWJPO will implement a permitting program in that community (Category 1).

If a local government incorporates the VRWJPO Standards into its ordinances and controls, and demonstrates compliance with the VRWJPO Standards, that local government will be responsible for all permitting (Category 2). The VRWJPO will require local governments responsible for permitting to submit some proposed land alteration plans to the VRWJPO for review and comment each year through a VRWJPO evaluation program. Land alteration plans with the following conditions are particularly important to the VRWJPO for review:

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Projects that are adjacent to or appear to impact major waterways or unique natural resources

All land alteration plans that require an amendment to or a variance form the adopted Local Water Plan must be submitted to the VRWJPO for review and approval or denial as prescribed by Minn. Stat. 103B.211.

The VRWJPO will enforce its permits and rules as allowed by Minnesota Statutes 103B and 103D. The VRWJPO may also evaluate local government permitting programs. If these evaluations show non-compliance with the VRWJPO's Standards and/or the local government's ordinances, the VRWJPO will implement a permitting program in that local government.

The VRWJPO will establish special subtaxing districts to collect funds to cover its cost to implement the permitting program in communities where the VRWJPO has permitting authority. As an alternative to setting up special subtaxing districts, the VRWJPO will consider collecting permit fees to offset the costs of implementing the permitting program.

**Action 10** – Work with State and local agencies to provide local, State and federal cost-share money to landowners implementing BMPs.

**Action 11** – Along with appropriate State and local agencies, work with livestock owners to eliminate direct access by livestock to natural waterbodies (e.g., lakes, wetlands, rivers, streams). [Minnesota Rules, Chapter 7020 only prohibits livestock from standing in lakes.]

**Action 12** – Work with State and local agencies to educate landowners regarding the potential liabilities associated with continuing to maintain fencing across public waters (e.g., Vermillion River and tributaries).

**Action 13** – Promote participation in local, State and federal conservation programs [e.g., Reinvest in Minnesota (RIM), Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Dakota County Farmland & Natural Areas Program, MN Cost Share Program, Conservation Security Program, Wildlife Habitat Incentives Program (WHIP), Farm and Ranch Lands Protection Program].

## 4.7 OPEN SPACE AND RECREATIONAL AREAS

**Goal –** Develop or improve recreational, fish and wildlife, open space areas and accessibility in conjunction with water quality improvement projects.

**Rationale –** Improving and maintaining water quality in the Watershed is the main concern and focus of the VRWJPO. Improved water quality is key to enhancing and increasing recreational uses, which are a secondary benefit. Increasing public access to the waters within the Vermillion River Watershed and providing places that offer a variety of water resource-related outdoor experiences can be the long-term results of improving water quality. Recreational and open space uses by the public can enhance people's understanding of the importance of protecting the natural resources in the Watershed. Through water quality improvement projects, the VRWJPO should seek opportunities to help provide quality open space and recreational areas in the Watershed, especially in the River corridor and along its major tributaries. This goal and the associated objectives and actions are intended to be long-term achievements that will follow significant improvements in water quality. The exceptions to this are: Objective 1 – increasing public awareness of the Vermillion River and its major tributaries, which should begin right away; and Objective 2 – maintaining natural stream corridor qualities, which should be done whenever opportunities arise.

**Policies**

1. Recreational uses of waterbodies in the Watershed will not be promoted by the VRWJPO unless or until water quality is not a threat to human health.
2. Impacts to regionally and locally important natural areas should be avoided or mitigated.
3. Fragmenting natural areas and natural/wildlife corridors should be avoided or mitigated.
4. Creation and preservation of navigational and wading access to public waters will be sought, where appropriate; opportunities may arise that should be pursued for future recreational uses, even if the VRWJPO is not currently willing to promote recreational uses due to water quality that poses a threat to human health.
5. Natural areas, shoreland and wetland environments will be preserved, restored and enhanced wherever possible.
6. Use of native vegetation should be maximized in local government projects and private development open spaces.
7. Certain recreational uses will be prohibited or restricted in natural areas and open spaces if the uses will degrade the natural features or characteristics of the area.
8. Existing open spaces, outdoor recreational amenities, and cultural resources will be connected and enhanced whenever possible.
9. Open space uses in wellhead protection areas will be encouraged and promoted.
10. Community efforts to create a continuous trail system along the Vermillion River and its major tributaries will be supported. Note: VRWJPO support will not include funding for trail construction.

**Objectives**

**Open Space and Recreational Areas Objective 1 –** Increase public awareness of the Vermillion River and its major tributaries as a valued resource. (Rationale: The public may not be aware of the attributes and characteristics of the Vermillion River and its watershed.)

**Action 1 –** Implement an education program (e.g., brochures, television public service spots) to educate the public about the River system and its characteristics.

**Action 2 –** Educate the public on the recreational opportunities provided by the Vermillion River through publication of maps and placement of signs denoting River access, etc.

**Open Space and Recreational Areas Objective 2 –** Maintain natural stream corridor qualities for recreational users and local residents. (Rationale: Public use and appreciation of the stream for open space and recreational uses are dependent on maintaining the natural beauty of the stream. The value of the public investment in water quality improvement and flow management will be diminished if the stream is degraded by litter and debris, invasive species and poorly planned structures.)

**Action 1 –** Support non-profit and volunteer groups for river cleanup activities.

**Action 2 –** Require communities to adopt shoreland ordinances that comply with existing County and State ordinances, and comply with VRWJPO standards.

**Action 3 –** Evaluate the River corridor and main tributaries for opportunities to restore natural scenic values.

**Action 4 –** Improve the visual quality of the River and main tributaries through buffer acquisition, riparian plantings, shoreline restoration, acquisition and/or removal of structures that degrade the corridor.

**Open Space and Recreational Areas Objective 3 –** Partner with others to develop a plan to improve access to public waters, while avoiding impacts of over-use or conflicting uses. (Rationale: Public use and access increase beneficial uses of streams and create public interest in conservation of stream corridors; however, increased use can create conflicts.)

**Action 1 –** Establish a task force of VRWJPO staff, citizens, and State, regional, and local agency/organization representatives to advise the VRWJPO on river corridor issues.

**Action 2 –** Encourage and sponsor preparation of a Vermillion River corridor recreational plan with the task force. The plan will identify priority areas and assess specific recreational uses and problems.

**Action 3 –** Educate recreational users on good stewardship practices to avoid damage to the stream or water body environment or conflicts with riparian landowners.

**Open Space and Recreational Areas Objective 4 –** Remove stream access barriers, and other impairments, consistent with the plan created in Objective 3.

**Action 1 –** Implement a targeted education program (e.g., brochures, flyers) to educate landowners about liabilities associated with River obstacles located on/originating from private land.

**Action 2 –** Work with the Minnesota Department of Natural Resources (MDNR) and landowners to remove dangerous impairments to river navigation (e.g., fallen trees that pose a danger, electrified and other fences).

**Action 3 –** Work with and support other agencies to address health and safety requirements in the River.

**Open Space and Recreational Areas Objective 5 –** Partner with others to pursue recreation and natural resource protection and enhancement opportunities. (Rationale: Establishment of stream and wetland buffers for water quality protection, and implementation of the Dakota County Farmland & Natural Areas Program will provide opportunities to improve recreational and aesthetic values. Some natural areas should not be promoted for all types of recreational use.)

**Action 1 –** Provide annual budget funding to leverage other funds and collaborate with other entities.

**Action 2 –** Explore and implement appropriate partnership opportunities [e.g., Dakota County Farmland & Natural Areas Program, southeast Minnesota Conservation Reserve Enhancement Program (CREP), etc.]

**Action 3 –** Work with Dakota County to enhance the Dakota County Farmland & Natural Areas Program, and assist in developing a process to continue the program when the initial investment ends.

**Action 4 –** Work with local units of government to integrate the Dakota County Farmland and Natural Area Protection Program, greenway planning, and water resource protection into local comprehensive plans.

**Action 5 –** Work with other governmental agencies and private landowners to increase public access to open space, the Vermillion River, and other public waters (e.g., Metropolitan Council through legislative park acquisition funding, Minnesota Department of Transportation to preserve ponding areas for future highway projects).

**Action 6 –** Support community efforts to create a continuous trail system along the Vermillion River and its major tributaries. Note: VRWJPO support will not include funding for trail construction.

**Action 7** – Request that the Minnesota Department of Natural Resources (MDNR) conduct an expanded fisheries survey of the water resources in the Watershed to better identify aquatic habitat issues and restoration opportunities.

**Action8** – Request that the MDNR conduct creel surveys and access surveys of the River and other major water resources in the Watershed.

## 4.8 EDUCATION

**Goal –** Offer programs, educational opportunities, and information that facilitate an understanding of watershed principles and objectives.

**Rationale –** Educating and working with stakeholders in the Watershed can provide a network of knowledgeable people who can support and even help implement the Plan to achieve Watershed goals.

### Policies

1. Assist in distributing materials developed by other organizations and/or develop educational materials, where appropriate.
2. Support education for local officials emphasizing sustainable land use decisions that protect water quality, such as the Nonpoint Education for Municipal Officials (NEMO) program.
3. Coordinate and collaborate general education efforts with the efforts of the local units of government in the VRWJPO (e.g. NPDES Phase II MS4 permit education requirements).

### Objectives

**General Action –** Provide training and guidance to local planners, developers and engineers on how best to implement Watershed standards and requirements.

**General Action –** Work with other agencies and groups to develop and implement education programs related to responsible land use practices. Ensure that elected officials have access to this program.

**General Action –** Work with government, nonprofit and other agencies to provide education programs on watershed issues.

**Education Objective 1 –** Develop an educational program related to each goal area in the Plan that includes marketing and other efforts to educate and motivate the target audience (e.g., elected officials, general public). The following is a compilation of educational actions from previous sections.

**Action 1 – Water Quality:**

Objective 2, Action 2: Collect, organize and interpret water quality monitoring data.

Objective 2, Action 3: Continue to fund the Vermillion River Watch program.

Objective 2, Action 6: Make water quality monitoring data available via website or other means and summarize data for public information purposes.

Objective 4, Action 4: If problems or shortcomings exist [in recreational lake management], work with affected municipalities to address problems through regulation, education, and/or implementation of capital projects.

**Action 2 – Water Quantity**

Objective 1: Advance the understanding of the hydrology of the Vermillion River.

Objective 2, Action1: Provide funding for staff time or contracted services to provide standards oversight and guidance to assist developers in planning and designing onsite water management practices.

Objective 2, Action 3: Compile design and guidance documents for stormwater management within the Watershed.

Objective 4, Action 2: Collaborate with other agencies to provide best management practices (BMP) information in targeted rural areas.

**Action 3 – Groundwater**

Objective 2, Action 2: Collaborate with other agencies to develop a water conservation guidance document and provide this guidance document to cities and agriculture-related agencies and groups.

Objective 2, Action 3: Implement an educational campaign to distribute Watershed water conservation standards and monitoring requirements to public and non-public water suppliers by 2006.

Objective 2, Action 4: Encourage public and non-public water suppliers to institute phased water conservation techniques through education, monitoring, and development and implementation of standards by 2008. VRWJPO will provide assistance to public and non-public water suppliers to develop standards by 2007.

Objective 2, Action 8: Provide education to local governments and residents on the hydrologic cycle, groundwater, groundwater/ surface water interactions, groundwater recharge areas, and groundwater conservation.

Objective 3, Action 1: Require local governments and rural subdivision developers to consider community wells and septic systems, when feasible, as a method to reduce pollution potential and increase groundwater resource management; include educating developers and local government representatives as a part of this action.

Objective 3, Action 3: [To reduce septic tank pollution of groundwater] Develop an information piece to distribute to developers and well and septic contractors.

Objective 3, Action 4: Educate land use authorities about community wells and septic systems (Action 4d)

Objective 4, Action: Assist counties in developing and distributing general well and well sealing information, or distribute existing information pieces, and identify opportunities to make landowners aware of general well information and well sealing programs.

Objective 7: Distribute (and develop or assist in developing, if necessary) educational materials or programs that provide information on groundwater and how land use impacts our drinking water supply.

Objective 7, Action 1: Develop (or assist in developing) and distribute groundwater protection areas information. The VRWJPO will use existing information and modify/create new information only if necessary (Action 8a).

Objective 8: Support and assist in groundwater research, regulation and education.

Objective 8, Action 1: Provide groundwater monitoring data/information and use the data/information to develop targeted educational messages.

Objective 8, Action 2: Work with partners to develop a distribution strategy to get the right information to the right public and private sector groups.

**Action 4 – Wetlands**

Objective 6: Assist in public education efforts regarding fish and wildlife populations in the Vermillion River watershed.

Objective 6, Action 1: Support signage and other location-specific education practices in public open spaces of the Vermillion River corridor.

Objective 6, Action 2: Distribute (and develop or assist in developing, if necessary) educational materials or programs that provide information on the fish and wildlife resources of the Vermillion River and steps being taken to preserve habitat.

Objective 6, Action 3: Provide support to local communities to continue the Wetland Health Evaluation Program.

**Action 5 – Floodplains**

Objective 1, Action 7: Assist local governments in developing, if necessary, and distributing educational materials regarding floodplain locations, protection, and floodplain land use and land alteration restrictions.

**Action 6 – Land Use Management**

Objective 3, Action 4: Assist State and local agencies in the distribution of research data, information and case studies showing how to reduce non-point source pollution from agricultural land by implementing best management practices (BMPs).

Objective 3, Action 10: Work with State and local agencies to educate landowners regarding the potential liabilities associated with continuing to maintain fences across public waters (e.g., Vermillion River and tributaries).

Objective 3, Action 11: Promote participation in local, State and federal conservation programs [e.g., Reinvest in Minnesota (RIM), Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Dakota County Farmland & Natural Areas Program, MN Cost Share Program, Conservation Security Program, Wildlife Habitat Incentives Program (WHIP), Farm and Ranch Lands Protection Program.

**Action 7 – Open Space and Recreation Areas**

Objective 1: Increase public awareness of the Vermillion River and its major tributaries as a valued resource.

Objective 1, Action 1: Implement an education program (e.g., brochures, television public service spots) to educate the public about the River system and its characteristics.

Objective 1, Action 2: Educate the public on the recreational opportunities provided by the Vermillion River through publication of maps and placement of signs denoting River access, etc.

Objective 3, Action 3: Educate recreational users on good stewardship practices to avoid damage to the stream environment or conflicts with riparian landowners.

Objective 4, Action 1: Implement a targeted education program (e.g., brochures, flyers) to educate landowners about liabilities associated with River obstacles located on/originating from private land.

**Education Objective 2 –** Provide information to the public, and provide opportunities for public involvement and input on Watershed policies and programs.

**Action 1 –** Use the VRWJPO web page to provide pertinent information about the Watershed.

- Post all agendas, background materials and meeting minutes to web.
- Post all major proposed plans and projects to web and request public comment through published notices and news releases.

**Action 2 –** Regularly publish VRWJPO newsletters.

**Action 3 –** Publish articles about the Watershed in other organizations' publications (e.g. the Scott County Scene and Dakota County Update).

**Action 4 –** Recruit volunteers for monitoring efforts (e.g., stream and lake sampling) and involvement in other VRWJPO programs and projects.

**Action 5 –** Provide or support formal volunteer training for Watershed projects and programs.

**Action 6 –** Develop and implement a recognition program for volunteers.

**Action 7 –** Publish Watershed map and handbook.

**General Action –** Work with other agencies and groups to develop and implement education programs related to responsible land use practices. Ensure that elected officials have access to this program.

**General Action –** Work with government, nonprofit and other agencies to provide education programs on watershed issues.

# SECTION 5: VERMILLION RIVER WATERSHED JOINT POWERS ORGANIZATION (VRWJPO) GOVERNANCE AND ADMINISTRATIVE AUTHORITY

## 5.0 INTRODUCTION

Dakota and Scott Counties' watershed management authority is provided for in Minn. Stat. § 103B.231, Subd. 3(b). The Counties' groundwater management authority is derived from Minn. Stat. § 103B.255. Dakota and Scott Counties became responsible for managing the Vermillion River Watershed when the former watershed management organization failed to sign a new Joint Powers Agreement in August 2000. After evaluating various watershed management structures, Dakota and Scott Counties signed a Joint Powers Agreement in September 2002 that established the Vermillion River Watershed Joint Powers Organization.

## 5.1. STRUCTURE OF THE VRWJPO

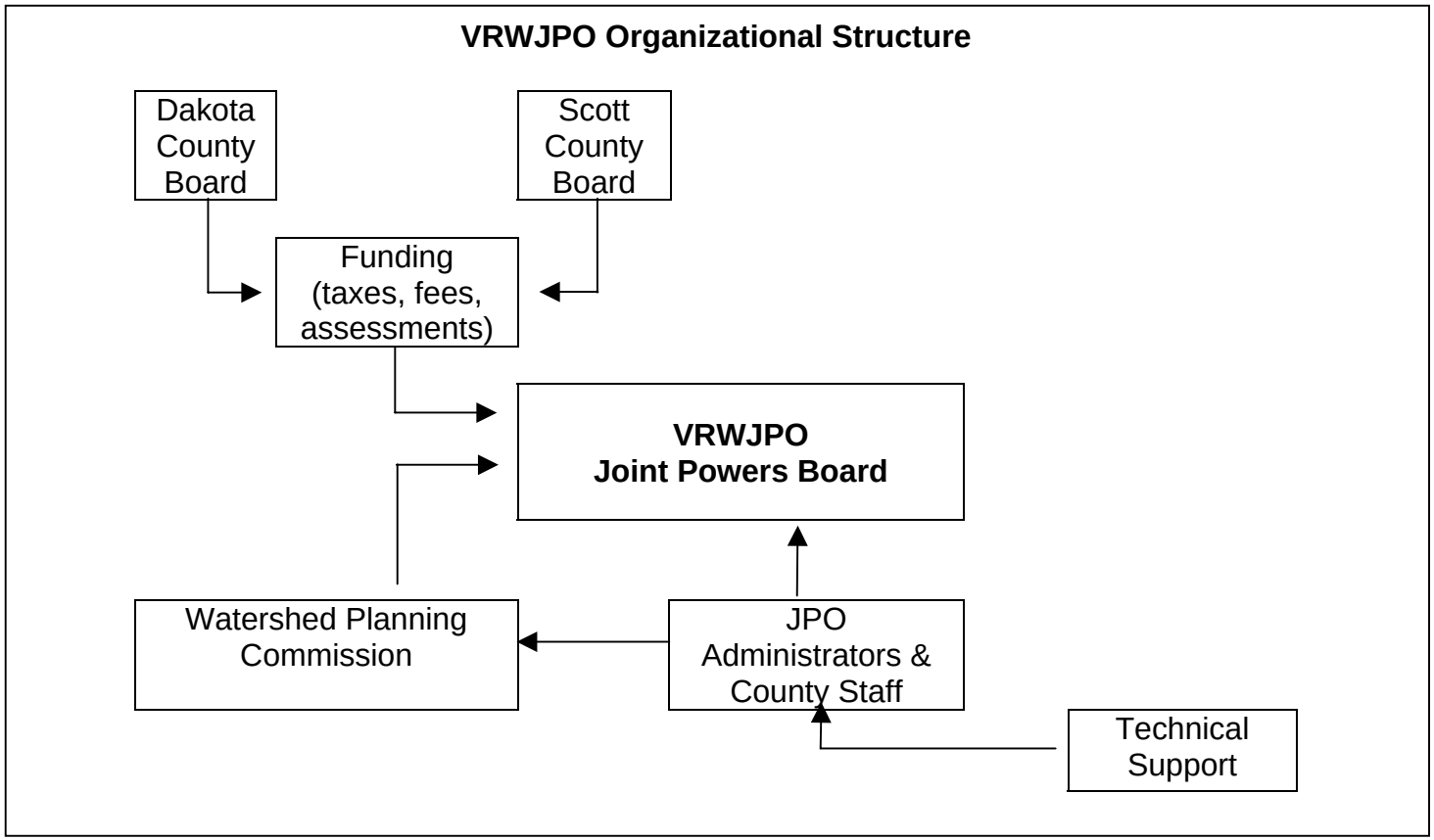
The VRWJPO Joint Powers Agreement (JPA) establishes a three-member Joint Powers Board consisting of two Dakota County Commissioners and one Scott County Commissioner (the JPA is included in Appendix E). The Joint Powers Board provides the direction to plan for the management and protection of water resources throughout the Vermillion River Watershed (Watershed).

The Joint Powers Board is supported by a nine-member, advisory Watershed Planning Commission (WPC), consisting of eight members from the Dakota County portion of the Watershed, and one member from the Scott County portion of the Watershed. As stated in the JPA, the general duties of the WPC are to advise the Joint Powers Board regarding its duties under the JPA, including the responsibility to:

- Review, comment and recommend on the proposed watershed management plan;
- Review, comment and recommend on the proposed annual work plan and budget; and
- Recommend action regarding disputes pursuant to the Joint Powers Agreement.

The VRWJPO is administered by Dakota County staff, through its Physical Development Division, and by Scott County staff, through its Community Development Division. Technical assistance regarding Watershed issues is provided through a combination of County staff and outside consulting services.

**Figure 5.1: VRWJPO Organizational Structure**




## 5.2 REGULATORY CONTROLS

Various units of government are involved in regulating water resource related activities, as described in the following paragraphs and summarized in Table 5.1.

**Minnesota Department of Natural Resources (MDNR).** The MDNR administers the Public Waters Work Permit Program, the water appropriation permit program, the dam safety permit program, and the riprap shore protection permit program. The MDNR is involved in enforcement of the Wetland Conservation Act and is responsible for identifying, protecting and managing calcareous fens. The MDNR also has model shoreland ordinances that cities and counties can adopt.

The MDNR's Public Waters Work Permit Program (Minnesota Statutes 103G) requires a MDNR protected waters permit for any work below the Ordinary High Water elevation (OHW) or any work that will alter or diminish the course, current, or cross-section of any protected water, including lakes, wetlands and streams. For lakes and wetlands, the MDNR's jurisdiction extends to designated U.S. Fish and Wildlife Service Circular #39 Types 3, 4, and 5 wetlands, which are 10 acres or more in size in unincorporated areas, or 2.5 acres or more in size in incorporated areas. The program prohibits most filling of protected waters and wetlands for the purpose of creating upland areas. The Public Waters Work Permit program was amended in 2000 to minimize overlapping jurisdiction with the WCA.

Questions concerning the MDNR's role in water resource management should be directed to the MDNR Division of Waters, Metro Region, 1200 Warner Road, St. Paul, MN 55106 (651-772-7910).

**Minnesota Board of Water and Soil Resources (BWSR)**. The BWSR oversees the State's watershed management organizations (joint powers and watershed district organizations), oversees the State's Soil and Water Conservation Districts, and administers the rules for the Wetland Conservation Act and Metropolitan Area watershed management. Questions concerning the BWSR's role in water resource management should be directed to the Minnesota Board of Water and Soil Resources, , 520 Lafayette Road, St. Paul, MN 55155 (651-296-3767).

**Minnesota Pollution Control Agency (MPCA).** The MPCA administers the State Discharge System/National Pollutant Discharge Elimination System (NPDES) Permit program (point source discharges of wastewater), the NPDES General Permit for Construction Activities program, the NPDES General Stormwater Permit for Industrial Activities program, the NPDES MS4 Storm Water Permit program, Section 401 of the Clean Water Act Water Quality Certification program, and the individual sewage treatment system regulations (7080 Rules). The MPCA also reports the State's "impaired waters" to the U.S. Environmental Protection Agency. Spills should be reported directly to the MPCA. Questions concerning the MPCA's role in water resource management should be directed to the Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, MN 55155-4194 (651-296-6300).

**Minnesota Department of Health (MDH).** The MDH administers the Well Management Program, the Wellhead Protection Program, and the Safe Drinking Water Act rules. See the Background part of the Groundwater section for more information about these programs. Questions concerning the MDH's role in water resource management should be directed to the Minnesota Department of Health, P.O. Box 64975, St. Paul, MN (651-215-5800).

**Minnesota Environmental Quality Board (EQB).** The EQB administers the State's environmental review program, including Environmental Assessment Worksheets (EAW) and Environmental Impact Statements (EIS). Questions concerning the EQB's role in water resource management should be directed to the Minnesota Environmental Quality Board, 658 Cedar Street, St. Paul, MN 55155 (651-296-3985).

**U.S. Army Corps of Engineers (COE).** The COE administers Section 10 of the Rivers and Harbors Act permit program, and the Section 404 permit program. See Section 8.3 for more information about these programs. Questions concerning the COE's role in water resource management should be directed to the U.S. Army Corps of Engineers, St. Paul District, Army Corps of Engineers Centre, 190 East 5th Street, St. Paul, MN 55101-1638 (651-290-5200).

**The Metropolitan Council.** The Metropolitan Council provides regional planning and wastewater services (collection and treatment) for the seven-county Metropolitan Area. The Metropolitan Council's adopted "Interim Strategy to Reduce Nonpoint Source Pollution to All Metropolitan Water Bodies" requires local governments to 1) adopt design standards for new stormwater ponds; 2) follow the best management practices given in the MPCA's *Protecting Water Quality in Urban Areas* (2000), or an equivalent set of standards; and 3) adopt the DNR's shoreland regulations. Questions concerning the Metropolitan Council's role in water resource management should be directed to the Metropolitan Council, Mears Park Center, 230 East 5th Street, St. Paul, MN 55101 (651-602-1000).

Table 5.1 lists State agency involvement using a matrix showing watershed components and the corresponding regulatory agency. Table 5.2 lists the current regulatory controls applied by the cities and townships. Most of the local controls are in the form of city ordinances.

**Dakota and Scott Counties.** Dakota County townships have had municipal powers since the 1970s, when they became responsible for their own land use and zoning. The exception being that Dakota County has zoning authority in the shoreland and floodplain areas of the townships. Dakota County administers Ordinances No. 50 (Shoreland and Floodplain Management) and No. 113 (Individual Sewage Treatment Systems) in these areas. In Scott County, the County provides the land use and zoning function for townships. This Plan does not override the land use or zoning authority of either County in rural township areas.

**The Vermillion River Watershed Joint Powers Organization.** The VRWJPO does not currently operate a regulatory program and would prefer that the cities and townships continue to operate their regulatory programs in the future, rather than the VRWJPO. The local governments are to adopt the VRWJPO's goals, policies, and standards into their local water management plans and ordinances. The VRWJPO will take a leadership role in a process improvement effort to clarify expectations and opportunities for watershed management plans and local water management plans, and how these plans can be coordinated with the requirements of other programs (e.g., NPDES Phase II MS4 permit requirements). The VRWJPO goals are to: 1) achieve greater alignment among water-related planning requirements for local governments to avoid unnecessary duplication with other programs/requirements, 2) emphasize development and implementation of ordinances, and 3) use the local watershed plans to fill in gaps and address issues that cannot or do not need to be addressed through ordinances. Cities and townships must obtain approval of their local water management plans from the VRWJPO. When a plan is received by the VRWJPO, it will be reviewed for consistency with this Plan (see Section 7 for more information about local watershed management plans).

As specified in Section 4 of this Plan, the VRWJPO will set standards for water resource management that local governments within the Watershed will use to develop and implement their individual local water management plans and ordinances. These standards will be developed as a minor plan amendment to this Plan (Section 6.3.1 presents information about the minor plan amendment process). Following VRWJPO adoption of the minor plan amendment (estimated to be in early 2006), the VRWJPO will begin a rule-making process to implement the standards. During the rule-making process, the VRWJPO will:

1. Review existing local government ordinances to check for gaps between local standards and VRWJPO standards.
2. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, if the plans include any of the following conditions:
    - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more.

The VRWJPO estimates the VRWJPO rules will be adopted in December 2006, per the requirements of Minn. Stat. 103B.235, Subd. 4, which states that local governments will adopt and implement their plans within 120 days and will amend their official controls accordingly within 180 days. During the interim period between VRWJPO rule adoption and local government adoption of ordinances and controls (estimated to be between December 2006 and December 2007), the VRWJPO will:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that the local governments submit proposed land alteration plans to the VRWJPO for review and comment, if the plans includes any of the following conditions:
   - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
   - Diversions
   - Intercommunity flows (to or from)
   - Project site size of 40 acres or more
   - Other proposed activities, as identified in the VRWJPO rules.

The VRWJPO envisions three categories of permitting responsibility following adoption of the VRWJPO rules:

Category 1. VRWJPO responsible for permitting.
Category 2. Local governments responsible for permitting of certain proposed projects
Category 3. Local governments responsible for permitting, with VRWJPO permitting required under certain circumstances.

Following VRWJPO rule adoption, the VRWJPO will evaluate local government ordinances to determine if they match the VRWJPO rules. If a local government's ordinances are found to be insufficient (i.e., do not meet the VRWJPO rules), the VRWJPO will implement a permitting program in that community (Category 1).

If a local government incorporates the VRWJPO rules into its ordinances and controls, and demonstrates compliance with the VRWJPO rules, that local government will be responsible for all permitting (Category 2). However, the VRWJPO will require local governments responsible for permitting to submit proposed land alteration plans to the VRWJPO for review and approval or waiver or denial (VRWJPO permitting, Category 3), if they include any of the following conditions:

- Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Other proposed activities, as identified in the VRWJPO rules.

The submittal would be required prior to the community issuing a permit. The VRWJPO will enforce its permits and rules as allowed by Minnesota Statutes 103B and 103D. The VRWJPO may also evaluate local government permitting programs. If these evaluations show non-compliance with the VRWJPO's rules and/or the local government's ordinances, the VRWJPO will implement a permitting program in that local government.

The VRWJPO may establish special subtaxing districts to collect funds to cover its cost to implement the permitting program in communities where the VRWJPO has permitting authority. As an alternative to setting up special subtaxing districts, the VRWJPO will consider collecting permit fees to offset the costs of implementing the permitting program.

## 5.3 VRWJPO'S FINANCIAL MECHANISMS

Dakota and Scott Counties jointly fund the administration and activities of the VRWJPO per the Joint Powers Agreement. Based on tax capacity, Dakota County contributes 96.5% and Scott County contributes 3.5% of total VRWJPO management costs (the percentages may change somewhat as tax capacities change). Dakota and Scott Counties established special tax districts within their respective portions of the Vermillion River Watershed to provide a mechanism for funding their shares of the organization's costs. The following is a list of the funding mechanisms available to watershed management organizations, including a county-managed organization, with Minnesota Statute references where appropriate.

- Contributions from general fund of member agencies. There are no statutory limits. Counties may levy a tax for planning or projects identified in an approved plan. Counties may also levy amounts necessary to pay the costs to soil and water conservation districts to administer and implement projects (103B.241).
- Creation of watershed management tax districts by ordinance. Notification of new tax districts must be given to the county auditor by July 1 to be effective for taxes payable in the following year. After adoption of a tax district, taxes may be levied annually on all taxable property in the district to fund watershed projects. The tax may not exceed 0.02418% of market value of property in rural towns, unless allowed by resolution of the "town electors" (103B.245, Subd. 1).
- Levy. Levy for taxes is in addition to any other money levied and distributed in the tax district (103B.245, Subd. 3).
- Bonds. The tax district may issue bonds necessary to cover project costs. Bonds are to be repaid from tax proceeds raised in the district by the WMO. No election is required. Obligation is not included in the net indebtedness of the local government unit (103B.245, Subd. 4).
- General obligation bonds. Counties may also issue general obligation bonds to cover part or all of the costs of a project certified to the county (103B.251, Subd. 7).
- Grants. Grants may be pursued for certain qualifying projects.

**Table 5.1: Regulatory Framework**

| Agency | Type of Approval | Description |
|---|---|---|
| ***Federal*** | | |
| Environmental Protection Agency (EPA) | Clean Water Act | Works with other agencies to develop and enforce regulations under existing environmental laws, researches and sets national standards; delegates responsibility for permitting, monitoring and enforcing compliance to states and tribes; issues sanctions where national standards are not met. |
| U.S. Army Corps of Engineers (COE) | Section 10 of the Rivers and Harbors Act | Applies to placement of structures and/or work in, or affecting, navigable waters of the United States. |
| | Section 404 Permit | Applies to the discharge of dredged or fill material into waters of the United States. There are two types of Section 404 permits: regional and nationwide general permits, and individual permits. |
| ***State*** | | |
| Minnesota Department of Natural Resources (MDNR) | Protected Waters and Wetlands Permit | Applies to any work that will alter the course, current or cross-section of any DNR-protected lake, wetland or watercourse; also applies to any work below the ordinary high water mark of DNR-protected waters. |
| | Water Appropriation Permit | Applies to suppliers of domestic water to more than 25 people or for any use that exceeds 10,000 gallons per day or 1,000,000 gallons per year. |
| | Fisheries | Manages the State's fisheries; responsible for trout stream designations. |
| | Dam Safety Permit | Applies to impoundments that pose a potential threat to public safety or property. Dams 6 feet high or less and dams that impound 15 acre-feet of water or less are exempt from the rules. Dams less than 25 feet high that impound less than 50 acre-feet of water are also exempt unless there is a potential for loss of life. |
| | Riprap Shore Protection Permit | Applies to the placement of riprap shore protection or placement of fill to recover shoreland lost to erosion. |
| Minnesota Environmental Quality Board (EQB) | EAWs, EISs, AUARs | Broad environmental assessment required for certain proposed developments and other activities. |

**Table 5.1: Regulatory Framework**

| Agency | Type of Approval | Description |
|---|---|---|
| Minnesota Pollution Control Agency (MPCA) | State Discharge System/National Pollutant Discharge Elimination System (NPDES) Permit | Applies to all discrete sources of wastewater discharge to surface waters, including sanitary wastewater, process wastewater, etc. |
| | NPDES General Stormwater Permit for Construction Activities | Applies to construction activities that disturb 1 or more acres of land. Requires preparation of a stormwater pollution prevention plan with appropriate BMPs for erosion and sediment control, and stormwater management. |
| | NPDES General Industrial Stormwater Permit | Applies to certain industrial/ commercial activities that come into contact with stormwater. Requires preparation of stormwater pollution prevention plan. |
| | NPDES Phase II MS4 Storm Water Permit | Applies to municipal separate storm sewer systems (MS4s) serving populations under 100,000 located in urbanized areas. Requires cities to develop and implement a stormwater pollution prevention program (SWPPP). The SWPPP must cover the following six minimum control measures:<br>• Public education and outreach<br>• Public participation/involvement<br>• Illicit discharge, detection and elimination<br>• Construction site runoff control<br>• Post-construction site runoff control<br>• Pollution prevention/good housekeeping |
| | Section 401 of the Clean Water Act Water Quality Certification | Applies to activities that require either a Corps of Engineers Section 10, Corps of Engineers Section 404 or Federal Energy Regulatory Commission permit. These activities must first obtain Section 401 water quality certification. |
| | Feedlots | The MPCA issues permits for feedlots over 1,000 animal units and provides enforcement action for violations under Minn. Rules Chapter 7020. |
| Minnesota Department of Agriculture (MDA) | Pesticides and fertilizers | Lead on all pesticide and fertilizer regulatory functions, develops guidelines for soil amendments and nutrient management. |

**Table 5.1: Regulatory Framework**

| Agency | Type of Approval | Description |
|---|---|---|
| Minnesota Department of Health (MDH) | Well Management Program | Applies to drilling of new water wells and sealing of abandoned water wells. |
| | Safe Drinking Water Act | Applies to construction of new water wells and other public water supply systems. |
| Minnesota Board of Water and Soil Resources (BWSR) | Watershed Plans | The BWSR reviews and approves county groundwater protection plans, watershed plans and county comprehensive water plans; administers the rules for the MN Wetland Conservation Act (WCA); oversees watershed organizations and Soil and Water Conservation Districts. |
| ***Regional*** | | |
| Metropolitan Council | Wastewater | Collects and treats wastewater; operates 4 wastewater treatment plants in Dakota County; is working with another plant in Scott County. |
| ***Local Government Units [Counties (Dakota and Scott), Townships, and Cities]*** | | |
| Local Government Units | Wetland Conservation Act Rules Administration | Regulates draining and filling of wetlands larger than 2,000 square feet. Requires 2:1 replacement of drained and filled wetlands. (See also Table 5.2.) Scott County Zoning Ordinance Chapter 6 addresses stormwater management, erosion control and wetlands. |
| Counties | Feedlots | The Counties are MPCA delegated feedlot permitting counties and issue permits for feedlots up to 1,000 animal units. The Counties also register feedlots and are responsible for other feedlot permitting and inspection duties under Minn. Rules Chapter 7020.1600. Scott County Zoning Ordinance Chapter 9 addresses feedlots |
| Counties and Cities | Shoreland and Floodplain | The Counties administer shoreland and floodplain regulations in unincorporated areas (Dakota County Ordinance No. 50, Scott County Zoning Ordinance Chapters 70 and 71); the cities administer their own regulations. |
| Cities | Overall water management | For the most part, every city develops and enforces ordinances addressing erosion and sediment control, floodplain protection and easements, shoreland protection, and wetland management programs. |
| Counties | ISTS | Dakota County administers County ISTS regulatory Ordinance No. 113. Scott County administers ISTS Ordinance No. 4. |

**Table 5.1: Regulatory Framework**

| Agency | Type of Approval | Description |
|---|---|---|
| Counties | Wells | Dakota County administers County well and water supply Ordinance No. 114 that sets standards and establishes guidelines and regulations for wells and water supplies; County authority is delegated by the State. Dakota County administers the County's groundwater model. |

## Table 5.2: Local Regulatory Controls (as of June 2005)

| Cities and Townships | Erosion and Sediment Control | Floodplain Regulations | | | Stormwater Rate and Water Quality | | | | Shoreland Protection | Local SWMP | Wetland Conservation Act | | | Street Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freeboard | Floodway Protection | Easements | Rate Control | NURP Ponding | Pond Maintenance Agreements | Easements | DNR+ Approved Ordinance | VRWMC Approved | Wetland Management Program (BWSR) | Wetland Classification | LGU | Street Width Ordinance |
| Apple Valley* | | | | | | | | | Yes (old) | | | | | |
| Burnsville | Yes | Yes-1 ft | Yes | No | Yes | Yes | No | Yes | Yes (new) | Yes | Yes | Yes | City | Yes |
| Castle Rock Twp | See Dakota County | | | | | | | | | | | | | |
| Coates | | | | | | | | | | | | | | |
| ***Dakota County*** | No | Yes-1 ft | Yes | No | No | No | No | No | Yes (new) | -- | No | No | Townships | No[1] |
| Douglas Twp | See Dakota County | | | | | | | | | | | | | |
| Elko* | Yes | Yes[2] | No[3] | Yes | Yes | Yes | Yes[4] | Yes | No | No | No | Yes | City | Yes |
| Empire Twp | See Dakota County | | | | | | | | | | | | | |
| Eureka Twp | | | | | | | | | | | | | | |
| Farmington | Yes | Yes-1ft | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | City | Yes[5] |
| Hampton | | | | | | | | | | | | | | |
| Hastings | | Yes-1 ft | Yes | | | | | | Yes (old) | | | | | |
| Lakeville | Yes | Yes-1 ft | Yes | Yes | Yes | Yes | Yes | Yes | Yes (new) | Yes | Yes | Yes | City | No[6] |
| Marshan Twp | See Dakota County | | | | | | | | | | | | | |
| New Market* | Yes | Yes[2] | No[3] | Yes | Yes | Yes | Yes[4] | Yes | No | No | No | Yes | City | Yes |
| Nininger Twp | See Dakota County | | | | | | | | | | | | | |
| Ravenna Twp | See Dakota County | | | | | | | | | | | | | |
| Rosemount | Yes | Yes-1 ft | Yes | Yes | Yes | Yes | Yes | Yes | Yes (old) | Yes | Yes | Yes | City | No[7] |
| ***Scott County*** | Yes | Yes-1 ft | Yes | Yes | Yes | Yes | Yes | Yes | Yes (new) | -- | No | No | Twp | Twp |
| Vermillion | | | | | | | | | | | | | | |
| Vermillion Twp | See Dakota County | | | | | | | | | | | | | |

NA Not available
NURP Nationwide Urban Runoff Program
SWMP Surface Water Management Plan
BWSR Board of Water and Soil Resources
LGU Local Governmental Unit

* Apple Valley, Elko, and New Market do not participate in the National Flood Insurance Program (NFIP). No flood insurance study has been performed in these communities and no regulatory flood plain exists.
+ "Old" is original shoreland regulations circa 1972 while "new" reflects adoption and state approval of revised shoreland rules from 1989.

[1] Dakota County has access and spacing guidelines along County roads.
[2] One foot is required, but will request 2 feet when possible.
[3] No delineated floodway within this city.
[4] City is responsible once project is approved (usually when project is near completion, 1-2 years), until then developer is responsible.
[5] Ordinance is inconsistent; will be looking to improve consistency. City will consider smaller streets on a case-by-case basis.
[6] Street widths are regulated by a City ordinance that is set up according to road type. City will consider smaller streets if warranted.
[7] There is no ordinance regarding street widths; however, typical guidelines are set forth in an official specification book published by the City. The City will also consider smaller street width under special circumstances.

# 6.0 VRWJPO PLAN REVIEW, ADOPTION, UPDATE, AND REVISION

## 6.1 VRWJPO PLAN REVIEW, APPROVAL AND ADOPTION

During development of the VRWJPO Plan, prior to its submittal for formal review, the VRWJPO accomplished outreach to the public, agencies and other organizations through the following mechanisms:

- September 2003 open house for public, agencies and organizations
- Five Technical Advisory Group (TAG) meetings in 2003 and 2004. The following agencies, units of government, and organizations were invited to the TAG meetings:

| **Cities:** | **Townships:** | **Federal/State/Regional Agencies:** |
|---|---|---|
| Apple Valley | Castle Rock | U.S. Corps of Engineers |
| Burnsville | Douglas | Metropolitan Council |
| Coates | Empire | MN Board of Water and Soil Resources |
| Elko | Eureka | MN Dept. of Agriculture |
| Farmington | Hampton | MN Dept. of Health |
| Hampton | Marshan | MN Dept. of Natural Resources |
| Hastings | New Market | MN Dept. of Transportation |
| Lakeville | Nininger | MN Pollution Control Agency |
| New Market | Ravenna | Natural Resource Conservation Service |
| Rosemount | Vermillion | |
| Vermilion | | **Other Local Units of Government:** |
| | **Other Organizations:** | Dakota County Environmental Mgmt. Dept. |
| | Friends of the Mississippi River | Dakota Co. Soil & Water Conservation Dist. |
| | MN Farm Bureau | Scott County Natural Resources Dept. |
| | Sierra Club | Scott Co. Soil & Water Conservation Dist. |
| | | Elko/New Market Joint Sewer Board |

- Presentations at Dakota County Township Officers meetings in 2003 and 2004
- VRWJPO website (www.co.dakota.mn.us/planning/vermillionjpo) provides information to the public and provided opportunities to comment on portions of the draft Plan
- The Friends of the Mississippi River and members of the Vermillion River Watershed Planning Commission facilitated public outreach meetings regarding the Vermillion River watershed in the Apple Valley and Farmington areas in 2004

The Vermillion River Watershed Planning Commission (WPC) was instrumental in developing the preliminary draft of the VRWJPO Plan. Section 5.1 of this Plan provides more information about the WPC.

As part of the formal review process, and in accordance with Minnesota statutes, this Plan was submitted for review to the cities and townships within VRWJPO, Dakota County, Dakota County Soil and Water Conservation District, Scott County, Scott County Soil and Water Conservation District, the Minnesota Board of Water and Soil Resources (BWSR), the Minnesota Pollution Control Agency (MPCA), the Minnesota Department of Natural Resources (DNR), the Minnesota Department of Agriculture, the Minnesota Department of Health (MDH), and the Metropolitan Council. In addition, this Plan was submitted to all of the other agencies and organizations that are part of the TAG (see above listing) and to the adjoining watershed management organizations.

During the first (60-day) formal review period, the VRWJPO held open houses/workshops throughout the watershed and gave presentations (as invited) to the cities and townships within the watershed. Through these open houses/workshops and presentations, the VRWJPO provided information about the VRWJPO and the Plan, and requested comments on the Plan.

After the 60-day formal review period, the VRWJPO held a public hearing on the Plan. After further revisions to the Plan, it was submitted for its second formal review, then revised again and submitted to BWSR for its final review and approval. BWSR approved the Plan on **[insert date]**, indicating that the Plan met all the requirements of current Minnesota laws and rules (Minnesota Statutes 103B.231 and 103D.405 and Minnesota Rules 8410). The VRWJPO Joint Powers Board formally adopted this Plan on **[insert date]**.

## 6.2 PLAN UPDATE

This Plan will guide VRWJPO activities through at least 2015, unless it is superseded by adoption and approval of a subsequent Plan. Approximately two years prior to the expiration date of this Plan (in 2013), VRWJPO will begin the process of updating its Plan. The updated Plan will meet the requirements of the applicable Minnesota laws and rules.

BWSR may develop a priority schedule for the revision of watershed management plans (Minnesota Statutes 103B.231, Subd. 3a). BWSR will use the schedule to inform VRWJPO and other watershed management organizations in the Twin Cities metropolitan area of when they will be required to revise their plans. Based on Minnesota Statutes 103B.231, the VRWJPO may submit a draft plan revision for review prior to BWSR's scheduled plan revision date. If BWSR fails to begin review of the submitted plan within 45 days of plan submittal, the VRWJPO may adopt and implement their plan without formal BWSR approval.

## 6.3. PLAN REVISIONS/AMENDMENTS

The VRWJPO may revise its Plan through an amendment prior to a Plan update if either minor changes are required, or if problems arise that are not addressed in the Plan. However, this Plan, authorities, and official controls of the VRWJPO will remain in full force and effect until a Plan revision is approved by BWSR.

All amendments to this Plan will follow the procedures set forth in this section, or as required by Minnesota laws and rules (as revised). Plan amendments may be proposed by any person to the VRWJPO Joint Powers Board, but only the VRWJPO Joint Powers Board may initiate the amendment process.

Neither a minor nor a general plan amendment will be required for the following situations:

1. The capital projects, annual activities, or studies listed in Table 5-1 are implemented at a different time than shown in the table;
2. When the VRWJPO initiates a capital project listed in Table 8-1 and the updated cost estimate is
   a. no more than $500,000
   *or*
   b. more than $500,000 and less than 80% higher than the estimated costs shown in Table 8-1 (as annually adjusted);
3. Implementation of a capital project discussed in the Plan, but not listed in Table 8-1 and the estimated cost of the capital project is less than $500,000;
4. The estimated activity/study costs are different than shown in Table 5-1;
5. The VRWJPO adds or deletes non-capital activities and/or studies to/from Table 5-1 . Such additions or deletions will be proposed, discussed and adopted as part of the VRWJPO's annual budgeting process (see Section 5 – Implementation for more information); and
6. The proposed funding method (or combination of methods) for a capital improvement project listed in Table 5-1 is different than shown in the table (e.g. watershed-wide tax instead of subwatershed tax). In this situation, VRWJPO will hold a public hearing on the proposed change to the funding method.

If an amendment is needed, the VRWJPO will prepare plan amendments in a format consistent with Minnesota Rules 8410.0140, Subp. 4, unless a different format is approved by BWSR. The rule requires that, unless the entire document is reprinted, all amendments adopted must be printed in the form of replacement pages for the Plan, each page of which must:

1. Show deleted text as stricken and new text as underlined (for draft amendments under consideration):
2. Be renumbered as appropriate; and
3. Include the effective date of the amendment.

The VRWJPO will maintain a distribution list of everyone who receives a copy of the Plan. Within 30 days of adopting an amendment, the VRWJPO will distribute copies of the amendment to everyone on the distribution list.

### 6.3.1 Minor Plan Amendments

The minor plan amendment process is more streamlined than the general plan amendment process. The VRWJPO will consider certain changes to its approved capital improvement program (Table 8-1, "capital improvements") to be minor plan amendments if both of the following conditions are met (from Minnesota Rules 8410.0140, Subp. 3):

1. The original Plan set forth the capital improvements but not to the degree needed to meet the definition of "capital improvement program" as provided in Minnesota law (Minnesota Statutes, Section 103B.205, subdivision 3. (The VRWJPO deems that the capital improvements listed in Table 8-1, along with the supporting sections of this Plan describing the need for the capital improvements and the financial impact of the improvements on local units of government, meet the definition of a "capital improvement program" as given in statute.)
2. The affected county or counties approve the capital improvement in its revised, more detailed form.

A minor plan amendment will be required for the following situations:

1. When the VRWJPO initiates a capital project listed in Table 8-1 and the updated cost estimate is more than $500,000 and increases by more than 80% of the cost shown in Table 8-1 (as annually adjusted).
2. Implementation of a capital project listed in Table 8-1 for which either no cost estimate is given and the estimated cost is more than $500,000, or no funding method is listed.
3. Addition of a new policy or significant revision of an existing policy that will require substantive revision of the VRWJPO rules and regulations. For example, the VRWJPO will be developing watershed standards that will be incorporated into the VRWPO Plan as a minor plan amendment. The standards development process will begin immediately with VRWJPO adoption of the minor plan amendment expected in 2006.

Minnesota Rules 8410.0020, Subp. 10 gives the following examples of other minor plan amendments:
"...recodification of the Plan, revision of a procedure meant to streamline administration of the Plan, clarification of the intent of a policy, the inclusion of additional data not requiring interpretation, or any other action that will not adversely affect a local unit of government or diminish a water management organization's ability to achieve its Plan's goals or implementation program."

By approving this Plan, BWSR agrees that the above types of plan revisions will require minor plan amendments (not general plan amendments), in conformance with Minnesota Rules 8410.0140.

The VRWJPO will follow the following review process for minor plan amendments:

1. The VRWJPO will send copies of the proposed minor plan amendment to the affected cities and townships, the Metropolitan Council, Dakota and Scott Counties (if the amendment is a minor amendment to the VRWJPO capital improvement program), and the state review agencies for review and comment.
2. The VRWJPO will hold a public meeting to explain the amendments and publish a legal notice of the meeting twice, at least 7 days and 14 days before the date of the meeting. The VRWJPO will also post the notice of the public meeting on the VRWJPO website and mail the notices to each affected city, township and county.

3. If the proposed amendment is a minor amendment to the VRWJPO capital improvement program, Dakota and Scott Counties must approve the minor amendment.

### 6.3.2 General Plan Amendments

If VRWJPO or BWSR decide that a general plan amendment is needed, the VRWJPO will follow the general plan amendment process described in Minnesota rules and laws (Minnesota Rules 8410.0140, Subp. 2 and Minnesota Statutes 103B.231, Subd. 11, or as subsequently amended). The general plan amendment process is as follows (and is the same as the Plan review process):

1. The VRWJPO must submit the amendment to the VRWJPO cities and townships, Dakota County, Scott County, Dakota County Soil and Water Conservation District, Scott County Soil and Water Conservation District, the state review agencies (the DNR, MPCA, Minnesota Department of Agriculture, and MDH), the Metropolitan Council, and BWSR for a 60-day review.
2. The VRWJPO must respond in writing to any concerns raised by the reviewers.
3. The VRWJPO must hold a public hearing on the proposed amendment.
4. The VRWJPO must submit the revised amendment to the Metropolitan Council, the state review agencies and the BWSR for a 45-day review.
5. The VRWJPO must submit the final revised amendment to the BWSR for approval.

The VRWJPO will consider sending drafts of proposed general plan amendments to all plan review authorities to receive input before beginning the formal review process.

Examples of situations where a general plan amendment may be required include:

- Addition of a capital improvement project that is not included in Table 8-1 is not mentioned in the text of this Plan, and the estimated project cost is more than $500,000.
- Addition of new VRWJPO policies or programs with the potential to result in significant financial impacts or controversy.

# SECTION 7: LOCAL WATER MANAGEMENT PLANS

## 7.1 VRWJPO PLAN RELATIONSHIP TO LOCAL WATER MANAGEMENT PLANS

In accordance with Minnesota law (Minn. Stat. Chapter 103B.235), once a watershed plan is approved and adopted, or amended, local units of government must prepare a local water management plan, capital improvement program and official controls as necessary to bring local water management into conformance with the watershed plan, within the time period prescribed in the watershed plan. The BWSR approved this Plan on October 26, 2005. Local governments (the communities within the VRWJPO) must adopt local watershed plans by November 3, 2007, two years from the date of adoption of the VRWJPO Plan. If a local government unit does not wish to be the permitting authority, the community may conform to this law by adopting all or part of this VRWJPO Plan by reference through a resolution or other VRWJPO-approved official means. If a local government unit wishes to continue as the permitting authority, the community must prepare its own local watershed plan. Any community may prepare its own local watershed plan and may incorporate any of the VRWJPO plan into the local watershed plan. Local watershed plans must conform to the VRWJPO Plan, Minnesota law (Minn. Stat. Chapter 103B), and Minnesota Rules (Minn. Rules 8410). Table 7-1 lists all of the cities and townships in VRWJPO, the other watersheds they lie within, and the dates by which they will be required to adopt local plans or the VRWJPO Plan by reference.

The VRWJPO will take a leadership role in a process improvement effort to clarify expectations and opportunities for watershed management plans and local water management plans, and how these plans can be coordinated with the requirements of other programs (e.g., NPDES Phase II MS4 permit requirements). The VRWJPO goals are to 1) achieve greater alignment among water-related planning requirements for local units of government to avoid unnecessary duplication with other programs/requirements, 2) emphasize development and implementation of ordinances, and 3) use the local watershed plans to fill in gaps and address issues that cannot or do not need to be addressed through ordinance.

Within 30 days of the VRWJPO‘s adoption of this 2005 VRWJPO Watershed Management Plan, the VRWJPO will notify each city and township of the VRWJPO’s requirements regarding local plan revisions and adoption. The VRWJPO will assist local governments in identifying the steps and information needed to meet the VRWJPO’s requirements for local watershed plans.

A local government unit can maintain as much management control as it wishes, through its approved local water management plan and local controls (e.g., ordinances). For example, a community can maintain the permitting authority for all land alteration activities. In this case, the VRWJPO would require the community to adopt all the VRWJPO standards/rules by ordinance and to outline the community’s permitting process, including the preliminary and final platting process in their local water management plan. Local government units are also responsible for permitting wetland alteration activities unless the community designates the VRWJPO as the Local Government Unit (LGU) for the Wetland Conservation Act. Even if a community continues its permitting role, the VRWJPO will require the community to occasionally submit to the VRWJPO for review and comment selected proposed land alteration plans

and associated documentation showing compliance to the VRWJPO and community rules and regulations. The submittal would be required prior to the community issuing a permit. The VRWJPO may appeal the community's approval of a project, if the VRWJPO believes the project is not consistent with the community's local water management plan.

Any proposed zoning changes in a community with an approved local water management plan will be reviewed by the VRWJPO for conformance with the local plan. If the proposed zoning change will result in changes to the approved rates and volumes of stormwater runoff, the local plan will need to be amended, and the amendment reviewed and approved by the VRWJPO.

**Table 7.1: VRWJPO Cities and Townships, WMOs, and Required Dates of Local Plan**

| **City – (C) or Township (T)** | Watershed Management Organizations (WMOs) and Date/Expected Date of BWSR-Approved Plan | Required Plan Adoption Date |
|---|---|---|
| Apple Valley (C) | Vermillion River Watershed Joint Powers Organization (VRWJPO), 9/2005; Black Dog WMO (BDWMO), 5/2002 | 9/2007 |
| Burnsville (C) | VRWJPO, 9/2005; BDWMO, 5/2002; Lower Minnesota River Watershed District, 9/1999 | 9/2007 |
| Castle Rock (T) | VRWJPO, 9/2005; North Cannon River WMO (NCRWMO), [10/2003] | 9/2007 |
| Coates (C) | VRWJPO, 9/2005 | 9/2007 |
| Douglas (T) | VRWJPO, 9/2005; NCRWMO, [10/2003] | 9/2007 |
| Elko (C) | VRWJPO, 9/2005; Scott Watershed Management Organization (Scott WMO), 2/2004 | 9/2007 |
| Empire (T) | VRWJPO, 9/2005 | 9/2007 |
| Eureka (T) | VRWJPO, 9/2005; NCRWMO, [10/2003] | 9/2007 |
| Farmington (C) | VRWJPO, 9/2005 | 9/2007 |
| Hampton (C) | VRWJPO, 9/2005 | 9/2007 |
| Hampton (T) | VRWJPO, 9/2005; NCRWMO, [10/2003] | 9/2007 |
| Hastings (C) | VRWJPO, 9/2005; Lower St. Croix Valley Watershed Management Organization, [early 2005?] | 9/2007 |
| Lakeville (C) | VRWJPO, 9/2005; BDWMO, 5/2002 | 9/2007 |
| Marshan (T) | VRWJPO, 9/2005 | 9/2007 |
| New Market (C) | VRWJPO, 9/2005; Scott WMO, 2/2004 | 9/2007 |
| New Market (T) | VRWJPO, 9/2005, Scott WMO, 2/2004 | 9/2007 |

| | | |
|---|---|---|
| Nininger (T) | VRWJPO, 9/2005 | 9/2007 |
| Ravenna (T) | VRWJPO, 9/2005 | 9/2007 |
| Rosemount (C) | VRWJPO, 9/2005 | 9/2007 |
| Vermilion (C) | VRWJPO, 9/2005 | 9/2007 |
| Vermillion (T) | VRWJPO, 9/2005 | 9/2007 |

## 7.2 REQUIREMENTS FOR LOCAL WATER MANAGEMENT PLANS

Local water management plans are required to conform to Minnesota Statutes Chapter 103B.235, Minnesota Rules 8410.0160, and the VRWJPO Plan. Minnesota Rules 8410.0160 requires (in part) that:

> "Each local plan must include sections containing a table of contents; executive summary; land and water resource inventory; establishment of goals and policies; relation of goals and policies to local, regional, state, and federal plans, goals, and programs; assessment of problems; corrective actions; financial considerations; implementation priorities; amendment procedures; implementation program; and an appendix. Each community should consider including its local plan as a chapter of its local comprehensive plan."

The rules (Minn. Rules 8410.0170) also explain in more detail the general requirements stated above.

The policies and goals established by the local water management plan must be consistent with the VRWJPO Plan. The section of the local water management plan covering assessment of problems must include those problems identified in the VRWJPO Plan that affect the community; this would include the problems identified in Section 3.

In accordance with Minnesota Rules 8410.0100, Subp. 6, the VRWJPO Plan assessed the stormwater-related maintenance issues in the Watershed. Local units of government are to maintain stormwater systems (storm sewers, ponding areas, ditches, water level control structures, etc.) under their jurisdiction in good working order to prevent flooding and water quality problems. In accordance with Minnesota rules (8410.0100, Subp. 6), the VRWJPO requires that local water management plans "…assess the need for periodic maintenance of public works, facilities and natural conveyance systems and specify any new programs or revisions to existing programs needed to accomplish its goals and objectives." Local water management plans will also be required to address, at a minimum, the following maintenance issues, also taken from Minnesota rules (8410.0100, Subp. 6):

- The need and frequency for street sweeping of public and private streets and parking lots.
- The need and frequency for inspecting stormwater outfalls, skimmers, sumps, and ponds.

- The adequacy of maintenance programs for stormwater facilities and water level control structures owned by both the city and private parties.
- The need for other maintenance programs as considered necessary.

In addition to the maintenance issues, the communities will be required to assess the following (taken from Minn. Rules 8410.0100, Subp. 6):

1. The need to establish a water body classification system different from the VRWJPO's or to adopt the VRWJPO water body classification system. If a different classification system is used, it will have to be correlated to the VRWJPO classification system and approved by VRWJPO;
2. The need to establish local spill containment clean-up plans; and
3. The need for any other necessary management programs.

Local water management plans must clearly identify when the management programs will go into effect.

The VRWJPO general standards for local water management plan content are as follows, and incorporate the requirements of Minnesota law (Minn. Stat. Chapter 103B.235, Subd. 2):

1. Describe existing and proposed physical environment and land use.
2. Define drainage areas, and the volumes, rates, and paths of stormwater runoff, including a map of the stormwater system.
3. Include or reference a map of the stormwater system that shows the drainage patterns, existing and proposed stormwater ponds, and stormwater outfalls.
4. Identify areas and elevations for stormwater storage adequate to meet the VRWJPO standards.
5. Identify normal elevations for stormwater storage adequate to meet the VRWJPO standards.
6. Identify areas where improvement measures are needed to address stormwater management and water quality issues.
7. Control of stormwater rates crossing municipal boundaries.
8. Define water quality and water quality protection methods adequate to meet VRWJPO standards.
9. Describe the local unit of government's roles and responsibilities for implementation of lake water quality and other lake management projects.
10. Identify regulated areas.
11. Set forth an implementation program, including a description of official controls and, as appropriate, a capital improvement program.
12. The local government unit's permitting process for land and wetland alteration work shall be outlined in the local water management plan. The VRWJPO reserves the right to recommend to the local government that a project that the VRWJPO considers to be inconsistent with the local management plan be denied. If the local government proceeds to approve such a project, the VRWJPO reserves the right to take legal action.
13. The local water management plan must describe the community's conformance with the U.S. Environmental Protection Agency's Storm Water Phase II National Pollutant Discharge Elimination System (NPDES) Rules for small municipal separate storm sewer

systems (MS4s). The local water management plan must either include the community's Storm Water Pollution Prevention Plan (SWPPP) or provide a summary of the SWPPP contents.

The Metropolitan Council requires cities to adopt stormwater management ordinances as part of their comprehensive plan updates. The Metropolitan Council's adopted "Interim Strategy to Reduce Nonpoint Source Pollution to All Metropolitan Water Bodies" includes three requirements:

1. Local governments must adopt design standards (such as Nation Urban Runoff Program (NURP)) for new stormwater ponds that will reduce pollutant loadings from stormwater runoff;
2. Local governments must follow the best management practices given in the Minnesota Pollution Control Agency's (MPCA) *Protecting Water Quality in Urban Areas* (2000), or an equivalent set of standards; and
3. Local governments must adopt the Department of Natural Resources' (DNR) shoreland regulations, as required by the DNR's priority phasing list.

The Metropolitan Council developed a model stormwater ordinance that addresses the first two requirements. The MPCA later developed a more comprehensive model stormwater ordinance that the Metropolitan Council encourages local units of government to adopt.

Other requirements for local water management plans are described in previous sections of the VRWJPO Plan.

## 7.3 VRWJPO REVIEW OF LOCAL WATER MANAGEMENT PLANS

Before a local unit of government adopts its local water management plan, the plan must be submitted to all of the affected watershed management organizations for review. The local unit of government must also submit its plan to the Metropolitan Council, and to any counties with adopted groundwater plans, for a 45-day review. Within 60 days of receipt of the local plan, the VRWJPO will review the local plan for conformance with the VRWJPO Plan. During its review, the VRWJPO will take into consideration any comments received from the Metropolitan Council and the counties. The VRWJPO will approve or disapprove all or part of the local plan within the 60-day time frame, unless the local government agrees to an extension. If the VRWJPO does not complete its review, or fails to approve or disapprove the plan within the allotted time, and the local government has not given an extension, the local plan will be considered approved (Minn. Rules 8410.0170, Subp. 12 and Minn. Stat. Chapter 103B.235, Subd. 3 and 3a).

Following VRWJPO approval of the local plan, the local unit of government must adopt and implement its plan within 120 days and amend its official controls within 180 days of plan approval. Each local unit of government must notify the VRWJPO (and the other affected WMOs) within 30 days of plan adoption and implementation, and adoption of necessary official controls.

Any amendments to the local plan must be submitted to the VRWJPO for review and approval prior to their adoption by the local unit of government. The VRWJPO review process for local plan amendments is the same as for the original local plan.

# SECTION 8: IMPLEMENTATION PROGRAM

The implementation program of this Plan includes capital improvement (structural) projects and non-structural activities (e.g., studies, monitoring). The implementation program identifies the specific projects, studies and other activities necessary to implement the VRWJPO goals and policies. Table 8.1 is a comprehensive list of the VRWJPO implementation program. The implementation program components will be funded as shown in Table 8.1 and in accordance with applicable State laws. Table 8.2 is a reorganization and summary of the activities in Table 8.1, showing the year-by-year estimated costs of the implementation program and the total estimated annual costs 2006-2015. The costs shown in Tables 8.1 and 8.2 are the potential VRWJPO costs. These costs could be offset by grants, cost sharing with other organizations, etc. Section 5.3 provides information about the VRWJPO financing of its implementation program.

The VRWJPO will follow the process outlined in the applicable Statutes for implementing proposed capital improvement projects. Typically, capital improvement projects begin with the preparation of a feasibility study and report on the proposed project. If the VRWJPO orders the project, plans and specifications are prepared, the funding mechanism is finalized, and the project is advertised for bid. If the funding mechanism changes for any of the capital improvement projects listed in Table 8-1, the VRWJPO will hold a public hearing on the proposed change to the funding method before ordering the project.

The capital improvement project costs in Table 8-1, expressed in 2004 dollars, will be adjusted annually in accordance with an inflation index (i.e., the Engineering News Record's Construction Cost Index). As stated in Section 6.3, the VRWJPO will consider certain increases in estimated project costs (as annually adjusted) to be consistent with the Plan and not require a minor or general plan amendment. If the cost of a capital improvement project in Table 8-1 increases by more than this amount, the VRWJPO will follow the minor plan amendment process before implementing the project (see Section 6.3 for more information regarding plan amendments).

Similarly, the VRWJPO may implement the activities and projects listed in Table 8-1 at a different time than shown in the table (e.g., year 2007 rather than 2009), as circumstances dictate. For example, the availability of grants and partnerships could result in either acceleration or delay of projects. The VRWJPO will consider such shifts in the time schedule to also be consistent with the Plan and not require a minor or general plan amendment (see Section 6.3 for more information regarding plan amendments).

The VRWJPO will consider any changes to estimated costs for monitoring activities, assessments, studies and other non-structural projects to be consistent with the Plan and not require a minor or general plan amendment (see Section 6.3 for more information regarding plan amendments).

As described in Section 5.2 of this Plan, the VRWJPO will use a minor plan amendment process to develop standards for water resource management in the Watershed. The VRWJPO considers standards development and the subsequent rule-making to be a very high priority for the Watershed, so the process will begin immediately. As noted in Section 5.2, the VRWJPO will be working with local governments during the rule-making process to incorporate the VRWJPO standards into their ordinances and other controls (e.g., assisting townships with development of a model ordinance, and review of existing city ordinances). During the rule-making process, the VRWJPO will:

1. Review existing local government ordinances to check for gaps between local standards and VRWJPO standards.
2. Require that local governments submit proposed land alteration plans to the VRWJPO for review and comment, if the plans include any of the following conditions:
   - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
   - Diversions
   - Intercommunity flows (to or from)
   - Project site size of 40 acres or more.

The VRWJPO estimates the VRWJPO rules will be adopted in December 2006, per the requirements of Minn. Stat. 103B.235, Subd. 4, which states that local governments will adopt and implement their plans within 120 days and will amend their official controls accordingly within 180 days. During the interim period between VRWJPO rule adoption and local government adoption of ordinances and controls (estimated to be between December 2006 and December 2007), the VRWJPO will, in LGUs without a Local Water Plan approved by the VRWJPO:

1. Work with local governments to revise/adopt their ordinances and other controls to incorporate the VRWJPO standards.
2. Assist the townships in developing a model ordinance that incorporates the VRWJPO standards.
3. Require that the local governments submit proposed land alteration plans to the VRWJPO for review and comment, if the plans includes any of the following conditions:
   - Variances from the local government's ordinances that affect surface water or impact surface water/groundwater interactions
   - Diversions
   - Intercommunity flows (to or from)
   - Project site size of 40 acres or more
   - Other proposed activities, as identified in the VRWJPO rules.

The VRWJPO envisions three categories of permitting responsibility following adoption of the VRWJPO rules:

Category 1. VRWJPO responsible for permitting.
Category 2. Local governments responsible for permitting
Category 3. Local governments responsible for permitting, with VRWJPO permitting required under certain circumstances

Following VRWJPO rule adoption, the VRWJPO will evaluate local government ordinances to determine if they match the VRWJPO Standards. If a local government's ordinances are found to be insufficient (i.e., do not meet the VRWJPO Standards), the VRWJPO will implement a permitting program in that community (Category 1).

If a local government incorporates the VRWJPO Standards into its ordinances and controls, and demonstrates compliance with the VRWJPO Standards, that local government will be responsible for all permitting (Category 2). The VRWJPO will require local

governments responsible for permitting to submit some proposed land alteration plans to the VRWJPO for review and comment each year through a VRWJPO evaluation program. Land alteration plans with the following condition are particularly important to the VRWJPO for review:

- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Project that are adjacent to or appear to impact major waterways or unique natural resources

All land alteration plans that require an amendment to or a variance from the adopted Local Water Plan must be submitted to the VRWJPO for review and approval or denial as prescribed by Minn. Stat. 103B.211.
The VRWJPO will enforce its permits and rules as allowed by Minnesota Statutes 103B and 103D. The VRWJPO may also evaluate local government permitting programs. If these evaluations show non-compliance with the VRWJPO's Standards and/or the local government's ordinances, the VRWJPO will implement a permitting program in that local government.

The VRWJPO may establish special subtaxing districts to collect funds to cover its cost to implement the permitting program in communities where the VRWJPO has permitting authority. As an alternative to setting up special subtaxing districts, the VRWJPO will consider collecting permit fees to offset the costs of implementing the permitting program.

**Table 8-1 Explanatory Information**

The tasks in Table 8-1 (Implementation Table) are broken down into the following headings and subheadings:

Administrative/Managerial
Subheadings:

AA – Providing or Assisting with Finding Funds
AC – Conducting Evaluations and Formulating Policy
AD – Regulatory, Review and Intervention
AE – Coordination with Agencies
AF – Coordination with Counties, Cities and Townships

Feasibility/Preliminary Studies (S)
Capital Projects (CP)
Education and Public Outreach (EA)
Inventory and Assessment (IA)
Monitoring and Data Analysis (MA)

## Table 8-1

## IMPLEMENTATION PROGRAM
## Vermillion River Watershed Joint Powers Organization

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand^) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| **Administrative / Managerial (AA) Providing or Assisting with Finding Funds** | | | | | | | | |
| AA | 1 | Encourage public and non-public water suppliers to institute phased water conservation techniques through education, monitoring, and development and implementation of standards by 2008. VRWJPO will provide assistance to public and non-public water suppliers to develop standards by 2007. | 4.3, 2/4 | 3 | 2.5 | | L, V, S, N | 2007 - Initial<br>2008-2013 - Annual |
| AA | 2 | Enhance local units of governments' efforts to inventory failing and non-compliant septic systems and to jointly prioritize areas for septic system upgrades. | 4.3, 3/7 | 20 | 25 | | L, V, S | 2006 – Initial<br>2007-2015 Annual |
| AA | 3 | Support and/or assist local governments in the development of wetland protection ordinances. | 4.4, 2/1 | 10 | 7.5 | | L, V, S | 2006 - Initial<br>2007-2008 - Annual |
| AA | 4 | Provide support to local communities to continue the Wetland Health Evaluation Program. | 4.4, 6/3 | | 20 | | V, L | Annually |
| AA | 5 | Provide annual funding to leverage other funds and collaborate with other entities on recreational/natural resource protection and enhancement studies and projects. | 4.7, 5/1 | | 5 | | V, L, S, F, N | Annually |
| AA | 6 | Support community efforts to create a continuous trail system along the Vermillion River and its major tributaries. (Note: VRWJPO support will not include funding for trail construction.) | 4.7, 5/6 | | 2 | | L, S, F, N, (V) | Annually |
| **Conducting Evaluations and Formulating Policy (AC)** | | | | | | | | |
| AC | 1 | Determine appropriate responsibilities in implementing load reduction measures identified in TMDL studies. | 4.1, 1/2 | | 5 | | S, L, V, F | 2006-2011 |
| AC | 2 | Determine how to best expand and enhance water quality monitoring in the Watershed. | 4.1, 2/1 | | 1 | | V, S, F, L, N, | 2006-2010 |

* V=Vermillion River Watershed Taxing District L=Local or Regional Govt. S=State assistance/cost-share/grant F=Federal assistance/cost-share/grant N=Non-government org.
^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand^) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| AC | 3 | Develop a management framework for water bodies, based on existing statutory classifications, desired uses, existing conditions, and the priorities of the VRWJPO. | 4.1, 3/3 | 10 | 80 | | V, L, S | 2006 – Initial<br>2007-2008 - Annual |
| AC | 4 | Where water quality does not support desired uses, prepare subwatershed plans to meet required water quality. | 4.1, 3/4 | | | | | |
| AC | 5 | Determine appropriate stream buffer locations and widths according to priorities within each subwatershed, type of stream, and adjacent land use. | 4.1, 3/5.2 | 40 | 15 | | V, L, S, F, N | 2006 – Initial<br>2007-2008 - Annual |
| AC | 6 | Identify and prioritize recreational lakes that are the responsibility of the VRWJPO. | 4.1, 4/1 | 3 | | | V, L, S | 2006-2008 |
| AC | 7 | Review federal, State, and local agency programs and designation related to surface water quality and identify where additions or changes are needed. | 4.1, 5/1 | | 0.5 | | V, L, S | Annually |
| AC | 8 | In collaboration with state agencies and local units of government, lead effort to explore a watershed-based approach to NPDES Phase II MS4 permitting. | 4.1, 5/2 | | 20 | | V, L, S | 2006-2008 |
| AC | 9 | Monitor emerging technologies for protecting the cold-water fishery, including reducing thermal impacts to streams. | 4.1, 5/7 | | 1 | | S, V, N | 1-4 |
| AC | 10 | Establish and oversee stormwater management system maintenance standards for cities and townships within the Watershed. | 4.1, 6/1 | 5 | 5 | | V, L, S | 2007 - develop<br>2008-2015 - oversee |
| AC | 11 | Inventory individual NPDES point source permits in the Watershed. Identify the permits the VRWJPO should monitor. Review water quality standards for the identified NPDES permits. Determine if there are gaps between the permit standards and what the VRWJPO believes is needed to protect Watershed water resources. If there are gaps, develop recommendations and/or options for addressing the gaps/deficiencies, such as new water quality standards (e.g. thermal standards) to apply to these point sources. | 4.1, 7/1 | | 7 | | V, L, S | 2006-2008 |

* V=Vermillion River Watershed Taxing District L=Local or Regional Govt. S=State assistance/cost-share/grant F=Federal assistance/cost-share/grant N=Non-government org.
^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand^) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| AC | 12 | Develop a program to monitor streambank stability along the Vermillion River and its major tributaries (North Creek, South Creek, Middle Creek, South Branch, and Etter Creek). | 4.2, 1/4 | | 1.5 | | V, L, S | 2006-2008 |
| AC | 13 | Compile and update design and guidance documents for stormwater management within the Watershed. | 4.2, 2/3 | 10 | 5 | | S, L, V, N | 2006 – Initial<br>2007-2015 – Annual |
| AC | 14 | Address issues of cross-jurisdictional hydrology (e.g. Goodhue County, the Gun Club WMO, the Lower Mississippi WMO, and the Minnesota Zoo). | 4.2, 5/1<br>4.2, 5/2<br>4.2, 5/3 | 4 | 10 | | V, L | 2006-2010 |
| AC | 15 | Collaborate with other agencies to develop a groundwater monitoring system along the Vermillion River and at key areas within the Watershed to better understand surface water/groundwater interactions. | 4.3, 1/1 | 4 | 3 | | V, S, F, L | 2006-2008l |
| AC | 16 | Collaborate with other agencies to develop a water conservation guidance document and provide this guidance document to cities, agriculture-related agencies and other key water users or organizations. | 4.3, 2/2 | 10 | 1 | | V, S, F, N | 2008 – Initial<br>2009-2015 – Annual |
| AC | 17 | Develop a program to determine the most effective water conservation techniques for water supplies and local waters. | 4.3, 2/5 | | | | | |
| AC | 18 | In collaboration with others, develop a method and inventory abandoned well locations in key/sensitive areas. | 4.3, 3/10 | 2 | | | | 2006-2010 |
| AC | 19 | Identify priority strategies and objectives in both County Groundwater Protection Plans (e.g., defining groundwater recharge areas). | 4.3, 5/1 | 5 | 12.5 | | V, L, S, F | 2006 – Initial<br>2007-2010 Annual |
| AC | 20 | Develop a strategy/action that supports or corroborates the implementation of County Groundwater Protection Plan objectives, but that does not duplicate County efforts, and implement these actions (e.g., model ordinance to protect recharge areas). | 4.3, 5/2 | | | | | |

* V=Vermillion River Watershed Taxing District L=Local or Regional Govt. S=State assistance/cost-share/grant F=Federal assistance/cost-share/grant N=Non-government org.
^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand^) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| AC | 21 | Research the issue of infiltration impacts on groundwater and develop a consistent approach to protecting areas sensitive to groundwater contamination. | 4.3, 7/2 | 7 | 6 | | V, L, S | 2006 Initial<br>2007-2008 – Annual |
| AC | 22 | Identify priority wetland restoration project opportunities. | 4.4, 3/1 | 7 | 6 | | V, S | 2006 – initial<br>2007-2008 – Annual |
| AC | 23 | Evaluate fish and wildlife habitat areas to prioritize the acquisition of easements over floodplains. (See also Floodplain Objective 3, Action 4.) | 4.4, 4/4 | 4 | 3 | | S, F, N, V | 2006 – initial<br>2007-2008 – Annual |
| AC | 24 | Establish setback requirements for any structures allowed in the floodplain or flood zone. | 4.5, 2/3 | 1 | 0.5 | | L, S, V | 2006 – Initial<br>2007-2008 – Annual |
| AC | 25 | Create a policy to guide the proportion of local and Watershed financial contributions to flood storage projects (e.g., Farmington basin, serving more than one community). | 4.5, 3/2 | 2 | 1 | | V, L | 2006 – Initial<br>2007-2008 – Annual |
| AC | 26 | Identify locations where conservation plans are most needed, and in collaboration with others, assist landowners in completing conservation plans for these lands. | 4.6, 3/6 | 30 | 5.5 | | F, S, V, L, N | 2006 – Initial<br>2007-2015 – Annual |
| AC | 27 | Establish a task force of VRWJPO staff, citizens, and State, regional, and local agency/organization representatives to advise the VRWJPO on river corridor issues. | 4.7, 3/1 | | 0.5 | | V, L, S, N | 2008-2015 – Annual |
| AC | 28 | Encourage and sponsor preparation of a Vermillion River corridor recreational plan with the task force. The plan will identify priority areas and assess specific recreational uses and problems. | 4.7, 3/2 | | 12.5 | | V, L, S, N | 2007-2010 |
| AC | 29 | Lead process improvement effort to clarify expectations and opportunities for watershed management plans and local water management plans, and how to coordinate these plans with the requirements of other programs (e.g., NPDES Phase II MS4 permit requirements). | 7.1 | 10 | | | V | 2006 – Annual |

* V=Vermillion River Watershed Taxing District L=Local or Regional Govt. S=State assistance/cost-share/grant F=Federal assistance/cost-share/grant N=Non-government org.
^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand^) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| **Regulatory, Review, and Intervention (AD)** | | | | | | | | |
| AD Stds | 1 | Develop watershed standards for water quality, runoff rate and volume, including agricultural, rural residential, and urban runoff BMPs (and other watershed management standards, if needed), as a minor amendment to the VRWJPO Watershed Management Plan. | 4.1, 5/2<br>4.2, 2/2<br>4.6, 3/7 | 80 | 6 | | V, L, S | 2006 – Initial<br>2007-2015 – Annual |
| AD Stds | 2 | Review current water conservation standards and practices and develop water conservation standards for the Watershed by 2008. | 4.3, 2/1 | 10 | 1 | | V, L, S | 2008 – Develop<br>2008-2015 – Oversee |
| AD Rules | 3 | Develop, adopt and oversee official rules to implement the VRWJPO standards for water quality, runoff rate and volume, including agricultural, rural residential, and urban runoff BMPs (and other watershed management rules, if needed). | 4.1, 5/3<br>4.2, 2/4<br>4.6, 3/8 | 100 | 300 | | V, L, S | 2006-2007 – Develop2008-2015 – Monitor & Implement |
| AD | 4 | Review the status of lake water quality and management plans on at least a five-year basis as part of VRWJPO planning. | 4.1, 4/2 | | 1 | | V, L, S | Annually |
| AD | 5 | Following VRWJPO implementation of its rules for water quality, runoff rate and volume, and land disturbance runoff (and other watershed management rules, if needed), 1) review and audit the ordinances of the local units of government to determine if they match the VRWJPO rules; and 2) perform selected project reviews as informal audits of the local units of government's ordinances and permitting programs. | 4.1, 5/4<br>4.2, 2/5<br>4.6, 3/9 | 20 | 2.5 | | V, L, S | 2007 – Review2008-2015 – Audit |
| AD | 6 | Implement a permitting program in communities where the local unit of government's ordinances and other controls are found to be insufficient (i.e. do not meet the VRWJPO rules) or where a watershed program is determined to be more efficient and effective. Cost dependent on volume of watershed permitting. | 4.1, 5/4<br>4.2, 2/5<br>4.6, 3/9 | | 50 | | V, L | 2007-2015 |

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|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| AD | 7 | Set up special subtaxing districts or permit fees to collect funds to cover the VRWJPO's cost of implementing the permitting program in those communities where the VRWJPO has permitting authority. | 4.1, 5/4<br>4.2, 2/5<br>4.6, 3/9 | | 2.5 | | V, L | 2007-2010 |
| AD | 8 | Review NPDES permit applications, renewals, revisions, etc. and comment on aspects of the permit application that impact the water resources in the Watershed. Suggest additional or modified standards to MPCA, when/if appropriate. | 4.1, 7/4 | | 5 | | L, S, V | Annually |
| AD | 9 | Review annual monitoring reports of wastewater discharge facilities within the Vermillion River Watershed. | 4.1, 7/3 | | 3 | | S, L, V | Annually |
| AD | 10 | Provide runoff rate and volume oversight, guidance, and assistance to developers in planning and designing onsite water management practices. | 4.2, 2/1 | | 20 | | V, L, S | Annually |
| AD | 11 | Consider alternatives to upgrade septic-systems, including support of focused enforcement of ISTS requirements, in potential partnership with other units of government. | 4.3, 3/8 | | 5 | | V, L, S | 2006-2010 |
| AD | 12 | Review projects and plans with an awareness of sensitive habitats and communities, and rare species, as listed in this Plan or otherwise available (e.g., County Biological Survey or other biological inventories).<br>While conducting environmental reviews [e.g., Environmental Assessment Worksheets (EAW), Alternative Urban Area Reviews (AUAR) and Environmental Impact Statements (EIS)], the VRWJPO will evaluate the impacts of proposed and existing land uses on surface water and groundwater resources in the Watershed. | 4.4, 5/2<br>4.6, 1/1 | | 5 | | V, S, F, N | Annually |

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| AD | 13 | Review the status of local floodplain and shoreland ordinances to identify voids and potential enhancements. | 4.5,1/1 | 6 | 2.5 | | V, L, S | 2006-2008 – Review/Initial |
| AD | 14 | Work with local governments that lack adequate floodplain and shoreland ordinances to develop and adopt ordinances compatible with VRWJPO, County, and State requirements. | 4.5, 1/2 | | | | | 2007-2012Coordinate/Annual |
| **Coordination with Agencies (AE)** | | | | | | | | |
| AE | 1 | Actively participate in the TMDL process by participating in public meetings and liaison activities | 4.1, 1/1 | | 1 | | S, V, L, N | Annually |
| AE | 2 | Coordinate buffer configuration and acquisition efforts with the Dakota County Farmland & Natural Areas Program, the Scott County SWCD buffer program, and similar or related local, state, or federal programs. | 4.1, 3/5.3 | | 1 | | V, L, S, N | 2006-2010 |
| AE | 3 | Promote participation in existing local, State, and federal agriculture and conservation programs [e.g., Environmental Quality Incentives Program (EQIP), Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), MN Cost Share Program, Dakota County Farmland & Natural Areas Program, Conservation Security Program, Wildlife Habitat Incentives Program (WHIP), Farm and Ranch Lands Protection Program, Conservation Reserve Program (CRP)] and work with other agencies to identify rural areas needing the most assistance. | 4.2, 4/1 | | 2 | | V, S, N, F, L | Annually |
| AE | 4 | Work with the Minnesota Department of Natural Resources (MDNR) and Southwest Metro Groundwater Workgroup to address well interference and water appropriation issues in the Watershed. | 4.3, 2/7 | | 1 | | S, V, L | Annually |

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| AE | 5 | Work with the Minnesota Pollution Control Agency (MPCA) and local governments to develop watershed standards and requirements for community wells and septic systems. | 4.3, 3/2 | | 1 | | S, V, L | 2006-2010 |
| AE | 6 | Develop a model zoning ordinance to promote community wells and septic systems. | 4.3, 3/5 | | | | | |
| AE | 7 | Support Minnesota Department of Health (MDH) development of standards for pesticide degradates and mixtures. | 4.3, 3/9 | | 0.5 | | S, V, L, N | Annually |
| AE | 8 | Coordinate with conservation agencies and other organizations to supplement their fish and wildlife habitat protection and enhancement efforts and programs. | 4.4, 4/2 | | 0.5 | | S, V, N | Annually |
| AE | 9 | Coordinate habitat and wetland programs (e.g., a VRWJPO incentive program for wetland restoration, Dakota County's Farmland & Natural Areas Program, local wetland plans) to help produce a continuous corridor, especially along the Vermillion River and its major tributaries. | 4.4, 4/6 | | 0.5 | | S, V, L, N | Annually |
| AE | 10 | Assist State and local agencies in providing technical assistance to feedlot operators and other agricultural landowners whose operations are causing pollution problems. Assist agencies and/or feedlot operators and other agricultural landowners in obtaining grants to correct/mitigate pollution problems. | 4.6, 3/3 | | 0.5 | | S, V, L | Annually |
| AE | 110 | Along with appropriate State and local agencies, work with livestock owners to eliminate direct access by livestock to natural waterbodies (e.g., lakes, wetlands, rivers, streams). | 4.6, 3/11 | | 1 | | S, V, L | 2006-2010 |
| AE | 12 | Work with and support other agencies to address health and safety requirements in the River. | 4.7, 4/3 | | 0.5 | | S, V, L, N | Annually |

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| | | | | Initial | Annual | Capital | | |
| AE | 13 | Work with other governmental agencies and private landowners to increase public access to open space and the Vermillion River (e.g., Metropolitan Council through legislative park acquisition funding, Minnesota Department of Transportation to preserve ponding areas for future highway projects). | 4.7, 5/5 | | 1 | | S,V, N | Annually |
| AE | 14 | Request that the Minnesota Department of Natural Resources (MDNR) conduct an expanded fisheries survey of the water resources in the Watershed to better identify aquatic habitat issues and restoration opportunities. | 4.7, 5/7 | | | | S, V, N | 1-10 |
| AE | 15 | Request that the MDNR conduct creel surveys and access surveys of the River and other major water resources in the Watershed. | 4.7, 5/8 | | | | S, V, N | 1-10 |
| **Coordination with Counties, Cities, and Townships (AF)** | | | | | | | | |
| AF | 1 | Coordinate with cities, townships, and other agencies and groups to conduct an inventory of existing and desired uses for major water bodies within the Watershed. | 4.1, 3/1 | 10 | 2.5 | | S, V, N, L | 2006 – Initial<br>2007-2010 – Annual |
| AF | 2 | Implement the buffer program through requirement of local ordinances that mandate creation of buffers as part of approval of developments and land-disturbing activities. | 4.1, 3/5.5 | 8 | 1 | | L, V, S, N | 2006-2007 – Develop/Initial<br>2008-2015 – Oversee/Annual |
| AF | 3 | Work with local units of government to develop a management framework that assigns roles and responsibilities for implementation of lake management projects. | 4.1, 4/3 | | 0.5 | | L, S, V, N | Annually |
| AF | 4 | If problems or shortcomings exist, work with affected municipalities to address lake management problems through VRWJPO and local regulation. | 4.1, 4/4 | | | | | |

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| AF | 5 | Work with local units of government to incorporate the VRWJPO standards into their stormwater management plans, ordinances and other controls. Assist the townships with development of a model ordinance that incorporates the VRWJPO standards. Oversee implementation. | 4.1, 5/3<br>4.2, 2/4<br>4.6, 3/8 | 40 | 5 | | L, V, S, N | 2006-2007 – Develop/Initial<br>2008-2010 – Oversee |
| AF | 6 | Require local government stormwater management plans to include documentation adequate to ensure that urban runoff will meet VRWJPO water quality standards and not adversely affect the Vermillion River, its major tributaries and other waterbodies. | 4.1, 5/5 | | 1 | | L, S, V, N | 2007-2015 |
| AF | 7 | Require local governments to develop stormwater management plans and ordinances that ensure that the costs of constructing, operating, and maintaining stormwater management systems for new development are fairly allocated so as not to unduly burden local governments or the VRWJPO (development pays for itself). | 4.1, 5/6 | | 10 | | L, S, V, N | 2006-2007 |
| AF | 8 | Develop and implement an incentive program to encourage implementation of additional BMPs. | 4.1, 5/8<br>4.2, 2/6 | 10 | 20 | | V, L, S | 2008 – Develop/Initial<br>2009-2015 – Annual |
| AF | 9 | Work with local units of government to reduce nitrogen application rates in targeted area. | 4.3, 1/3 | | 1 | | L, V, S | 2008-2015 |
| AF | 10 | Encourage development of water conservation plans as required by the Minnesota Land Planning Act. | 4.3, 2/6 | | 0.2 | | S, L, V, N | Annually |
| AF | 11 | Require communities to adopt and implement an inspection program for septic systems within the Watershed. | 4.3, 3/6 | | .55 | | L, V, S | Annually |
| AF | 12 | Require that local government units in the Watershed ensure that all non-compliant Individual Sewage Treatment Systems (ISTS) located in wellhead protection areas be upgraded within five years. | 4.3, 6/1 | | 1 | | S, L, V | 2006-2010 |
| AF | 13 | Support the implementation of best management practices (BMPs) for wellhead protection areas. | 4.3, 6/2 | | 0.5 | | S, L, V | Annually |

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| AF | 14 | Encourage local government units to work with the Minnesota Department of Health (MDH) and Dakota and Scott Counties to periodically assess the vulnerability of groundwater used for drinking water supplies. | 4.3, 8/3 | | 0.5 | | S, L, V | Annually |
| AF | 15 | Support and/or assist local governments in the development and implementation of Comprehensive Wetland Management Plans. | 4.4, 1/1 | 40 | 1 | | L, V, S, N | 2006-2008 – Develop/Initial<br>2009-2015 – Implement/Annual |
| AF | 16 | Require communities to obtain conservation easements over critical habitat areas during development, possibly through a set-aside program. Critical habitat will be defined during the standards development process. | 4.4, 4/5 | | 0.5 | | V, S, L, N | Annually0 |
| AF | 17 | Require local stormwater management and wetland management plans to include known sensitive habitats and communities, and rare species, and take reasonable measures to avoid impacts to these areas. | 4.4, 5/1 | | 0.5 | | S, L, V, N | Annually |
| AF | 18 | Require local stormwater management plans to identify 100-year floodplains for all water bodies, and be consistent with the counties' revised FEMA floodplain maps. | 4.5, 2/2 | | 1 | | L, V, S | 2006-2008 |
| AF | 19 | Require local government units to obtain flood and drainage easements, easements for maintenance access and easements over emergency flow routes during development and/or building permit processes. | 4.5, 2/4 | | 1 | | L, V, S | 2006-2008 |
| AF | 20 | Coordinate with responsible government units to ensure that structures are properly located relative to the floodplain. | 4.5, 2/5 | | 0.5 | | | Annually |
| AF | 21 | Ensure that local governments require compensatory storage for new developments within the floodplain. | 4.5, 3/1 | | | | | |

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| AF | 22 | Assist local governments within the Watershed in developing criteria to consider potential off-site impacts of developments on water resources (e.g., how far downstream to evaluate, what types of problems to look for). | 4.6, 1/2 | | 0.5 | | V, L, S, N | Annually |
| AF | 23 | Work with local units of government to set standards for managing stormwater and culvert flows on road and other public improvement projects. | 4.6, 1/4 | 5 | | | V, L | 2008 |
| AF | 24 | Assist Dakota and Scott Counties in updating and maintaining their feedlot inventories. | 4.6, 3/1 | | 1 | | L, S, V | 2006-2010 |
| AF | 25 | Assist Dakota and Scott Counties, where appropriate, in implementing/administering their delegated county feedlot permitting programs. | 4.6, 3/2 | | 0.5 | | L, S, V | Annually |
| AF | 26 | Require communities to adopt stream corridor shoreland ordinances that comply with existing County and State ordinances, and comply with VRWJPO standards. | 4.7, 2/2 | 2 | 0.5 | | L, V, S | 2006 – Initial<br>2007-2015 – Annual |
| AF | 27 | Work with Dakota County to enhance the Dakota County Farmland & Natural Areas Program, and assist in developing a process to continue the program when the initial investment ends. | 4.7, 5/3 | | 1 | | L, V, N | Annually |
| AF | 28 | Work with local units of government to integrate the Dakota County Farmland and Natural Area Protection Program, greenway planning, and water resource protection into local comprehensive plans. | 4.7, 5/4 | | 1 | | V | 2007-2008 |
| **Feasibility / Preliminary Studies (S)** | | | | | | | | |
| S | 1 | Conduct or assist with TMDL or other water quality studies | 4.1, 1/1 | | 20 | | S, V, L, F, N | 2006-2010 |
| S | 2 | Conduct feasibility studies for water quality improvement projects identified in subwatershed plans. | 4.1, 3/4 | | 5 | | V, L, S, N | Annually |
| S | 3 | Conduct feasibility studies for restoring damaged stream banks at priority locations. | 4.2, 3/1 | 40 | 5.5 | | V, S, L, N | 2006 – Initial<br>2007-2015 – Annual |

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| S | 4 | Complete feasibility study that identifies sources of sedimentation in the Vermillion River and its major tributaries. | 4.2, 3/3 | 40 | | | V, L, S | 2008 |
| S | 5 | Conduct feasibility study or studies to identify the best means for addressing gully erosion problems in the Watershed. | 4.2, 6/2 | 40 | 5.5 | | V, L, S, N | 2006 – Initial<br>2007-2015 – Annual |
| S | 6 | Use collected data, identify needed research, and in partnerships with other entities, develop collaborative groundwater projects and programs [e.g., Hastings Area Nitrate Study (HANS) future phases, Vermillion River Headwaters Groundwater Study]. | 4.3, 1/6 | | 10 | | L, V, S, F, N | Annually |
| S | 7 | In collaboration with other entities, conduct feasibility studies for implementing groundwater projects. | 4.3, 1/7 | | 10 | | L, V, S, F, N | Annually |
| S | 8 | Conduct feasibility studies for implementing fish and wildlife habitat protection and enhancement projects. | 4.4, 4/3 | | 5 | | L, V, S, F, N | Annually |
| S | 9 | Conduct feasibility studies for implementing projects to produce a continuous wildlife corridor, especially along the Vermillion River and its major tributaries. | 4.4, 4/6 | | | | | |
| S | 10 | Determine how best to improve the visual quality of the River and main tributaries (e.g., through buffer acquisition, riparian plantings, shoreline restoration, acquisition and/or removal of structures that degrade the corridor). | 4.7, 2/4 | | 10 | | L, S, V, N, F | 2006-2010 |
| S | 11 | In collaboration with other entities, conduct feasibility studies for recreational/natural resource protection, enhancement, and accessibility projects. | 4.7, 5/1 | | 5 | | S, L, V, N, F | Annually |
| S | 12 | Conduct study to determine feasibility of regional flood control projects. | 4.5, 3/2 | | 10 | | L, V, F, S | Annually |
| **Capital Projects (CP)** | | | | | | | | |
| CP | 1 | Implement load reduction measures as identified in TMDL studies. | 4.1, 1/1 | | | 125/yr | S, V, L, N | 2008-2015 |

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| CP | 2 | Implement the buffer program through cost sharing with other voluntary programs. [Related to CP 17] | 4.1, 3/5.4 | | | 900/yr | V, S, F, N, L | 2007-2015 |
| CP | 3 | If problems or shortcomings exist, work with affected cities and tonwships to address lake management problems through implementation of capital projects. | 4.1, 4/4 | | | 55/yr | L, S, V, N | 2007-2015 |
| CP | 4 | Collaborate with Soil and Water Conservation Districts' (SWCD), federal, State and local programs to cost share for lake shore restoration projects undertaken by landowners. | 4.1, 4/5 | | | 10/yr | L, S, F, V | 2007-2017 |
| CP | 5 | Construct or sponsor construction of demonstration or research projects that show promise to reduce thermal impacts from stormwater runoff or otherwise protect the cold-water fishery. | 4.1, 5/7 | | | 40/yr | S, N, V, L | 2006-2010 |
| CP | 6 | Restore damaged stream banks at priority locations, taking advantage of partnerships and cost-sharing whenever possible. | 4.2, 3/1 | | | 100/yr | V, S, F, L, N | Annually |
| CP | 7 | Collaborate with Soil and Water Conservation Districts' (SWCD) federal, State and local programs to cost share for streambank restoration projects undertaken by landowners. | 4.2, 3/2 | | | | | |
| CP | 8 | Implement sediment removal projects based on results of feasibility study. | 4.2, 2/3 | | | 50/yr | V, :, S | 2009-2015 |
| CP | 9 | Seek opportunities to retrofit existing developments with low impact development techniques, in partnership with cities and other units of government. | 4.2, 3/4 | | | 50/yr | L, S, V, F, N | Annually |
| CP | 10 | In cooperation with other government entities, implement projects to address identified gully erosion problems in the Watershed. | 4.2, 6/2 | | | 30/yr | F, S, V, L | Annually |
| CP | 11 | In partnership with other entities, implement collaborative groundwater projects and programs [e.g., Hastings Area Nitrate Study (HANS) future phases, abandoned well sealing, Vermillion River Headwaters Groundwater Study]. | 4.3, 1/6 | | | 30/yr | L, S, F, V | Annually |

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| CP | 12 | Utilize or develop a cost-share or loan program to implement septic system upgrades within the Watershed, in potential partnership with the counties, Community Development Agencies, MPCA, etc. | 4.3, 3/8 | | | 53/yr | L, V, S | 2007-2015 |
| CP | 13 | Implement priority wetland restoration projects.<br>Provide financial and other incentives to landowners and local units of government for wetland restoration projects. | 4.4, 3/2 | | | 89/yr | S, F, V, L, N | 2007-2015 |
| CP | 14 | Coordinate with other agencies and organizations to develop or enhance wildlife habitat corridors that connect open space, stream corridors, lake buffers, wetland buffers and stormwater management facilities. (See also Surface Water Quality Objective 3, Action 6.) | 4.4, 4/1 | | | 22/yr | S, F, L, V, N | 2007-2015 |
| CP | 15 | Implement fish and wildlife habitat protection and enhancement projects. | 4.4, 4/3 | | | | | |
| CP | 16 | Implement projects to help produce a continuous wildlife corridor, especially along the Vermillion River and its major tributaries. | 4.4, 4/6 | | | | L, V, F, S | |
| CP | 17 | Cost-share on regional floodplain projects. | | | | 44/yr | | 2007-2015 |
| CP | 18 | Establish a funding program to obtain easements within floodplains. [575 acres (5% of FEMA floodplain areas) at $6000/acres] [Related to CP-2] | 4.5, 3/3 | | | 383/yr | V, L, S, F, N | 2007-2015 |
| | | | | | | | | |

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| CP | 19 | Assist in implementing cropland conservation practices in targeted areas, through incentive programs, cost share programs, and other measures (such as purchase of no-till drills). The VRWJPO's assistance will be focused on innovative/non-traditional agricultural erosion control measures, such as:<br>• No-till practices<br>• Residue management practices<br>• Temporary cover crop plantings to provide erosion control from fall through spring (harvest through planting) | 4.6, 3/6 | | | 25/yr | F, S, V, N | 2007-2015 |
| CP | 20 | Work with State and local agencies to provide local, State and federal cost-share money to landowners implementing agricultural non-point source pollution BMPs. | 4.6, 3/10 | | | 55 | V, S, F, N | 2007-2015 |
| CP | 21 | Improve the visual quality of the River and main tributaries through buffer acquisition, riparian plantings, shoreline restoration, acquisition and/or removal of structures that degrade the corridor. [Costs covered under other projects.] | 4.7, 2/5 | | | | L, V, S, N | 2007-2015 |
| CP | 22 | Work with the Minnesota Department of Natural Resources (MDNR) and landowners to remove dangerous impairments to river navigation (e.g., fallen trees that pose a danger, electrified and other fences). | 4.7, 4/2 | | 2 | | S, L, V | Annually |
| CP | 23 | In collaboration with other entities, implement recreational/natural resource protection, enhancement and accessibility projects. | 4.7, 5/1 | | | 11/yr | | 2007-2015 |
| CP | 24 | Explore and implement appropriate natural resource protection partnership opportunities [e.g., Dakota County Farmland & Natural Areas Program, southeast Minnesota Conservation Reserve Enhancement Program (CREP), etc.] | 4.7, 5/2 | | | 20/yr | L, F, S, V, N | Annually |
| **Education and Public Outreach (EA)** | | | | | | | | |
| EA | 1 | Prepare and make available educational materials related to TMDL studies and load restrictions. | 4.1, 1/1 | | 1 | | S, L, V | Annually |

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| EA | 2 | Make runoff and pollution data available via website or other means, and summarize data for public information purposes. | 4.1, 2/6 | | 2.5 | | V, S, L | Annually |
| EA | 3 | If problems or shortcomings exist, work with affected cities and townships to address lake management problems through the development of educational programs and materials. | 4.1, 4/4 | | 0.5 | | V, L, S | Annually |
| EA | 4 | Collaborate with other agencies to provide rural best management practices (BMP) information in targeted rural areas. | 4.2, 4/2 | | 1 | | V, S, L, F, N | Annually |
| EA | 5 | Implement an educational campaign to distribute Watershed water conservation standards and monitoring requirements to public and non-public water suppliers by 2006. | 4.3, 2/3 | 10 | 1 | | L, V, S | 2006 – Initial<br>2007-2015 – Annual |
| EA | 6 | Encourage local governments and rural subdivision developers to install community wells and septic systems, when feasible, as a method to reduce pollution potential and improve groundwater resource management; include educating developers and local government representatives as a part of this action. | 4.3, 3/1 | | | | | |
| EA | 7 | If requested, provide education to local governments, residents, school groups, and others regarding the hydrologic cycle, groundwater, groundwater/surface water interactions, groundwater recharge areas, and groundwater conservation. | 4.3, 2/8 | | 0.5 | | V, L, S, N | Annually |

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| EA | 8 | Work with LGUs and others to develop an information piece about wells and septic systems to distribute to developers and well and septic contractors. | 4.3, 3/3 | | 2 | | L, S, V, N, F | Annually |
| EA | 9 | Educate land use authorities about community wells and septic systems. | 4.3, 3/4 | | | | | |
| EA | 10 | Assist counties in developing and distributing general well and well sealing information, or distribute existing information pieces, and identify opportunities to make landowners aware of general well information and well sealing programs. | 4.3, 4/1 | | | | | |
| EA | 11 | Develop (or assist in developing) and distribute information on groundwater protection areas. The VRWJPO will use existing information and modify/create new information only if necessary. | 4.3, 7/1 | | | | | |
| EA | 12 | Provide groundwater monitoring data/information and use the data/information to develop targeted educational messages. | 4.3, 8/1 | | | | | |
| EA | 13 | Work with partners to develop a distribution strategy to get the best groundwater protection information to the right public and private sector groups. | 4.3, 8/2 | | | | | |
| EA | 14 | Distribute (and develop or assist in developing, if necessary) educational materials or programs that provide information on the fish and wildlife resources of the Vermillion River and the steps being taken to preserve habitat. | 4.4, 6/2 | | 1 | | S, V | Annually |
| EA | 15 | Encourage local participation in the National Flood Insurance Program. | 4.5, 2/1 | | 0.5 | | S, V, L | 2007-2015 |
| EA | 16 | Assist local governments in developing, if necessary, and distributing educational materials regarding floodplain locations, protection, and floodplain land use and land alteration restrictions. | 4.5, 2/7 | | .55 | | S, V, L | Annually |

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^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| EA | 17 | Assist state and local agencies in the distribution of research data, information and case studies showing how to reduce non-point source pollution from agricultural land by implementing best management practices (BMPs). | 4.6, 3/4 | | 1 | | S, L, V, N | Annually |
| EA | 18 | Work with State and local agencies to educate landowners regarding the potential liabilities associated with continuing to maintain fences across public waters (e.g., Vermillion River and tributaries). | 4.6, 3/12 | | 1 | | S, L, V | Annually |
| EA | 19 | Implement a targeted education program (e.g., brochures, flyers) to educate landowners about liabilities associated with river obstacles located on/originating from private land. | 4.7, 4/1 | | | | | |
| EA | 20 | Promote participation in local, State and federal conservation programs [e.g., Reinvest in Minnesota (RIM), Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Dakota County Farmland & Natural Areas Program, MN Cost Share Program, Conservation Security Program, Wildlife Habitat Incentives Program (WHIP), Farm and Ranch Lands Protection Program]. | 4.6, 3/13 | | 2 | | F, S, V, L, N | Annually |
| EA | 21 | Implement an education program (e.g., brochures, television public service spots) to educate the public about the Vermillion River system and its characteristics. | 4.7, 1/1 | | 10 | | V, N, S, L | Annually |
| EA | 22 | Educate the public on the recreational opportunities provided by the Vermillion River through publication of maps and placement of signs denoting River access, etc. | 4.7, ½ | | 4.5 | | V, N, S, L | 2007-20015 |
| EA | 23 | Support signage and other location-specific education practices in public open spaces of the Vermillion River corridor. | 4.4, 6/1 | | | | | |

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^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| EA | 24 | Educate recreational users on good stewardship practices to avoid damage to the stream environment or conflicts with riparian landowners. | 4.7, 3/3 | | 2 | | V, N, S, L | 2006 – Initial<br>2007-2015 – Annual |
| EA | 25 | Use the VRWJPO web site to provide pertinent information on the Watershed. (Post all agendas, background materials and meeting minutes to web site; Post all major proposed plans and projects to web site and request public comment through published notices and news releases.) | 4.8, 2/1 | 10 | 2 | | V, L, N | Annually |
| EA | 26 | Regularly publish and distribute VRWJPO newsletters. | 4.8, 2/2 | | 5 | | V, L, N | Annually |
| | 27 | Publish articles about the Watershed in other organizations' publications,( e.g. the *Scott County Scene* and *Dakota County Update*.) | 4.8, 2/3 | | | | | |
| EA | 28 | Recruit volunteers for monitoring efforts (e.g., stream and lake sampling) and involvement in other VRWJPO programs and projects. | 4.8, 2/4 | | 20 | | N, V, L, S | Annually |
| | | Support non-profit and volunteer groups for watershed and river cleanup and informational activities. | 4.7, 2/1 | | | | | |
| EA | 29 | Provide or support formal volunteer training for Watershed projects and programs. | 4.8, 2/5 | | | | | |
| EA | 30 | Develop and implement a recognition program for volunteers. | 4.8, 2/6 | | | | | |
| EA | 31 | Publish and distribute Watershed map and handbook. | 4.8, 2/7 | | 3 | | V, L, S, N | Annually |
| EA | 32 | Work with other agencies and groups to develop and implement education programs related to responsible land use practices. Ensure that elected officials have access to this program. | 4.8, 3 | | 10 | | S, L, V, N | 1-10 |
| | 33 | Work with government, nonprofit and other agencies to provide education programs on watershed issues. | 4.8, 4 | | | | | |

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^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| **Inventory and Assessment (IA)** | | | | | | | | |
| IA | 1 | Collect information on the location of agricultural drainage installations (tile systems) and the effect of these systems on downstream waters.<br><br>Collect information on the location of agricultural drainage installations and their effects on nitrate concentrations (and other pollutants of concern) in surface water and groundwater resources. | 4.1, 2/4<br><br>4.3, 1/4 | 40 | 8 | | S, F, L, V | 2006 – Initial<br>2007-2011 – Annual |
| IA | 2 | Inventory, map, and prioritize water features with existing buffers, and those in need of buffers. | 4.1, 3/5.1 | 40 | 20 | | V, S, F | 2007 – Initial<br>2008 – Annual |
| IA | 3 | Identify River corridor reaches for streambank erosion reduction projects, and for restoring damaged stream banks. | 4.2, 3/1 | 20 | 5 | | V, L, S, F, N | 2006 – Initial<br>2007-2008 – Annual |
| IA | 4 | Identify, inventory, and prioritize gully erosion problems in the Watershed (e.g., gully erosion within communities directly tributary to the Mississippi and Vermillion Rivers below the falls in Hastings). | 4.2, 6/1 | | 3 | | V, S, F | 2006-2008 |
| IA | 5 | Assess nitrogen application rates in high infiltration areas of the watershed and identify targeted areas for reduction in application rates. | 4.3, 1/3 | 20 | | | V | 2007 |
| | 6 | Identify natural and unnatural conduits from the ground surface to the groundwater (e.g. Karst features) that have the potential to affect drinking water and develop management strategies to protect groundwater in these areas. | 4.3, 1/5 | 20 | 16 | | L, S, V, F | 2006 – Initial<br>2007-2011 – Annual |
| IA | 7 | Conduct an inventory of “grandfathered” structures within floodplain setbacks. | 4.5, 2/6 | | 10 | | L, V, S | 2007-2010 |
| IA | 8 | Develop habitat inventories. | 4.4, 4/3 | | 7 | | S, F, V, N | 2006-2008 |
| IA | 9 | Work with local units of government to 1) inventory road crossings, and 2) identify opportunities for flood control, water quality improvement, and channel/stream restoration measures. | 4.6, 1/4 | 20 | | | V, L | 2007 |
| IA | 10 | Evaluate the River corridor and main tributaries for opportunities to restore natural scenic values and to enhance accessibility. | 4.7, 2/3/4 | 30 | 2 | | V, L, N | 2006 – Initial<br>2007-2009 – Annual |

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^Amounts shown are for 2005 dollars

| Item Type | Item Number | Item Description | Section, Objective/ Action | Potential Cost ($thousand) | | | Potential Partners and Funding Sources* | Proposed Implementation Year(s) |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | Annual | Capital | | |
| **Monitoring and Data Analysis (MA)** | | | | | | | | |
| MA | 1 | Collect, organize, and interpret water quality monitoring data. | 4.1, 2/2 | | 50 | | V, S, L, N | Annually |
| MA | 2 | Continue to fund the Vermillion River Watch program. | 4.1, 2/3 | | 20 | | V, N | Annually |
| MA | 3 | Monitor runoff from urban and agricultural areas, and determine the sources of pollutants of concern. | 4.1, 2/5 | | 20 | | | Annually |
| MA | 4 | Analyze water quality monitoring data, identify trends, identify data gaps, and target areas or subwatersheds with water quality issues. | 4.1, 3/2 | | | | | |
| MA | 5 | Collaborate with cities and townships to monitor lake water quality, vegetation, shore erosion, etc. | 4.1, 4/6 | | | | | |
| MA | 6 | Monitor and document the surface water origins of Vermillion River flows, based on actual flows from treatment plants and River tributaries (Note: groundwater origins are addressed in Section 4.3–Groundwater). | 4.2, 1/1 | | | | | |
| MA | 7 | Provide funding for surface water flow monitoring network. Monitoring data will be used, when needed, to calibrate and refine hydrologic models. | 4.2, 1/2 | 25 | 20 | 25 | V, S | 2006 – Initial/Capital<br>2007-2015 – Annual |
| MA | 8 | Implement a program to monitor streambank stability along the Vermillion River and its major tributaries (North Creek, South Creek, Middle Creek, South Branch, and Etter Creek). | 4.2, 1/4 | | 7 | | V, L, S, N | Annually |
| MA | 9 | In collaboration with other agencies, implement a groundwater monitoring system throughout the Watershed to monitor changes in groundwater levels and contaminants and groundwater/surface water interactions. | 4.3, 1/2 | 10 | 2 | | V, L, S | 2006 – Initial<br>2007-2015 – Annual |

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## Table 8.2
## IMPLEMENTATION PROGRAM SUMMARIZED BY YEAR
### Vermillion River Joint Powers Organization

| | | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | Item Number | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Providing or Assisting with Finding Funds | AA1 | $0 | $3,000 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $0 |
| | AA2 | $20,000 | $5,000 | $5,000 | $5,000 | $5,000 | $0 | $0 | $0 | $0 |
| | AA3 | $10,000 | $7,500 | $7,500 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AA4 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | AA5 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | AA6 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | **TOTAL AA** | **$57,000** | **$42,500** | **$42,000** | **$34,500** | **$34,500** | **$29,500** | **$29,500** | **$29,500** | **$27,000** |
| Conducting Evaluations and Formulating Policy | | | | | | | | | | |
| | AC1 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $0 | $0 | $0 |
| | AC2 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 |
| | AC3 &AC4 | $10,000 | $80,000 | $80,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC5 | $40,000 | $15,000 | $15,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC6 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC7 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AC8 | $20,000 | $20,000 | $20,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC9 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 |
| | AC10 | $0 | $5,000 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AC11 | $7,000 | $7,000 | $7,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC12 | $1,500 | $1,500 | $1,500 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC13 | $10,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | AC14 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $0 | $0 | $0 | $0 |
| | AC15 | $4,000 | $3,000 | $3,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC16 & AC17 | $0 | $0 | $10,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AC18 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $0 | $0 | $0 | $0 |
| | AC19 & AC20 | $5,000 | $12,500 | $12,500 | $12,500 | $12,500 | $0 | $0 | $0 | $0 |
| | AC21 | $7,000 | $6,000 | $6,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC22 | $7,000 | $6,000 | $6,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC23 | $4,000 | $3,000 | $3,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC24 | $1,000 | $500 | $500 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC25 | $2,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AC26 | $30,000 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 |
| | AC27 | $0 | $0 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AC28 | $0 | $12,500 | $12,500 | $12,500 | $12,500 | $0 | $0 | $0 | $0 |
| | AC29 | $10,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | **TOTAL AC** | **$179,000** | **$204,000** | **$210,000** | **$57,000** | **$56,000** | **$18,000** | **$13,000** | **$13,000** | **$13,000** |
| | | | | | | | | | | |
| Regulatory, Review, and Intervention | AD1 | $80,000 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 |
| | AD2 | $10,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AD3 | $50,000 | $50,000 | $37,500 | $37,500 | $37,500 | $37,500 | $37,500 | $37,500 | $37,500 |
| | AD4 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AD5 | $0 | $20,000 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 |
| | AD6 | $0 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 |
| | AD7 | $0 | $2,500 | $2,500 | $2,500 | $2,500 | $0 | $0 | $0 | $0 |
| | AD8 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | AD9 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 |
| | AD10 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | AD11 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $0 | $0 | $0 | $0 |
| | AD12 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | AD13 & AD14 | $2,000 | $4,500 | $4,500 | $2,500 | $2,500 | $2,500 | $2,500 | $0 | $0 |
| | **TOTAL AD** | **$181,000** | **$173,000** | **$143,000** | **$141,000** | **$141,000** | **$133,500** | **$133,500** | **$131,000** | **$131,000** |
| | | | | | | | | | | |

## Table 8.2
## IMPLEMENTATION PROGRAM SUMMARIZED BY YEAR
### Vermillion River Joint Powers Organization

| | | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | Item Number | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Coordination with Agencies | AE1 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AE2 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $5,000 | $0 |
| | AE3 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | AE4 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AE5 & AE6 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 |
| | AE7 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AE8 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AE9 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AE10 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AE11 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 |
| | AE12 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AE13 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AE14 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AE15 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | **TOTAL AE** | **$10,500** | **$10,500** | **$10,500** | **$10,500** | **$10,500** | **$7,500** | **$7,500** | **$12,500** | **$7,500** |
| | | | | | | | | | | |
| Coordination with Counties, Cities, and Townships | AF1 | $10,000 | $2,500 | $2,500 | $2,500 | $2,500 | $0 | $0 | $0 | $0 |
| | AF2 | $4,000 | $4,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AF3 & AF4 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF5 | $20,000 | $20,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | AF6 | $0 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AF7 | $10,000 | $10,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AF8 | $0 | $0 | $10,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | AF9 | $0 | $0 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AF10 | $200 | $200 | $200 | $200 | $200 | $200 | $200 | $200 | $200 |
| | AF11 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF12 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 |
| | AF13 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF14 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF15 | $14,000 | $13,000 | $13,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AF16 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF17 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF18 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AF19 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AF20 & AF21 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF22 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF23 | $0 | $0 | $5,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | AF24 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $0 | $0 | $0 | $0 |
| | AF25 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF26 | $2,000 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | AF27 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | AF28 | $0 | $1,000 | $1,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | **TOTAL AF** | **$69,700** | **$60,700** | **$48,700** | **$39,700** | **$39,700** | **$35,200** | **$35,200** | **$35,200** | **$35,200** |
| | | | | | | | | | | |

## Table 8.2
## IMPLEMENTATION PROGRAM SUMMARIZED BY YEAR
### Vermillion River Joint Powers Organization

| | | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Item Number | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Feasibility/Preliminary Studies | S1 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $0 | $0 | $0 | $0 | $0 |
| | S2 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | S3 | $40,000 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 |
| | S4 | $0 | $0 | $40,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | S5 | $40,000 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 | $5,500 |
| | S6 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | S7 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | S8 & S9 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | S10 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $0 | $0 | $0 | $0 | $0 |
| | S11 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | S12 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | **TOTAL S** | **$155,000** | **$86,000** | **$126,000** | **$86,000** | **$86,000** | **$56,000** | **$56,000** | **$56,000** | **$56,000** | **$56,000** |
| | | | | | | | | | | | |
| Capital Projects | CP1 | $0 | $0 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 |
| | CP2 | $0 | $900,000 | $900,000 | $900,000 | $900,000 | $900,000 | $900,000 | $900,000 | $900,000 | $900,000 |
| | CP3 | $0 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 |
| | CP4 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | CP5 | $40,000 | $40,000 | $40,000 | $40,000 | $40,000 | $0 | $0 | $0 | $0 | $0 |
| | CP6 & CP7 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 |
| | CP8 | $0 | $0 | $0 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 |
| | CP9 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 |
| | CP10 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 |
| | CP11 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 | $30,000 |
| | CP12 | $0 | $53,000 | $53,000 | $53,000 | $53,000 | $53,000 | $53,000 | $53,000 | $53,000 | $53,000 |
| | CP13 | $0 | $89,000 | $89,000 | $89,000 | $89,000 | $89,000 | $89,000 | $89,000 | $89,000 | $89,000 |
| | CP14, CP15 & CP16 | $0 | $22,000 | $22,000 | $22,000 | $22,000 | $22,000 | $22,000 | $22,000 | $22,000 | $22,000 |
| | CP17 | $0 | $44,000 | $44,000 | $44,000 | $44,000 | $44,000 | $44,000 | $44,000 | $44,000 | $44,000 |
| | CP18 | $0 | $383,000 | $383,000 | $383,000 | $383,000 | $383,000 | $383,000 | $383,000 | $383,000 | $383,000 |
| | CP19 | $0 | $25,000 | $25,000 | $25,000 | $25,000 | $25,000 | $25,000 | $25,000 | $25,000 | $25,000 |
| | CP20 | $0 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 | $55,000 |
| | CP21 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | CP22 | $0 | $11,000 | $11,000 | $11,000 | $11,000 | $11,000 | $11,000 | $11,000 | $11,000 | $11,000 |
| | CP23 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | CP24 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | **TOTAL CP** | **$282,000** | **$1,919,000** | **$2,044,000** | **$2,094,000** | **$2,094,000** | **$2,054,000** | **$2,054,000** | **$2,054,000** | **$2,054,000** | **$2,054,000** |
| | | | | | | | | | | | |

## Table 8.2
## IMPLEMENTATION PROGRAM SUMMARIZED BY YEAR
### Vermillion River Joint Powers Organization

| | | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | Item Number | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Education and Public Outreach | EA1 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA2 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 |
| | EA3 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | EA4 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA5 & EA6 | $10,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA7 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | EA8 - EA13 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | EA14 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA15 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | EA16 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $500 |
| | EA17 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA18 & EA19 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| | EA20 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | EA21 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | EA22 & EA23 | $0 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 |
| | EA24 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | EA25 | $10,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | EA26 & EA27 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 | $5,000 |
| | EA28, EA29 & EA30 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | EA31 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 |
| | EA32 & EA33 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | **TOTAL EA** | **$83,500** | **$71,000** | **$71,000** | **$71,000** | **$71,000** | **$71,000** | **$71,000** | **$71,000** | **$71,000** |
| | | | | | | | | | | |
| Inventory and Assessment | IA1 | $40,000 | $8,000 | $8,000 | $8,000 | $8,000 | $8,000 | $0 | $0 | $0 |
| | IA2 | $40,000 | $20,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA3 | $20,000 | $5,000 | $5,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA4 | $3,000 | $3,000 | $3,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA5 | $0 | $20,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA6 | $20,000 | $16,000 | $16,000 | $16,000 | $16,000 | $16,000 | $0 | $0 | $0 |
| | IA7 | $0 | $10,000 | $10,000 | $10,000 | $10,000 | $0 | $0 | $0 | $0 |
| | IA8 | $17,000 | $17,000 | $17,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA9 | $0 | $20,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | IA10 | $30,000 | $2,000 | $2,000 | $2,000 | $0 | $0 | $0 | $0 | $0 |
| | **TOTAL IA** | **$170,000** | **$121,000** | **$61,000** | **$36,000** | **$34,000** | **$24,000** | **$0** | **$0** | **$0** |
| | | | | | | | | | | |
| Monitoring and Data Analysis | MA1 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 | $50,000 |
| | MA2 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | MA3 - MA6 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | MA7 | $50,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
| | MA8 | $7,000 | $7,000 | $7,000 | $7,000 | $7,000 | $7,000 | $7,000 | $7,000 | $7,000 |
| | MA9 | $10,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| | **TOTAL MA** | **$157,000** | **$119,000** | **$119,000** | **$119,000** | **$119,000** | **$119,000** | **$119,000** | **$119,000** | **$119,000** |
| | | | | | | | | | | |
| **YEARLY TOTAL** | | **$1,344,700** | **$2,806,700** | **$2,875,200** | **$2,688,700** | **$2,658,700** | **$2,547,700** | **$2,518,700** | **$2,521,200** | **$2,513,700** |

The VRWJPO will establish special subtaxing districts to cover the VRWJPO's cost of implementing the permitting program. See Section 5.2 for more details regarding the standards development and rule-making process, and the VRWJPO role in permitting.

Most non-structural activities (e.g., monitoring, studies) will be funded through a VRWJPO ad valorem tax over the entire Watershed. The VRWJPO must adopt a budget for the following year before September 1 of each year and submit its budget to Dakota and Scott Counties prior to the date by which the counties establish their maximum levy pursuant to Minn. Stat. § 275.065, Subd. 1, (usually September 15). The final budget amount is approved by Dakota and Scott Counties in December, at which time the final amount can be less than, but not more than the budget amount approved in September.

Non-capital projects/activities, capital projects that benefit the entire watershed, and capital projects less than $500,000, will be funded through a VRWJPO ad valorem tax over the entire Watershed. For capital projects that benefit some parts of the Watershed more than others, the VRWJPO may consider distributing the costs (or a portion of the costs) on a subwatershed basis.

To promote cooperative efforts, the VRWJPO will seek grants and other cost-share opportunities for appropriate implementation activities.

## 8.1 VRWJPO COST SHARING POLICY

The VRWJPO's cost sharing policy provides guidance regarding the cost sharing between the VRWJPO and its potential partners for various watershed management efforts within the Vermillion River Watershed. The policy reflects a presumed level of watershed benefit and local benefit accruing from various types of projects or activities, based on the VRWJPO's priorities for improvement. The VRWJPO will base its participation in a particular proposed project on an evaluation of other factors, including:

- Budgeting
- Available funding
- Merit
- Feasibility
- Risk
- Consideration of other proposed projects.

**PRIORITIES FOR IMPROVEMENT**

The VRWJPO's highest priorities for improvements within the watershed are:

- Protecting and preserving the conveyance capacity of the Vermillion River and its primary tributaries: the South Branch; Etter Creek; and North, Middle and South Creeks.
- Completing TMDL analyses on those water resources identified by the MPCA as impaired.
- Achieving required pollutant load reductions identified in approved TMDLs (e.g., addressing failing ISTS).
- Establishing buffers for water quality improvement in riparian areas.

- Correcting existing erosion problems in the main stem and its primary tributaries.
- Reducing flooding in areas with known flooding problems.
- Preserving and improving habitat and suitable stream conditions in those portions of the main stem and its primary tributaries designated by the Minnesota DNR as trout streams, through in-stream actions and actions throughout the watershed (e.g., thermal protection measures).
- Restoring streambank native vegetation.
- Increasing flood storage in critical subwatersheds.
- Delineating flood zones on the primary tributaries where they have not been delineated or mapped.
- Addressing surface water impacts on water supply aquifers.

The next level of priorities for improvement are:

- Restoring riparian native vegetation within buffer zones.
- Acquiring public easements in critical flood storage and groundwater recharge areas.
- Promoting agricultural and urban BMPs that reduce erosion and sedimentation, herbicide and pesticide application, manure, and other nutrients/pollutants, and exclude livestock.
- Enhancing wildlife habitat.
- Protecting river and stream navigability.
- Improving public access to the Vermillion River and other public waters.
- Addressing non-TMDL water quality concerns.

These priorities may be amended by the VRWJPO Joint Powers Board from time to time.

**WATERSHED BENEFIT**

Watershed benefit is defined as achieving in whole or part a high-priority watershed need as described in this policy.

The VRWJPO's policy is that any project or activity not included under this policy is of local benefit and should be funded by the benefiting or proposing local government(s). Routine maintenance, required mitigation, land acquisition, and storm drainage system construction are generally of local benefit, except and unless those activities are an integral component of a project previously defined as a watershed priority need and inclusion of those items is approved by the VRWJPO Joint Powers Board.

**COST SHARING POLICY**

1. For those projects listed in this policy as being of highest VRWJPO priority, the study, analysis, design, construction, and implementation of such projects or activities are determined to be of watershed-wide benefit.

    - The cost of study, analysis, and design of projects or activities will be funded up to 100 percent by the VRWJPO for projects or activities on public property, or within the streambanks of the main stem and the primary tributaries.

- The cost of study, analysis, and design of projects or activities on private property will be eligible for funding from the VRWJPO up to 50 percent of the total cost. Requirements of funding include execution of any required easements as well as execution of a ten-year maintenance agreement.
- Construction or implementation activities will be funded up to 100 percent by the VRWJPO for projects or activities on public property or within the streambanks of the main stem and the primary tributaries with the exception of flood storage projects. The VRWJPO will fund up to 25 percent of the cost of regional flood storage projects that have a demonstrable flood storage benefit to the watershed.
- Construction or implementation activities on private property will be eligible for funding from the VRWJPO up to 50 percent of the total cost. Requirements of funding include execution of any required easements as well as execution of a ten-year maintenance agreement.

2. For those projects listed in this policy as being of the next highest level of VRWJPO priority: study, analysis, design, construction, and implementation of projects or activities are determined to be of partial watershed-wide benefit.

   - Study, analysis, and design of projects or activities will be funded up to 50 percent by the VRWJPO for projects or activities on public property or within the streambanks of the main stem and the primary tributaries. The balance of funding is the responsibility of the benefiting or proposing local government(s).
   - The cost of study, analysis, and design of projects or activities on private property will be eligible for funding from the VRWJPO up to 25 percent of the total cost. Requirements of funding include execution of any required easements as well as execution of a ten-year maintenance agreement.
   - Construction or implementation activities will be funded up to 50 percent by the VRWJPO for projects or activities on public property or within the streambanks of the main stem and the primary tributaries. The balance of funding is the responsibility of the benefiting or proposing local government(s).
   - Construction or implementation activities on private property will be eligible for funding from the VRWJPO up to 25 percent of the total cost. Requirements of funding include execution of any required easements as well as execution of a ten-year maintenance agreement.

By agreement of a majority of its members the VRWJPO Joint Powers Board may choose to participate in the cost of other projects or activities not comprehended in this policy, or may adjust the level of VRWJPO funding for a project.

## 8.2 IMPACT OF IMPLEMENTATION PROGRAM ON RESIDENTS AND LOCAL GOVERNMENTS

The VRWJPO's portion of the implementation program will be funded through tax levies. These taxes will not directly affect local governments' finances since the VRWJPO tax levies do not apply toward local government levy limits. However, there would be a financial impact to the residents of the cities and townships that reside in the VRWJPO Watershed. The VRWJPO's intention is to limit additional requirements imposed on local units of government as much as possible, while still accomplishing the VRWJPO's purposes and implementing the Plan.

Table 8-3 shows the approximate financial burden on VRWJPO residents for various VRWJPO budget amounts and home values, shown as a tax per residence. Actual tax values will differ slightly due to tax increment financing, fiscal disparities, and changes in market valuation.

Some of the implementation program elements reflect the goals, policies and requirements of State and regional government agencies that local government units are required to address.

Local governments already have ordinances in place that address many of the VRWJPO requirement, including ordinances that address shorelands, floodplains, wetland protection, stormwater management, erosion control, and stormwater system maintenance.

**Table 8.3:**

# Vermillion River Watershed Management Tax District
# Estimated Pay 2006 Taxes * (Dakota County)

## Residential Property

| Market Value | Tax Capacity | Levy 300,000 | 350,000 | 400,000 | 450,000 | 500,000 | 550,000 | 750,000 | 1,000,000 | 1,500,000 | 2,000,000 | 3,000,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rate | | 0.1766% | 0.2110% | 0.2453% | 0.2797% | 0.3140% | 0.3484% | 0.4858% | 0.6575% | 1.0010% | 1.3445% | 2.0316% |
| Various Values | | | | | | | | | | | | |
| 150,000 | 1,500 | $ 2.65 | $ 3.16 | $ 3.68 | $ 4.20 | $ 4.71 | $ 5.23 | $ 7.29 | $ 9.86 | $ 15.02 | $ 20.17 | $ 30.47 |
| 175,000 | 1,750 | $ 3.09 | $ 3.69 | $ 4.29 | $ 4.89 | $ 5.50 | $ 6.10 | $ 8.50 | $ 11.51 | $ 17.52 | $ 23.53 | $ 35.55 |
| 185,000 | 1,850 | $ 3.27 | $ 3.90 | $ 4.54 | $ 5.17 | $ 5.81 | $ 6.44 | $ 8.99 | $ 12.16 | $ 18.52 | $ 24.87 | $ 37.58 |
| 200,000 | 2,000 | $ 3.53 | $ 4.22 | $ 4.91 | $ 5.59 | $ 6.28 | $ 6.97 | $ 9.72 | $ 13.15 | $ 20.02 | $ 26.89 | $ 40.63 |
| 225,000 | 2,250 | $ 3.97 | $ 4.75 | $ 5.52 | $ 6.29 | $ 7.07 | $ 7.84 | $ 10.93 | $ 14.79 | $ 22.52 | $ 30.25 | $ 45.71 |
| 250,000 | 2,500 | $ 4.42 | $ 5.27 | $ 6.13 | $ 6.99 | $ 7.85 | $ 8.71 | $ 12.14 | $ 16.44 | $ 25.03 | $ 33.61 | $ 50.79 |
| 275,000 | 2,750 | $ 4.86 | $ 5.80 | $ 6.75 | $ 7.69 | $ 8.64 | $ 9.58 | $ 13.36 | $ 18.08 | $ 27.53 | $ 36.98 | $ 55.87 |
| 300,000 | 3,000 | $ 5.30 | $ 6.33 | $ 7.36 | $ 8.39 | $ 9.42 | $ 10.45 | $ 14.57 | $ 19.73 | $ 30.03 | $ 40.34 | $ 60.95 |
| 325,000 | 3,250 | $ 5.74 | $ 6.86 | $ 7.97 | $ 9.09 | $ 10.21 | $ 11.32 | $ 15.79 | $ 21.37 | $ 32.53 | $ 43.70 | $ 66.03 |
| 350,000 | 3,500 | $ 6.18 | $ 7.38 | $ 8.59 | $ 9.79 | $ 10.99 | $ 12.19 | $ 17.00 | $ 23.01 | $ 35.04 | $ 47.06 | $ 71.10 |
| 375,000 | 3,750 | $ 6.62 | $ 7.91 | $ 9.20 | $ 10.49 | $ 11.78 | $ 13.06 | $ 18.22 | $ 24.66 | $ 37.54 | $ 50.42 | $ 76.18 |
| 400,000 | 4,000 | $ 7.06 | $ 8.44 | $ 9.81 | $ 11.19 | $ 12.56 | $ 13.93 | $ 19.43 | $ 26.30 | $ 40.04 | $ 53.78 | $ 81.26 |
| 425,000 | 4,250 | $ 7.51 | $ 8.97 | $ 10.43 | $ 11.89 | $ 13.35 | $ 14.81 | $ 20.65 | $ 27.95 | $ 42.54 | $ 57.14 | $ 86.34 |
| 450,000 | 4,500 | $ 7.95 | $ 9.49 | $ 11.04 | $ 12.59 | $ 14.13 | $ 15.68 | $ 21.86 | $ 29.59 | $ 45.05 | $ 60.50 | $ 91.42 |
| 475,000 | 4,750 | $ 8.39 | $ 10.02 | $ 11.65 | $ 13.28 | $ 14.92 | $ 16.55 | $ 23.07 | $ 31.23 | $ 47.55 | $ 63.87 | $ 96.50 |
| 500,000 | 5,000 | $ 8.83 | $ 10.55 | $ 12.27 | $ 13.98 | $ 15.70 | $ 17.42 | $ 24.29 | $ 32.88 | $ 50.05 | $ 67.23 | $ 101.58 |

*Estimated TCAF 145,556,294
(as of 07/27/05)

# Appendices

# APPENDIX A

## Endangered, Threatened, or Special Concern, and Non-listed Rare Plants and Animals Found in Dakota and Scott Counties

| Scientific Name | Common Name | Minnesota Status | Federal Status |
|---|---|---|---|
| **PLANTS** | | | |
| *Agalinis auriculata* | Eared False Foxglove | Endangered | |
| *Aristida tuberculosa* | Sea-beach Needlegrass | Special Concern | |
| *Arnoglossum plantagineum* | Tuberous Indian-plantain | Threatened | |
| *Asclepias amplexicaulis* | Clasping Milkweed | Special Concern | |
| *Asclepias sullivantii* | Sullivant's Milkweed | Threatened | |
| *Baptisia bracteata - glabrescens* | Plains Wild indigo | Special Concern | |
| *Besseya bullii* | Kitten-tails | Threatened | |
| *Carex sterilis* | Sterile Sedge | Threatened | |
| *Cirsium hillii* | Hill's Thistle | Special Concern | |
| *Cladium mariscoides* | Twig-rush | Special Concern | |
| *Cristatella jamesii* | James's Polanisia | Endangered | |
| *Cypripedium candidum* | Small White Lady's-slipper | Special Concern | |
| *Decodon verticillatus* | Waterwillow | Special Concern | |
| *Desmodium cuspidataum - longifolium* | Big Tick-trefoil | Special Concern | |
| *Echinochloa walteri* | Walter's Barnyard Grass | Rare, but no legal status | |
| *Eryngium yuccifolium* | Rattlesnake-master | Special Concern | |
| *Gymnocladus dioica* | Kentucky Coffee Tree | Rare, but no legal status | |
| *Helianthemum canadense* | Canada Frostweed | Rare, but no legal status | |
| *Hieracium longipilum* | Long-bearded Hawkweed | Rare, but no legal status | |
| *Hudsonia tomentosa* | Beach-heather | Special Concern | |
| *Juniperus horizontalis* | Creeping Juniper | Special Concern | |
| *Lechea tenuifolia* | Narrow-leaved Pinweed | Endangered | |
| *Lespedeza leptostachy* | Prairie Bush Clover | Threatened | Threatened |
| *Linaria canadensis* | Old Field Toadflax | Rare, but no legal status | |
| *Liparis lilifolia* | Lilia-leaved Twayblade | Rare, but no legal status | |
| *Minuartia dawsonensis* | Rock Sandwort | Special Concern | |
| *Oenothera rhombipetala* | Rhombic-petaled Evening Primrose | Special Concern | |
| *Orobanche fasciculata* | Clusterd Broom-rape | Special Concern | |
| *Orobanche uniflora* | One-flowered Broom-rape | Special Concern | |
| *Oxypolis rigidior* | Cowbane | Rare, but no legal status | |
| *Panax quinquefolium* | American Ginseng | Special Concern | |
| *Platanthera flava – herbiola* | Tubercled rein-orchid | Endangered | |
| *Polanisia jamesii* | James's Polanisia | Endangered | |
| *Rhynchospora capillacea* | Hair-like Beak-rush | Threatened | |
| *Scleria triglomerata* | Tall nut-rush | Endangered | |
| *Scleria verticillata* | Whorled Nut-rush | Threatened | |
| *Scutellaria ovata - versicolor* | Ovate-leaved Skullcap | Threatened | |
| *Triglochin palustris* | Marsh Arrow-grass | Rare, but no legal status | |
| *Trillium nivale* | Snow Trillium | Special Concern | |

| Scientific Name | Common Name | Minnesota Status | Federal Status |
|---|---|---|---|
| *Triodanis leptocarpa* | Venus' Looking Glass | Rare, but no legal status | |
| *Valeriana edulis* ssp. *ciliata* | Valerian | Threatened | |
| *Helianthemum canadense* | Canada Frostweed | Rare, but no legal status | |
| *Hieracium longipilum* | Long-bearded Hawkweed | Rare, but no legal status | |
| *Hudsonia tomentosa* | Beach-heather | Special Concern | |
| *Juniperus horizontalis* | Creeping Juniper | Special Concern | |
| *Linaria canadensis* | Old Field Toadflax | Rare, but no legal status | |
| *Liparis lilifolia* | Lilia-leaved Twayblade | Rare, but no legal status | |
| *Minuartia dawsonensis* | Rock Sandsort | Special Concern | |
| *Oxypolis rigidior* | Cowbane | Rare, but no legal status | |
| BIRDS AND MAMMALS | | | |
| *Bartramia longicauda* | Upland Sandpiper | Rare, but no legal status | |
| *Buteo lineatus* | Red-shouldered hawk | Special Concern | |
| *Dendroica cerulea* | Cerelean Warbler | Special Concern | |
| *Empidonax virescens* | Acadian Flycatcher | Special Concern | |
| *Falco peregrinus* | Peregrine Falcon | Threatened | Endangered |
| *Haliaeetus leucocephalus* | Bald Eagle | Special Concern | Threatened |
| *Lanius ludovicianus* | Loggerhead Shrike | Threatened | |
| *Vireo bellii* | Bell's Vireo | Rare, but no legal status | |
| *Wilsonia citrina* | Hooded Warbler | Special Concern | |
| *Spilogale putorius* | Eastern Spotted Skunk | Threatened | |
| AMPHIBIANS AND REPTILES | | | |
| *Chelydra serpentia* | Snapping Turtle | Special Concern | |
| *Clemmys insculpta* | Wood Turtle | Threatened | |
| *Coluber constrictor* | Racer | Special Concern | |
| *Crotalus horridus*, | Timber Rattlesnake | Threatened | |
| *Elaphe vulpina* | Fox Snake | Rare, but no legal status | |
| *Emydoidea blandingii* | Blanding's Turtle | Threatened | |
| *Lampropeltis triangulum* | Milk Snake | Special Concern | |
| *Pituophis catenifer* | Gopher Snake | Special Concern | |
| FISH AND MOLLUSKS | | | |
| *Actinonaias ligamentina* | Mucket Mussel | Threatened | |
| *Arcidens confragosus* | Rock Pocketbook Mussel | Endangered | |
| *Cycleptus elongatus* | Blue Sucker | Special Concern | Threatened |
| *Polyodon spathula* | Paddlefish | | |
| *Ellipsaria lineolata* | Butterfly Mussel | Threatened | |
| *Elliptio crassidens* | Elephant-Ear Mussel | Endangered | |
| *Elliptio dilatata* | Spike Mussel | Special Concern | |
| *Fusconaia ebena* | Ebony Shell Mussel | Endangered | |
| *Ictiobus niger* | Black Buffalo | Special Concern | |
| *Lampetra appendix* | American Brook Lamprey | Rare, but no legal status | |
| *Lampsilis higginsi* | Higgins Eye Mussel | Endangered | Endangered |
| *Lampsilis teres* | Yellow Sandshell Mussel | Endangered | |
| *Lasmigona compressa* | Creek Heelsplitter Mussel | Special Concern | |
| *Ligumia recta* | Black Sandshell Mussel | Special Concern | |
| *Megalonaias nervosa* | Washboard Mussel | Threatened | |

| Scientific Name | Common Name | Minnesota Status | Federal Status |
|---|---|---|---|
| *Notropis anogenus* | Pugnose Shiner | Special Concern | |
| *Notropis nubilus* | Ozark Minnow | Special Concern | |
| *Obovaria olivaria* | Hickorynut Mussel | Special Concern | |
| *Opsopoeodus emiliae* | Pugnose Minnow | Rare, but no legal status | |
| *Pleurobema coccineum* | Round Pigtoe Mussel | Threatened | |
| *Quadrula fragosa* | Winged Mapleleaf Mussel | Endangered | |
| *Quadrula nodulata* | Wartyback Mussel | Endangered | |
| *Speyeria idalia* | Regal Frittilary | Special Concern | |
| *Tritogonia verrucosa* | Pistolgrip Mussel | Threatened | |

## Assessment of the Project Area's Water Quality

The first objective of the Hastings Area Nitrate Study was to describe nitrate conditions in the Shakopee aquifer of the Prairie du Chien group and the Jordan aquifer and to identify the sources of nitrate in the area's groundwater. Groundwater quality issues can be viewed in two ways: aquifer conditions – what's under ground – or drinking water conditions – what comes out of residents' taps. This study found that well construction factors both influence the quality of the drinking water and complicate the investigation of aquifer conditions.

### Nitrate Conditions

The results of the sampling done in September 2000 of private and public drinking water wells showed that the City of Hastings and the surrounding area do indeed have a "nitrate problem," with a quarter of the wells exceeding the drinking water standard of 10.0 mg/L and a quarter of the wells in the "elevated" range of 3.0 to 10.0 mg/L.

Hastings' municipal supply wells were all below the drinking water standard, ranging from 2.1 to 8.5 mg/L, with a median result of 5.7 mg/L. While this is acceptable, the facts that most of the City's wells are in the "elevated" range and that the MDH's routine municipal well sampling shows that the City's nitrate levels continue to increase indicate that drinking water quality in the City will be a concern for the foreseeable future.

The results showed significantly different nitrate levels in wells completed in unconsolidated materials (Quaternary), the Shakopee, and Jordan aquifers. Shakopee had the highest levels (15.0 mg/L), followed by Quaternary (8.7 mg/L) and Jordan (1.85 mg/L). However, the presence of the Hastings buried bedrock valley, with depths to bedrock of 500 feet or more, means that the deepest Quaternary wells in the study area may be deeper than the Shakopee wells. Associated with that, the depth of the well was a stronger predictor of nitrate level than the aquifer in which the well was constructed.

Throughout the study area, the nitrate results did not indicate a "plume" of contamination. Instead, a set of risk factors was associated with high nitrate levels in a given well: the depth of the well (deeper wells have lower nitrate), the age of the well (newer wells have lower nitrate), and the soil type in which it was constructed (wells in sand or sandy loam have higher nitrate than wells in soils with a higher clay content). As well construction has become more regulated, first with Minnesota's first Well Code in 1974 and then with the establishment of Dakota County's Delegated Well Program in 1989, new wells have been drilled deeper than old ones, so the depth of the well and the age of the well are interrelated.

### Sources of Nitrate

Three potential sources of nitrate were considered: row-crop agriculture, feedlots, and septic systems. Lawn fertilizers can also be a potential source of nitrate, but after reviewing the land use in the study area and determining that the acreage devoted to lawns was insignificant compared to the acreage devoted to agriculture, lawn fertilizers were not pursued as a line of inquiry.

Two research tools were used to identify sources of nitrate: conducting a MDA FANMAP to better understand agricultural practices in the area, and sampling for indicator compounds (agricultural pesticides and caffeine) to determine what other parameters might be associated with nitrate in wells.

*Farm Nutrient Management Assessment Program*
In order to quantify the agricultural nitrogen inputs to the study area, the MDA conducted an FANMAP, representing the 2000 cropping season. In this program, MDA staff conducts comprehensive, confidential interviews with farm operators in the study area. The farmers provide detailed information about how what crops they are growing that year, how many acres have been planted in each, what their fertilizing practices are, what pesticides they use and when, what livestock they raise, and what their manure management practices are. The farmers' practices are then compared to the University of Minnesota's recommended Best Management Practices, which are intended to maximize crop yields and minimize water pollution, to see if there are areas for improvement.

In the HANS area, the MDA found the greatest crop diversity of any of the areas of Minnesota where they have conducted FANMAPs. However, the dominant crop regime is corn and soybeans grown in rotation (69% of acreage). The acreage devoted to potatoes (7%) was lower than expected. However, irrigation was prevalent (63% of the acreage), including all of the potato acres. The study found that farmers in the area were adopting the educational materials and recommended nitrogen management strategies available from the U of M for the study area. The study also found that, while some beef cattle, dairy cattle, and hogs were raised in the study area, the number of livestock raised in the area was not large enough for their manure to be a significant source of nitrogen compared to commercial nitrogen fertilizers.

*Indicator Compounds*
A representative subset of the private drinking water wells sampled for nitrate was also sampled for caffeine (as a tracer for domestic wastewater coming from septic systems) and for agricultural pesticides (as a tracer for row crop agriculture). All of these samples contained at least one of the parameters: caffeine was detected in 89% of the wells, and pesticides or pesticide metabolites were detected in 70% of the wells. The caffeine detections were extremely low, and all the pesticide detections were well below drinking water standards. Caffeine levels were not statistically related to nitrate levels, which is logical considering that caffeine was even found in wells contained no nitrate. The frequency with which caffeine was detected does indicate that the groundwater is being widely affected by domestic wastewater. The statistical relationship between nitrate and the total mass of pesticide or pesticide metabolites in a well was extremely strong.

When the results of the indicator compound analysis are combined with the FANMAP results, the conclusion is that row-crop agriculture is the main source of the elevated nitrate in the study area. Although farmers in the area are following recommended Best Management Practices for both fertilizer and pesticide application, the area's soil and geological conditions are working against them. As was seen from the helium-tritium isotope age-dating, the groundwater in the area is all "young," ranging from five to 40 years since it fell as rainwater. Indeed, one of the pesticides whose breakdown products were detected in a 27% of the wells, Acetochlor, was not introduced to the market until 1994, so the water in those wells was younger than that. This indicates that within the study area, water moves very quickly from the surface to the groundwater, carrying any contamination with it.

<u>Movement of Contaminated Water Within the Study Area</u>

*Vermillion River*
The results from the monitoring wells installed along the Vermillion River indicate that the relationship between the river and the groundwater is complex and changes along the

course of the river. Water levels measured in the wells show that upstream of the Hastings buried bedrock valley, the groundwater table is higher than the river, so that groundwater is flowing into the river, but where the river crosses the valley, the groundwater table drops sharply. Over the valley, the river is "perched," with little interaction with the groundwater below, but further downstream, within the City of Hastings, the river loses water into the groundwater. The nitrate results from the SWCD, Metropolitan Council, and this project's monitoring wells are consistent with the water level data in indicating that the Vermillion River appears to be contributing to the nitrate in the groundwater within the City of Hastings, but not upstream of the city itself.

*Groundwater Modeling*

The general direction of groundwater flow in eastern Dakota County is parallel to the Vermillion River into the Mississippi River. The HANS groundwater model, using static water level data from the study's monitoring wells along the Vermillion River and from WELLMAN records, estimates that a large volume of water exfiltrates from the Vermillion River between the falls and the city boundary: that the total volume lost from the river is roughly 30 percent of its net flow. The model also estimates that the permeability of the Hastings buried bedrock valley is much higher than the values used in the Metro Model or in the Dakota County Groundwater Model. Taken together, these factors cause the direction of groundwater flow to be outward from Hastings in all directions, including to the southwest from Hastings into the Hastings buried bedrock valley. From the Hastings buried bedrock valley, the groundwater flows either north or south into the Mississippi.

The model therefore estimates that all of the groundwater in the City of Hastings originates as rainfall infiltration within the City boundaries, or as losses from the Vermillion River within the City boundaries. If true, this has a significant effect on the potential for contamination in the City of Hastings municipal wells. In particular, high nitrate levels observed in wells south and west of the City would have no relevance to Municipal well water quality, and water quality in the Vermillion River would have a larger influence than previously thought.

The HANS model fundamentally disagrees with previous groundwater flow models about the direction of flow between the City of Hastings and the Hastings buried bedrock valley. Additional observations of Vermillion River/groundwater interactions and of static water levels in the area between the Vermillion River and the Hastings valley will be required before these differences can be resolved.

## Resource Water Quality Objectives

The second objective of the Hastings Area Nitrate Study was to develop non-regulatory strategies for addressing the area's water quality concerns. Based on the Diagnostic Study, Dakota County's proposed water quality objectives for the Hastings area are

1) to raise public awareness of drinking water quality issues in the Hastings area and throughout Dakota County;
2) to improve the quality of groundwater reaching the City of Hastings municipal wells, addressing current and future concerns about nitrate levels and the presence of agricultural pesticide and organic wastewater components in the public water supply, and
3) to improve the quality of groundwater reaching private drinking water wells in the rural area around Hastings, addressing concerns about nitrate, agricultural pesticides, and organic wastewater components in the area's drinking water aquifers.

Goals for chemical, biological and physical measurements:

1) To improve the quality of groundwater flowing to the each individual City of Hastings municipal water supply well so that MDH sampling results remain below 10 parts per million, without treatment, and reverse the upward trend in the City of Hastings municipal wells' MDH nitrate results.
2) To continue to meet drinking water standards for agricultural pesticides and/or pesticide breakdown products in each individual City of Hastings municipal water supply well, and to reduce the number and quantity of such chemicals detected in municipal wells.
3) To have median nitrate levels, per Dakota County local government unit, at or below 3 parts per million, without treatment, in private drinking water wells throughout Dakota County.
4) To continue to meet drinking water standards for agricultural pesticides and/or pesticide breakdown products in private drinking water wells, and to reduce the number and quantity of such chemicals detected in private drinking water wells.
5) To reduce organic wastewater components in Dakota County drinking water supplies (public and private) below current detection limits.

Goals for economic and health factors:

1) To encourage agricultural practices that protect and improve groundwater and surface water quality without affecting the economic viability of agriculture in Dakota County.
2) To meet all health standards for public and private drinking water supplies, as outlined above.

Priority Management Areas:

Two Priority Management areas are identified, based on the findings of the Diagnostic Study and ongoing Vermillion River surface water monitoring: the Wellhead Protection Area currently being delineated by the City of Hastings and the South Branch Sub-watershed of the Vermillion River subwatershed.

# APPENDIX C

## *MUNICIPAL CONTACTS or SEPTIC INSPECTORS IN DAKOTA CO. July 2004

**(Each City & Township administers their own total Septic System Program)**

| MUNICIPALITY | OFFICIALS NAME | TELEPHONE NO. |
|---|---|---|
| Apple Valley | *Ernie Aden | 952 -953- 2588 |
| Burnsville | Mike Hessian | 952 -895- 4444 |
| Castle Rock Township | Ron Wasmund | 651 -322- 6632 |
| Coates | Bob Hegner | 507- 645- 8486 |
| Douglas Township | For new house ISTS, Bob Hegner | 507- 645- 8486 |
| | All other ISTS, Bob Freiermuth Sr. | 651- 437- 5343 |
| Eagan | Mike Lence | 651 -675- 5676 |
| Empire Township | Ron Wasmund | 651- 322 -6632 |
| Eureka Township | Bob Hegner | 507- 645- 8486 |
| Farmington | Darrel Gilmer | 651 -463- 1830 |
| Greenvale Township | Bob Hegner | 507 -645- 8486 |
| Hampton City | *Joy Stoleson | 651 -437- 8846 |
| Hampton Township | Bob Freiermuth Sr. | 651 -437- 5343 |
| Hastings | Bill Meseros | 651 -437- 4127 |
| Inver Grove Heights | Joe Merchak | 651 -450- 2550 |
| Lakeville | Chris Rosival | 952- 985- 4440 |
| Marshan Township | Ron Wasmund | 651- 322 -6632 |
| Mendota Heights | Ron Wasmund | 651- 322 -6632 |
| Miesville | Bob Freiermuth Sr. | 651 -437- 5343 |
| New Trier | *Kathy Fritz | 651-437-8262 |
| Nininger | Ed Samuelson | 651 -437- 6310 |
| Northfield | *Joel West | 507 -645- 3006 |
| Randolph City | Bob Hegner | 507 -645- 8486 |
| Randolph Township | Bob Hegner | 507 -645- 8486 |
| Ravenna Township | Ron Wasmund | 651- 322 -6632 |
| Rosemount | Ron Wasmund | 651 -322- 6632 |
| Sciota Township | Bob Hegner | 507 -645- 8486 |
| South St. Paul | Benny Svien | 651 -554- 3222 |
| Sunfish Lake | Ron Wasmund | 651 -322- 6632 |
| Vermillion City | Ron Wasmund | 651 -322- 6632 |
| Vermillion Twp | Darrel Gilmer | 651 -463- 7273 |
| Waterford Township | Bob Hegner | 507 -645- 8486 |
| West St. Paul | Ron Wasmund | 651- 322 -6632 |
| Twp Shoreland/Flood Plain Areas | Tom Berry, Dakota County Planning | 952 -891- 7030 |

**SEND COMPLIANCE INSPECTIONS TO THESE MUNICIPAL ADDRESSES IN DAKOTA COUNTY**
**(May 2004)**
**(Each City & Township administers their own total Septic System Program)**

| MUNICIPALITY | OFFICIAL'S NAME | ADDRESS |
|---|---|---|
| Apple Valley | *Ernie Aden | City Hall, 7100 W 147th St., 55124 |
| Burnsville | Mike Hessian | CityHall,100 Civic Center Parkway,Burnsville 55337 |
| Castle Rock Township | *Maralee Rother | Town Clerk, 2537 240th St. Farmington, 55024 |
| Coates | *Marjorie Karnick | Town Clerk, 15660 Clayton Av., Rosemount, 55068 |
| Douglas Township | *Ralph Schweich | Town Clerk, 11581 240th St E, Hampton, 55031 |
| Eagan | Mike Lence | City Hall, 3830 Pilot Knob Rd, Eagan, 55122 |
| Empire Township | *Kathleen Krippner | Town Clerk, 3385 197th St., Farmington, 55024 |
| Eureka Township | *Nanett Leine | Township Clerk, 24797 Highview, Lakeville, 55044 |
| Farmington | Darrel Gilmer | City Hall, 325 Oak St., Farmington 55024 |
| Greenvale Township | *Edith Nelson | Town Clerk, 29292 Isle Ave W, Northfield, 55057 |
| Hampton City | *Mavis Gerber | Town Clerk, P.O. Box 128, Hampton, 55031 |
| Hampton Twp | *Eunice Schiller | Town Clerk, 22885 Goodwin Av., Hampton, 55031 |
| Hastings | Bill Meseros | City Hall, 101 4th St. E, Hastings, 55033 |
| Inver Grove Heights | Joe Merchak | City Hall, 8150 Barbara Av., I.G.Heights, 55077 |
| Lakeville | Chris Rosival | City Hall, 20195 Holyoke Av., Lakeville 55044 |
| Marshan Township | *Marjory Snyder | Town Clerk, 19980 Nicolai Av, Hastings, 55033 |
| Mendota Heights | *Jim Danielson | 1101 Victoria Curve, Mendota Heights, 55118 |
| Miesville | *Anita Freiemuth | Town Clerk, 14115 240th St, Cannon Falls, 55009 |
| New Trier | *Kathy Fritz | Mayor, 8540 240th St E, Hampton, 55031 |
| Nininger | Ed Samuelson | Bldg Official, 9507 123rd St. E Hastings, 55033 |
| Northfield | *Joel West | City Hall, 801 Washington St., Northfield, 55057 |
| Randolph City | *Sheila Ekstrom | Town Clerk, PO Box 142, Randolph, 55065 |
| Randolph Township | *Geri Baumgartner | Town Clerk, PO Box 142, Randolph, 55065 |
| Ravenna Township | Barb Kienberger | Clerk, 20425 Red Wing Blvd, Hastings 55033 |
| Rosemount | Mary Ann Stoffel | City Hall, 2875 145th St W, Rosemount, 55068 |
| Sciota Township | *Cindy Penny | Clerk, 31250 Sciota Trail, Northfield, 55057 |
| South St. Paul | *Frank Martin | Municipal Bldg., 125 3rd Av N, So. St. Paul, 55075 |
| Sunfish Lake | *Frank Tiffany | 369 Salem Church Rd, St. Paul, 55118 |
| Vermillion City | *Patricia Ward | Town Clerk, PO Box 67, Vermillion, 55085 |
| Vermillion Twp | *Faith Siebenaler | Town Clerk, 19895 Inga Av, Hastings, 555033 |
| Waterford Township | *Mary Ellen Frame, | Twp Clerk, 31679 Dahomey Av., Northfield, 55057 |
| West St. Paul | *Terry Maruska | Bldg Official, 1616 Humboldt Av, W St. Paul, 55118 |
| Twp Shoreland/Flood Plain | Tom Berry | Dakota County Planning, 14955 Galaxie Av., Apple Valley, 55124 |

*Municipal Contact, **NOT** Septic System Inspector o:walm/ists/MunicipalAddresses2sendComplInspections2.

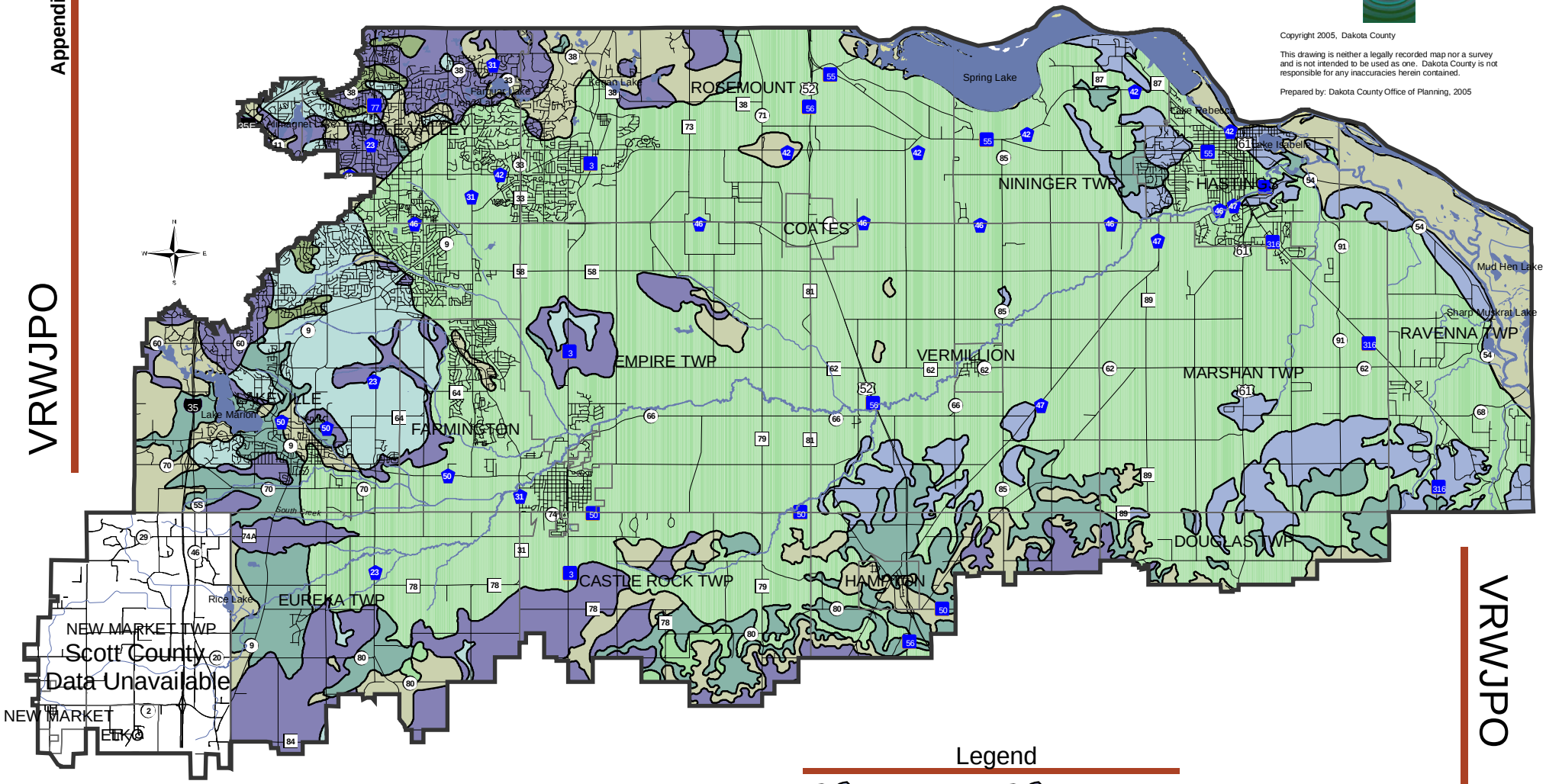
Appendix D

VRWJPO

Vermillion River Watershed Joint Powers Organization



Prepared by: Dakota County Office of Planning, 2005




## Legend

- Very High
- High
- High-Moderate
- Moderate
- Low-Moderate
- Low
- Very-Low
- Water

0 1 2 4 6
Miles

# Groundwater Sensitivity

Derived from the Dakota County Geologic Atlas, Minnesota Geological Survey, 1990

VRWJPO

Appendix D

# APPENDIX E

## JOINT POWERS AGREEMENT
## BETWEEN DAKOTA COUNTY AND SCOTT COUNTY
## FOR VERMILLION RIVER WATERSHED

WHEREAS, Minnesota Statutes § 471.59 authorizes local governmental units to jointly or cooperatively exercise any power common to the contracting parties; and

WHEREAS, pursuant to Minn. Stat. § 103B.231 a watershed management plan is required for watersheds comprising all minor watershed units wholly or partly within the metropolitan area, in accordance with the requirements of § 103B.205 to § 103B.255; and

WHEREAS, the Vermillion River Watershed is a watershed comprising minor watershed units wholly within the metropolitan area, specifically, within Dakota County and Scott County; and

WHEREAS, pursuant to Minn. Stat. § 103B.231 if a watershed management organization within the metropolitan area is terminated, the counties containing the watershed unit shall prepare, adopt, and implement the watershed plan and shall have the planning, review, permitting, and financing authority of a watershed management organization specified in Minn. Stat. §§ 103B.211 to 103B.255; and

WHEREAS, the Vermillion River Watershed Management Organization, consisting of 21 cities and towns located within the Vermillion River Watershed ceased to exist as of August 1, 2000; and

WHEREAS, Dakota County and Scott County desire to cooperatively carry out their responsibilities and duties pursuant to Minn. Stat. §§ 103B. 211 to 103B.255; and

WHEREAS, Dakota County and Scott County desire to do so pursuant to the authority granted to them pursuant to Minn. Stat. § 471.59.

NOW, THEREFORE, in consideration of the mutual promises and benefits that Dakota County and Scott County shall derive herefrom, Dakota County and Scott County hereby enter into this joint powers agreement for the purposes herein.

I. Purposes.

This Agreement has been executed by Dakota and Scott Counties for the purposes set forth at Minn. Stat. § 103B.201 within the political boundary of the Vermillion River watershed located in Dakota County and Scott County, as shown on the attached Map A, hereby incorporated by reference. Specifically, the purpose of this Agreement is to establish a joint powers board that will (1) exercise leadership in the development of policies, programs and projects that will promote the accomplishment of the purposes found at Minn. Stat. § 103B.201, including the preparation, adoption and implementation of the plan required by Minn. Stat. § 103B.211 for the Vermillion

River watershed and (2) guide and assist Dakota County and Scott County in acting jointly and individually to take actions that will promote the goals listed in Minn. Stat. § 103B.201 and fulfill their responsibilities under Chapter 103B.

II. Joint Powers Board.

A. Creation and Composition of Joint Powers Board.

A joint powers board, known as the Vermillion River Watershed Joint Powers Board (VRWJPB), is established for the purposes contained herein with the powers and duties set forth in this Agreement. The VRWJPB shall consist of one county commissioner from Scott County and two county commissioners from Dakota County. The board of commissioners of each county shall appoint, by resolution, its representative(s) to the VRWJPB, together with one alternate commissioner. Resolutions appointing representatives of each county shall be filed with the clerk to the board of commissioners of Dakota County.

B. Terms.

Each county representative and alternate shall be appointed for a two-year term, except that the terms of the initial members shall extend from the date of their appointment through December 31, 2004. In the event that any county representative or alternate shall not have been appointed by the board of commissioners prior to expiration of the representative's term, the incumbent representative shall serve until a successor has been appointed.

C. Vacancies.

If the appointment of any representative commissioner or alternate is vacated before the end of the term, the vacancy shall be filled by appointment by the appropriate county board of commissioners. A vacancy shall be deemed to have occurred when any of the conditions specified in Minn. Stat. § 351.02 exist or if a representative fails to qualify or act as a commissioner.

D. Chair and Vice-chair.

The VRWJPB shall elect a chair and a vice-chair from its membership for one-year terms. The chair shall preside at all meetings of the VRWJPB and shall perform other duties and functions as may be determined by the VRWJPB. The vice-chair shall preside over and act for the VRWJPB during the absence of the chair.

E. Secretary/Treasurer.

The VRWJPB shall elect a secretary/treasurer from its membership for a one-year term. The secretary/treasurer shall submit all minutes of VRWJPB

meetings for approval by the VRWJPB and shall assist the chair in overseeing the VRWJPB's budget and finances.

F. Meetings.

The VRWJPB shall have regular meetings at least annually and at such times and places as the VRWJPB shall determine. Special meetings may be held on reasonable notice by the chair or by a majority of the VRWJPB upon terms and conditions as the VRWJPB may determine. The presence of a majority of the VRWJPB at a meeting shall constitute a quorum. The VRWJPB shall be subject to the requirements of the Open Meeting Law, Minn. Stat. Ch. 13D.

G. Voting.

Each county representative shall be entitled to one vote. If a county representative is absent that county's alternate is entitled to one vote. If more than one Dakota County representative is absent, Dakota County's alternate shall be entitled to only one vote. The VRWJPB shall function by a majority vote of the county representatives present.

H. Staff.

Dakota County and Scott County shall provide staff support to the VRWJPB. Dakota County and Scott County shall provide legal services as needed, and in accordance with law.

I. Duties of the VRWJPB.

The VRWJPB shall have the responsibility to prepare, adopt and implement a plan for the Vermillion River watershed that meets the requirements of Minn. Stat. § 103B.231; the responsibility to review and approve local water management plans as provided in Minn. Stat. § 103B.235; the responsibility to regulate the use and development of land in the Vermillion River watershed if the conditions found at Minn. Stat. §. 103B.211, subd. 1(3)(i)(ii)(iii) are present.

III. Powers of the VRWJPB.

A. General Powers.

The VRWJPB is hereby authorized to exercise such authority as is necessary and proper to fulfill its purposes and perform the duties identified in paragraph II(I) above. Such authority shall include, but not be limited to, those specific powers enumerated in paragraph III (Sections B through I) herein. The VRWJPB may refer decisions for approval by the boards of commissioners of

Dakota County and Scott County. The VRWJPB shall not have the authority described at Minn. Stat. § 103B.211, subd. 1(a)(6).

B. Contracts.

The VRWJPB may enter into any contract necessary or proper for the exercise of its powers or the fulfillment of its duties and enforce such contracts to the extent available in equity or at law, including contracts with Dakota County and/or Scott County. Additionally, the VRWJPB may enter into agreements pursuant to Minn. Stat. § 471.59. The VRWJPB may approve any contract up to the amount included in the approved annual budget and may authorize its chair to execute these contracts. No payment on any invoice for services performed by a consultant or any other person or organization providing services in connection with this Agreement shall be authorized unless approved by the chair and vice-chair or by the chair and secretary/treasurer. The chair shall report to the VRWJPB and the VRWJPB shall ratify any such payments authorized under this provision at its next regular meeting.

C. Funds.

The VRWJPB may disburse funds in a manner which is consistent with the Agreement and with the method provided by law for the disbursement of funds by the parties to this Agreement.

D. Bylaws.

The VRWJPB shall have the power to adopt and amend such bylaws that it may deem necessary or desirable for the conduct of its business. Such bylaws shall be consistent with this Agreement and any applicable laws or regulations.

E. Grants and Loans.

The VRWJPB may apply for and accept gifts, grants or loans of money, other property or assistance from the United States government, the State of Minnesota, or any person, association or agency for any of its purposes; enter into any agreement in connection therewith; and hold, use and dispose of such money, other property and assistance in accordance with the terms of the gift, grant or loan relating thereto.

F. Property.

The VRWJPB may hold such property as may be required to accomplish the purposes of this Agreement and upon termination of this Agreement make distribution of such property as is provided for in this Agreement.

G. Insurance.

The VRWJPB may obtain any liability insurance or other insurance it deems necessary to insure itself and Dakota County and Scott County for action arising out of this Agreement.

H. Exercise of Powers.

All powers granted herein shall be exercised by the VRWJPB in a fiscally responsible manner and in accordance with the requirements of law. The purchasing and contracting requirements of the county which is the lead for the project shall apply to the VRWJPB.

I. Public Participation.

The VRWJPB shall provide for such public participation in the conduct of its activities as will promote understanding of its activities among the public and local governmental units affected by the activities and the informal resolution of disputes or complaints.

IV. Reservation of Authority.

All responsibilities not specifically set out to be jointly exercised by the VRWJPB under this Agreement are hereby reserved to the Counties.

V. Budgeting and Funding.

A. Budget.

By September 1 of each year, the VRWJPB shall adopt a budget for the following calendar year. Any proposed contribution from Dakota County or Scott County which the VRWJPB deems appropriate to be satisfied from the annual property tax levy must be recommended to Dakota County and Scott County prior to the date by which the counties shall establish their maximum levy pursuant to Minn. Stat. § 275.065, subd. 1. Other proposed contributions or assessments from Dakota County or Scott County may be made at any time.

B. County Funding.

If there is proposed funding from Dakota County or Scott County which is to be satisfied from the annual property tax levy, such proposed funding shall not become the obligation of either county unless and until the respective county has agreed to the funding as part of the county's annual budget and levy process pursuant to Minn. Stat. § 275.065. If there is proposed funding from Dakota County or Scott County which is not to be satisfied from the annual

property tax levy, such funding shall not become the obligation of either county until the respective county has agreed by resolution to the funding.

Any proposed funding from Dakota County or Scott County which has been included within the county's levy or which has been approved by resolution of the Dakota County or Scott County board of commissioners shall constitute an assessment against the county and shall be paid over to the VRWJPB pursuant to its terms, this Agreement, and as required by law.

C. Expenditure Policy.

Dakota County and Scott County agree that the budget for each year shall include expenditures which will benefit the portion of the Vermillion River Watershed located in Scott County.

D. Fiscal Agent.

Dakota County agrees to serve as the fiscal agent for the VRWJPB. Dakota County agrees to provide any and all budgeting and accounting services necessary or convenient for the VRWJPB. Such services include, but are not limited to, management of all funds, including county contributions and grant monies; payment for contracted services; relevant record keeping and bookkeeping. The treasurer/auditor of Dakota County shall act as controller for the VRWJPB and shall draw warrants to pay demands against the VRWJPB when the demands have been approved by the VRWJPB. Scott County retains the authority to request reports pertaining to any and all budgeting and accounting services. All interest earned from VRWJPB funds shall be credited back to that fund.

E. Accountability.

All funds shall be accounted for according to generally accepted accounting principles.

VI. Watershed Planning Commission.

As soon as practicable after appointment of the VRWJPB, the VRWJPB by resolution shall establish and make appointments to the Watershed Planning Commission (WPC). The VRWJPB shall utilize an open appointments process for making these appointments.

A. Responsibilities of WPC.

The WPC shall have the responsibility to advise the VRWJPB with respect to implementation of the VRWJPB's duties pursuant to this Agreement, including the responsibility to review, comment and recommend upon the proposed

watershed management plan; review, comment and recommend upon the proposed annual work plan and budget; and recommend action regarding disputes pursuant to section IX hereof.

B. Membership.

The WPC shall consist of nine members who are residents of the Vermillion River Watershed. One shall be from Scott County and eight shall be from Dakota County. WPC members shall be appointed to three-year staggered terms. WPC members must be and remain residents of the watershed and the County from which they were appointed. WPC members are limited to serving two consecutive terms.

C. Conflict of Interest.

If any WPC member has a financial interest or personal interest with respect to the parties involved, or stands to realize a financial or personal gain or loss with respect to an action on any matter coming before the WPC, that member shall disclose this fact and be disqualified from taking part in any discussion or action on the matter as a member of the WPC. The chair of the WPC shall make rulings on such disqualifications. Any WPC member who believes that the WPC chair should be disqualified from any matter hereunder may refer the matter to the vice-chair who shall make a ruling on such disqualification.

D. Compensation.

Members of the WPC shall be eligible to receive a per diem payment of $35 per meeting in lieu of expenses.

E. Officers.

The WPC shall elect a chair and vice-chair from among its members. The chair and vice-chair shall serve for one-year terms.

F. Meetings.

The WPC shall meet regularly pursuant to a schedule established by the WPC. Special meetings may be called by the chair. The WPC shall be subject to the Open Meeting Law, Minn. Stat. Ch. 13D.

G. Bylaws.

The WPC shall adopt bylaws governing its activities. Such bylaws shall be subject to approval by the VRWJPB and shall be consistent with law and terms of this Agreement.

H. Staff Support.

Dakota County and Scott County shall provide staff support to the WPC. The cost of such support will be funded through the budget of the VRWJPB. The VRWJPB also may make technical support available to the WPC.

VII. Indemnification.

If the VRWJPB incurs any expenses as a result of a claim for damages, the expenses and any damages paid shall be assessed against the counties in proportionate shares. Proportionality will be measured with reference to fault, percentage of county financial contribution, location of the project or other similar factors giving rise to the damages or expenses. Dakota County and Scott County hereby agree to indemnify, save, hold harmless and defend the VRWJPB, its officers, employees, and agents for negligent or intentional acts or omissions of itself, its officers, employees, and agents that result in expenses or damages assessed against the VRWJPB.

VIII. Records, Accounts, and Reports.

The books and records of the VRWJPB shall be subject to the provisions of Minn. Stat. Ch. 13. The VRWJPB annually shall give a complete written report of all financial activities for the previous fiscal year to the counties.

IX. Dispute Resolution.

Disputes between Dakota County and Scott County may be addressed by any means agreed upon by them, and may include the procedures set forth at Minn. Stat. § 103B.345.

X. Termination.

This Agreement shall terminate upon the withdrawal of either member county. Either county may withdraw upon one year's written notice to the other county. Withdrawal shall not act to discharge any liability incurred or chargeable to the withdrawing county before the effective date of the withdrawal. Such liability shall continue until discharged by law or agreement.

XI. Distribution of Surplus Funds and Property.

Upon termination of this Agreement, funds and property held by the VRWJPB shall then be distributed to Dakota County and Scott County in proportion to their contributions.

XII. Amendments.

This Agreement may be amended only in writing and upon consent of each of the county boards of commissioners of Dakota County and Scott County.

**IN WITNESS WHEREOF**, the parties have executed this Agreement on the dates indicated below.

Approved as to form:

_____
Assistant Dakota County Attorney/Date

**COUNTY OF DAKOTA**

By_____

Title Chair
Date of Signature_____

ATTEST:

_____
Title Clerk to the Board

Approved as to form:

_____
Assistant Scott County Attorney/Date

**COUNTY OF SCOTT**

By_____

Title Chair
Date of Signature_____

ATTEST:

_____
Title _____

K/K02-181 Vermillion River Watershed Board JPA

Minnesota Board of Water and Soil Resources
520 Lafayette Road North
St. Paul, Minnesota 55155

| | |
|---|---|
| **In the Matter** of the review of the Watershed Management Plan for the **Vermillion River Watershed Joint Powers Organization** pursuant to Minnesota Statutes Section 103B.231, Subdivision 9 | **ORDER APPROVING WATERSHEDMANAGEMENT PLAN** |

**Whereas**, the Board of the Vermillion River Watershed Joint-Powers Organization (VRWJPO) submitted a Watershed Management Plan (Plan) to the Minnesota Board of Water and Soil Resources (Board) pursuant to M.S. Section 103B.231, Subd. 9, and;

**Whereas**, the Board has completed its review of the Plan;

**Now Therefore**, the Board hereby makes the following Findings of Fact, Conclusions and Order:

## FINDINGS OF FACT

1. **District Establishment.** The VRWJPO was established by an executed joint powers agreement between Dakota and Scott Counties in September 2002. The VRWJPO provides the forum for the counties to prioritize and address intercommunity drainage issues affecting the 21 cities and townships that comprised the former Vermillion River Watershed Management Organization.

2. **Requirement to Plan.** The Metropolitan Water Management Act requires the preparation of a watershed management plan for the subject watershed area which meets the requirements of Minnesota Statutes Sections 103B.201 to 103B.251. The VRWJPO protects and preserves water resource, establishes policies for water resources management, prevents soil erosion, promotes groundwater recharge and protects wildlife habitat all while minimizing public capital expenditures.

3. **Nature of the Watershed.** The VRWJPO covers 335 square miles of Dakota and Scott Counties. The River flows 38 miles in an easterly direction before dropping 90 feet at the falls in the City of Hastings before entering the Mississippi River. The VRWJPO includes 49 miles of trout habitat, several wastewater treatment plants, and includes the large populations of Lakeville, Farmington, and Apple Valley in the upper watershed (See enclosed overview with map).

4. **Local Review.** The VRWJPO circulated a copy of the draft Plan to local units of government for their review pursuant to Minnesota Statutes Section 103B.231, Subd. 7, prior to submittal to the Metropolitan Council. Comments were received from ten communities.

5. **Metropolitan Council Review.** In letters dated December 29, 2004 and June 28, 2005 the Council submitted numerous comments. An underlining theme in both review letters was the need for local plans to address detailed standards and hit the goals the JPO establishes for them. To that end, it was desired that additional guidance be provided to local governments. Metropolitan Council specifically noted allowable peak runoff rates, soil erosion controls, and the need to provide some guidance on how wetlands will be managed over the long haul. The JPO made a number of favorable changes to the plan to accommodate Met Councils concerns. However some language proposed by the JPO ended up seemingly lessening the requirement for local plan development. In their 45-day comment letters both BWSR and Met Council rejected the notion that the local water plans could be de-emphasized from both practical and statutory perspectives. The VRWJPO has since revised the language in response to the comments received.

6. **Department of Agriculture Review.** The Minnesota Department of Agriculture commented during both review periods in letters dated January 11, 2004 and June 14, 2005. Their primary concern was that the VRWJPO was encouraged to continue to work with them on ground water protection in the agricultural sand plain areas in the east half of the watershed. It is the VRWJPO intent to continue the association.

7. **Department of Health Review.** The Department did not provide written comments.

8. **Department of Natural Resources Review.** The DNR provided ample comments in letters dated January 14, 2005 and July 26, 2005. The DNR was complimentary of the comprehensive approach, which the plan undertook and provided 11 pages of comments addressing nearly all areas of the plan. The DNR indicated in their July 2005 correspondence that the JPO had sufficiently considered responses to these first round of comments. Additional comments raised by the DNR were varied and ranged from typographical corrections to a commitment to continue the agency's participation with the development of rules and standards all the way through the adoption process. Other issues raised included expressing a desire for the watershed to someday undertake measures to address inadequate public access on watershed lakes, incorporation of barriers to fish migration on outlets for landlocked basins, and incorporation of Scott County ground water data which had yet to be included in the plan. DNR expressed a concern that the local governments place a similar emphasis on protecting the cold-water fishery that the VRWJPO was. The plan text has gone to extraordinary lengths to make sure that local water plans and the standards that they adopt will have full buy-in by the local communities by the time the standards development process is completed in early

2006. The Commission has also articulated the regulatory structure by which communities may elect to regulate development to these standards or defer to JPO rules that will allow the VRWJPO to regulate activity in the absence of local controls.

9. **Pollution Control Agency Review.** The PCA provided comment in January 18, 2005 correspondence. Major comments included: clarifying roles of various levels of government and whether the role was voluntary or mandatory, clarifying when the cessation of wastewater flows from the Empire WWTP would occur, the need to address the increasing flow trend observed in the river, the anticipated role of the JPO in addressing the TMDLs needed in the watershed, the development standards to promote infiltration, need to mention the various citizen monitoring programs available for enlarging the monitoring network in the watershed, and a request to eliminate the words "whenever possible" from policy language addressing wetland replacement areas.

   The PCA letter of July 28, 2005 indicated that these items were satisfactorily addressed and went on to note additional issues. The VRWJPO did satisfactorily address agency concerns with the exception of one item. The VRWJPO elected to retain their language addressing wetland replacement areas. It was their position that removal of the phrase "whenever possible" essentially would constitute a complete prohibition of wetland replacement occurring outside of the subwatershed in which the impact occurred. Noting that this was sometimes physically impossible, the VRWJPO affirmed their desire to see subwatershed wetland replacement but declined to change the policy. Several PCA comments on detailed standards were deferred to the upcoming minor amendment process wherein the standards developed through the technical advisory group would be adopted.

10. **Board Review.** BWSR commented in letters dated January 13, 2005 and July 27, 2005. Primary concerns on both plan drafts were that they more clearly lay out the relative priority of the numerous action items listed. The capital improvements portion of the plan needed to indicate the source and portion of the total project cost to be addressed by the VRWJPO. Other comments addressed the clarity of local planning and regulatory requirements and that sufficient documentation be provided regarding the detailed standards being developed on a parallel path. The VRWJPO responded by providing the required information for the implementation plan addressing source and timing of funds. The new table clearly articulates the requirements for local plans, and a great deal of clarifying text now signals the organization's intent to adopt detailed regulatory standards via the minor amendment process.

11. **Highlights of the Plan.** The critical elements included in the Plan and process are:

    a. The organization made a conscious decision to save the cold water trout fishery
    b. JPO recognizes significant local efforts have been made within the developing

communities for managing water resources

c. Plan strikes an informed balance between local implementation and watershed level implementation
d. Local governments are given the option for regulating per watershed standards or, in the absence of local controls, the JPO will have rules with which to regulate directly
e. Identification of priority issues determined through extensive citizen involvement and agency participation

## CONCLUSIONS

1. All relevant substantive and procedural requirements of law and rule have been fulfilled.

2. The Board has proper jurisdiction in the matter of approving a Watershed Management Plan for the Vermillion River Watershed Joint Powers Organization pursuant to Minnesota Statutes Sections 103B.201, Subd. 9.

3. The Vermillion River Watershed Joint Powers Organization Plan attached to this Order defines water and water-related problems within the VRWJPO boundary, possible solutions thereto, and an implementation program.

4. The attached Plan is in conformance with the requirements of Minnesota Statutes Sections 103B.201 to 103B.251.

## ORDER

The Board hereby approves the attached Plan dated June 2001 as the Watershed Management Plan for the Vermillion River Watershed Joint Powers Organization.

Dated at Saint Paul, Minnesota this 26th day of October, 2005.

MINNESOTA BOARD OF WATER AND SOIL RESOURCES

BY: Jerome Deal, Chair

H:\October 26, 2005\Vermillion River Board Order doc

**Vermillion River Watershed Joint Powers Organization**
**14955 Galaxie Avenue ~ Apple Valley, MN 55124**
**952.891.7030 ~ Fax 952.891.7031**

VERMILLION RIVER WATERSHED JOINT POWERS ORGANIZATION

STATE OF MINNESOTA

RESOLUTION DATE: Nov. 3, 2005

RESOLUTION APPROVING WATERSHED PLAN

WHEREAS, the Vermillion River Watershed Joint Powers Organization (VRWJPO) is the Watershed Management Organization responsible for preparing a watershed plan for the Vermillion River Watershed, pursuant to Minn. Stat. 103B.231; and

WHEREAS, the VRWJPO has prepared such watershed plan entitled "Vermillion River Watershed Joint Powers Organization, Watershed Plan, September 2005" (hereinafter the "Plan"); and

WHEREAS, the Plan has been reviewed in accordance with the requirements of Minn. Stat. 103B.231, including approval by the Minnesota Board of Water and Soil Resources on October 26, 2005; and

WHEREAS, the VRWJPO find that the adoption of the Plan is in accordance with requirements of law and in the best interests of the public:

NOW, THEREFORE, BE IT RESOLVED, by the Joint Powers Board of the VRWJPO as follows:

1. The Plan is hereby approved in accordance with Minn. Stat. 103B.231, Subd. 10.
2. The VRWJPO Administrator is directed to transmit copies of the Plan as approved by the Joint Powers Board at their November 3, 2005 meeting, together with a letter advising the cities and townships of their obligation to adopt and/or amend local watershed management plans in accordance with Minn. Stat. 103B.235.

Adopted by the Joint Powers Board of the VRWJPO this 3rd day of November, 2005.

Joseph A. Harris

Chair

ATTEST:

JENNIFER A. CUKROWSKI
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2007

Jennifer A. Cukrowski