

# Introduction and Project Background

## Middle Minnesota Major Watershed Resource Investigation and Seven Mile Creek

This report is the end product of a scientific attempt at understanding and protecting water quality in a small agricultural watershed in South Central Minnesota. The outcomes of this report are two-fold.

- Develop a list of action priorities, which provide the most effective enhancement for water quality with the smallest economic impact on stakeholders.
- Provide realistic pollution reduction goals and implementation plan for the watershed.

To do this effectively, five basic components of the watershed needed to be addressed. This report covers the first three components listed below.

1. the sources of pollution
2. the pathways of movement
3. the factors affecting delivery to the study area
4. the relative cost and effectiveness of various management strategies
5. the potential socio-economic impacts of these strategies on stakeholders.

Major funding sources during the two-year water resource investigation project included the Minnesota Pollution Control Agency, Nicollet County, and the Minnesota Department of Natural Resources.

### Project Background & History

The Middle Minnesota Basin covers 1,350 square miles in parts of eight counties in south central Minnesota--Redwood, Brown, Cottonwood, Blue Earth, and Le Sueur on the south and east side of the Minnesota River, and Renville, Nicollet, and Sibley on the north side. The basin ranks sixth in area of the twelve watersheds supplying the Minnesota River.

Map 1 gives the location of the Middle Minnesota Major Watershed and Seven Mile Creek in context to the state and map 2 shows the Middle MN in more detail.

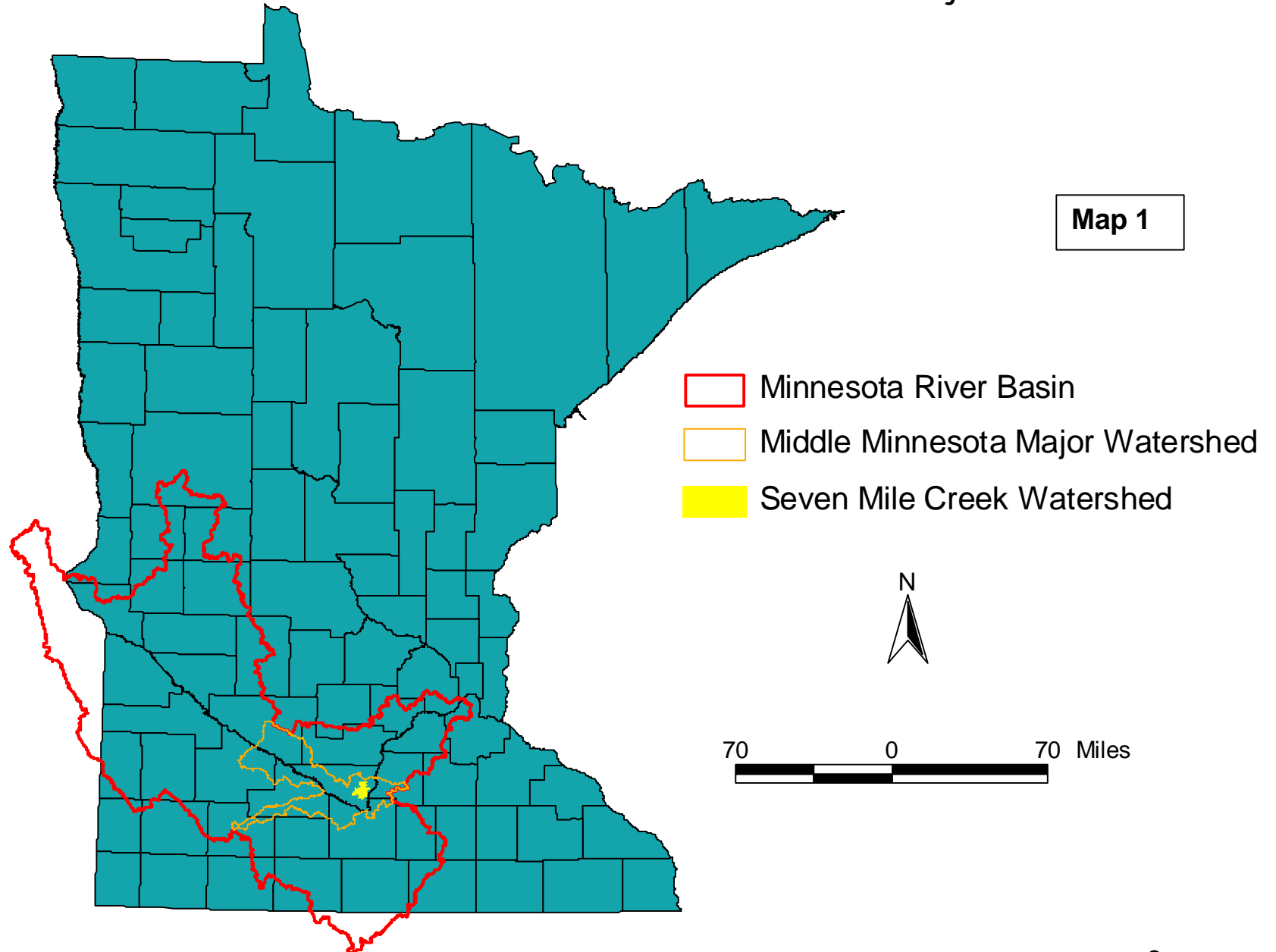
Except for the Little Cottonwood River, the streams comprising the Middle Minnesota Basin are first- or second-order streams. That makes this basin somewhat unique; the rest of the twelve basins all have identifying dendritic rivers. The Middle also differs from all the other basins in that there is no single reach on the main river where the effects of the basin drainage can be monitored. This is because the mouths of four entire basins (Cottonwood, Blue Earth, Watonwan, and Le Sueur) enter the Minnesota at points in the area of the Middle Minnesota. Due to the large number of small streams feeding the Minnesota River, this can pose difficulty in establishing water resource monitoring and implementation plans for the Middle Minnesota Major Watershed.

This project does not include work on two streams, which are already under assessment by separate Clean Water Partnerships--the Little Cottonwood River Project (see *Little Cottonwood River Restoration Project*, 2000 for more information on that particular watershed) and the Lake Crystal-Minneopa Creek Project.

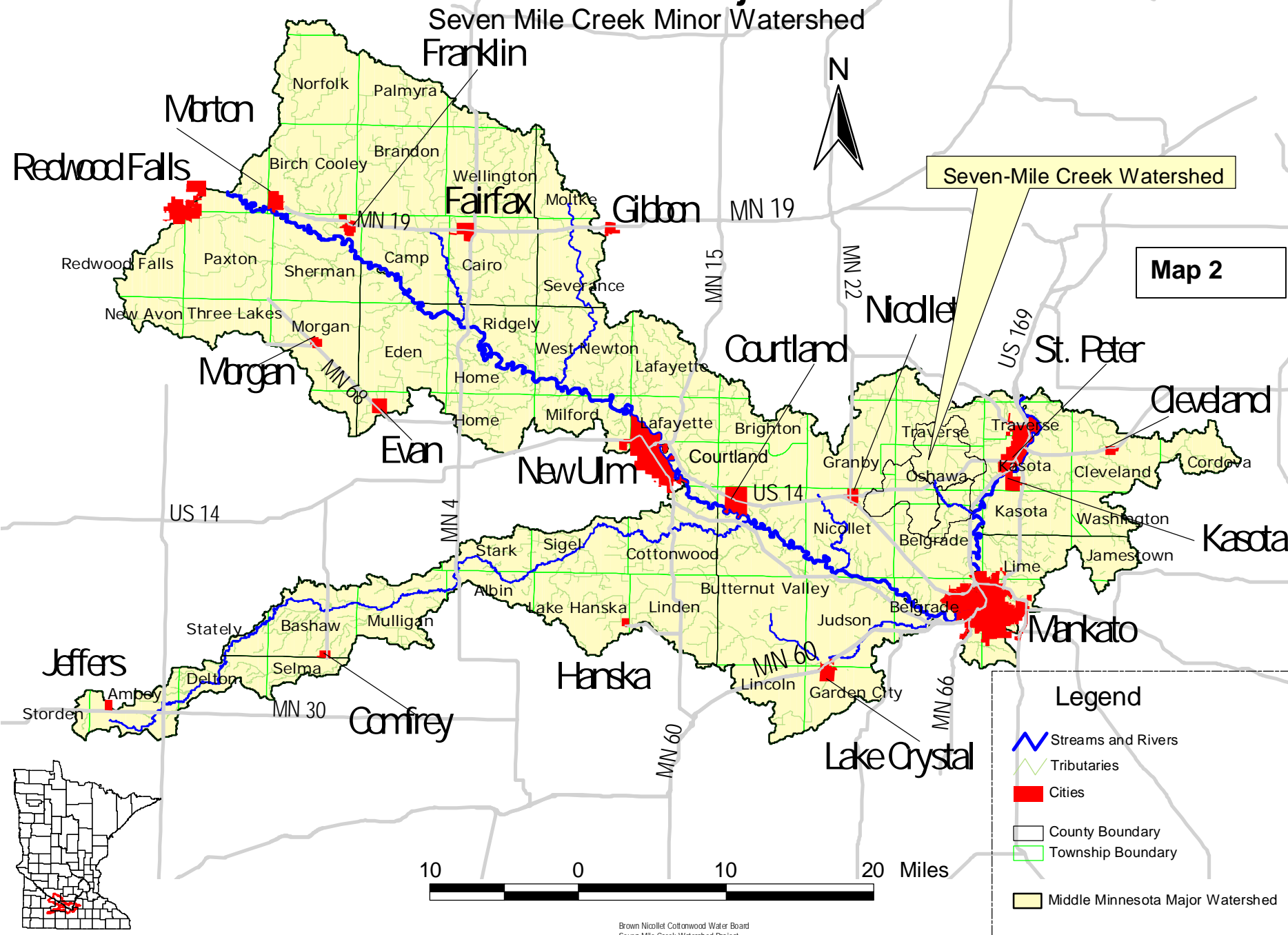
The Major Middle MN streams on the south and east sides of the Minnesota are: Wabasha Creek, Hindeman (also known as Spring) Creek, the Little Cottonwood River, Minneopa Creek, and Shanaska Creek. Major streams on the north side of the Minnesota include: Birch Coulee, Ft. Ridgely Creek, Eight Mile Creek, St. George Creek, Nicollet Creek (also known as the Swan Lake Outlet), North Ridge Outlet, Hiniker Creek, Seven Mile Creek, and Robart's (also known as Robert's or Roger's) Creek. The Middle Minnesota Basin includes several small pothole lakes, and two major lakes--Crystal Lake in Blue Earth County and Swan Lake in Nicollet County.

# Seven Mile Creek Watershed

in Relation to Minnesota River Basin and Middle MN Major Watershed



# Middle Minnesota Major Watershed



Brown Nicollet Cottonwood Water Board  
Seven Mile Creek Watershed Project

The Middle Minnesota basin contains five wildlife management areas, two state parks, two city/county parks/campgrounds, and six historical sites. The population residing in the Middle Minnesota watershed is over 50,000. It covers part or all of 56 townships and the following cities:

Blue Earth County: Lake Crystal, part of Mankato

Brown County: Evan, Comfrey

Le Sueur County: Cleveland, Kasota

Nicollet County: St. George, Klossner, Nicollet, Courtland, North Mankato, St. Peter

Redwood County: Morgan, Lower Sioux Indian Reservation

Renville County: Fairfax, Franklin, Morton

Sibley County: Gibbon

Two of the communities, St. George and Evan, are considered "unsewered communities."

-St. George has recently been updated using wetlands.

The upland areas of the basin were formerly prairie; stream ravines were (and still are) forest. As in many other rural Midwest areas, the Middle Minnesota Basin is undergoing change. The increase in numbers of large animal production farms is resulting in controversy regarding the long- and short-term effects of new feedlots, and increased scrutiny focused on manure and nutrient management. Drainage issues are also contentious. Other land use issues emerging in the Middle Minnesota include the changes from two-crop agriculture to land retirement through the Conservation Reserve Enhancement Program (CREP), and long-term effects of urban and suburban expansion.

## Why the Project is Taking Place

The Minnesota River does not meet state and federal water quality standards and is a major source of pollution to the Mississippi River. It is a high priority of the State of Minnesota to restore the Minnesota River to fishable and swimmable conditions within ten years, from 1992-2002. The Minnesota River Assessment Project (MRAP) recommendations translate this general goal into specific pollutant reduction targets and suggest changes required to achieve the targets.

Recommendations include:

- Forty percent reduction in total suspended solids
- Maintenance of nitrate concentrations at less than ten parts per million
- Development of a phosphorus standard for the basin
- The implementation of sediment-reduction and cropland soil loss programs
- Removal of bacteria and other pathogens, which make the river unsafe for human contact

The Middle Minnesota streams covered by this project are mostly first- or second-order streams. In many cases, these streams flow only a few miles before entering the Minnesota River. The Middle Minnesota Basin project began by studying the pollutant contributions of selected streams to the Minnesota/Mississippi system specifically that of the Seven Mile Creek Watershed. Due to the watershed's size, location, trout fishery, and applicable research Seven Mile Creek Watershed was chosen. It was felt the watershed could serve as a demonstration for other watersheds in terms of cost effective modeling using GIS nutrient management/manure management demonstrations and new ecosystem management techniques. The project also evaluated remediation strategy options and goals, and began citizen awareness and other educational initiatives.

## Existing Water Quality Conditions and Problems

During the MRAP study, major tributaries and the main stem of the Minnesota River were monitored for flow and water quality parameters. Springs and general biological integrity were also evaluated to determine the relative impairment of the riverine environment. The results of the study suggested that not only do flows increase from west to east, but also that loads of sediment and nutrients increase in a downstream progression. Monitoring of Seven Mile Creek Watershed is providing further evidence of that trend. The implication is that every small tributary likely contributes to the overall pollutant load. None of the Middle Minnesota streams were directly monitored during the MRAP study. Follow-up monitoring on the streams in the Middle Minnesota Basin is needed to more clearly define their potential impacts on the Minnesota River.

Some of the streams have been monitored since 1989 as part of groundwater studies, or county water planning initiatives, and localized resource investigation projects. The following Middle MN streams were monitored in 1996 and 1997 in the Middle/Lower Assessment Project (MLAP), a resource investigation project cosponsored by the MPCA:

Camp Pope in Redwood County

Hindeman (also known as Spring) Creek in Redwood and Brown Counties

Shanhaska Creek in Le Sueur County

Fort Ridgely Creek in Renville and Nicollet Counties

Eight Mile Creek in Sibley and Nicollet Counties

St George Creek in Nicollet County

Nicollet Creek (also known as Swan Lake Outlet) in Nicollet County

Seven Mile Creek in Nicollet County

Robart's (also known as Roberts and Rogers) Creek in Nicollet County

The streams were sampled under two schemes; the channel/bed status was evaluated using Tailored Integrated Stream/Watershed Assessment (TISWA), and potential wetland restoration site exploration was begun. The MLAP project also began other watershed assessment activities and established communications with watershed landowners.

Monitoring has also taken place at the following Middle Minnesota locations:

Birch Coulee Creek in Renville County

City of Fairfax inputs from storm and sanitary sewers to Fort Ridgely Creek

Hiniker Creek in Nicollet County

The management of water has strongly influenced current water quality and habitat conditions of the Minnesota River. The nature and character of drainage facility development has produced channel instability and overall ecological dis-equilibrium. The current array of ditches, open-tile intakes, side inlets and subsurface tile lines has transferred flooding problems downstream to other land operators, created highway maintenance problems, and major ditch clean-out expenses.

Drainage augmentations have also influenced water quality in the tributaries and the Minnesota River itself. Drainage from unsewered communities, septic systems directly connected to underground tiles and/or ditches, animal manure from feedlots and winter field applications have increased levels of bacteria and other pathogens. Nitrates and phosphorus are other contaminants of concern from the above situations; contribution of these nutrients is also occurring through untimely and/or heavy applications of chemical fertilizers. Another concern is that of high sediment loads resulting from erosion due to overland runoff, bank erosion and rapid drainage resulting from ditching and tiling.

Urban situations also lead to water quality impairment of the streams and the river. These include sediment, nutrients, and other contaminants from storm runoff, periodic inundation of sewage treatment ponds located in the river flood plain, and pollution resulting from over application of fertilizers within tributary communities.

Working with counties, communities, agriculture, industry, institutions and citizens to increase awareness and concern about the above contaminant contribution situations is the highest priority of the Middle Minnesota Basin Project.

## Seven Mile Creek Watershed Project

Due to the nature of the Middle Minnesota Basin, a sub-watershed within the Middle was chosen for a two-year water quality monitoring study. Seven Mile Creek Watershed located just south of St. Peter in Nicollet County was chosen as a study watershed during the two-year grant. See map 3.

### Background

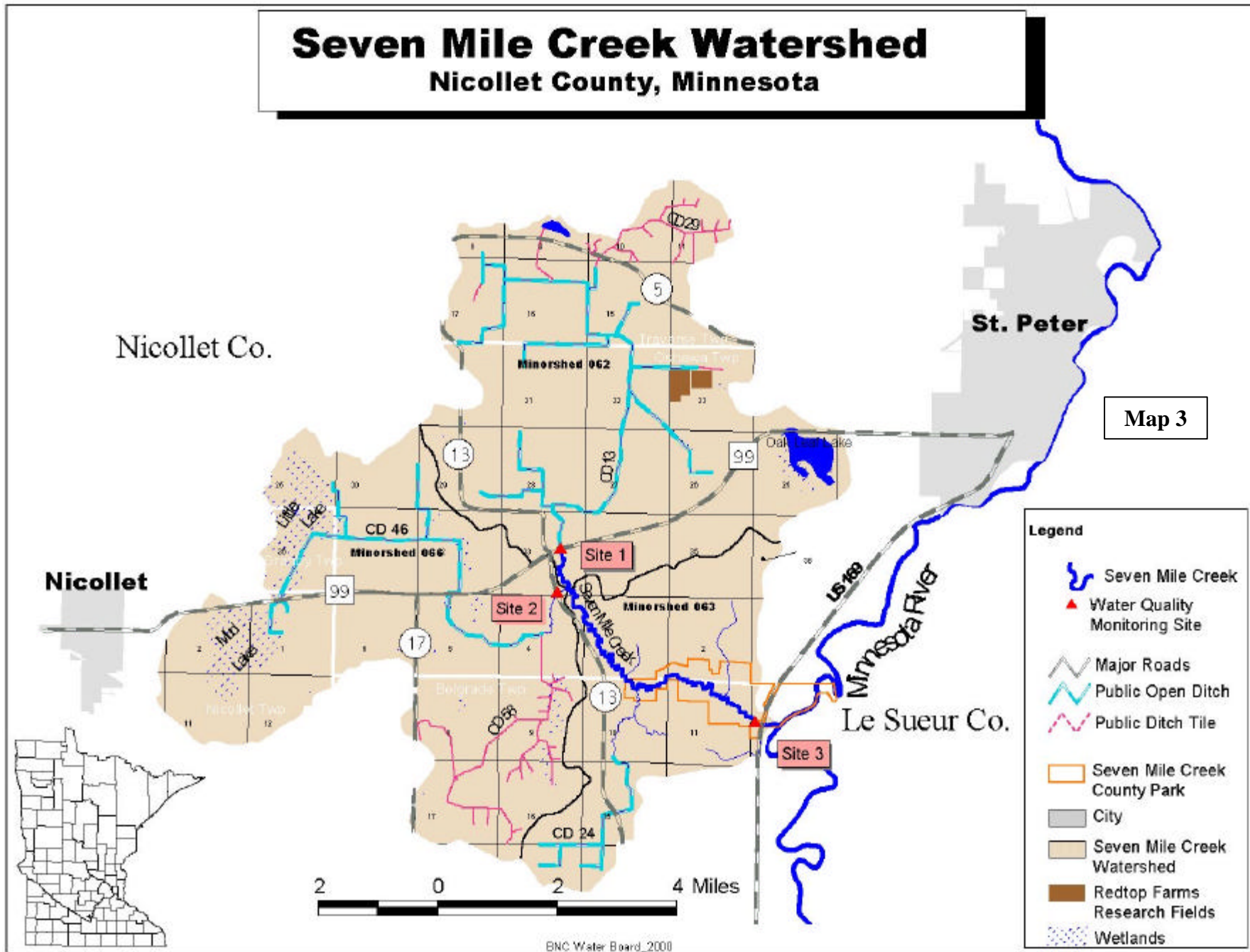
The Seven Mile Creek Watershed was chosen for a Water Quality Resource Investigation Grant following the 1990 Middle Lower Assessment Project funded through the Minnesota Pollution Control Agency. The two-year study was postponed following the 1998 tornado, with monitoring resuming in earnest in 1999 and 2000. The water quality study was funded through a Water Resource Investigation Grant administered by the MPCA. The \$50,000 grant was expended by 2000. Watershed assessments and monitoring

continued in 2001 and is currently temporarily funded through the DNR Environmental Partnerships Program, Nicollet Environmental Services and Soil and Water Conservation District.

The watershed is 23,551 acres in size and comprises about 3% of the Middle MN Major watershed and covers 8% of Nicollet County. Monitoring within this watershed has taken place since the early 1990s. Minnesota State University in Mankato and Gustavus Adolphus College have also studied the creek through classroom exercises. Since 1985 the ecological classification of the stream has been a class1-D or marginal trout fishery. With the start of the Middle MN project in 2000, three monitoring sites were established at the mouth of the watershed and two upper reaches to estimate loads within Seven Mile Creek Watershed and its effect on the MN River. Water Quality data from the project and other watershed information can be found in the following chapters.



# Seven Mile Creek Watershed Nicollet County, Minnesota



The 23,551-acre watershed was chosen for several reasons.

- Size and location-- smaller watersheds under 50,000 acres are easier to monitor model, and track improvements.
- High levels of public support and interest.
- Seven Mile Creek County Park--attracts thousands of visitors yearly from the Midwest, and serves as easy access point for schools and public education events.
- Unique fishery—Seven Mile Creek is the only water resource in South Central Minnesota that supports water temperatures and habitats suitable for trout production. Although currently classified as a marginal trout water fishery, DNR fisheries biologist feel watershed management techniques can transform Seven Mile Creek into a successful long-term fishable trout fishery.
- Red Top Farm Research Fields— A ninety-acre site located on the Red Top Farm near St. Peter in the northern portion of the watershed provides a unique opportunity to study on a field-scale the quality and quantity of water and agricultural chemicals moving through subsurface drainage tile systems. Results from Red Top fill a critical gap between university research, and the effectiveness of Best Management Practices on a production “real world” scale.
- St. Peter source water protection--The city of St. Peter is increasing its efforts to ensure safe and dependable drinking water for its 11,000 residents. Since portions of the wellhead protection area lie within and around the watershed, efforts between the two projects are planned to work together since they both are trying to accomplish the same goals.

From the spring of 2000 through the fall of 2001, loading rates were determined for the watershed at three locations. In addition to water quality monitoring, watershed assessments, sediment and nutrient modeling, mass balance, bank erosion/tile intake/private tile line inventories, and educational outreach initiatives were conducted during the span of the two-year project. The results of the two-year study can be seen in the following chapters. The Seven Mile Creek study will be used as a template for other study areas within the Middle MN Major Watershed.

### **Seven Mile Creek Watershed Goal:**

*To encourage voluntary land use practices within the watershed using sound research to reduce sediments, pathogens, and nutrient loads to Seven Mile Creek.*

## **Statement of Project Goals & Outcomes**

### A. Overall Resource Goals

The ultimate goal for the Middle Minnesota Basin is to encourage land use changes that will reduce sediment and nutrient discharges to the river thereby improving its ecological, recreational and aesthetic value. Improvements of this nature will also help reduce pathogens in the streams and river and increase bank stability, moving the Minnesota River toward the goal of becoming swimmable and fishable.

The project will document factors affecting hydrology, and pathogen, sediment and nutrient transport to the Middle Minnesota streams. In addition, it will determine reductions necessary to meet both the mainstem (Minnesota River) and local goals for the basin.

#### B. Desired Outcomes of the Project

The project intends to work toward the achievement of these conditions:

- \* Fish populations of greater diversity and abundance
- \* Wildlife habitat of greater diversity and abundance
- \* Landscape vegetation of greater diversity and abundance, with more native species
- \* Lower chemical transport, with reduced nitrogen, phosphorus, and herbicides
- \* Less soil displacement, with decreased sheet and bank erosion
- \* More stable stream channels, with lower energy and greater desynchronization of storm flows
- \* Less transport of bacteria, thus leading to swimmable waters
- \* Less loading of pollutants to the mouth of the Minnesota River
- \* Stronger stewardship attitudes throughout the watershed
- \* Increased sense of pride and ownership of the water resources
- \* Greater public awareness of land and water interconnections
- \* Greater public awareness of links between upstream and downstream neighbors
- \* Increased watershed storage through reestablished wetlands and longer tributary retention times

#### C. Overall Project Goals

- 1) Provide assistance to projects throughout the Middle Minnesota Basin.
  
- 2) Serve as the liaison for Middle Minnesota planning through the MN River Joint Powers Board LCMR Basin project; provide coordination for Middle Minnesota activities.

- 3) Develop outreach materials for public awareness activities through the basin including:
  - a) display for use at Middle Minnesota events and county fairs
  - b) materials for Middle Minnesota citizens and businesses
  - c) informational kiosk for Seven Mile Creek
  
- 4) Establish a demonstration monitoring project at Seven Mile Creek that includes:
  - a) citizen monitoring assistance
  - b) monitoring to assess current conditions
  - c) monitor to track impacts of impending changes such as new ditching, new feedlots
  - d) develop monitoring protocol for future use as small stream template
  - e) bridge GIS spatial analysis with research from Red Top Farms, UM research, field studies within the watershed and water quality data to obtain realistic water quality goals, and implementation plans to efficiently incorporate best management practices

## Project Organization & Responsibilities

The project sponsor is the Brown-Nicollet-Cottonwood Water Quality Joint Powers Board composed of County Commissioners representing the full county boards of the three counties.

The administrative management committee includes:

Kevin Kuehner - Coordinator	Brown-Nicollet-Cottonwood Water Quality Board
Marcy Pengilly - Accountant	Brown-Nicollet CHS
Bonnie Holz	Brown-Nicollet Environmental Health
Pam Rivers-Water Planner	Nicollet County Environmental Office

Mike Hanson	Cottonwood County Planning and Zoning
Lee Ganske	Project Manager-MPCA
Pat Baskfield	Project Hydrologist-MPCA
Bill Vanryswick	Dept. of Agriculture (Red Top Farms)
Kevin Ostermann	Nicollet County SWCD
Bill Geary	Nicollet County NRCS
Todd Kolander	MN DNR Fisheries
Norm Kuhlman	Nicollet County Environmental Services
Tina Rosenstein	Nicollet County Environmental Services
Charles Guggisberg	Brown County Commissioner
Don Wellner	Brown County Commissioner
John Oeltjenbruns	Cottonwood County Commissioner
Ken Elg	Cottonwood County Commissioner
David Dehen	Nicollet County Commissioner
Judy Hanson	Nicollet County Commissioner

The coordinating committee also includes:

Scott Sparlin	Citizens Coalition for a Clean MN River
Lauren Klement	Sibley County Water Planning
Joe Stengel	Renville County SWCD
Cathy Fouchi	DNR - Minneopa Project
Julie Conrad	Blue Earth Environmental Office
Paul Davis	Brown County Water Planning (MM Basin)

## Milestone Schedule

Program Element & Actions

Start

Completion

PE 1: Preparatory Activities

- |                           |        |        |
|---------------------------|--------|--------|
| A. Work plan development  | Feb 99 | Apr 99 |
| B. Basin plan development | Jan 99 | Aug 99 |

PE 2: Watershed Project Assistance

- |                           |                             |  |
|---------------------------|-----------------------------|--|
| A. Data analysis          | throughout project timeline |  |
| B. Assistance to projects | throughout project timeline |  |

PE 3: Basin Coordination

- |                         |   |        |
|-------------------------|---|--------|
| A. Communications       | bimonthly & as necessary throughout project |        |
| B. Support spokesperson | throughout project                          |        |
| C. Develop basin plans  | Aug 99                                      | Oct 99 |

PE 4: Outreach Activities

- |                             |  |           |
|-----------------------------|--|-----------|
| A. Seven Mile Newsletter    | Spring & Fall 99                               | Spring 00 |
| B. MM Display               | Spring 99 then use throughout project timeline |           |
| C. Presentations & exhibits | throughout project                             |           |
| D. Informational Kiosk      | Fall 99  | Summer 00 |

PE 5: Seven Mile Monitoring & Assessment

- |  |           |           |
|--|-----------|-----------|
| A. Develop citizens monitoring project | Spring 99 | Summer 00 |
| B. Measure flows                       | Spring 99 | Summer 00 |
| C. Monitoring                          | Spring 99 | Summer 00 |

D. Analyze above data	Summer 99	Fall 00
E. Assess land use	Summer 99	Fall 99
F. TISWA	Spring 99	Fall 99
G. GIS	Summer 99	Summer 00
H. Report on Results	Summer 00	Fall 00

PE 6: Administration

A. Personnel training & supervision	throughout project timeline
B. Fiscal management	throughout project timeline
C. Project management	throughout project timeline