

Watershed Achievements Report

**2010 Annual Report to the
U.S. Environmental Protection Agency**

Clean Water Act Section 319, Clean Water Legacy and
Clean Water Partnership Projects in Minnesota



Minnesota Pollution Control Agency



**Minnesota Pollution
Control Agency**

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Cover photo: Terrie Christian, Association of Medicine Lake Area Citizens

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Introduction

Money can't buy happiness, but it can do a lot of good if used properly. Dollars for watershed work from the new Clean Water Fund (CWF), established by the Clean Water, Land, and Legacy state constitutional amendment of 2008, enabled continued progress on water monitoring, Total Maximum Daily Load (TMDL) and watershed plan development, and implementation activities in 2010. Funding for these activities via the CWF remained stable or increased as compared to the previous biennium. Also, both federal Section 319 funds from the United States Environmental Protection Agency (EPA) and state Clean Water Partnership (CWP) funds saw one-time doubling of their funding levels last year. Agency staff are rising to the challenge of administering these increased levels of funding, accomplishing more watershed work and making great progress.

Watershed approach taking hold

The Minnesota Pollution Control Agency (MPCA) continues to shift the way it is addressing water issues to the Watershed Approach. The focus is on the 81 major watersheds of the state, and about 35 subwatersheds in the Twin Cities Metropolitan area that are overseen by local Watershed Management Organizations/Districts. This approach is more holistic, efficient, and effective in managing our water resources based on how the water flows.

The Agency's ambient condition monitoring efforts are well into implementing this approach, TMDLs and Watershed Restoration and Protection Strategy (WRAPS) development funding is now being directed to holistic watershed projects, and strong consideration is being given to using the watershed approach for implementation efforts.

The MPCA is in the process now of updating its federally-required Continuing Planning Process (CPP) document,

which explains to the EPA and other stakeholders how the Agency administers the Water Program on behalf of the EPA. This update will detail how the Watershed Approach will be used to guide implementation of the Water Program, and will be completed by the end of 2010.

Multiple coordination efforts underway

In addition to the CPP update focusing on the MPCA's work, several broader water management coordination efforts have begun as well, spurred by the establishment of the Clean Water Fund and on-going legislative planning requirements.

The state 10-year water plan is under development under the guidance of the state Environmental Quality Board (www.eqb.state.mn.us/project.html?id=19166). The legislature also appropriated funding to the University of Minnesota to craft a Water Sustainability Framework, a comprehensive, 25-year framework for the sustainable management of Minnesota's water resources (<http://wrc.umn.edu/watersustainabilityframework/index.htm>).

State agencies have come together to form the CWF Interagency Coordination Team. The team is made up of high-ranking members of six state agencies with water responsibilities (Board of Water and Soil Resources, Department of Natural Resources, MPCA, Department of Agriculture, Department of Health, Public Facilities Authority), the Twin Cities Metropolitan Council, and the University of Minnesota.

The team meets regularly, and has subteams to further coordinate aspects of water work. The subteams are: surface water monitoring and assessment; protection/restoration strategy development; protection/restoration strategy implementation; groundwater/drinking water; research and outreach; measures and outcomes; and communications. Key issues emerging from the teams include: local capacity and funding to perform water work; targeting of funds to Priority Management Zones (PMZ), or critical areas in need of protection and restoration efforts; identifying key research needs; integration of groundwater and surface water issues; civic engagement; and communicating progress and success of water management efforts.

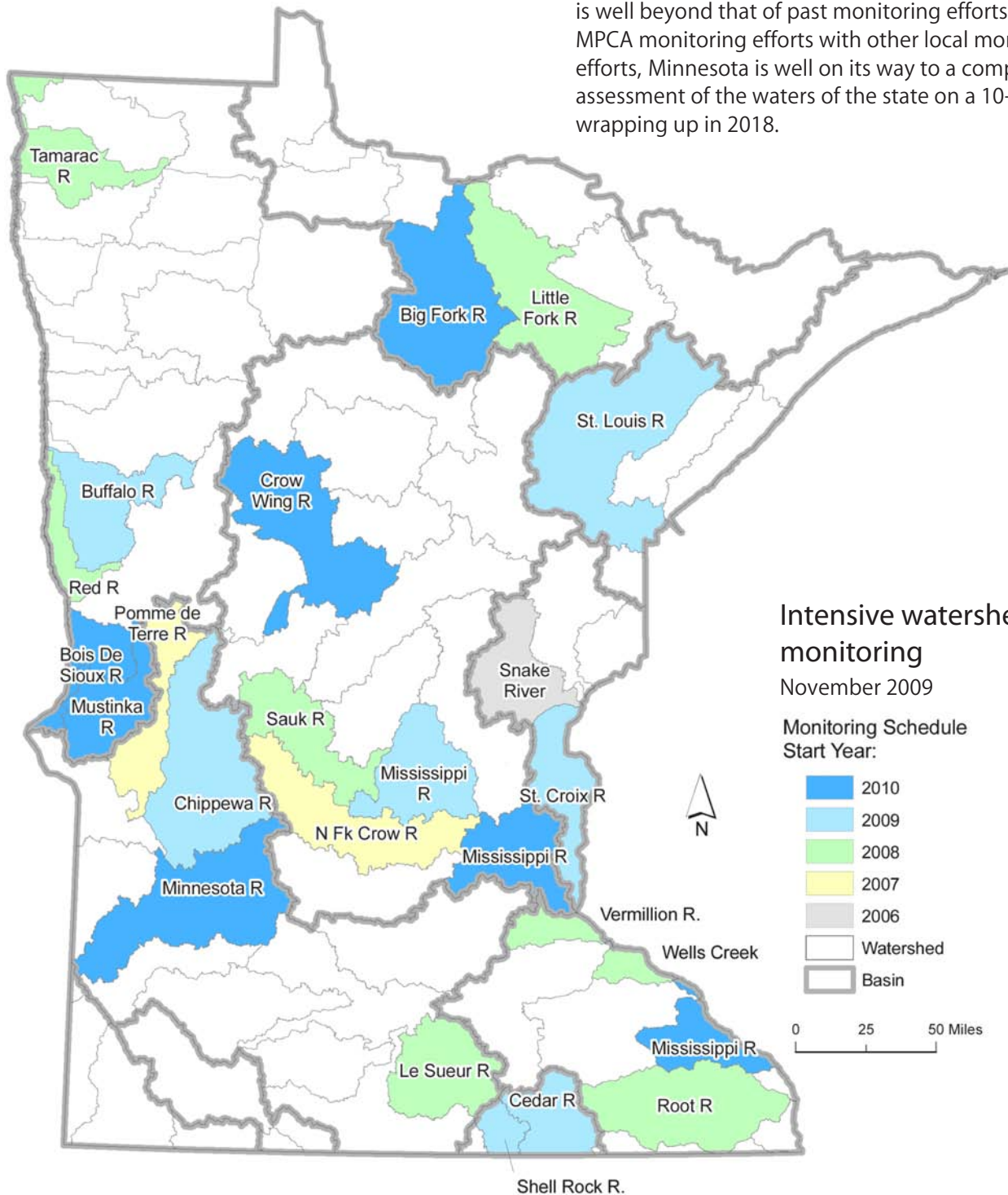
Off to a great start

In these first couple years of the 25 year Clean Water Fund allocations, it is good to see progress continuing in water monitoring, planning, and implementation. The well-funded work of today builds on the good efforts of past years when funding was more modest. As we see those past, more modest efforts bearing fruit, it is exciting to contemplate what will be accomplished in 25 years with the significant investments enabled by the CWF. Coordination efforts among the key agencies and local partners, with each agency and partner playing its unique role, will go a long way in ensuring preservation and restoration of Minnesota's waters.

See the maps, tables and graphs on the following pages to get a picture of progress that is being made statewide. Following that, read the results of individual grant-funded projects focused on monitoring, planning, implementing, researching, and communicating about our water resources. It is enjoyable to see the good work over the past decades to protect and improve our water resources, and all the learning and progress accomplished. Minnesota is off to a great start as it embarks on 25 years of CWF implementation.

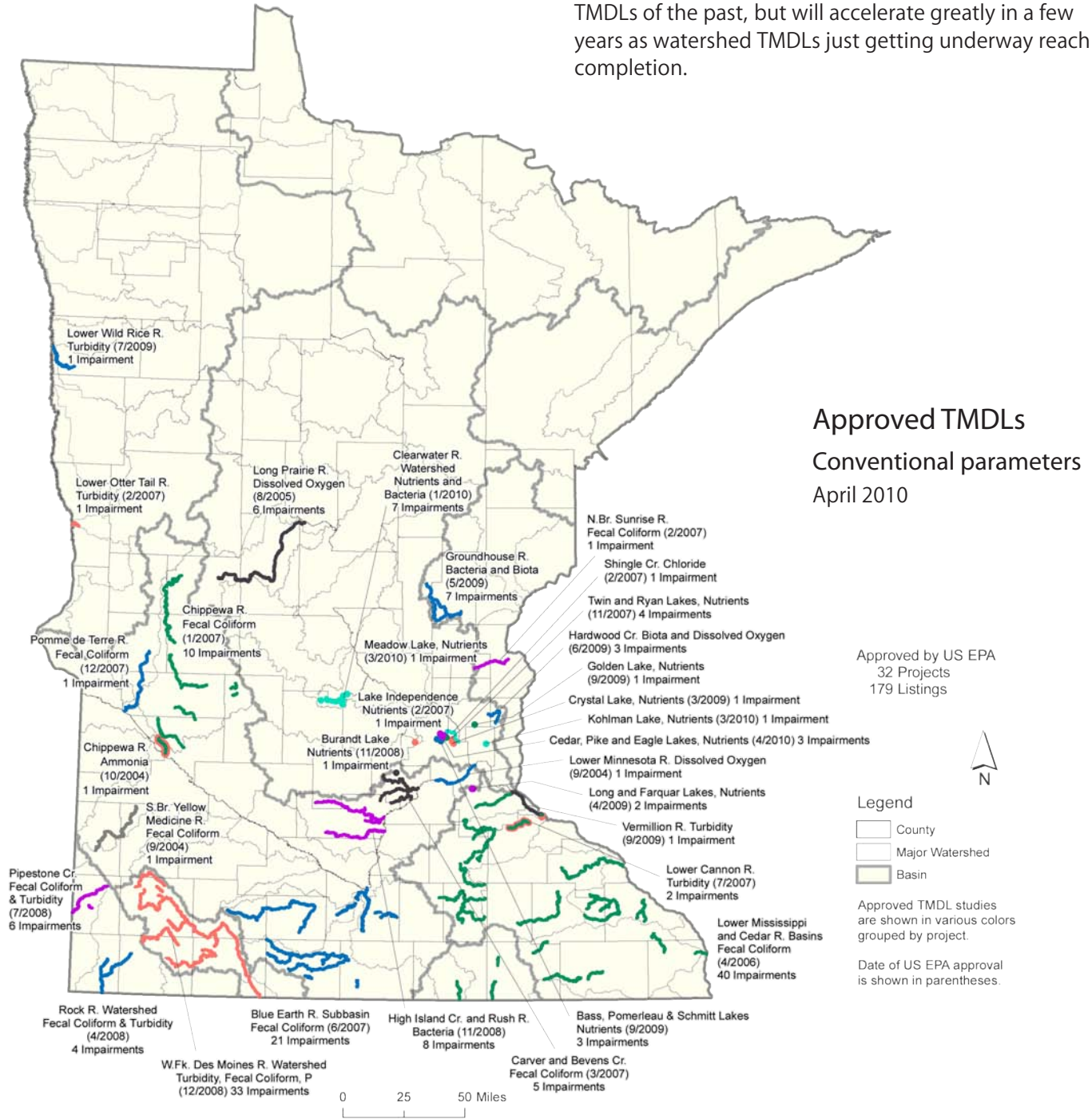
Monitoring progress

The MPCA has now initiated or completed Intensive Watershed Monitoring (IWM) in 25 of the state's 81 major watersheds – that's over 30% of the state's watersheds. The level of effort of this monitoring and the amount and types of data being collected in this Watershed Approach is well beyond that of past monitoring efforts. Marrying MPCA monitoring efforts with other local monitoring efforts, Minnesota is well on its way to a comprehensive assessment of the waters of the state on a 10-year cycle wrapping up in 2018.



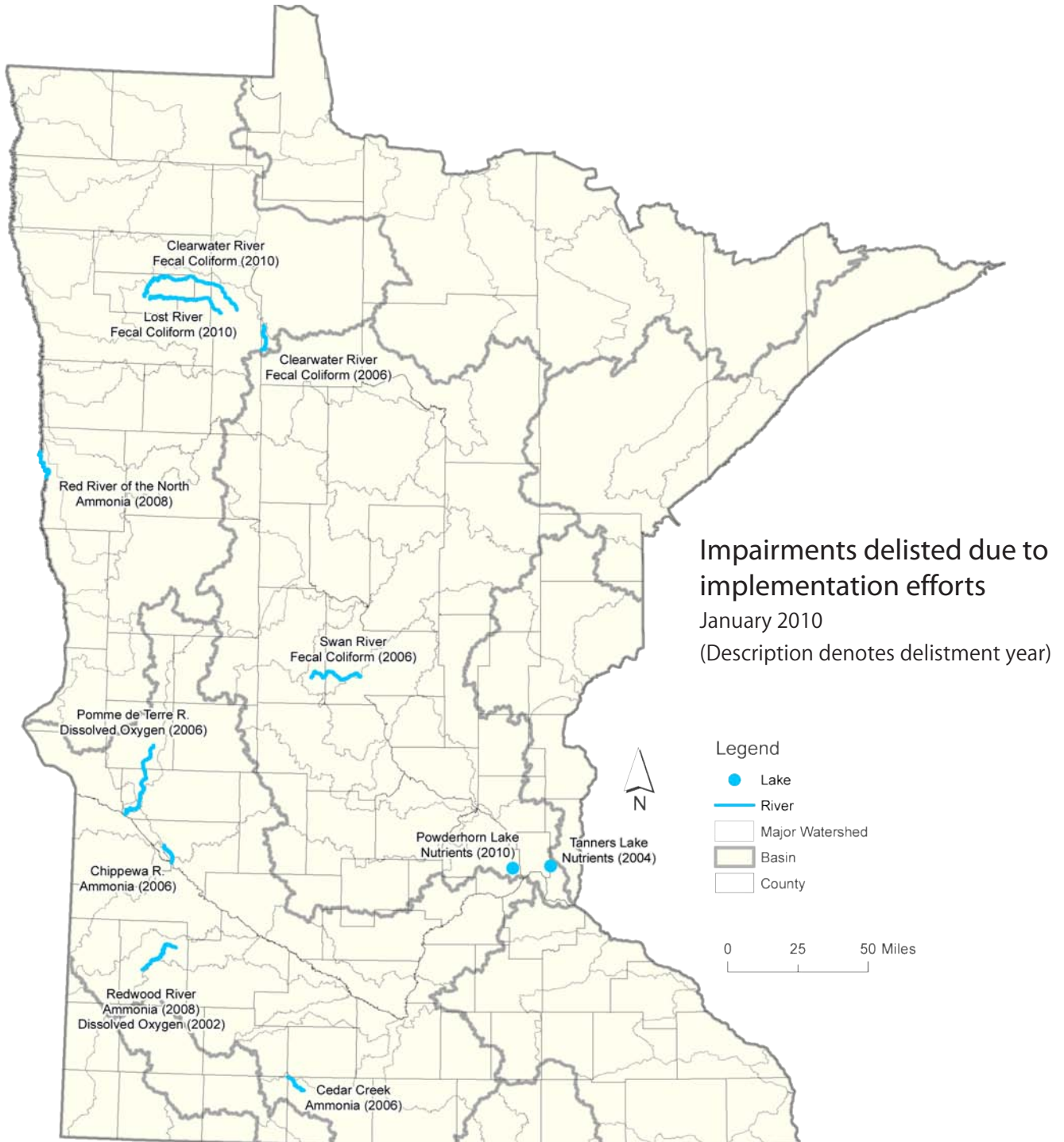
TMDL development progress

Through April 2010, Minnesota has completed TMDLs for 179 impaired waters listings. As we wrap up, progress is steady and significant in the more limited scope TMDLs of the past, but will accelerate greatly in a few years as watershed TMDLs just getting underway reach completion.



Restoration progress

Minnesota is delisting three additional waterbody impairments in 2010 that were cleaned-up. These waters meet water quality standards thanks to implementation efforts. One was a nutrient impairment of Powderhorn Lake in Minneapolis, restored through improved urban stormwater management and in-lake treatment; and two were bacteria impairments of segments of the Lost River and Clearwater River, restored by a combination of improvements to wastewater treatment, drainage and agricultural best management practices (bmp), buffers, and erosion control.



Civic engagement in watershed projects

In the past, water studies and implementation plans many times were developed with limited involvement from the public. Citizens and stakeholders were often consulted at the end of the planning process when they could have little impact on proposed policies and strategies. This approach did not prove effective in encouraging local ownership of the plans or in increasing the number of citizens willing to implement best management practices (BMP) and other behavior changes that would benefit water quality.

Early involvement of citizens in the planning process and dialogue are central to civic engagement. Watershed planning activities must include the creation of safe and meaningful opportunities for citizens to come together to dialogue about the issues of concern to them in their watershed and to create their own visions and strategies for change. A goal of civic engagement is to encourage local leaders to create a watershed study and implementation plan that reflects the unique circumstances within their communities. Civic engagement activities should support existing leaders within each watershed or encourage the development of new leaders who can assist in creating implementation strategies and encouraging others within their communities to carry them out.

MPCA recognizes that a more deliberate and strategic approach must be made to increase civic engagement and to empower citizens to reach water quality goals. Civic engagement will receive greater emphasis within the context of the watershed approach. This can happen when local governments are appropriately supported with funding, facilitation services and other expertise. The amount of services and support given to a local organization working with citizens will vary depending on the staffing levels, expertise and experience they have. MPCA will learn as it works with watershed projects statewide, improving techniques and tools over time.

To help project teams navigate a shift from customary public input late in the watershed management process

to include more authentic civic engagement earlier, the MPCA is developing a four-faceted Civic Engagement Support Service:

1. A Civic Engagement Planning Cycle (a classic plan-do-check cycle) encourages local project teams to plan strategically for civic engagement based on a clear understanding of the unique attributes of a specific community, and track performance for adaptive management.
2. An interactive, multimedia Idea Bank of stories, testimonials, example documents and technologies, techniques and methods to help project teams think outside the box and to incorporate technology creatively.
3. A Specialist Network will give project teams access to consistently trained and oriented experts in areas such as:
 - a. Group process (facilitation, conflict management, communication strategies, etc.) and civic leadership development;
 - b. Technology and creative services (interactive kiosks, physical computing, online social networking, data visualization, etc.)
 - c. Funding strategists and grant writers;
 - d. Evaluation and performance tracking.
4. A Practitioners' Forum to tap the collective knowledge and experience of people in the field, connecting and optimizing resources, approaches and ideas.

The goals are to instill environmental stewardship within communities and promote preferred land use and operational practices by shifting public involvement earlier in the watershed management process, creating a sense of public ownership in time for TMDL Implementation Plan development; encouraging more diverse and expanded public participation; and fostering civic leaders. This system will be gradually tested through and incorporated into watershed projects over the next several years.

Clean Water Legacy projects active in 2010

Project Title	Watershed	Project Sponsor	Project Manager	Amount
Cedar River				
Alternative Ditch TMDL Project	Cedar River	Mower County. Soil and Water Conservation District	Joseph Magner	\$149,194.47
Cedar River Turbidity/Nutrients TMDL	Cedar River - Headwaters	Mower County Soil and Water Conservation	Bill Thompson	\$361,823.00
Lake Superior				
Poplar River Watershed Project	Lake Superior - MN North	Cook County Soil and Water Conservation District/University of MN	Karen Evens	\$172,830.21
Knife River Watershed TMDL Part 3	Lake Superior - MN South	South St. Louis County Soil and Water Conservation District	Gregory Johnson	\$27,715.00
Lake Superior Basin Miller Creek TMDL Part 2	St. Louis	South St. Louis County Soil and Water Conservation District	Tom Estabrooks	\$70,000.00
Lower Mississippi				
Crystal/Keller/Lee/Earley Lakes Nutrient TMDL	2 watersheds including Mississippi - Red Wing	Black Dog Water Management Commission	Barbara Peichel	\$174,102.00
Cannon River Watershed One Water Strategy	Cannon River	Cannon River Watershed Partnership	Justin Watkins	\$98,668.00
Lower Vermillion River Effectiveness Monitoring	Mississippi River - Red Wing	Dakota County Soil and Water Conservation District	Brooke Asleson	\$31,739.00
Root River Basin Turbidity TMDL	Root River	Fillmore County	Shaina Keseley	\$300,000.00
Upper Cannon Lakes Nutrients TMDL	Cannon River	Minnesota State University Mankato	Shaina Keseley	\$240,000.00
Whitewater River Watershed Turbidity TMDL	Mississippi River - Winona	Whitewater Joint Powers Board	Bill Thompson	\$57,444.00
Sediment Work for Lower Mississippi Basin TMDL Support	8 watersheds including Zumbro River	Winona State University	Justin Watkins	\$15,000.00
Minnesota				
Chippewa River Watershed Turbidity TMDL	Chippewa River	Chippewa County	Katherine Pekarek-Scott	\$140,000.00
Pope County Eight Lakes TMDL	Chippewa River	Pope County Soil and Water Conservation District	Tim James	\$269,727.26
Fish/Schwanz Lakes Nutrient TMDL	Minnesota River - Shakopee	City of Eagan	Barbara Peichel	\$90,000.00
Long Lake Nutrient TMDL	Minnesota River - Granite Falls	Kandiyohi County	Darrell Schindler	\$70,704.00
Lac qui Parle-Yellow Bank River TMDL Assessment/Implementation Plan	Minnesota River - Headwaters	Lac qui Parle Yellow Bank Watershed Dist	Katherine Pekarek-Scott	\$137,021.00
Lake Crystal Excess Nutrients TMDL	Minnesota River - Mankato	Minnesota State University Mankato	Paul Davis	\$39,698.85
Lura Lake Nutrients TMDL	LeSueur River	Minnesota State University Mankato	Paul Davis	\$33,484.00
Rush River and High Island Creek Turbidity/Biota TMDL	Minnesota River - Shakopee	Minnesota State University, Mankato	Scott MacLean	\$155,000.00
Cottonwood River Turbidity TMDL	Cottonwood River	Redwood-Cottonwood Rivers Control Area	Mark Hanson	\$145,000.00

Clean Water Legacy projects active in 2010 (continued)

Project Title	Watershed	Project Sponsor	Project Manager	Amount
Redwood River Turbidity TMDL	Redwood River	Redwood-Cottonwood Rivers Control Area	Mark Hanson	\$120,000.00
Hawk Creek/Beaver Creek Bacteria TMDL	Minnesota River - Granite Falls	Renville County	Darrell Schindler	\$61,660.58
Credit River Turbidity TMDL Development	Minnesota River - Shakopee	Scott County	Brooke Asleson	\$125,000.00
Pomme de Terre River Watershed Turbidity TMDL	Pomme de Terre River	Stevens County Soil and Water Conservation District	Katherine Pekarek-Scott	\$120,000.00
LeSueur River Basin Sediment Study - National Center for Earth-Surface Dynamics	LeSueur River	University of Minnesota - Water Resources Center	Larry Gunderson	\$589,903.00
Lake Pepin Watershed TMDL Full Cost Accounting	31 watersheds including Watonwan River	University Of Minnesota	Norman Senjem	\$385,699.81
Rainy				
Jessie Lake Nutrients TMDL	9 watersheds including Vermillion River - Rainy River	Itasca Soil and Water Conservation District	Nolan Baratono	\$97,789.00
Williams Creek Dissolved Oxygen TMDL	Rainy River - Baudette	Lake of the Woods Soil and Water Conservation District	Tim James	\$20,000.00
Lake of the Woods Nutrient Budget Water Quality Modeling	Lake of the Woods	St Cloud State University	Cary Hernandez	\$50,000.00
Red				
Buffalo Red Watershed Approach to Water Quality	Buffalo River	Buffalo-Red River Watershed District	John Frederick	\$87,910.00
USGS Real Time Monitoring in the Red River	Red River of the North	US Geological Survey	Cary Hernandez	\$9,870.00
Red River Basin Soil and Water Assessment Tool Modeling	5 watersheds including Red River of the North	University of North Dakota	Michael Vavricka	\$250,000.00
St. Croix				
Ann River Watershed	Snake River - St. Croix River	Kanabec Soil and Water Conservation District	Christopher Klucas	\$44,860.00
Lake St. Croix TMDL	St. Croix River - Upper	Randy Ferrin, consultant	Denise Leezer	\$14,985.00
Sunrise River Watershed Soil and Water Assessment Tool Modeling	St. Croix River - Lower	Science Museum of Minnesota	Christopher Klucas	\$86,545.00
Lake St. Croix Water Quality Monitoring & Phosphorous Reduction	St. Croix River - Lower	St. Croix River Association	Denise Leezer	\$500,000.00
Brown's Creek Impaired Biota TMDL	St. Croix River - Lower	Washington Conservation District	Christopher Klucas	\$263,901.00
Statewide				
MN DNR Stream Gaging (CWLA & 319)		MN Dept. of Natural Resources	Tim James	\$200,000.00
Statewide Sediment		US Geological Survey	Gregory Johnson	\$258,000.00

Clean Water Legacy projects active in 2010 (continued)

Project Title	Watershed	Project Sponsor	Project Manager	Amount
Upper Mississippi				
Big Sandy Area Lakes Nutrients TMDL	Mississippi River - Grand Rapids	Aitkin County/Barr Engineering	Bonnie Finnerty	\$232,682.02
Sweeney Lake TMDL Phase 2	Mississippi River - Twin Cities	Bassett Creek Watershed Management Commission	Brooke Asleson	\$78,650.00
Crow River South Fork Buffalo Creek Turbidity TMDL	Crow River South Fork	Crow River Organization Of Water	Margaret Leach	\$109,778.00
Elm Creek Watershed - Wide TMDL	Mississippi River - Twin Cities	Elm Creek Watershed Management Commission	Brooke Asleson	\$183,000.00
Crow River Middle Fork Diamond Lake TMDL	Crow River South Fork	Middle Fork Crow River Watershed District	Margaret Leach	\$176,215.00
Rice Lake Nutrient TMDL	Crow River North Fork	North Fork Crow River Watershed District	Margaret Leach	\$138,871.00
Getchell/Stony/Unnamed Creeks Turbidity TMDL	Sauk River	Sauk River Watershed District	Greg VanEckhout	\$80,000.00
Pearl Lake/Mill Creek/ Lower Sauk River TMDL	Sauk River	Sauk River Watershed District	Greg VanEckhout	\$80,410.00
Elk River Watershed Association TMDL	Mississippi River - St. Cloud	Sherburne Soil and Water Conservation District	Phil Votruba	\$215,264.00
Lake Sarah Nutrient TMDL	Crow River South Fork	Three Rivers Park District	Barbara Peichel	\$34,912.00
Ann & Emma Lakes Nutrients TMDL	Crow River South Fork	Wright County Soil and Water Conservation District	Margaret Leach	\$141,218.00
Little Rock Lake Nutrients TMDL	Mississippi River - Sartell	Benton Soil and Water Conservation District	Margaret Leach	\$150,224.54

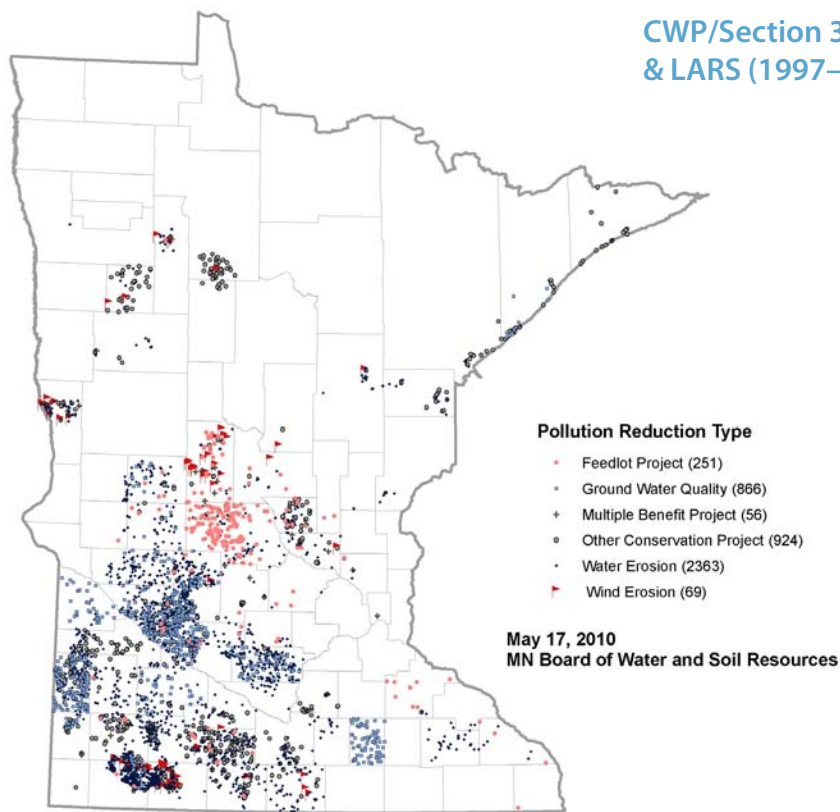


LARS and eLINK results from Section 319 & CWP projects 1997–May, 2010

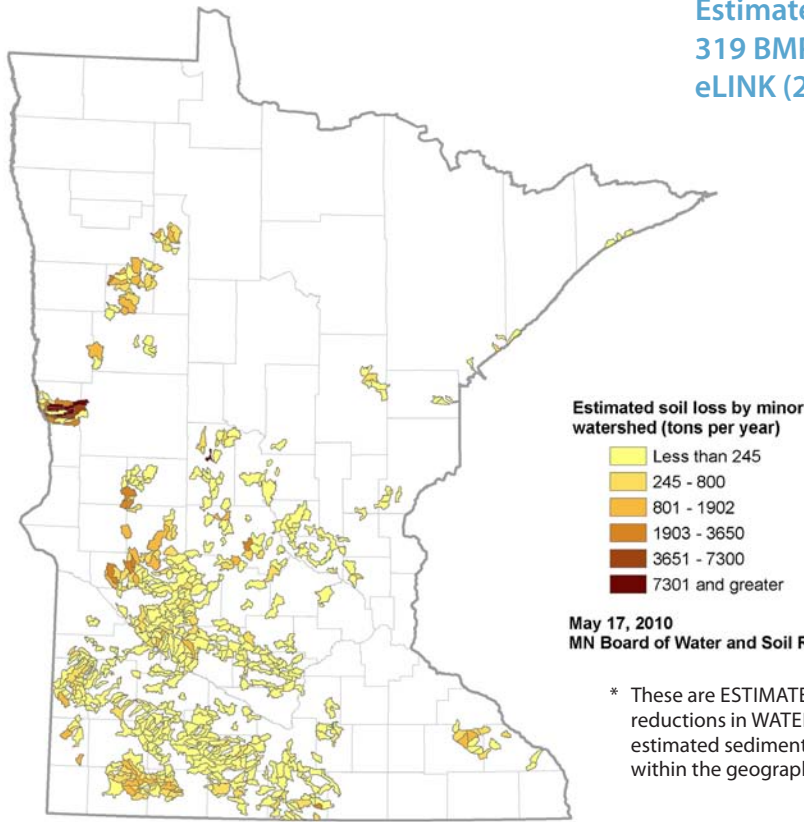
The following table shows progress through May 2010 based on previous Local Annual Reporting System (LARS) reporting (1997–2002) and reporting data from eLINK(2003–May 2010). Based on LARS/eLINK reporting by CWP and Section 319 project partners, these projects have reduced soil loss from 1998 through May 2010 by approximately more than 194,000 tons/year. During the same period, sedimentation was reduced by approximately more than 98,220 tons/year. Phosphorus loading was approximately reduced by more than 292,912 pounds/year.

Pollution reduction estimate type	# of BMPs	Estimated soil loss reduction (tons/yr)	Estimated sediment reduction (tons/yr)	Estimated phosphorus reduction (pounds/yr)	Estimated nitrogen reduction (pounds/yr)*
Feedlot project	257	0	0	43,641	87,281
Groundwater quality	890	0	0	3,946	7,891
Multiple benefit project	195	17,934	2,773	3,557	7,115
Other conservation projects	991	32,242	7,760	143,217	286,433
Water erosion	4,104	143,964	87,644	97,920	195,840
Wind erosion	70	2,295	44	632	1,263
Total	6,507	196,436	98,220	292,912	585,824

* Estimated nitrogen calculated from doubling estimated phosphorus

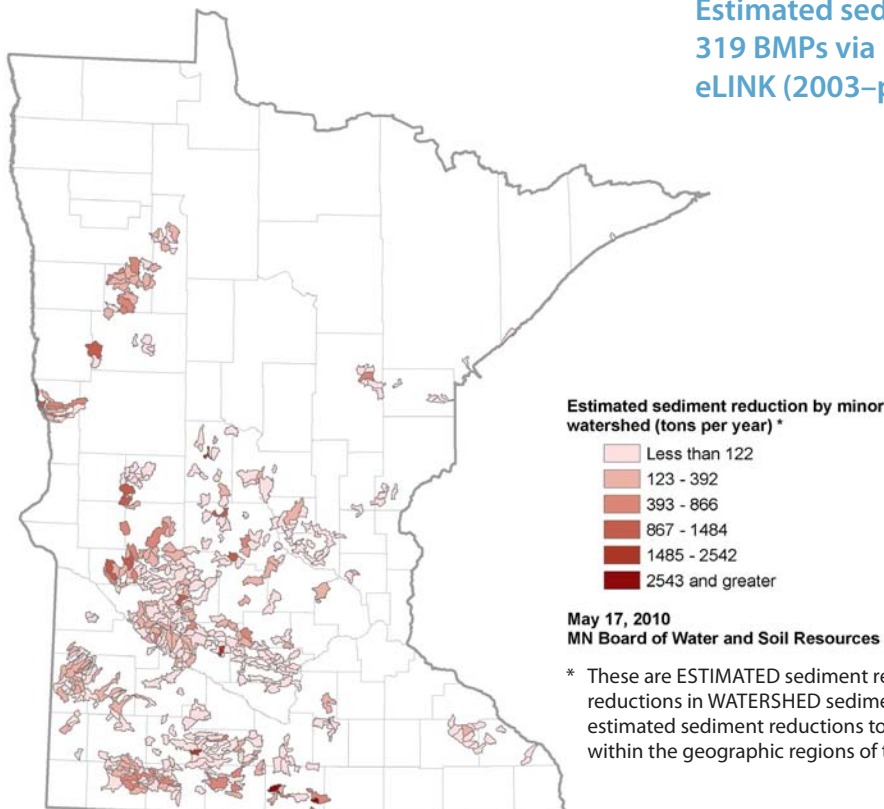


Estimated soil loss reduction — CWP/Section 319 BMPs via local government reporting, eLINK (2003–present) & LARS (1997–2002)



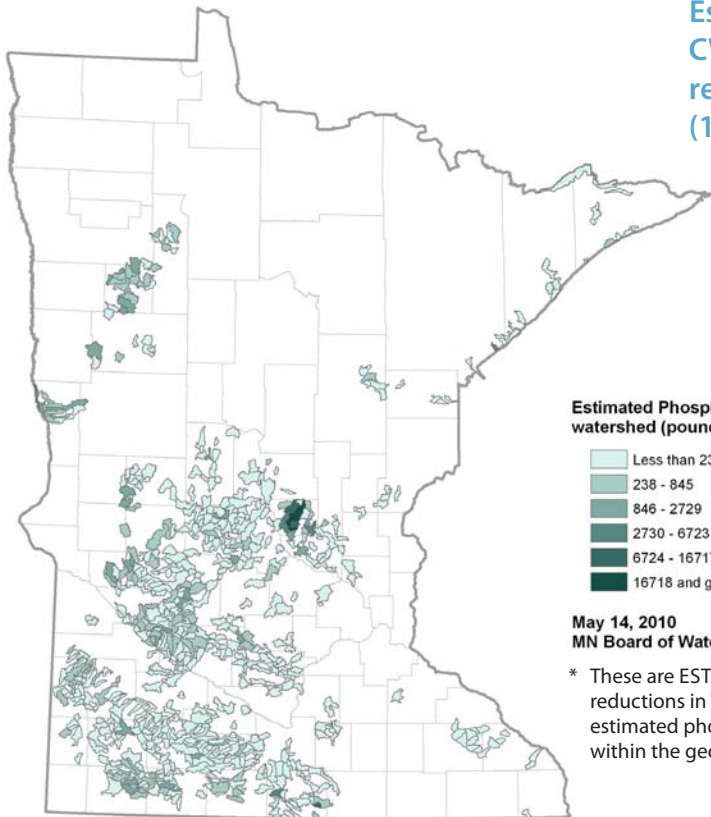
* These are ESTIMATED sediment reductions. They DO NOT represent reductions in WATERSHED sediment yield. They represent the sum of estimated sediment reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

Estimated sediment reduction — CWP/Section 319 BMPs via local government reporting, eLINK (2003–present) & LARS (1997–2002)



* These are ESTIMATED sediment reductions. They DO NOT represent reductions in WATERSHED sediment yield. They represent the sum of estimated sediment reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

Estimated phosphorous reduction — CWP/ Section 319 BMPs via local government reporting, eLINK (2003–present) & LARS (1997–2002)



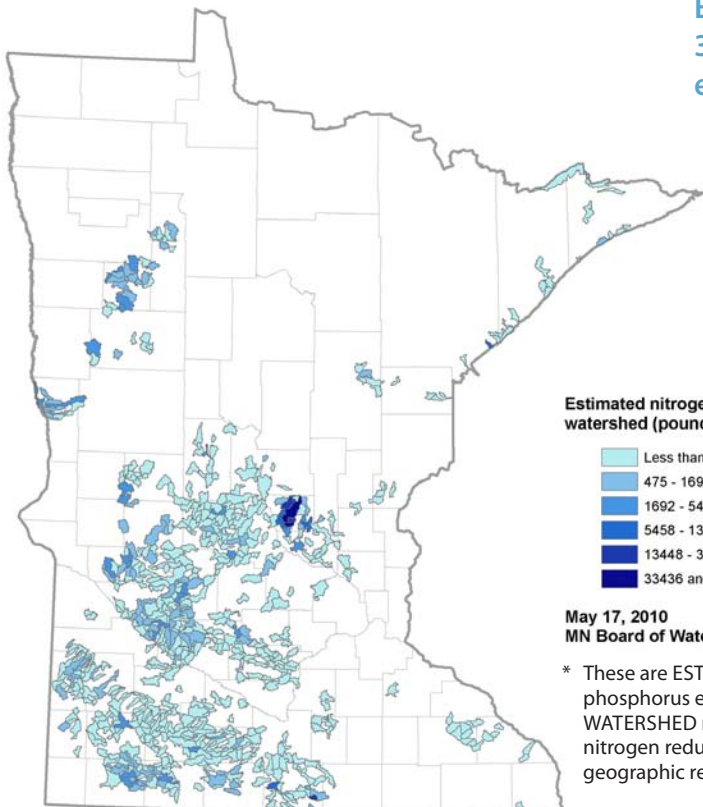
Estimated Phosphorus reduction by minor watershed (pounds per year) *

- Less than 238
- 238 - 845
- 846 - 2729
- 2730 - 6723
- 6724 - 16717
- 16718 and greater

**May 14, 2010
MN Board of Water and Soil Resources**

* These are ESTIMATED phosphorus reductions. They DO NOT represent reductions in WATERSHED phosphorus yield. They represent the sum of estimated phosphorus reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

Estimated nitrogen reduction — CWP/Section 319 BMPs via local government reporting, eLINK (2003–present) & LARS (1997–2002)



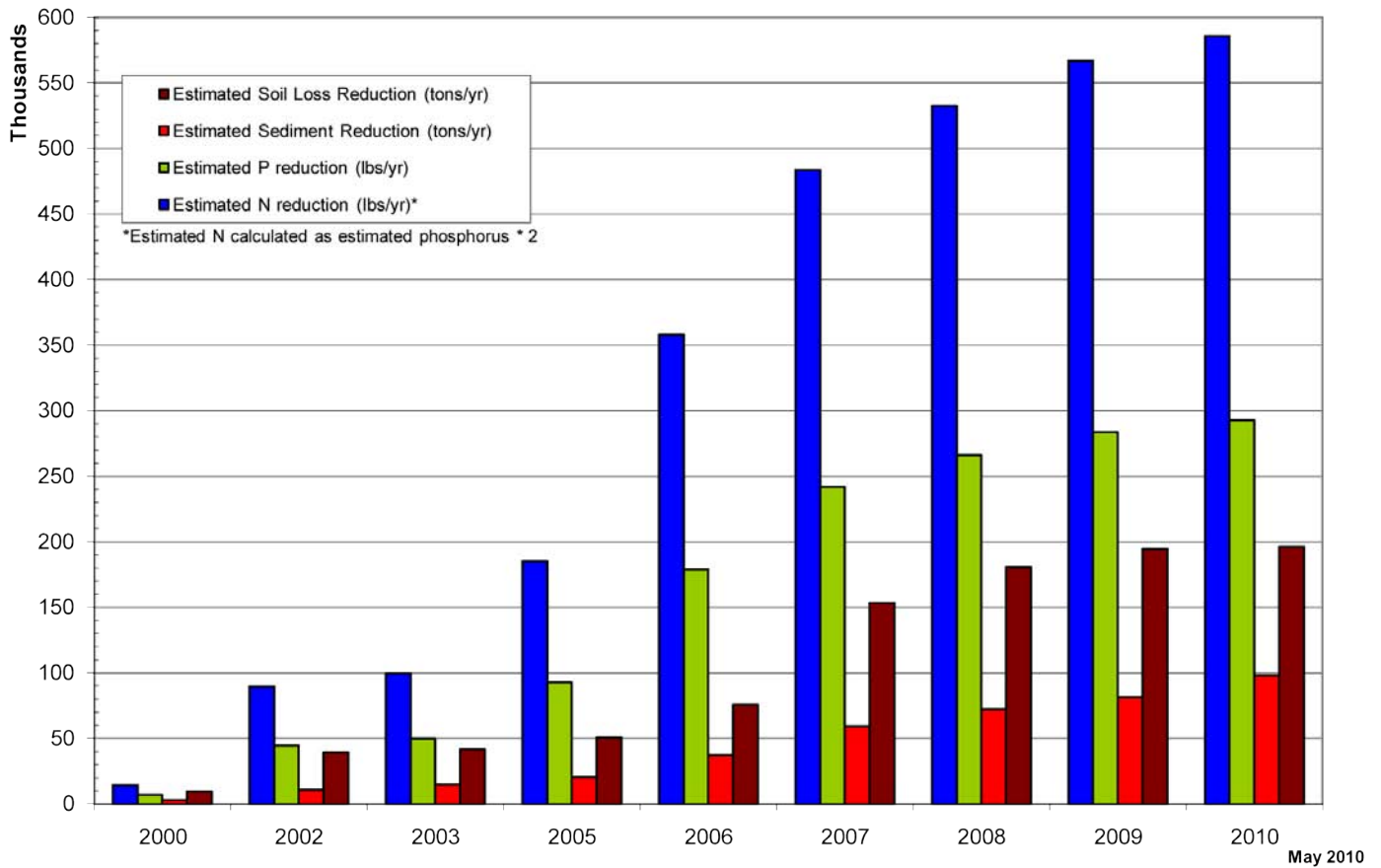
Estimated nitrogen reduction by minor watershed (pounds per year) *

- Less than 474
- 475 - 1691
- 1692 - 5457
- 5458 - 13447
- 13448 - 33435
- 33436 and greater

**May 17, 2010
MN Board of Water and Soil Resources**

* These are ESTIMATED nitrogen reductions calculated by doubling phosphorus estimates. They DO NOT represent reductions in WATERSHED nitrogen yield. They represent the sum of estimated nitrogen reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

CWP/Section 319 cumulative estimated pollution reduction benefits via local government reporting, LARS (1997–2002) and eLINK (2003–present)





Report organization

Currently, some existing projects are watershed-wide, while others focus on specific pollutants or issues. As the MPCA moves toward implementing the statewide watershed approach, more projects will begin encompassing entire watersheds. During this transition period, MPCA is making some changes to the organization of this year's report to give a clear vision of all of the work that is taking place in each major watershed.

The 2010 Watershed Achievements Report is organized by basins as in previous years, however this year each basin will have a map at the beginning of its section, indicating which major watersheds had projects completed, newly awarded or currently active in the past year.

More information can be found about MPCA's watershed approach at: www.pca.state.mn.us/publications/wq-s126.pdf.

Projects completed for 2009–2010

Statewide

- Clean Water Legacy Act Tracking & Reporting Strategy
- eLINK Database Support
- Minnesota Conservation Corps Intensive Monitoring
- Phosphorus Fertilizer/Turfgrass Clip Management Effects
- Social Indicators — Development and Testing
- Statewide Development of Monitoring Networks
- Winter Maintenance and Training Certification

Des Moines and Missouri River Basins

- Beaver Creek Watershed Implementation
- Elk Creek Conservation Tillage

Lake Superior River Basin

- Deer Creek and Nemadji River Turbidity TMDL
- Miller Creek Watershed Implementation Continuation

Lower Mississippi and Cedar River Basins

Vermillion River and Chub Creek ISTS Inspection and Upgrade
 Volunteer Nitrate Monitoring
 Cannon River Wastewater Building Local Capacity
 Whitewater Watershed South Branch — Bacteria Reduction
 Zumbro River Watershed Turbidity and Nutrients TMDL

Minnesota River Basin

Metro Area Chloride Impairments Feasibility Study
 Minnesota River Sediment Source Research
 State of the River Report
 Lily and Center Creeks - Blue Earth River Clean Water Partnership
 Redwood River Phosphorus TMDL Compliance Continuation
 Chippewa River East Branch Continuation Project
 Little Chippewa River Implementation Project
 Shakopee Creek Headwaters Continuation
 Cottonwood River Watershed Fecal Coliform TMDL
 Cottonwood River Watershed Phosphorus Reduction Project
 Lower Maple River Watershed Project
 Hawk Creek Green Corridors Work Area Continuation
 Hawk Creek Watershed Project
 Crystal, Loon, Mills Implementation Program
 Bluff Creek Turbidity/Fish Biota TMDL
 Carver County Turbidity and Excess Nutrients TMDL
 Redwood River Fecal Coliform TMDL

Rainy River Basin

Big Fork and Little Fork Rivers Paired Watershed Study

Red River Basin

Red River Basin Turbidity TMDL — Year 3
 Red River Valley Biotic Assessment
 Buffalo River Sediment Modeling for BMP Implementation
 Red River Basin Multi-Parameter TMDL Monitoring
 Clearwater River Dissolved Oxygen Impairment Evaluation
 Detroit Lakes Water Quality Improvement Nutrient Reductions Continuation
 Clearwater River Dissolved Oxygen/Fecal Coliform TMDLs

St. Croix River Basin

St. Croix Watershed Research Station
 Carnelian Marine St. Croix 12 Lakes TMDL Update
 Comfort and Forest Lakes Watershed TMDL
 Sunrise River Watershed TMDL Phase 1
 Typo and Martin Lakes TMDL Update

Upper Mississippi River Basin

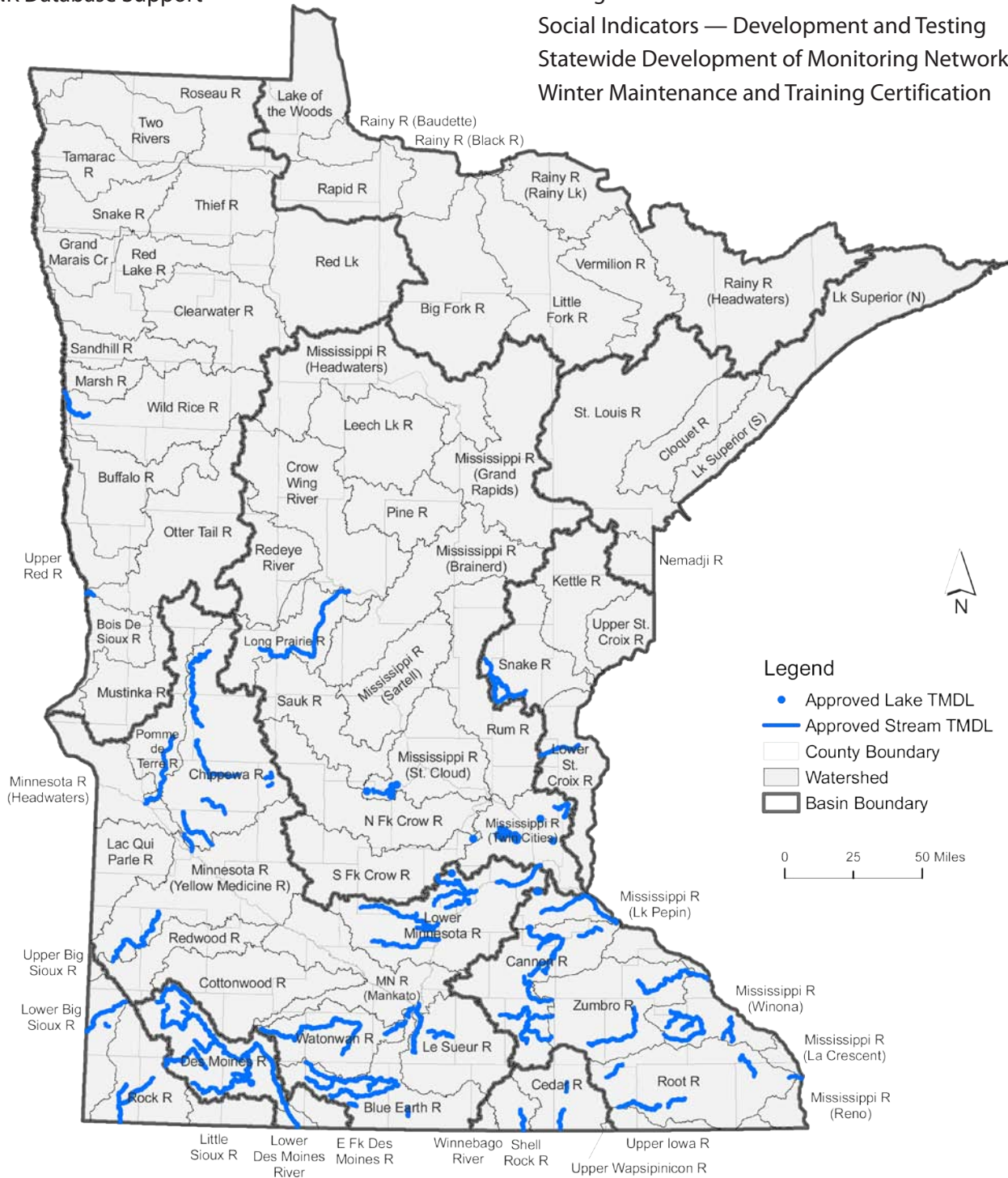
Upper Mississippi River Bacteria TMDL
 Crow River Lower North Fork Watershed
 Middle Fork Crow River Watershed Restoration
 Water Quality Improvement Continuation
 Crow River Working Together to Improve Water Quality
 Long Prairie River TMDL
 Big Sandy Area Lakes Watershed Management Continuation
 Little Rock Creek Biological Impairment TMDL
 Feedlot Runoff Removal by Organic Biofilter Demonstration
 Clearwater River and Lake Louisa TMDL
 Clearwater River Five Lakes Nutrients
 Clearwater River Ongoing TMDL Studies
 Golden Lake TMDL Report— Stormwater Runoff Appendix
 Medicine Lake Nutrients TMDL
 Minnehaha Creek Lake Hiawatha TMDL
 Minnehaha Creek Watershed Lakes TMDL
 Shingle Creek Chloride Reduction
 Shingle Creek Watershed Lake TMDL Implementation Plans
 Shingle and Bass Creeks Dissolved Oxygen/Biota TMDL Phase 1
 Wirth Lake Nutrients TMDL
 Middle Sauk River Water Quality Restoration
 Osakis 3 Continuation
 Sauk River Chain of Lakes TMDL
 Upper Mississippi River TMDL Compliance in Impaired Areas

Statewide

Projects completed

Clean Water Legacy Act Tracking and Reporting Strategy
 eLINK Database Support

Minnesota Conservation Corps Intensive Monitoring
 Phosphorus Fertilization/Turfgrass Clip Management Effects
 Social Indicators — Development and Testing
 Statewide Development of Monitoring Networks
 Winter Maintenance and Training Certification



Clean Water Legacy Act (CWLA) Tracking and Reporting Strategy

This effort was the first of two phases to develop a framework and metrics for tracking and reporting the effectiveness of waters activities supported by the 2006 Clean Water Legacy Act (and it will also apply to activities supported by the constitutionally-dedicated Clean Water Fund). The process built on the partnerships among the agencies responsible for the CWLA implementation, and resulted in the development of a shared vision to track and report on the CWLA and funds. The ultimate goal of this framework is to allow agencies and the public to track progress and effectiveness of state programs in meeting goals for improving water quality in the state.

The University of Minnesota Water Resources Center (WRC) convened four meetings with representatives of four Minnesota state agencies (Board of Water and Soil Resources, Department of Agriculture, Department of Natural Resources, and the Pollution Control Agency), several federal agencies (U.S. Environmental Protection Agency, U.S. Department of Agriculture, and the Natural Resources Conservation Services), and local governments (Soil and Water Conservation Districts and Watershed Districts) to review the current data collected by agencies, develop the framework and measures, and finalize the framework.

The final measurement framework was described in a WRC report completed in July 2008, with further refinements provided in an addendum that was completed in October 2008. Three areas of continuing work are in developing measures of knowledge, attitude and practices also known as social measures; incorporating financial measures into the framework; and determining how to measure the effectiveness of the research. Future steps to implement the framework include a data management system that will allow users to draw on information from multiple state agency programs on water quality improvement efforts.

Goals

- Convene stakeholders of the CWLA to develop a shared vision of tracking and reporting strategy.
- Develop draft measures and an organizing framework for reporting them.
- * Complete a final report that will help launch the second phase of this effort.

Results that count

- Four meetings of state, federal and local agency stakeholders were convened by the University of Minnesota Water Resources Center during the first phase of the project, ending in October 2008.
- Measures were developed and organized in four major categories: Environmental Indicators, Partnerships/Leveraging, Social Indicators, and Organizational Performance. The measurement outcomes will be collected at both hydrological and political scales, the 81 major watersheds, county and statewide.
- The final report was completed in July, 2008: http://wrc.umn.edu/prod/groups/cfans/@pub/@cfans/@wrc/documents/asset/cfans_asset_114286.pdf
An addendum to the final report was completed in October, 2008: http://wrc.umn.edu/prod/groups/cfans/@pub/@cfans/@wrc/documents/asset/cfans_asset_114289.pdf

Financial information

Funding type: CWLA
Grant amount: \$50,700

Contact information

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McNamara Center, Suite 450
200 Oak Street
Minneapolis, MN 55455
MPCA Project Managers: Megan Pavek & Jeff Risberg

Developing an Effectiveness Tracking and Reporting Framework for Implementing the Clean Water Legacy Act

Final Report



Prepared by:
Water Resources Center,
University of Minnesota



College of Food, Agricultural
and Natural Resource Sciences UNIVERSITY OF MINNESOTA
UNIVERSITY OF MINNESOTA EXTENSION
Minnesota Agricultural Experiment Station

eLINK Database Support

The goal of this project is for the MN Board of Water and Soil Resources (BWSR) to provide eLINK support services to MPCA for their watershed grant programs. eLINK support services are aimed at MPCA staff as well as their project sponsors. The goal of eLINK is to record soil and water conservation project BMPs and pollutant load reductions for those practices. This information is required by the US EPA for the Clean Water Act Section 319 program. Project locations are also input into eLINK, which are used with natural resource information to estimate soil erosion and resultant environmental benefits from project implementation.

BWSR also provides MPCA with data for the annual Watershed Achievement report (annual report to US EPA). This data includes the type and number of various BMPs as well as estimated phosphorus, nitrogen and sediment load reductions as a result of the BMPs.

When necessary, BWSR staff works with training MPCA staff in navigating through eLINK and pulling data out of eLINK. All MPCA Section 319 and Clean Water Partnership project sponsors are required to enter the load reduction information into eLINK.

Goals

- Provide MPCA with load reduction information twice a year.
- Work with MPCA staff so they can more easily navigate through eLINK.
- Provide MPCA with cumulative load reduction information for the annual report to US EPA.

Results that count

- Information is provided to MPCA semi-annually according to US EPA deadlines.
- Several training sessions and work sessions have occurred between the two agencies.
- BWSR reports annually to MPCA with load reduction information (maps and charts).

Financial information

Funding type: Section 319

Grant amount: \$75,000

Contact information

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Minnesota Conservation Corps Intensive Watershed Monitoring

Minnesota Conservation Corps (MCC) crew helped MPCA staff in stressor identification in watersheds across Minnesota. The crew assisted in identification of potential stressors such as sediment, dissolved oxygen, habitat, nutrients, and others. MCC assisted in the documentation of pollutant/stressor source and protection. The crew assisted with water sampling, gathering hydro-geomorphologic data, and other watershed assessment data. MCC crews gather scientific data ranging from water samples to geomorphic measurements. They kayaked/canoed stream reaches in search of indicators of potential stressors, while utilizing photos, GPS coordinates and field notes, to document stressor/pollutant sources and potential protection areas.

Financial information

Funding type: CWLA
Grant amount: \$37,001

Contact information

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MCC crew assisting in temperature probing in Dry Wood Creek to find groundwater inputs.

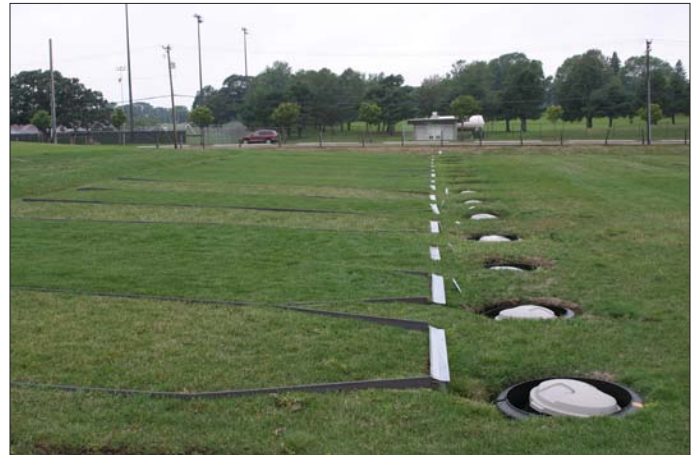
Phosphorus Fertilization/Turfgrass Clipping Management Effects

Phosphorus (P) enrichment of surface water and the role of home lawns as a P source is a concern in many watersheds. Effects of P fertilization and clipping management on P runoff from turfgrass were studied from September 2004 to October 2009. Four fertilizer treatments were compared: 1) no fertilizer, 2) nitrogen (N)+potassium(K)+0xP, 3) N+K+1xP, and 4) N+K+3xP. Phosphorus rates were 21.3 and 63.9 kg ha⁻¹ yr⁻¹ the first year and 7.1 and 21.3 kg ha⁻¹ yr⁻¹ the following four years. Each fertilizer treatment was evaluated with clippings removed or clippings returned to the turf. Data were collected for runoff P concentrations, runoff depth, P transport in runoff, turfgrass quality, plant tissue P, P uptake, and soil test P.

Soil P and P runoff concentrations increased with increasing P fertilizer rate, leading to P runoff increases in four of five years. Phosphorus runoff for no fertilizer was comparable to or greater than the 1xP rate, even though it received no fertilizer P. This was associated with reduced turf quality for no fertilizer and increases in runoff depth. Maintaining a dense stand of turf through N and K fertilization can reduce P transport by reducing runoff depth. Return of clippings did not increase P runoff, indicating that clipping management will not significantly affect P transport from turfgrass. Snowmelt or rainfall runoff while the soil was frozen accounted for 86% of P runoff. Even on soils requiring P, fall application of P fertilizer has a high runoff potential and should be avoided. Tissue P concentrations and P uptake generally increased as P fertilizer rate increased, but with adequate N and K the application of P had no effect on turfgrass quality. On sites with sufficient soil P, runoff P from lawns can be reduced without affecting quality by not applying P fertilizer.

Goals

- Quantify phosphorus runoff following phosphorus fertilization of turfgrass maintained similar to a home lawn
- Evaluate the effects of frozen soil conditions and removing vs. recycling grass clippings on phosphorus runoff
- Assess the effects of phosphorus fertilization and clipping management on turf quality and growth



Closeup of runoff collection device in St Paul.

Results that count

- Phosphorus runoff increased as the phosphorus fertilizer application rate increased, except that when no fertilizer at all was applied and turf quality was poor phosphorus runoff increased despite no phosphorus application
- Most of the phosphorus runoff in the study occurred in snowmelt and rainfall runoff when the soil was frozen; phosphorus runoff was not affected by removing vs. recycling grass clippings
- Phosphorus fertilization had no effect on turf quality and growth when there was sufficient phosphorus in the soil and adequate nitrogen and potassium fertilizer were applied; clipping management had no effect on turf quality and growth

Financial information

Funding type: Section 319

Grant amount: \$90,000

Local match: \$60,034

Total project costs: \$150,034

Contact information

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Social Indicators — Development and Testing

The purpose of the social indicators project was to create a new evaluation framework for measuring social outcomes in nonpoint source pollution (NPS) projects. Social outcomes include the adoption and maintenance of BMPs, behavior change that results from specific water quality projects, and increased capacity of audiences targeted by NPS project staff to implement and sustain new and beneficial water quality efforts. The evaluation framework is based upon fourteen indicators that evaluate changes in the behaviors, attitudes, knowledge and capacities of target audiences. Representatives from US EPA Region 5 states designed a social indicators handbook, two survey questionnaires, and an on-line software system, Social Indicators Data Management and Analysis (SIDMA), to assist the US EPA in comparing projects region-wide. The social indicators framework, Social Indicator Planning and Evaluation System for Nonprofit Source Management (SIPES), is currently designed for larger, uniform audiences who are urban or rural property owners. Region-wide, SIPES is still being tested and is considered experimental. In Minnesota, five SIPES surveys were completed in Duluth, Dakota County, and Heron Lake.

Goals

- A set of indicators that measures social data related to NPS program management efforts. The set will include indicators consistent with others used in the region as well as indicators that are pertinent for Minnesota.
- A toolkit for evaluating NPS programs describing the indicators and providing methodological approaches and tools for collecting and analyzing data. This guidance will be for program and project staff and will be available online and CD, website, and hard copy formats.
- A data management system for social indicators that will be regionally consistent and compatible with the existing data management systems. It will involve an SQL-server spatial database and will facilitate program analysis as well as assessment of the effectiveness of the social indicators framework.

Results that count

- A set of indicators was derived through a Delphi process with local and state stakeholders in US EPA



Social indicators surveys being completed by residents of Duluth

Region 5, and were further revised by the Regional team. Minnesota team members learned the SIPES indicators and their related SIDMA questionnaires were useful in some contexts, but may not always be relevant for all local partners.

- The Regional team designed the SIPES and SIDMA components of the toolkit, including a draft handbook. Minnesota has complemented the regional effort with several supplemental tools, including the knowledge, attitudes and practices (KAP) study method, an evaluation mini-workshop tool, and participant observation.
- The regional team launched SIDMA, which is now available on-line. SIDMA is currently housed at Purdue University while the software is being rewritten by staff on the Michigan team. SIDMA and SIPES are still undergoing testing and development, and are not yet available to users who are not pilot projects.

Financial information

Funding type: Section 319

Grant amount: \$260,000 Local match: \$87,000

Total project costs: \$347,000

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Statewide Development of Monitoring Networks

Evaluation of restoration efforts to improve impaired water is fundamentally tied to establishing cost-effective monitoring networks. A well-designed network needs to capture long-term trends as well as short-term responses, especially those that are necessary to evaluate the implementation of BMPs. Inherent in the design of a monitoring network is the natural variability of watershed variables. Extra care is therefore needed to capture the appropriate statistics that are necessary for prudent management decisions.

Overall goals of the project are to develop and evaluate methodologies for the design of monitoring networks. Key features of well-defined networks are the flexibility to handle multiple objectives of current and possibly future (possibly unknown) problems and to be able compute statistics of interest such as mean, variance, and extreme events (e.g. 100 year). This study focused on the errors in statistical values for different sampling frequency in space and with time.

The report first develops the framework to assess errors caused by different sampling frequencies. This framework is initially developed using the complete data set for a given population. Although these data sets are unavailable, they allow us to focus on the theoretical errors. This foundation is then used with synthetic data to allow the method to be applied to watersheds in Minnesota. To illustrate the approach, statistical models for the Redwood River Basin are developed and discussed. These models are used to demonstrate the usefulness of the proposed approach.

Goals

Develop and evaluate methodologies for the design of statewide monitoring networks.

Results that count

A report was written to address various monitoring network models and will be used to demonstrate the usefulness of the proposed approach.

Financial information

Funding type: CWLA

Grant amount: \$32,913

Contact information

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Winter Maintenance and Training Certification

Chloride contamination from road salt is a concern because it can be toxic to aquatic life, contaminate groundwater and harm terrestrial plants. Source reduction is needed to reduce chloride contamination of our waters. We determined that an education effort focused on reducing the use of chloride-containing deicers was needed to prevent future water from chloride impairments and remedy existing impairments.

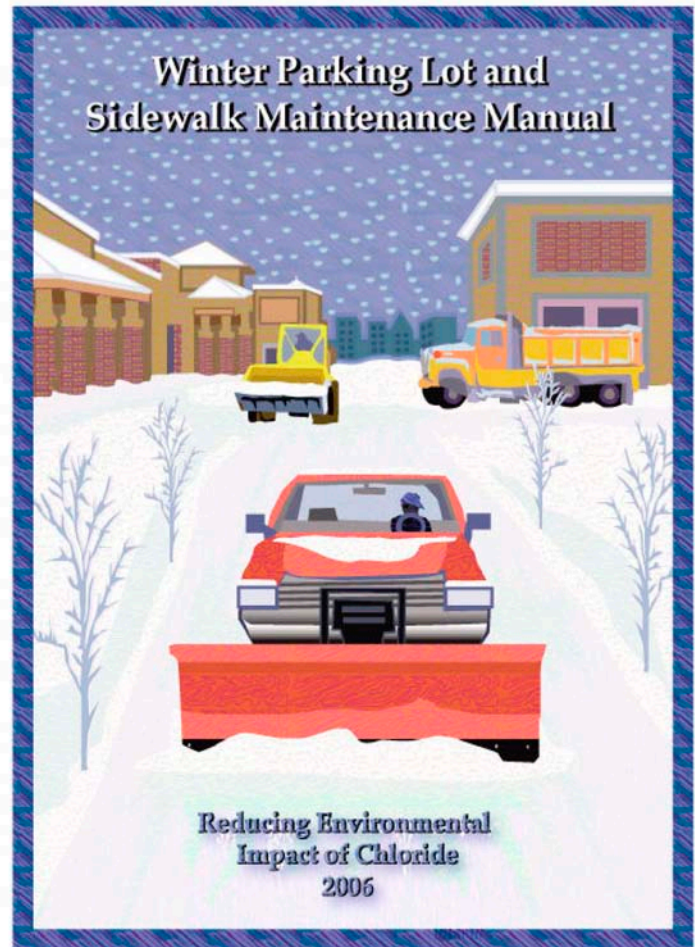
An estimated 10 - 25% of chloride comes from winter maintenance of parking lots and sidewalks. This project provided training of BMPs for winter maintenance to those that maintain parking lots and sidewalks. The training was based on a pilot training program previously developed and tested by Fortin Consulting, and a team of experts in winter maintenance. Working with local partners around the state, 26 training classes were presented to 758 private contractors and local government staff. Ten shorter presentations were given at conferences and other events reaching an estimated 750 people. An additional 665 were trained using the training materials with additional private funding to hold the class and about 1900 are certified through the new MPCA winter maintenance BMP certification. The training resulted in measurable reductions in the use of chloride-containing deicers and sand that is applied to our roads and thus a likely reduction in the amount of chloride and sediment entering our waters.

Goals

- Conduct 25 – 31 training courses
- Give 2 – 3 shorter presentations to conferences or groups
- Reduce the input of chlorides into our surface and groundwater

Results that count

- 38 training sessions for 1,423 people, a parallel “winter maintenance for roads” class was established and 18 classes were held, worked with MPCA to establish the voluntary certification (1542 certified from Minnesota and 355 certified from other states).
- We exceeded this goal many times over. We estimate that 750 attended these presentations.



- Rate reduction exercises showed potential salt use reductions of about 62%. The follow-up surveys showed salt use reductions ranging from 0 to 75%.

Financial information

Funding type: Section 319

Grant amount: \$80,000

Local match: \$142,557

Total project costs: \$222, 557

Contact information

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MPCA Project Manager: Brooke Asleson & Denise Leezer

Statewide

Projects active and awarded in 2010

eLINK Database Support — 2010

Sponsor: MN Board of Water and Soil Resources (BWSR)

Funding: Section 319 (Grant) \$75,000

Purpose: Provide eLINK database support to the MPCA, both for the staff, local units of government and other grant sponsors. The goal of eLINK is to record soil and water conservation project BMPs and load reductions. Geographic project locations can be entered into eLINK. Also, BWSR provides a section for the annual Watershed Achievements report showing load reductions.

Enhanced Filter Media for Removal of Dissolved Heavy Metals and Phosphorus from Stormwater Runoff — 2010

Sponsor: University of Minnesota-Twin Cities

Funding: Section 319 (Grant) \$404,000

Purpose: Provide an important step in improving stormwater treatment to remove dissolved nutrients and heavy metals by developing technology that is applicable to urban and agriculture environments. The new technology, enhanced soil and sand filter media, will be available for use in stormwater sand filters, infiltration systems, rain gardens, buffer strips, and other treatment systems.

Outcomes: Design standards for using the technology in new and renovated stormwater treatment practices may be published in the Minnesota Stormwater Manual. Educational outreach will occur through webinars, incorporation into University of Minnesota Extension Services Stormwater U classes, and publication in UPDATES, quarterly stormwater research newsletter, with distribution to more than 2,000 interested parties. This technology will also be used in pilot studies with cities, watershed districts, and/or local governments. Implementation of the technology will result in significant removal of the dissolved fraction of heavy metal and nutrient loads from stormwater runoff.

Side Inlet Controls to Improve Water Quality — 2010

Sponsor: Minnesota Board of Water and Soil Resources

Funding: Section 319 (Grant) \$341,605

Purpose: Side inlets serve as surface runoff outlets from agricultural land into drainage ditches and are very common wherever surface drainage ditches are present.

These side inlets contribute sediment and concomitant nutrients and pesticides to MN's waters. Side inlet controls such as culverts and drop pipes can prevent gully erosion, control the rate of flow to ditches, and create sedimentation areas to improve water quality. Current design practice does not consider water quality impacts, which this project would address. Research and demonstrations are needed to quantify the benefits of this BMP on sediment, nutrient, and pesticide loading to receiving waters and to develop design guidance and outreach so that side inlet controls can be implemented on a widespread basis.

Outcomes: Develop a Light Detection and Ranging (LiDAR)-based method for identifying side inlets to aid in implementation prioritization, estimate the cumulative benefits of adopting side inlet controls at different scales, optimize side inlet control design to provide water quality benefits while minimizing negative impacts to agricultural production, develop technical guidance for side inlet controls to be used by SWCDs, engineers, and other water resources professionals, and build research and demonstration projects at selected key locations across the state.

Social Indicators — Development and Testing — 2010

Sponsor: University of MN, Water Resources Center

Funding: Section 319 (Grant) \$200,000

Purpose: The SI project is in the final phase of testing with local pilot project partners. Further work will be done to test the SIPES and SIDMA tools. Pilot partners will create survey questionnaires using SIDMA for their pre and post project work to assess changes in behavior and practices, as well as for planning future project work. Partners will also follow the SIPES evaluation process using the SI handbook in an effort to help provide feedback to MPCA and US EPA on the usefulness and effectiveness of the evaluation tools and methodology. Project data will be entered in SIDMA and compared regionally to other SI efforts. Supplemental social outcomes evaluation methodologies, such as KAP (Knowledge, Attitude and Practices) will be developed and tested with local partners.

Outcomes: The MPCA will train stakeholders on how to use Social Indicator tools and operationalize social outcomes evaluation methodologies for the Agency's nonpoint water quality grant work. A solid foundation of experiential data related to the effectiveness of SIPES and SIDMA will be made available to US EPA.

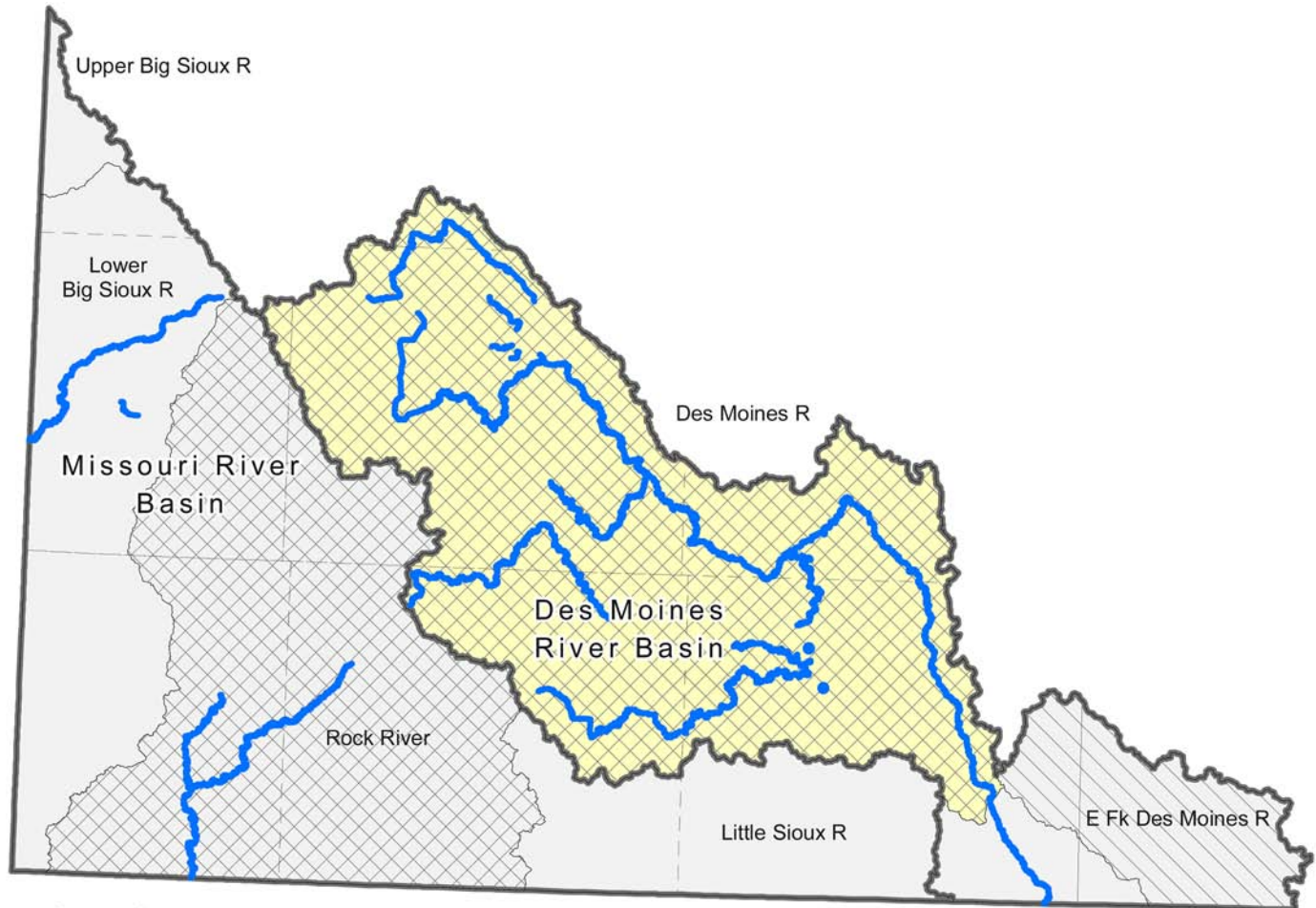
Des Moines and Missouri River Basins

Projects completed

West Fork Des Moines

Beaver Creek Watershed Improvement Project

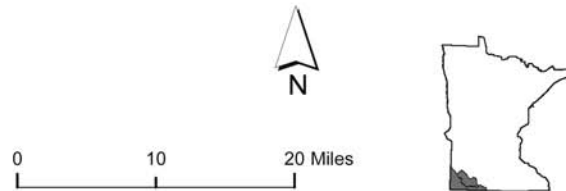
Elk Creek Conservation Tillage



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- County Boundary
- Watershed with Newly Awarded Project
- Watershed with Active Project
- Watershed with Newly Awarded and Active Projects
- Watershed with Completed Project
- Watershed
- Basin Boundary

Lower Des Moines R



Beaver Creek Watershed Improvement Project

The Beaver Creek Watershed Improvement Project began in 2005 and continued through June 30, 2009. All loan and grant dollars were expended within the timeframe. The Project has undergone three modifications including reallocation of funds initially earmarked for implementation of the program moved to cost-share. The project funded implementation, education monitoring, education and staff. A summer intern was hired in 2007 and 2008 to lead activities. Through all of this, the Beaver Creek Watershed Improvement Project left a positive mark on the watershed landowners by assisting in the upgrading of 26 non-complying septic systems. The Project also helped fund one wetland restoration, one sediment control structure, 2.81 acres of grassed waterways, and 493 acres of buffer strips. Monitoring at one site was crucial to determining changes in the watershed. In review of data collected in 1994, water quality has improved. Education efforts were also conducted throughout the project. A newsletter was mailed to each Beaver Creek watershed resident and several meetings were held during the project. The Beaver Creek Implementation Steering Committee has expressed interest in continuing the project.

Goals

- Reduce total suspended solids load by 35%, nitrate-nitrite nitrogen load by 30%, and total phosphorous load by 30%, at Site B1 to attain the goals established by the West Fork Des Moines River Clean Water Partnership-Diagnostic study.
- Reduce fecal coliform bacteria concentrations to meet the state standard of 200 cfu/100 mL.
- Provide education and information to each landowner within the Beaver Creek watershed.

Results that count

- The total suspended solids have decreased but did not meet the goal. The nitrate-nitrite nitrogen goal was also not met and actually levels have increased. The total phosphorus goal was met and exceeded. Fecal coliform levels have not changed since the first diagnostic study was completed in 1994.
- Met with each landowner to discuss septic system upgrades and cost share on other BMPs. They also



Beaver Creek bridge on State Highway 30, Section 18, Murray Township, and Murray County, Minnesota.

received the Beaver Creek Bulletin newsletter. Held two public meetings regarding landowner interest in water retention structures as well as six regular meetings of the Beaver Creek Watershed Clean Water Partnership Committee.

Financial information

Funding type: CWP

Grant amount: \$62,122

Local match: \$160,254

Loan: \$178,800

Total project costs: \$401,176

Contact information

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Elk Creek Conservation Tillage

The Heron Lake watershed encompasses many of the same problems seen in other agricultural areas in Minnesota. A 1991 diagnostic study determined the major sources of nutrients and total solids to Okabena Creek were Elk Creek and the section of Okabena Creek that drains the City of Worthington. It was also determined that streambank erosion was very evident at an Elk Creek sampling site.

To address the water quality concerns that arise from phosphorus loading, erosion, and sedimentation, this project hoped to increase public awareness of pollution problems, provide an incentive for landowners and farm operators to implement conservation tillage methods in Elk Township, and monitor for changes and improvement.

Heron Lake Watershed District (HLWD) staff provided information about the program requirements through direct mailing, one-on-one contact, watershed-wide newsletters, and reports to the general public and local officials. These efforts proved successful. There was a total of 8,147.7 acres enrolled in conservation tillage practices and the usage of strip-till and no-till systems increase by 88 percent. Operators were enthusiastic about the program and commented that the incentive helped their decision to switch to less aggressive tillage. Water quality monitoring showed significant improvement. From 2002 (pre-grant) through 2008, total phosphorus (TP) mean concentrations decreased 90 percent from 2002-2008, total suspended solids (TSS) decreased 39 percent and nitrate-nitrite (NO₂_NO₃) decreased 17 percent at Okabena Creek.

Goals

- Increase public awareness
- Nonpoint source pollutant loading reductions
- Monitor improvement and changes

Results that count

- During the grant period, more than 87 landowners were invited through a letter and direct contact to be a part of the incentive program. Over the six years, the HLWD had contracts with 47 landowners. In addition, a monthly newsletter highlighted the grant once in 2007 and again in 2008, which spurred four additional townships within the HLWD to request similar projects.



HLWD summer intern Janelle Kuechle conducting residue cover percentage survey.

Currently, there are two other projects in the HLWD with similar programs.

- Over the three-year grant period, 8,147.7 acres were enrolled in conservation tillage practices, surpassing the 6,000 acreage goal in the work plan. According to BWSR's eLINK system, implementation of these practices saved 1,315 lbs/year of phosphorus and 788 tons/year of sediment.
- Monitoring of Okabena Creek shows a significant improvement in water quality. Average TP concentrations decreased from 1.56 mg/L in 2002 to 0.16 mg/L in 2008, a change of 90 percent! Average TSS decreased from 114 mg/L in 2002 to 69 mg/L in 2008 a change in excess of 39 percent. Average NO₂_NO₃ concentrations decreased from 17.29 mg/L in 2002 to 14.37 mg/L in 2008 a change of 17 percent.

Financial information

Funding type: CWP

Grant amount: \$28,200

Local match: \$66,992

Total project costs: \$95,192

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Des Moines and Missouri River Basins

Projects active and awarded in 2010

Des Moines River Basin

West Fork Des Moines River (Headwaters)

Heron Lake Alternative Tile Intake Cost-Share Program — 2006

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$36,000

Purpose: Reduce sediment in runoff from farm fields by replacing open tile intakes with subsurface rock intakes.

Heron Lake Alternative Tile Intake Cost-Share Program Continuation — 2009

Sponsor: Heron Lake Watershed District

Funding: CWP (Grant) \$36,000

Purpose: Heron Lake Watershed District (HLWD) and local Soil and Water Conservation District (SWCD) staff will promote the alternative tile intake program. They will explain the program, review the design specifications with each landowner, and answer questions. Rock inlet design and specifications will be provided to each contractor performing the actual installation of these structures. All contractors must be checked in the field as they install the first rock inlet to determine that each inlet will be constructed according to specifications determined by the HLWD/SWCD. Landowners will be contracted with a general survey asking for feedback on the performance of these structures.

Heron Lake Sediment Reduction Demo — 2010

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$16,500

Purpose: Heron Lake Watershed District (HLWD) proposes demonstrations of two effective, yet relatively inexpensive methods of streambank erosion control, a tree revetment and a J-hook weir. A tree revetment is a bioengineering method that uses whole trees, cabled tightly together in giant bundles, which are then secured to eroding streambanks. A J-hook weir is an upstream directed, gently sloping structure composed of natural materials designed to guide water away from the streambank. Both are new to southwestern Minnesota and landowners are unaware of the benefits of these practices.

Education and outreach would be the most time-intensive portion of the project. Site visits and bus tours, one at the beginning of the project and one upon completion, would be included. Photos and videos would be used for presentations and posted on the website. Project progress would be documented by videos and photographs, and disseminated via newsletters, news articles, public presentations and the HLWD website.

Heron Lake Watershed District — Bmp Program For Alba Township — 2007

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$40,800

Purpose: The goal of this project is to decrease water movement, reduce erosion, and improve water quality throughout approximately 23,000 acres in Alba Township through changing tillage methods from conventional tillage to conservation tillage. Conventional tillage is the main practice undertaken on the silty clay loam soils. Creating awareness among landowners about the relationship between soil conservation and water quality will be critical to the project's success.

Heron Lake Watershed District: Clean Water Partnership Continuation — 2008

Sponsor: Heron Lake Watershed District

Funding: CWP (Grant) \$428,752.50
CWP (Loan) \$500,000

Purpose: This implementation project will continue to increase public awareness of water quality issues. The watershed district will establish cost-share, incentive, and loan programs for best management practice (BMPs) installation. Conservation tillage equipment purchase will continue. This project will control water flow in the watershed through the installation of alternative surface tile intakes and water/sediment control basins, wetland restoration, storm water retention ponds, critical area plantings, and riparian easements. The monitoring effort will ensure timely completion of the watershed treatment strategies and their effectiveness in improving the stream and lake water quality. Installation of BMPs such as filter strips and wetland restorations will provide habitat for resident and migrant wildlife species.

Heron Lake Watershed District — Conservation Tillage Demonstration Plot — 2008

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$20,547

Purpose: This grant will allow continued research in conservation tillage used on the demonstration plot developed in 2005. The economic and environmental benefits of six treatments of reduced tillage, including strip till, will be evaluated. This project will demonstrate 1) several tillage practices that have the potential to reduce sediment delivery to surface waters and preserve agricultural soils through increased crop residue cover on row-cropped fields, and 2) economic and environmental benefits of reduced tillage systems.

Heron Lake Watershed District — Fulda Lakes Project — 2007

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$55,800

Purpose: The Heron Lake watershed is rural and agricultural. In a watershed such as this, agricultural BMPs are crucial. Landowners are hesitant to try new methods. The goal of this project is to improve the water quality in Fulda lakes through the use of cost share and incentive programs, and education of residents and landowners.

East Fork Des Moines River

Des Moines River, East Fork Monitoring Project — 2009

Sponsor: Martin County Soil and Water Conservation District

Funding: CWP (Grant) \$40,000

Purpose: The intent of this phase 1 project is to provide an inventory of resource needs and fill in the gaps in water quality data within the East Fork Des Moines River Watershed, to expand on the work already underway in the Tuttle Lake water quality assessment project and to complete a diagnostic study and implementation plan for this watershed.

Shell Rock River

New Tools to Support TMDL P Reduction Plans — 2009

Sponsor: University of Minnesota Water Resources Center

Funding: Section 319 (Grant) \$298,175

Purpose: The goals of this project are to (1) develop a whole-watershed P balance for a case study watershed (Albert Lea Lake), (2) develop a simple approach for determining the source of water to streams (groundwater vs. surface runoff), and (3) develop an approach to integrate these new ideas into TMDL implementation plans. The P balance will be developed for the entire Albert Lea Lake watershed to determine forms and amount of P entering the watershed, being transferred among “compartments” (e.g., hog farms, crop farms, soil system) within the watershed, being lost via stream export, and being accumulated. Hydrologic studies will be conducted to determine the source of water (groundwater vs. surface runoff) and P. Results will be integrated with the conventional modeling approach. Outcomes will include an online guidance manual, local workshops, and state-wide workshops.

Missouri Basin

Rock River

Reducing Fecal Coliform in the Rock River Watershed with Manure Management — 2009

Sponsor: Rock River TMDL Organization

Funding: Section 319 (Grant) \$147,372

Purpose: Reduce bacteria contributions by 60 percent to the Rock River through correct management of land application of manure. The overall goal will be accomplished through the following four goals:

1. Increase the number of operations utilizing calibrated manure application equipment to at least 50 solid manure applicators and 25 liquid manure applicators.
2. Utilize incentive payments to encourage 25 producers to develop and maintain a manure management plan. These producers will also be required to complete a survey to understand behavior and operation changes.
3. Increase operator and agronomist knowledge by providing a field day (at least 100 attendees) that displays a field size plot of varying manure applications.
4. Increase commercial manure applicator knowledge by offering continuing education opportunities to at least 25 commercial applicators.

Rock River Replacement Subsurface Sewage Treatment System (SSTS) Loan Program — 2009

Sponsor: Rock County

Funding: CWP (Loan) \$650,000

Purpose: The Rock River is located in the southwest corner of Minnesota and is a main tributary to the Missouri River Basin. This project would provide a low interest loan option for financing replacement of approximately 75 SSTSs in the three-year grant period. Replacement of failing SSTSs was chosen by the committees as one of the main concerns in this area.

Lake Superior Basin

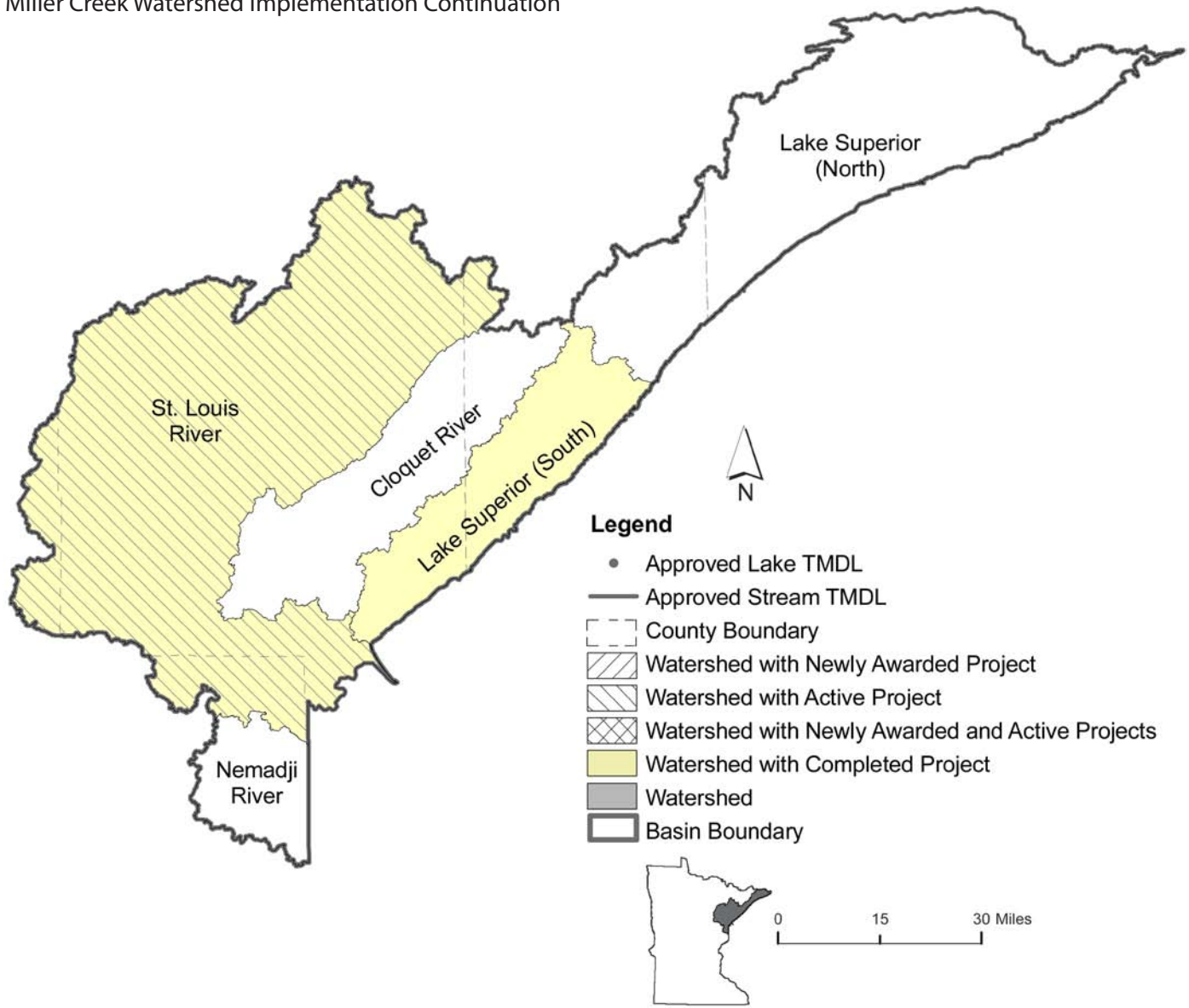
Projects completed

Lake Superior South

Deer Creek and Nemadji River Turbidity TMDL

St. Louis River

Miller Creek Watershed Implementation Continuation



Deer Creek and Nemadji River Turbidity TMDL

In December of 2003, Deer Creek (headwaters to Nemadji River) and the Nemadji River (from the Minnesota/Wisconsin border upstream in Minnesota to the headwaters) were listed on the Federal Clean Water Act's 303 (d) list of impaired waters for turbidity. This project, by its various phases, will result in the development of a TMDL for turbidity for Deer Creek and the Nemadji River, and will also define which reaches of the Nemadji basin may be meeting standards for turbidity. In December 2007 the MPCA contracted with the Carlton County SWCD to serve as a local partner and lead the project in specific work plan tasks in order to develop a TMDL for Deer Creek and a separate TMDL for the Nemadji River. Because Deer Creek watershed is a sub watershed of the Nemadji River watershed, some tasks are combined for efficiency, however, the project will result in two separate TMDLs.

Work on this TMDL project will be completed in three phases. This report details the tasks and budget for Phase I, which began in February 2008 and ended in April 2010. This phase focused on assembling existing turbidity data and GIS data, developing a monitoring plan, beginning sediment loading monitoring, supporting additional research led by the MPCA related to this project, developing partnerships and stakeholder involvement, and developing a prototype educational tool for disseminating information about Deer Creek, which will be expanded to the larger Nemadji River watershed in subsequent phases of the project.

Goals

- Begin sediment load monitoring
- Public/stakeholder outreach
- Create a prototype educational tool for watershed landowners and partners

Results that count

- Completion of Deer Creek/Nemadji River TMDL Summary of Existing Data; Deer Creek/Nemadji River Turbidity TMDL Monitoring Plan; and TMDL monitoring
- Formation and implementation of the Nemadji River Stewardship Committee; Deer Creek/Nemadji River TMDL newsletters and public outreach meetings; and the Nemadji River Watershed volunteer stream monitoring team



Blackhoof River Monitoring Station: The SWCD worked with County Transportation Department to construct a safe walkout structure for a new stream-monitoring site as part of the TMDL load monitoring for the Nemadji River. 9 new monitoring sites were developed for this project.

- Deer Creek Watershed Guide Website: <http://www.carltonswcd.org/DeerCreekGuide.htm>

Financial information

Funding type: CWLA

Grant amount: \$176,419

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MPCA Project Manager: Karen Evans

Miller Creek Watershed Implementation Project

Miller Creek is an urban trout stream located in St. Louis County, Minnesota. In the past, Miller Creek ranked as one of the best brook trout streams in the area. However, over the past 30 years portions of the Miller Creek Watershed have undergone significant commercial development. While brook trout continue to reproduce, their numbers are declining in the creek segments adjacent to the most intense development. Miller Creek is on the Impaired Waters List and suffers from high temperatures.

Through this project, the SWCD and project partners were able to implement projects to improve the condition of the stream and address the identified impairments. Through this project:

- Planted 302 potted white spruce trees during the project and performed weed control on previously planted trees.
- Completed three stormwater retrofits.
- DNR Fisheries completed trout population assessments each year of the project
- Held individual meetings regarding Miller Creek and Stormwater with Target, Wal-Mart, Irresistible Ink, Mission Development, Hermantown Star, Catholic Charities, and Grandma's Restaurant.
- Completed street sweeping

Goals

- Plant trees to enhance riparian vegetation
- Retro-fit innovative stormwater practices
- Hold one workshop for watershed businesses and the public

Results that count

- 302 potted white spruce were planted
- Two stormwater retro-fits were installed and one rain garden was planted
- Seven meetings with watershed businesses were held and two workshops were held



Photos from the Irresistible Ink and Energy plus stormwater retrofits

Financial information

Funding type: CWP
 Grant amount: \$31,000
 Local match: \$35,927
 Total project costs: \$66,927

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Lake Superior Basin

Projects active and awarded in 2010

St. Louis River

East Swan River Watershed Protection Strategy — 2009

Sponsor: North St. Louis Soil and Water Conservation District

Funding: CWP (Grant) \$147,000

No water quality or biological monitoring programs exist within the watershed at this time, and the current water quality of the East Swan River and its tributaries are largely unknown. The initial focus of this phase 1 project will be building community coalitions, consolidating the technical infrastructure required, developing a watershed monitoring plan, collecting and assessing watershed data and developing a diagnostic study and implementation plan to protect the watershed from degradation. The project will also develop a GIS watershed management database and analysis tool which quantitatively analyzes water quality impacts of factors such as land use, zoning, property ownership, topography, soils, stream buffers, wetlands, point source discharges, drainage networks, hydrologic modifications, stream flow, and other available biological, physical and socioeconomic data on surface waters within the watershed.

Lower Mississippi and Cedar River Basins

Projects completed

Projects involving multiple watersheds

Vermillion River and Chub Creek ISTS Inspection and Upgrade
 Volunteer Nitrate Monitoring

Cannon River

Cannon River Wastewater Building Local Capacity

Mississippi (Winona)

Whitewater Watershed South Branch — Bacteria Reduction

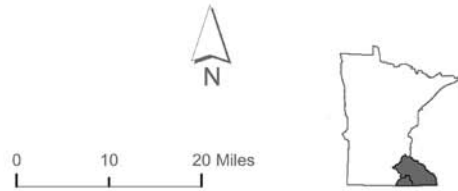
Zumbro River

Zumbro River Watershed Turbidity and Nutrients TMDL



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- County Boundary
- Watershed with Newly Awarded Project
- Watershed with Active Project
- Watershed with Newly Awarded and Active Projects
- Watershed with Completed Project
- Watershed
- Basin Boundary



Vermillion River and Chub Creek ISTS Inspection and Upgrade

Dakota County, Minnesota, is an area in the Twin Cities Metropolitan Area that contains urban, suburban, and rural landscapes. Surface water resources include the Vermillion River and Chub Creek with reaches listed as impaired for bacteria. This project received a Section 319 Implementation Grant to target Individual Sewage Treatment System (ISTS) compliance in rural riparian areas in Dakota County.

The goal of the Vermillion and Chub Creek ISTS Inspection and Upgrade Program was to decrease the bacteria contamination in these streams by upgrading the majority of failing ISTS in rural riparian areas. After completing an inventory to identify pre-1996 ISTS in riparian areas, project staff conducted outreach activities to reach homeowners within 300 feet of the streams. Licensed septic system inspectors under contract for the project inspected 165 ISTS and found 64 failing systems. Using incentive payments of \$500 per household, existing low-interest loan programs available for septic system upgrades, and compliance and enforcement, the program achieved compliance for all 64 failing systems.

Goals

- Inventory pre-1996 ISTS in rural riparian areas.
- Complete licensed septic system inspections on inventoried pre-1996 ISTS in rural riparian areas.

Results that count

- Inventory of pre-1996 ISTS in rural riparian areas completed.
- Project contracted licensed ISTS inspectors, inspected 165 ISTS and found 64 failing systems. All 64 of the failing systems achieved compliance.

Financial information

Funding type: Section 319

Grant amount: \$160,500

Local match: \$162,738

Total project costs: \$323,238

Contact information

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MPCA Project Manager: Roger Ramthun



Before and after: The failing septic system shown (above left) was located close to a child's swing set. The system was upgraded as a result of the Vermillion and Chub Creek ISTS Inspection and Upgrade Program Section 319 Project.

Volunteer Nitrate Monitoring Network in Targeted Areas — a Pilot Project

This regional project developed and tested the concept of a cost-effective, locally-driven, and self-sustaining means of obtaining long-term trend data for nitrate occurrence in private drinking water supplies where the wellowner is at the heart of the process.

To obtain a representative sample of wells that would answer the question - what is the quality of the water that people are drinking in terms of nitrate - a 675-point grid was superimposed over a nine-county region of southeastern Minnesota. A buffer two miles in diameter was circumscribed around each grid point. A random parcel was then selected within each buffer and the parcel owner recruited as a volunteer. A County Well Network Coordinator was hired in each participating county and conducted a site visit at each well to identify the location, age, depth, diameter, and potential sources of nitrate contamination in the vicinity of the well. A survey was administered to each well owner to assess knowledge of their well and attitudes and practices related to their water. Well owners were subsequently mailed a sample bottle, instructed to take a water sample, freeze the sample, and then mail the sample to a specified county location. County staff then conducted the nitrate analysis on a bi-annual basis using Hach 4000 Nitrate Analyzers provided at no cost to the counties by the MN Department of Agriculture. Four rounds of nitrate monitoring were conducted during the grant period, with analysis being conducted in February 2008, August 2008, February 2009 and August 2009.

Goals

- Develop a nitrate ground water monitoring network design for southeast Minnesota to determine the condition of the ground water in selected aquifers and to assess the condition of drinking water from wells
- Establish a long-term volunteer monitoring network in each of the participating counties to obtain nitrate trend data
- Based on homeowner and staff feedback evaluate the feasibility of this innovative approach for nitrate data collection and its applicability to other areas of the state

Results that count

- Developed a network design including; where to test, how often to test, seasonality of sampling and target areas for additional sampling
- Hired a data analyst and Well Network Coordinators (WNC), recruited volunteers to meet network design criteria, trained WNC's and volunteers in sample handling and analysis, and conducted four rounds of monitoring using the network design
- Mailed an evaluation survey to all volunteers and held focus group discussions with volunteers and WNC's to evaluate network success in areas such as homeowner willingness to participate, sustainability of homeowner involvement and ability of homeowners to follow sampling protocol

Financial information

Funding type: Section 319 Grant

Grant amount: \$275,000 Local match: \$284,825

Total project costs: \$559,825

Contact information

Linda Dahl

Southeast Minnesota Water Resources Board

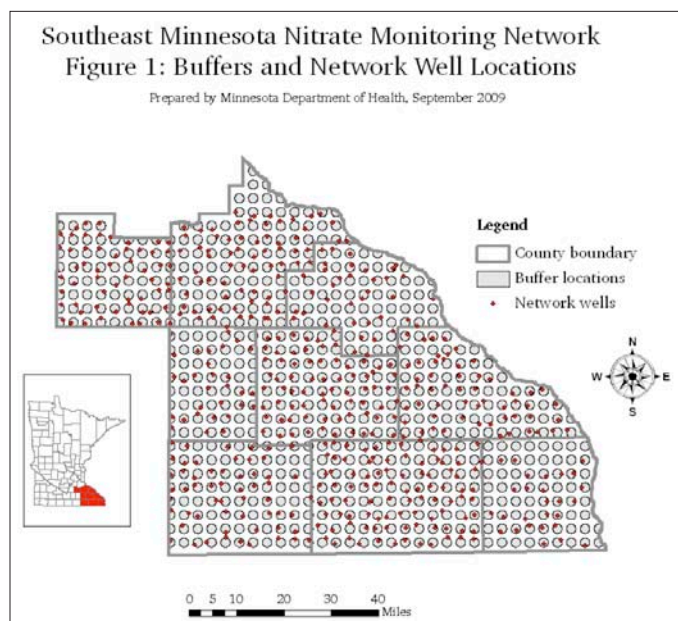
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Cannon River Wastewater Building Local Capacity

The Southeast Minnesota Wastewater Initiative project takes a comprehensive approach to addressing the problems of small communities with straight-pipe septic systems and other forms of inadequate sewage treatment through community facilitation expertise and technical assistance, education, and cost-share assistance.

Component #1: Facilitators and technical assistance.

The role of the wastewater facilitator is to build capacity, develop leadership in the community, and provide technical assistance. A facilitator's tasks may include finding a meeting space, developing an agenda, leading contentious public meetings, pursuing funding, or forming a management entity such as a subordinate service district.

Component #2: Cost-share assistance. The cost-share assistance portion of the Initiative's model allows communities to apply for 50 percent cost share with a limit of \$3,000 to do an initial needs assessment of their current wastewater conditions and a second 50 percent cost share with a limit of \$6,000 to contract for a project feasibility study.

Component #3: Education. Once a community has taken some initial steps to address the condition of their systems, they require education in the types of treatment options available. Finally, once a new system has been installed, education of how to operate and maintain the system is vital to its viability.

Goals

- Reduce the number of unsewered communities and failing septic systems in the basin to reduce fecal coliform.
- Develop local capacity to effectively manage rural sewage
- Create a greater awareness of wastewater treatment issues

Results that count

- Six communities constructed new wastewater treatment systems and abandoned their straight-pipes. 78,600 gallons of untreated sewage per day no longer enters Southeast Minnesota's surface waters.
- Public Facilities Authority (PFA) established the new Small Communities Wastewater Treatment funding program. Five counties have undertaken straight pipe inventory projects, four counties offered low interest



Meriden construction materials and Meriden ponds

loan programs for septic systems and Dodge and Fillmore County now require compliance inspections when properties transfer.

- Conducted at least seven educational presentations.

Financial information

Funding type: Section 319

Grant amount: \$299,999

Local match: \$309,842

Total project costs: \$609,841

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Whitewater Watershed South Branch — Bacteria Reduction

The South Branch of the Whitewater River is impaired for recreation from fecal coliform bacteria. Monitoring data shows the Whitewater River Watershed having the highest fecal coliform levels in the Lower Mississippi River Basin. Through the Section 319 Grant Program, the Whitewater Watershed Project implemented a South Branch Bacteria Reduction Project.

The project utilized education, technical assistance and financial assistance to address this pollutant.

Using the Regional TMDL Implementation Plan as a guide, the project team focused its efforts on 1) educating watershed residents and local officials, 2) developing customized maps on sensitive features and setback requirements for livestock farmers, 3) offering low interest loans for septic system upgrades and 4) utilizing existing cost share programs to increase the adoption of targeted BMPs for the reduction of fecal coliform bacteria pollution. Work began in June 2005 and continued through June 2009.

The project made significant progress toward addressing an extremely complex pollution problem. Outreach efforts reached many watershed residents, increasing knowledge and awareness of the problem and potential solutions. Farmers installed BMPs on hundreds of acres, and five feedlots were brought into compliance with pollution standards. 72 percent of feedlot operators with between 10 and 1000 animal units met to discuss personalized maps showing sensitive features on their farms. Seven residents replaced failing septic systems through our low-interest loan program.

Goals

- Increase replacement of failing septic systems and promote proper maintenance of ISTSs to reduce non-point source pollution in the South Branch of the Whitewater River Watershed.
- Increase knowledge and understanding of bacterial pollution by South Branch Whitewater Watershed residents, farmers and municipalities.
- Increase adoption of low-cost feedlot fixes to reduce non-point source pollution in the South Branch of the Whitewater River Watershed.



Tour of rain gardens with local city officials.

Results that count

- Seven residents used CWP loan funds to improve or replace ISTS; 25 attended ISTS maintenance classes.
- Provided site-specific maps of Sensitive Features for Manure Application to 89 percent of feedlots between 100 and 1000 animal units. Met individually with 72 percent of feedlot operators between 100 and 1000 animal units to discuss their maps and MPCA manure spreading guidelines. Provided brochures, Do-It-Yourself Septic Evaluations, and other educational materials to 300 residents. Discussed stormwater management with local city officials. Designed two rain gardens for the City of St. Charles for installation in the fall of 2009 with cost share funding from the Winona SWCD. These rain gardens will utilize native plants to buffer the river as it flows through the city.
- Used matching funds from a CWL grant to provide cost-share for ten feedlots with less than 300 animal units. BMPs included: roof gutters, clean water diversions, filter strips, etc. Whitewater cost share total \$19,000. The cost to landowners and other cost-share sources was approximately \$118,000. Landowners typically paid 50 percent or more of the cost.

Financial information

Funding type: Section 319

Grant amount: \$147,467 Local match: \$297,464

Total project costs: \$444,931

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Zumbro River Watershed Turbidity and Nutrients TMDLs

The Zumbro River watershed encompasses more than 900,000 acres of agricultural and urban lands that drain through the three forks of the Zumbro River. The watershed includes parts of Olmsted, Dodge, Goodhue, Rice, Wabasha, and Steele Counties, as well as the growing City of Rochester. This TMDL development project addressed turbidity impairments (listed 1998-2008) on seventeen stream and river reaches of the Zumbro River. The project employed a variety of methods to evaluate the current loading, contributions by the various pollutant sources, as well as the allowable pollutant loading capacity of the impaired reaches. These methods included the load duration curve approach for reaches impaired by turbidity. Primary sources and causal factors contributing to the turbidity impairments in the watershed were found to be streambank/bed erosion, row cropland, impervious areas, inadequate buffers near streams and waterways, channelization of streams, and overgrazed pasture near streams and waterways. Minor contributions from algae to turbidity are more likely in reaches downstream of reservoirs or impoundments.

The work completed in this project will ultimately result in an approved TMDL which will become an implementation plan. This plan will be written by local stakeholders, coordinated by the Zumbro Watershed Partnership. The implementation plan will guide funding aimed at addressing the impairments.

Goals

- Gather all data relevant to the Zumbro River watershed's turbidity impairments and sediment dynamics; collect more information as needed
- Conceptualize and develop tools for use in TMDL development; construct TMDLs for seventeen impairments
- Provide adequate outreach and information to public

Results that count

- This project significantly increased the available data pertaining to the Zumbro River watershed and its sediment dynamics; all of this information is stored well, and many of the stations will be maintained indefinitely



The middle fork of the Zumbro River during the August 2007 flood

- Agency draft of the TMDL report was delivered at the close of the contract with Barr Engineering
- Numerous meetings and outreach tools were used throughout the project

Financial information

Funding type: CWLA

Grant amount: \$250,037

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Lower Mississippi and Cedar River Basins

Projects active and awarded in 2010

Cedar River Basin

Cedar River Watershed

Alternative Designs for Drainage Ditches — 2010

Sponsor: University of Minnesota (U of M), Department of Bioproducts and Biosystems Engineering (BBE)

Funding: Section 319 (Grant) \$286,128

Purpose: Finding a balance between the benefits of drainage and protecting water bodies is a difficult challenge. This proposal will study the effectiveness of innovative ditch designs as a BMP solution to water quality concerns related to artificial agricultural drainage. This BMP addresses water quality concerns and TMDL impairments related to highly drained agricultural areas of Minnesota. Minnesotans need to make advances now in alternative ditch designs. Ditches comprise many miles of the rivers and streams on the impaired waters list. As TMDL's are completed, ditches and tile drainage will be targeted as sources and receive a load allocation to be remediated. Alternative ditch designs are viable options for reducing targeted load allocations without requiring major changes in current farming practices. This project builds on previous work completed at the U of M and includes development of tools to identify high priority ditches or landscapes that would benefit from the use of this BMP.

Lower Mississippi River Basin

Multiple watersheds in the basin

Assistance for Unsewered Communities in the Lower Mississippi/Cedar River Basin — 2008

Sponsor: Southeast Minnesota Water Resources Board

Funding: Section 319 (Grant) \$272,080

Purpose: This project will be implemented within the boundaries of the thirteen counties in the basin. The regional TMDL study identified streams in the basin posing a risk of human illness from excessive levels of fecal coliform bacteria. This study also found that failing septic systems and unsewered communities comprised

an estimated 52% of the bacteria load during spring and summer, making it the single greatest pollutant source. In order to achieve a 65 percent reduction of this load by 2012, this project will assist those small communities with expertise and resources needed to achieve a wastewater solution.

Lower Mississippi Feedlot Runoff Control — 2006

Sponsor: Southeast Minnesota Water Resources Board

Funding: Section 319 (Grant) \$300,000

Purpose: Hire technicians to assist eligible open livestock feedlots and provide some funds for low-cost improvements to reduce runoff.

Southeast Minnesota Volunteer Nitrate Monitoring Network — 2009

Sponsor: Southeast Minnesota Water Resources Board

Funding: CWP (Grant) \$143,600

Purpose: To maintain the established network of 675 homeowner volunteers whose wells are annually sampled in order to evaluate condition and trends of area drinking water sources. The overall goal is to provide long-term data counties need to focus on their implementation efforts for groundwater protection.

Sustaining Progress Toward Reducing Runoff from Open Lot Feedlots — 2009

Sponsor: Southeast Minnesota Water Resources Board

Funding: Section 319 (Grant) \$300,000

Purpose: Local staff or contractors will provide open lot agreement signers with technical assistance in designing low-cost fixes to correct and treat polluted runoff (average cost of a low-cost fix is \$5000) and to trouble-shoot implementation challenges where runoff reduction is not completely abated despite feedlot design implementation.

Cannon River Watershed

North Cannon River Bacteria Reduction Project — 2010

Sponsor: Dakota County Soil and Water Conservation District (SWCD)

Funding: Section 319 (Grant) \$66,000

Purpose: The purpose of the North Cannon River Bacteria Reduction Project is to identify, target and work with rural landowners to install filter strips and other best management practices that reduce bacteria, nutrients and sediment contributions to surface waters within the North Cannon River Watershed.

Southeast Regional Grant for Water Quality — 2010

Sponsor: Southeast Minnesota Water Resources Board

Funding: Section 319 (Grant) \$900,000

Purpose: This project forms part of a larger regional effort to comprehensively address sources of fecal coliform bacteria tied to the Regional TMDL Implementation Plan. We will secure two experienced Wastewater Facilitators to work with 13 additional small Southeast Minnesota communities to find solutions to inadequate wastewater treatment. We will also conduct an inventory of individual on-site sewage treatment systems on a county or small watershed scale, followed by replacement of 450 Imminent Threats to Public Health. Finally, local feedlot staff will provide technical and engineering assistance to design and implement 100 small feedlot fixes to treat polluted runoff.

Upper Cannon Assessment Project — 2007

Sponsor: Le Sueur County

Funding: CWP (Grant) \$184,588

Purpose: This is a diagnostic study which will include monitoring selected stream sites for flow and water quality parameters, in-lake monitoring, aggressive educational components, GIS mapping, a point source inventory and stormwater monitoring. In addition, an implementation plan will be developed to understand the water pollutant sources, identify priority areas and develop strategies and activities for improvement of the water quality in the Upper Cannon River watershed.

Mississippi River (Winona)**Whitewater Watershed, South Branch - Bacteria Reduction Project Continuation — 2009**

Sponsor: Whitewater Joint Powers Board

Funding: CWP (Grant) \$214,028

Purpose: Decrease the number of failing septic systems in the shoreland area, educate producers about sensitive feature setbacks and increase adoption of Manure Management Plans, improve management of heavily grazed stream banks and shoreland areas by hosting field days and promoting cost-share opportunities and grazing plans, achieve complete compliance with the shoreland vegetated buffer ordinance and continue monitoring efforts, adding bacteria monitoring sites in the North and Middle Branch.

Mississippi River (Red Wing)**Dakota County Nonpoint Source Reduction Project — 2009**

Sponsor: Dakota County

Funding: CWP (Grant) \$172,700

Purpose: This continuation grant will enable Dakota County to continue and expand a successful agricultural outreach program. Through the coordinated efforts of an increased Extension Educator position and the multiple agencies involved in this effort, the project will be able to involve more farmers and more acreage in demonstration projects and outreach activities, while continuing the existing efforts such as the twice-yearly "Focus on Ag" newsletter, annual spring Crops Day and annual summer Field Day. The county will provide assistance and incentives to private well owners and the City itself to seal unused wells. It will also continue programs to monitor groundwater and surface water quality in the study area.

Stream Cooling Demonstrations in the Vermillion River Watershed — 2009

Sponsor: Vermillion River Watershed Joint Powers Organization (VRWJPO)

Funding: Section 319 (Grant) \$260,000

Purpose: The VRWJPO and its partners have accumulated data that suggest that the trout reaches of the Vermillion River are at risk of warming, despite a trout population that is thriving and has even expanded in recent years. The VRWJPO wants to maintain temperatures in the watershed's trout streams sufficient to preserve the brown trout population and other cold-water species.

Minnesota River Basin

Projects completed

Projects Involving Multiple Watersheds

Metro Area Chloride Impairments Feasibility Study
 Minnesota River Sediment Source Research
 State of the River Report

Blue Earth

Lily & Center Creeks — Blue Earth River Clean Water Partnership
 Redwood River Phosphorus TMDL Compliance Continuation

Chippewa River

Chippewa River East Branch Continuation Project
 Little Chippewa River Improvement Project
 Shakopee Creek Headwaters Continuation

Cottonwood River

Cottonwood River Watershed Fecal Coliform TMDL
 Cottonwood River Watershed Phosphorus Reduction Project

LeSueur River

Lower Maple River Watershed Project

Minnesota River — Granite Falls

Hawk Creek Green Corridors Work Area Continuation
 Hawk Creek Watershed Project

Minnesota River — Mankato

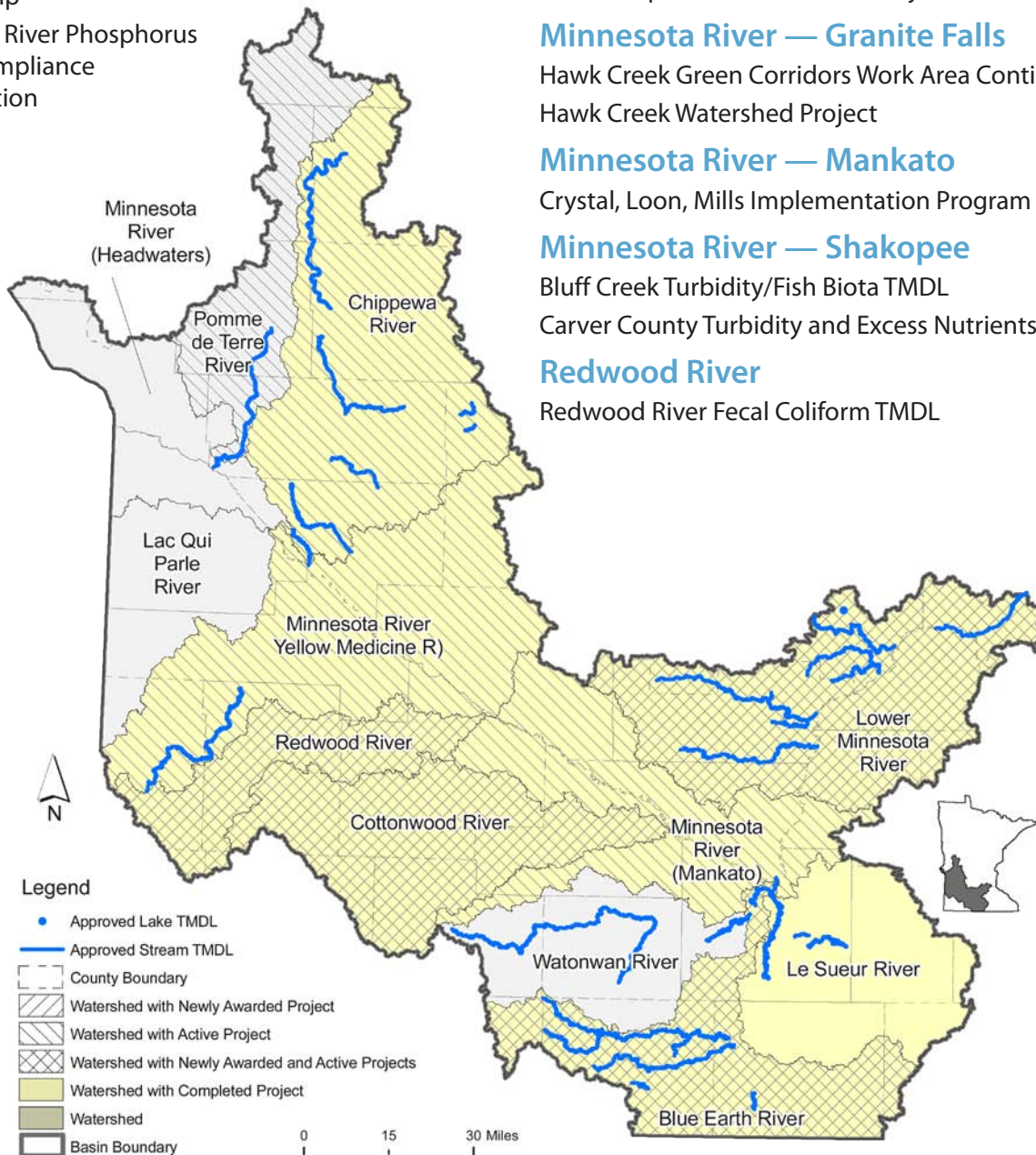
Crystal, Loon, Mills Implementation Program

Minnesota River — Shakopee

Bluff Creek Turbidity/Fish Biota TMDL
 Carver County Turbidity and Excess Nutrients TMDL

Redwood River

Redwood River Fecal Coliform TMDL



Metro Area Chloride Impairments Feasibility Study

The purposes of the Metro Chloride Feasibility Report conducted in 2009 were to:

- Obtain a better understanding of the extent and magnitude of chloride contamination to surface waters in the seven-county Twin Cities Metropolitan Area (TCMA);
- Explore options and strategies for addressing chloride impairments and other effects to water resources; and
- Determine the feasibility of addressing chloride contamination on a metro-wide scale.

Existing stream, lake, and groundwater chloride data and current management programs and practices were reviewed and summarized for the TCMA. The study found a number of lakes and streams with at least some chloride concentrations greater than the chloride impaired waters listing thresholds. However, there are significant gaps in data availability. The existing data were sufficient to conclude that no empirical relationship appears to exist between road salt and chloride concentration in streams. Instead, in the TCMA, the best predictor of winter stream median chloride concentration is the amount of road salt applied in the stream's watershed. There are other potential sources of chloride, but not enough is known at this time to reliably estimate their contribution and affect on water quality.

An interagency Technical Advisory Committee discussed three possible future management approaches:

- A Total Maximum Daily Load (TMDL) approach;
- A regulatory approach; and
- A management approach.

The committee agreed that while there were not enough data to reliably complete a metro-wide TMDL for chloride, further assessment of the regulatory and management approaches should be completed. In Phase II of this study, the interagency team and local stakeholders will work together to prioritize strategies, identify and assign specific chloride reduction actions, identify funding opportunities, and define research and monitoring programs.

Goals

- Collect, review, and summarize all existing TCMA data relevant to chloride.
- Collect, review, and summarize information on chloride use and management practices.
- Develop strategies for future chloride management, including research, monitoring, regulation, education, and funding.

Results that count

- Identified empirical relationship between use of road salt and chloride concentration in streams.
- Identified data and management practice gaps for future research, monitoring, and management program development.

Financial information

Funding type: CWLA

Grant amount: \$29,925

Contact information

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Minnesota River Sediment Source Research

The MPCA and affiliated researchers are conducting studies to identify and quantify sediment sources within the Minnesota River Basin. This report describes the near-channel and upland sediment sources and the methods to quantify them. Many of the stream and rivers in the Minnesota River watershed show high levels of turbidity, which impairs the ecosystem of the Minnesota River, as well as the Mississippi River and Lake Pepin. The primary components of turbidity in the Minnesota River are suspended solids, of which sediments, silts and clays, are the main contributors. An effective plan to reduce turbidity in the Minnesota River requires identification of the principal sources of sediment, including their location, rate, and erosion mechanism.

Goals

- Review Minnesota River sediment research to date.
- Complete a report summarizing the results and areas of agreement on the sediment sources thus far.
- Work in cooperation with scientists from other agencies and organizations.

Results that count

- Reviewed current and past Minnesota River research.
- Developed a report of sediment sources based on consensus from scientists. The report provides preliminary sediment budget analysis for the LeSueur River, which includes the use of radio nuclides and physical measurements from water monitoring stations and air photo interpretation. This knowledge, including approximate amounts of sediment contributed by near channel sources and the erosion mechanisms that are responsible, is essential to selecting appropriate implementation measures in order to improve water quality. The report can be found at <http://www.pca.state.mn.us/index.php/download-document.html?gid=8099>.
- Presented the report to Minnesota River stakeholders at the August 27 meeting in New Ulm.

Financial information

Funding type: CWLA
Grant amount: \$5,000

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State of the Minnesota River Analysis and Reports

The purposes of this project were to update the State of the Minnesota River Report, combining the data from 2000 through 2008, as well as examine trends in water quality and land use change. Two statistical programs were used to analyze water quality trends. Input and data from agencies, organizations and citizens helped to construct a document reflecting changes in land use, recreation, aquatic life, and water quality. The reports are available at: State of the Minnesota River Report 2000-2008 - <http://mrbdc.mnsu.edu/mnbasin/state/index.html> Minnesota River Trends – <http://mrbdc.mnsu.edu/mnbasin/trends/index.html> Minnesota River Basin Statistical Trend Analysis - http://mrbdc.mnsu.edu/reports/statistical_trends/index.html.

Goals

- Update the State of the Minnesota River Report.
- Use the Seasonal Kendall Test and Quality of Water Trend Analysis to study water quality trends in Minnesota River and tributaries.
- Develop a trends report showing changes in land use, recreation, and aquatic life.

Results that count

- People have a better understanding of changes that have occurred in the Minnesota River Basin because of this Report that summarizes the major demographic, land use, water quality, biological and recreational trends that have occurred in this region.
- This information has been presented around the Minnesota River Basin to many people and has appeared in many media stories.
- The two statistical tests have provided a basis for analyzing water quality changes.

Financial information

Funding type: MN River

Grant amount: \$98,336

Contact information

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Lily and Center Creeks — Blue Earth River Clean Water Partnership

The Center and Lily Creek sub-watersheds were chosen as priority areas for implementation within the Blue Earth River watershed based on the 1996 Blue Earth River Major Watershed Phase I Diagnostic Study. To identify priority management areas, the Watershed Implementation at the Local Level (WILL) Committee reviewed total suspended solids (TSS), total phosphorus (TP), orthophosphorus (P-PO₄), and nitrate (N-NO₃) results from stream monitoring of the Phase I Diagnostic Study. In 2001, Martin County applied for and received a CWP Phase II Implementation grant to address water quality concerns identified by the diagnostic study.

In 2004, the focus area was expanded to include Dutch Creek, Elm Creek, Cedar Run Creek, the southern chain of lakes near Fairmont, and portions of the Blue Earth River main stem in Faribault County. The project title was changed to the Lily and Center Creeks Blue Earth River Watershed Project.

The CWP Phase II was granted a continuation in 2006, which is the subject of this final report.

Goals

- Reduce pollutant loading from non-point source pollution through targeted, planned implementation of management strategies.
- Increase habitat for native plants and wildlife within Lily and Center Creek – Blue Earth River Project Watershed sub-watersheds in the riparian zone adjacent to the river.
- Increase public awareness of water quality and water quantity issues throughout the watershed.

Results that count

- Data analysis indicates that straight concentrations of TSS and nitrate-nitrogen did not increase during the implementation phase, and in fact showed non-significant negative slopes for each parameter. Transparency showed a non-significant increase over the course of the project and Center Creek total phosphorus concentrations decreased significantly from 2002 to 2009, indicating an improvement in water quality.
- Between 2002 and 2009 the project resulted in 266.2 acres enrolled in filter strips, 24.1 acres in riparian



Grade stabilization project in the Blue Earth River watershed.

buffer, 1,361.1 acres in wetland restoration, 6,071.5 acres in residue management, and 50.6 acres in alternative easements.

- Education efforts included high school water quality education grants, rain barrel classes and literature, nutrient management workshops, a weekly conservation radio program, information at the SWCD fair booth, and an annual newsletter distributed throughout the watershed.

Financial information

Funding type: CWP

Grant amount: \$450,000

Local match: \$1,261,203

Loan amount: \$184,015

Total project costs: \$1,895,218

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Redwood River Phosphorus TMDL Compliance Continuation

The “Redwood River Watershed Phosphorus TMDL Compliance Project (continuation)” goal was to continue best management implementation according to the Redwood River Phase I Implementation Plan approved in 1992 and implement phosphorus reducing conservation practices that will help achieve the Lower Minnesota River dissolved oxygen TMDL and Redwood Fecal TMDL that is currently being developed.

The grant was matched with part of the low interest loan awards for Lincoln, Lyon, Pipestone, Redwood, and Yellow Medicine Counties for a total of \$900,000.00.

The “Redwood River Watershed Phosphorus TMDL Compliance Project (continuation)” implemented contracts consisting of various BMPs in the Redwood River Watershed to reduce direct sediment and phosphorus delivery to the Redwood River watershed. The BMPs consisted of 23 water and sediment control basins, a grade control structure, and 565 feet of stream bank restoration. These projects have the potential to reduce phosphorus transport by 600.61 pounds per year and reduce net sediment in surface water by 547.53 tons per year. Over the ten year life expectancy of each BMP, a potential reduction of 3.0031 tons of phosphorus or 1,201.22 tons of algae can be reduced.

The project also accomplished the replacement of 47 non-compliant septic systems reducing an estimated 2,100 pounds of phosphorus/yr from the Redwood River watershed.

Goals

- Bring 120 identified non-compliant septic systems into compliance.
- Implement 1,306 feet of stream bank restoration, 1,905 feet of grassed waterways, three sediment control basins, and one multipurpose dam.
- Continue to identify problem areas in the Redwood River Watershed and implement additional non-point pollution controls using state and federal programs.

Results that count

- Brought 47 non-compliant septic systems into compliance, complementing the 69 implemented in the previous grant and reducing 2,100 pounds of phosphorus year from the Redwood River, Lake Benton and Redwood Lake.



This picture shows a Redwood River riffle after fresh fallen snow; Redwood Falls Township/ Section 9, Redwood County.

- Implementation of 27 BMPs consisting of 23 water and sediment control basins, 565 feet of stream bank restoration (three projects), and one grade control structure, reducing phosphorus transport by 600.61 pounds per year and keeping 547.53 tons of sediment per year from entering the Redwood River and Minnesota River system.
- Continued partnership to service the six counties in the Redwood River Watershed.
- Collection of valued data to perform TMDLs and prioritize areas of greatest need for conservation practices in the Redwood River Watershed.

Financial information

Funding type: CWP

Grant amount: \$341,486

Local match: \$52,169

Loan amount: \$370,789

Total project costs: \$764,444

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Chippewa River East Branch Continuation Project

The East Branch Chippewa River joins the main stem of the Chippewa River in Benson, Swift County, Minnesota. Its drainage basin covers the east-southeastern portion of Pope County and the northeast quarter of Swift County, encompassing 323,630 acres. This is the largest of the six major sub-basins of the Chippewa River Watershed. The headwaters area is dotted with many lakes and the predominant land use downstream to the mouth is agricultural row cropping. The principle pollutant problems are high levels of nitrates/nitrites and TSS. Loading estimates have shown the East Branch Chippewa River contributes 2.5 lbs/acre of nitrates/nitrites and 62.6 lbs/acre of TSS to the main stem.

BMPs implemented with this project include:

- 404.5 acres of buffer strips
- Three shoreline naturalization projects
- Three sediment basins
- Two stream bank stabilization projects
- Four manure management plans
- 12 alternative tile intakes
- 41.16 acres of wetland restorations
- One feedlot improvement
- Two terraces

Educational activities included sponsored canoe trips for high schools students, biological monitoring with high school science classes, and BMP information booths at county fairs. Posted BMP and water quality information on the Chippewa River Watershed Project website, www.chippewariver.com.

This project was a continuation of work from the federal Clean Water Act Section 319 grant in the sub-basin, which helped to build capacity with cooperating partners and landowners in the watershed. With the cohesive group of partners in place, it increased the ability to provide solutions to achieve increased water quality in the East Branch Chippewa River.

Goals

- BMP Implementation: Install 300 acres of buffer strips, three shoreline naturalization projects, 10 alternative tile intakes, five sediment basins, three manure management plans, three wetland restorations, and two feedlot improvements



Shoreline Naturalization/Lakescaping with Native Plants, Pope County-Lake Amelia

- Summer Intern: Further the water quality education of a college student through the summer intern program
- Loan \$135,000 in CWP loan funds to upgrade on-site sewer systems.

Results that count

- Installed 404.50 acres of buffer strips, three shoreline naturalizations, 12 alternative tile intakes, three sediment basins, four manure management plans, four wetland restorations, one feedlot improvement, two terraces, and two streambank stabilizations
- Educated four college students in flow measurements, water quality monitoring tasks, transparency tube transects, and identification of macro-invertebrates.
- Used the entire \$135,000 in loan funds, upgrading 17 septic systems.

Financial information

Funding type: CWP

Grant Amount: \$175,000

Local match: \$46,500

Loan amount: \$135,000

Total project costs: \$356,500

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Little Chippewa River Implementation Project

Through the cooperation of landowners, project partners and Chippewa River Watershed Project staff, this project was established to abate or prevent non-point source pollution by implementing BMPs that included buffer strips, feedlot upgrades, manure management plans, rain gardens, pervious pavers, stormwater retention ponds, shoreline naturalization, sediment basins, and ag waste pit closures.

This implementation project started after the report for the larger Chippewa River watershed, published in 2000, identified the Little Chippewa River sub-basin as a priority for implementation. The Little Chippewa River sub-basin covers 257,712 acres of the 1.3 million acre Chippewa River Watershed. Lake Minnewaska and Lake Emily, the two largest lakes in the Chippewa River Watershed, are located in this sub-basin, along with many other small lakes. The topography of this sub-basin is rolling glacial moraine and the major land use is agricultural at 68 percent of the sub-basin.

The Little Chippewa joins the main stem of the Chippewa River in Pope County south of Highway 28 between Cyrus and Starbuck. About 4 miles upstream of this confluence, a large portion of the flow from the Little Chippewa has been diverted to Pope County Ditch 2, which then joins Outlet Creek before flowing through Lake Emily and then connecting to the main stem of the Chippewa river. This Ditch 2 diversion happened over many years from the work of beavers and sedimentation. There is controversy over this diverted flow and whether it is hurting or helping the water quality and the water quantity of Lake Emily.

Goals

- Install BMPs.
- Educate watershed residents.
- Upgrade 32 individual septic systems in Douglas and Pope counties.

Results that count

- BMPs included 34.9 acres of buffer strips, two manure management plans, three rain gardens, two urban BMPs (pervious pavers and stormwater retention pond), two shoreline naturalizations, one sediment basin, and two ag waste pit closures.



Rain garden construction at the Pope County Fairgrounds.

- Education efforts included a photo contest of the watershed, an educational calendar produced and distributed to 600 project partners and watershed residents, a prairie restoration for a water quality demonstration project at a high school, and participation in the Stevens County children's water festival with 700 fifth- grade students.
- Sewer system upgrades totaled 21 in Douglas and Pope counties.

Financial information

Funding type: CWP

Grant amount: \$281,797

Local match: \$229,905

Loan amount: \$149,162

Total project costs: \$660,864

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Shakopee Creek Headwaters Continuation Project

Shakopee Creek is a tributary of the Chippewa River. The headwaters region is approximately 50,000 acres and lies on the border of the North Central Hardwood Forest and the Western Corn Belt. The Shakopee Creek Headwaters Watershed includes a popular chain of lakes (West Norway, Norway, Games, Andrew, and Florida) which comprises about 15% of the land area with an additional 52% being agricultural land located in northern Kandiyohi County. The water quality problems come from both agricultural and residential sources. Changes in agricultural practices as well as shoreline management are necessary for improvements in water quality.

The watershed is a valuable recreation area in Kandiyohi County and the state. Through goal setting for nutrient concentrations and educational outreach, pollution reduction and restoring water quality will become a common goal for all citizens that utilize these waters.

Goals

- Increase the number of septic system upgrades by landowners using the CWP loan program.
- Implement five shoreline naturalization projects on the chain of lakes.
- Educate landowners on the connection between their actions and water quality

Results that count

- \$200,000 in CWP loan funds were used on individual landowner septic system upgrades.
- Installed eight shoreline naturalization projects.
- Developed the Shakopee Creek Headwaters Handbook and distributed to shoreline and agricultural landowners.

Additional BMPs implemented include:

- 23.6 acres of buffer strips
- Nine alternative tile intakes and two side inlets
- Three wetland restorations
- Two nutrient management plans
- Two livestock exclusion projects
- Two riprap projects
- One rain garden
- One ag waste management system
- One manure pit closure
- One streambank stabilization
- One water control structure



Wetland Restoration, Kandiyohi County

Financial information

Funding type: CWP

Grant amount: \$254,346

Local match: \$972,984

Loan amount: \$200,000

Total project costs: \$1,427,330

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Cottonwood River Watershed Fecal Coliform TMDL

The Cottonwood River Watershed Fecal Coliform TMDL project was scheduled to begin in 2009 and be completed in 2012. A willing local group, the Redwood Cottonwood River Control Area, allowed for an earlier completion of the TMDL. Ranking criteria for scheduling TMDL projects include, but are not limited to:

- Impairment impacts on public health and aquatic life;
- Public value of the impaired water resource;
- Likelihood of completing the TMDL in an expedient manner, including a strong base of existing data and the water body's capacity for restoration;
- Technical capability and willingness, locally, to assist with the TMDL; and
- Appropriate sequencing of TMDLs within a watershed or basin.

The implementation plan required by the MPCA was not under the scope of this contract, but will be completed as part of subsequent projects in the Cottonwood River watershed.

Goals

- Determine the sources of fecal coliform throughout the Cottonwood River watershed and specifically in the listed reach. These sources include agricultural runoff, urban runoff, wastewater treatment facilities, and subsurface sewer treatment systems.
- Determine the loading capacity for fecal coliform through modeling. Determine the allocations for the load, wasteload, and margin of safety.
- Educate the public about the fecal coliform impairment and also involve the public in the process.

Results that count

- The TMDL process determined that the sources of fecal coliform were largely from nonpoint sources, mainly agricultural runoff. Wastewater treatment facilities and urban runoff were found to be a small percentage of the fecal coliform load.
- The load duration curve produced a loading capacity for five flow regimes: high, moist, mid, dry, and low, with the highest loading capacity at high flows and the lowest at low flows.



This picture shows a small cattle feeding operation through which a ravine runs. The ravine enters directly into the Cottonwood River a couple of hundred feet downstream near Leavenworth in Brown County.

- Meetings were held for public information with much discussion and explanation of the TMDL process and the responsibilities of the agencies involved. Also, canoe trips and golf outings were used to explain plans and goals of this project.

Financial information

Funding type: CWLA

Grant amount: \$50,000

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Cottonwood River Watershed Phosphorus Reduction Project

The Cottonwood River Watershed (Lower Minnesota TMDL) Phosphorus Reduction grant was to accomplish the implementation activities in the continuing goal of phosphorus reduction. The grant was matched with a low interest loan award for Murray and Redwood County of \$405,485. A quick dollar per pound reduction summary shows that it took \$7.51 of cost share to reduce one pound of phosphorus. Using the total cost analysis, the cost to reduce a pound of phosphorus was \$13.68.

The Cottonwood River Watershed (Lower Minnesota TMDL) Phosphorus Reduction project implemented contracts consisting of 46 various BMPs in the Cottonwood River Watershed to reduce direct sediment and phosphorus delivery to the Cottonwood River and the Minnesota River. The 46 BMPs consisted of three pond/multipurpose dam repairs, 9,131 feet of grassed waterways, 585 feet of streambank stabilization, 3,700 feet of terraces, two tile intake replacements, and 17 water and sediment control basins. These projects have the potential to reduce phosphorus losses by 2,247.23 pounds per year and reduce net sediment in surface water by 1,958 tons per year. The project also accomplished the replacement of 48 non-compliant septic systems reducing an estimated 2,135 pounds of phosphorus/yr from the Redwood River and Lake Benton.

Goals

- Help reduce phosphorus in the Cottonwood and Minnesota river basins through the replacement of non-compliant septic systems and implementation of BMPs.
- Implement about 8,000 feet of grassed waterways, 400 feet of streambank restoration, 800 feet of terraces, 18 sediment control basins, 10 alternative tile intakes, and three multi-purpose impoundments.
- Continue to identify problem areas and implement additional non-point pollution controls using state and federal programs.

Results that count

- Brought 48 non-compliant septic systems into compliance (complementing the 82 implemented in the previous grant), reducing 2,135 pounds of phosphorus per year from the Cottonwood River and ultimately the Minnesota River and Lake Pepin.



This picture shows a bank on the Cottonwood River after the implementation of bank stabilization including stream barbs to keep the river from heavy erosion on the outside bank. The project is on the Cottonwood River in Gales Township, Redwood County.

- BMPs included eight sediment control basins, 12 acres of buffer strips, one alternative tile inlet, one outlet control structure, and one water diversion at a livestock operation, saving an estimated 153.7 tons of sediment and 177.52 pounds of phosphorus per year from entering the Cottonwood River system.
- Continued monitoring and analysis of waters in the Cottonwood River watershed have aided in listing and prioritizing sub-watersheds to be targeted in forthcoming TMDL projects.

Financial information

Funding type: CWP (Grant and Loan)

Grant amount: \$290,000

Local match: \$80,204

Loan amount: \$405,485

Total project costs: \$775,689

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Lower Maple River Watershed Project

A priority for the Maple River Watershed Improvement Project was to implement BMPs in the project watershed. Cost-share for BMPs and incentives for conservation easements were the primary focus of staff. The Maple River CWP offered assistance on additional practices including rain gardens and alternative tile intakes.

Another important function of the Maple River CWP was educating students and landowners in the Maple River watershed. Education grants were given to schools so educators could offer unique environmental programs that would normally not exist. Maple River CWP staff also lead education programs that gave students hands on lessons in conservation.

Accurate water quality monitoring is an essential role of the Maple River CWP. Two monitoring stations located on the Maple River were funded through the CWP.

Although a consistent staff would have benefited the Maple River watershed, we were able to implement BMPs and other conservation programs that did impact the project watershed in a positive way.

Goals

- Reduce pollutant loading from non-point sources.
- Increase awareness of water quality and water quantity issues in the Maple River Sub- Watershed through education and outreach.
- Assess and evaluate the project's effectiveness through stream water quality monitoring, land use management changes and implementation of management strategies.

Results that count

The Maple River project funded the following BMPs:

- 23 alternative tile intakes
- 12 water and sediment control basins
- Six grassed waterways
- Four grade stabilizations
- Three rain gardens
- Two terraces

The following incentives were financed to encourage landowner participations:

- CRP/SAFE incentives: 14 applications resulting in 88.9 acres of CRP
- EQIP Residue Management Incentives: Two applications resulting in 333 acres of management



Lower Maple River Environmental Learning Center

- EQIP Nutrient Management Incentives: One resulting in 269.3 acres of management

A total of 15 education grants were awarded during Phase IIB funding. Some of the funding went toward using the Ecology Bus for in-school programming and for the Faribault County Environmental Day Camp. The education grants also funded portions of RiverQuest, an environmental field day at the river put on by Maple River Middle School. Education grants also went toward the purchase of conservation trees for Maple River Elementary students to take home and for Maple River High School students to plant as class projects.

Water quality sampling took place each monitoring season from 2003 to 2009 on the Maple River at two different sites.

Financial information

Funding type: CWP

Grant amount: \$474,100

Local match: \$366,354

Loan amount: \$40,000

Total project costs: \$880,454

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Hawk Creek Green Corridors Work Area Continuation

The Hawk Creek Watershed drains 623,424 acres (974 square miles) of land. It is unique among the other major watersheds of the Minnesota River in that it is comprised of a main tributary (Hawk Creek) and several other streams that flow directly into the Minnesota River. Hawk Creek originates in the lakes region of Kandiyohi County and flows about 65 miles to the Minnesota River. The Green Corridors Continuation project area comprises about 272,000 acres and a population of 7,300 residents. Chetomba Creek and the middle portion of Hawk Creek play a significant role in determining the health of the Minnesota River. Agricultural land that is extensively drained is the primary land use. Nearly 98 percent of the original wetlands in the watershed have been drained to increase agricultural opportunities. Corn, soybeans, and sugarbeets are the primary crops. Livestock production includes dairy, beef, swine and poultry.

Goals

- To involve the citizens and landowners in the identification of problem areas through a citizen monitoring network that complements ongoing watershed activities.
- Promote and cost-share a variety of other special projects/BMPs that will reduce sediment or nutrient runoff in the watershed.

Results that count

- Development and maintenance of good working relationships with landowners and agencies is a major key to continued promotion of BMPs in this region. Sound, trusting relationships with agency personnel and private citizens have been used to promote BMPs and provide water quality education throughout the watershed.
- Provided cost share for the installation of 89 BMPs affecting 1,418.6 acres, thereby reducing soil loss by 474.17 tons per year and phosphorus loading by 538.79 pounds per year.

Financial information

Funding Type: CWP

Grant Amount: \$106,837

Local match: \$813,562

Total project costs: \$920,399

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Hawk Creek Watershed Project

The Hawk Creek Watershed drains 623,105 acres (974 square miles) of land. This unique watershed is comprised of a main tributary (Hawk Creek) and several other streams that flow directly into the Minnesota River. Hawk Creek originates in the lakes region of Kandiyohi County and flows approximately 65 miles to its mouth in the Minnesota River, located eight miles southeast of Granite Falls.

The primary goal of the “Hawk Creek Watershed Project FY2006” grant was to implement land use changes that would improve the water quality and quantity issues in the watershed while also promoting a healthy agricultural, industrial, and recreation-based economy for the region.

Throughout the duration of this grant, 305 BMPs were installed using cost-share funds from concurrent grants. This would not have been possible without the staff that this grant funded to accomplish the coordination of these practices. An aggressive education campaign reached a diverse audience and public awareness and concern for improving the water quality of the region was enhanced through these efforts. Finally, water quality monitoring efforts allowed the project to evaluate the effectiveness of implemented BMPs and to pinpoint locations where BMP efforts should be focused upon. These efforts will be continued with future grants.

Goals

- To determine specific pollutants and the processes affecting their passage through the Hawk Creek Watershed.
- To maximize public input and ownership of the project.
- To implement land use changes that will improve the water quality and quantity issues in the watershed while also promoting a healthy agricultural, industrial, and recreation-based economy for the region.

Results that count

- First, sediment and phosphorus loading are slowly trending downward in the watershed. Second, nitrogen levels remain high throughout the watershed.
- An annual information and appreciation meeting typically draws between 120 and 140 participants. A total of 16 public meetings were held during this grant period. Educational events and materials reached an audience upwards of 145,949 people. Media outlets



Scenic Hawk Creek outlet sampling site on May 19, 2009.

printed articles about Hawk Creek Watershed Project (HCWP) that reached a potential audience of 446,773 people. A citizen monitoring network of 27-41 participants has been actively maintained over the last three years.

- The primary land use continues to be agricultural row crops. Funds from this grant were utilized by HCWP to provide the necessary staff to accomplish this work, while funds from concurrent grants were utilized to provide the landowner with the cost-share assistance necessary to implement the practice. These 305 BMPs treated 4,705.1 acres and resulted in a reduction of 4,572.95 lbs/year of phosphorus, 3,411.97 tons/year of sediment loss, and 3,189.46 tons/year of soil saved.

Financial information

Funding Type: CWP
 Grant Amount: \$300,000
 Local match: \$291,854
 Loan amount: \$1,084,567
 Total project costs: \$1,676,421

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Crystal Loon Mills Implementation Program

The Crystal Loon Mills Clean Water Partnership (CWP) is a locally managed project that addresses water quality issues in three southern Minnesota lakes: Crystal, Loon and Mills. Priority issues include reducing phosphorus, decreasing harmful algal bloom intensity and frequency, and educating citizens on lake-related environmental concerns. Initial BMP goals were to achieve a reduction in phosphorus levels in Crystal Lake to meet state water quality standards and allow for de-listing from the 303(d) (impaired waters) list.

The diverse watershed includes rural and agricultural land, lakeshore property, and urban areas. Complex interactions among stakeholder groups and conflicting interests among the groups required a multi-pronged approach to education and implementation.

Because agricultural land forms the majority of the watershed, reduction strategies were focused on addressing agricultural inputs and included: installing 100-percent buffer on County Ditch 56, the primary inflow to Crystal Lake; securing a net gain in wetlands; replacing open surface tile intakes with rock tile inlets; and enrolling a majority of the ag watershed in nutrient management and soil testing programs.

Addressing urban stormwater runoff and lakeshore practices was also important due to the large amount of current and ongoing lakefront development. Urban and lakeshore goals included the promotion and installation of rain gardens, rain barrels, and shoreline re-vegetation projects.

Between July 2007 and October 2009, the CWP was able to enroll more than 40 percent of the agricultural watershed in soil sampling and variable rate nutrient application programs; convert 15 tile inlets; install 0.9 acres of buffer on County Ditch 56; restore 10.6 acres of wetlands; provide technical assistance for 18 rain gardens; and provide cost share for 82 rain barrels.

Goals

- Reduce nutrient levels in Crystal Lake to allow for de-listing from the 303(d) Impaired Waters List.
- Secure net gain in wetlands and vegetative buffers in the watershed.
- Educate citizens on environmental issues related to the lakes, including rural and urban issues.



Take a Kid Fishing participants take a closer look at a female carp from Crystal Lake at the fish ID station, staffed by MSU graduate assistant and DNR employee, Jason Rhoten.

Results that count

- Enrolled 4,077.7 acres (about 40 percent) of the agricultural watershed in grid soil sampling and nutrient management programs.
- Provided incentives for 10.6 acres of restored wetlands and 0.9 acre of vegetative buffer. Provided incentive and assistance on installation of 15 rock inlets. Urban practices included the installation of 18 rain gardens and 82 rain barrels.
- Coordinated or hosted more than 30 outreach and education activities; provided 14 mailings/resources; and submitted 12 press releases to area newspapers along with one radio and one television interview for education and project promotion.

Financial information

Funding Type: CWP Grant

Grant amount: \$163,606 Local match: \$239,816

Total project costs: \$403,422

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Bluff Creek Turbidity/Fish Biota TMDL

In 2002, Minnesota placed Bluff Creek on the 303(d) list of impaired waters for elevated turbidity levels measured at the Metropolitan Council Environmental Services (MCES) Watershed Outlet Monitoring Program (WOMP) station on the main stem of the creek downstream of Minnesota Highway 212. Elevated levels of turbidity mean the water is too cloudy to support aquatic life such as fish and activities like swimming.

Following the impaired waters listing, an intensive electrofishing monitoring program was started to supplement the water monitoring and further assess the impairments throughout the watershed. Electrofishing is a method for counting the number of fish and fish species. This program also included habitat surveys between 2003 and 2006. In 2004, the MPCA listed Bluff Creek as impaired for low fish Index of Biotic Integrity (IBI) scores.

To identify impaired reaches and sources of turbidity, as well as stressor identification for fish population impairments, the project included additional monitoring throughout the Bluff Creek watershed. The consultant used GIS data for land use and land cover information, along with BMP information, to identify the origins of non-point source pollution.

Using GIS data, monitoring results, literature and documentation, this project will result in draft TMDL loading scenarios for each of the impairments. The loading scenarios relate how much of a pollutant – the load – a water body can receive and still meet water quality standards. Development of the Stressor Identification Report and pollutant allocations has required the use of various tools, including numerical simulation models, spreadsheets and GIS. A reduction goal, an allocation of pollutant loadings and an implementation plan are the final outcomes of the third phase of this project. Stakeholder and technical advisory meetings have been completed as part of this project.

Goals

- Collect additional monitoring data to better identify the extent of impairment and sources of turbidity/sediment.
- Complete Stressor Identification analysis and some parts of the TMDL report/implementation plan.
- Engage project stakeholders.



Bluff Creek Stream Corridor, Chanhassen

Results that count

- Results of monitoring upstream and downstream of the Bluff Creek lower valley indicate that near-channel sources of sediment are the primary source of turbidity as well as impaired fish biota.
- The stressor identification analysis and final report are complete. Parts of the TMDL report and implementation plan are still in development.
- Two stakeholder and technical advisory meetings were held. Questions and comments on the draft report were incorporated into the process of finalizing the Stressor Identification report.

Financial information

Funding Type: CWLA

Grant Amount: \$111,333

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Carver County Turbidity and Excess Nutrients TMDL Project

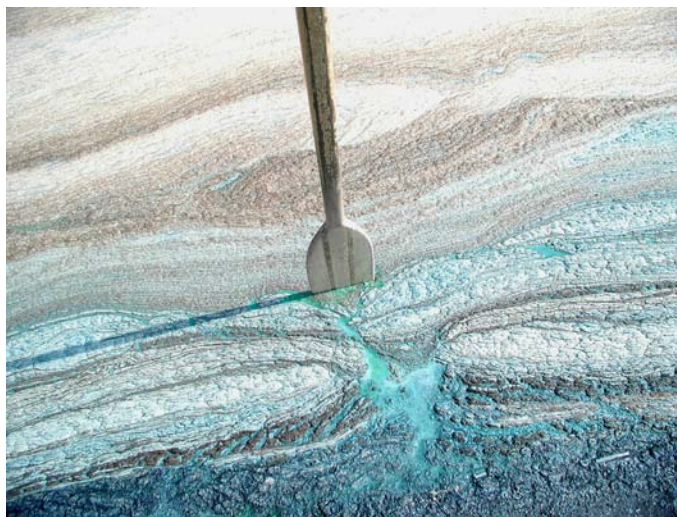
Fourteen lakes in Carver County in the Twin Cities metro region are on the state impaired waters list for excess nutrients: Eagle, Hydes, Goose, Miller, Winkler, Benton, Burandt, Reitz, Maria, Oak, Campbell, Hazeltine, Gaystock, and Swede. The levels of nutrients, such as phosphorus, in the lakes are too high to meet water quality standards. Bevens and Carver creeks are listed for turbidity, meaning the water is too cloudy to support aquatic life such as fish or activities such as swimming. The county and Metropolitan Council have collected data in the Carver County Water Management area for more than seven years with much of this information collected on the main parts of the creeks. While these data are important for setting goals and analyzing trends, a more detailed and aggressive water monitoring plan needed to be developed to assess pollutant sources.

Carver County received a grant from the MPCA in 2003 to develop six TMDLs for Carver, Bevens, and Silver creeks for fecal coliform bacteria impairments and for Reitz, Hydes and Goose lakes for excess nutrients impairments. The MPCA amended the grant in 2005 for four additional lake TMDLs. TMDLs determine the amount of pollutants (the load) that a water body can receive and still meet state water quality standards.

These projects resulted in an extensive sampling program at the tributary level to accurately assess the main pollutant contributors to each creek, its tributaries and lakes within their watersheds. This process included data assessment, land use compilation and analysis, data QA/QC, and data gap analysis. Eight TMDL drafts were submitted that covered Benton, Goose, Hydes, Miller, Winkler, Eagle, Swede, Oak, Reitz, Burandt, Hazeltine, and Gaystock lakes for excess nutrients and Bevens and Carver creeks for turbidity. Only Burandt Lake has a TMDL approved by the US EPA and associated MPCA implementation plan. Draft TMDLs for Maria and Campbell lakes are pending upon reclassification as wetlands.

Goals

- Develop excess nutrient TMDLs for 14 lakes.
- Develop turbidity TMDLs for two streams, covering three reaches within Carver County.
- Establish extensive monitoring network within Carver County.



Picture of Hydes Lake highlighting the excess nutrient problem within the lake.

Results that count

- Submitted six draft excess nutrient TMDLs, covering 12 lakes within Carver County.
- Submitted two turbidity TMDLs for two streams, covering three reaches in Carver County.
- Increased monitoring stations in Carver County to include tributary streams and lake outlets. Lake monitoring increased in both frequency and distribution of lakes.

Financial information

Funding: Section 310 and CWLA

Grant amount: \$228,150

Local match: \$274,665

Total project costs: \$502,815

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Redwood River Fecal Coliform TMDL

The goal of this project was to complete a TMDL study on river reaches in the Redwood River watershed that were listed as impaired for excess fecal coliform bacteria. Portions of the project were scheduled to begin in 2004, 2007, and 2009 with completion in 2012. A local group, the Redwood Cottonwood Rivers Control Area (RCRCA), allowed for an earlier completion of the TMDL. Ranking criteria for scheduling TMDL projects included, but were not limited to:

- Impairment impacts on public health and aquatic life;
- Public value of the impaired water resource;
- Likelihood of completing the TMDL in an expedient manner, including a strong base of existing data and restorability of the water body;
- Technical capability and willingness, locally, to assist with the TMDL; and
- Appropriate sequencing of TMDLs within a watershed or basin.

The implementation plan required by the MPCA was not under the scope of this contract, but will be completed as part of subsequent projects in the Redwood River watershed.

Goals

- Determine the sources of fecal coliform throughout the Redwood River watershed and specifically in the listed reach. These sources include agricultural runoff, urban runoff, wastewater treatment facilities, and subsurface sewer treatment systems.
- Determine the loading capacity for fecal coliform through modeling. Determine the allocations for the load, wasteload, and margin of safety.
- Educate the public about the fecal coliform impairment and involve the public in the TMDL process.

Results that count

- The sources of fecal coliform were largely from non-point sources, mainly agricultural runoff. Wastewater treatment facilities and urban runoff were found to be a small percentage of the fecal coliform source.
- The load duration curve produced a loading capacity for five flow regimes: high, moist, mid, dry, and low, with the highest loading capacity at high flows and the lowest at low flows.



This picture shows a section Redwood River in Redwood County where cattle are grazed and have access to water.

- Meetings were held for public information with much discussion and explanation of the TMDL process and the responsibilities of the agencies involved. Also, canoe trips and golf outings were used to explain plans and goals of this project.

Financial information

Funding type: CWLA

Grant amount: \$35,000

Contact information

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Minnesota River Basin

Projects active and awarded in 2010

Multiple watersheds in the basin

A Decision Support Tool to Restore Impaired Waters — 2010

Sponsor: University of Minnesota, Department of Forest Resources

Funding: Section 319 (Grant) \$719,468

Purpose: This education and applied research project expands upon earlier work estimating impacts of restored wetlands, stream channel restoration and targeted conversion to perennial crops and adds an outreach component. The project integrates existing research, fills in research gaps, and will prepare and disseminate a decision support tool to assist managers in selecting practices with the greatest potential for restoring impaired waters. An advisory group composed of agency personnel will be formed to assist with tool development. The planned activities include: 1) hydrologic research on the impact of perennial plantings and stream channel —riparian restoration on improving the quality of impaired waters; 2) research on the agronomic aspects of producing energy crops in riparian areas to address impairments; 3) developing a decision support tool for managers; and 4) education and outreach to train managers to use the tool and landowners to implement practices and land use options.

The long term goal of this project is restoring impaired waters through the provision of a research based decision support tool that allows agencies and stakeholder groups to concentrate their efforts on supporting programs and targeting effort to areas with the greatest chance of restoring impaired waters. Outcomes/products include: 1) A decision support tool for managers; 2) Field days for the general public and trainings for managers; 3) Measurements of the impact of stream channel restoration and continuous monitoring of pilot watershed areas; 4) Decision support tool that can estimate potential environmental results of BMP's and land use changes.

Cottonwood/Redwood River Project — 2008

Sponsor: RCRCA

Funding: Section 319 (Grant) \$300,000

Purpose: This is a long term water quality program designed to restore the watersheds through local efforts. The overall project goals are to achieve the highest water

quality attainable to eco-region streams, have watershed residents take an active role in enhancing and protecting the project area and to develop it as a major recreational resource within the Minnesota River Basin.

Evaluation of Artificial Drainage in Altering Hydrology — 2009

Sponsor: Minnesota State University – Mankato

Funding: Section 319 (grant) \$300,000

Purpose: The final product of this project will be an interpretive report describing (a) the extent and distribution of artificial drainage in 23 agricultural watersheds, and (b) the relation between artificial drainage and changes in the hydrologic conditions in these 23 watersheds. The proposed outcomes from this project include:

1. Assessment of hydrologic changes from 1940 to present in 23 agricultural watersheds based on 14 hydrologic parameters.
2. Estimation of present day artificial drainage density in the same 23 agricultural watersheds using surveys of two surrogate metrics.
3. Quantitative comparison of the effect of artificial drainage and precipitation on hydrology.
4. Detailed quantification of trends in installation of artificial drainage using multiple assessment tools for six watersheds.
5. Analysis of relationship between temporal trends in artificial drainage density and changes in hydrology.
6. Analysis of model results to seek causal relations between climate, tiling, and runoff in a selected watershed.
7. Correlation between trends in artificial drainage and continuing increases in Lake Pepin sediment accumulation rates.

Greater Blue Earth and Des Moines River SSTS Loans — 2009

Sponsor: Watonwan County

Funding: CWP (Loan) \$1,200,000

Purpose: Initiate and re-establish the CWP loan program in southern Minnesota counties to demonstrate the influence low interest SSTS loans has on the rate of SSTS compliance. 30-40 non-compliant or failing existing systems, as determined by inspection in each of four counties, will be replaced by new single sewage treatment systems. It is anticipated that 120-160 new

systems will be installed. Each of these systems will be financed through low interest loans which will be administered by the individual counties: Blue Earth, Cottonwood, Jackson and Watonwan.

Middle Minnesota-Brown and Redwood Counties First Order Streams Phase I Diagnostic Study — 2009

Sponsor: RCRCRA

Funding: CWP (Grant) \$200,000

Purpose: The project area lies between two major watershed confluences, the Redwood and Cottonwood Rivers. This area is included by designation as a part of the Middle Minnesota River Basin, but for the most part been overlooked by major watershed initiatives. The phase 1 project will establish six long term monitoring sites, compile and analyze water quality data, develop an implementation plan that will prioritize each of the watersheds and implement best management practices geared to maintain or improve water quality and keep these first order streams off of the 303d list.

Minnesota River Community Clean-Ups for Water Quality — 2010

Sponsor: Friends of the Minnesota Valley

Funding: Section 319 (Grant): \$110,000

Purpose: The Community Clean-Ups for Water Quality have a direct, measurable, and significant impact upon the water quality of the Minnesota River and its watershed by measurably and significantly reducing phosphorus pollution. In addition to the physical results, the Clean-Ups result in an educational process of area citizens that motivates them to take action and that instills within them an ongoing commitment to their communities and to the long-term health of the Minnesota River.

Outcomes:

Five 20-25-pound bags of debris contain about one (1) pound of phosphorus.

Some project outcomes and results may include, but are not limited to:

1. Identify a minimum of 30 target communities to host clean-ups.
2. Quantify, publish & publicize the results of community clean-ups through printed and electronic media, including our annual report, newsletter and website. We

will also work with our partners to publish and publicize the results in this manner as well.

3. Achieve pollution reduction figures of an estimated 15,000 pounds of phosphorus and 30,000 pounds of trash.

Motivate the involvement of 1,800 volunteers, sustained over the grant period total of three years, to actively participate in the project.

Minnesota River Tributary Phosphorus and Flow BMPs — 2010

Sponsor: Scott Watershed Management Organization

Funding: Section 319 (Grant): \$475,000

Purpose: Per the Lower Minnesota River DO TMDL Implementation Plan phosphorus needs to be reduced, and recharge and baseflows increased. To deal with additional turbidity impairments in the Minnesota River sediment needs to be reduced and channel forming flows moderated. This project accelerates implementation of BMPs specifically listed in the DO TMDL Implementation Plan for the benefit of Minnesota River impairments and local impairments. The goals are to: 1) reduce phosphorus, 2) moderate channel forming flows, and 3) increase recharge.

What makes this project unique is: 1) the robust existing program from which to accelerate implementation; and 2) an emerging demand for an alternative grass crop for biofuel at the Koda electric facility in Scott County. This demand for grass biofuel makes it easier to promote grass filter strips, and native grass plantings. Both practices are listed in the TMDL implementation plan.

Deliverables include the installation of additional BMPs called for in the Minnesota River DO TMDL Implementation Plan, and monitoring to document effectiveness. BMPs to be implemented include filter (harvestable) strips, tile intake controls, alternative crops, critical area plantings, grade control structures, water and sediment basins, native grasses and restored wetlands. The amount budgeted is sufficient to create about 150 acres of grass or between 12 and 24 miles of filter strips (depending on the width of the filter strip), install 3 to 5 grade/water control structures, 5 to 10 surface tile intake controls, and restore 25 to 30 acres of wetland or riparian buffers.

Redwood and Cottonwood Rivers Watershed Conservation and Nutrient Reduction Projects —2009

Sponsor: RCRC

Funding: Section 319 (Grant) \$253,440

Purpose: The goal of this project is to continue best management implementation according to the phase I implementation plans and implement phosphorus reducing conservation practices that will help achieve the Lower Minnesota River dissolved oxygen TMDL. This project is expected to reduce phosphorus reaching the Minnesota River by 1.139 tons annually or 911,683 pounds of aquatic plant growth annually (plus 1,960.50 tons of sediment). This work plan will administer grant funds from 2009 through 2013 to achieve the implementation goals through these objectives: 1. BMP technical assistance and implementation, and 2. Grant facilitation.

Blue Earth River

Blue Earth Basin Small Community Stormwater Management Project — 2007

Sponsor: Faribault and Martin Counties

Funding: Section 319 (Grant) \$91,000

Purpose: This project will concentrate on small, non MS4, communities within Faribault and Martin Counties to assist communities with improved stormwater management. The success of this project will be demonstrated through proactive and voluntary prevention and protection actions, and will be measured through the implementation and promotion of cost effective alternative stormwater strategies and solutions.

Blue Earth River Basin Restoration Positions — 2009

Sponsor: Greater Blue Earth River Basin Alliance

Funding: CWP (Grant) \$227,600

Purpose: To continue funding four specialist positions. The Urban Outreach Specialist position provides communities with assistance in developing and delivering presentations, education campaign materials, educates about alternative stormwater management practices, and assists communities with the implementation of stormwater projects. The Nutrient Management Specialist position develops nutrient management plans and conducts outreach and education to area livestock producers and the general public. These plans are designed to help manage the

amount, source, placement, form and timing of the application of nutrients and soil amendments.

The Conservation Agronomist position focuses on education and applied research around sustainable farming systems that promote higher levels of non-point source pollution mitigation practices. This position works with local and regional educators to conduct applied research and uses demonstration of appropriate principles and practices to meet these goals.

The Cobb River Watershed Technician position provides the landowners with guidance on BMP project implementations and programs to help improve water quality.

These positions will continue to utilize available state Clean Water Legacy, BWSR State Cost-Share, Federal CWA Section 319 and NRCS EQIP funds to initiate the installation of BMPs in the watershed.

Blue Earth River-East Branch Watershed Approach — 2009

Sponsor: Faribault County

Funding: CWP (Grant) \$250,000, CWP (Loan) \$200,000

Purpose: Faribault County will utilize a systematic approach to identify principal sources, or "hot-spots", of sediment contributions and work with individual landowners, county drainage officials, and municipalities to coordinate and implement critical BMP's, establish demonstration sites, and provide education and outreach efforts. This project will also establish baseline watershed data with the addition of site specific information and determine high priority watersheds. Appropriate practices will be identified and mapped utilizing GPS and GIS equipment and software. The project will promote side inlets with buffers, incentives for filter strips or establishment of harvestable filter strips, water storage areas, inline ditch treatment, crop residue, open intake alternatives, controlled drainage projects, along with other structural and innovative practices.

Blue Earth River Channel Modifications and Nutrients in the Blue Earth River Basin — 2006

Sponsor: University of Minnesota

Funding: Section 319 (Grant) \$296,060

Purpose: Advance the work started by the Blue Earth River Basin Initiative to reduce levels of sediment, turbidity, and nutrients in the river to meet the goals of the TMDL.

GBERBA Dissolved Oxygen TMDL Application — 2009

Sponsor: Greater Blue Earth River Basin Alliance (GBERBA)

Funding: Section 319 (Grant) \$108,000

Purpose: The goal of the project is to reduce the amount of sediment entering the Blue Earth and Le Sueur rivers by providing cost-share to landowners who wish to install agricultural BMPs designed to reduce erosion. Reducing sediment also reduces the phosphorus bound to the soil, thereby addressing the low dissolved oxygen problem identified in the Lower Minnesota River TMDL. The cost-share is an incentive to landowners wishing to conserve their land. A healthier river system is the goal, which increases the value of the river as a resource.

Greater Blue Earth River Watershed BMPs Focus on the Big Cobb — 2006

Sponsor: GBERBA

Funding: Section 319 (Grant) \$299,988

CWP (Loan) \$100,000

Purpose: Hire staff and provide cost-share for installation of conservation practices to reduce phosphorus and sediment.

Chippewa River**Chippewa River Lower Main Stem Sub-Basin Implementation Project Continuation — 2007**

Sponsor: Chippewa County

Funding: CWP (Grant) \$499,998, CWP (Loan) \$375,000

Purpose: This project provides continued water-quality monitoring and data analysis, upgrading of individual septic systems, cost-share or incentive programs for buffer strips, shoreline naturalization projects, livestock exclusion, nutrient management, residue management, wetland restoration, water and sediment control basins, grassed waterways, streambank restoration/erosion control, terraces, and alternative tile inlets. Education activities to heighten awareness of local water quality, pollution, and proper BMPs will continue.

Dry Weather/Lines/Spring Creek Sub-Basin of the Chippewa River — 2006

Sponsor: Chippewa County

Funding: Section 319 (Grant) \$264,100

CWP (Loan) \$300,000

Purpose: Reduce nutrients, sediment and bacteria through tree plantings, nutrient and residue

management, alternative tile intakes, septic system improvements, and nutrient insurance.

Shakopee Creek Headwaters Project (SCHP) Continuation — 2009

Sponsor: Kandiyohi County

Funding: CWP (Grant) \$222,241 CWP (Loan) \$450,000

Purpose: The focus of this continuation is on implementing practices or techniques that prevent or reduce nonpoint source pollution in the watershed to reach surface water quality standard goals. This project will continue to monitor the water quality of the streams and lakes in the Shakopee Creek Watershed. The SCHP will continue to partner with other agencies and individuals over the next three years to encourage the installation or adoption of BMPs such as buffer strips, livestock exclusions, alternative tile intakes, watershed-wide septic system upgrades and lakeshore naturalizations. The project will continue to participate in activities to educate the public about the quality of the watershed's resources and the implications that their actions can have on the area's lakes and streams.

Upper Main Stem Chippewa River Project Continuation — 2009

Sponsor: Chippewa County

Funding: CWP (Grant) \$251,474 CWP (Loan) \$100,000

Purpose: This continuation project will work to abate or prevent nonpoint source pollution by implementing agricultural BMPs that were begun in the upper main stem Chippewa River workplan, adding rain gardens and manure management plans. This project will continue the ongoing monitoring component for the upper main stem Chippewa River. Education outreach efforts will also be continued to inform citizens in the watershed of the ongoing project activities and their impact on watershed water quality and quality of life.

Cottonwood River**Cottonwood River Watershed Non-Point Pollution Reduction Project — 2007**

Sponsor: RCRA

Funding: Section 319 (Grant) \$300,000

Purpose: The goal of this project is to continue best management implementation according to the Cottonwood River phase I implementation plan approved in 1999 and implement phosphorus reducing conservation practices that will help achieve the Lower

Minnesota River dissolved oxygen TMDL. This work plan is projected to reduce phosphorus reaching the Minnesota River by 3.47 tons annually or 2,776,064 pounds of aquatic plant growth annually (plus 2,504.41 tons of sediment).

Cottonwood River Watershed Phosphorus Reduction Continuation — 2009

Sponsor: RCRCA

Funding: CWP (Grant) \$343,000, CWP (Loan) \$545,000

Purpose: Replace 73 non-compliant eminent health threat (EMHT) SSTS systems, provide technical assistance to install SSTS and BMPs watershed wide, continue monitoring and sampling analysis and provide grant facilitation and administration during the project period.

Cottonwood River Native Vegetation Water Quality — 2010

Sponsor: Minnesota Department of Agriculture

Funding: Section 319 (Grant) \$183,766

Purpose: TMDL protocols include load allocations for natural background contributions. These allocations are often lumped with other nonpoint source loads because the data characterizing natural background conditions are very limited. Many TMDL implementation plans include the establishment of native prairie vegetation to remediate pollution in the agricultural landscapes of southern Minnesota; however, the quantification of the water quality benefits of such programs as the Conservation Reserve Program (CRP) at the landscape scale is lacking. This study will be conducted at a field scale site comprised of native prairie vegetation with no history of conventional row crop production agriculture to assess the soil and water characteristics of this system. This system will be compared to alternative management scenarios at the field scale using a paired watershed design to evaluate water quality differences.

Outcomes:

- Water quality and quantity characterization of native prairie systems.
- Quantification of natural background contributions from soil and native prairie vegetation to current water quality impairments related to turbidity, excess nutrients, and bacteria.
- Comparison of water quality characteristics among differing land management practices including: native prairie vegetation; conventional row crop agriculture;

and targeted placement of native vegetation in critical landscape positions.

- Development of management guidelines for CRP lands converted to cropland to minimize impacts on soil and water resources while maintaining agricultural productivity.

Lac qui Parle River

Lac Qui Parle River Main Stem Water Quality Enhancement Project Continuation — 2009

Sponsor: Lac qui Parle — Yellow Bank Watershed District

Funding: CWP (Grant) \$280,150 CWP (Loan) \$512,000

Purpose: This continuation project focuses on several practices designed to enhance water quality. These BMPs include filter/buffer strips, grass waterways, streambank restorations, terraces, diversion, alternative tile inlets, water and sediment control basins, feedlot upgrades and special urban projects. In order to raise citizen awareness of the degraded state of the rivers, education opportunities and outreach materials will be provided that will increase implementation of BMPs including newsletters, promotional material, and advertising. A network of monitors will continue to provide stream monitoring data throughout the watershed. The low interest loan program will continue throughout the watershed to upgrade out of compliance sewage systems.

Minnesota River – Granite Falls

Hawk Creek Watershed Accelerated Phosphorus Reduction Effort — 2009

Sponsor: Renville County — Hawk Creek Watershed Project (HCWP)

Funding: Section 319 (Grant) \$148,525

Purpose: The HCWP mission is to implement land use changes that will improve the water quality and quantity issues in the watershed, while also promoting a healthy agricultural, industrial, and recreation-based economy for the Minnesota River region. Specific goals for the Hawk Creek Watershed are based on sampling results, watershed assessments, and reasonable expectations regarding the condition of rivers and streams in this region of the state, as described in a diagnostic study completed in 1999. This project will focus on implementation of BMPs that reduce phosphorus in agricultural and urban areas. Eligible BMPs include, but are not limited to: terraces, waterways, sediment

retention basins, buffer strips, alternative intakes, wetland restorations, side inlet controls, livestock exclusions, waste storage facilities, feedlot runoff controls, and urban runoff practices such as rain gardens and other practices.

Hawk Creek Watershed Project “Beaver Tales” Continuation (Minnesota River) — 2008

Sponsor: Renville County

Funding: CWP (Grant) \$180,839

Purpose: “Beaver Tales” continues to reduce erosion and nutrient loading in the Hawk Creek watershed by enrolling riparian areas into the Reinvest in Minnesota program, improving agricultural drain-tiling systems, developing alternative tile inlet projects, installing buffer strips, supporting drainage ditch bank stabilization and implementing other priority BMPs. This project also continues water quality monitoring activities from previous projects to evaluate the effectiveness of BMPs. Educational activities include the recruitment and support of watershed assessment teams and coordination of promotional events, displays, tours and demonstrations.

Hawk Creek Watershed Project “Land of the Lost” Continuation (Minnesota River) — 2008

Sponsor: Renville County

Funding: CWP (Grant) \$177,437

Purpose: “Land of the Lost” continues to reduce erosion and nutrient loading in the Hawk Creek watershed by enrolling riparian areas into the Reinvest in Minnesota Program, improving agricultural drain-tiling systems, developing alternative tile inlet projects, installing buffer strips, supporting drainage ditch bank stabilization and implementing other priority BMPs. This project also continues water quality monitoring activities from previous projects to evaluate the effectiveness of BMPs. Educational activities include the recruitment and support of watershed assessment teams and coordination of promotional events, displays, tours and demonstrations.

Hawk Creek Watershed Project “Hawk TMDL” Continuation — 2009

Sponsor: Renville County

Funding: CWP (Grant) \$151,809

Purpose: This project will continue the technical assistance for resource assessments and installation of

BMPs including, livestock waste management systems, filter strips, grassed waterways, nutrient & residue management plans, livestock exclusions, alternative tile intake systems, terraces, and wetland restorations. Monitoring on a regular basis will continue to provide important baseline data as well as information to show pollutant reduction progress. This continuation also includes the recruitment and support of watershed assessment teams, such as the citizen monitoring network, the coordination of promotional events, displays, tours, demonstrations and staff training and administration activities for the overall coordination of local activities.

South Branch of the Yellow Medicine River TMDL Fecal Coliform Reduction Project — 2007

Sponsor: Yellow Medicine River Watershed District

Funding: Section 319 (Grant) \$238,500

The South Branch of the Yellow Medicine River is impaired for swimming. A study revealed frequent violations of state water quality standards for fecal coliform bacteria. The fecal coliform concentrations within this reach of the Yellow Medicine River pose an unacceptable health threat to human body contact recreation. The goal is to reduce the fecal coliform concentrations to healthy levels.

Yellow Medicine Watershed Dissolved Oxygen Project — 2007

Sponsor: Lyon Soil and Water Conservation District

Funding: Section 319 (Grant) \$31,150

Purpose: One significant water quality risk in the Minnesota River Basin is phosphorus, which encourages algae growth that results in lower dissolved oxygen levels. 14 percent of the phosphorus comes from the runoff from agricultural cropland. During low-flow conditions, there is little rainfall and most rainwater soaks in rather than running off the land. Although large reductions of phosphorus from this source cannot be achieved, our project will work to install practices such as sediment control basins and buffer areas along water courses to improve the water quality.

Minnesota River (Mankato)

Seven Mile Creek Glacial Sediment Fingerprinting — 2006

Sponsor: Brown-Nicollet-Cottonwood Water Quality Board

Funding: Section 319 (Grant) \$84,930

Purpose: Determine what portion of sediment and nutrient pollution in Seven Mile Creek is due to natural processes like stream-bank erosion.

Minnesota River (Shakopee)

Bevens and Silver Creeks SSTS Project — 2009

Sponsor: Sibley County

Funding: \$9,770 CWP (Grant), CWP (Loan) \$273,000

Purpose: To reduce the current level of fecal coliform bacteria by initiating the CWP loan program in Sibley County. It is expected that, through low interest loans which will be administered by the county, 21 non-complaint or failing existing systems as determined by inspection or landowner interest will be replaced by new single sewage treatment systems.

Carver, Bevens and Silver Creek Fecal Coliform TMDL implementation Plan — Phase II — 2008

Sponsor: Carver County Land and Water

Funding: Section 319 (Grant) \$148,420

Purpose: Continue phase I work. This includes bringing up to 100 direct discharge SSTSs into compliance, installing 26 miles of buffer strips and 80 alternative tile intakes, and writing 15 manure management plans in the targeted sub-watershed areas of Carver, Bevens and Silver Creek watersheds.

Carver, Bevens and Silver Creek Watershed Fecal Coliform TMDL Implementation Plan — 2007

Sponsor: Carver County

Funding: Section 319 (Grant) \$300,000

Purpose: Carver, Bevens, and Silver Creek's are on Minnesota's list of impaired waters (303d) for fecal coliform. The TMDL goal is to quantify the pollutant reductions to meet the water quality standards for fecal coliform. An implementation plan was developed to achieve the state standard for fecal coliform. The top priorities are to update, identify, and bring into compliance up to 100 direct discharge ISTS's, install 26 miles of buffer strips, install 80 alternative tile intakes, and write 15 manure management plans.

High Island Creek implementation Project Continuation) — 2008

Sponsor: Sibley County

Funding: CWP (Grant) \$500,000, CWP (Loan) \$500,000

Purpose: This project continues activities related to the installation, planning and design of BMPs in the watershed, with funding that includes cost-share monies, incentive payments and loan dollars. This project will continue the water quality and quantity monitoring plan established during the diagnostic study. It will also include additional watershed monitoring (streambank and aquatic surveys) to further define priority areas. This project will continue activities related to education and outreach, including workshops, brochures, surveys, displays, tours, demonstrations and newsletters. This project will also provide GIS analyses to estimate potential sediment and nutrient reductions of BMPs. Monitoring data will be evaluated to examine trends in sediment and nutrient concentrations and loads. Agricultural surveys will be utilized to evaluate the effectiveness of educational based activities. Septic system loans will be provided for systems in need of upgrade.

Lower Minnesota River Dissolved Oxygen Elevation Project — 2010

Sponsor: Renville County - Hawk Creek Watershed Project

Funding: Section 319 (Grant) \$205,186

Purpose: The HCWP is offering cost-share assistance and incentives for implementing BMPs such as, but not limited to: buffer strips, wetland restorations, side inlets, alternative tile intakes, wood chip bioreactors, conservation drainage systems, grassed waterways, water and sediment control basins, terraces, grade stabilization structures, feedlot waste reduction projects, rain gardens, and lake shoreline buffers. An Engineering Technician would be added to the staff to enhance the current BMP delivery process. Practice survey and design has frequently proven to be a factor limiting the implementation of BMPs within the watershed and this position would address that issue.

The final outcome of this project will be a reduction of phosphorus entering the Minnesota River from the HCWP work area. This goal would be accomplished by implementing BMPs in strategic locations within the

watershed. This is a multi-BMP grant that would focus on BMPs that have proven to be effective in reducing phosphorus. One focus of this project would be to accelerate enrollment of lands that are currently in row crop production into wetland restoration practices. Wetlands are visibly lacking throughout the watershed and there is a desperate need to restore the natural hydrology in key areas of the watershed.

Lower Minnesota River Low Flow Dissolved Oxygen TMDL — 2007

Sponsor: RCRCA

Funding: Section 319 (Grant) \$150,000

Purpose: The implementation phase of this project will facilitate watershed land-use changes that will lead to reductions necessary to meet state goals. The locally developed Implementation Plans for the Redwood River and the Cottonwood River were created to direct restoration activities in the watersheds until individual TMDL(s) are created and approved. The goal of this project is to continue best management implementation according to the Phase I Implementation Plans and implement phosphorus reducing conservation practices. This work plan is projected to reduce phosphorus reaching the Minnesota River by 2 tons annually or 1,601,200, pounds of aquatic plant growth annually (plus 2,354.70 tons of sediment).

Middle Minnesota Watershed Implementation of Conservation Practices and Effectiveness Monitoring — 2007

Sponsor: Brown, Nicollet, Cottonwood Water Quality Joint Powers Board

Funding: CWP (Grant) \$269,720, CWP (Loan) \$500,000

Purpose: This project involves three objectives. The first objective will assist local landowners to implement targeted BMPs by funding a technical service representative and conservation liaison. Targeted best management practices include conservation reserve enhancement program and conservation reserve program practices, wetland restorations, septic system upgrades, conservation tillage and alternative crops. Objective two will continue effectiveness monitoring of the recent conservation practices. The final objective will develop and compare conservation targeting tools for the watershed, in order to determine the most efficient strategy for implementing conservation practices.

Quantifying Phosphorus Load Reductions from Street Sweeping — 2010

Sponsor: Water Resources Center, University of Minnesota

Funding: Section 319 (Grant) \$285,970

Purpose: Soon it will necessary for cities to quantify load reductions in order to receive credit for TMDL programs. The proposed project would develop an approach for calculating street sweeping P load reductions under a variety of conditions, so cities can reliably estimate these reductions.

The City of Prior Lake will continue an aggressive street sweeping program, providing U of M researchers with street sweeping records and samples. The U of M team will analyze approximately 1000 samples, and a subset for bioavailable P. The project will also determine the timing of P release from tree leaves experimentally, to provide guidance on the timing of street sweeping. A database of 5,300 trees will be used to develop scenarios for a variety of conditions throughout Minnesota. Outcomes will be disseminated via a web-based guidance manual and six workshops held throughout the state.

The main outcomes will be a web-based report, targeted to municipal public works departments, that will provide guidance on calculating the effect of street sweeping under various conditions (extent and species of tree canopy; type of sweeper; timing) on reducing stormwater P loadings. This will be supported by six workshops held throughout Minnesota. Other technical products will include a masters thesis, and one or more peer-reviewed publications.

Rush Lake Watershed Implementation Project Continuation (Minnesota River)— 2008

Sponsor: Sibley County

Funding: CWP (Grant)\$500,000, CWP (Loan) \$500,000

Purpose: This project continues activities related to the installation, planning and design of BMPs in the watershed, with funding which includes cost-share monies, incentive payments and loan dollars. The project will continue the water quality and quantity monitoring plan established during the diagnostic study. It will also include additional watershed monitoring (streambank and aquatic surveys) to further define priority areas. It will continue activities related to education and outreach, including workshops, brochures, surveys, displays, tours, demonstrations and newsletters. The project will also provide GIS analyses to estimate potential sediment and

nutrient reductions of BMPs. Monitoring data will be evaluated to examine trends in sediment and nutrient concentrations and loads. Agricultural surveys will be utilized to evaluate the effectiveness of educational based activities. Septic system loans will be provided for systems in need of upgrade.

Rush River TMDL Implementation Project for Fecal Coliform — 2010

Sponsor: Rush River Watershed

Funding: Section 319 (Grant): \$340,000

Purpose: Fecal Coliform bacteria is a significant concern in the Rush River Watershed with the mainstem and south branch listed as impaired on the 303(d)list. To work towards reaching the TMDL for fecal coliform in the Rush River, project activities will be focused to on-the-ground implementation practices and educational activities. This project will prioritize implementation activities to areas of the watershed that contribute the largest fecal coliform bacteria loads and sites of direct surface water contamination. Implementation activities will include structural practices to reduce feedlot runoff, pasture management plans, manure management plans, manure application calibrations, open intake removals and low income financial aid for septic system upgrades. Educational activities will include manure management workshops, manure management field days and a quarterly newsletter. The project will continue to strive to create a sense of watershed stewardship and community pride in clean water, a social goal from previous grants.

Outcomes: The desired outcome for this project is to make significant progress on, or achieve, the TMDL for fecal coliform bacteria. By applying significant on the ground implementation practices, this project will also increase wildlife habitat and improve aquatic habitat. The success of the project will be measured by the participation of citizens in the project's activities. A continuation of water quality monitoring will be utilized to determine if bacteria reduction goals are being achieved by implementation activities. At minimum, the project will aim for a 30% reduction in the monthly fecal coliform geometric means from the fecal coliform TMDL assessment study.

Sand Creek Watershed TMDL And Impaired Waters Resource Investigation — 2007

Sponsor: Scott County Watershed Management Organization

Funding: CWP (Grant) \$277,150

Purpose: This project will compile watershed information, such as land cover, feedlot locations, geomorphology, drained wetland inventories, erosion surveys, collect two years of water quality data, develop water quality models and complete a diagnostic study and implementation plan for Sand Creek.

Pomme de Terre River

Pomme de Terre Fecal Coliform Implementation Plan — 2009

Sponsor: Pomme de Terre Watershed Project

Funding: Section 319 (grant) \$286,322

Purpose: The long term goal of the fecal coliform implementation plan is to reduce the amount of bacteria entering the Pomme de Terre River and its tributaries to levels that enable it to be removed from 303(d) impaired waters list. The objective of this monitoring plan is to evaluate effectiveness of BMP projects implemented under this bacteria 319 grant, and their impact on the E. coli levels in the Pomme de Terre River.

Redwood River

Interpreting a Century of Sediment In Redwood Lake — 2006

Sponsor: RCRC

Funding: Section 319 (Grant) \$89,140

Purpose: Redwood Lake is filled with up to 27 feet of sediment that has accumulated behind the dam in Redwood Falls, and has been proposed for dredging and restoration. This project will sample the sediment to help analyze the long-term impacts of land use on water resources.

Redwood River Watershed Nonpoint Pollution Reduction Project — 2010

Sponsor: RCRC

Funding: Section 319 (grant): \$175,575

Purpose: Long-term monitoring has identified encouraging trends of sediment and phosphorus reduction associated with the restoration that has taken place in the Redwood River watershed, but the current (2008) TMDL impaired reach designations show that the work is not finished. With the TMDL plan approved on the lower Minnesota River for phosphorus reduction, it is important to continue the implementation of BMPs that will reduce the total phosphorus contribution from

the Redwood River Major Watershed and work to delist the lower Minnesota River Dissolved Oxygen TMDL impairment. This organization has the benefit of a long history of monitoring data and the personnel and reputation in the community to make the proposed plan a successful project.

Outcomes: Through the funding of this project, the goal is to reduce phosphorus reaching the Minnesota River by 1,943.17 pounds annually or 777,268.00 pounds of aquatic plant growth annually (plus 350 tons of sediment).

Redwood River Watershed Phosphorus TMDL Compliance Project Continuation — 2007

Sponsor: RCRC

Funding: CWP (Grant) \$400,000, CWP (Loan) \$900,000

Purpose: This project continues current activities for water quality monitoring and assessment, upgrading non-compliant individual septic systems, providing cost share funds and technical assistance for agricultural BMPs and other conservation practices. It will also coordinate information and education activities.

Rainy River Basin

Projects completed

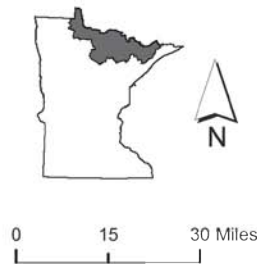
Big Fork and Little Fork Rivers

Big Fork and Little Fork Rivers Paired Watershed Study



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- - - County Boundary
- ▨ Watershed with Newly Awarded Project
- ▧ Watershed with Active Project
- ▩ Watershed with Newly Awarded and Active Projects
- Watershed with Completed Project
- Watershed
- ▭ Basin Boundary



Big Fork and Little Fork Rivers Paired Watershed Study

The Little Fork River and Big Fork River Watersheds are located in a remote portion of the state. There are few road crossings and access is limited. This aerial imagery (12 cm resolution) will allow us to accurately determine the extent of channel destabilization, along with land uses that might impact turbidity and stream flows remotely. In addition, the images will be used during the stressor identification process. The images and resulting remote assessment will result in staff time and cost savings, provide for an earlier start for the TMDL and watershed projects and ensure a better project.

Goals

Provide aerial imagery with sufficient resolution to perform a Reconnaissance Level Assessment for the Little Fork and Big Fork Watersheds.

Results that count

Aerial imagery was received and will be used for current and future watershed restoration and protection work in the Little Fork and Big Fork Watersheds

Financial information

Funding type: CWLA

Grant amount: \$111,373

Contact information

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Red River Basin

Projects completed

Project involving multiple watersheds

- Red River Basin Turbidity TMDL — Year 3
- Red River Valley Biotic Assessment

Buffalo River

- Buffalo River Sediment Modeling for BMP Implementation

- Red River Basin Multi-Parameter TMDL

Clearwater River

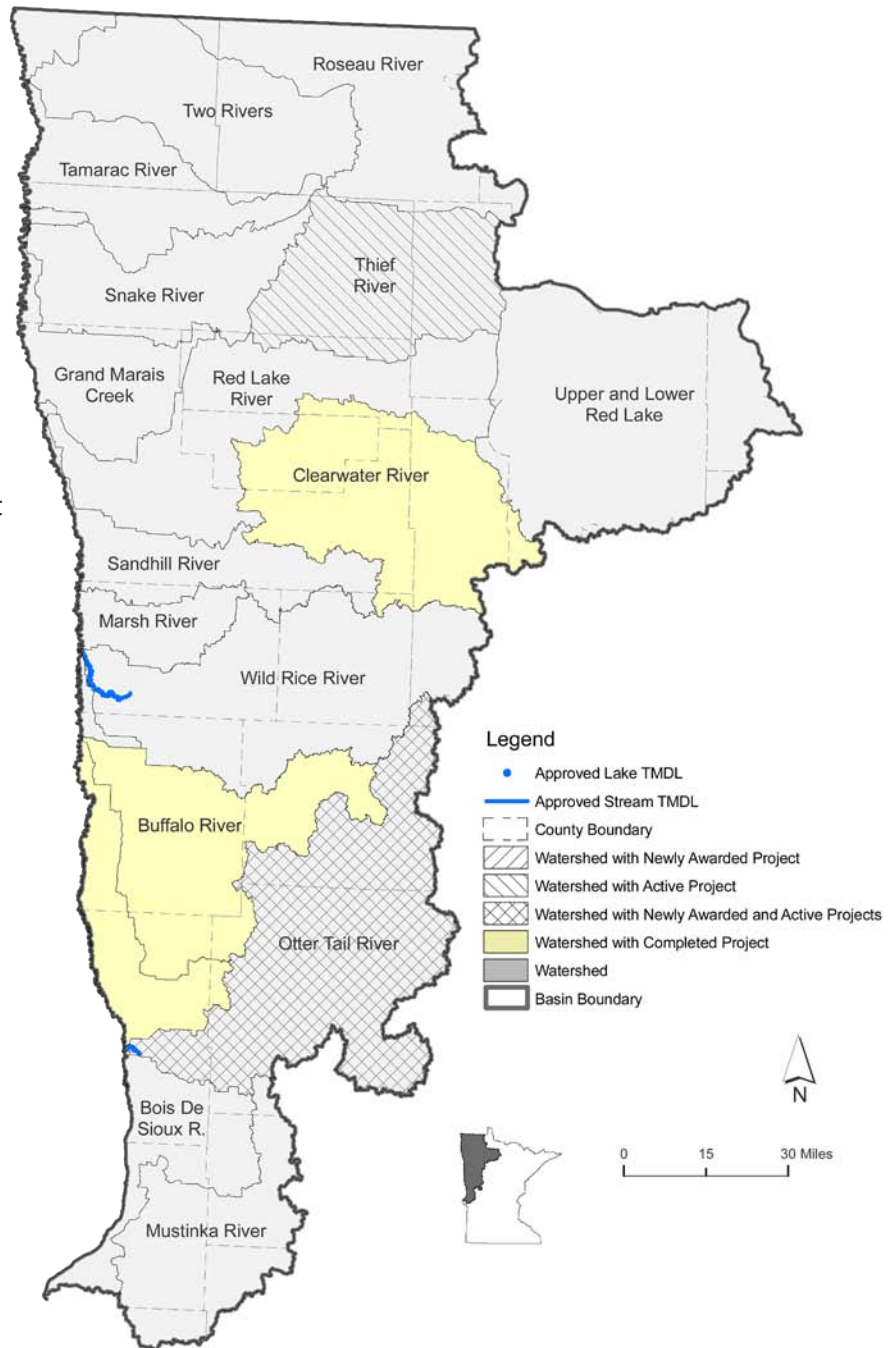
- Clearwater River Dissolved Oxygen/Fecal Coliform TMDLs

Otter Tail River

- Detroit Lakes Water Quality Improvement
- Nutrient Reductions Continuation

Red River – Upper

- Clearwater River Dissolved Oxygen Impairment Evaluation



Red River Basin Turbidity TMDL — Year 3

The Red River Turbidity Impairment project is a regional approach for developing tools to reduce sedimentation of surface waters in the Red River Basin in Minnesota.

Twenty-four monitoring stations (six sites on the main stem of the Red River) were sampled. Field and flow data, and water chemistry were collected at each site. The data was entered into the MPCA's Environmental Data Assessment (EDA) database. The purpose was to characterize the water quality for primary tributaries in each of the 8 digit HUCs (hydrologic unit) within the basin with an emphasis on turbidity.

Another component was to develop the Surface Water Assessment Tool (SWAT) for select watersheds (8 digit HUCs) within the basin. The Red River Watershed Management Board (RRWMB) contracted with the Energy and Environmental Research Center (EERC) at the University of North Dakota to develop SWAT models to assess water quality in the Bois de Sioux (09020101), Mustinka (09020102), Upper Red (09020104), and Snake River (09020309) watersheds. The SWAT model has and will continue to be useful in the development of TMDLs and TMDL implementation plan alternatives, such as BMPs to reduce erosion.

A third component was to assess sediment loading rates more accurately. The USDA-Agricultural Research Service (ARS) National Sedimentation Laboratory was contracted to do geomorphic assessments at 200 sites within the four eco-regions in the basin to establish sediment reference conditions. This will enable local resource managers to better establish target load reduction goals for TMDLs. The USDA- ARS was also contracted to provide a study titled, "Analysis of Bank Stability and Streambank Loading Along the South Branch Buffalo River, MN".

The final aspect of the project included development of turbidity TMDLs in the basin. The Lower Otter Tail River TMDL has received approval by the US EPA. The Lower Wild Rice River and the Mustinka TMDL studies are awaiting final approval. The Rabbit River TMDL is undergoing preliminary review, and the Snake River and Whiskey Creek Turbidity TMDLs are currently in development.

Goals

- Characterize the extent of turbidity impairments on primary tributaries in the basin
- Generate SWAT models for 4-8 digit HUCs in the basin
- Generate data and analysis on stream bank loading for the south branch of the Buffalo River

Results that count

- Data entered in STORET and EDA data
- Completed SWAT models for the Bois de Sioux, Mustinka, Upper Red and Snake River watersheds
- Report completed on "Analysis of Bank Stability and Streambank Loading Along the South Branch Buffalo River, MN"

Financial information

Funding type: CWLA

Grant amount: \$149,000

State match: \$100,000

Local match: \$41,500

Total project costs: \$290,500

Contact information

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Red River Valley Biotic Assessment

This project provides guidance for future biota TMDLs in the Red River Valley (RRV). Components of biotic TMDLs are discussed, including background on biotic TMDLs in Minnesota and water quality standards. Characteristics of the RRV, including geology, geomorphology, soils, land use, land cover, hydrology, and aquatic and riverine habitat are also discussed.

Lists of literature, technical references and models were provided to assist those embarking on biotic TMDL projects. The data gaps discussion highlights categories of data that are needed. Recommendations for long-term monitoring were made to assist with characterizing changes in geomorphology and the biota over time.

Specific recommendations for writing biotic TMDLs in the RRV are provided. A list of potential stressors were identified as likely leading to biotic impairments in the RRV, including primarily instream sediment from field and gully erosion, intermittent stream flow, channelization, pesticides, low dissolved oxygen, high temperature, and fish passage blockage.

Specific recommendations were made regarding the use of stream geomorphic tools in biotic TMDLs. "Canned" approaches that are generic to all watersheds were not favored over an integrated approach of available tools. Watershed Assessment of River Stability and Sediment Supply (WARSSS) and USDA-ARS were the focus of a qualitative methodology review.

The final report recommends that state-wide sediment load data from streams be collected, along with the development of a table illustrating physical channel properties and relationship to channel erosion rates.

TMDL implementation recommendations were included in the final report. Restoration and management actions were focused on activities that assist with de-listing. A table in the final report describes implementation options for biotic TMDLs in the Red River Basin. The table distinguishes between geographic and geologic differences within the basin, and focuses on sediment-related stressors.

Goals

- Compile sources of available information related to biotic TMDLs in the RRV
- Compare stream geomorphic assessment tools



- Write a guidance document for conducting biotic TMDLs in the RRV

Results that count

- Summary of available information is included in final report
- Summary of geomorphic assessment comparison is in final report
- Final guidance document is complete

Financial information

Funding type: CWLA

Grant amount: \$140,165

Contact information

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 MPCA Project Manager: Jack Frederick

Buffalo River Sediment Modeling for BMP Implementation

This project involved setting up a SWAT watershed model to replicate sediment in the Buffalo River system. A base condition was established from 1970 land use. Several years of records were represented with calibration of the model for the 2004-2005 timeframe as well as model validation from 2002-2003. This study builds on a 2006 sediment modeling study completed by the University of Minnesota Saint Anthony Falls Laboratory. The SWAT model was used to simulate the base condition, existing conditions, as well as BMP alternatives to evaluate what BMPs may be most effective in reducing sediment loads in the Buffalo River.

Goals

- Develop SWAT model for the Buffalo River
- Establish a base model condition
- Evaluate impacts of potential BMPs on sediment load to the channel

Results that count

- SWAT model established, to be used in future TMDL on Buffalo River Watershed
- Base model condition established as 1970 (pre-modern farming)
- BMPs modeled do not appear to achieve “stable” stream

Financial information

Funding type: Section 319 Grant

Grant amount: \$30,940

Local match: \$30,940

Total project costs: \$61,880

Contact Informatio

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Branch of the Buffalo River just upstream of the Buffalo River confluence

Red River Basin Multi-Parameter TMDL Modeling

The Red River Management Board (RRMB) conducted a water quality monitoring program that was developed to fill gaps in water quality data for TMDL projects in the Red River Basin (RRB). The primary objective was to provide data to support the development of multi-parameter, watershed-based TMDLs within the RRB. This approach to impaired waters assessment, listing, TMDL development and implementation is a more cost-effective and efficient process than a single parameter and reach-based process. This method minimizes the financial outlay both in terms of data collection, assessment and technical writing of the TMDL report. The need for efficiency is increasing as the backlog of impaired waters and limited funding increases.

A second objective was to gather data to understand the upper threshold of RRB water quality in each of the glacial moraine, beach ridge and lake plain areas. Of particular importance is data from the glacial moraine area, which has been underrepresented in the past.

The third objective was the restoration assessment of Lawndale Creek in Wilken County. This tributary to Deerhorn Creek and the Buffalo River will be restored by the DNR Ecological Services. This project helped estimate reasonable expectations for basin watercourses when planning TMDL implementation projects. The upper parts of this stream also provide one of the few remaining reference streams in the basin; documenting its condition is critical to understanding what can be accomplished in the highly-altered RRB. Lawndale Creek is one of the few trout streams in the RRB. Monitoring the ditched portion before and after restoration provides a very unique opportunity.

The product of this effort was water quality data submitted into STORET for future assessment and use in TMDL studies.

Goals

- Provide the data to support the development of multi-parameter, watershed based TMDLs within the RRB.
- Gather the data needed to understand the upper threshold of water quality we can come to expect from the streams in the RRB in each of the glacial moraine, beach ridge and lake plain areas.
- Document the pre-project condition of Lawndale Creek prior to restoration.

Results that count

- Data for all three goals available in STORET or by request.

Financial information

Funding type: CWLA

Grant amount: \$100,000

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Clearwater River Dissolved Oxygen/ Fecal Coliform TMDLs

The Clearwater River and its tributaries are located in northwest Minnesota. Impairments for low dissolved oxygen were addressed for reaches of the Clearwater River and Poplar River. The low dissolved oxygen (DO) impairment on Walker Brook was initially included in the study, but then deferred until new standards are adopted for naturally-impaired streams. Fecal coliform (FC) impairments were addressed for reaches of the Lost River, Silver Creek, and the Clearwater River. Re-assessment of the reaches included continuous dissolved oxygen data, which provided a record of true daily minimum values. E. coli samples were collected to assess the reaches that had aquatic recreation impairments.

The study found that the reach of the Clearwater River was meeting state standards for both E. coli and DO. The study also found that the Lost River is meeting state standards for the protection of aquatic recreation. High E. coli concentrations still occur in both the Lost River and Clearwater River, so there is room for improvement. Although the reports for these reaches won't be submitted to the US EPA as TMDLs, they will be used to create protection plans for the reaches.

Silver Creek was found to be exceeding the state aquatic recreation protection standard for E. coli. Concentrations were consistently high near the town of Clearbrook, where Silver Creek receives stormwater drainage from the town and is influenced by direct cattle access. A TMDL report was developed for this reach and submitted to the US EPA for comments. The public comment period should begin after mid-2010.

The Poplar River was found to be impaired by low dissolved oxygen throughout the assessed reach. The pollutant with the best connection to dissolved oxygen was found to be orthophosphorus. A TMDL report was written and submitted to the US EPA for comments. It is being revised based on their comments.

Goals

- Verify impairments of listed reaches
- Complete SWAT modeling of entire watershed
- Complete TMDL reports for verified impaired reaches

Results that count

- Verified FC/E. coli impairment for Silver Creek, provided non-impairment for all other reaches
- Completed SWAT modeling for entire watershed
- Completed TMDL report for Silver Creek FC/E. coli; initiated delisting for all other reaches and impairments

Financial information

Funding type: CWLA

Grant amount: \$100,000

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Detroit Lakes Water Quality Improvement Nutrient Reductions Continuation

The Detroit Lake Watershed drains 46,110 acres of land. It is located within the upper Pelican River watershed of the Ottertail River Basin in northwestern Minnesota. Detroit Lake covers 3,089 acres, and is one of a chain of lakes on the Pelican River. It is located in an urban center (8,000 population).

This project is a continuation of a CWP Phase II project to implement BMPs that will improve the water quality issues of Detroit Lake and its sub-watershed area. The overall project objective is to maintain a non-degradation water quality goal of an average trophic index of 45 (safely below the index of 50, the boundary between mesotrophy and eutrophy) for Big Detroit Lake. To accomplish this, the project involves impounding 1.5 ft. of water on an up-stream, ditched wetland (Rice Lake), which is exporting between 3,000 - 4,000 kg/year of phosphorus into Detroit Lake, a figure too high to achieve an average trophic index of 45. In order to achieve this non-degradation goal, total phosphorus levels from the Rice Lake Wetland must be reduced by 600-1,600 kg/year.

This CWP grant contract is for the acquisition of flowage easements as per element one of the work plan.

Goals

- Landowner contacts; project information, updates, project "buy-in"
- Pay costs associated with flowage easement acquisition: easement, legal, surveys, etc.
- Obtain flowage easements

Results that count

- Multiple contacts with all 32 private landowners and three public entities; meetings, mailings, legal document reviews
- Payment of flowage easements acquisition costs; easement value, legal expenses, surveys
- Obtained flowage easements



Rice Lake Wetland, Becker County, MN

Financial information

Funding type: CWP
 Grant amount: \$50,000
 Local match: \$59,407
 Total project costs: \$109,407

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Clearwater River Dissolved Oxygen Impairment Evaluation

The headwaters reach of the Clearwater River is impaired by seasonally low DO. Two hypotheses explaining the causes were tested by collecting hydrological and geochemical observations from the Clearwater River and its tributaries in the vicinity of Bagley from June to October, 2008.

The first hypothesis is that increases in bacterial respiration within the streamside fens during the warm summer months lead to oxygen depletion of pore waters within the streamside fens, which subsequently discharge anoxic water into the river. This hypothesis is rejected because DO concentration of groundwater within the fens was consistently low, even when frost remained within the peat soils. The second hypothesis is that decomposition of organic material within the fens during warmer months leads to release of soluble nutrients. When these nutrients are discharged into the stream, aerobic bacterial activity in the stream increases, leading to DO impairment. The second hypothesis is also rejected because the study failed to reveal increases in nutrient concentrations or microbial activity within the river that correlated with low DO concentrations.

No single geochemical or physical parameter correlates well with changes in DO concentrations. Multi-parameter evaluation of DO concentrations using response surface methodology did yield statistically significant results—however, the effects of specific parameters varies from one stretch of the stream to another.

Stream discharge measurements and evaluation of groundwater gradients and hydraulic conductivity within the streamside fens allows generation of an alternate hypothesis: discharge of anoxic groundwater from streamside fens during periods of low stream flow overwhelms the capacity of the stream to renew DO concentrations.

Goals

- Collect hydrologic and geochemical data for the Clearwater River in the Bagley area
- Test two hypotheses pertaining to seasonally low DO
- Create alternate hypotheses consistent with data available for additional testing

Results that count

- Hydrogeologic and geochemical data have been compiled and entered into STORET database
- Both preliminary hypotheses are rejected because they are inconsistent with data collected
- Alternate hypothesis suggests that discharge of anoxic groundwater into the river from streamside fens during periods of low flow leads to seasonal DO impairment

Financial information

Funding type: CWLA

Grant amount: \$82,865

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Red River Basin

Projects active and awarded in 2010

Otter Tail River Watershed

Lake Alice Resource Investigation Project — 2009

Sponsor: City of Fergus Falls

Funding: CWP (Grant) \$98,500

Purpose: Lake Alice is a 39-acre urban lake located near the center of Fergus Falls with a drainage basin of approximately 230 acres. Presently, a significant stormwater system flow is discharged into the lake from which it is discharged into the Otter Tail River, a tributary to the Red River. The investigation of these resources includes determining in qualitative and quantitative manners, the nutrients and other pollutants (including sediments) being transported into the lake by stormwater flows, the characteristics of the sediment present in the lake bottom and the effects of water quality on wildlife and of wildlife on water quality. The data collected in this phase will provide the information necessary to establish water quality goals, and will provide the basis upon which the success of the implementation measures in the second phase will be measured.

Lower Otter Tail River Sediment Reduction Project — 2008

Sponsor: Wilkin Soil and Water Conservation District

Funding: Section 319 (Grant) \$100,000

Purpose: The project is a continuation of our 2006 CWLA restoration project, which addresses turbidity in the Lower Otter Tail River. The objective of this grant is to reduce sedimentation in the Otter Tail River through education, cultural and structural BMPs. We will target four sediment sources identified in the TMDL approved plan. They are wind erosion, water erosion, stream bank erosion, and in-stream erosion.

Lower Otter Tail River Sediment Reduction Project — 2009

Sponsor: Wilkin Soil and Water Conservation District

Funding: Section 319 (Grant) \$66,750

Purpose: The MPCA has listed a stream reach, Assessment Unit ID (AUID) 09020103-502 in the Lower Otter Tail River, as impaired for exceeding the turbidity standard for aquatic life, currently set at 25 Nephelometric Turbidity Units (NTU). The goal of this

project is to reduce turbidity levels in the Otter Tail River by reducing sediment and erosion by 2,000 tons per year in the project area.

Pearl Lake Diagnostic Study — 2009

Sponsor: Pelican River Watershed District

Funding: CWP (Grant) \$47,188

Purpose: Pearl Lake is a relatively small water body on the western edge of the Pelican River Watershed District. It is the District's desire to conduct an exhaustive diagnostic study on Pearl Lake and the surrounding watershed area. Planned investigation and diagnostic activities include, but are not limited to: quantifying water quality conditions by increasing in-lake water chemistry testing, monitoring sub-watershed runoff and loadings, gathering historical data on land use, assessing septic conditions, further assessing shoreline conditions, modeling external and internal nutrient loading, engaging public participation and conducting sediment core analysis of the lake bottom. The desired outcome of this project will be to diagnose Pearl Lake's water quality problems and prescribe BMPs to reduce runoff and runoff impacts.

Thief River Watershed

Thief River Watershed Sediment Investigation (Red River) — 2007

Sponsor: Red Lake Watershed District

Funding: CWP (Grant) \$96,500

Purpose: This study will perform investigative water quality, sediment and flow monitoring, as well as data analysis, at up to 11 sites to diagnose the impact of hydrologic modification, other anthropogenic and natural factors influencing water quality in the Thief River watershed. This study will also develop a diagnostic study and implementation plan to address impairments discovered in the watershed.

St. Croix River Basin

Projects completed

Projects involving multiple watersheds

St. Croix Watershed Research Station

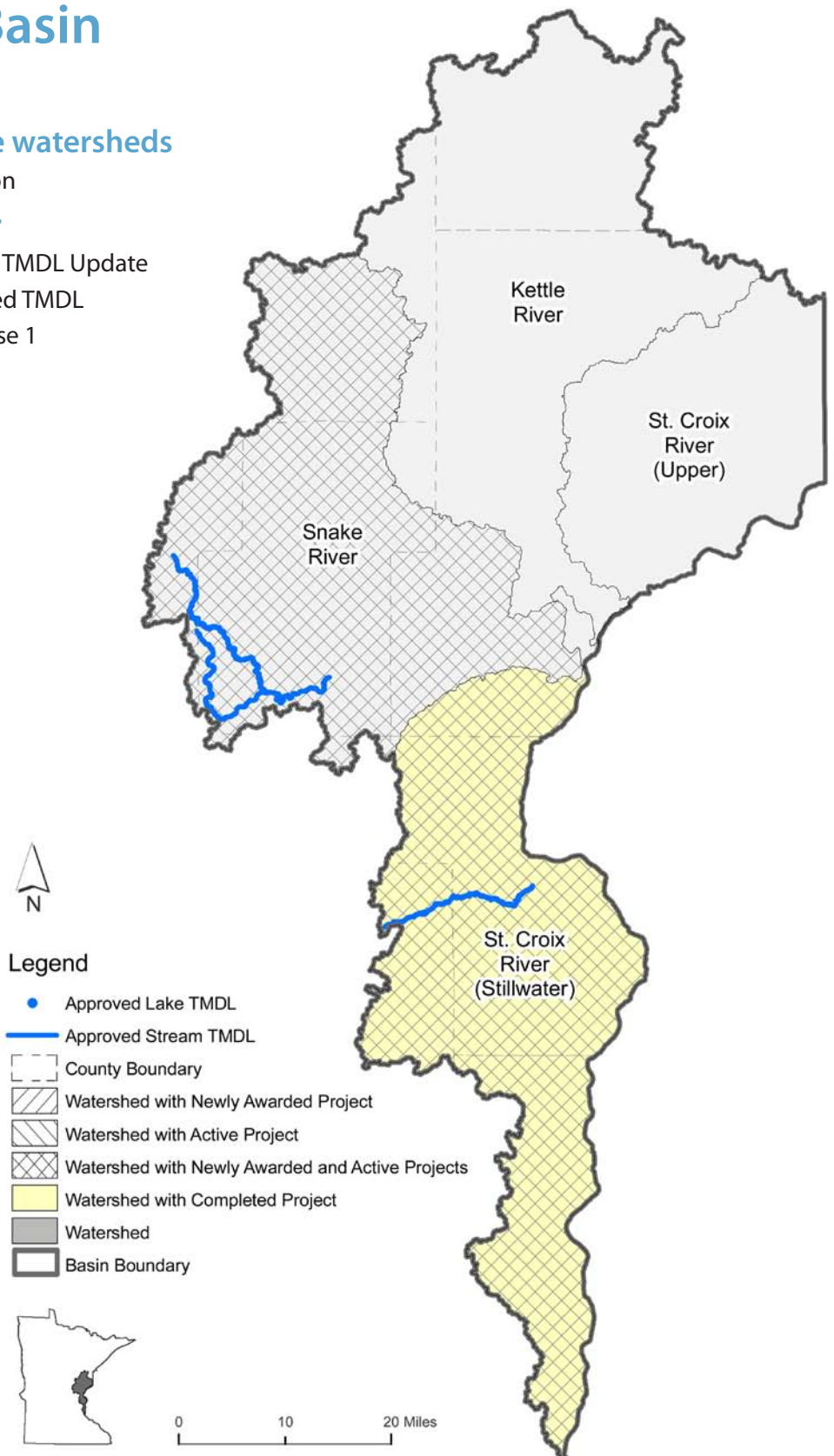
St. Croix River — Stillwater

Carnelian Marine St. Croix 12 Lakes TMDL Update

Comfort and Forest Lakes Watershed TMDL

Sunrise River Watershed TMDL Phase 1

Typo & Martin Lakes TMDL Update



St. Croix Watershed Research Station

On April 6, 2006, representatives from Minnesota and Wisconsin signed an agreement to cooperate on a goal to achieve a 20 percent reduction in P loading to Lake St. Croix by the year 2020. The Basin Team committed to develop as much information as possible for a basin-scale Lake St. Croix TMDL project and this started the Lake St. Croix Total Phosphorus Loading Study. Both states included Lake St. Croix on their 2008 303(d) lists, citing impairment of aquatic recreation due to nutrients and eutrophication.

An inventory of sources contributing P to Lake St. Croix identified three major partitions of the total load: natural background nonpoint source loading, cultural nonpoint source loading and cultural point source loading.

Natural background nonpoint source P loading to Lake St. Croix has been constant since 1800 at 166 T/yr, based on lake core records. Cultural nonpoint source loads were estimated using landcover-specific P export coefficients, and accounted for 60 percent of total nonpoint source loads in the 1990s. Cultural point source loads were estimated from wastewater treatment discharge data, and accounted for 11 percent of the total load in the 1990s. Cultural point source loads have decreased 55 percent across the basin since the 1990s, due to regulatory changes that have resulted in improved treatment technologies for P reduction.

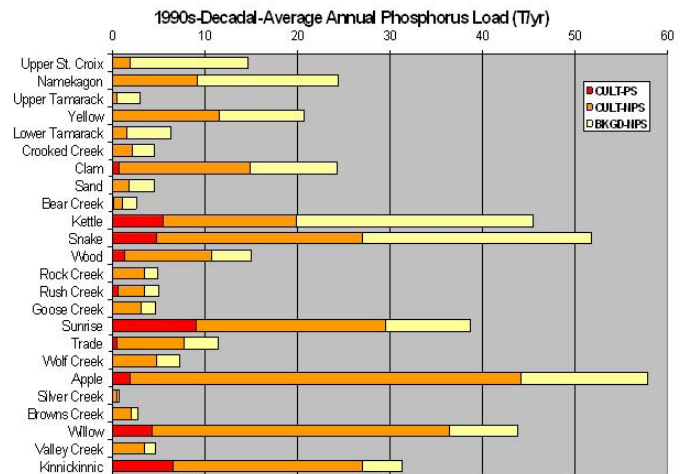
The goal of reducing total loads to Lake St. Croix by 20 percent is equivalent to reducing total cultural loads to Lake St. Croix by 34 percent. In addition, subwatershed-scale analysis of load partitions has identified high priority subwatersheds with high cultural loads located close to Lake St. Croix (see chart).

Goals

- Conduct a total phosphorus loading study of Lake St. Croix, the outlet of the St. Croix Basin
- Evaluate total phosphorus reduction strategies
- Report on progress and results

Results that count

- Estimated total phosphorus source loads within the St. Croix Basin
- Evaluated the PS:NPS ratio of subwatershed source loads and presented at basin conferences in April 2008 and 2009



- Completed the final loading study report and submitted to MPCA in May 2009

Financial information

Funding type: Section 319

Grant amount: \$73,000

Local match: \$48,667

Total project costs: \$121,667

Contact information

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Carnelian Marine St. Croix Twelve Lakes TMDL Update

The Carnelian Marine Saint Croix Watershed District (CMSCWD) is located north of Stillwater and encompasses portions of Stillwater Township, May Township, the cities of Hugo, Scandia, and Grant, and the Village of Marine on St. Croix. The CMSCWD contains thousands of acres of lakes and wetlands and has some of the most significant and unique groundwater dependent natural resources in Washington County and the Twin Cities Metro Area (TCMA). Originally there were 12 nutrient-impaired water bodies within the CMSCWD. Upon further analysis, three of these lakes were delisted because they met shallow-lake standards. To maximize efficiency and take a watershed-based approach, all the impaired waterbodies will be assessed in this TMDL.

Phase I of the study was completed December 2008, and included review and summary of available data; collection of new data on macrophytes, sediment, and plankton; sub-watershed delineations and mapping; a large public input meeting; and drafted sections for inclusion in the final TMDL report. Phase II is a continuation of this project, and includes additional data collection, public input, and watershed modeling. During Phase II, two public input meetings and one Technical and Citizen Advisory Committees (TAC/CAC) meeting took place. Watershed modeling was completed for four lakes.

Goals

- Develop TMDL allocation scenario for four lakes
- Prepare for third and final phase

Results that count

- Allocation scenario developed for four lakes
- Project is ready for third and final phase pending MPCA funding

Financial information

Funding type: CWLA

Grant amount: \$64,913

Contact information

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Comfort and Forest Lakes Watershed TMDL

The MPCA included five lakes in the Comfort Lake – Forest Lake Watershed District (CLFLWD) on the final of draft 303(d) lists for impairment of use due to excess nutrients: Bone Lake (82-0054), Comfort Lake (13-0053), Moody Lake (13-0023), School Lake (13-0057), and Shields Lake (82-0162). State eutrophication standards apply to these lakes.

The loading capacity for each lake was calculated using Unit Area Load and lake response modeling completed as part of the District's watershed load allocation modeling effort completed in 2007. Individual waste load allocations (WLAs) were set for each regulated MS4 source. Categorical WLAs were set for construction and industrial stormwater. One load allocation was set for each lake. The load allocation includes sources from MS4s, unregulated stormwater runoff, livestock, internal loading, atmospheric deposition, and upstream lakes.

To meet state standards, a phosphorus load reduction of 86 percent is needed for Moody Lake, 46 percent for Bone Lake, 51 percent for School Lake, 5 percent for Comfort Lake, and 83 percent for Shields Lake.

Cities, counties, agencies, and park TAC/CAC were invited to provide input into the project approach and to review draft documents. Public meetings were held to provide information about the project and to solicit input regarding background information and implementation recommendations.

The approach to implementation is based on the CLFLWD's adopted Capital Improvement Plan and Watershed Management Plan, which outlines a framework for water resource management including adaptive management approaches of implementation, evaluation and course correction and requirements for local government units. In addition, the CLFLWD also adopted rules that regulate activities in the watershed; pollution-prevention activities specific to individual lakes are included.

Goals

- Complete CLFLWD Lake Impairment TMDL Report
- Involve project partners and TAC/CAC stakeholders in TMDL development
- Hold public hearings

Results that count

- TMDL Report completed for submittal to US EPA for approval
- Stakeholders were involved in developing the project approach and reviewing work products. Five total public/stakeholder meetings were held, including three as part of load allocation process and two as part of TMDL process

Financial information

Funding type: CWLA

Grant amount: \$57,191

Local match: \$287,440

Total project costs: \$344,631

Contact information

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Sunrise River Watershed TMDL Phase I

The work plan chapter of the Phase 1 Report provides the overall framework for conducting the TMDL studies for all of the current impairments (2008) within the Sunrise River Watershed. This work plan will form the backbone of future TMDL specific work plans and can be used to estimate budgetary and staffing needs. The plan is adaptive in nature and will be updated as needed.

Work was completed to coordinate the development of TMDLs for impaired waters in the Sunrise River Watershed. Project tasks included: Task 1 — Assess watershed characteristics. Characterize the Sunrise River Watershed in terms of land use, topography, geomorphology, water resources, demography, and permitted pollution sources. Task 2 — Assess water quality. Identify existence of relevant monitoring data. Characterize the biological and water quality condition of the lakes and rivers focusing on the listed and proposed listed impaired water bodies. Task 3 — Identify data gaps. The available information collected in Tasks 1 and 2 are compared against the data needs of the TMDL studies, and data gaps are identified. The Data Gaps chapter of the Phase 1 Report compares the existing monitoring data with the recommended monitoring data and identifies the resulting data gaps. Task 4 — Develop monitoring framework to collect additional field data to address data gaps. The monitoring framework includes the following: which parameters need to be collected for each impairment, at what frequency, and for how many seasons/years. The Monitoring Framework chapter of the Phase 1 Report guides monitoring activities; as data are collected, the data will be evaluated and the monitoring framework will be adapted to changing monitoring needs. Task 5 — Develop work plan to complete priority Sunrise River Watershed TMDLs. The plan outlines how the TMDLs will be grouped, approximate cost and timeline, which entities will be involved, and what responsibility each entity will hold.

Goals

- Provide background information on Sunrise River
- Assess water quality within the watershed
- Develop work plan to complete priority Sunrise River watershed TMDLs

Results that count

- Compiled a final report that aids in understanding general watershed characteristics in the Sunrise watershed. All this information was put into the final Sunrise River watershed TMDLs work plan.
- Compiled and evaluated all available stream and lake data for the watershed. Locations of all the data were identified and listed in the work plan report.
- Received a final TMDL workplan that helps identify and guide the development of TMDLs in the watershed.

Financial information

Funding type: CWLA

Grant amount: \$24,986

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Typo and Martin Lakes TMDL Update

A draft Martin and Typo Lakes TMDL for phosphorus was originally completed during 2003-2006 by the Anoka Conservation District (ACD) with assistance from the MPCA, Sunrise River Watershed Management Organization (SRWMO), and other cooperators. Final reviews and approvals of that TMDL were delayed until updated shallow lakes standards could be finalized by the MPCA. In the interim, the ACD and SRWMO did additional work to improve our understanding of P sources and which management options would be most effective. The purpose of this grant was to update the TMDL into final form and produce a TMDL implementation plan.

The Anoka Conservation District completed the planned update of the TMDL and also expanded it to include the segment of the West Branch of the Sunrise River between the lakes. That stream segment is impaired for high pH and turbidity, and existing data allowed us to incorporate it into the TMDL. Combining these TMDLs makes sense because of the interconnectedness of these water bodies, their problems, and management solutions.

An implementation plan was drafted that also addresses both lakes and the stream connecting them. It includes a comprehensive menu of water quality improvement projects, cost estimates, and likely project leaders. Projects in the plan have been reviewed by some partners.

Unfortunately, we were unable to send this completed TMDL through the final approvals process because possible flaws in computer model were detected. For the same reason, we delayed discussing the TMDL with stormwater permittees and presenting the current TMDL draft to all implementation partners as loading estimates may change. The MPCA plans to review and re-run the model in 2010, which may demand further revisions. Thereafter, the TMDL will be ready for the formal review and approvals process.

Goals

- Finalize Martin and Typo lakes TMDL
- Produce Martin and Typo lakes TMDL implementation plan

Results that count

- TMDL was updated and expanded to include the segment of the West Branch of the Sunrise River, which connects the lakes and is impaired for elevated pH and turbidity. Unfortunately, the TMDL could not yet be finalized because possible flaws in the computer model were detected. The MPCA plans to review and re-run the model in 2010; this may demand further revisions.
- An implementation plan for this TMDL was completed. It includes water quality improvement projects for both lakes and the stream segment between them.

Financial information

Funding type: CWLA

Grant amount: \$5,293

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St. Croix River Basin

Projects active and awarded in 2010

Snake River

Groundhouse Fecal Coliform and Biota (Sediment) Implementation Project — 2010

Sponsor: Kanabec County SWCD

Funding: Section 319 (Grant) \$109,750

Purpose: The focus of the project will be to reduce the sediment and FC loading to impaired reaches of the Groundhouse River watershed through the implementation of BMPs. The TMDL study indicated that crop production and streambank erosion contribute 86 percent of the sediment load, with an additional 10 percent originating from pastures. The majority of the FC comes from livestock.

The purpose of the project is twofold. First, Kanabec and Mille Lacs County SWCDs along with their partners will work directly with landowners to increase awareness, identify areas of concern and initiate conservation planning to address these concerns. Second, BMPs will be implemented using cost-share money made available through the project. Anticipated practices include: livestock exclusion, filter strips, stream bank stabilization, sediment basins, manure management, feedlot runoff control, and other practices where appropriate. Priority will be given to projects that have the greatest potential impact on reducing sediment and FC loading.

Project outcomes include:

- Increased water quality awareness (through public outreach and education) for 80 percent of the landowners living in the watershed
- Identify and map areas of concern in the watershed
- Contact landowners individually and develop individualized information packets that include aerial photographs of property, BMP information, and information about assistance programs.
- Install 16 BMP practices that target sediment and FC loading.
- Reduce sediment loading by 210 tons/ year and begin working to achieve the FC standard of 200 org./100ml or E.Coli standard of 160 org./100ml at the monitoring stations in the watershed.
- See an overall improvement in the water quality and IBI.

North Branch Sunrise River TMDL Implementation Plan — 2010

Sponsor: Chisago County

Funding: Section 319 (Grant) \$190,000

Purpose: Chisago County has an approved TMDL study and implementation plan for the North Branch of the Sunrise River which is impaired due to excessive levels of fecal coliform bacteria. The county received Section 319 and CWLA grants to address this problem and are in the first full year of implementation. There continues to be more work to achieve the water quality goals.

Funds are needed to continue working with livestock owners to provide 75 percent cost share to implement BMPs.

Outcomes: Livestock management – a number of BMPs will be installed to reduce FC loading from animal agriculture, such as installation of waste storage facilities, clean water diversions, vegetative filter strips, moved fencing, livestock exclusion, rotational grazing, manure application setbacks, and nutrient management plans.

Snake River Enhancement Project Continuation — 2008

Sponsor: Snake River Watershed Management Board

Funding: CWP (Grant) \$500,000, CWP (Loan) \$400,000

Purpose: The Snake River Watershed Management Board will assist local technical people working with landowners to identify issues, find solutions to problems and provide technical and engineering assistance for appropriate BMPs targeted to impaired waters. The CWP loan program is targeted to identify, repair or replace non-compliant systems in shoreland areas.

St. Croix River (Stillwater)

Forest Lake (Subwatershed FL44) Assessment Project — 2009

Sponsor: Comfort Lake — Forest Lake Watershed District

Funding: CWP (Grant) \$23,333

Purpose: This grant will allow the District to conduct a diagnostic/feasibility study on the former DNR fish-rearing pond in order to confirm the nutrient and sediment loading from FL44, as well as evaluate the potential to reduce phosphorus and sediment loads to Forest Lake from the FL44 wetland. The proposed feasibility study will measure the effect of the fish-rearing pond on loads. If high loads and concentrations are identified upstream of the rearing pond, the wetland

may need to be investigated further. The proposed project will also evaluate the feasibility of reducing the load through options such as restoration of wetland hydrology, alterations to the fish-rearing pond to increase nutrient and sediment capture, alum treatment of the pond sediments, and control of rough fish.

Little Comfort Lake Watershed Load Assessment Project — 2009

Sponsor: Comfort Lake — Forest Lake Watershed District

Funding: CWP (Grant) \$17,085

Purpose: The phase 1 project will conduct a diagnostic/feasibility study on the loading between the outlet of Bone Lake and the inlet of Little Comfort Lake. The proposed feasibility study will determine areas of phosphorus and suspended sediment loading. An implementation plan will be completed to outline steps to further protect and improve the watershed.

Sand and Long Lake Diagnostic Studies — 2009

Sponsor: Carnelian-Marine-St. Croix Watershed District

Funding: CWP (Grant) \$39,000

Purpose: Evaluate existing conditions of Sand and Long Lakes to determine pollutant reductions needed to meet established water quality goals; analyze available data collected as part of a multi-lake TMDL that originally included Sand and Long Lakes; set numeric goals for lake water quality; develop watershed and in-lake models to determine the effect of existing and future total phosphorus loads on the lakes; develop implementation strategies; and complete the overall Diagnostic Study and Implementation Plan for each lake.

Square Lake Implementation Plan Refinement — 2009

Sponsor: Carnelian-Marine-St. Croix Watershed District

Funding: CWP (Grant) \$58,000

Purpose: Square Lake, within the St. Croix River basin in northern Washington County, is of regional significance due to its very high water quality and unique recreational opportunities including trout fishing and scuba diving. This proposed project will gather new data on transparency, aquatic macrophytes, plankton and fisheries data to identify trends and determine relationships between biologic fisheries and water quality; complete groundwater monitoring and assessment to determine total P sources within the contributing groundwatershed; gather

additional relevant information to identify changes in the lake from 2002 to present; complete an aquatic plant survey and develop an aquatic plant management plan; and develop site-specific and action-specific activities to protect the water quality in Square Lake.

Upper Mississippi River Basin

Projects completed

Projects involving multiple watersheds

Upper Mississippi River Bacteria TMDL

Crow River — North Fork

Crow River Lower North Fork Watershed
 Middle Fork Crow River Watershed Restoration
 Water Quality Improvement Continuation

Crow River — South Fork

Crow River Working Together to Improve Water Quality

Long Prairie River

Long Prairie River TMDL

Mississippi River — Grand Rapids

Big Sandy Area Lakes Watershed Management
 Continuation

Mississippi River — Sartell

Little Rock Creek Biological Impairment TMDL

Mississippi River — Sartell Sauk River

Feedlot Runoff Removal by Organic Biofilter Demonstration

Mississippi River — St. Cloud

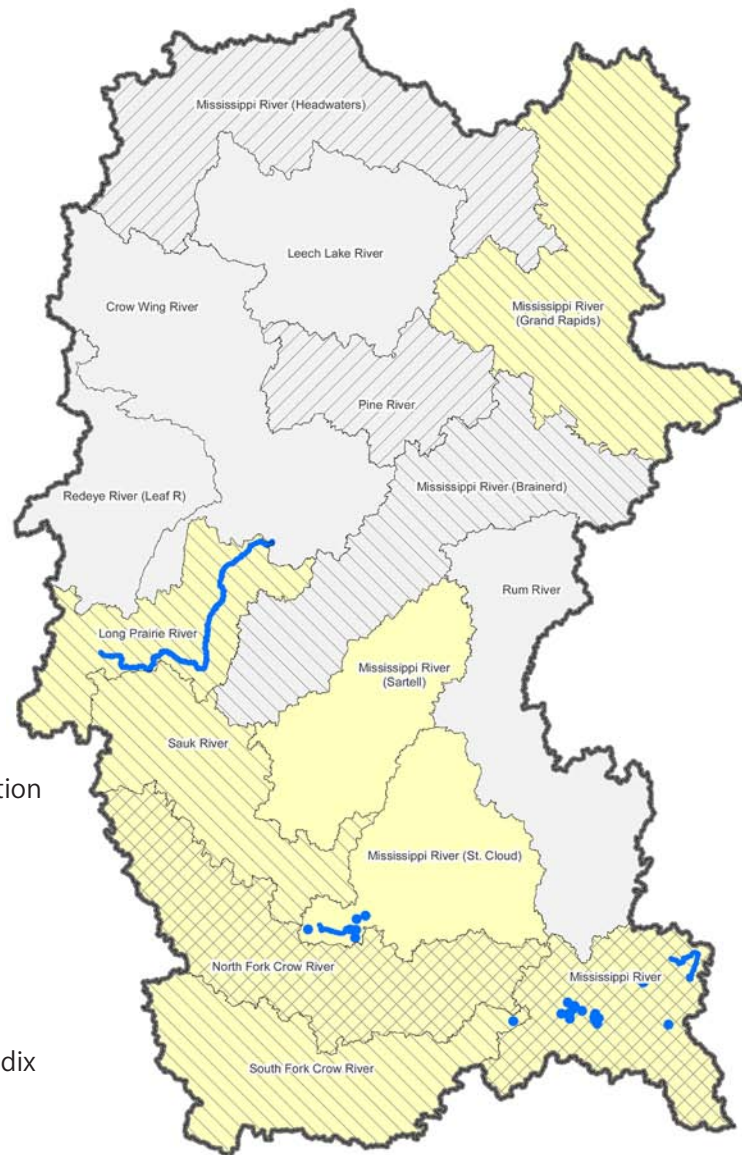
Clearwater River and Lake Louisa TMDL
 Clearwater River Five Lakes Nutrients
 Clearwater River Ongoing TMDL Studies

Mississippi River — Twin Cities

Golden Lake TMDL Report — Stormwater Runoff Appendix
 Medicine Lake Nutrients TMDL
 Minnehaha Creek Lake Hiawatha TMDL
 Minnehaha Creek Watershed Lakes TMDL
 Shingle Creek Chloride Reduction
 Shingle Creek Watershed Lake TMDL Implementation Plans
 Shingle/Bass Creeks Dissolved Oxygen/Biota TMDL Phase I
 Wirth Lake Nutrients TMDL Development

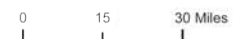
Sauk River

Middle Sauk River Water Quality Restoration
 Osakis 3 Continuation
 Sauk River Chain of Lakes TMDL
 Upper Miss River TMDL Compliance in Impaired Areas



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- - - County Boundary
- ▨ Watershed with Newly Awarded Project
- ▨ Watershed with Active Project
- ▨ Watershed with Newly Awarded and Active Projects
- Watershed with Completed Project
- Watershed
- ▭ Basin Boundary



Upper Mississippi River Bacteria TMDL

A large number of Minnesota's residents rely on the Upper Mississippi River for both drinking water and as a place for recreational activities. While specific recreational user data (boating, swimming, wading) is not known at this time, approximately 950,000 Minnesotans use the Mississippi River within this project's study area for drinking water. The Upper Mississippi River Bacteria TMDL is a joint effort between the MPCA, the Minnesota Department of Health (MDH), and close coordination with many project partners, to address recreational use impairments due to bacterial contamination in the Mississippi River and associated tributaries. The study area includes drainage to that part of the Upper Mississippi River that extends from St. Cloud to Hastings, Minnesota.

This first phase of the project included data analysis, preliminary source assessment, and monitoring recommendations. Existing main stem and adjacent tributary bacteria data were analyzed. Water quality and flow data within the project area from 1999 to 2008 were gathered from MPCA, project partners, and stakeholders. Analyses helped to identify both spatial and temporal trends in bacteria and will help focus future phases of the project.

Completed work during this phase of the project included:

- Literature review on environmental associations of bacteria
- Summary of bacteria growth; die-off and transport in soils; bacteria delivery from urban stormwater runoff; and effectiveness of BMPs in treating bacteria in urban stormwater runoff, and a process to discuss integration of the Clean Water Act and the Safe Drinking Water Act

Goals

- Analyze existing data in the project area
- Involve project partners and stakeholders in report development
- Develop recommendations for further monitoring in study area



River Recreation, St. Cloud

Results that count

- Developed draft reports — Upper Mississippi River Bacteria TMDL: Data Analysis, Source Assessment, and Monitoring Recommendations and Literature Summary of Bacteria and Environmental Associations
- Stakeholder meetings held, stakeholders reviewed draft report
- Finalized Reports — Upper Mississippi River Bacteria TMDL: Data Analysis, Source Assessment and Monitoring Recommendations and Literature Summary of Bacteria and Environmental Associations. Reports posted at <http://www.pca.state.mn.us/water/tmdl/project-uppermiss-bacteria.html>.

Financial information

Funding type: CWLA

Grant amount: \$129,917

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Crow River Lower North Fork Watershed — Phase II

The North Fork - Lower Crow River Watershed (NFLCRW) is located in the Upper Mississippi River Basin in central Minnesota, and encompasses all or parts of Pope, Stearns, Kandiyohi, Meeker, Renville, McLeod, Carver, Wright, and Hennepin Counties. The dominant land use within the watershed is agricultural (mainly row crops), grasslands, forests, water and wetlands, urban and other uses. The watershed contains some of the fastest growing areas on the outer edge of the Twin Cities metro area. The Crow River Watershed contains 1.76 million acres and is a significant tributary to the Mississippi River.

This project consisted of the following activities:

Objective 1: dissolved oxygen modeling for summer low flow — Reviewed historic data, monitoring plan, survey channel cross sections, travel time measurements, synoptic surveys, continuous DO measurements, data management. Also developed QUAL2E model and load allocations and prepared a technical memorandum summarizing DO modeling results.

The memorandum analyzed the data and summarized the results of the modeling. The data analysis portion of the report covers:

- Impairment analysis
- Extent (spatial scale), persistence (time scale), severity (ecological risk), and causes of impairment and identification of critical conditions
- Factors contributing to DO impairment
- QUAL2e model results
- TMDL Allocations

Objective 2: Preliminary turbidity analysis — Compiled, reviewed and analyzed existing data, developed conceptual source models for TSS/turbidity and E. coli monitoring requirements, developed load EST model for turbidity and channel assessment technical memorandum.

Objective 3: E. Coli — E.coli Source Assessment, delivery potential of FC and E.coli from watershed sources, monitoring requirements, load duration curves and model assessment, develop load allocations, technical memorandum summarizing FC analysis and data gaps.

Objective 4. Meetings and public outreach — MPCA and CROW staff meetings, Public and Watershed Board meetings.

Goals

- Compile and review all existing data
- Complete additional monitoring/data collection
- Develop models and technical memos

Results that count

- Compiled and reviewed all existing data
- Data collection is completed except for the remaining DO synoptic surveys
- Models have been built, technical memos completed

Financial information

Funding type: Section 319 Grant

Grant amount: \$83,056

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Middle Fork Crow River Watershed Restoration and Enhancement Project

The Middle Fork Crow River watershed is approximately 275 square miles and contains a number of economically and ecologically important lakes with increasing population and development pressures. The hydrology of the watershed has been highly altered with nine dams creating reservoirs rather than natural lake systems, 15 ditches totaling nearly 140 miles of open channels, and a significant number of drained or filled in wetlands. Land use pressures and hydraulic changes have led to the degraded water quality for many of the lakes, while others are in need of protection from non-point sources of pollution.

This project focused on protecting high quality lakes and restoring lakes with poor water quality by: providing educational opportunities that link people to the resources, implementing BMPs in areas identified as ecologically sensitive to reduce non-point pollution sources, and targeting specific lake management projects identified in prior diagnostic studies.

Goals

- Education and outreach
- Implement best management projects to reduce non-point source pollution
- Monitoring and evaluation

Results that count

- Hosted five workshops including a do-it-yourself raingarden workshop, a three part shoreland restoration workshop, and a stormwater workshop. Implemented an interactive education program in two area school districts (New London-Spicer, and Atwater-Cosmos-Grove City).
- Provided cost-share funding to install 13 shoreland restoration projects, four agricultural BMPs, six stream stabilization BMPs, and six stormwater BMPs.
- Funded water quality monitoring at 18 stream sites and 10 lake sites. Developed an extensive volunteer monitoring base to assist us in our monitoring efforts as well as to create more awareness of citizen's local resources and their impacts on them. Staff also completed BATHUB (Army Corps of Engineer lake model) and FLUX (inflow input model for BATHUB) modeling on one lake and four stream sites.



Macroinvertebrate identification with ACGC (Atwater-Cosmos-Grove City) elementary 4th graders

Financial information

Funding type: CWP

Grant amount: \$242,000

Local match: \$521,363

Loan amount: \$74,096

Total project costs: \$837,459

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Water Quality Improvement Project

The North Fork Crow River Watershed District (District) acknowledges that water quality improvement requires an integrated approach of research, education, and implementation. Unfortunately, budget constraints often limit how much of our goals we can accomplish.

Funding provided through this CWP continuation grant allowed the District to continue with, and expand on, its water quality monitoring efforts. This has proved to be very valuable baseline information as we move forward with a total maximum daily load study on one of the lakes in the District.

Grant funds gave the District the ability to reach out to the public through several venues including a newsletter, annual report, earth day event and several water festivals for area school children. However, the most important component is implementation.

Through this grant, the District provided loans and grants for updating manure management systems, thereby reducing the pollutant load into the North Fork Crow River Watershed. It also paved the way for a project unique to the District – a citizen-initiated septic system survey.

Over the course of a five year project, every septic system without a current certificate of compliance in the District will be inspected to certify compliance. Low interest loans provided by this project made it possible for home owners to bring their systems in to compliance. Other projects that utilized project funds include a biodigester system, drainage ditch buffering, feedlot revisions, storm drain marking and a demonstration rain garden.

Goals

- Cooperative funding with participating SWCD and NRCS agencies to further bring existing feedlots into compliance with developed manure application plans.
- Continue to reduce effects from septic leachate for noncomplying systems by supplying low interest loans for upgrades.
- Reduce sediment loading by implementation of BMPs. Reduce soil erosion in drainage systems, shoreland areas, along the North Fork Crow River and other highly erodible areas. With the aid of the city of Paynesville and Paynesville Township, provide education to landowners for better stormwater management through the use of rain gardens and other new technology.



Installing erosion control measures at the rain garden site between Crest Ridge Road and the Lake Koronis Recreational Trail.

Results that count

- Three feedlot upgrades, as well as funding for the installation of a biodigester system and two water quality improvement projects that removed feedlots from service.
- Initiated a district-wide septic inspection program, including hiring an inspector. At the completion of the grant, 710 systems were inspected with an 82.25 percent compliance rate. Low interest loans were provided for upgrades of 41 systems.
- Installed a rain garden along the Lake Koronis recreational trail as well as several other water quality BMPs.

Financial information

Funding type: CWP

Grant amount: \$85,000

Local match: \$165,494

Loan amount: \$383,087

Total project costs: \$633,581

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Crow River Working Together to Improve Water Quality

The Crow River is one of the Upper Mississippi River Basin's major water and nutrient loading tributaries. On average, discharges from the Crow River, dependant on flow, account for up to 46 percent of the total phosphorus (TP) and up to 53 percent of the TSS in the Mississippi River. The Crow River flows through both the North Central Hardwoods Forest and the Western Corn Belt Plains ecoregions. A 10 year goal of the project is a 25 percent reduction in TP, TSS and point and nonpoint source contribution to the Crow River and its tributaries. A long term management action (30 year outlook) is to reduce TP and TSS to meet ecoregion ranges.

The focus of this project included implementation efforts in the highest ranked priority management area. The priority area has 266,453 acres with 367 linear miles of watercourses characterized by nearly flat to gently rolling topography. Through county assessments, an average of 72 percent of the septic systems within the Buffalo Creek Management Area (BCMA) do not meet state compliance. The predominate land use in the area is comprised of cultivated land and has been extensively drained to accommodate more row crops and larger agricultural operations. Cropping history indicates small grain and hay have been replaced with corn, soybean, and sugar beet rotations.

The use of an IBI provided a framework to interpret biological data to assess water quality. Sites in the BCMA were listed as very poor to fair. Buffalo Creek Flow Weighted Mean Concentrations (FWMC) of nutrients and sediments exceed ecoregion values. Total phosphorus concentrations are well over the 50th percentile of the Western Corn Belt Plains ecoregion average. Significant concerns of FC were noted by resource managers and diagnostic data results.

Goals

- BMP Implementation - desired environmental outcomes reduced P, total suspended solids, nitrogen, and pathogens from entering in the BCMA.
- Information & Education – increase education awareness of water quality efforts and impacts throughout the BCMA.
- Water Quality Monitoring - conduct water quality monitoring at four sites within the BCMA.



Demonstration Rain garden at Christ Lutheran Church, Glencoe, MN.

Results that count

- 53 ISTS systems were upgraded, two streambank stabilized, one desilting basin installed, three rain gardens were constructed and 339.8 acres were enrolled into CRP in the BCMA.
- The project exceeded its expectations by providing increased educational awareness of water quality issues in a variety of workshops, newsletters, a watershed tour and water quality presentations.
- CROW conducted water quality monitoring during from 2006-2008. CROW monitored four sites in the BCMA. Staff collected water quality data and grab samples.

Financial information

Funding type: Section 319 Grant

Grant amount: \$286,280

Local match: \$388,907 Loan amount: \$492,926

Total project costs: \$1,168,113

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Long Prairie River TMDL 319 Nonpoint Implementation Plan

Dissolved oxygen (DO) concentrations below the 5-mg/L standard were found in the lowermost portion of the Long Prairie River at Motley, in and around Browerville, and during the summer months in the uppermost portion near Carlos. As a result, six segments of the Long Prairie River were listed as impaired waters for low DO.

During the TMDL study, it was determined that a large percentage of the DO depletion stems from point sources, with a potential for municipal discharges to cause ammonia toxicity during low flow conditions. Point sources are working directly with MPCA, through the permit process to reach compliance with their load allocations. The non-point pollutant sources are agriculture, shoreland, and rural development. They were addressed by this grant in cooperation with strong programs for implementing BMP's, through the Todd and Douglas SWCDs and continued funding through the CWLA Program.

The primary goal for the non-point implementation was to use BMPs in priority subwatersheds targeted by the SWAT model to achieve nutrient levels at or below the standard for each ecoregion. Half of the grant was used as cost share to landowners for the installation of BMPs. The Long Prairie River is responding well to the restoration efforts, and shown that the DO levels have improved significantly in all but the upper reach between site 9, 10 and 17 where they still fall below the 5.00 mg/L periodically during the summer months.

In addition, a tributary to the Long Prairie River (07010108-511 D Moran Creek, Headwaters to Long Prairie R) was delisted on September 25, 2008 for low DO following a review of new water quality data and re-assessment of existing fish community.

Goals

- Installation of BMPs to reduce nutrient levels.
- Comprehensive monitoring and evaluation.

Results that count

- Outstanding landowner participation in BMP installation. Practice details are described in the full report.



BMP's installed included stream barbs and tree planting for erosion control as well as new agricultural waste systems and closure of unused manure pits.

- Completed monitoring a minimum of 14 times each year, starting at ice out and continuing through the open water season at eight river and three to six tributary sites to achieve credible results that have provided the necessary tools to evaluate the project successfully.

Financial information

Funding type: Section 319 Grant

Grant amount: \$300,000

Local match: \$493,069

Total project costs: \$793,069

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Big Sandy Area Lakes Watershed Management Continuation

The Big Sandy Area Lakes Watershed Management Project has conducted an intensive monitoring and assessment program of the lake and the 413 square mile watershed. Efforts were made to accurately measure the amounts of nutrients and sediment contributed to Big Sandy Lake by each subwatershed. This data, combined with historical data, was used to start defining cause and effect pathways and corrective actions.

This CWP Continuation Grant was successful in implementing a variety of BMPs, including shoreland revegetation projects, runoff management projects, a conservation easement, agricultural BMPs, forest stewardship plans and more. It also included an education component that used newsletters, community events, workshops, and mailings to reach area landowners with information regarding wise management of natural resources. Dedicated project partners donated their time and energy to ensure the success of this project.

Goals

- Provide practical ways to prevent pollution by use of BMP.
- Implement a variety of education efforts to reach watershed landowners with the tools they need to make wise landuse decisions.
- Promote a strong local presence to ensure day to day compliance with state and local regulations.

Results that count

- Installed 10 shoreland revegetation projects and 9 runoff management projects, enrolled 490 feet of shoreline in the pilot No-Mow Zone Incentive Program, assisted 2 riparian livestock operations, wrote 1,761 acres of forest stewardship plans and protected 95 acres with a conservation easement.
- Distributed 14,175 watershed newsletters, mailed 2,101 Shoreland Homeowners Guides to riparian landowners, 1,200 students participated in the Big Sandy Water Institute, prepared and distributed 20 lake association newsletters, participated in 12 information fairs and hosted 15 neighborhood meetings.



Garske Project – Local residents plant vegetation for a Shoreland stabilization project on Big Sandy Lake

- Supported the Aitkin County Environmental Services to increase and expedite enforcement of regulations, issued 400+ permits, revised the Aitkin County Shoreland Management Ordinance and updated and expanded the Cromwell Comprehensive Plan.

Financial information

Funding type: CWP
 Grant amount: \$260,000
 Local match: \$704,010
 Total project cost: \$964,010

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Little Rock Creek Biological Impairment TMDL

Little Rock Creek is a DNR-designated trout stream (Class 2A Brook and Brown Trout) located in central Minnesota near the City of Rice. The Little Rock Creek Watershed is located in Benton and Morrison Counties. Little Rock Creek was listed on the State's 303(d) list in 2002 for lack of coldwater fish assemblage. Few trout were captured in the 1999 MPCA fish survey; there was also an absence of sculpin, burbot and other coldwater species.

The Little Rock Creek TMDL project was organized into 3 phases. Phase 1 was completed in 2003. Phase 2 began June 15, 2006 and was originally scheduled to end June 30, 2009, but was extended until September 30, 2009. The purpose of Phase 2 was to conduct a stressor identification analysis in order to determine the specific physical and/or chemical factors that are causing the biological impairment.

Phase 2 consisted of three primary tasks:

1. Collect additional physical, chemical, and biological data
 - a. Flow/stage monitoring (2006-2009)
 - b. Water quality sampling (2006-2008)
 - c. Fishery data and habitat analysis (2006)
 - d. Invertebrate data collection and habitat analysis (2006)
 - e. Volunteer Monitoring (2006-2008)
2. General project administration, coordinating, and bookkeeping (2006-2009)
3. Final report compilation (2009)

Upon completion of the Little Rock Creek stressor identification analysis, it was determined that TMDLs will be developed for temperature, bedded sediment, nitrates, and dissolved oxygen, by calculating the total pollutant load with reference to flow as source of impairment. TMDLs will be developed in Phase 3.

Goals

- Collect adequate data to make defensible decisions.
- Identify most probable stressors for the lack of coldwater assemblage.
- Build stakeholder participation and ownership of project through education and opportunities to provide input.



A brown trout caught in Little Rock Creek during electrofishing survey.

Results that count

- For most of the candidate causes, the data was sufficient and strong enough to use in making decisions.
- Consensus was reached on the most probable stressors to the coldwater fish community.
- Stakeholder education was conducted through various mediums, including newsletters, web pages, public meetings, newspaper articles, and other presentations. Public participation has been demonstrated through attendance at public meetings and web page hits.

Financial information

Funding type: Section 319 and CWLA

Grant amount: \$97,000.00

Local match: \$94,300

Total project costs: \$191,300

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Feedlot Runoff Removal by Organic Biofilter Demonstration

This project investigated the potential of using woodchips to treat feedlot runoff from a 156-animal unit family-dairy farm located in central Minnesota.

In September 2006, nearly 98,000 pounds of pine bark-rich woodchips were placed in a plastic-lined trench 15 feet wide by 68 feet long to a depth of 3.8 feet. A total of 51 sensors and monitoring devices were installed to assess changes in water-quality, flow conditions, water, media, soil and air temperatures, and moisture fluctuations within the woodchip media. A total of 32 bagged woodchip samples were installed within the woodchip biofilter to assess the changes in the media's physical and chemical properties relative to a control sample.

Along the flow path, runoff samples were obtained before, within, and after the biofilter using dedicated pumps and sample lines that discharged into a refrigerated sampler, or grab samples that were manually collected in the field. Samples were obtained for water chemistry from seven snowmelt events and five rainfall events.

The woodchip biofilter reduced total phosphorus concentrations by an average of 67 percent and total nitrogen by 49 percent. Woodchip moisture sensors indicated that once wetted, the media remained mostly at field capacity. Excessive moisture facilitated highly-reduced conditions at the base and promoted preferential woodchip decomposition at the front and within the medial zone, but sufficient carbon remained for nitrogen attenuation. Media consolidation decreased hydraulic conductivity values and the turning over and mixing of the woodchips on an annual basis would increase both flow rates and nutrient attenuation. The results indicate that a woodchip biofilter can be an effective BMP tool for small- to medium-sized livestock producers.

Goals

- Treat feedlot runoff under a wider range of environmental conditions for water-quality improvement
- Provide an efficient, economical, space-saving, treatment alternative for livestock producers
- Increase farmer awareness

Results that count

- The woodchip biofilter provides all-season treatment system for feedlot runoff. The highest nutrient and sediment-transport loads were associated with the melting of the snow pack in late winter/early spring. Although within the biofilter, biological activity is rapidly suspended with the passage of ice-cold water through the woodchip media, and it continues to attenuate feedlot derived nutrients through particulate filtration and chemical absorption.
- The biofilter at the Melrose, Minnesota occupied an area of approximately 1,650 square feet inclusive of the pre-biofilter secondary settling basin.
- To increase farmer awareness, a Field Day was held on August 18, 2009, at the project site. The biofilter project has also been discussed and highlighted during monthly radio show broadcasts. As a result of the Section 319 project and a preceding Legislative-Citizen Commission on Minnesota Resources (LCCMR) investigation at Morris, Minnesota, MinnFARM will likely be revised to account for higher loadings associated with the melting of the snowpack.

Financial information

Funding type: Section 319

Grant amount: \$149,928

Local match: \$181,720

Total project costs: \$331,648

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Clearwater River and Lake Louise TMDL — Dissolved Oxygen

This river reach was first listed as impaired in 2006. The Clearwater River Watershed District (CRWD) was in Phase II of a TMDL project at that time. This reach was added to the existing project to maximize efficiency in collecting data and completing field work. Additional data collected in this reach demonstrated that the impairment was not valid. A technical memorandum was prepared and submitted to the MPCA delisting committee in 2006. A decision has not yet been made by the delisting committee. The remainder of the project was completed and the TMDL study was approved by the US EPA.

Goals

- Collection of additional field data to verify impairment
- Modeling
- Load allocations

Results that count

- Data collection completed
- Dissolved oxygen technical memorandum developed based on data collected
- Submitted to the MPCA delisting committee

Financial information

Funding type: CWLA

Grant amount: \$70,052

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Clearwater River Five Lakes Nutrients

The goal of this project was to set TMDLs for five nutrient impaired lakes (listed in 2008) within the Clearwater River watershed in the Upper Mississippi River Basin. The TMDLs for these lakes were set using existing in lake and watershed water quality and hydrologic data available for the CRWD. These data have been collected through the CRWD's annual monitoring program which started in 1989. Additional data is available for Albion, Henshaw and Swarout Lakes through the Cedar Chain of Lakes Improvement Project which started in 2003. All data was collected according to the approved quality assurance/quality control (QA/QC) protocols of the Clearwater River Watershed District and the project Quality Assurance Project Plan (QAPP). All data is in STORET. The following tasks were included in this project work plan:

Task 1: Develop operational models: The water quality models are numerical representations of the impaired waters that will assist in allocation of daily loads.

Task 2: Quantify existing loadings and required load reductions: the operational models will be calibrated to existing conditions to determine the existing loads; modeled loads are reduced until water quality standards are achieved.

Task 3: Develop load allocations and reduction alternatives: Loads determined in the models are allocated to sources based on watershed data and load reduction alternatives evaluated.

Task 4: Develop implementation plan and future monitoring: Based on the load reductions required the implementation plan and future monitoring is developed

Task 5: Project meetings and public involvement: Project meetings and public involvement activities are on-going with the Chain of Lakes Association representing Lakes Augusta and Caroline; and through the Cedar Chain of Lakes Improvement Project (Albion, Swarout, and Henshaw are upstream of Cedar Lake).

Task 6: Final project report: Prepare a report to document the load allocations.

All listed tasks have been completed. The final report was submitted to the US EPA in November of 2009 for preliminary review. There were several delays with the preliminary review. The public notice and final approval process will be accomplished in a subsequent contract. The TMDL document will be posted on the MPCA website when it goes out on public notice.

Goals

- Develop load allocations for five nutrient impaired lakes
- Develop preliminary implementation plan based on load allocations.
- Develop TMDL report for US EPA approval

Results that count

- Load allocations were set for each lake.
- The preliminary implementation plan was completed with stakeholder input and used as the basis for the final implementation plan that is currently in draft form.
- TMDL sent to US EPA for preliminary comments. Initial comments have been addressed and the draft document will be put on public notice.

Financial information

Funding type: CWLA

Grant amount: \$62,423

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Clearwater River Ongoing TMDL Studies

The CRWD shows two stretches of Clearwater River and Lake Louisa are impaired: The Clearwater River between Clear Lake and Lake Betsy does not meet water quality standards for fecal coliforms (swimming) and DO (aquatic life), the Clearwater River between Grass Lake and the Mississippi does not meet water quality standard for DO (aquatic life), and Lakes Louisa, Betsy, Marie, Scott, Union and Clear do not meet water quality standards for nutrients (swimming).

The TMDL was completed for all of the above listed except for both DO reaches. The Clearwater River between Clear Lake and Lake Betsy was included in this TMDL and was submitted to the US EPA for preliminary review; however, a decision was made between MPCA and US EPA to explore a “natural background” cause for this impairment. Additionally, the Clearwater River between Grass Lake and the Mississippi River DO reach was added to the project when it was first listed. Additional data collected for this reach indicated that the impairment was not valid. It was sent to the MPCA delisting committee in 2007 to be considered for delisting and therefore was removed from this project.

The work plan tasks that were completed include:

Task 1: Develop operational models: The water quality models are numerical representations of the impaired waters that will assist in allocation of daily loads.

Task 2: Quantify existing loadings and required load reductions: the operational models will be calibrated to existing conditions to determine the existing loadings, then modeled loads are reduced until water quality standards are achieved.

Task 3: Develop load allocations and reduction alternatives: Loads determined in the models are allocated to sources based on watershed data and load reduction alternatives evaluated.

Task 4: Develop implementation plan and future monitoring: Based on the load reductions required the implementation plan and future monitoring is developed.

Task 5: Project meetings and public involvement: Project meetings and public involvement activities are on-going with the Chain of Lakes Association representing Lakes Louisa and Marie. One additional public involvement meeting will be conducted to present the findings of the TMDL study and load allocation.



Task 6: Prepare a report to document the load allocations. The TMDL report was approved by the US EPA.

Goals

- Develop load allocations for the listed impairments
- Develop preliminary implementation plan
- Develop TMDL report for EPA approval

Results that count

- Load allocations completed for listed impairments
- Drafted final implementation plan based on the preliminary plan
- The TMDL report has been approved by US EPA

Financial information

Funding type: CWLA

Grant amount: \$66,832

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Golden Lake TMDL Report — Stormwater Runoff Appendix

Staff from MPCA, Emmons & Olivier Resources, Inc. (EOR), and Rice Creek Watershed District (RCWD) met on September 22, 2008 to discuss questions regarding the watershed runoff value and phosphorus loading used in the Golden Lake TMDL (draft completed in 2006 with US EPA grant funding). Following the meeting, it was agreed that an additional appendix for the Golden TMDL Report should be produced. The appendix contains text and data needed to explain the extraordinarily low watershed runoff values used in the TMDL. The items below, proposed by MPCA and modified by RCWD, were addressed in the appendix:

- State clearly and upfront that the hydrology of the study area is very unique
- Lake recharges groundwater — cite both 1982 report and recent work on this
- Wetlands in watershed probably also recharge groundwater — explain seasonal — four foot water table drop that usually occurs
- Compare 1982 and 2004 snowmelt volumes — percentage of total runoff as snowmelt not greatly different between 1982 report and 2004 data (note difference between monitoring start times in 1982 vs 2004)
- Discuss 1999, 2002 and 2008 (2008 depending on the availability of a revised rating curve) monitored runoff volumes as a validation/verification for 2004's low runoff values
- 1997 runoff and P export: P export ~moderate-normal in extremely wet year - consistent with very low P export in ~normal climatic year
- Describe land use changes as presented
- Regarding correlation between precipitation and in-lake TP: can say that the correlation does not necessarily indicate that external P loading is dominant, but that it dominates year-to-year variability in loading; in fact, internal loading is comparable to external, but internal loading is expected to be fairly constant from year to year
- Illustrate and discuss the decrease in P concentration in Anoka Conservation District 53-62 since 1982

Goals

- Determine the need for an appendix to Golden TMDL Report.
- Write appendix to Golden TMDL Report.

Results that count

- It was agreed that an additional appendix for the Golden TMDL Report should be produced.
- An appendix was written containing text and data needed to explain the extraordinarily low watershed runoff values used in the TMDL.

Financial information

Funding type: CWLA

Grant amount: \$4,183

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Medicine Lake Nutrients TMDL

In 2004, Medicine Lake was placed on MPCA's list of impaired waters in need of a TMDL study for excess nutrients, based primarily on data collected by Three Rivers Park District (TRPD) and the Bassett Creek Watershed Management Commission (BCWMC). The data indicated that Medicine Lake had total phosphorus concentrations in excess of the MPCA's state water quality narrative standard of 40 micrograms per liter for the growing season mean.

The MPCA partnered with Limno Tech Consulting, TRPD and the BCWMC to develop the work products based on the stakeholder input process which was lead by a professional facilitator, CR Planning. This work included:

- compiling and summarizing the existing information
- revising and updating the watershed and in-lake water quality response modeling developed for the City of Plymouth and the BCWMC Medicine Lake plans
- calibrating/validating the modeling to the most recent monitoring data for the lake and for the watershed
- determining the loading capacity based on the water quality goals for the lake
- evaluating watershed control measures and in-lake management techniques for phosphorus load reductions
- determining the margin of safety and specific waste load and load allocations for each source of phosphorus and MS4
- developing implementation and compliance monitoring plans

Revisions and updates were made to the modeling and other work previously performed as part of the City of Plymouth and the BCWMC's Medicine Lake plans, and the additional Plymouth Creek and Medicine Lake monitoring data collected since those efforts were completed.

Goals

- The overall stakeholder involvement goal was to develop Medicine Lake's TMDL in a "partnership process" that facilitated positive interactions and ownership of the results among the stakeholders.
- Compile and update existing water quality data and modeling
- Complete a TMDL and Implementation Plan



Results that count

- The Medicine Lake TMDL process engaged stakeholders to provide value-based feedback and prioritization to complement the modeling and scientific analysis, particularly in regard to making wasteload allocations and prioritizing BMPs.
- Previous watershed and in-lake models were updated and used to develop the TMDL and Implementation Plan.
- An approvable TMDL and Implementation Plan were developed and submitted to MPCA.

Financial information

Grant type: CWLA

Grant amount: \$47,100.12

Contact information

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Minnehaha Creek Lake Hiawatha TMDL

Tetra Tech is supporting MPCA with the development of FC, chloride, and nutrient (phosphorus) TMDLs in the Minnehaha Creek — Lake Hiawatha watershed. The TMDLs will provide MPCA with the information needed to meet TMDL regulatory requirements and will provide recommendations to local stakeholders on how to prioritize implementation activities. The TMDL is being developed through a joint effort between MPCA and US EPA Region 5, with each agency funding separate tasks. The MPCA work order resulted in a Watershed Characterization report, a Source Assessment report, and BATHTUB modeling of Lake Hiawatha.

The watershed characterization report provides an introduction to the TMDL document, describes background information, summarizes the watershed's characteristics (e.g., land uses, jurisdictions, potential pollutant sources, etc.), and defines the water quality problems in the Minnehaha Creek — Lake Hiawatha watershed. The source assessment report identifies and quantifies loading from all significant sources within the Minnehaha Creek — Lake Hiawatha watershed at both the entire watershed scale, as well as at the sub-watershed scale. The BATHTUB modeling resulted in an initial framework for simulating in-lake phosphorus and eutrophication response in Lake Hiawatha and also provides background information about the lake, as well as a summary of hydrologic and water quality data.

The US EPA Region 5 work order, which continues, will result in the Linkage Analysis report and the draft TMDL report for public review.

Goals

- Prepare a watershed characterization report for the Minnehaha Creek — Lake Hiawatha Watershed. Review Draft.
- Prepare a watershed source assessment report for the Minnehaha Creek - Lake Hiawatha Watershed.
- Prepare a Lake Hiawatha modeling analysis.

Results that count

- The watershed characterization report was completed.
- The source assessment report was completed.
- The Lake Hiawatha modeling analysis was completed.



Financial information

Funding type: CWLA

Grant amount: \$77,078

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Minnehaha Creek Watershed Lakes TMDL

Four lakes in the Minnehaha Creek Watershed District (MCWD) — Nokomis, Parley, Virginia, and Wassermann — are on the US EPA's 303(d) list of impaired waters due to excess nutrients. The state eutrophication standards apply to these lakes. A request is being made to set site-specific standards for Lake Nokomis. Phosphorus is identified as the primary pollutant leading to eutrophication in these lakes. Phosphorus loads were estimated for stormwater runoff, internal loading, and atmospheric deposition.

The loading capacity for each lake was calculated using BATHTUB, a lake response model. Individual WLAs were set for each regulated MS4 source. Categorical WLAs were set for construction and industrial stormwater. One load allocation was set for each lake. The load allocation includes sources from un-regulated stormwater runoff, internal loading, atmospheric deposition, and unidentified loads.

- To meet the Nokomis standards, need to reduce the P load reduction by 57 percent.
- To meet the requested site-specific standards, the reduction drops to 35 percent.
- To meet the Parley standards, need to reduce by 44 percent.
- To meet the Virginia standards, need to reduce by 20 percent.
- To meet the Wassermann standards, need to reduce by 62 percent.

A series of stakeholder meetings were held. Cities, counties, agencies, and park districts were invited to provide input into the project approach and to review draft documents. Public meetings were held to provide information to the public about the project and to solicit input regarding background information and implementation recommendations.

The approach to implementation is based on the MCWD Comprehensive Watershed Management Plan, which outlines a framework for water resource management including requirements for local government units. In addition, the MCWD has also adopted rules that regulate activities in the watershed and strive to prevent pollution. Watershed-wide activities and activities specific to the individual lakes are included.



Lake Virginia – high quality macrophyte communities

Goals

- Complete MCWD Lakes TMDL report
- Involve project partners and stakeholders in TMDL development
- Hold public meetings

Results that count

- TMDL submitted for US EPA preliminary approval.
- Stakeholders were involved in developing the project approach and reviewing work products
- Three public meetings were held

Financial information

Funding type: CWLA

Grant amount: \$145,773

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Shingle Creek Chloride Reduction Project

Shingle Creek, an 11-mile stream located in northwestern Hennepin County, was designated an impaired water by the MPCA and US EPA for chloride concentrations that exceed the state's established standards. The use of a new de-icing product, Clearlane, is identified by the City of New Hope as a BMP to reduce chloride levels in Shingle Creek.

Goals

- Pollution reduction
- Programmatic changes
- Public support

Results that count

- During the winter, staff responded to 17 different events from 12/6/08 to 3/14/09. These events required the spreading of 1,458 tons of material - 1,093 tons of sand and 364 tons of ClearLane. The sanding equipment was calibrated to use 30-50 percent less ClearLane than regular rock salt. If rates of application were not adjusted, 2,041 tons of material were approximately used (1,531 tons of sand and 510 tons of salt.) By using ClearLane, 146 fewer tons of salt were used.
- Sanders were set to 50 percent that of normal settings. The number of times staff returned to de-ice diminished. ClearLane sticks to the pavement, therefore, requiring fewer trips to de-ice.
- Staff did not receive any negative calls regarding the level of service (even with reducing the number of return calls to de-ice.)

Financial information

Funding type: Section 319 Grant

Grant amount: \$15,000

Local match: \$26,000

Total project costs: \$41,000

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Shingle Creek Watershed Lake TMDL Implementation Plans

There are nutrient TMDLs under development in the Shingle Creek watershed for Meadow Lake and Magda Lake. Implementation plans were prepared, presented at stakeholder meetings, submitted to agencies for comment, finalized as a draft, and submitted to the MPCA for review and approval.

Goals

- Draft Implementation plans for Magda and Meadow Lakes in the Shingle Creek Watershed submitted to MPCA

Results that count

- Stakeholder, interagency and local review comments incorporated into draft implementation plans

Financial information

Funding type: CWLA

Grant amount: \$3,146

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Lake Magda

Shingle Creek Watershed Phase I Biotic and Dissolved Oxygen TMDL Project

Shingle Creek was listed on the 2004 303(d) list of impaired water for DO. The listing for Shingle Creek resulted from sampling completed by the U.S. Geological Survey at the Queen Avenue Bridge in Minneapolis, just downstream from the Centerbrook Golf Course. This data indicated that Shingle Creek frequently has DO concentrations below the state standards of 5.0 mg/L and occasionally has concentrations below the standard in winter. While this data is sufficient for identifying impairment, additional data is needed to understand and diagnose the factors contributing to the low DO concentrations.

In 2006, Shingle Creek was listed on Minnesota's 303(d) list of impaired waters for biological impairment. Bass Creek was listed in 2002. Shingle Creek is impaired based on the macroinvertebrate IBI, while Bass Creek is impaired based on the fish IBI. One potential stressor is DO. Dissolved oxygen is only one factor; excess chlorides, poor habitat, flow velocities, sedimentation, and other urban stormwater runoff pollutants are also potential issues.

Phase I of the DO/biotic integrity TMDL included monitoring and problem assessment/diagnosis. Specific tasks included travel time measurements, water quality synoptic surveys, continuous DO measurements, and additional biologic and geomorphic assessments. This additional data collection was necessary to improve understanding so that TMDL models/assessment tools can be developed, various loading scenarios assessed, and a TMDL completed under Phase II by a separate contract.

Goals

- Review and compile historic creek data
- Collect stream geomorphology data
- Better understanding of the stressors to Shingle and Bass Creek

Results that count

- Particularly for Bass Creek, a historical perspective of wetland ditching that can better inform restoration planning
- Better understanding of physical drivers impacting fish and macroinvertebrates in the streams



Shingle Creek

- Technical memo summarizing the data summary that will be included in the future TMDL project

Financial information

Funding type: CWLA

Grant amount: \$94,100

Local match: \$30,000

Total project costs: \$124,100

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Wirth Lake Nutrients TMDL Development

In 2004, Wirth Lake was placed on the MPCA's list of impaired waters in need of a TMDL study for excess nutrients, based primarily on data collected by the Minneapolis Park and Recreation Board (MPRB) and the Bassett Creek Water Management Commission (BCWMC). The data indicated that Wirth Lake had total phosphorus concentrations in excess of the MPCA's state water quality standard of 40 micrograms per liter for the growing season mean.

This project involved the completion of a TMDL and implementation plan for Wirth Lake recognizing that a significant amount of the work has previously been completed by the local partners. This project included:

- Updating the existing watershed and in-lake water quality response modeling
- Calibrating the modeling to the most recent monitoring data
- Reviewing the water quality goals for the lake
- Evaluating watershed control measures and in-lake management techniques for phosphorus load reductions
- Determining the margin of safety and specific waste load and load allocations for each source of phosphorus
- Updating existing implementation and compliance monitoring plans.

Stakeholder/technical advisory meetings were also completed.

Goals

- Update and complete additional watershed and in-lake modeling to better identify extent of impairment and sources of phosphorus.
- Complete TMDL report/implementation planning.
- Engage project stakeholders

Results that count

- Updated modeling indicated that backflow from Bassett Creek is the primary cause of the impairment and will be addressed through the implementation of a new outlet structure to prevent backflow.

- Completed the draft TMDL report and implementation plan
- Held two stakeholder and technical advisory meetings and draft report questions and comments were fielded from the US EPA.

Financial information

Funding type: CWLA

Grant amount: \$31,207

Local match: \$28,529

Total project costs: \$59,736

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Middle Sauk River Water Quality Restoration Project

The Middle Sauk River region located in central Stearns County is impacted by nutrient and sediment loading as a result of land use practices and changes. The 1985 and 1993 diagnostic studies on the Sauk River Chain of Lakes identified the Sauk River as the primary source of water and the largest nutrient contributor to the Chain of Lakes. In 2004, the Sauk River Chain of Lakes were listed on the MPCA's list of impaired waters. The purpose of the Middle Sauk River Water Quality Restoration Project was to provide financial incentives and technical guidance to reduce nutrient and sediment loading from eroding areas, as well as stormwater runoff from area agriculture lands and municipalities.

Goals

- Implement an interactive education program for adult and youth within the watershed
- Implement a water monitoring program to determine the effectiveness of the BMPs installed during the project and to obtain baseline water quality data for Little Birch, Sylvia and St. Anna's Lake. Reduce flow weighted mean average TP concentrations of the Sauk River (in-flow) to <150ug/L. Reduce in-flow average TSS concentrations to approximately 18mg/L.
- Install BMPs within the Middle Sauk River watershed and the Getchell, Unnamed, Stony and Adley subwatersheds including feedlot improvements, bank stabilization activities, land retirement programs, buffers strips and urban stormwater abatement

Results that count

- In 2007 the SRWD launched the District's Senior High Outdoor Resources Education (S.H.O.R.E.) curriculum offering students a hands-on opportunity to collect water samples. The SRWD staff presented environmental information and education to over 1,000 people/year at community events.
- The middle Sauk River watershed area was assessed through a network of tributary monitoring stations and four anchor sites along the river. Expanded monitoring efforts to include Lake Sylvia, Little Birch Lake and St. Anna's Lake, which are the headwaters of Adley and Getchel Creek tributaries to the Sauk River. Data was used as a baseline for TMDL studies.



- Fifteen landowners completed feedlot abatement projects using the cost share and low interest loan funds. The feedlot evaluations (FLEVAL) ranged from 25 to 50. Each completed project now has a FLEVAL rating of zero. The average TP reduction per site was 20 pounds per year. Two landowners properly abandoned their animal waste storage structure using the MPCA guidelines. One landowner utilized the SRF loan program to purchase a stalk chopper to increase residue cover and to allow for a no-till drill to be used the following spring. Three riparian restoration projects were completed along two lakes in the middle Sauk River region. The SRWD worked with the city of Sauk Centre to install a stormwater management project downstream of the Sauk Lake Dam. The SRWD worked with twelve landowners to update their septic systems.

Financial Information

Funding type: CWP
 Grant amount: \$216,892
 Local match: \$467,296
 Loan amount: \$95,879
 Total project costs: \$780,067

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Osakis Lake Watershed Management Project Phase III Continuation

Osakis Lake is a large, popular, recreational water body located in central Minnesota and is the headwaters of the Sauk River. The water quality of Osakis Lake sets the stage for the overall water quality of the Sauk River, which directly impacts the water bodies downstream. The City of Osakis borders the south shore of Osakis Lake. The lake is a major economic asset to the city and to this region of the Sauk River watershed.

The primary focus for the Osakis Lake Watershed Management Phase III Continuation Project is to prevent Osakis Lake and its tributaries from further degradation and to improve current water quality conditions. Priority was given to feedlots, erosion issues, shoreland and stormwater concerns.

Goals

- Address the water quality concerns on Osakis Lake by concentrating implementation efforts on ag-waste and manure management issues, erosion concerns, shoreland restoration and stormwater concerns.
- Conduct effectiveness monitoring to track water quality changes and to zero in on the “hot spots” within the watershed to prioritize funding and implementation efforts.
- Educate the Osakis Lake Watershed citizens on the impacts of non-point source pollution and how conservation BMPs can benefit water quality.

Results that count

- Installed one stormwater basin and storm drain markers throughout the city of Osakis, properly abandoned one ag-waste basin, installed one buffer strip and native windbreak along stream, installed a two-celled sediment reduction pond approximately 10.8 acres in size and conducted a sediment core research to determine the internal loading in Osakis Lake, upgraded 13 septic systems within the Osakis Lake shoreline protection zone and installed nine shoreland restoration projects totaling 1,655 (over 35,000 sq.ft)
- Conducted a three year monitoring program on Osakis Lake and its tributaries. This data was used for the current TMDL study.



Stormwater retention project in the city of Osakis.

- Completed an extensive education program which consisted of three SHORE program events, a three week river awareness program at the local school, five workshops with 500+ attendance focusing on shoreland restoration, volunteer monitoring, urban BMPs and public education presentation on the status of the Osakis Lake water quality.

Financial information

Funding type: CWP
 Grant amount: \$235,000
 Local match: \$328,088
 Loan amount: \$214,601
 Total project costs: \$777,689

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Sauk River Chain of Lakes TMDL

The Sauk River Chain of Lakes (SRCL) is comprised of more than 15 interconnected lakes and shallow impoundments located in central Minnesota. The Sauk River watershed accounts for 85 percent of the total watershed area above the lake outlet. Because of excessive nutrient concentrations and nuisance algal blooms, most of the lakes do not meet Minnesota's water quality standards. The blooms result from a combination of excessive phosphorus loads and limited assimilative capacity.

While point sources accounted for more than half of the phosphorus loads prior to 1991, current loads originate primarily from agricultural areas (cropland, pasture) and urban areas dispersed throughout the watershed. Some of the lakes and bays are impacted by runoff and septic tank discharges from adjacent developed shorelines.

Modeling results indicate that the TMDL is largely determined by the 60 ppb TP criterion for the mainstem lakes, as driven primarily by the Sauk River inflow concentration. It is estimated that achieving the TP criteria in shallow and deep lakes would require an overall reduction in TP load of approximately 64 ± 3 percent relative to 2002-2006 conditions. This could be accomplished by limiting the long term average, flow-weighted-mean TP concentration in each tributary to a maximum of 60 ppb and reducing inputs from shoreline areas (runoff and septic systems) by approximately 50 percent. While subject to greater uncertainty because of data limitations, a similar remedy is prescribed for the Eden Valley lakes (North Browns and Long Lake). It is unlikely that mean chlorophyll-a criteria would be achieved in most of the lakes with a 64 percent load reduction; however, the frequency of severe nuisance algal blooms (chlorophyll-a > 60 ppb) would be reduced to less than 5 percent as compared with baseline values of 30 to 60 percent.

Goals

- Assemble needed data for determining loading within system
- Calculate assimilative capacity
- Model scenarios of implementation efforts to attain state standards



Wildlife enjoying the Sauk River Chain of Lakes.

Results that count

- Defined implementation ideas and directions
- Completed overall phosphorus modeling
- Calibrated model & analysis of several scenarios of nutrient reductions

Financial information

Funding type: Section 319

Grant amount: \$125,000

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Upper Mississippi River TMDL Compliance in Impaired Areas — Phase II

Stearns County has approximately 2,900 livestock operations with 2,000 of these operations having 300 animal units or less. Proper manure management and storage within and near ecologically sensitive and impaired areas will enhance or sustain surface and groundwater quality.

The grant was very effective in accomplishing the goals set forth. Eighteen feedlot animal waste control facilities were constructed. The Feedlot Evaluation model (FLEval) was replaced with the Minnesota Feedlot Annualized Runoff Model (MinnFARM) midway through the grant. MinnFARM was used as a uniform means of objectively evaluating potential pollution problems from animal feedlots and impacts on water quality.

The BMP implementation projects provided a 910 lbs. per year reduction in phosphorous, and a 620 ton per acre per year reduction in soil loss.

The Stearns County Environmental Services has identified and prioritized additional livestock producers with pollution potential; 25 sites had their unpermitted manure storage basins investigated with 21 sites failing to meet the MPCA specifications. These producers will be targeted in the future with technical and financial assistance to address their pollution problem.

Nearly 140 agriculture professionals attended the Certified Crop Advisor (CCA) Update workshops held in 2007. The workshops provided the latest agronomic information, including updates on conservation practices that can impact water quality.

The latest modeling results indicate that TP and TSS reductions are progressing in the Sauk River and the three primary tributaries. The past two monitoring seasons were relatively “dry”. Nutrient and sediment concentrations generally improve during dry years and therefore measuring improvements in water quality becomes more difficult to quantify unless several years (10+years) of data is available to determine a trend.

Goals

- Reduce surface and ground water pollution from livestock feedlots and related non-point activities
- Investigate unpermitted manure storage basins for pollution potential, and target failing systems for repair or closure
- Increase technical assistance, provide education of BMPs to agriculture professionals, and water quality monitoring

Results that count

- The BMPs implemented provided a 910 lbs/yr reduction in phosphorous, and a 620 ton/ac/yr reduction in soil loss.
- 25 sites had their unpermitted manure storage basins investigated with 21 sites failing to meet the MPCA specifications. These producers will be targeted in the future with technical and financial assistance to address their pollution problem.
- 136 agriculture professionals attended two CCA Update workshops. Seven additional manure management plans were developed by CCA. The SRWD has summarized water quality monitoring data. A TMDL study for the Sauk River Chain of Lakes is nearing completion.

Financial information

Funding type: Section 319

Grant amount: \$300,000

Local match: \$728,545

Total project costs: \$1,028,545

Contact information

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MPCA Project Manager: Greg Van Eeckhout

Upper Mississippi River Basin

Projects active and awarded in 2010

Multiple watersheds in the basin

Improving Rural Water Quality in the Crow River Basin Project — 2008

Sponsor: Crow River Organization of Water (CROW)

Funding: Section 319 (Grant) \$272,480,
CWP (Loan) \$770,000

Purpose: This project will continue CROW's goal of reducing nutrients and sediment from the Crow River and its tributaries. The focus of this project includes implementation efforts in highly ranked priority management areas as identified in the Crow River Phase I Diagnostic Study. The management areas cover portions of Renville, McLeod, Kandiyohi and Meeker counties.

Upper Mississippi River Source-Water Protection Plan Implementation Project — 2006

Sponsor: City of St. Cloud Public Utilities

Funding: CWP (Grant) \$425,000

Purpose: Funding allows the project to conduct a dye-trace study on the South Fork of the Crow in order to refine the earlier travel-time estimates, obtain locational data from local units of government on potential point and nonpoint contaminant sources, identify areas susceptible to nitrate contamination, hire a project data specialist to update state and federal data files and incorporate the data into the project data base, quantify tributary inflows and in-stream flows (allowing for estimates of groundwater contributions to and losses from the Mississippi River), identify areas of potential contaminant transport between ground and surface waters, support the delineation of wellhead protection areas for ground water-based suppliers, identify areas of high sediment loading potential, implement local source water protection plans, and continue administration and education activities.

Long Prairie River

Long Prairie River Dissolved Oxygen TMDL Implementation Project — 2007

Sponsor: Todd County Soil and Water Conservation District

Funding: Section 319 (Grant) \$150,000

Purpose: The MPCA has observed DO concentrations below the 5-mg/L standard near Motley and Browerville, and during the summer months near Carlos. The primary goal for the project is to use certain BMPs to keep nutrient levels at or below the standard. The BMPs to be constructed include, but are not limited to, riparian buffers, contour cropping, grassed waterways and others, along with the use of alternative water sources, seed varieties, rotations, cover crops and fertilizers.

Long Prairie River TMDL Non-Point Implementation Project — 2009

Sponsor: Todd County Soil and Water Conservation District

Funding: Section 319 (Grant) \$300,000

Purpose: The primary goal for the non-point implementation project is to continue and expand the Long Prairie River TMDL Non-Point Implementation Plan, through installation of BMPs in priority sub-watersheds targeted by the SWAT model used in the TMDL study to bring or maintain nutrient levels at or below the eco-region median values, (McCollor & Heiskary, 1993) resulting in the reduction of biochemical oxygen demand (BOD) from all sources during low flow conditions. In addition, improvement of the dissolved oxygen levels will also help resolve the fish bioassessment impairments in several reaches of the Long Prairie River as noted on the 2008 MPCA list of impaired waters.

Mississippi River (Headwaters)

Deer and Pokegama Lakes: A Diagnostic Study — 2009

Sponsor: Itasca County

Funding: CWP (Grant) \$249,986

Purpose: Pokegama Lake was chosen for the proposed study to represent lakes with large hydraulic connections to surface waters (the Mississippi in this case), whereas Deer Lake has a small watershed relative to the lake area and is likely groundwater dominated. This project will oversee the year-round collection and analysis of water samples from Pokegama and Deer lakes; determine the current nutrient and suspended sediment concentrations; define the sources of nutrients and sediments; assess the distribution of sources and losses across watersheds; and develop an implementation plan to address possible impairments to the two lakes.

Mississippi River (Twin Cities)

Burandt Lake Excess Nutrient Implementation Plan — 2009

Sponsor: Carver County Land and Water

Funding: Section 319 (Grant) \$82,500

Purpose: Burandt Lake was listed for excess nutrients in 2004 and the final TMDL and implementation plan were recently approved. Identified in each of those was the need to limit both internal and external sources of phosphorus entering the lake. This is a unique project in that it can meet state standards relatively quickly if funds are granted. The implementation plan identified the need for urban stormwater management as well as a chemical (possible ALUM) treatment to bring the lake into compliance. At this point the county and city started to implement the plan by addressing the non-point run-off sources with the installation of several rain gardens and educating landowners in the area. This project will build on that by gaining resources necessary to install several more rain gardens and complete chemical (possible ALUM) treatment, while also actively monitoring the lake and tributaries as outlined in the work plan.

Outcomes: Based on the TMDL Implementation Plan and modeling that was used to complete both we feel that by continuing to limit runoff from entering the lake, treating the lake with chemical (possible ALUM) to control the large internal source of phosphorus, and combined with the clean water entering from Lake Waconia, that Burandt Lake could potentially meet state standards by the end of the grant cycle in 2014.

Clear Lake Water Quality Diagnostic Study — 2009

Sponsor: Rice Creek Watershed District

Funding: CWP (Grant) \$20,100

Purpose: Clear Lake is located within the City of Forest Lake in Washington County. This project proposes to collect and analyze detailed water quality data that will be used to calibrate watershed and in-lake models. A final report will summarize the methods and present the loading estimates and will also include a Management Action Plan (MAP) that will consist of a list of possible BMPs, along with feasibility and cost/benefit assessment of each BMP. Pollutant removal potential will be estimated for each BMP, and the cost/benefit analysis will be used to prioritize management actions.

Crosby Lake Management Plan — 2009

Sponsor: Capitol Region Watershed District

Funding: CWP (Grant) \$50,000

Purpose: Situated in the floodplain of the Mississippi River in Saint Paul, Crosby Lake is divided into two separate waterbodies by a bog trail, forming Crosby Lake and Little (or Upper) Crosby Lake. This project will review and evaluate available data and studies from relevant sources and determine gaps in data; obtain/collect additional data and synthesize all information on Crosby Lake; develop a hydrologic regime for Crosby Lake as well as a simple water quality model to analyze current and future conditions of the lake and watershed; identify implementation activities; identify the management goals, objectives and activities to address the high priority issues of Crosby Lake; and prepare the Crosby Lake Management Plan.

Crystal Lake Nutrient TMDL Alum Treatment — 2010

Sponsor: Shingle Creek Watershed Management Commission

Funding: Section 319 (Grant) \$82,500

Purpose: Crystal Lake in Robbinsdale is impaired by high concentrations of nutrients. The 2008 TMDL identified both internal and external phosphorus loading as contributing to poor water quality. This project would apply an alum treatment to Crystal Lake to address internal load and improve water clarity while a separate project would construct a facility to treat the stormwater runoff from about 25 percent of the lakeshed that currently is untreated.

This internal load project will accomplish 90 percent of the internal load reduction required. The separate external load reduction project will accomplish about half the external load reduction required. Together, these projects will significantly improve water quality and clarity in Crystal Lake.

Outcomes: This project will significantly improve water quality and clarity in Crystal Lake, which will be beneficial in helping to restore appropriate aquatic vegetation, fish, and zooplankton communities. The project will accomplish about 90 percent of the internal phosphorus load reduction required by the Crystal Lake Nutrient TMDL.

Hardwood Creek TMDL Implementation Project — 2010

Sponsor: Rice Creek Watershed District

Funding: Section 319 (Grant) \$344,200

Purpose: The Rice Creek Watershed District (RCWD) will lead a coordinated effort to improve the biological integrity and DO levels in Hardwood Creek to meet the goals of the TMDL. Average TSS concentration will need to be decreased 14% from approximately 22 mg/L to 19 mg/L to address biological integrity. The average BOD concentration will need to be decreased 30% from approximately 4.6 mg/L to 3.2 mg/L to address dissolved oxygen levels. The TMDL study found that altered habitat and altered hydrology were both found to be negatively impacting the biotic community.

To achieve the goals for reductions in TSS and BOD concentrations, a variety of measures, including streambank stabilization, in-stream habitat improvements, re-establishment of stream meanders, and livestock exclusion, will be implemented across the watershed as part of the project. The project is unique in its ability to reconnect the stream to the adjacent floodplain with the use of re-meanders.

Outcomes: By addressing the sources of sediment and phosphorus, this project will contribute to overall water quality improvements in Hardwood Creek. The completion of projects identified in the TMDL Implementation Plan will result in decreased TSS and BOD loading, leading to the restoration of biological integrity (IBI score) and DO levels.

Measureable outcomes, as identified by the TMDL, include a 14 percent reduction in TSS and 30 percent reduction in BOD.

Lake Johanna/Oasis Pond Water Quality Treatment — 2009

Sponsor: Rice Creek Watershed District

Funding: CWP (grant) \$110,200

Purpose: Repair and upgrade of a water control structure and water quality enhancement measures on Oasis Pond in Roseville, Minnesota in an effort to reduce phosphorus pollutant loads to Lake Johanna and protect the quality of downstream receiving waters. In addition, monitoring will occur to determine how loads of nutrients, suspended solids and turbidity are affected.

Lambert Creek Retrofit ID and Design Project — 2009

Sponsor: Vadnais Lake Area Watershed Management Organization

Funding: CWP (Grant) \$15,000

Purpose: Lambert Creek discharges into Vadnais Lake, which is the final impoundment reservoir containing the potable water supply that the Saint Paul Regional Water Services (SPRWS) distributes to the cities of St. Paul, Arden Hills, Falcon Heights, Lauderdale, Little Canada, Maplewood, Mendota Heights, Roseville and West St. Paul. This project aims to analyze the wealth of existing data, identify locations within Lambert Creek's sub watersheds that contribute the greatest to water quality degradation, engage local partners and decision makers and determine which BMP retrofit designs would be the most cost effective and efficient to install for removing pollutants. An administrative outcome of this work will be a database of construction-ready projects to guide future BMP installations throughout the subwatersheds of concern and for a few pilot installation projects.

Enhanced TP Removal in an Urban Wetland System — 2009

Sponsor: Capitol Region Watershed District

Funding: CWP (Loan) \$430,000

Purpose: This project will dredge wetland cells of the Villa Park system to remove sediment, develop watershed volume reduction BMPs, enhanced sand filter, alum treatment system or low flow filtration treatment that will enhance phosphorus removal at an inlet to Lake McCarrons. This project will publish a summary report on the project that includes the historical information on the Villa Park Wetland System, pre- and post-project monitoring and performance data, design and construction documents.

Permeable Reactive Barriers for Phosphorus Removal — 2010

Sponsor: Ramsey-Washington Metro Watershed District

Funding: Section 319 (Grant) \$89,200

Purpose: This project will determine the effectiveness of using "Spent Lime" to reduce phosphorus in stormwater. Spent Lime is created by water utilities (e.g. St Paul Water Utility) and is a byproduct of the water clarification process. Spent Lime contains calcium, iron, and/or aluminum, all three of which bind phosphorus in the natural environment. Currently, Spent Lime must be disposed or transported for use on agricultural fields.

Because of its potential for high phosphorus binding capacity, Spent Lime could be beneficially reused in a permeable reactive barrier system to remove phosphorus from stormwater runoff. As the water flows through the permeable reactive barrier containing the Spent Lime, phosphorus would be actively stripped from the water, decreasing the overall phosphorus load to the receiving surface water body. Because of the low cost, small footprint, and passive nature of the system, the Spent Lime permeable reactive barrier has wide ranging applicability.

Outcomes: The project will result in detailed information on the phosphorus removal capacity of Spent Lime under different scenarios (e.g. flow rate). The potential for secondary effects such as metal leaching and toxicity will also be studied. Additionally, pilot scale testing (based on the laboratory results) will be conducted in the field to assess the function and effectiveness of the Spent Lime permeable reactive barrier for phosphorus removal. The project's main outcome will be detailed information that can be used for design and implementation of permeable reactive barriers for the purpose of reducing the available phosphorus load from stormwater runoff.

Shingle Creek Porous Pavement Paired Intersection Study — 2009

Sponsor: Shingle Creek Watershed Management Commission

Funding: Section 319 (Grant) \$282,000

Purpose: The goals of this project are to estimate the effectiveness of porous asphalt on residential streets in reducing the need for salt as a deicer; to determine whether porous asphalt is a BMP that can hold up to rigors of regular city street use; to determine short term and likely long term maintenance requirements; and to measure the water quality and quantity benefits of porous asphalt in a residential street application in both sandy and clay/loam subgrades.

Wetland 639W Restoration — 2008

Sponsor: Shingle Creek Watershed Commission

Funding: Section 319 (Grant) \$60,000

Purpose: This project is a feasibility study and design for the restoration of Wetland 27-639W, which is a major external phosphorus source to Impaired Water 27-0042-01, North Twin Lake. This wetland restoration is the highest priority implementation action in the Twin and Ryan Lakes Nutrient TMDL Implementation Plan. Wetland

639W contributes an estimated 730 pounds of total phosphorous per year into North Twin Lake. The goal is to identify and evaluate options to reduce or eliminate phosphorous discharge to the lake, and design and prepare construction plans for the future construction of the design.

Twin Lake Wetland 639 Nutrient Export Reduction — 2010

Sponsor: Shingle Creek Watershed Management Commission

Funding: Section 319 (Grant) \$300,000

Purpose: This project is the reduction of phosphorus export from Wetland 27-639W, which is a major external phosphorus source to Impaired Water 27-0042-01, North Twin Lake, which is severely impaired by excess nutrients. North Twin Lake is the first in a chain of connected lakes, and the nutrient-rich outflow from North Twin is a significant source of phosphorus to the downstream lakes, which are also impaired.

A feasibility study has concluded that the export is primarily caused by drawdown and drying in the wetland through evapotranspiration by the extensive cattail vegetation in the central wetland during the growing season. Large precipitation events then sheet flow through the wetland, mobilizing phosphorus and transporting it through Twin Creek to North Twin Lake. The project would construct a weir to increase storage and keep the wetland wetter, and create a bypass route for high flows to and through an adjacent channel.

Outcomes: Reduction in phosphorus export from Wetland 27-639W into North Twin Lake resulting in improved water quality and clarity and reduced frequency of severe algae blooms in North Twin. Reduction of phosphorus discharged from North Twin into Middle and Lower Twin Lakes and resulting improvements to water quality and clarity in those lakes. More natural hydrology and improved vegetative diversity in Wetland 27-639W.

Mississippi River (Brainerd)

Swan River Watershed Management Plan Implementation — 2006

Sponsor: Morrison County Soil and Water Conservation District

Funding: Section 319 (Grant) \$70,000

Purpose: Identify and work with smaller feedlots to reduce over-application of manure to cropland with nutrient management plans, buffer strips and other conservations practices.

Mississippi River (Grand Rapids)

Demonstrating Shoreline Buffers in Big Sandy Lakes Watershed — 2009

Sponsor: Aitkin County SWCD/Big Sandy Lakes Management Project

Funding: Section 319 (Grant) \$37,400

Purpose: Promote the implementation of shoreline buffers through the use of demonstration projects, cost-share funding, and education efforts. Landowners in the Big Sandy Area Lakes Watershed will be provided tools to implement successful shoreline buffers on their property, reducing erosion, and managing runoff.

Elk River Watershed Priority Lakes li — 2006 (Active In 2009)

Sponsor: Elk River Watershed Association

Funding: Section 319 (Grant) \$185,187

Purpose: Re-establish shoreland vegetation around area lakes, reduce phosphorus and nitrogen applications on farmland, improve and create wetlands.

North Fork Crow River Watershed

Crow River Basin Sediment Reduction — 2009

Sponsor: Crow River Organization of Water

Funding: CWP (Grant) \$250,000

Purpose: The Crow River Watershed, made up of two major subwatersheds, the North Fork and the South Fork, is located in south-central Minnesota and has its confluence with the Mississippi River near Dayton, Minnesota in Wright County. This project focuses on preventing and reducing sediment related turbidity problems throughout the Crow River Watershed and contains three main tasks; BMP installation, public outreach and administration. BMP activities include four streambank or lakeshore erosion control projects,

six filterstrips, waterways or sediment basins, a wetland restoration, seven shoreline naturalizations, rain gardens and a modern storm water control mechanism in new or existing developments. Public outreach will include a shoreline naturalization workshop, a Storm Water Task force, webpages and advertisements, and other media for use by every municipality in the Watershed.

Green Lake Eurasian Water Milfoil (EWM)/Stormwater Study — 2009

Sponsor: Middle Fork Crow River Watershed District

Funding: CWP (Grant) \$33,000

Purpose: Green Lake is a 5,500 acre mesotrophic lake located in Kandiyohi County, in west central Minnesota. Its clear waters and excellent fishing represent an outstanding recreational and economic resource for the City of Spicer, the county, and the entire region. This research investigation project will examine the relationship between the location of stormwater inlets and stands of Eurasian water milfoil; the hypothesis is that stormwater inlets provide a means for nutrient and sediment loading that previously did not exist, and that the nutrients and sediment are providing an environment more hospitable for the propagation of EWM. 30 total sites will be examined. Multiple sediment cores will be collected. Water samples will be collected and analyzed for patterns and relationships to answer the research question. A final report will be completed and an implementation plan developed for the future management of EWM and stormwater improvements.

Improving Stormwater Management in Ecologically Sensitive Watersheds — 2008

Sponsor: Middle Fork Crow River Watershed District

Funding: Section 319 (Grant) \$140,000

CWP (Loan) \$100,000

Purpose: This project's goal is to reduce the impacts of stormwater runoff into the Middle Fork Crow River, Nest Lake and Green Lake by implementing a variety of stormwater treatment options, including retrofits, in areas that are already highly impervious or rapidly increasing the imperviousness.

Middle Fork Crow River Watershed Restoration and Enhancement Project — 2008

Sponsor: Middle Fork Crow River Watershed District

Funding: CWP (Grant) \$242,000, CWP (Loan) \$200,000

Purpose: This project focuses on protecting high quality lakes and restoring lakes with poorer water quality by restoring wetlands, providing educational opportunities that link people to resources, implementing BMPs to reduce non-point source pollution and targeting specific lake management projects that harness internal loading in lakes. Activities will focus on citizen information (new district website, workshops, newsletters, and volunteer training), continued water quality monitoring and evaluation, agricultural and rural land use BMPs, wetland, streambank and shoreland restoration, stormwater and urban BMPs and septic system upgrades.

Middle Fork Crow River Watershed Restoration and Enhancement Project Continuation — 2009

Sponsor: Middle Fork Crow River Watershed District

Funding: CWP (Grant) \$350,000, CWP (Loan) \$150,000

Purpose: The proposed project continues and expands upon the activities initiated by the Middle Fork Crow River Watershed Restoration and Enhancement Project. This project focuses on continued protection of high quality lakes and improvement of lakes with poor water quality by: working to restore the hydraulic regime by restoring wetlands, continuing to provide educational opportunities that link people to the resources, implementing BMPs in areas identified as ecologically sensitive to reduce non-point pollution sources, targeting specific lake management projects identified in the diagnostic studies and expand the monitoring efforts established during recent years.

North Fork Crow River Septic System/ Feedlot Upgrades — 2009

Sponsor: North Fork Crow River Watershed District

Funding: CWP (Loan) \$750,000

Purpose: The CWP State Revolving Fund (SRF) will finance ongoing efforts to upgrade 60-70 noncompliant septic systems in the watershed area of Rice and Koronis Lakes and undertake two to three cooperative feedlot manure management projects such as manure pit upgrades, installing storage ponds, pumps, liners, and clean water diversions.

Working Together to Improve Water Quality Continuation — 2009

Sponsor: Crow River Organization of Water

Funding: CWP (Grant) \$314,000, CWP (Loan) \$750,000

Purpose: Provide financial incentives to landowners to reduce sediment and nutrient loading through wetland restorations, filterstrips, grassed waterways, nutrient and residue management plans, livestock and milkhouse waste management systems, manure tests, alternative tile intakes, raingardens, rainbarrels, installation/upgrade of outlet structures, sediment basins, lake shore and streambank stabilized by rip rap, bioengineering or a combination of practices, increase education initiatives, promote other related BMPs and maintain water quality monitoring and analysis in the Buffalo Creek and South Fork Lower Reach Management Areas. Renville, Sibley, McLeod and Meeker Counties receive loan dollars to upgrade noncompliant ISTS systems.

South Fork Crow River

Lake Independence Channel Stabilization Project — 2008

Sponsor: Three Rivers Park District

Funding: Section 319 (Grant) \$119,500

Purpose: The Lake Independence TMDL study identified numerous eroding channels adjacent to the lake as significant sources of phosphorus and sediment loading. The TMDL Implementation Plan included recommendations to stabilize these eroding channels. A series of eroding channels are in the Baker Park Reserve Campground adjacent to Lake Independence. The main objective of this project is to repair and stabilize four of these ravines to reduce phosphorous and sediment loading to the lake.

Pine River

Pine River Watershed Stream Baseline Water Quality — 2009

Sponsor: Cass County

Funding: CWP (Grant) \$105,712

Purpose: The Pine River is a major walleye spawning river and is the major stream source for the Whitefish Chain of recreational lakes. The area under consideration has not been adequately addressed to determine any water quality impairments. This project defines a two year program of weekly chemical and physical sampling from 20 sites to characterize the three priority streams and

the six lakes they influence in the Pine River Watershed. In addition, physical stream measurements, for which no baseline data exists, will be taken in order to provide input data for modeling. A final report will be prepared summarizing data and conclusions and providing information on BMPs to continue or improve the water quality for Pine River.

Sauk River

Middle Sauk River Water Quality Restoration Project Continuation — 2009

Sponsor: Sauk Lake Watershed District

Funding: CWP (Grant) \$376,130, CWP (loan) \$350,000

Purpose: This continuation project will provide administrative and technical assistance that will increase public awareness of water quality issues. This project will continue to work with the local governmental units to hold educational field events to address stormwater runoff and implement urban BMPs. Newsletters and brochures will be generated and distributed to local residents. This project will expand its current youth programs by launching its Lake Ecology curriculum to middle and high school students in the local schools, encouraging teachers to develop hands on curriculum and field days for students to better understand their environment and why we need to protect it. The project will be developing an adult speaker series to get the general public more involved in water resource management within the Sauk River Watershed. We will continue to focus on citizen volunteer monitoring by providing training for area volunteers to enhance our monitoring plan. Website updates will continue as well to provide information on upcoming seminars, meetings and available cost share funding as well as monitoring information on local lakes and streams. This project will continue to focus on BMPs for agricultural and rural land use, stormwater and urban uses, well sealing, shoreland/riparian restorations, septic systems upgrades and erosion and sediment reduction.

Osakis Lake Shoreland Enhancement Project — 2008

Sponsor: Sauk River Watershed District

Funding: Section 319 (Grant) \$160,000

CWP (Loan) \$100,000

Purpose: Osakis Lake is on the MPCA's Impaired Waters list for excess nutrients. To reduce in-lake TSS concentrations, the Osakis Lake Shoreland Enhancement Project will primarily focus on restoring the 24 miles of

lakeshore to a more natural state to reduce shoreland erosion and sediment loading. The education component will set the stage by offering area residents information on the benefits of lakescaping and "how to" workshops. The incentive program is designed to encourage lakeshore owners to convert their high maintenance and manicured lakeshore to native vegetations to protect the lakeshore, improve water quality and provide better aquatic habitat.

Restoring Water Resources of the Sauk River Chain of Lakes — 2008

Sponsor: Sauk River Watershed District

Funding: Section 319 (Grant) \$200,000

CWP (Loan) \$200,000

Purpose: This restoration project proposes a three year implementation plan. The first year will involve installing monitoring equipment and attaining baseline monitoring data, comprehensive stream bank assessments, feedlot inventories, stormwater assessments and begin a tailored education program. The following years will focus on implementing stormwater, urban and Ag BMPs. Monitoring and education programs will continue until project completion.

Restoring Water Resources of the Sauk River Chain of Lakes Project Continuation — 2009

Sponsor: Sauk Lake Watershed District

Funding: CWP (Grant) \$138,050, CWP (Loan) \$150,000

Purpose: This project will continue to educate the local citizens on the immediate and long-term impact of agricultural, shoreland and urban stormwater management. The sponsor will work with local units of government to hold educational events and seminars based on local needs targeted to adult, youth and volunteer audiences. Stream monitoring will continue at the Sauk River Chain of Lakes inlets, as well as beginning research of the physical and biological characteristics of the inlets. BMP activities continue, including agricultural and rural land use, stormwater and urban uses, well sealing, shoreland/riparian restorations, septic systems upgrades and erosion and sediment reduction. This project begins a process to develop a water quality trading program within the watershed of the Sauk River Chain of Lakes.

Stearns County Manure Basin Abandonment Project — 2006

Sponsor: Stearns County

Funding: Section 319 (Grant): \$57,150

Purpose: Evaluate ground water beneath six abandoned manure basins, with the aim of learning more about the effect of such facilities on regional ground-water resources.

Targeted Implementation Activity Within Impaired and Ecologically Sensitive Areas in Stearns County — 2007

Sponsor: Stearns County Soil and Water Conservation District

Funding: Section 319 (Grant) \$300,000

Purpose: This project targets livestock producers and landowners located in and near wellhead protection areas and drinking water supply management areas, designated lakesheds and shoreland areas. Funds would be made available to encourage livestock producers to work with a Certified Crop Adviser in developing a comprehensive Manure Management Plan, and to correct feedlot pollution problems and soil erosion for producers within the ecologically sensitive areas.

Targeted Bmp Implementation Within Impaired Areas in the Upper Mississippi Basin Continuation — 2008

Sponsor: Stearns County Soil and Water Conservation District

Funding: Section 319 (Grant) \$300,000

Purpose: This project will address the following items: Unpermitted manure storage basin investigations and feedlot evaluations, nonpoint BMPs educational initiatives, manure management plan development, animal waste management systems, erosion control and promotion of other related BMPs. In addition, water quality monitoring from the Sauk River Watershed District will be used to identify impaired areas and improvements to designated impaired waters.

Targeted Implementation/Compliance Activity Within Impaired and Ecologically Sensitive Areas in the Upper Mississippi River Basin in Stearns County Continuation — 2006

Sponsor: Stearns County SWCD

Funding: Section 319 (Grant) \$300,000

Purpose: Hire inspector and technician to investigate unpermitted earthen manure storage basins, conduct feedlot evaluations, develop manure management plans.

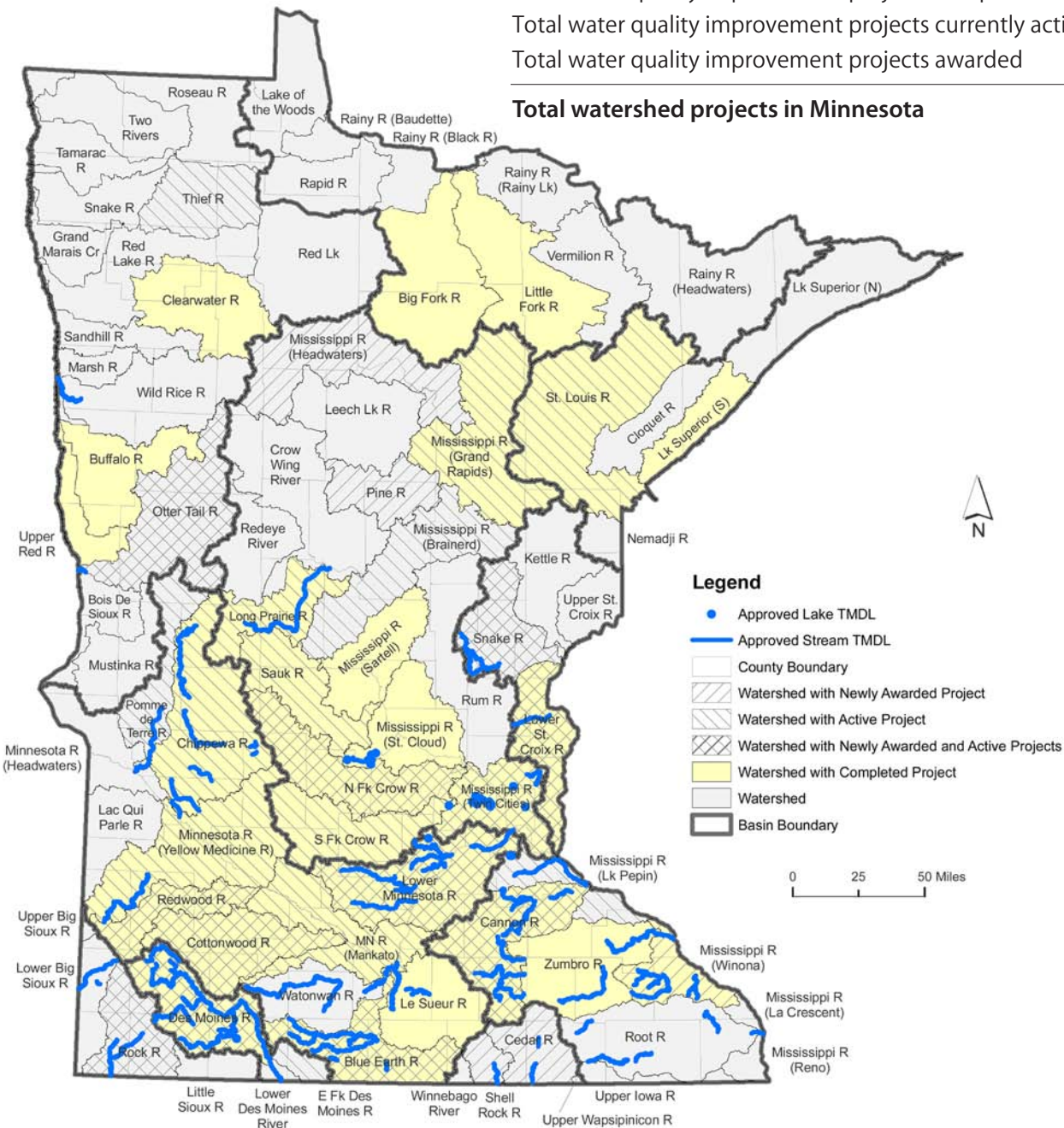
Summary of statewide watershed project activity

Projects completed, currently active and awarded

Made possible through a variety of funding sources (US EPA Section 319 grants, CWLA and CWP) and the dedication and hard work of our agency partners, the following represents the water quality improvement projects that are currently underway, ready to begin or recently completed in the state.

CWLA projects (primarily TMDL projects)	52
Total water quality improvement projects completed	71
Total water quality improvement projects currently active	82
Total water quality improvement projects awarded	48

Total watershed projects in Minnesota **253**



Glossary of acronyms

annAGNPS annualized Agricultural Non Point Source model	MPCA Minnesota Pollution Control Agency
BATHTUB Army Corps of Engineers Lake Model	NCED National Center for Earth-surface Dynamics
BERBI Blue Earth River Basin Initiative	NMP national monitoring program
BMP best management practices	NO³ nitrate/nitrogen
BOD biochemical oxygen demand	NPS non point source
BWSR Board of Water and Soil Resources	NPSP non point source pollution
CAC Citizen Advisory Committee	NRCS Natural Resource Conservation Service
CCA certified crop advisor	OLCP open lot certification program
COD chemical oxygen demand	P Phosphorus
CROW Crow River Organization of Water joint powers board	PFA Public Facilities Authority
CRP Conservation reserve program	PPB parts per billion
CREP conservation reserve enhancement program	RCRCA Redwood-Cottonwood Rivers Control Area
CRWP Chippewa River Watershed Project	Section 319 section of Clean Water Act
CSM citizen stream monitoring	SHEP Stream Health Evaluation Program
CSMP citizen stream monitoring program	SRF state revolving fund
CWA Clean Water Act (1987)	SRWD Sauk River Watershed District
CWLA Clean Water Legacy Act	SSC suspended sediment contamination
CWP Clean Water Partnership	SSTS Subsurface Sewage Treatment System
DNR Department of Natural Resources	STORET storage and retrieval system—EPA database
DO dissolved oxygen	SVS Suspended volatile solids
EPA or USEPA Environmental Protection Agency or United States Environmental Protection Agency	SWAT surface water assessment tool
ESD Environmental Services Department	SWCD Soil and Water Conservation District
FLEval Feedlot evaluation model	TAC Technical Advisory Committee
FLUX input inflow model for BATHTUB	TMDL total maximum daily load
GBERBA Greater Blue Earth River Basin Alliance	TP total phosphorus
GIS geological information systems	TSS total suspended solids
GPS global positioning system	TT transparency tube
HUC hydrologic unit code	UM University of Minnesota
IBI index of biological integrity	USDA-ARS USDA Agricultural Research Service
IPHT imminent public health threat	USEPA United States Environmental Protection Agency
ISTS individual sewage treatment system	USGS United States Geological Survey
LCMR Legislative Commission on Minnesota Resources	WAR SSS Watershed Assessment of River Stability and Sediment Supply
LiDAR Light Detection and Ranging	WD watershed district
LID low impact development	WLA Waste Load Allocation
MDA Minnesota Department of Agriculture	WNC Well Network Coordinators
MMP manure management plan	
MS4 Municipal Separate Storm Sewer System	



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