

Watershed Achievements Report

2014 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



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On the cover:

Cover photo courtesy of Daniel Dix. Non-tourists kayaking in the Cottonwood River near New Ulm.

From: <http://www.pca.state.mn.us/index.php/view-document.html?gid=10414>

The 1,284 square mile Cottonwood River Watershed is situated between the Little Cottonwood River Sub-Watershed to the east and the Redwood River Watershed to the west. The watershed drains sections of Lyon, Murray, Cottonwood, Redwood, and Brown counties. The River itself originates in the Northern Glaciated Ecoregion on top of the Coteau des Prairies or "Highland of the Prairies," an impressive morainal plateau and important drainage divide, so named by French explorers. Except for a few isolated wetlands set aside by state and federal agencies, many of the Coteau's wetlands have been drained and converted to cultivated fields. In addition, a large proportion of the Coteau's small creeks and streams have been ditched and straightened, permitting earlier planting and allowing more acres to be placed into production.

Headwaters of the Cottonwood are in the marshes of Rock Lake, in southwestern Lyon County, from which the river wanders on the Coteau for about twenty miles as an intermittent stream. Characterized by landscapes with long northeast facing slopes of moderate steepness, the majority of the Coteau (72%) is classified as having a high water erosion potential. Its well drained, loamy southwestern side sheds water into the Big Sioux River while on the other side of the divide, waters flow across well drained loamy soils and into the Des Moines and Minnesota rivers.

Above Amiret, the Cottonwood, still a very small stream, plunges through a deep, wooded valley and drops 200 feet off the highlands over a distance of approximately five miles. Turning southeast, the river flows along the base of the Coteau's moraines and receives many small tributaries and intermittent streams that also come down the highland's slope. Leaving the base of the Coteau, the Cottonwood enters the Blue Earth Till Plain of the Western Cornbelt Ecoregion. The River then flows east, enters the Minnesota River Valley and flows through a heavily wooded valley to its mouth at New Ulm. Lands within this section of the Blue Earth Till Plain are characterized as being a complex mixture of gently sloping (2-6%) well drained loamy soils and nearly level (0-2%) poorly drained loamy soils. Artificial drainage to remove ponded water from flat and depressional areas is extensive. Water erosion potentials are moderate on much of these lands (46%).

Water Quality

Ground Water

Aquifers throughout the watershed serve two major functions in the hydraulic system; they are sources of water supplies, and

they furnish a perennial base of streamflow by ground water discharge.

Water supplies are obtained from wells tapping Pleistocene glacial deposits, Cretaceous sandstone, Cambrian sandstone, and Precambrian crystalline rocks. The most accessible and widely used aquifers are beds of sand and gravel buried in the glacial deposits.

Dominant regional ground water flow is northeastward from the topographic high in the southwest toward the Minnesota River. Local flow patterns indicate ground water discharging into rivers and creeks. Most of the Cottonwood River Watershed is an area of ground water recharge, indicated by a decreased in hydraulic potential as depth below land surface increases.

The dissolved solids and water type in surficial aquifers (less than 100 feet deep) depend on mineral composition of the glacial sediment and the solubilities of these minerals, ground water movement, and agricultural pollutants. End moraines having good surface drainage generally contain water having the largest concentration of dissolved solids (>1000 mg/l) which is of the calcium magnesium type. Water from wells completed in sand and gravel and ground moraine deposits are generally of calcium magnesium bicarbonate type, with concentrations of dissolved solids less than 1000 mg/l. Nitrate concentrations greater than 45 mg/l are more frequent in shallow wells affected by infiltration of water through barnyard or feedlot wastes.

Surface Water

The Cottonwood River is somewhat different from the Minnesota River's other three major tributaries running off the Coteau (the Redwood, Yellow Medicine, and Lac Qui Parle rivers); it is longer, larger, and has a greater drainage area with a different drainage pattern in that nearly all of its tributaries are on the south side of the river. There are several reasons for this odd drainage pattern. One reason is the uniform northeastward slope from the crest of the Coteau; another is the presence of a terminal moraine along the north bank of the stream from near Marshal to Sanborn. The position of this moraine indicates that the valley of the Cottonwood was developed along the southwest margin of the Des Moines lobe of the last glacier, at a time when the ice recession was halted and the moraine that parallels the valley was formed. Very few tributaries enter the Cottonwood from the north side; the major one is Sleepy Eye Creek, entering near the upper end of the lower reach on the lowland plain. Nine major creeks outlet to the Cottonwood River and fourteen lakes are contained within the watershed. Wetland drainage has been extensive throughout the portion of the watershed contained within the Blue Earth Till Plain, a Clean Water Partnership grant application for the Cottonwood River Restoration Project states there are currently less than 4,000 acres of wetlands within the watershed. Overall, the Cottonwood River flows about

100 miles and drops a total of 750 feet from Rock Lake to the Minnesota River. Average gradient of the river is seven and one-half feet per mile.

Flooding is a significant problem in the central portion of the watershed. Most of the smaller tributaries have no natural storage; therefore, they cease to flow during droughts, and flood as the result of snowmelt and excessive precipitation.

Today, pollution of surface waters in the Minnesota River's major watersheds is a moderate to severe problem. Constituents of concern often include: suspended sediments, excess nutrients (primarily nitrogen and phosphorus), pesticides, pathogens, and biochemical oxygen demand. High concentrations and loads of suspended sediments and nutrients can often be linked to artificial drainage patterns (ditches, tile, etc.) and wetland reductions. Alone or in combination, these landscape alterations have effectively increased the hydraulic efficiency and magnitude of storm and snowmelt runoff events.

Estimates vary, but about 80 percent of the wetlands in the Minnesota River Basin have been drained and converted to other uses. High nutrient levels in lakes and streams often result from over-land runoff across erodible soils.

Eroded soils and the runoff which transport these particles often carry pesticides and excess nutrients to receiving waters. Increased discharges and elevated flood peaks also erode streambanks, destroy shoreline vegetation and deposit sediment on floodplains, in streams, and in downstream receiving waters. Sediment in water often leads to impaired habitat for aquatic life, decreased photosynthetic activity, and reduced recreational quality. Excessive levels of nutrients often promote eutrophication; defined as nutrient rich oxygen poor water. Elevated nutrient levels often promote abundant algal populations which in turn can cause large diurnal fluctuations in dissolved oxygen concentrations (photosynthesis being responsible for daytime highs, respiration for nighttime lows). In addition, algal decomposition is often a major factor responsible for high biochemical oxygen demand (BOD) levels. BOD is the amount of oxygen consumed-biologically and chemically-over a five day period. The BOD test reflects the effect of easily decomposed organic materials on oxygen depletion. Other sources of organic materials include eroded organic materials associated with sediment or manure, and discharges from faulty wastewater treatment plants, and faulty septic systems. The presence of water-borne pathogens is often characterized by determining the population of fecal coliform in water quality monitoring samples. Fecal coliform are a subset of bacterial populations, and generally arise from the fecal excrement of humans, livestock, and water fowl. Common sources of fecal coliform include feedlots, faulty wastewater treatment plants, and faulty septic systems.

Recreation

Camping, hunting, fishing, and other outdoor activities can all be found within the Cottonwood River Watershed. In the upper reaches of the Cottonwood River is Lyon County's Garvin Park, located on the Cottonwood's descent off the slope of the Coteau.

The park encloses a spreading, wooded valley of steep slopes, and rushing stream, offering camping, picnicking, and trails. In addition, there is a city park on the Cottonwood at Springfield and a wayside park near Sleepy Eye where canoe access is available. The lower section, from the Sleepy Eye wayside down to Flandrau State Park can usually be canoed. It is a scenic trip along a mostly wooded course, especially in the lower gorge reach; however, water levels are not always sufficient for canoeing, especially in late summer. Flandrau State Park at New Ulm memorializes territorial supreme court jurist Charles Flandrau, hero of the defense of New Ulm in the Sioux Uprising. The park includes a swimming pool, camp and picnic grounds, primitive canoe access, and many trails. A dam in Flandrau State Park once impounded Cottonwood Lake, a recreational lake in the park, but since high waters washed out the dam in both 1965 and 1969, it has not been rebuilt. A Redwood County Park is located near Walnut Grove on Plum Creek, a small tributary on the Cottonwood made famous by the books of Laura Ingalls Wilder.

The watershed also contains 6100 acres of state wildlife management areas (WMAs) and fourteen lakes.

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and Clean Water Fund Projects in Minnesota



Minnesota Pollution Control Agency



A portion of the Clean Water Partnership Grant funds that are passed through to local units of government for nonpoint source implementation projects listed in this report are appropriated from the Clean Water Land and Legacy Amendment.

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Projects completed for 2013–2014			
Projects active and awarded in 2014			
Des Moines and Missouri River Basins	31	Rainy River Basin	74
Projects completed for 2013–2014		Projects completed for 2013–2014	
Projects active and awarded in 2014		Projects active and awarded in 2014	
Lake Superior Basin	37	Red River Basin	79
Projects completed for 2013–2014		Projects completed for 2013–2014	
Projects active and awarded in 2014		Projects active and awarded in 2014	
		St. Croix River Basin	84
		Projects completed for 2013–2014	
		Projects active and awarded in 2014	
		Upper Mississippi River Basin	89
		Projects completed for 2013–2014	
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Introduction

The Section 319 Grant program (Section 319) was established by a 1987 amendment to the federal Clean Water Act. The primary purpose of the Program is to provide funding for efforts to reduce unregulated sources of pollution called “nonpoint source (NPS)” pollution. NPS water pollution is not released from the end of a discharge pipe, but results from rainfall or snowmelt moving over and through the ground. As the water moves, it picks up and carries away natural and man-made pollutants; depositing them into lakes, rivers, wetlands, and infiltrated into the ground water.

The Section 319 Program is only one element of Minnesota’s larger effort to reduce and manage sources of NPS pollution. The Minnesota Clean Water Partnership (CWP) Program was also created in 1987 to address nonpoint pollution associated with run off from agricultural and urban areas. The CWP Program provides local governments with resources to protect and improve lakes, streams, and groundwater. The CWP Program funds are distributed as either grants or low-interest loans. These funds may cover the entire cost of project implementation or be used as leverage for another grant. The implementation phase involves putting in place BMPs such as sedimentation ponds, manure management, conservation tillage, terraces, new ordinances, wetland restoration, fertilizer management, education, or other methods designed to reduce nonpoint source pollution.

Minnesota uses this Watershed Achievements Report to annually report on the state’s progress for reducing NPS pollution and celebrate the success achieved from local implementation of pollution reduction projects. This document describes the newly awarded, active and final NPS projects for statewide and watersheds-based projects.

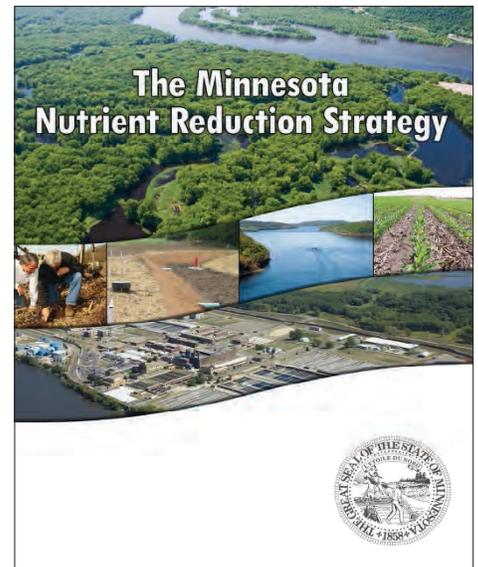
Watershed Program Accomplishments – 2014

State Nutrient Reduction Strategy

Multiple state agencies in Minnesota worked together to develop [Minnesota’s Nutrient Reduction Strategy](http://www.pca.state.mn.us/zihy1146) (Strategy, <http://www.pca.state.mn.us/zihy1146>). The Strategy provides guidance for achieving reductions in nonpoint source pollution by maximizing existing, on-going efforts.

The Strategy focuses on:

- Progress goals for downstream waters
- Progress on in-state nutrient criteria
- Prioritized and targeted watersheds
- Building from existing efforts
- Local implementation



Clean Water Accountability Act

The Clean Water, Land and Legacy Amendment was passed in 2008; allowing for the MPCA and other agencies to increase and expedite funding for water quality improvement projects. Since then, the Minnesota legislature passed the Clean Water Accountability Act (CWAA). This new law aims to ensure that state reports are more specific in identifying all sources of pollution, that state agencies target funding where it can have the most benefit, and that the state reports to the public on its progress toward clean water goals.

Watershed Restoration and Protection Strategy Update

This CWAA defines a fairly new approach by the MPCA called Watershed Restoration and Protection Strategies (WRAPS). Over the past few years, the agency has worked to implement a watershed approach to protecting and restoring lakes and streams. Whereas previous studies (Total Maximum Daily Loads or TMDLs) and accompanying implementation plans often focused on a limited number of impaired lakes and/or stream segments; studies now look watershed-wide and include protection considerations for unimpaired waters.

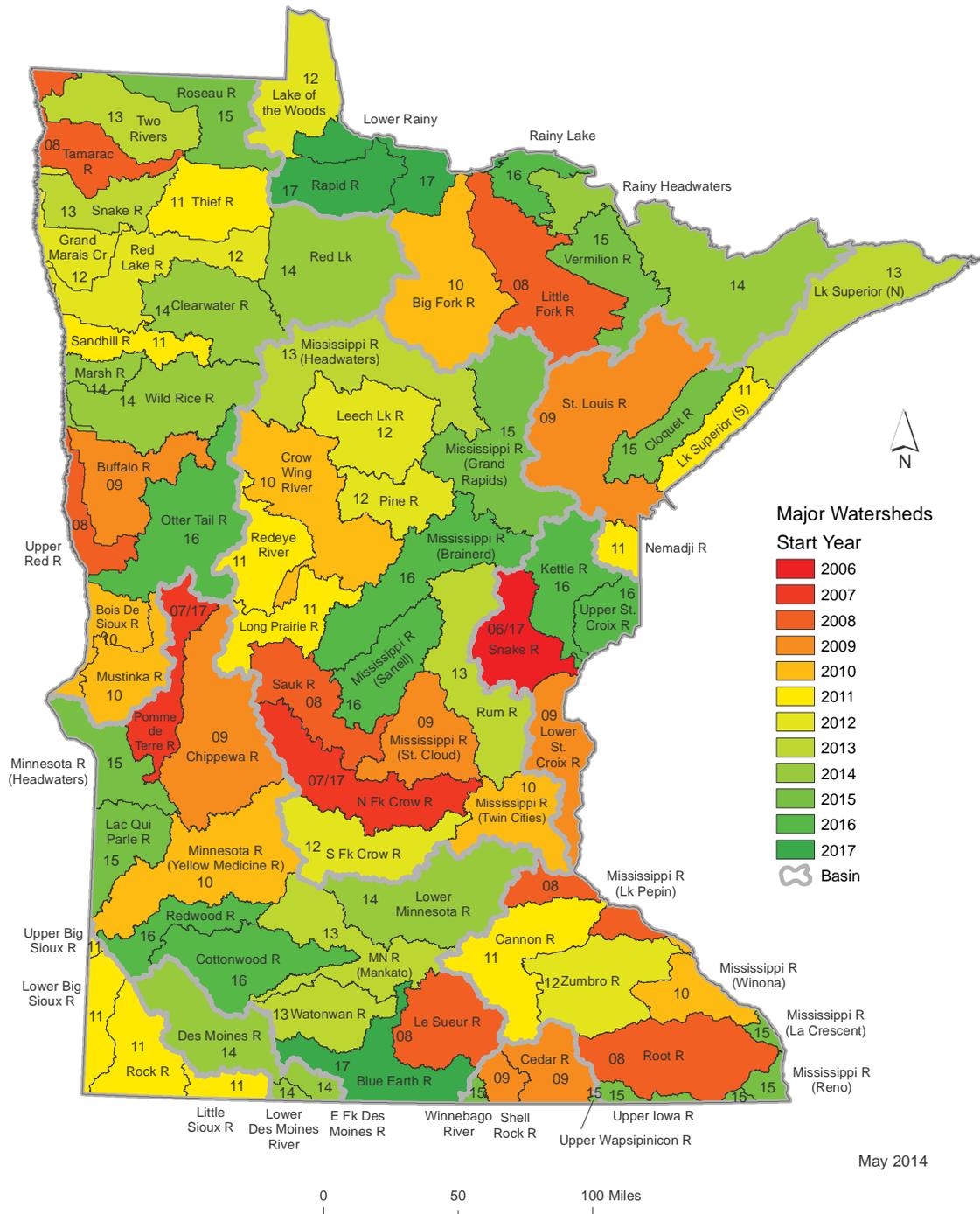
List of acronyms

annAGNPS Annualized Agricultural Nonpoint Source Model	MPCA Minnesota Pollution Control Agency
BATHTUB Army Corps of Engineers Lake Model	MS4 Municipal Separate Storm Sewer System
BERBI Blue Earth River Basin Initiative	NCED National Center for Earth-surface Dynamics
BMP best management practice	NMP National Monitoring Program
BOD biochemical oxygen demand	NO³ nitrate/nitrogen
BWSR Minnesota Board of Water and Soil Resources	NPS nonpoint source
CAC Citizen Advisory Committee	NPSP nonpoint source pollution
CCA certified crop advisor	NRCS Natural Resource Conservation Service
COD chemical oxygen demand	OLCP Open Lot Certification Program
CROW Crow River Organization of Water	P Phosphorus
CRP Conservation Reserve Program	PFA Public Facilities Authority
CREP Conservation Reserve Enhancement Program	PPB parts per billion
CRWP Chippewa River Watershed Project	QA/QC Quality Assurance/Quality Control
CSM or CSMP Citizen Stream Monitoring / Citizen Stream Monitoring Program	RCRCA Redwood-Cottonwood Rivers Control Area
CWA Clean Water Act (1987)	Section 319 section of Clean Water Act
CWF Clean Water Fund	SHEP Stream Health Evaluation Program
CWLA Clean Water Legacy Act	SONAR Statement of Need and Reasonableness
CWP Clean Water Partnership	SRF state revolving fund
DNR Minnesota Department of Natural Resources	SRWD Sauk River Watershed District
DO dissolved oxygen	SSC suspended sediment contamination
ESD Environmental Services Department	SSTS Subsurface Sewage Treatment System
FLEval Feedlot Evaluation Model	STORET storage and retrieval system (now EQUIS)
FLUX input inflow model for BATHTUB	SWAT Soil And Water Assessment Tool
GBERBA Greater Blue Earth River Basin Alliance	SWCD soil and water conservation district
GIS geological information systems	TAC Technical Advisory Committee
GPS global positioning system	TMDL total maximum daily load
HLWD Heron Lake Watershed District	TP total phosphorus
HSPF Hydrologic Simulation Program FORTTRAN	TSS total suspended solids
HUC hydrologic unit code	TT transparency tube
IBI index of biological integrity	U of M University of Minnesota
IPHT imminent public health threat	USDA-ARS United States Department of Agriculture – Agricultural Research Service
ISTS Individual Sewage Treatment System	USEPA United States Environmental Protection Agency
LCMR Legislative Commission on Minnesota Resources	USGS United States Geological Survey
LiDAR Light Detection and Ranging	VSS volatile suspended solids
LID low impact development	WAR SSS Watershed Assessment of River Stability and Sediment Supply
MDA Minnesota Department of Agriculture	WD watershed district
MDH Minnesota Department of Health	WLA waste load allocation
MECA Minnesota Erosion Control Association	WNC Well Network Coordinators
MMP manure management plan	WRAPS Watershed Restoration and Protection Strategies

Statewide monitoring schedule

Because of Minnesota Pollution Control Agency (MPCA) monitoring efforts, combined 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. Effectiveness monitoring will continue after 2018.

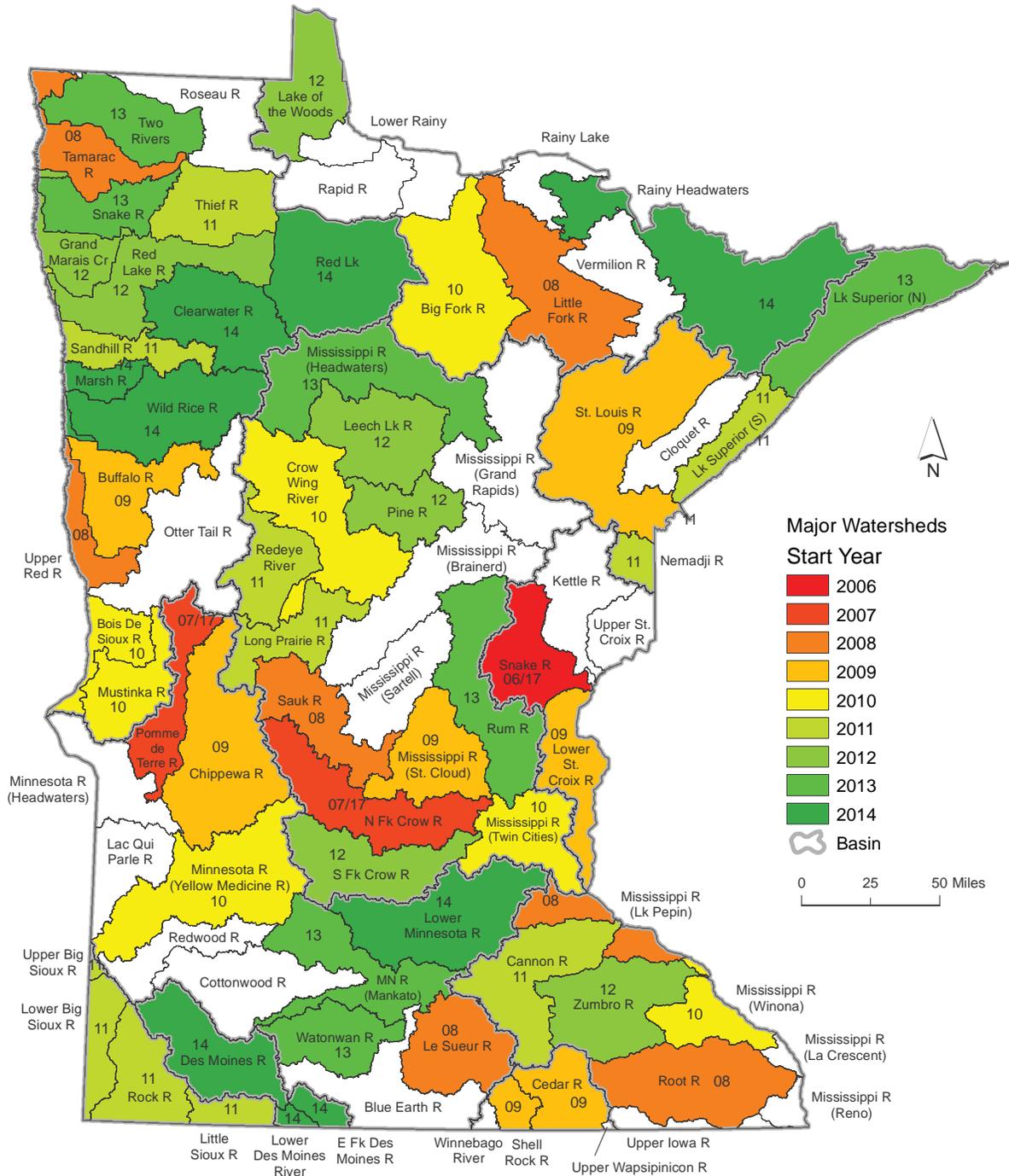
Intensive Watershed Monitoring



Statewide monitoring progress

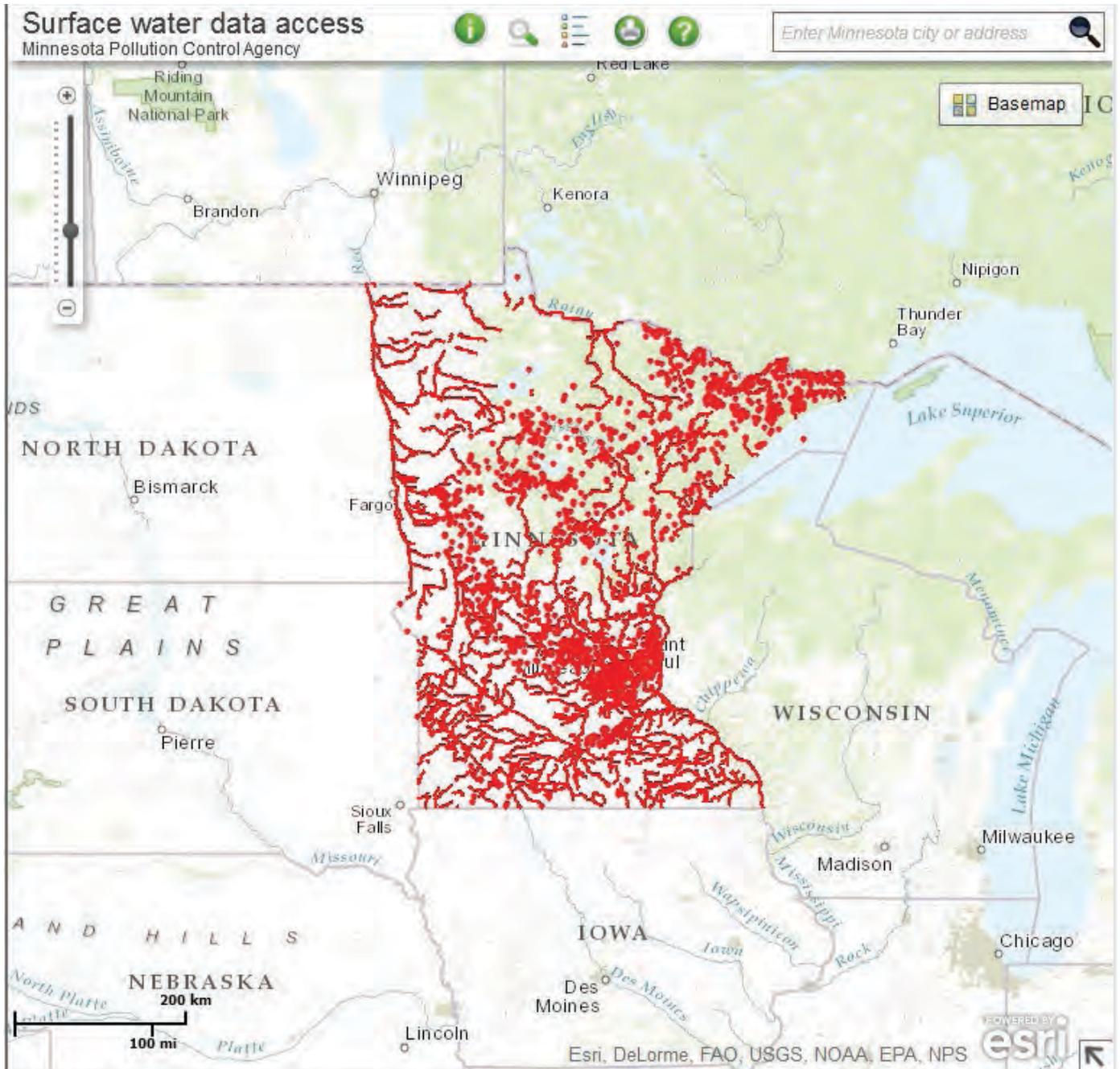
The MPCA has now initiated or completed Intensive Watershed Monitoring in 45 of the state's 81 major watersheds — that is approximately 56% of the state's watersheds. The level of effort of this monitoring and the amount and types of data being collected in this Watershed Approach is well beyond that of past monitoring efforts.

Intensive Watershed Monitoring



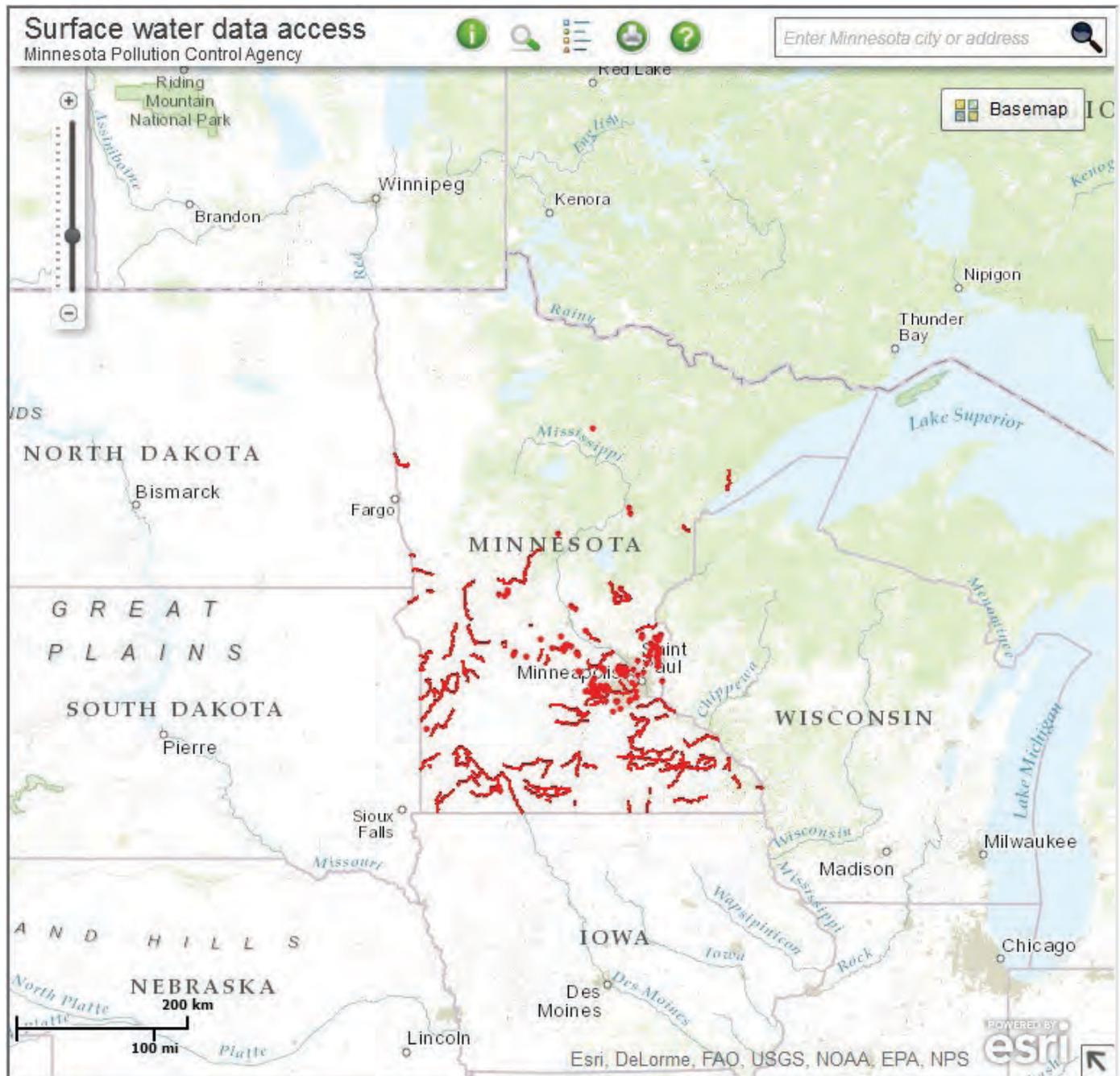
Impaired waters in Minnesota

Impaired waters in Minnesota can be viewed using the MPCA web-based mapping application IWAV (impaired waters viewer). The graphic below is a screen shot of the application that is available at this internet address: http://www.pca.state.mn.us/index.php?option=com_k2&view=item&id=871



Approved TMDLs in Minnesota

Approved TMDLs in Minnesota can be viewed using the MPCA web-based mapping application IWAV (impaired waters viewer). The graphic below is a screen shot of the application that is available at this internet address: http://www.pca.state.mn.us/index.php?option=com_k2&view=item&id=871



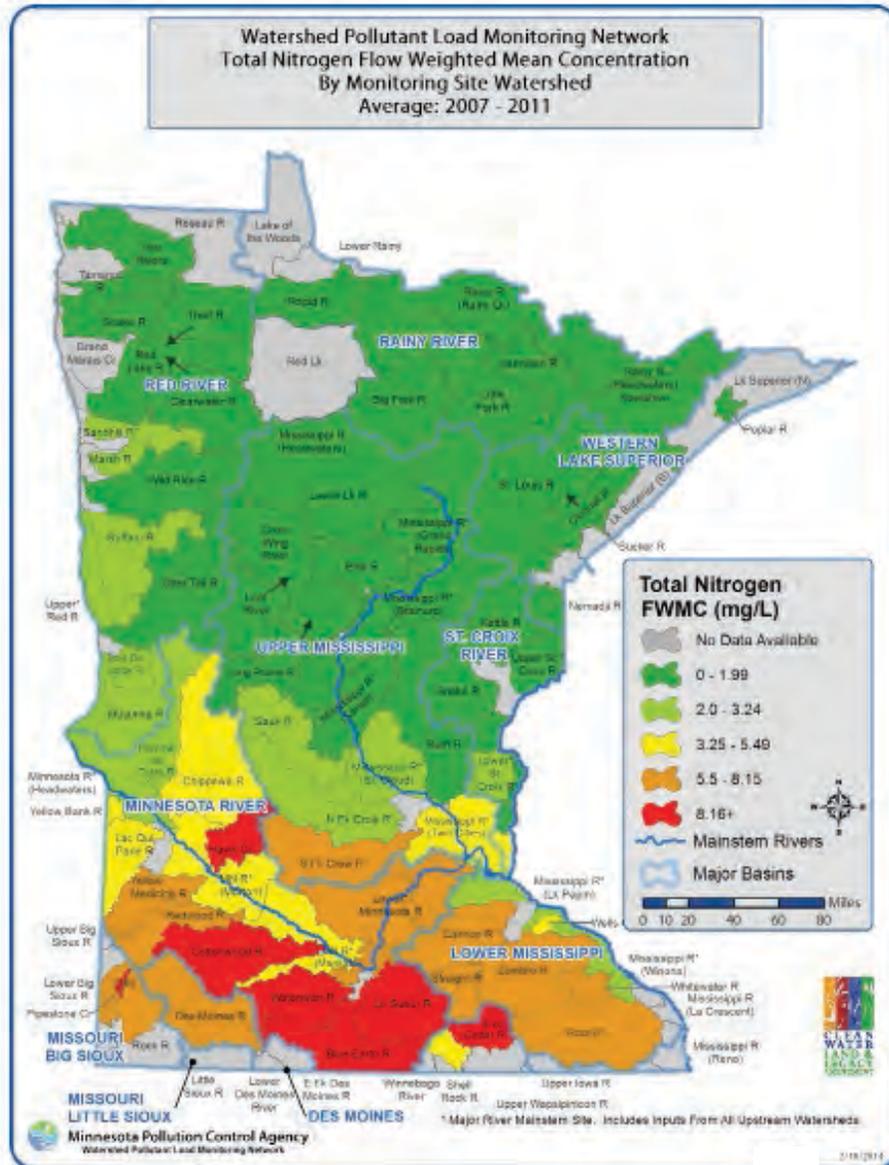
Tracking progress

The Watershed Pollutant Load Monitoring Network is designed to obtain spatial and temporal pollutant load information from Minnesota’s rivers and streams and track water quality trends. This long-term program utilizes state and federal agencies, universities, local partners and Minnesota Pollution Control Agency staff to collect water quality and flow data to calculate pollutant loads. Monitoring sites span three ranges of scale:

- Basin – major river main stem sites along the Mississippi, Minnesota, Rainy, Red, and St Croix rivers
- Major Watershed – tributaries draining to major rivers with an average drainage area of 1,350 square miles (8 digit HUC scales)
- Subwatershed – major branches or nodes within major watersheds with average drainage areas of approximately 300-500 mi²

Most installations occurred in 2008 and 2009, all sites were installed by the end of 2010 and intensive sampling began the year following installation.

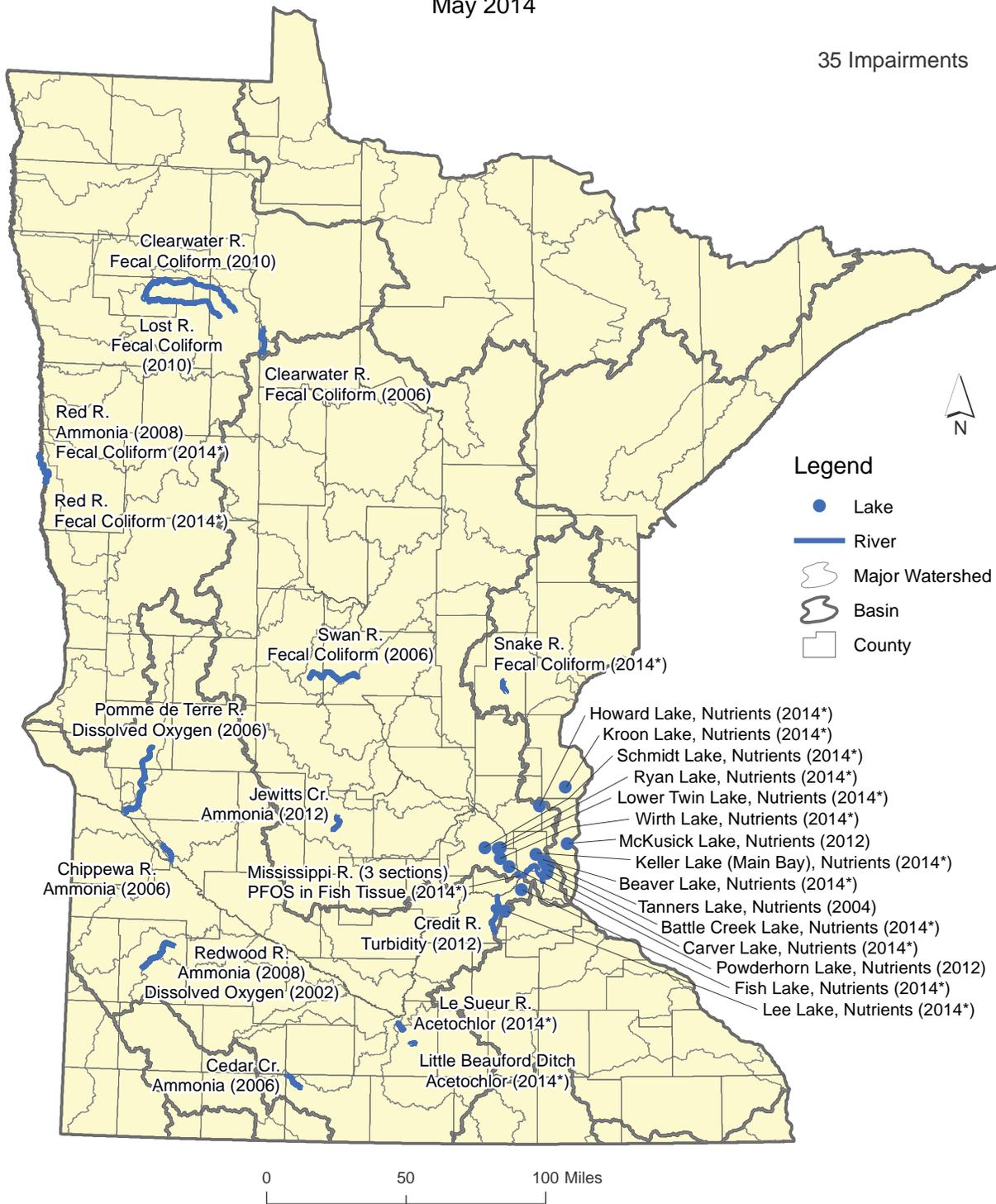
(To compute a discharge for new stations protocols require two years of discharge measurements for a rating curve.)



Previous Impairments now Meeting Water Quality Standards due to Corrective Actions

May 2014

35 Impairments



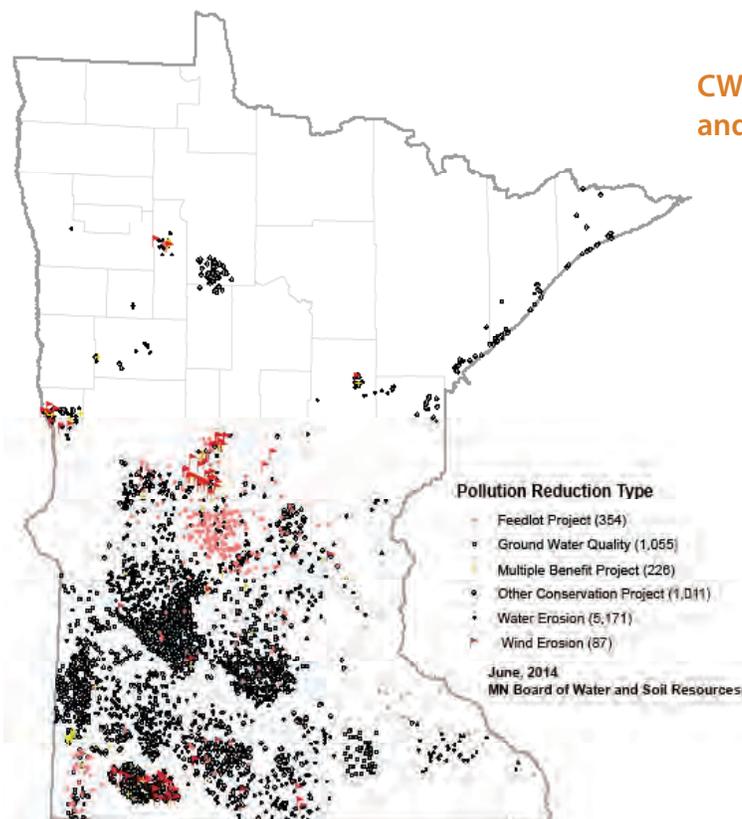
* To be proposed by MPCA for delisting in the next listing cycle. Delisting proposals are subject to public comment and EPA approval.

LARS and eLINK results from Section 319 and CWP projects 1997–July 2014

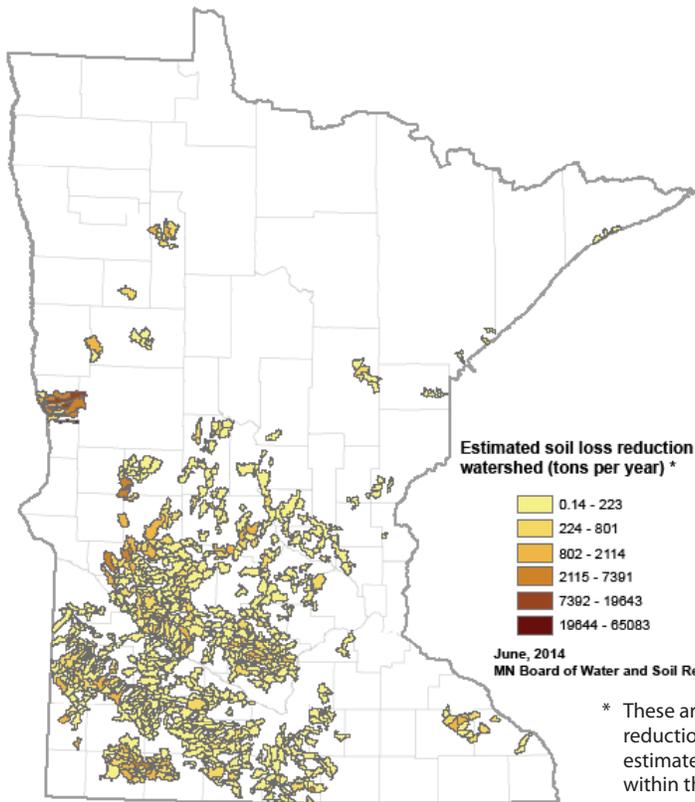
The following table shows progress through July 2014 based on previous Local Annual Reporting System (LARS) reporting (1997–2002) and reporting data from eLINK (2003–July 2014). Based on LARS/eLINK reporting by Clean Water Partnership (CWP) and Section 319 project partners, these projects have reduced soil loss from 1998 through July 2014 by more than 131,000 tons/year. During the same period, sedimentation was reduced by more than 285,000 tons/year. Phosphorus loading was reduced by more than 350,000 pounds/year. Nitrogen reduction was reduced by more than 690,000 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	354	0	0	63,927	118,378
Groundwater quality	1,055	2,421	0	6,550	13,088
Multiple benefit project	226	3,114	18,276	4,077	8,153
Other conservation projects	1,011	4,004	18,397	136,891	273,782
Water erosion	5,171	121,745	246,879	138,119	276,238
Wind erosion	87	44	2,258	632	1,263
Total	7,904	131,329	285,811	350,195	690,902

* Estimated nitrogen calculated from doubling estimated phosphorus



CWP/Section 319 BMPs eLINK (2003–present) and LARS (1997–2002)



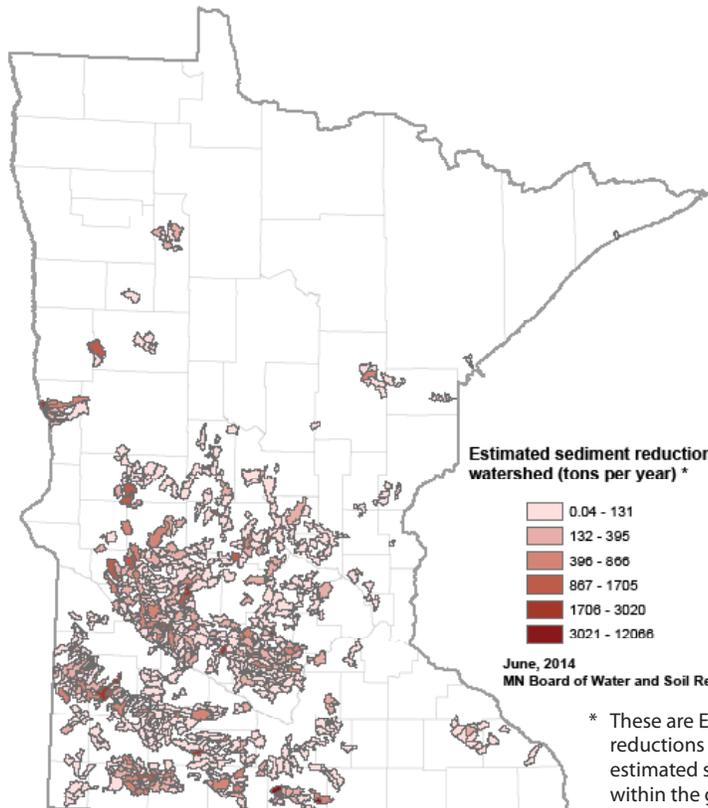
**Estimated soil loss reduction —
CWP/Section 319 BMPs via local government
reporting, eLINK (2003–present) and LARS
(1997–2002)**

Estimated soil loss reduction by minor watershed (tons per year) *

- 0.14 - 223
- 224 - 801
- 802 - 2114
- 2115 - 7391
- 7392 - 19643
- 19644 - 65083

June, 2014
MN Board of Water and Soil Resources

* These are ESTIMATED soil loss reductions. They DO NOT represent reductions in WATERSHED soil loss yield. They represent the sum of estimated soil loss 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) and LARS
(1997–2002)**

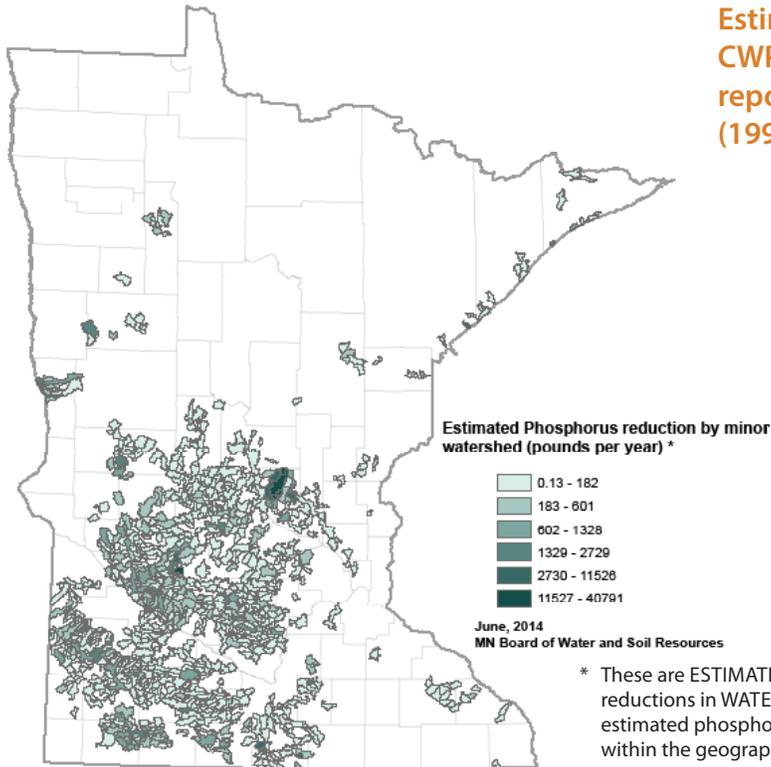
Estimated sediment reduction by minor watershed (tons per year) *

- 0.04 - 131
- 132 - 395
- 396 - 866
- 867 - 1705
- 1706 - 3020
- 3021 - 12088

June, 2014
MN Board of Water and Soil Resources

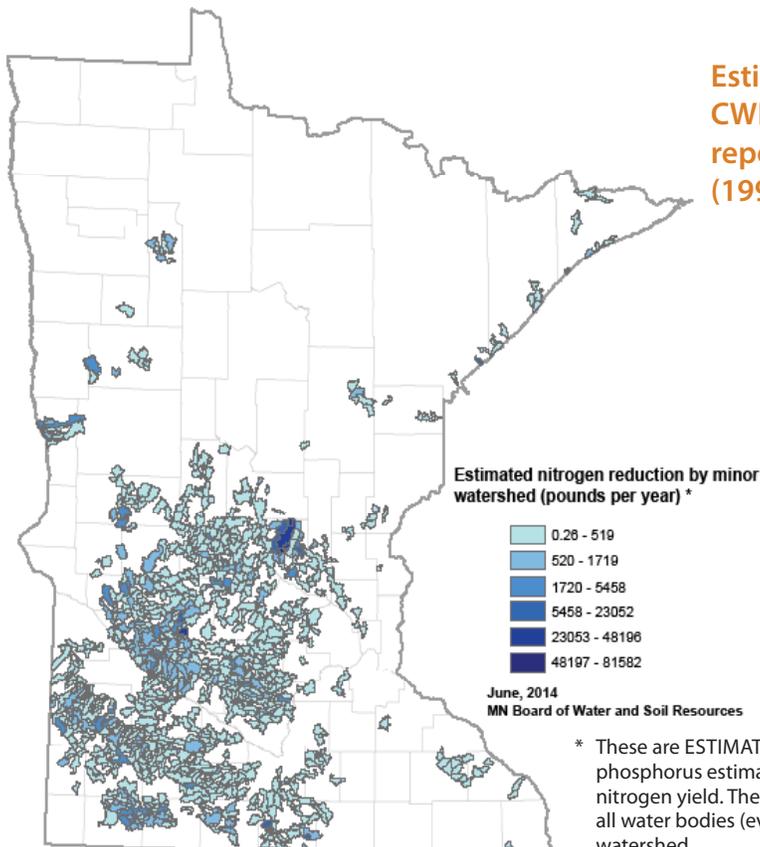
* These are ESTIMATED sediment reductions. They DO NOT represent reductions in WATERSHED sediment yield. They represent the sum of estimated sediment reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

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



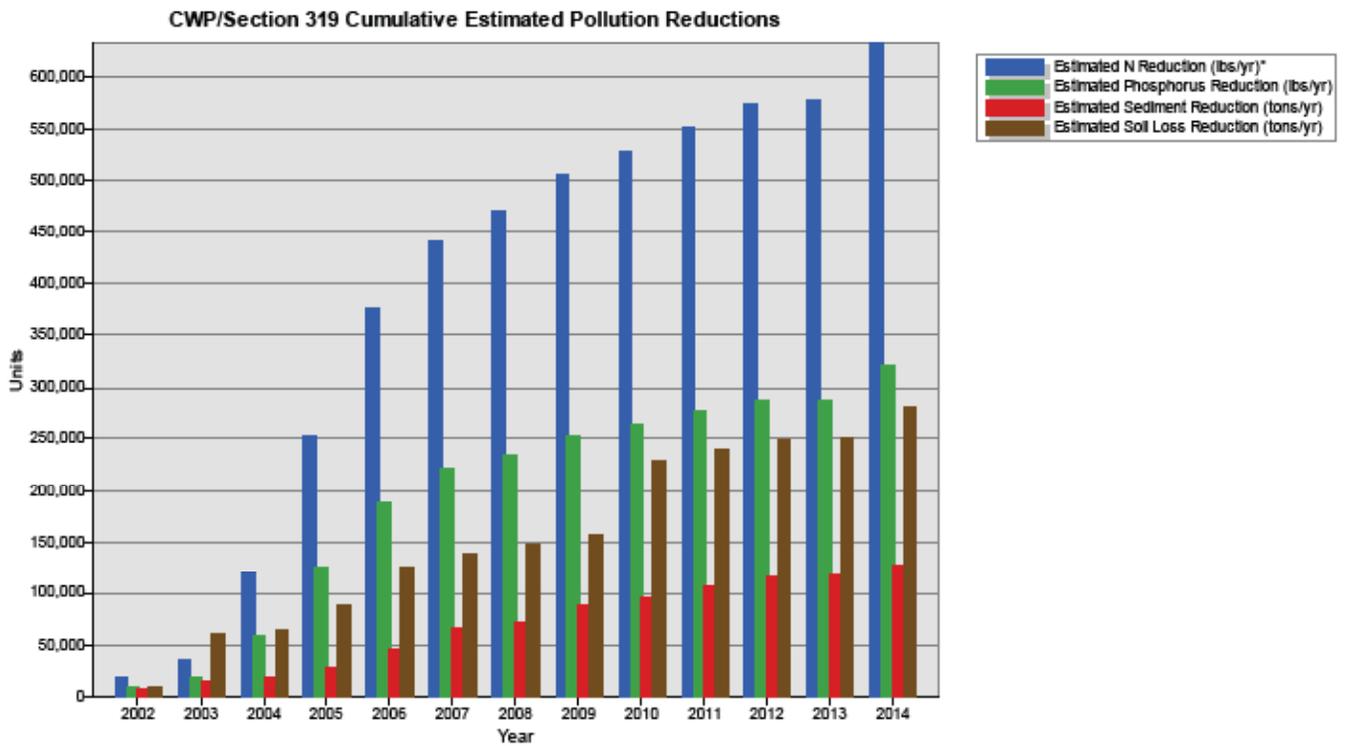
* These are ESTIMATED phosphorus reductions. They DO NOT represent reductions in WATERSHED phosphorus yield. They represent the sum of estimated phosphorus reductions to all water bodies (even isolated ones) within the geographic regions of the watershed.

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



* 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)



All projects for 2013–2014

No projects were awarded in 2014

No Clean Water Partnership or Federal Section 319 awards were given during state fiscal year 2014 (July 1, 2013 – June 30, 2014) because of administrative delays in opening the annual funding rounds. The funding rounds opening in late spring 2014 and award recommendations were not made until after June 1, 2014.

	Project Name	No New As Active Complete	Year Awarded	Amount
Statewide	Enhanced Filter Media for Removal of Dissolved Heavy Metals and Phosphorus from Stormwater Runoff	A	2010	\$ 404,000
	Side Inlet Controls to Improve Water Quality	A	2010	\$ 341,605
	Social Indicators — Development and Testing	A	2010	\$ 200,000
	Assessing Enhanced Swales for Pollution Prevention	A	2011	\$ 400,000
	Watershed Specialist Training, Phase II	A	2011	\$ 193,029
	Linking Water Storage BMPs to Watershed Goals	A	2012	\$ 292,140
	Reducing Phosphorus Runoff From Livestock Farms	A	2012	\$ 296,318
	Chloride Reduction Outreach Program	A	2012	\$ 97,286
	Internal Phosphorus Load Reduction with Iron Filings	A	2013	\$ 299,047
	Performance of an Agricultural Drainage Tile Filter	A	2013	\$ 256,465
	Turf and Winter Maintenance Training	A	2013	\$ 110,000
	eLINK Database Support FY14	A	2014	\$ 60,000
	eLINK Database Support — FY 2012	C		\$ 59,966
	Evaluation of Artificial Drainage in Altering Hydrology	C		\$ 599,309
	Maintenance Training and Certification for Reduction of Environmental Impacts	C		\$ 391,365
Statewide Total				\$ 4,000,530

	Project Name	IC: New A: Active C: Complete	Year Awarded	Amount
<i>Des Moines and Missouri River Basins</i>	Heron Lake Sediment Reduction Demo	A	2010	\$ 16,500
	Fulda Phosphorus Reduction Initiative	A	2011	\$ 12,600
	West Fork Des Moines River TMDL Implementation	A	2011	\$ 198,248
	Heron Lake TMDL Phosphorus Reduction Project	A	2012	\$ 450,000
	Jack and Okabena Creek Sediment Reduction Project	A	2012	\$ 20,600
	Heron Lake Third Crop Phosphorus Reduction Effort	A	2013	\$ 33,120
	Heron Lake Alternative Tile Intake Cost-Share Program Continuation	C		\$ 53,602
	Rock River Replacement SSTS Loan Program	C		\$ 378,657
	Rock River Watershed: Manure Management	C		\$ 291,506
Des Moines and Missouri River Basins Total				\$ 1,454,833

	Project Name	N: New A: Active C: Complete	Year Awarded	Amount
<i>Lake Superior Basin</i>	No new, active or completed projects			
<i>Lower Mississippi and Cedar River Basins</i>	New Tools to Support TMDL Phosphorus Reduction Plans	A	2009	\$ 298,175
	Alternative Designs for Drainage Ditches	A	2010	\$ 286,128
	Southeast Regional Grant for Water Quality	A	2010	\$ 900,000
	Lower Cannon River Turbidity Reduction Project	A	2011	\$ 178,120
	Steele County Septic System Loan Program	A	2012	\$ 700,000
	Dakota County Nitrate Reduction Project	A	2012	\$ 215,307
	Reducing Runoff from Southeast Minnesota Feedlots	A	2013	\$ 300,000
	Southeast Minnesota Volunteer Nitrate Monitoring Network	C		\$ 326,272
	Sustaining Progress Toward Reducing Runoff from Open Lot Feedlots	C		\$ 913,933
	North Cannon River Bacteria Reduction Project	C		\$ 121,010
	Rice Creek Assessment Project	C		\$ 260,654
	Stream Cooling Demonstrations in the Vermillion River Watershed	C		\$ 529,454
	Whitewater River Watershed Bacteria Reduction CWP Phase II Continuation Project	C		\$ 501,626
<i>Lower Mississippi and Cedar River Basins Total</i>				\$ 5,530,679

	Project Name	PA Step PA Action is Complete	Year Awarded	Amount
Minnesota River Basin	Greater Blue Earth and Des Moines River SFS Loans	A	2009	\$ 1,200,000
	A Decision Support Tool to Restore Impaired Waters	A	2010	\$ 719,488
	Cottonwood River Native Vegetation Water Quality	A	2010	\$ 183,766
	Lower Minnesota River Dissolved Oxygen Elevation Project	A	2010	\$ 205,186
	Minnesota River Tributary Phosphorus and Flow BMPs	A	2010	\$ 475,000
	Quantifying Phosphorus Load Reductions from Street Sweeping	A	2010	\$ 285,900
	Rush River TMDL Implementation Project for Fecal Coliform	A	2010	\$ 340,000
	Redwood River Watershed Non-point Pollution Reduction Project	A	2010	\$ 175,575
	Minnesota Pollution Reduction and Economic Test with Nutrient Trading Tool	A	2011	\$ 171,906
	Assessing Iron Enhanced Filtration Tranches	A	2011	\$ 240,000
	High Island Creek TMDL Project for Fecal Coliform	A	2011	\$ 300,000
	Middle Minnesota Watershed, Implementation of Conservation Practices	A	2011	\$ 1,400,000
	Collaborative for Sediment-Source Reduction: Greater Blue Earth River Basin	A	2012	\$ 300,000
	Greater Blue Earth Urban Retrofit Initiative	A	2012	\$ 270,300
	Chippewa River Accelerated Restoration	A	2012	\$ 900,000
	Cottonwood Streambank Inventory and Prioritization Project	A	2012	\$ 297,000
	Ice Saver Watershed Targeted Conservation Practices	A	2012	\$ 82,491
	Neighborhood Lakes Management Plans	A	2012	\$ 167,000
	Protecting North and South Fork Yellowbank River	A	2012	\$ 630,900
	Middle Minnesota River Low Dissolved Oxygen TMDL Project	A	2012	\$ 245,475

	Project Name	PA Class or Active TCC Status	Year Awarded	Amount
	Cottonwood-Redwood River Septic Loan Program	A	2013	\$ 518,000
	Elm Creek Tile Outlet Treatment Trains	A	2013	\$ 165,000
	Chippewa River Phosphorus Reduction Practices	A	2013	\$ 279,500
	Lake Minnesota Phase I Resource Investigation	A	2013	\$ 112,425
	Blackhawk Lake Protection Project	A	2013	\$ 46,500
	Credit River Protection Plan	A	2013	\$ 225,000
	High Island Creek – Mound County STS Project	A	2013	\$ 130,000
	Rush River Watershed – Nicollet County STS Project	A	2013	\$ 150,000
	Scott Watershed Management Organization TMDL Implementation	A	2013	\$ 298,512
	Hawk Creek – Minnesota River Phosphorus Reduction	A	2013	\$ 220,992
	Hawk Creek Watershed Nitrogen Reduction Project	A	2013	\$ 1,000,000
	Redwood and Cottonwood Rivers Watershed Conservation and Nutrient Reduction Project	C		\$ 700,497
	Blue Earth River Basin Restoration Positions	C		\$ 458,170
	East Branch Blue Earth River Watershed Approach	C		\$ 640,094
	Nutrient Reduction Project for the Lower Minnesota Dissolved Oxygen TMDL	C		\$ 398,225
	Dry Weather, Lines and Spring Creeks Sub-basin of the Chippewa River Continuation	C		\$ 557,980
	Cottonwood River Watershed Phosphorus Reduction Continuation	C		\$ 600,000
	Ten Mile Creek Protection Plan For Turbidity	C		\$ 134,304
	Lower Prior Lake Diagnostic Study	C		\$ 55,311
	Hawk Creek Watershed Accelerated Phosphorus Reduction Effort	C		\$ 1,321,881
	Hawk Creek Watershed Project FY2016 Project Continuation	C		\$ 1,517,654
	Pomme de Terre River Bacteria Implementation	C		\$ 504,940
Minnesota River Basin Total				\$ 18,734,400

	Project Name	N: New A: Active C: Complete	Year Awarded	Amount
<i>Rainy River Basin</i>	Bostic and Zippel Watershed Assessment	C		\$ 102,150
	Kawishiwi Watershed Clean Water Protection Project – Phase 1	C		\$ 359,942
Rainy River Basin Total				\$ 462,092
<i>Red River Basin</i>	Lake Alice Resource Investigation	C		\$ 274,803
	Pearl Lake Diagnostic Study	C		\$ 100,996
Red River Basin Total				\$ 375,799
<i>St. Croix River Basin</i>	Groundhouse Fecal Coliform and Biota (Sediment) Implementation Project	A	2010	\$ 109,750
	Sunrise River North Branch TMDL Implementation Plan	A	2010	\$ 130,000
	Kanabec Water Resources Protection Project	A	2012	\$ 201,892
	Snake River Watershed Resource Protection Project	A	2012	\$ 400,000
	Forest Lake North Shore Subwatershed Assessment	A	2013	\$ 12,000
	Forest Lake Stormwater Filtration Retrofit	A	2013	\$ 143,025
	Sand and Long Lakes Protection Project	A	2013	\$ 132,000
	St. Croix Minimal Impact Design Standards Pilot Project	C		\$ 254,035
	Square Lake Implementation Plan Refinement	C		\$ 108,288
St. Croix River Basin Total				\$ 1,490,990

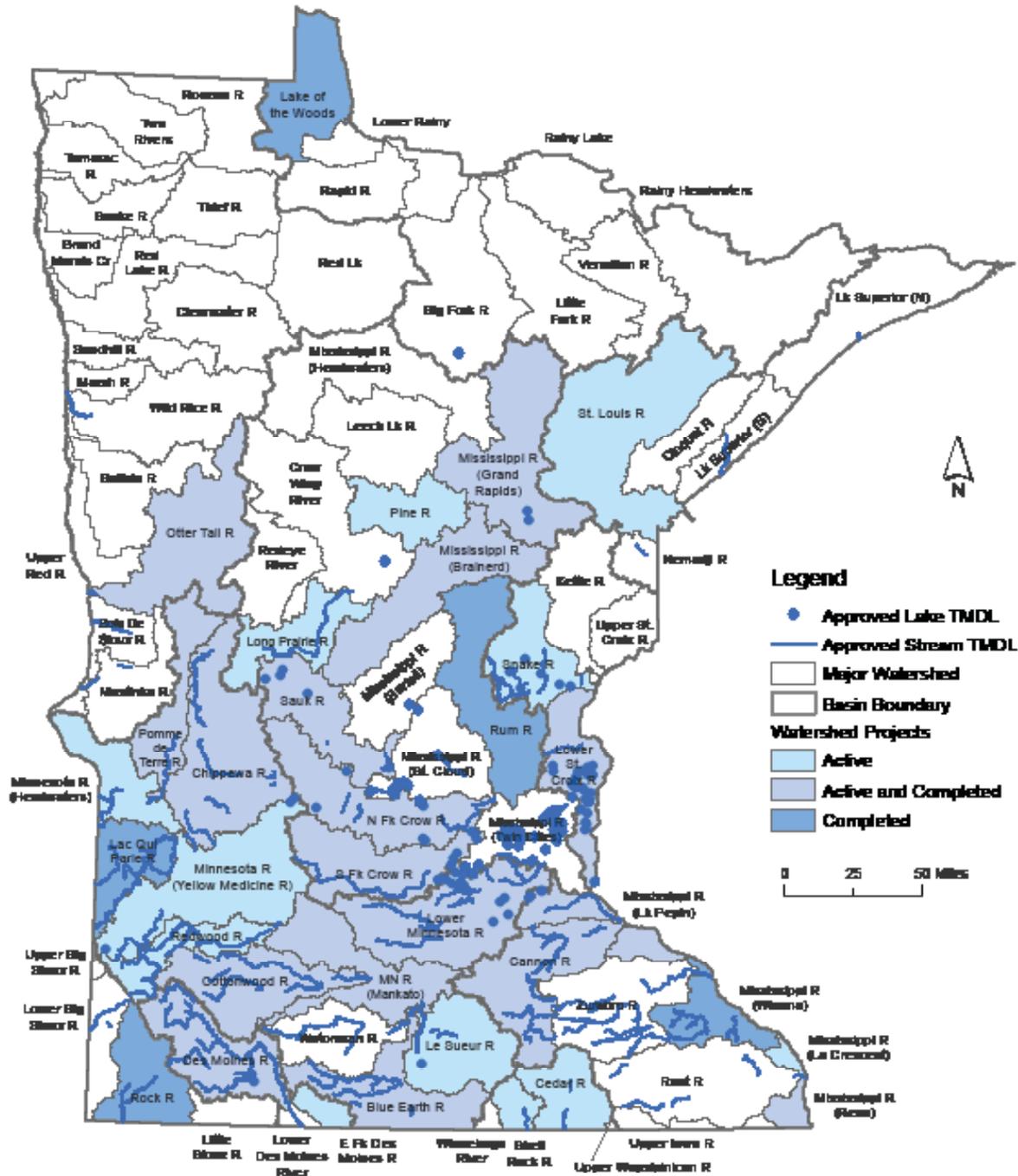
	Project Name	N: New A: Active C:Complete	Year Awarded	Amount
Upper Mississippi River Basin	Burandt Lake Excess Nutrient Implementation Plan	A	2009	\$ 82,500
	North Fork Crow River Septic System/ Feedlot Upgrades	A	2009	\$ 750,000
	Crystal Lake Nutrient TMDL Alum Treatment	A	2010	\$ 82,500
	Hardwood Creek TMDL Implementation Project	A	2010	\$ 344,200
	Permeable Reactive Barriers for Phosphorus Removal	A	2010	\$ 89,200
	Twin Lake Wetland 639 Nutrient Export Reduction	A	2010	\$ 300,000
	Kingston Wetland Feasibility Study and Restoration	A	2011	\$ 404,300
	Modular Green Roof Retrofit System Development	A	2011	\$ 27,140
	Targeted Fertilizer Application Reduction Project	A	2012	\$ 243,475
	Lake McCarrons Sub-watershed BMP Project	A	2012	\$ 275,000
	Targeting BMPs in the Crow River Watershed	A	2012	\$ 1,100,000
	Lower Sauk-Metro Area Water Quality Protection	A	2012	\$ 448,000
	Long Prairie River Dissolved Oxygen TMDL Implementation	A	2013	\$ 300,000
	Bald Eagle Lake TMDL Implementation	A	2013	\$ 300,000
	Crow Lakes Protection and Resource Investigation	A	2013	\$ 124,200
	Crow River Middle Fork Watershed Resource Investigation	A	2013	\$ 63,250
	Lake Koronis Subwatershed Protection Project	A	2013	\$ 197,871
	Crooked Lake Basin Restoration Project	A	2013	\$ 663,000
	Long Prairie River CWL 319 Non-Point Implementation Plan	C		\$ 1,291,950

	Project Name	N: New A: Active C:Complete	Year Awarded	Amount
	Serpent Lakeshed Protection Investigation Study	C		\$ 86,033
	Demonstrating Shoreline Buffers in Big Sandy's Watershed	C		\$ 98,088
	Deer and Pokegama Lakes: A Diagnostic Study	C		\$ 742,268
	Pelican Lake of St. Anna Diagnostic Study and Implementation Plan	C		\$ 74,309
	Clear Lake Diagnostic Study	C		\$ 42,360
	Lake Harriet Diagnostic Study and Management Plan	C		\$ 112,989
	Shingle Creek Porous Pavement Paired Intersection Study	C		\$ 304,238
	West Moore Lake Water Quality Enhancements	C		\$ 142,396
	Crow River Basin Sediment Reduction Project	C		\$ 362,633
	Green Lake Eurasian Watermilfoil/ Stormwater Study	C		\$ 91,853
	Middle Fork Crow River Watershed Restoration and Enhancement Project Continuation	C		\$ 837,307
	CROW – Working Together to Improve Water Quality Continuation	C		\$ 732,869
	Pine River Watershed Stream Baseline Water Quality	C		\$ 171,393
	Mille Lacs Lake Watershed Protection	C		\$ 241,371
	Lower Sauk River Water Quality Protection Project	C		\$ 636,061
	Osakis Lake Enhancement Continuation Project	C		\$ 639,770
	Sauk River Water Quality Protection Project Phase III	C		\$ 487,346
	SRWD Watershed-Wide Groundwater Protection Project	C		\$ 31,041
	CROW – Surface Water Runoff Reduction Project	C		\$ 366,083
Upper Mississippi River Basin Total				\$ 14,172,820

Summary of statewide watershed project activity

Projects completed, currently active and awarded

Made possible through a variety of funding sources — USEPA Section 319 grants, Clean Water Fund and Clean Water Partnership — and the dedication and hard work of our agency partners, the following map represents major watersheds where water quality improvement projects are currently underway, ready to begin or recently completed in the state.



Statewide

Projects completed

eLINK Database Support — 2012

Evaluation of Artificial Drainage in Altering Hydrology

Maintenance Training and Certification for Reduction of Environmental Impacts

eLINK Database Support — FY 2012

This project provides financial support to the I.T. staff that support the eLINK reporting system and eLINK users. eLINK, the electronic link between state and local governments, is a web based reporting system that is maintained and supported by the Board of Water and Soil Resources (BWSR). eLINK is used by BWSR to track expenditures and accomplishments by local governments with state grant funds. In Minnesota, the same local governments who receive state grant funds from BWSR also receive federal 319 water quality grants via the MPCA. BWSR and MPCA have long had a coordinating relationship regarding the collection of expenditure and accomplishment reporting data from local governments. To the extent that state water quality agencies can coordinate their administrative requirements, we are all better off.

Specifically, this project provides financial support for BWSR staff to maintain and support the eLINK system. This includes a variety of tasks, such as server administration, database administration, GIS administration, eLINK configuration, eLINK system reports management, eLINK account administration, eLINK user support, and eLINK user training. These support tasks are ongoing throughout the year.

BWSR staff provided system and end user support during the contract. Conor Donnelly and Tim Ogg are responsible to work together to provide system support and Conor Donnelly is the primary provider of System support. Mr. Donnelly provided user support and system administration throughout the year.

During the course of this grant BWSR developed and rolled out an new eLINK System. BWSR has provided user training to grant recipients and MPCA staff for the new system. BWSR will continue to work with MPCA as we maintain and improve the new system.

In the data migration from the previous version of eLINK some records were not migrated as expected. Some 319 grants were affected. 85% of the 319 grants that were originally migrated as expected have been fixed and are now available for accomplishment reporting. The remaining 15% will be addressed in the next 3 weeks.

Goals

- Provide access and support to local government 319 grant recipients so they can report expenditures and

accomplishments back to the state via the eLINK reporting system.

- Provide training to MPCA staff to participate in the “set up” of 319 grant information.
- Provide data and maps from eLINK to MPCA upon request.

Results that count

- Local government staff have been submitting information about their BMP installations and associated pollution reductions via eLINK since 2004. There are roughly 4000 landowner BMP 319 implementations recorded in eLINK going back to 2004. BSWR eLINK staff met with MPCA staff to discuss enhancements for the new eLINK, some of which were incorporated. BSWR staff attended a monthly MPCA watershed videoconference to provide training on the new eLINK to MPCA project managers.
- MPCA staff are setting up information about the 319 and CWP grants that have been awarded. This set up stages eLINK in order for the local governments to begin reporting. With the implementation of new eLINK BWSR staff has been setting up 319 information for local stakeholders, based on information provided by MPCA.
- MPCA receives data and maps out of the eLINK database annually upon request for inclusion in the annual Watershed Achievements Report submitted to EPA. In February and August of 2013 eLINK staff provided the pollution reduction estimates of Section 319 funding projects for download to the Federal GRTS reporting system. Due to data migration issues to the new eLINK some of the estimates were not available. BWSR has solved these migration issues and revised estimates will be provided for the February 2014 reporting period.

Financial information

Funding type: Section 319

Grant amount: \$59,966

Contact information

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Evaluation of Artificial Drainage in Altering Hydrology

The purpose of this study was to verify and elucidate the drivers of increased streamflow in a suite of 21 agricultural watersheds and determine if these hydrologic changes triggered an increased in erosion of near-channel sediment sources. Seasonal and annual water yield (flow) and runoff ratio were found to increase by >50% since 1940 in half of the watersheds, with no statistical change in the others. Using the first 35 years of the dataset (1940-1974) to calibrate the relationship between water yield and PET and precipitation, it was found that climate and crop conversion could explain less than half of the observed increase in river flow that occurred in the second period (1975-2009). Artificial drainage was identified as the largest driver of increased flow. The majority of the increase in flow was attributed to changes in water residence time on the landscape and subsequent reductions in ET resulting

from installation of artificial drainage networks. This conclusion is supported by the strong correlation between the amount of wetland /depressional areas lost and increases in excess annual water yield in the 21 watersheds. The magnitude of change caused by artificial drainage deserves further scrutiny, but the link to increased flow follows a clear set of connections: a) a principal purpose of artificial drainage is to facilitate agricultural production by reducing the amount of time water is ponded in fields; b) quickly routing ponded water to rivers reduces the amount of time available for ET; c) thus, the proportion of precipitation lost to ET is reduced and instead ends up as river flow.

Goals

- One of our primary goals for this project focused on estimating the amount of present day artificial drainage through direct mapping of the tile or through surrogates that can assist us in quantifying the amount. This goal was essential so that the project could compare the 21 different watersheds. Along with identifying the amount of tile, the amount of loss of depressional areas and wetlands was a goal for this study. The installation of tile and thus the loss of wetlands are integrated thus detailing the effect of tile drainage on the landscape.
- The second goal of this project was to verify and elucidate the drivers of increased streamflows in a

suite of 21 agricultural watersheds and determine if these hydrologic changes triggered an increase in erosion of near channel sediment sources.

- We hypothesize that 1) Changes in erosion rates and sources are linked to changes in watershed-scale hydrology and that these changes over the last ~60 years in the agricultural sub-watersheds are controlled by changes in precipitation and/or artificial drainage. The importance of artificial drainage compared with precipitation can be quantified by comparing a suite of long-term hydrologic parameters in watersheds with varying degrees of artificial drainage intensity. When normalized to climate (e.g., precipitation or PHDI), watersheds with extensive artificial drainage networks will show changes in hydrologic parameters such as Q/P ratio, peak flows, and base flow duration that are distinctly different from those watersheds with minimal artificial drainage

Results that count

- In general, the density of pattern tiling is associated with cultivated soils that are specified as poorly drained and very poorly drained. Correlation of soil type to the length of tile for 19 sub-basins in the Le Sueur watershed demonstrates this relationship and provides an estimation of the overall density of tile on poorly drained and well drained soils. As expected the poorly drained soils have a higher density of tile but it is only about double that of the well drained soils. Our estimates for the loss of depressional areas using the Restorable Wetlands Inventory datasets show that watersheds with poorly drained soils and a high percentage of cultivated land have high losses of depressional areas. In these watersheds, nearly all of the natural wetlands and depressional areas have been altered by drainage, representing a profound hydrological modification of up to 18% of the total watershed area.
- Using the first 35 years of our dataset (1940-1974) to calibrate the relationship between water yield and PET and precipitation, It was found that climate and crop conversion could explain less than half of the observed increased in river flow that occurred in the second period (1975-2009). Artificial drainage was identified as the largest driver of increased flow. The majority of the increase in flow was attributed to changes in water residence time on the landscape and subsequent reductions in ET resulting in installation of artificial drainage networks. Our

analysis of drained depressional areas along with the estimation of tile drainage through soil classification made this possible.

- The largest increases in flow are correlated to the largest conversions to soybeans and extent of artificial drainage. Artificial drainage of depressional areas reduces water residence time on the landscape, consequently; a significant portion of annual rainfall that was once returned to the atmosphere via evapotranspiration, is now routed to the rivers. Loss of depressional areas and wetlands are strongly correlated to increases in excess flow in the 21 watersheds, thus supporting the proposed linkage between facilitated drainage of depressional areas and increases in river flow. Using a water budget, calibrated to the first 35 years of record, we calculated that artificial drainage accounts for the majority of the statistically significant increases in flow. Climate, crop conversion and artificial drainage have combined to create more erosive rivers, with drainage as the largest driver of this change. Flow and runoff ratio have increased by than more 50% in about half of the watersheds. Increases in rainfall generally account for less than half of the increases in flow. Rivers with increased river flow have experienced channel widening of 10-40%.

Financial information

Funding type: Section 319

Grant amount: \$299,309

Final matching funds: \$300,000

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MPCA Project Manager: Bill Thompson

Maintenance Training and Certification for Reduction of Environmental Impacts

Nutrients and chloride are immediate issues of concern for Minnesota and many other states due to their negative impacts on the environment, including impaired waters. Currently 448 Minnesota lakes are on the 2012 TMDL list for nutrient/eutrophication. Thirty percent of sampled groundwater wells in the TCMA exceed the federal drinking water standard for chloride, and Minnesota has 15 streams and 3 lakes on the 2012 impaired waters list for chlorides and more likely to be listed.

This grant funded training of maintenance professionals, public and private, who engage in winter and summer activities which lead to the introduction of nutrients/phosphorus, chloride, sediment and other pollutants into the environment. The training directly addressed the environmental impacts of these substances and offered practical solutions for reducing the quantity released into Minnesota watersheds from such winter and summer maintenance efforts. FCI and the project partners delivered three (3) separate training workshops: 1) Turfgrass Maintenance; 2) Winter Parking Lot and Sidewalk Maintenance; and 3) Winter Road Maintenance. We also offered an MPCA-approved test for voluntary certification.

This project was a statewide effort, however, there were several geographic areas where training was focused due to both high concentrations of impervious surfaces and developed areas and willing partner groups. Training workshops were posted on the websites of the MPCA, Fortin Consulting, and partners. FCI created a brochure template for use by partners, and many mailed copies or sent out the brochures in emails with training class information.

Eighty (80) workshops and 8 short presentations were held under this grant, with a total of 2,564 participants. The training materials were refined and improved throughout the course of the grant funding. Completed worksheets and follow-up interviews of attendees suggests a potential 62% reduction in chlorides and reductions in nitrogen, phosphorus and pesticides, through better fertilizer practices and spot treating weeds due to this educational outreach and the subsequent changed practices.

Goals

- Reduced pollutant loading from chlorides, nutrients, toxins and sediments.
- Improve adoption of best management practices for both winter maintenance and turfgrass maintenance.
- Conduct 75 – 85 workshops and short presentations through continuation of the MPCA Voluntary certification program.

Results that count

- Predicted and documented reductions in salt use and fertilizer and pesticide quantities used.
- Fifty to sixty percent predicted adoption of best management practices.
- Conducted 80 workshops and 8 short presentations throughout the state, reached many more through the materials on the MPCA website and exchange of information from those trained to others.

Financial information

Funding type: Section 319

Grant amount: \$189,938

Final in-kind: \$201,427

Contact information

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MPCA Project Manager: Brooke Asleson

Statewide

Projects active

Section 319 projects awarded in 2013

None awarded in 2014

Assessing Enhanced Swales for Pollution Prevention — 2011

Sponsor: University of Minnesota (U of M) – Twin Cities

Funding: Section 319 (Grant) \$400,000

Purpose: This research will demonstrate the effectiveness of a new stormwater treatment system developed specifically for capturing dissolved phosphorus and heavy metals from roadway runoff. This new technology is relatively inexpensive to install compared to standard stormwater treatment practices and will fit within the limited roadway right-of-way, making it applicable to public and private roadways throughout the State of Minnesota and beyond. With approximately 290,954 lane-miles of public roadways in Minnesota and an approximate annual phosphorus load of 1.87 pounds per lane-mile, the potential reduction in phosphorus load to receiving water bodies is (at a 90% capture rate) approximately 488,800 pounds per year. The result would be a substantial improvement in water quality wherever this novel technology is installed.

Stormwater professionals will be informed of these results through workshops, a technical advisory panel, and UPDATES (a stormwater research newsletter with distribution to more than 2,000 interested parties). We will also seek inclusion in the on-line document, "Minnesota Stormwater Manual," <http://www.pca.state.mn.us/index.php/view-document.html?gid=8937>.

Chloride Reduction Outreach Program — 2012

Sponsor: Freshwater Society

Funding: Section 319 (Grant) \$97,286

Purpose: This project will engage public officials, businesses and citizens in a facilitated planning process that will increase their understanding of chloride pollution, ways to reduce it at organizational and personal levels, create and implement a collaborative Chloride Reduction Outreach Strategy and Implementation Plan for Rochester, Mankato and St. Cloud that will be distributed to citizens, businesses and public officials for future action.

eLINK Database Support — 2013

Sponsor: Minnesota Board of Water and Soil Resources

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

Purpose: Provide eLINK database support to MPCA staff, local units of government and grant sponsors; record soil and water conservation project BMPs, geographic project locations and load reductions in eLINK; and provide a section for the annual Watershed Achievements Report showing estimated load reductions.

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

Sponsor: U of M – 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.

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 U of M Extension Services Stormwater U classes, and publication in UPDATES (a 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.

Internal Phosphorus Load Reduction with Iron Filings — 2013

Sponsor: University of Minnesota

Funding: Section 319 (Grant) \$299,047

Purpose: Determine the effectiveness of iron filings under different conditions at reducing internal phosphorus loading, determine the conditions required for iron filings to be effective at reducing internal phosphorus loading, and determine the quantity of iron filings that must be placed in the sediments for a successful reduction of internal phosphorus loading.

Linking Water Storage BMPs to Watershed Goals — 2012

Sponsor: Minnesota River Board

Funding: Section 319 (Grant) \$292,140

Purpose: This project will develop, adjust, verify and test a water storage calculator that links new and existing individual projects to large-scale watershed goals, measuring the results in “cubic feet stored” or “volume and rate of storage” for structural and vegetative BMPs; establish and facilitate a Water Storage Learning Group; select and implement 5-10 water storage practices/projects; and reach out to technical service providers, certified crop advisors, soil and water conservation districts (SWCDs), and Natural Resource Conservation Service (NRCS) so this technology and thinking can be applied in everyday work.

Performance of an Agricultural Drainage Tile Filter — 2013

Sponsor: U of M

Funding: Section 319 (Grant) \$256,465

Purpose: This project will measure and evaluate the performance of an engineered enhancement to agricultural drainage tiles that will significantly decrease the release of phosphates to surface waters from agricultural runoff. The innovative filter design would be based on previously developed technology that enables increased phosphate removal by adsorption using iron, in the form of iron filings.

Reducing Phosphorus Runoff From Livestock Farms — 2012

Sponsor: U of M, Leslie Everett

Funding: Section 319 (Grant) \$296,318

Purpose: This project will determine phosphorus balances on farms in two regions of high dairy and beef density near nutrient impaired waters; select management strategies for bringing representative farms with a phosphorus surplus into balance or below; develop selected farm analyses into teaching case studies; and use case studies from the farm phosphorus balance analyses to assist livestock producers and their agricultural professionals in evaluating their operations and select strategies to prevent excessive build-up in soil test phosphorus and transport of phosphorus to waters, while maintaining or improving profitability.

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 Minnesota’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.

Social Indicators — Development and Testing — 2010

Sponsor: U of M, Water Resources Center

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

Purpose: The Social Indicators (SI) project is in the final phase of testing. Further work will be done to test the Social Indicators Planning and Evaluation System (SIPES) and Social Indicators Data Management and Analysis (SIDMA) system. 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 USEPA 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.

Turf and Winter Maintenance Training — 2013

Sponsor: Fortin Consulting, Inc.

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

Purpose: Three different voluntary certifications courses will be taught: Winter Maintenance of Roads, Winter Maintenance of Parking Lots/Sidewalks and Turfgrass Maintenance with Reduced Environmental Impacts. We anticipate a fourth course, MPCA Level II

Winter Maintenance, will exist so we can offer it. We will conduct 30-40 classes or shorter presentations at conferences or group meetings across the state. We will teach about 2,000 people and will reach many more through our training manuals and information on the MPCA web site. This project is unique in that the audience is maintenance workers and it is a certification course. It will help organizations meet salt reduction goals expected to be established with the metro chloride plan. Based on results from previous classes, we expect changes in practices and substantial reductions in salt, sand, nutrients pesticide and water use from this project, which will translate into pollutant loading reductions to Minnesota waters.

Watershed Specialist Training, Phase II – 2011

Sponsor: U of M, Water Resources Center

Funding: Section 319 (Grant) \$193,029

Purpose: The U of M, through its Water Resources Center, proposes to develop Minnesota's Watershed Specialist Training Program. The program is in partnership with other training providers and watershed organizations including the MPCA, academic departments, and other state and local governmental and non-governmental conservation organizations. This training program will ensure that those leading and involved in watershed planning and implementation involving impaired waters understand the legal framework, the programmatic requirements, and the resources and tools needed to complete total maximum daily loads (TMDLs), develop watershed plans, and lead implementation efforts. The goal is to help managers go beyond their specialized skills to be able to integrate a broad set of natural and social science skills.

We will develop and implement an online training program for watershed professionals that will improve their management skills and their ability to effectively and holistically address water quality issues.

Des Moines and Missouri River Basins

Projects completed

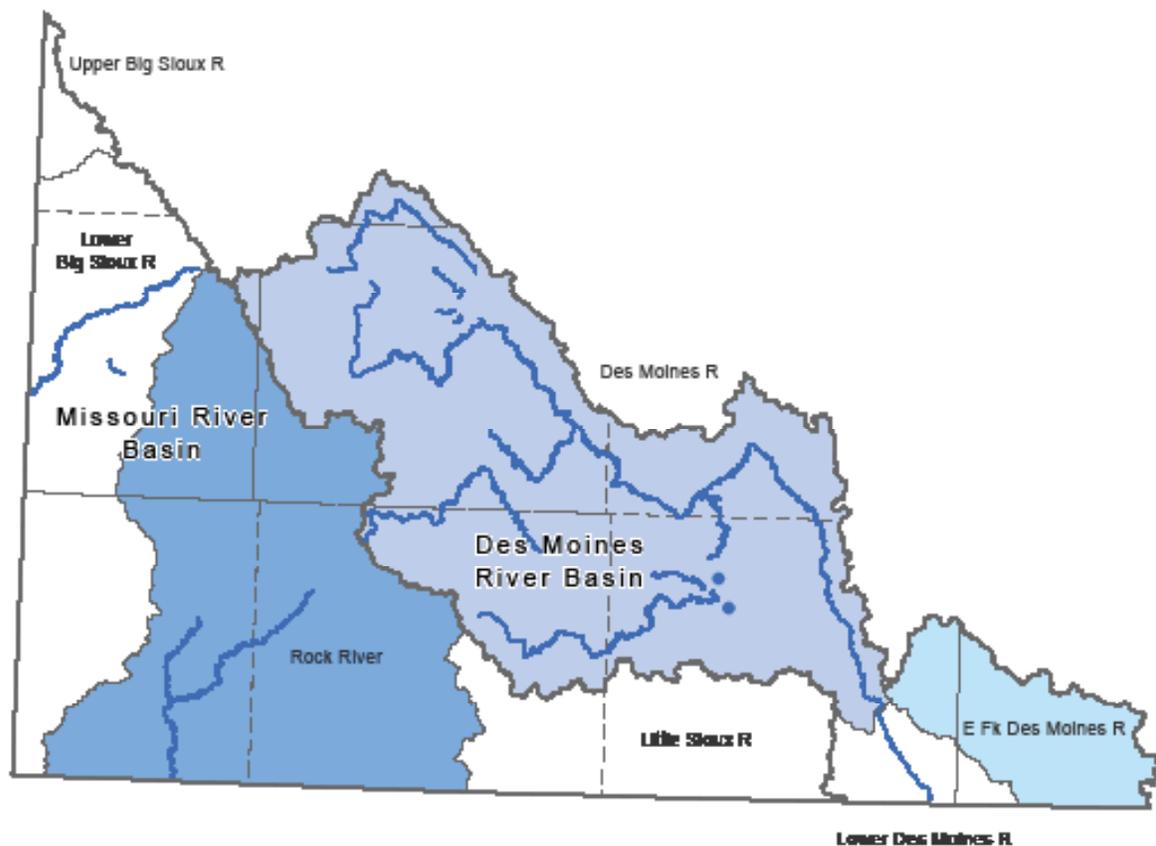
Des Moines River – Headwaters

Heron Lake Alternative Tile Intake Cost-Share Program Continuation

Rock River Watershed

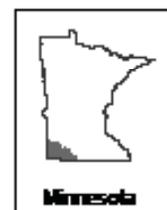
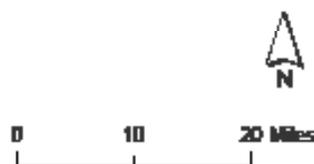
Rock River Replacement SSTS Loan Program

Rock River Watershed: Manure Management



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- County Boundary
- Major Watershed
- Basin Boundary
- Watershed Projects**
- Active
- Active and Completed
- Completed



Des Moines River – Headwaters

Heron Lake Alternative Tile Intake Cost-Share Program Continuation

The Heron Lake watershed encompasses many of the same problems seen in other agricultural areas in Minnesota. A diagnostic study completed in 1992 indicated the watershed's major problems are a direct result of drainage and the resulting higher peak and base flows, urban sources of pollution and storm water runoff, and intensive agricultural land use. These same problems are prevalent throughout the four counties within the project area.

Farmers within Nobles, Jackson, Murray, and Cottonwood counties have been receptive to programs available for installing filter strips, waterways, terraces, and wetland restorations. Increasing the soil conservation practices within the watershed is a vital component for water quality improvement. 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 cost-share for landowners and farm operators to replace open tile intakes with rock inlets, and monitor for changes and improvement.

The Heron Lake Watershed District (HLWD) and Soil and Water Conservation District (SWCD) staff provided first-hand information about the program requirements through direct mailing, flyers, one-on-one contact, a watershed-wide newsletter, and press releases to local news media. These efforts proved successful in that there were a total of 114 open tile intakes replaced with rock inlets in the four-county project area. Operators were enthusiastic about the program and commented that the rock inlets were convenient for their farming operation and helped to improve water quality.

The estimated reduction in phosphorus is 114 pounds per year. The estimated reduction in sediment is 22.8 tons per year.

Goals

- To reduce phosphorus and sediment loading to streams and lakes in the project area.
- To replace 180 open tile intakes with alternative tile intakes.
- To engage in one-on-one contact with landowners.



Heron Alternative Tile Intake - finished product

Results that count

- The estimated reduction in phosphorus is 114 pounds per year. The estimated reduction in sediment is 22.8 tons per year.
- One hundred fourteen open tile intakes were replaced with alternative tile intakes.
- Direct contact was made with 39 landowners, 29 of whom installed intakes.

Financial information

Funding type: CWP

Grant amount: \$25,981

Final in-kind: \$27,621

Contact information

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Rock River Watershed

Rock River Replacement SSTS Loan Program

The Rock River is located in the southwest corner of Minnesota and is a main tributary to the Missouri River Basin. The Rock River originates in Pipestone County and flows south through Rock County into Iowa.

A TMDL Assessment, approved by EPA in 2008, listed non-conforming Subsurface Septic Treatment Systems (SSTs) as a potential point source for fecal coliform bacteria and estimated that 72% of the SSTs in the Rock River Watershed are allowing inadequately treated wastewater into waterways.

In 2006, a Rock River Technical Committee was developed consisting of local, state, and federal entities tasked with addressing the impaired waters in the watershed. The four counties, Rock, Nobles, Pipestone, and Murray, took an active role in the committee and in the development of the TMDL Assessment and Implementation Plan.

Replacement of failing SSTs was chosen by the committees as one of the main priorities for addressing fecal coliform bacteria. Both committees have been instrumental in this project by promoting and utilizing the loan funds for replacing SSTs.

Replacement of failing SSTs has been shown to be 100% effective in reducing fecal coliform. This project replaced 30 SSTs over the three-year grant period. By providing a low interest option for financing replacement of the SSTs, this CWP has promoted the correction of failing SSTs. The advertising of the program also raised awareness of the importance of replacing failing SSTs. This awareness will increase the demand for attractive financing options for SSTs.

Goals

- Water quality goal: The water quality goal is to decrease bacteria concentrations by 20% in August and September (months when the standard was exceeded) at the station located on the Minnesota/Iowa border as stated in the Rock River TMDL Assessment Report. The monthly geometric mean was 518 org/100 mL for the months exceeding the standard; a 20% reduction goal would be 414 org/100 mL.
- Information and education goals for citizens in the project area: The goal would be to educate at least 75 homeowners adequately to encourage them to



Rock River Replacement - Septic System

enroll in the low interest loan program and upgrade noncompliant SSTs.

Results that count

- The water samples taken for water quality have not yet shown a 20% reduction which may be due to multiple factors such as not as many systems as planned were installed and weather conditions affecting bacteria.
- This goal was successful in reaching 75 or more landowners but only 30 chose to replace within the time period of this CWP loan program. We applied and received another CWP loan to continue to replace more failing SSTs.

Financial information

Funding type: CWP

Loan amount: 376,425

Final in-kind: \$2,232

Contact information

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Rock River Watershed

Rock River Watershed: Manure Management

This project provided opportunities to educate producers, landowners, and operators on the importance of correct manure management, and calibration of manure application equipment.

The overall goal of this grant was to reduce bacteria concentrations by 60% in the Rock River through correct management of land application of manure. Water quality samples have shown a 64% reduction at the discharge of the Rock River at the Minnesota state line. Showing this much reduction is great but given the fact that we have only a small percentage of the watershed's producers involved it is difficult to determine the success of the grant project on these water quality samples only. Another factor to consider is that it has been unusually dry for the last three years, causing low flow in the river and creating ideal conditions for the natural increase of bacteria within the river.

The most challenging part of the grant was to encourage producers to develop and maintain a manure management plan for their operation. Of the 22 producers that signed agreements to develop and utilize manure management plans for three years, only 11 carried through two years and only 4 completed the whole three year commitment.

The most successful part of the grant was the increased usage of calibrated application equipment. Over 45 producers took advantage of calibrating their solid manure spreaders or applied their liquid manure with flow meters. This improvement in manure management will continue on for many years and cover many acres of manure application.

The educational and outreach goals of the grant were successful in numerous ways. Both the semiannual newsletter and the field demonstration day rated very high on surveys. Providing opportunities for commercial manure applicators to attend informational and recertification training meetings was also well received.

Goals

- Increase the number of operations utilizing calibrated manure application equipment to at least 50 solid manure applicators and 25 liquid manure applicators.
- Utilize incentive payments to encourage 25 producers to develop and maintain a manure management plan.



Rock River Watershed Manure Management - Field Day

- These producers will also be required to complete a survey to understand behavior and operation changes
- Increase operator and agronomist knowledge by providing a field day (at least 100 attendees) that displays a field size plot of varying manure applications.
 - Increase commercial manure applicator knowledge by offering continuing education opportunities to 25 CAWTs

Results that count

- Thirty liquid manure applicators and 15 solid manure applicators calibrated their equipment to more accurately apply their manure.
- Eleven producers completed three years of manure management planning and participated in the KAP study.
- One hundred forty people attended a very educational and informative field day.
- Forty-two CAWTs attended the training events.

Financial information

Funding type: Section 319

Grant amount: \$126,821

Final in-kind: \$155,136

Matching funds: \$9,549

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Des Moines and Missouri River Basins

Projects active

Section 319 projects awarded in 2013

None awarded in 2014

Des Moines River Basin

Des Moines River – Headwaters

Fulda Phosphorus Reduction Initiative — 2011

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$12,600

Purpose: Through this effort, project sponsors will conduct a rain garden demonstration project to work with the community to address pollution concerns. This will be done by providing educational opportunities for students and the community to learn about native vegetation, water quality improvement, pollution reduction, and environmentally-friendly landscaping. This project will provide opportunities for students to learn about the importance of water quality improvement and how they can play a part in pollution reduction efforts.

The community is concerned about their lake system and has requested assistance from the HLWD. The majority of landowners and operators in this sub-watershed are concerned about soil health and water quality. These residents have been involved in a redetermination of benefits of filter strip installation, and other conservation efforts. Landowners are receptive to conservation practices along the ditch system. This effort will provide landowners with funding for conservation tillage incentives and shoreline restoration demonstration projects.

Fulda Lakes 1 and 2 were placed on the impaired list in 2008 for nutrient and eutrophication biological indicators. Stormwater runoff contributes to these impairments.

The City of Fulda residents were invited to participate in a Social Indicators Pilot Project in 2009 by completing a survey. This was an effort to gauge public opinion regarding water quality efforts conducted in the Fulda Lakes' project area.

Heron Lake Sediment Reduction Demo — 2010

Sponsor: Heron Lake Watershed District

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

Purpose: 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 Third Crop Phosphorus Reduction Effort — 2013

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$33,120

Purpose: Provide incentives to establish 200 acres of cover crops on an annual basis during the three-year grant period. This will be done by aerially seeding a third crop, or cover crop, of cereal rye, purple top turnip, and tillage radish. Cover crops reduce erosion, decrease soil compaction, increase water infiltration to prevent runoff, bring leached nitrogen back to the root zone for the following year's crop, increase organic matter, and provide habitat cover. The HLWD also proposes to conduct civic engagement through the development of a steering committee. Processes taught at the Southwest Civic Engagement Cohort will be employed with the committee to brainstorm about the needs, wants, and perceptions of watershed landowners as they relate to water quality improvement, focusing on cover crops.

They will also be asked to assist in identifying barriers to making changes and develop strategies for behavior change.

Heron Lake TMDL Phosphorus Reduction Project — 2012

Sponsor: Heron Lake Watershed District

Funding: CWP (Loan) \$450,000

Purpose: This project will promote and install 45 Subsurface Septic Treatment Systems (SSTS) and other agricultural BMPs in the Heron Lake watershed.

Jack and Okabena Creek Sediment Reduction Project — 2012

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$20,600

Purpose: This project will install 2 J-hook weirs on Jack and Okabena Creeks; monitor sites and collect documentation; publicize project through Heron Lake Watershed district website, newsletters, local newspapers and landowner mailings; and complete all project reporting requirements.

West Fork Des Moines River TMDL Implementation Project — 2011

Sponsor: Heron Lake Watershed District

Funding: Section 319 (Grant) \$198,248

Purpose: In December 2008, the USEPA approved a TMDL study encompassing 32 impairments in the West Fork Des Moines River watershed. This project is unique in that it addressed several impairments on a basin-wide scale, worked with local partners, and developed an advisory stakeholder committee early in the process. The local stakeholder advisory committee that provided input and received project updates during the development of the TMDL Report provided a foundation for developing an implementation plan. A cooperative effort of local, state, and federal representatives from conservation agencies and the advisory committee led to the development of the WFDMR and Heron Lake TMDL Implementation Plan, approved by the MPCA on September 22, 2009.

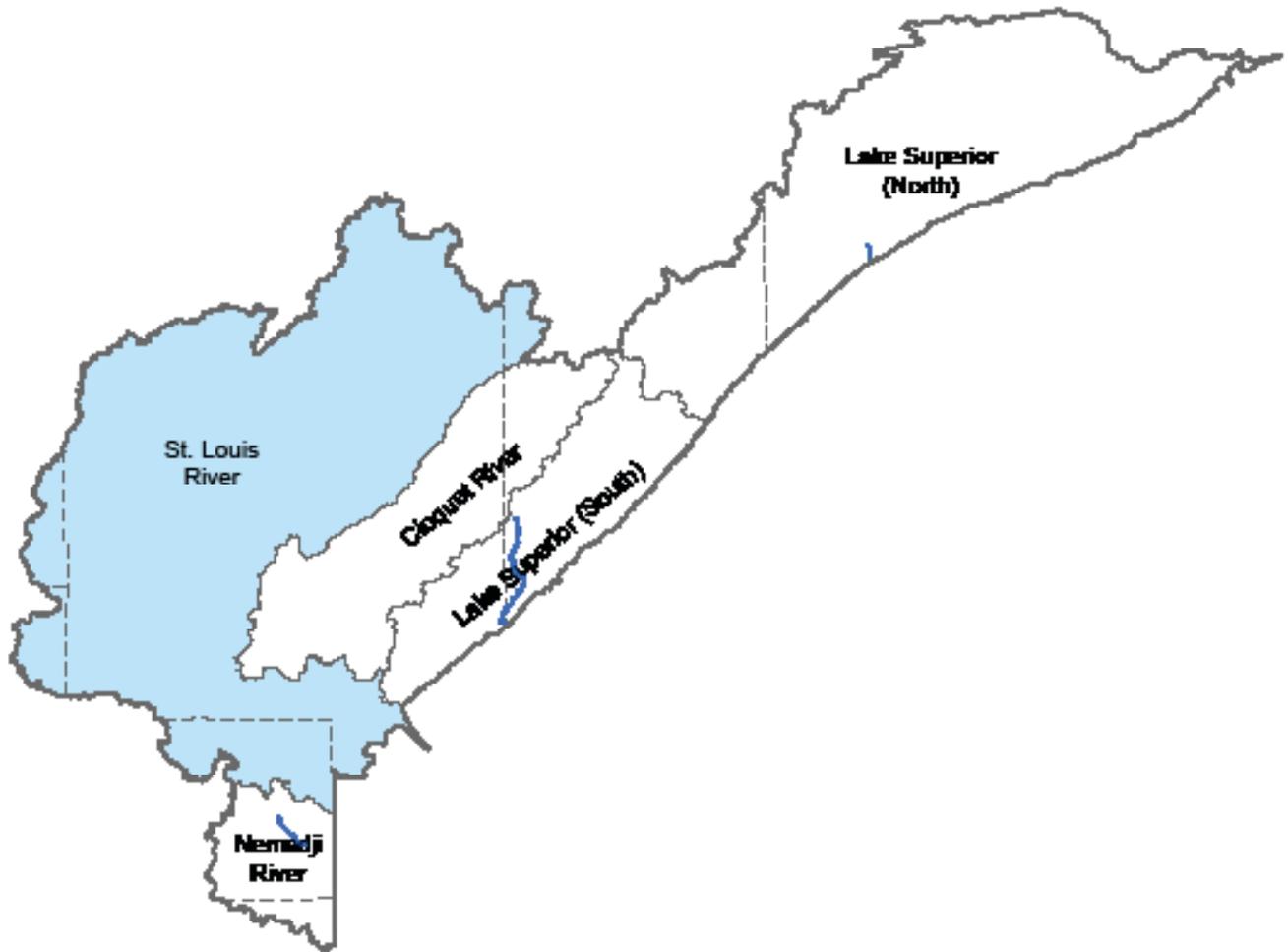
Missouri Basin

No projects active in Missouri Basin

Lake Superior Basin

Projects completed

None completed for 2013 – 2014



Legend

- Approved Lake TMDL
 - Approved Stream TMDL
 - - - County Boundary
 - Major Watershed
 - Basin Boundary
- ### Watershed Projects
- Active
 - Active and Completed
 - Completed



Lake Superior Basin

No active projects

None awarded in 2014

Lower Mississippi and Cedar River Basins

Projects completed

Projects involving multiple watersheds

Southeast Minnesota Volunteer Nitrate Monitoring Network
 Sustaining Progress Toward Reducing Runoff from Open Lot Feedlots

Mississippi River – Lake Pepin

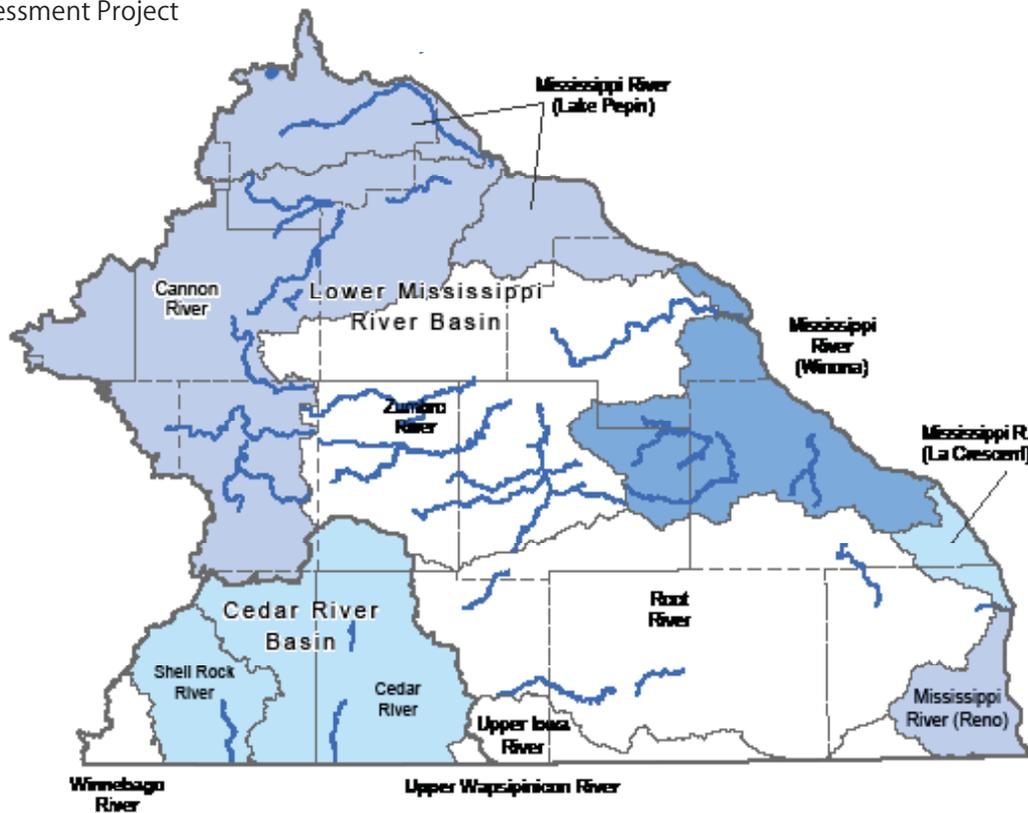
Stream-cooling Demonstrations in the Vermillion River Watershed

Mississippi River – Winona Watershed

Whitewater River Watershed Bacteria Reduction CWP Phase II Continuation Project

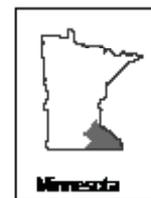
Cannon River Watershed

North Cannon River Bacteria Reduction Project
 Rice Creek Assessment Project



Legend

- ◆ Approved Lake TMDL
- Approved Stream TMDL
- County Boundary
- Major Watershed
- Basin Boundary
- Watershed Projects**
- Active
- Active and Completed
- Completed



Project involving multiple watersheds

Southeast Minnesota Volunteer Nitrate Monitoring Network

This project built upon efforts to develop and utilize a low-cost monitoring network as a sustainable means of obtaining long-term trend data for nitrate occurrence in private drinking water supply wells. From 2006-2009 the project team, including nine southeastern Minnesota counties and state agency staff, with funding from USEPA's 319 program, coordinated efforts to develop a low-cost groundwater monitoring network in Southeast Minnesota that relies on trained volunteers to sample their private drinking water supply wells and send the samples to their county representative for nitrate analysis.

Four rounds of nitrate monitoring were conducted during the previous grant period; February 2008, August 2008, February 2009 and August 2009. Through the CWP grant we conducted an additional four rounds of monitoring in August of 2010, 2011 and 2012 with an optional spring 2013 round completed by six of the nine counties.

The Volunteer Nitrate Monitoring Network design was developed by hydrologists from the Minnesota Departments of Health (MDH) and Agriculture (MDA) in cooperation with county water resource managers. Through the Nitrate Well Testing program, many county staff have become trained in using the nitrate testing equipment and experienced in working with homeowners on water quality issues. Some counties have targeted sensitive areas for additional monitoring beyond the network, in an effort to get a better understanding of water quality in highly sensitive areas.

With the data from this monitoring network, counties will have the means to determine the efficacy of their water quality programs, to identify emerging trends, and to target water management resources for program implementation. The network serves as a resource for future studies of additional water quality parameters. The results of this study will also compliment the efforts of local, state and federal agencies in regional nitrate TMDL development.

Goals

- Assess the condition of private well drinking water in terms of nitrate.

- Maintain a network of well-owner volunteers for assessment of other water quality parameters when resources become available Nitrogen.
- Provide long-term data counties need to focus their implementation efforts.

Results that count

- Conducted four rounds of nitrate testing, sent data to MDH for entering into a database and analysis. Winona State University completed a statistical analysis and report.
- Utilized newsletters and volunteer recognition events to maintain volunteer participation. Public Outreach and education resulted in an average 84% of volunteers returning samples during each sampling round.
- Maintained the network without a break in nitrate monitoring while making plans for long-term sustainability of the project through continued funding.

Financial information

Funding type: CWP

Grant amount: \$143,600

In-kind: \$182,672

Contact information

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Project involving multiple watersheds

Sustaining Progress Toward Reducing Runoff from Open Lot Feedlots

“Sustaining Progress toward Reducing Runoff from Open Lot Feedlots” was part of a basin-wide response to the findings of the Regional Total Maximum Daily Load (TMDL) study that identified the streams of the Lower Mississippi River Basin in Minnesota (the Basin) as posing a risk of human illness from excessive levels of fecal coliform bacteria. The TMDL study found that runoff from feedlots or manure stockpiles without runoff controls comprises an estimated loading of fecal coliform bacteria to streams of 17% during a wet spring and 37% during a wet summer. To reach water quality standards, the Regional TMDL Implementation Plan calls for reducing bacteria impairments from all major sources by an average of 65%. One of several strategies for reaching this goal includes providing assistance for accelerated compliance with the state feedlot rules.

Approximately 8350 or 87% of feedlots in the basin are feedlots with less than 300 Animal Units (au). According to county surveys, approximately 3100 of these smaller feedlots are likely to pose a pollution hazard. A successful strategy used in the Basin to reach runoff reduction goals has been to build local capacity for accelerating producer compliance with state feedlot rules. Employing this strategy in previous regional feedlot



Before feedlot fix, Goodhue County



After feedlot fix, Goodhue County

projects, 2295 producers in the region signed up for the Open Lot Agreement (OLA) and by June 2009 we completed runoff reduction designs for 1,471 feedlots, and implemented over 324 feedlot fixes with very low 50% cost-share funding of \$1,000 - \$15,000, plus technical assistance.

To continue this progress, this 319 grant project used funds to provide cost share and technical assistance to livestock producers with less than 300 animal units. Technical assistance funds enabled 10 counties in the Basin to sustain technicians to design simple, low-cost runoff reduction solutions. Technicians worked under supervision of county feedlot officers and feedlot design engineers to design such low-cost measures. Through cost share from this grant we were able to install 7 clean water diversions, 18 vegetative buffers or filter strips, 1 roof gutter, 4 roof structures, 10 solids settling areas, 7 runoff containment structures, 2 storage facilities and 5 livestock exclusions on a total of 40 feedlots. In addition, grant funding allowed counties to build local staff capacity to continue assistance to producers as they implement their feedlot designs with other sources of cost share. To avoid duplicate reporting, the numbers reported here do not include fixes completed with technical assistance from this grant if the cost share dollars came from other sources.

County	County Goals: Completed Fixes	Completed with no c/s	Completed with other c/s funds	Completed with 319 c/s	Total Fixes Completed
Dodge	8	1	7	3	11
Fillmore	4	7	9	5	21
Goodhue	5			4	4
Houston	10			9	9
Mower	1			0	0
Olmsted	1		4	1	5
Rice	5		1	0	1
Steele	2			0	0
Wabasha	5			4	4
Winona	3			6	6
TOTALS	44	8	21	32	61

Goals

- Local staff work with OLA signers to complete 15-30 feedlot runoff designs and installations
- Twenty OLA signers receive cost-share funding up to \$15,000 to assist with low-cost fix implementation

Results that count

- Technical assistance was provided to over 25 local producers
- Cost share and technical assistance was utilized to implement runoff fixes on 40 feedlots

Financial information

Funding type: Section 319

Grant amount: \$300,000

In-kind: \$137,541

Matching funds: \$476,392

Contact information

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Cannon River Watershed

North Cannon River Bacteria Reduction Project

The North Cannon River Bacteria Reduction Project began in 2009 by using GIS to identify specific parcels of land in southern Dakota County (within the North Cannon River Watershed Management Organization) in need of filter strips (or buffer strips) along streams, waterways and ditches. Landowners were then identified and contacted by the SWCD with information about the benefits of filter strips and programs offering cost share options and funding to install filter strips or other BMPs.

Through this project 40.9 acres of filter strips were installed along streams, rivers and ditches to slow runoff and improve water quality. Additionally, a large-scale feedlot improvement project was installed along with two water and sediment control basins. These projects will result in annual estimated pollutant reductions of 2,050 lbs of phosphorus and 1,360 tons of sediment. Bacteria loads to water bodies will also be reduced through these practices.

Less tangible but equally important are results of the landowner outreach and education that was conducted through this project. Although it's difficult to quantify, discussions about the benefits of buffers with individual landowners raise awareness about the issue, the current rules requiring buffers along DNR-protected waters, and the various programs facilitating buffer installations.

Although the option of installing harvestable filter strips for biomass production was not utilized as anticipated, conversations were generated and the concept was advanced in this area.

Goals

- Significantly increase the acreage of filter strips in the North Cannon River Watershed
- Contact and inform landowners about the benefits of filter strips and programs available to install them.
- Minimize contamination runoff from entering waterbodies.



Cannon River filter strip — April 2010



Aerial view of Cannon River filter strip



Cannon River filter strip — July 2011

Results that count

- 40.9 acres of filter strips were installed in addition to one feedlot project and two water and sediment control basins
- Approximately 130 landowners were contacted by mail and another 40 were contacted in person regarding filter strips and funding opportunities
- Trends in water quality improvements are difficult to track and are dependent on multiple conditions during a given monitoring season. Bacteria remains high during runoff events in Chub Creek.

Financial information

Funding type: Section 319

Grant amount: \$66,000

In-kind: \$18,510

Matching funds: \$36,500

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Cannon River Watershed

Rice Creek Assessment Project

Rice Creek is the only designated trout stream in Rice County. It straddles the border between agriculture and urban land use. In November of 2009, the Rice Creek Concerned Citizens Group submitted a report of recommendations to Bridgewater Township to call for collaboration among stakeholders to improve and protect the brook trout community in Rice Creek. This Clean Water Partnership project was carried out to improve our understanding of this watershed to better address these management concerns. This study was carried out from the spring of 2011 through the end of 2012. During the study we collected water chemistry samples, stream flow, and water temperature and conductivity measurements. Stream habitat and width were assessed along with studying the brook trout and macroinvertebrates. One point of interest was to understand if the groundwater recharge to the stream was shallow or deep in origin. The watershed experienced extreme weather conditions with two years of mostly drought conditions punctuated by two flood events.

We learned that nitrate-nitrogen (nitrate) concentrations are high during spring runoff and events as well as during base (low) flow conditions indicating subsurface inputs. Total suspended solids (TSS) and total phosphorus (TP) are event driven with concentrations far exceeding the proposed Class 2A TSS standard of 10 mg/L and TP of 0.15 mg/L. During base flow conditions TSS and TP are within desired ranges. Overall the stream habitat is fair with areas in need of improvement in terms of channel morphology, width and type of riparian vegetation. Brook trout are present in the stream with an estimated population of 3,350 trout/mile. They are doing surprisingly well, but like their habitat there is room for improvement. The groundwater inputs to the system appear to be local, shallow and "young"; the estimated age based on tritium samples was 5 – 10 years old.

Goals

- Characterize stream sediment, nutrient and *E. coli* bacteria concentrations, loads, and their effect on the Rice Creek system.
- Determine groundwater sources and high stream temperature priority areas within the stream.
- Determine macroinvertebrate and fish population distribution within Rice Creek watershed.
- Evaluate the ecological health of the Rice Creek system.



Seep locations shown by white arrows at Decker Down (04LM077) station

Results that count

- Nitrate levels are high and are influenced by land use practices and subsurface drainage. Flooding and heavy rains are driving TSS and TP inputs. *E. coli* is high near two feedlots but of lesser concern due to lack of body contact.
- Water temperature is on the borderline with brook trout needs and attention must be paid to keep it from increasing. It is influenced by shallow groundwater recharge.
- The brook trout are doing alright but there is room for improvement of population and habitat. The macroinvertebrates are marginal and need to be improved.
- Based on the MPCA Stream Habitat Assessment most areas are "Fair" or worse.

Financial information

Funding type: CWP

Grant amount: \$110,197

In-kind: \$140,029

Matching funds: \$10,428

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Mississippi River – Lake Pepin

Stream Cooling Demonstrations in the Vermillion River Watershed

The Vermillion River Watershed Joint Powers Organization's (VRWJPO) 319 Demonstration project is part of ongoing efforts in the Vermillion River Watershed to manage thermal impacts in the watershed and its tributaries, as well as its self-sustaining brown trout population. The initial objectives of the project were to monitor new and existing thermal reduction BMPs in the watershed and assess the costs and benefits of them, verify whether the heat modeling effort that was done in the watershed is an effective tool for estimating thermal impacts, increase local citizen knowledge about thermal impacts to the river and trout, and maintain no net increase in stream temperature throughout the duration of this project. After the initial screening and development, the focus changed from evaluating all thermal BMPs, to focus more on the mechanical cooling practices rather than infiltration and volume control.

Throughout the project the VRWJPO found that many aspects in the environment affect the stream temperature in the Vermillion. Many of these are beyond the control of the VRWJPO, like climate and weather. However, the information from this study and others gives the VRWJPO sufficient information to take action that will assist with management decisions in the watershed. For example, the VRWJPO's runoff volume standard should be sufficient to prevent heat loading from new development, but areas that were developed before the rules were adopted should be considered for stormwater retrofits; or developing a long term strategy with partners to establish riparian forest buffers along the Vermillion and its tributaries, as well as areas with large amounts of impervious surface. In the end, a healthy river supports a healthy and diverse ecosystem, and for that reason the VRWJPO will continue to manage to achieve both.

Goals

- Determine cost/effectiveness of specific thermal-reduction BMPs.
- Assess methods, such as modeling, to identify "hot spots" where thermal-reduction BMPs would be effective.
- Increase public awareness of the importance of stream temperature stability to biota.



A stream restoration in the DNR Otting Aquatic Management Area incorporated a University of Minnesota Extension riparian forested buffer demonstration project, in which trees were planted on one reach, no trees on another. The VRWJPO plans to monitor stream temperatures over time to assess the impacts.

Results that count

- Infiltration BMPs are the most effective; shading provides significant protection and helps to maintain stream temperature.
- Identification of "hot spots" in the watershed can be achieved using the Surface Heat Loading Model, stormwater pond monitoring, and tracking the percentage of impervious surface in urban areas.
- Awareness of the impact of increasing stream temperature on trout is growing, but there is less understanding about increasing temperature's impacts on other biota.

Financial information

Funding type: Section 319
 Grant amount: \$254,088
 In-kind: \$130,917
 Matching funds: \$144,449

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Mississippi River – Winona

Whitewater River Watershed Bacteria Reduction CWP Phase II Continuation Project

Multiple branches of the Whitewater River are impaired for recreation from fecal coliform bacteria. This impairment poses a threat to human health from pathogen exposure, decreases the river's suitability for livestock and wildlife drinking water, and reduces recreational suitability.

Using the Regional TMDL Implementation Plan as a guide, this project focused efforts to 1) Decrease the number of failing septic systems in shoreland areas. 2) Educate producers about sensitive feature setbacks, increase adoption of Nutrient Management Plans and promote BMPs that reduce bacteria. 3) Educate producers by hosting field days and promoting cost-share opportunities and grazing plans. Project work began September 2009 and continued through June 2013.

The project made 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 bacteria reduction BMPs, ten farmers set up nutrient management plans and 29 completed various farmer-led incentives that addressed bacteria reduction practices. Two homeowners replaced septic systems using grant incentives.

Goals

- Reduce contamination from failing septic systems, especially in shoreland areas by inventoring shoreland SSTs and educating about BMPs for septic systems
- Promote BMPs that reduce bacteria contamination through encouraging use of sensitive feature setback maps in farming operations, increasing adoption of Nutrient Management Plans, and assisting local farmer-led council in development of effective incentive program. Educate producers about alternative manure uses and manure management BMPs by hosting field days and promoting cost-share opportunities.
- Determine the current bacteria loading in each of the three branches of the watershed through establishment of geometric mean for e-coli and a preliminary assessment of sources of bacteria through microbial source tracking



Whitewater River Watershed

Results that count

- Sixty-eight parcels that have septic systems in shoreland areas were identified. Homeowners received letters informing them of BMPs for septic systems in shoreland areas as well as information about low-interest loans that are available for septic system upgrades. In the Whitewater Watershed in Winona County, 15 septic systems were replaced, one of these was in the shoreland area. Eleven homeowners attended SSTs maintenance classes.
- Approximately 192 sensitive feature setback maps were provided to producers for use in operations. In addition South Branch producers were contacted to determine their use of maps. Ten producers started NMPs and 31 residents participated in performance-based incentives that reduce bacteria contamination. Five field days/conservation tours were held. These events provided opportunities to develop partnerships with other agencies (SWCD, NRCS, DNR, RC&D and Extension) and provided the farmer-led council opportunities to host tours and engage the public in educational field days. In all over 160 people attended.
- E-coli geometric mean was established for 15 sampling sites (five on each branch) for May through September. Microbial source tracking was used on samples collected in the Middle Branch. Preliminary results determined the presence of fecal matter from cows in these samples.

Financial information

Funding type: CWP

Grant amount: \$199,972

In-kind: \$301,654

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Lower Mississippi and Cedar River Basins

Projects active

Section 319 projects awarded in 2013

None awarded in 2014

Cedar River Basin

Cedar River Watershed

Alternative Designs for Drainage Ditches — 2010

Sponsor: U of M, Department of Bioproducts and Biosystems Engineering

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 TMDLs 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.

Shell Rock River

New Tools to Support TMDL Phosphorus Reduction Plans – 2009

Sponsor: U of M Water Resources Center

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

Purpose: The goals of this project are to 1) develop a whole-watershed phosphorus (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 statewide workshops.

Lower Mississippi River Basin

Projects involving multiple watersheds

Reducing Runoff from Southeast Minnesota Feedlots — 2013

Sponsor: Southeast Minnesota Water Resources Board

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

Purpose: A larger regional effort to comprehensively address sources of fecal coliform bacteria tied to the Regional TMDL Implementation Plan. Local feedlot staff in the ten counties of SE Minnesota will provide technical and engineering assistance to design and implement feedlot runoff control activities to treat polluted runoff. Farms will be prioritized based on criteria developed by each county and SWCD. The MinnFARM model will be run by feedlot technicians for each completed fix to determine reductions in polluted runoff from projects implemented. Reduction amounts will be reported using the Feedlot Unified Reporting Form developed for this project.

Cannon River Watershed

Lower Cannon River Turbidity Reduction Project — 2011

Sponsor: Cannon River Watershed Partnership

Funding: Section 319 (Grant) \$178,120

Purpose: The Lower Cannon River Turbidity TMDL study, completed in July 2007, sets significant load reductions

for sediment in the Lower Cannon River watershed. The water quality goal is a TSS value of 44 mg/L or less. At high flows, a reduction in TSS values ranging from 49% to 82% is needed in the Cannon River system depending on the reach. The implementation plan, completed in October 2009, established a short term goal of achieving a 30% reduction in sediment sources by 2020.

Project Goals:

- Identify the major sources of sediment to the Little Cannon River and Belle Creek that are contributing to the pollution of these streams and the Cannon River.
- Implement BMPs to reduce sediment delivery to the streams with the support of local landowners.

The water body is considered of high public value, having been designated a Wild and Scenic River in order to afford it additional protection from potential degradation. It is located less than an hour's drive from the Twin Cities Metropolitan Area, along a popular bicycle path which brings thousands of Minnesotans close to the water.

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.

Steele County Septic System Loan Program — 2012

Sponsor: Steele County

Funding: CWP (Loan) \$700,000

Purpose: This project will promote and install 70 SSTs in Steele County.

Mississippi River – Twin Cities

Dakota County Nitrate Reduction Project — 2012

Sponsor: Dakota County

Funding: Section 319 (Grant) \$215,307

Purpose: This project will create and implement agricultural projects to validate, demonstrate, and refine BMPs for nitrogen fertilizer for corn production that will lower nitrate levels in Dakota County's groundwater and surface water; promote Private Pesticide Applicator Training, Crops Days, "Focus on Ag" Newsletter and innovative demonstration projects to area farmers to improve quality of Dakota County's water resources; monitor nitrate levels in private drinking water wells and in the Vermillion River and its tributaries; track project grant, matching funds and expenditures; and complete required reporting.

Minnesota River Basin

Projects completed

Project involving multiple watersheds

Redwood and Cottonwood Rivers Watershed Conservation and Nutrient Reduction Project

Blue Earth River

Blue Earth River Basin Restoration Positions
 East Branch Blue Earth River Watershed Approach
 Nutrient Reduction Project for the Lower Minnesota Dissolved Oxygen TMDL

Chippewa River

Dry Weather, Lines and Spring Creeks Sub-basin of the Chippewa River Continuation

Cottonwood River

Cottonwood River Watershed Phosphorus Reduction Continuation

Lac qui Parle River

Ten Mile Creek Protection Plan For Turbidity

Lower Minnesota River

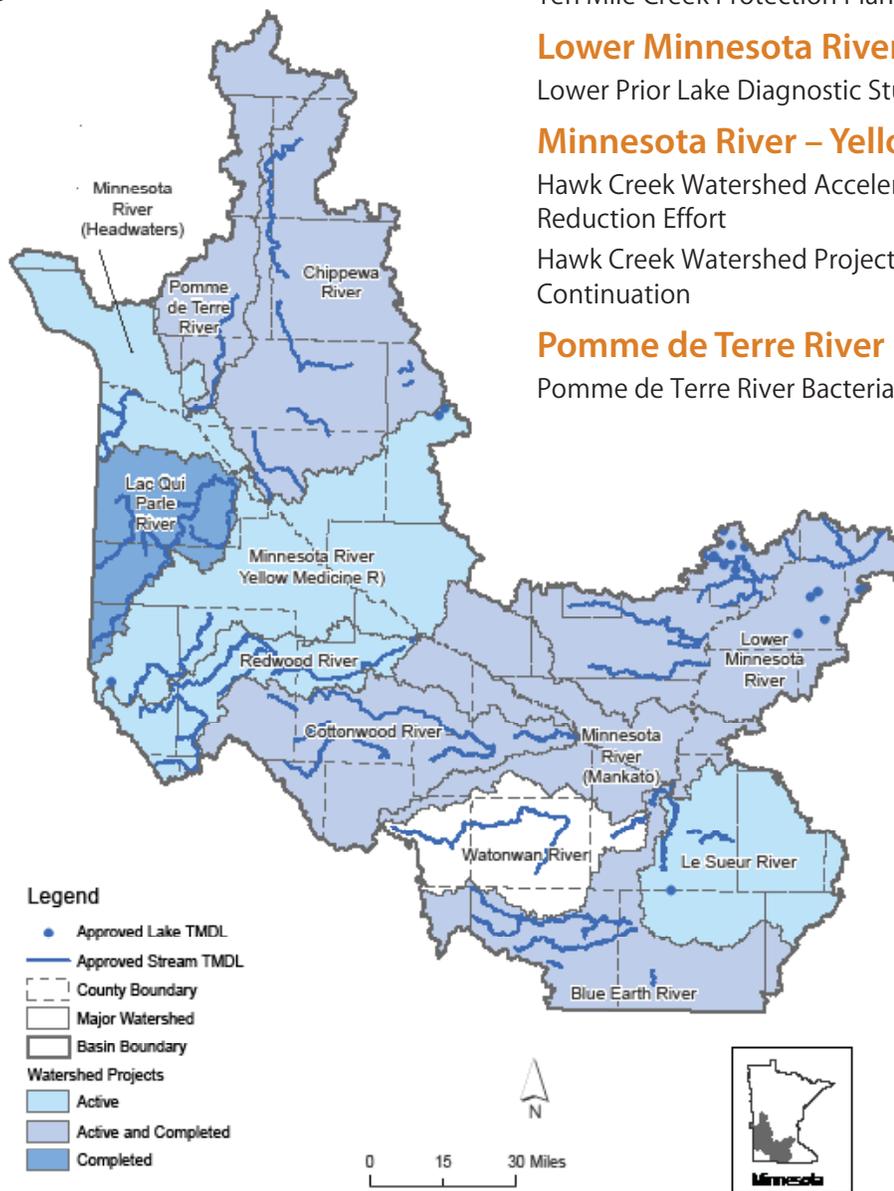
Lower Prior Lake Diagnostic Study

Minnesota River – Yellow Medicine River

Hawk Creek Watershed Accelerated Phosphorus Reduction Effort
 Hawk Creek Watershed Project FY2006 Project Continuation

Pomme de Terre River

Pomme de Terre River Bacteria Implementation



Project involving multiple watersheds

Redwood and Cottonwood Rivers Watershed Conservation and Nutrient Reduction Project

The "Redwood and Cottonwood Rivers Watershed Conservation and Nutrient Reduction Project" contract was a total grant award of \$354,740.00. The 4 year work plan was projected to reduce phosphorus reaching the Minnesota River by 3,011 pounds annually or 1,204,400.00 pounds of aquatic plant growth annually (plus 2,658 tons of sediment). The 319 grant portion was broken down into \$64,500 for technical assistance and administration, \$265,340 for 75% BMP cost share, and \$24,900 of incentive payments for buffer strips. The final expenditures were \$64,500.00 for technical assistance and administration, \$265,340.00 for 75% BMP cost share, and \$24,900.00 of incentive payments for buffer strips.

Goals

- Help in the efforts of reducing phosphorus in the Cottonwood and Minnesota River Basins through the replacement of non-compliant septic systems and implementation of BMP projects.
- Implement BMP projects of approximately 4,820 feet of grassed waterways, 2,000 feet of terraces, 650 feet of shoreland/streambank stabilization, 4 grade stabilization structures, 2 ponds, 12.45 acres of filter strips and 25 Water and Sediment Control Basins
- Implementation of Best Management Practices (BMP) to reduce 2,658 tons of sediment annually, 3,011 pounds of phosphorus annually, and nitrate pollution to the Cottonwood, Redwood, and ultimately the Minnesota Rivers

Results that count

- 21.5 septic systems were installed in association with this project reducing phosphorus in the Cottonwood, Redwood, and Minnesota Rivers by a potential 880 pounds/year amongst other benefits.
- Projects put on the ground included 6,310 feet of grassed waterways, 200 feet of terrace/diversions, 1,400 feet of shoreland/streambank stabilization, 4 grade stabilization structures, 49.8 acres of filter strip



A close-up of the j-hook stabilization method utilized in the bank restoration project on the Redwood River near Lynd, Lyon County. J-hooks are positioned in such a way to provide a deep pool habitat at the point of the hook while redirecting stream flow to inhibit bank erosion downstream.

incentive monies, and 12 Water and Sediment Control Basins.

- Projects were implemented in the project area that has the potential to reduce phosphorus transport by 4,044.72 pounds per year and reduce net sediment in surface water by 3,141.04 tons per year. Over the ten year life expectancy, a potential reduction of 20.22 tons of phosphorus and 808.94 tons of algae can be reduced.

Financial information

Funding type: Section 319
 Grant amount: \$354,740
 Matching funds: \$425,697

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Blue Earth River Watershed

Blue Earth River Basin Restoration Positions

Through the MPCA Clean Water Partnership Grant, February 2010 to June 2013 the Greater Blue River Basin Alliance utilized these funds to facilitate four positions in the watershed including Urban Outreach Specialist, Nutrient Management Specialist/Watonwan Watershed Technician, Cobb River Technician and the Minnesota Extension Educator-Conservation Agronomist position. As of 2008, the Greater Blue Earth has 40 listed impaired waters and 9 eutrophic lakes. Water quality concerns in the watershed include suspended sediment, excess nitrates and phosphorus, pesticides, pathogens, and biological oxygen demand. High nutrient and sediment have been linked to wetland loss and intensive drainage. Water quantity is also a concern as the water comes out of the system at a much faster rate with the artificial drainage set up. In addition, today the watershed is predominately agriculture with approximately 84% of the watershed being cropped.

The Greater Blue Earth River Basin Alliance's mission is "to lead in the implementation and promotion of economically viable watershed activities through the combined efforts of local partners and GBERBA. Through these positions implementation of Best Management Practices, watershed residents' contacts and partnerships have grown. Through individual contacts, displays, news articles, radio updates, TV interviews, demonstrations and tours these positions have used their skills to put agricultural and urban conservation on the landscape. These positions have worked through member Soil and Water Conservation Districts, County Planning and Zoning, and Rural Advantage to implement local, state and federal conservation programs. Also these positions have helped further partnerships with the Board of Water and Soil Resources, Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, Minnesota Department of Agriculture, University of Minnesota – Extension, Minnesota Department of Health, Natural Resources Conservation Service and U.S. Fish and Wildlife Service along with numerous local sportsman's and community groups.



Goals

- Implementation of agricultural and urban Best Management Practices
- Accelerate the use of third and perennial crops and nutrient management plans
- Make direct contact with producers and landowners within the watershed

Results that count

- Completed Projects: Rain Gardens (12); Bioreactors (2); Water and Sediment Control Structure (2); Wetland Restorations (3); Grade Stabilization Structure (1); Terrace (1); Grass Waterways (3); Nutrient Management Plans (39 plans) continuous 15,272.02 acres
- Over 250 landowners contacted regarding nutrient management plus displays, news releases and direct mailings 2,000+ contacts regarding third and perennial crops through walk-n-talks, articles, TV and radio interviews, brochures and flyers, demonstrations
- Each position made direct contacts with numbers reaching into the thousands. With reports given every month at the GBERBA Technical and Policy/Executive Board meetings and those being distributed through the SWCD and County participants and on the GBERBA website. Numerous media outlets including news releases, radio, TV, direct mailings, newsletters (ag and urban based), booths at County Fairs and Farm and Home Shows, demonstrations and tours and civic group presentations

Financial information

Funding type: CWP

Grant amount: \$218,752

In-kind: 191,443

Matching funds: \$47,978

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Blue Earth River Watershed

East Branch Blue Earth River Watershed Approach

This project was specific to the East Branch Blue Earth River watershed, consisting of 61,500 acres of flat, predominately row crop landscape. The area included 55 miles of public open ditch and 180 miles of public tile.

By limiting our scope and focusing on the turbidity impairment that exists on the East Branch, Faribault County was able to begin utilizing a systematic approach to assist with the identification of sources of sediment, and work more individually with landowners and drainage officials on education and outreach efforts to promote critical BMP's and demonstration sites.

The county has begun to implement much needed change to its local drainage policy and program. This has provided new opportunities. We have begun to gain the trust, respect, and understanding of our landowners. We have started to get them interested, involved, and committed. They have begun to understand how their decisions affect the entire watershed, not just their farm.

Implementation and demonstration has been frustrating and challenging. Hopefully as landowners begin to understand that BMP's will enhance their ability to maintain a crop and improve long term sustainability of their farming practices, implementation funding will be better utilized.

In conclusion, we must find a way to balance drainage and natural resource needs, allowing for funding of non-traditional practices in a timely manner. There needs to be a funding mechanism for the implementation of water retention areas when the opportunity arises. We know that in order to benefit drainage and control erosion there needs to be a focus or shift in state programs, including drainage law. The SWCD continues to work with the same producers. Those who are conservation minded are a limited group. How we reach the much larger percentage and make headway with unwilling landowners will depend on program change, including availability, amount, and timing

Goals

- Conduct system investigation to identify high priority areas for targeting of BMP's.
- Establish baseline watershed data with practices identified and mapped utilizing GPS and GIS.

- Implement existing, and apply for additional funding to target critical BMP's.

Results that count

- Completed investigation on all 22 drainage systems.
- Utilized GPS and GIS to capture data and create reports.
- Implemented 30.5 acres of buffer.

Financial information

Funding type: CWP

Grant amount: \$212,576

In-kind: \$4,284

Matching funds: \$423,234

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Blue Earth River Watershed

Nutrient Reduction Project for the Lower Minnesota Dissolved Oxygen TMDL

The project area is the Greater Blue Earth River Basin (GBERBA). The basin includes portions of 11 counties in Minnesota and includes the three major watersheds of the Blue Earth, Le Sueur, and the Watonwan Rivers. The GBERB contains 3364 miles of streams and rivers and 3374 miles of public drainage with an unknown amount of private tile added to the system. Agriculture is the predominant land use in the area with 88% of the landscape in some type of crop system with corn and soybeans the primary types.

The project is part of a larger effort to improve water quality in the Minnesota River Basin with a focus on the GBERB. The Blue Earth and Le Sueur in particular have been shown to deliver a disproportionately higher pollution load than other watersheds that contribute to the Minnesota River.

Even with many water quality concerns, the Blue Earth River system is utilized by many individuals and groups for various activities including fishing, canoeing, kayaking and even swimming. Improving the water quality for both recreational and aquatic life activities has become a goal for many local groups and government entities as a way to increase economic benefits in the area.

The goal of the project is to reduce the amount of sediment entering the rivers by providing cost-share to landowners who wish to install agricultural BMPs designed to reduce erosion. By reducing sediment we will also reduce the phosphorus bound to the soil thereby addressing the low dissolved oxygen problem identified in the Lower Minnesota River TMDL. The cost-share will be an incentive to landowners wishing to conserve their land. A healthier river system is the goal, which will increase the value of the river as a resource.

Goals

- Increase the oxygen levels in the Lower Minnesota River, by reducing sediment and phosphorus delivery from the Greater Blue Earth River Watershed through the installation of agricultural Best Management Practices.
- To implement Best Management Practices aimed at reducing phosphorus load from the Greater Blue Earth



Construction of Grass Waterway

River Basin to help achieve the goals of the Lower Minnesota Rivers Dissolved Oxygen TMDL.

- Improve water quality for both recreational and aquatic life activities as a way to increase economic benefits in the area.

Results that count

- Completed Projects: Water and Sediment Control Basins (4); Grade Stabilization Structure (4); Terrace (1); Grass Waterways (2)
- Many other projects were completed from other sources, as indicated by the high level of cash and In-kind match

Financial information

Funding type: Section 319

Grant amount: \$94,611

In-kind: \$121,838

Matching funds: \$181,786

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Chippewa River Watershed

Dry Weather, Lines and Spring Creeks Sub-basin of the Chippewa River Continuation

The Dry Weather/Lines/Spring Creeks subbasin is one of six subbasins of the Chippewa River Watershed and represents the lower 132,059 acres of the 1.3 million acre Chippewa River watershed directly above the confluence of the Chippewa River and the Minnesota River. As one of the tributaries of the Chippewa River, it is a direct participant in the hypoxia issue of the Gulf of Mexico. This subbasin has the highest concentrations of Nitrogen (NO₂-3) and orthophosphorus (OP) in the Chippewa River watershed. It also has the fewest number of ditch banks with buffers and the lowest portion of lakes, wetlands, grass and woodlands. Agricultural land represents 94.2% of the acres in this subbasin, mainly row crops of corn and soybeans. The remaining acres are comprised of grassland 2.4%, forest 1.5%, urban 1.4%, and water and wetlands 0.5%. Most of the lengths of Dry Weather and Spring Creeks have been channelized as county ditches for agricultural drainage. The lower portion of Lines Creek is one of the intact natural stream systems in the larger Minnesota Basin. This subbasin includes Montevideo, population 5,178 and the community of Watson, population 209.

Implementation of Best Management Practices included establishing 325.4 acres of buffer strips, replacing 33 open tile intakes with alternative tile intakes, 22 side inlets for gully erosion and 2 bank stabilization projects. The CRWP has monitored water quality on Dry Weather Creek for the past 12 years. Water quality/quantity monitoring by CRWP staff was conducted at five sites throughout the Chippewa River Watershed for total suspended solids, total phosphorus, orthophosphorus, turbidity, nitrate/nitrites, and *E. coli* bacteria.

Goals

- Upgrade individual septic systems in Chippewa County and upgrade service lines for wastewater in the community of Watson
- Educate watershed residents
- Install Best Management Practices

Results that count

- Upgraded 9 septic systems in Chippewa County and upgraded 29 sewer service lines in Watson



Bank erosion control with rip-rap.

- Conducted Conservation Field days in Chippewa County reaching 600 fifth graders and at the Swift County Water Festival reaching 500 fifth graders. Staffed information booths at county fairs in Chippewa and Swift counties reaching over 5,000 watershed residents
- Established 325.4 acres of buffer strips, 33 alternative tile intakes, 22 side inlets for gully erosion, 1 reclamation of riparian zone, and installed 2 riprap projects for streambank stabilization

Financial information

Funding type: CWP

Grant amount: \$341,630

In-kind: \$216,363

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Cottonwood River Watershed

Cottonwood River Watershed Phosphorus Reduction Continuation

The "Cottonwood River Watershed-(Lower Minnesota TMDL) Phosphorus Reduction Continuation" grant was a total award of \$343,000.00. The grant was matched with a low interest loan awards for Cottonwood River Counties "SRF0208 -0212" of \$343,000.00.

A quick grant dollar per pound reduction summary shows that it took \$7.42 of cost share to reduce one pound of phosphorus a year over a 10 year period. Using the total cost analysis, the cost to reduce a pound of phosphorus was \$11.72.

The "Cottonwood River Watershed Non-point Pollution Reduction" project implemented 16 BMP contracts consisting of 16 various best management practices (BMPs) in the Cottonwood River Watershed to reduce direct sediment and phosphorus delivery to the Cottonwood River and the Minnesota River. The project also accomplished the replacement of 33 non-compliant septic systems reducing an estimated 1,320 pounds of phosphorus/yr from the Cottonwood River and ultimately the Minnesota River.

Goals

- Help in the efforts of reducing phosphorus in the Cottonwood and Minnesota River Basins through the replacement of non-compliant septic systems and implementation of BMP projects.
- Implement BMP projects of approximately 8,654.20 feet of grassed waterways, 3,000 feet of terraces, 1,200 feet of shoreland/streambank stabilization, 2 grade stabilization structures, 25 open-tile intake replacements, 2 ponds, and 10 Water and Sediment Control Basins
- Continue to identify problem areas and implement additional non-point pollution controls utilizing state and federal programs.

Results that count

- Brought 33 non-compliant septic systems into compliance reducing 1,320 pounds of phosphorus/yr from the Cottonwood River and ultimately the Minnesota River and Lake Pepin.
- Implemented projects including 6,289 feet of grassed waterways, 900 feet of shoreland/streambank stabilization, 2,909 feet of grade stabilization structures,



This picture shows a portion of the Cottonwood River in Custer Township near Garvin Park, Lyon County after treatment and before final seeding and re-vegetation.

5 open-tile intake replacements, and 10 Water and Sediment Control Basins saving an estimated 2,477.52 tons of sediment and 2,546.59 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 watershed analysis through the intensive watershed analysis cycles.

Financial information

Funding type: CWP

Grant amount: \$343,000

Matching funds: \$343,000

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Lac qui Parle River Watershed

Ten Mile Creek Protection Plan For Turbidity

Ten Mile Creek, a tributary of the Lac qui Parle River in the Minnesota River basin, has a relatively level drainage area of about 76,000 acres of which approximately 90% of the land use is cultivated crops of corn and soybeans. Ten Mile Creek currently meets the Minnesota water quality standard for turbidity but was listed on the 303(d) Impaired Waters List in 2006 for fecal coliform bacteria and is known to have high levels of Nitrate+Nitrite Nitrogen. This project was designed to protect Ten Mile Creek from additional sediment entering it by offering incentives for filter strips, cost share to replace open tile intakes and create awareness of water quality concerns in the watershed. Grade control structures were added to the list of BMP's to reduce soil erosion from gullies by using a pipe outlet to allow water to drop to a lower elevation while protecting soil from eroding or scouring. The project began in January 2011 and ran through June 2013. The project produced the following savings with the completed projects, 483.3 tons per year of total suspended solids and 540.99 lbs. per year of phosphorus. Additional projects were planned but due to adverse weather conditions in 2012 and 2013 were not completed. A small group meeting was held with landowners that provided valuable insight on how they felt about filter strips. Following this meeting a survey was developed and sent out to the whole watershed with questions about water quality, filter strips, open tile intakes and other conservation information they would like to receive. This survey had nearly a 20% response rate from landowners. The small group meeting and survey aided immensely in managing this grant by understanding and then adjusting the project to address landowner issues and concerns surrounding Ten Mile Creek.

Goals

- Install 25 miles of new filter strips thirty feet wide for approximately 90 acres.
- Replace 50 open tile intakes with alternative intakes.
- Provide credible water quality information to landowners to enhance water quality.



Before picture of special project-Grade Stabilization with side inlet in Lac qui Parle County, Baxter Township Section 34 T-117-N; R-42-W

Results that count

- We did not reach our goal but did successfully enroll/re-enroll 26.6 acres into a Continuous CRP program that resulted in savings of 89.3 tons per year of total suspended solids and 147.37 lbs. per year of phosphorus. Early in the project we found that landowners were hesitant about signing 10 or 15 year contract for filter strips as the soil rental rates were substantially lower than land rental rates.
- This project did not reach their goal for installing filter strips, but they did install 18 grade control structures; not an original goal of the project. This project returned \$25,188.52.
- Forty-four intakes were encumbered and scheduled to be replaced but the wet, adverse weather conditions prevented field work in the spring of 2013. There were nine intakes replaced with a pattern tile design and resulted in soil savings of 1.8 tons/per year of soil and 4.5 lbs./per year of phosphorus.

- Approximately 469 landowners in the watershed received newsletters and postcards, two landowner meetings held, six radio programs and approximately 70 individual contacts with landowners provided water quality information on BMP's to reduce pollutants from entering Ten Mile Creek.

Financial information

Funding type: CWP

Grant amount: \$116,661

In-kind: \$74,264

Matching funds: \$45,376

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After picture of special project-Grade Stabilization with side inlet in Lac qui Parle County, Baxter Township Section 34 T-117-N; R-42-W

Lower Minnesota River Watershed

Lower Prior Lake Diagnostic Study

A diagnostic and feasibility study for Spring Lake and Prior Lake was developed in the early 1990s. Although the study addressed all three lakes in the chain (Spring, Upper Prior, and Lower Prior Lakes), it focused on Spring Lake and Upper Prior Lake, due to water quality issues apparent in those lakes at the time. The study concluded that Lower Prior Lake would reach its water quality goal through improvements in the two upstream lakes. The proposed project differs from the previous study in the focus on evaluating the variability in water quality in Lower Prior Lake and identifying BMPs for the direct drainage area. BMPs will range from options for individual homeowners, to neighborhood-scale practices, to regional treatment practices; recommendations will be for new BMPs and for retrofits of existing ones.

Goals

- Water Quality Goals: 0-10% improvement of TP, Chl-A, and Secchi depth. A 10% improvement equates to the following: 26 µg/l total phosphorus, 13 µg/l chlorophyll-a, and 2.8 meters Secchi transparency.
- Ensure stakeholders understand the direct connection between watershed, shoreline, and in-lake practices and the observed water quality in Lower Prior Lake.
- Instill realistic expectations of water quality improvements to citizens in the project area.

Results that count

- Numerous potential BMPs identified, including raingardens in 15 subwatershed area, 5 larger infiltration areas, 2 expansions of existing ponds, an underground infiltration site, a series of ditch checks along Highway 13, and watershed-wide practices including buffers and lawn management.
- Two public meetings held with good attendance. Expressed preference on the part of the general public for education-based BMPs incorporated into final report.
- Intensive monitoring revealed extensive influence from Upper Prior Lake on the southernmost bay, and influence from the watershed on the rest of the lake. Further communication will build on this understanding of what influence BMPs will have on different parts of the lake.



Water quality monitoring on Lower Prior Lake

Financial information

Funding type: CWP

Grant amount: \$47,417

In-kind: \$7,894

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Minnesota River – Yellow Medicine River
Watershed

Hawk Creek Watershed Accelerated Phosphorus Reduction Effort

Prompted by water quality issues in the Hawk Creek watershed, a group of concerned citizens and local, state, and federal representatives from the three counties in the watershed began meeting in 1997 to work together to address these water quality issues. Known as the Hawk Creek Watershed Committee, the group determined their long-term goal to be “improving the water quality/quantity issues in the watershed, while also promoting a healthy agricultural, industrial, and recreational based economy for the region.”

The Hawk Creek watershed drains 623,105 acres of land. 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 approximately 65 miles to its mouth in the Minnesota River, located eight miles southeast of Granite Falls.

A primary goal of this project is to promote and implement Best Management Practices that decrease phosphorus runoff and increase water infiltration in agricultural and urban areas in an effort to achieve the water quality conditions outlined in the Lower MN River Dissolved Oxygen TMDL. Another goal of this project is to continue efforts to educate the public on the importance of phosphorus reduction by maximizing public input and water stewardship through educational and outreach activities.

Throughout the duration of this grant, educational and outreach activities reached an estimated 185,680 people. A total of 124 BMP projects were implemented with a reduction of an estimated 2,443.96 pounds of phosphorus per year and 4,442,600 pounds (2,221.30 tons) of sediment per year. Water quality monitoring has shown BMP implementation is working with the reduction in phosphorus and sediment, but they are still not to ecoregion standards. HCWP will continue the goals of water quality improvement and increased watershed citizen involvement.



Hawk Creek Gully Stabilization – Before

Goals

- Implement in-field BMPs that reduce phosphorus loss and increase groundwater infiltration and recharge as a means to progress the Lower Minnesota Dissolved Oxygen TMDL Implementation Plan. This project aimed to implement the following BMPs: 30 alternative intakes, 60 side inlets, 150 acres of buffer/filter strips, three gully/grade stabilizations, and seven streambank stabilizations. In total, a phosphorus reduction of 2,014 pounds per year was anticipated.
- Implement ag-waste BMPs that reduce phosphorus runoff from livestock operations and implement urban runoff practices that reduce phosphorus and increase groundwater infiltration and recharge. This project aimed to implement one feedlot waste reduction project and three rain gardens for an anticipated phosphorus reduction of 55 pounds per year.
- Administer an Education and Public Awareness Campaign designed to inform the public about water quality problems, promote watershed wide solutions, environmental stewardship, and municipal stormwater and agricultural water management responsibilities.

Results that count

- In-field BMPs installed during this grant period include 30 alternative intakes, 51 side inlets, 154.2 acres of buffers, three gully/grade stabilizations, and ten streambank stabilizations for a total of 1,442.70 total treated acres, a phosphorus reduction of 2,388.95



Hawk Creek Gully Stabilization – After

pounds per year, and a sediment reduction of 4,349,520 pounds per year (2,174.76 tons per year). We exceeded our goal of the anticipated phosphorus reduction by 374.95 pounds per year.

- Ag-waste BMPs and urban runoff BMPs included in this grant period include one critical area seeding, one shoreland restoration, and one water diversion for a total of 22.30 total treated acres, a phosphorus reduction of 55.01 pounds per year, and a sediment reduction of 93,080 pounds per year (46.54 tons per year). We exceeded our goal of the anticipated phosphorus reduction by 0.01 pounds per year. Technical assistance for two ag-waste projects and one rain garden were also completed.
- Watershed citizens have taken an active interest in the HCWP. An annual information and appreciation meeting draws roughly 100 – 120 people on average. A total of 20 public meetings were held during the grant period, where water quality, BMPs implemented through this grant, BMP funds available, and

educational and outreach activities were discussed. The meetings also provided a forum for input from watershed citizens on the watershed's problems and opportunities for restoring it. HCWP developed, led, and/or participated in numerous educational and outreach events to increase knowledge on the water quality issues in the watershed and water stewardship. Some of the outreach events HCWP participated in include the annual Earth Day Celebration at PWELC, many school presentations, such as the annual WALK events in coordination with the Renville County SWCD, and county fairs. Through these educational and outreach activities, it is estimated HCWP reached over 185,680 people. Several newspaper articles, online articles, and web postings from local media outlets have highlighted the activities of HCWP to a potential audience of over 1,431,754 people through the course of the grant period. The Citizen Monitoring Network has been actively maintained during the grant period. Currently, a total of 29 volunteers gather water quality data within the Hawk Creek watershed and have increased water stewardship and a sense of responsibility for the water quality of the watershed.

Financial information

Funding type: Section 319

Grant amount: \$148,525

In-kind: \$972,863

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Minnesota River – Yellow Medicine River Watershed

Hawk Creek Watershed Project FY2006 Project Continuation

Prompted by water quality issues in the Hawk Creek watershed, a group of concerned citizens and local, state, and federal representatives from the three counties in the watershed began meeting in February 1997 to work together to address these water quality issues. Known as the Hawk Creek Watershed Committee, the group determined their long-term goal to be “improving the water quality/quantity issues in the watershed, while also promoting a healthy agricultural, industrial, and recreational based economy for the region.”

The Hawk Creek watershed drains 623,105 acres (974 square miles) of land. 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 approximately 65 miles to its mouth in the Minnesota River, located eight miles southeast of Granite Falls.

The primary goals of this grant are to implement BMPs that focus on reducing phosphorus, nitrogen, and/or sediment, maximize public input and water stewardship through educational and outreach activities, and track the conditions of streams in the watershed through intensive water quality monitoring at ten sites.

Throughout the duration of this grant (September 2010 – June 2013), educational and outreach activities reached an estimated 52,246 people. In a 16-month period from February 2012 to June 2013, a total of 65 BMP projects were implemented with a reduction of an estimated 488.44 pounds of phosphorus per year and 387.06 tons of sediment per year. Water quality monitoring has shown BMP implementation is working with the reduction in phosphorus and sediment, but they are still not to ecoregion standards. HCWP will continue the goals of water quality improvement and increased watershed citizen involvement.

Goals

- Implement BMPs that reduce phosphorus, nitrogen, and/or sediment in agricultural and urban areas as a means to progress the Lower Minnesota Dissolved Oxygen TMDL Implementation Plan. This project aimed to implement four types of BMPs: 20 alternative intakes, 20 side inlets, 2 feedlot waste reduction projects, and

120 acres of buffers. In total, a phosphorus reduction of 3,334 pounds per year was anticipated.

- Maximize public input and ownership of the HCWP. This primary focus is accomplished by engaging citizens in the decision-making process and involving youth groups.
- Monitor water quality to track the condition of the streams in the watershed and observe conditions and trends in priority management areas identified within the watershed. Continued monitoring demonstrates the effectiveness of implemented BMPs and illustrates the areas that need further attention in terms of reducing pollutants.

Results that count

- BMPs installed during this grant period include nine alternative intakes, 43 side inlets, one feedlot waste reduction project, 37.2 acres of buffers, one critical area seeding (2.6 acres), and one shoreland restoration for 560.32 total treated acres, a phosphorus reduction of 488.44 pounds per year, and a sediment reduction of 774,120 pounds per year (387.06 tons per year). BMP projects implemented are subject to landowner willingness, contractor availability, and weather conditions. Although the pollutant reduction goals stated in the work plan were not met, BMP implementation was still successful, considering different BMPs were implemented than what was originally planned (changing pollutant load reductions), all of the BMPs were implemented in the last 16 months of the grant and the late spring of 2013 (shortening the window of time to put in BMPs before crops are planted).
- Watershed citizens have taken an active interest in the HCWP. An annual information and appreciation meeting draws roughly 100 – 120 people on average. A total of 12 public meetings were held during the grant period, where water quality, BMPs implemented through this grant, BMP funds available, and educational and outreach activities were discussed. The meetings also provided a forum for input from watershed citizens on the watershed’s problems and opportunities for restoring it. HCWP developed, led, and/or participated in numerous educational and outreach events to increase knowledge on the water quality issues in the watershed and water stewardship. Some of the outreach events HCWP participated in include the annual Earth Day



Mulder Shoreline Restoration – Before



Mulder Shoreline Restoration – After

Celebration at PWELC, many school presentations, such as the annual WALK events in coordination with the Renville County SWCD, and county fairs. Through these educational and outreach activities, it is estimated HCWP reached over 52,000 people. Several newspaper articles, online articles, and web postings from local media outlets has highlighted the activities of HCWP to a potential audience of over 1,000,000 people through the course of the grant period.

- Water quality monitoring of 10 sites throughout the grant period demonstrated trends in the watershed. The 2011 season had sustained high flows, similar to the 2010 season. The high amount of runoff these years highlighted erosion concerns throughout the watershed. Throughout the entire year of 2012, the watershed received very little precipitation and most of the watershed area was classified as abnormally dry. The low flows of the waterways made it easier to see the extensive amount of erosion of the streambanks. The spring of 2013 was late and included many snowfall events into April and May. Slow snowmelt deterred major flooding in the watershed this spring. Although 2012 was very dry and the spring of 2013 had little to no flooding, erosion and sedimentation concerns still exist in the watershed. HCWP will continue to strive for the resolution of water quality and quantity issues throughout the watershed. TSS have declined through the watershed over the past decade. Phosphorus is following a similar trend, though not to the same degree. Nitrogen had been steady or decreasing in the streams of the watershed since 1999; however, recent results show an increase in the flow-

weighted mean concentrations of nitrogen in the last few years. Phosphorus, TSS, and nitrogen levels are not to ecoregion standards, so BMPs will continue to be implemented to reduce phosphorus and erosion. The Citizen Monitoring Network has been actively maintained during the grant period. Currently, a total of 29 volunteers gather water quality data within the Hawk Creek watershed and have increased water stewardship and a sense of responsibility for the water quality of the watershed.

Financial information

Funding type: CWP

Grant amount: \$442,697

In-kind: \$1,064,957

Contact information

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Pomme de Terre River Watershed

Pomme de Terre River Bacteria Implementation

In 2008, the MPCA approved a Pomme de Terre River fecal coliform TMDL implementation plan, written to target bacteria loading in the Pomme de Terre watershed. A monetary award in the form of a fecal 319 grant was received by the Pomme de Terre River Association (care of Stevens SWCD) in 2009 with associated BMPs selected to reduce sediment and bacteria loading in the watershed, as well as community outreach objectives to increase public awareness of the fecal coliform problem in the Pomme de Terre River. As a result of the project, newsletters were sent to watershed citizens, and numerous BMP practices were installed including 158 acres of buffer, and 145.3 acres of grazing management as a direct result of this project. Although some work plan changes were made, all objectives and tasks of this grant were completed successfully. The timeline of completion for this grant was between September 1st 2009, and August 31st of 2013.

Goals

- Install BMPs to reduce sediment and nutrient loading in the watershed.
- Increase public awareness through meetings and newsletters.
- Monitor water quality before and after BMP implementation (2010, and 2012).

Results that count

- Ten contracts were signed resulting in 297.6 acres of land enrolled in programs as a result of this grant.
- Public awareness was increased through a newsletter that was sent to all citizens and an annual meeting.
- Water quality samples were taken, and all data was successfully submitted for 2010 and 2012.

Financial information

Funding type: Section 319

Grant amount: \$280,626

In-kind: \$47,997

Matching funds: \$238,325



Pasture buffer – Drywood Creek

Contact information

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MPCA Project Manager: Joseph Hauger

Minnesota River Basin

Projects active

Section 319 projects awarded in 2013

None awarded in 2014

Multiple watersheds in the basin

A Decision Support Tool to Restore Impaired Waters — 2010

Sponsor: U of M, 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 BMPs and land use changes.

Cottonwood-Redwood River Septic Loan Program — 2013

Sponsor: Redwood-Cottonwood Rivers Control Area

Funding: \$ 9,000 CWF, \$510,000 CWP loan

Purpose: This project will continue the offering low-interest loans to citizens, some of whom may not be able to acquire funding otherwise, for upgrading 50 septic systems to ensure compliance with state rules. Grant funds will be used to administer the low-interest loan program.

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.

Minnesota Pollution Reduction and Economics Test with Nutrient Trading Tool — 2011

Sponsor: Minnesota River Board

Funding: Section 319 (Grant) \$172,916

Purpose: The Conservation Marketplace of Minnesota (CMM) project collaborators will be among the first groups to work with the Nutrient Trading Tool (NTT) in Minnesota upon its nationwide release in 2011. CMM is a collaboration of public and private conservation professionals developing a market-driven approach to advance conservation efforts and agricultural sustainability with a crediting system that provides multiple environmental benefits with measurable outcomes in participating watersheds. We will identify BMP sites to evaluate and validate the Nutrient Trading Tool, incorporate a farm economic model, develop curriculum, provide outreach events and train natural resource professionals. This project will professionally validate and demonstrate the NTT to evaluate land management scenarios and provide measureable outcomes for conservation practices designed to reduce nonpoint source pollution in watersheds across the state.

Blue Earth River

Collaborative for Sediment Source Reduction: Greater Blue Earth River Basin — 2012

Sponsor: U of M, Jeff Marr

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

Purpose: This project will develop a sediment budget for the Greater Blue Earth River watershed; establish efficiency and cost of sediment reduction strategies (type, setting, and location); develop a sediment simulation model; build a decision analysis system; develop management strategy; provide seven workshops to develop and test the simulation model and decision tools; and complete all fiscal management and planning.

Elm Creek Tile Outlet Treatment Trains — 2013

Sponsor: Rural Advantage

Funding: Section 319 (Grant) \$165,000

Purpose: Demonstrate innovative redesign of tile outlets using an innovative treatment train approach that addresses water traveling through drainage systems, focused toward linking upland practices with farm tile outlets to increase practice adoption, deliver environmental soundness and transfer knowledge on effective techniques resulting in improved nutrient management, post field treatment, reduced in-stream nutrient loads, and enhance wildlife and other ecosystem services while maintaining agricultural productivity.

Greater Blue Earth Urban Retrofit Initiative — 2012

Sponsor: Faribault County SWCD

Funding: Section 319 (Grant) \$270,250

Purpose: This project will use various electronic and printed media, as well as meetings, to promote environmentally-friendly stormwater management practices; design and implement stormwater retrofit and new stormwater practices; provide technical assistance for stormwater implementation; track grant project and matching fund expenditures; and complete required reporting.

Chippewa River

Chippewa River Accelerated Restoration — 2012

Sponsor: Chippewa County

Funding: CWP (Loan) \$900,000

Purpose: This project will promote and install 90 SSTS, rural and agricultural best management practices in the Chippewa River watershed.

Chippewa River Phosphorus Reduction Practices — 2013

Sponsor: Chippewa River Watershed Project

Funding: Section 319 (Grant) \$279,518

Purpose: Address phosphorus loading sources within the watershed and effectively reduce the amount of pollutant load entering the local priority waters within the watershed and lower the Chippewa River Watershed's contribution to the Minnesota River. The utilization of alternative surface tile intakes, drop side inlets, cover crops, livestock exclusion (fencing), pasture management/planned grazing, and water and sediment control basins will provide the best options for landowners to make site and management specific choices for reducing phosphorus.

Lake Minnewaska Phase I Resource Investigation — 2013

Sponsor: Pope Soil & Water Conservation District

Funding: CWP (Grant) \$112,435

Purpose: This project will hire a half time employee for three years responsible for meeting the requirements outlined in the preparation of a diagnostic study and implementation plan guidance document. The requirements are as follows but not limited to: monitoring water quality, compiling data, gathering public comments, identifying priority areas, providing timelines and cost estimates for best management practices and writing a detailed report. The resource investigation report will explore land use in the watershed, point and nonpoint pollution sources, agricultural practices being used, lakeshore development, septic system compliance, and water quality trends.

Cottonwood River

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 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.

Cottonwood Streambank Inventory and Prioritization Project — 2012

Sponsor: RCRCA

Funding: Section 319 (Grant) \$297,000

Purpose: This RCRCA project will promote agricultural BMPs projects, identify sensitive areas for projects, inventory and prioritize project need, provide cost-share funding for BMP implementation, particularly the remediation of stream bank failures through a) direct streambank restoration and b) practices that slow hydrologic processes; identify high erosion streambanks and near-channel grade stabilization/ravine problems along the Cottonwood River corridor and create a method to prioritize the sites; and provide necessary project administration, meeting all grant requirements.

Le Sueur River

Le Sueur Watershed Targeted Conservation Practices — 2012

Sponsor: Minnesota State University – Mankato – Water Resources Center

Funding: Section 319 (Grant) \$82,491

Purpose: The Water Resources Center at Mankato will form a steering committee to serve an advisory role for the project; collect and organize data on existing BMP implementation, targeting and modeling research and other data for the map production; complete tillage transect survey/WinTransect; determine what existing laws or regulations, location and type of BMPs to target; complete “Flow Calculation Modeling”; actively seek out willing stakeholders through the “Le Sueur Civic Engagement Project”; provide project information to local government units meetings; provide a project survey, and data usage analysis; and manage and coordinate project administration.

Lower Minnesota River

Assessing Iron Enhanced Filtration Trenches — 2011

Sponsor: City of Prior Lake

Funding: Section 319 (Grant) \$240,000

Purpose: The purpose of this project is to quantify the performance of full-scale, field-installed, iron-enhanced filtration trenches which will provide critical design, construction, and performance information for a practice that could be used to significantly reduce the dissolved phosphorus load entering wetlands, rivers, and lakes in Minnesota.

This project will investigate the design of a new treatment system that utilizes a sand filter enhanced with iron shavings or steel wool around the perimeter and near the outlet of a wet detention basin. When stormwater enters the basin, the water level will increase and stormwater will begin flowing into the filtration trenches. Significant particulate removal occurs through settling within the wet detention basin and additional particle and dissolved pollutant capture occurs by filtration and adsorption within the enhanced media trench. The technology was tested during the summer of 2010 through funding provided by the City of Prior Lake, the Prior Lake Spring Lake Watershed District, and the Scott County Watershed Management Organization.

Blackhawk Lake Protection Project — 2013

Sponsor: City of Eagan

Funding: CWP (Grant) \$46,500

Purpose: The City of Eagan will collaboratively develop educational programs and materials for the Black Hawk Middle School and Deerwood Elementary School

community and will determine the most appropriate opportunities for community education and involvement in site analyses and selection, design, installation, operation, and maintenance of selected BMPs.

Credit River Protection Plan — 2013

Sponsor: Scott Watershed Management Organization

Funding: CWF (Grant) \$225,000

Purpose: This project will promote land and water treatment practices, including wetland restoration, riparian vegetation management, geomorphic (stream stabilization and grade control), livestock exclusion, native grasses, and rain gardens. Also included are three specific geomorphic (stream/grade) stabilization projects in the Hidden Hills Park area of Savage, a wetland restoration in Savage, and finishing the Ponds Park Storm Water Reuse Project. The project includes a 0.25 FTE to provide the technical assistance necessary to implement the practices. Metrics or targets for this objective include: installation of 30 rain gardens, 70 acres of natural practices (i.e., wetland restoration, native grass or riparian vegetation management), the completion of 3-4 geomorphic practices (stream stabilization or grade control), and 1 storm water reuse project. The bulk of the education/outreach effort, however, will be used to develop and implement a program targeting small hobby farm and other large-lot residential land owners, to include both broad-based and individual (e.g. door-to-door) marketing and outreach components. A 0.25 FTE position is included in the budget for this effort.

High Island Creek – McLeod County SSTS Project — 2013

Sponsor: McLeod County

Funding: CWP (Loan) \$120,000

Purpose: This project will work to address non-compliant SSTS systems in McLeod County's portion of the High Island Creek Watershed through the allocation of loan funds to rural homeowners. Overall, this specific project strives to implement 3 SSTS upgrades per year for the next 3 years.

High Island Creek TMDL Project for Fecal Coliform — 2011

Sponsor: Sibley County

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

Purpose: The water quality issues and concerns of the High Island Creek Watershed grew from past surface

water monitoring completed within the watershed and the Minnesota River Basin. The Minnesota River Basin is a major source of pollution to the Mississippi River, as determined by the Minnesota River Assessment Project (MRAP, 1994). Results from the Agricultural Drainage and Pesticide Transport model by the University of Minnesota (Dr. David Mulla), shows that the Lower Minnesota River watershed contributes a large percentage of the sediment and nutrients that enter into the Mississippi River. This has put pressure on the rural watersheds of the Lower Minnesota to improve their surface water quality. The desired environmental outcome for this project is to make significant progress on or achieve the TMDL for fecal coliform bacteria. To work toward reaching the TMDL for fecal coliform in High Island Creek, project activities will be focused to on-the-ground implementation practices that reduce fecal coliform bacteria levels and educational activities. By applying significant implementation practices, this project will also increase wildlife habitat and improve aquatic habitat. 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.

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.

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.

Neighborhood Lakes Management Plans — 2012

Sponsor: City of Eagan

Funding: CWP (Grant) \$167,000

Purpose: The City of Eagan will prepare state-of-the-art water quality management plans for twelve

neighborhood lakes. The plans will include the following specific sections: 1) Introduction of purpose, problem, etc.; 2) Summary of watershed and lake, including history, soils and geology, climate, watershed characteristics, lake morphometry and hydrology, historical water quality, fisheries status, aquatic vegetation, and water level; 3) Discussion of water quality standards (as above) and numeric targets; 4) Assessment and analysis of TP sources and contributions from urban stormwater, internal release, atmospheric deposition, and others; 5) Modeling water quality to source loads; 6) Development of a TMDL for impaired lakes and a virtual TMDL for unimpaired lakes, including waste load allocations, load allocations, and margin of safety, and discussion of future growth and anti degradation; 7) Public input and involvement in development of plan; and 8) Implementation strategy, including reasonable assurance and follow-up monitoring.

Quantifying Phosphorus Load Reductions from Street Sweeping — 2010

Sponsor: U of M, Water Resources Center

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 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.

Rush River Watershed – Nicollet County SSTS Project — 2013

Sponsor: Nicollet County

Funding: CWP (Loan) \$150,000

Purpose: This project will work to address non-compliant SST systems in Nicollet County's portion of the Rush River Watershed through the allocation of loan funds to rural homeowners. Overall, this specific project strives to implement 5 SSTS upgrades per year for the next 3 years.

Scott Watershed Management Organization TMDL Implementation — 2013

Sponsor: Scott Watershed Management Organization

Funding: Section 319 (Grant) \$298,512

Purpose: Implement BMPs that are part of, and citizen engagement efforts that support; Implementation Plans for Cedar and McMahon Lakes Excessive Nutrients and the Lower Minnesota River Dissolved Oxygen TMDLs. BMPs to be promoted include: harvestable filter strips, alternative tile intakes, water and sediment basins, grassed waterways, grade control, wet detention ponds, native vegetation plantings, wetland restoration, riparian vegetation improvements, and shoreline restoration and stabilization. Much of the funding is for staffing to provide the technical assistance necessary to promote and implement the BMPs. One specific project included on public land converts roughly 19 acres of cropland near Cedar Lake to native vegetation. A citizen engagement event using volunteers to complete the seeding and planting will be coordinated with this effort. A second citizen engage/community capacity building effort that will be completed is a customer service survey with landowners who participated in the cost share/incentive program.

Minnesota River – Headwaters

Protecting North and South Fork Yellow Bank River — 2012

Sponsor: Lac qui Parle-Yellow Bank Watershed District

Funding: CWF (Grant) \$260,900, CWP (Loan) \$370,000

Purpose: This project will offer incentives to protect 80 acres of land in filter strips and highly erodible lands adjacent to the rivers; construct nine sediment and water control basins or terraces; replace 35 open tile intakes and advocate wetland restorations and grassland easement programs; organize a Friendship Tour to bring together Minnesota and South Dakota farmers, county commissioners, farm organizations, local, state and federal agency personnel to experience the watershed, farming practices, discuss future project ideas and strengthen relationships; and upgrade 37 subsurface sewage treatment systems by offering landowners low interest loans for their share of construction.

Minnesota River – Mankato

Middle Minnesota River Low Dissolved Oxygen TMDL Project — 2012

Sponsor: Renville County

Funding: Section 319 (Grant) \$245,475

Purpose: This Renville County project will offer one-time and annual financial incentives to landowners for BMP efforts that will be focused on activities that reduce phosphorus loss, prevent soil erosion, and increase groundwater recharge. The anticipated activities include 50 side inlets, 150 acres of buffers, 2 feedlot upgrades/livestock exclusions and other special projects to be determined.

Middle Minnesota Watershed, Implementation of Conservation Practices — 2011

Sponsor: Cottonwood County

Funding: CWP (Loan) \$1,400,000

Purpose: Coordinate the CWP loan program in southern Minnesota counties to demonstrate the influence low interest SSTS loans has on the rate of SSTS compliance. 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 individual counties: Blue Earth, Brown, Cottonwood, Nicollet, Redwood, Renville and Sibley.

Minnesota River – Yellow Medicine River

Hawk Creek – Minnesota River Phosphorus Reduction — 2013

Sponsor: Hawk Creek Watershed Project

Funding: Section 319 (Grant) \$228,992

Purpose: Cost-share assistance will be available for BMPs that focus on and are proven to be effective in reducing phosphorus, such as, but not limited to: side inlets, alternative tile intakes, conservation drainage systems, water and sediment control basins, grade stabilizations, streambank stabilizations, feedlot waste reduction projects, rain gardens, and lakeshore buffers. Another goal is to build on established relationships through increased authentic civic engagement activities to increase conversations and collaboration with a more diverse community.

Hawk Creek Watershed Nitrogen Reduction Project — 2013

Sponsor: Hawk Creek Watershed Project

Funding: CWF (Grant) \$10,000, CWP (Loan) \$1,050,000

Purpose: This project will upgrade an estimated 75 subsurface sewage treatment systems (SSTS) for the three counties of Chippewa, Kandiyohi, and Renville within the watershed. The grant funds will be used to administer the loan program for the three counties.

Pomme de Terre River

Pomme de Terre River Protective Buffer Project — 2013

Sponsor: Pomme de Terre River Association

Funding: CWF (Grant) \$216,600, CWP (Loan) \$500,000

Purpose: This project will offer incentives to protect 200 acres of riparian buffer in the headwaters of the watershed, accounting for 1860 tons of sediment prevented from reaching surface waters each year the practices remain in place. This project will allow for outreach programs, such as tours, to engage more interested citizens. The desired outcome would include 30 or more participants in the program, and to develop a more extensive volunteer base.

Redwood River

Redwood River Watershed Nonpoint Pollution Reduction Project — 2010

Sponsor: RCRCA

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 pounds of aquatic plant growth annually (plus 350 tons of sediment).

Rainy River Basin

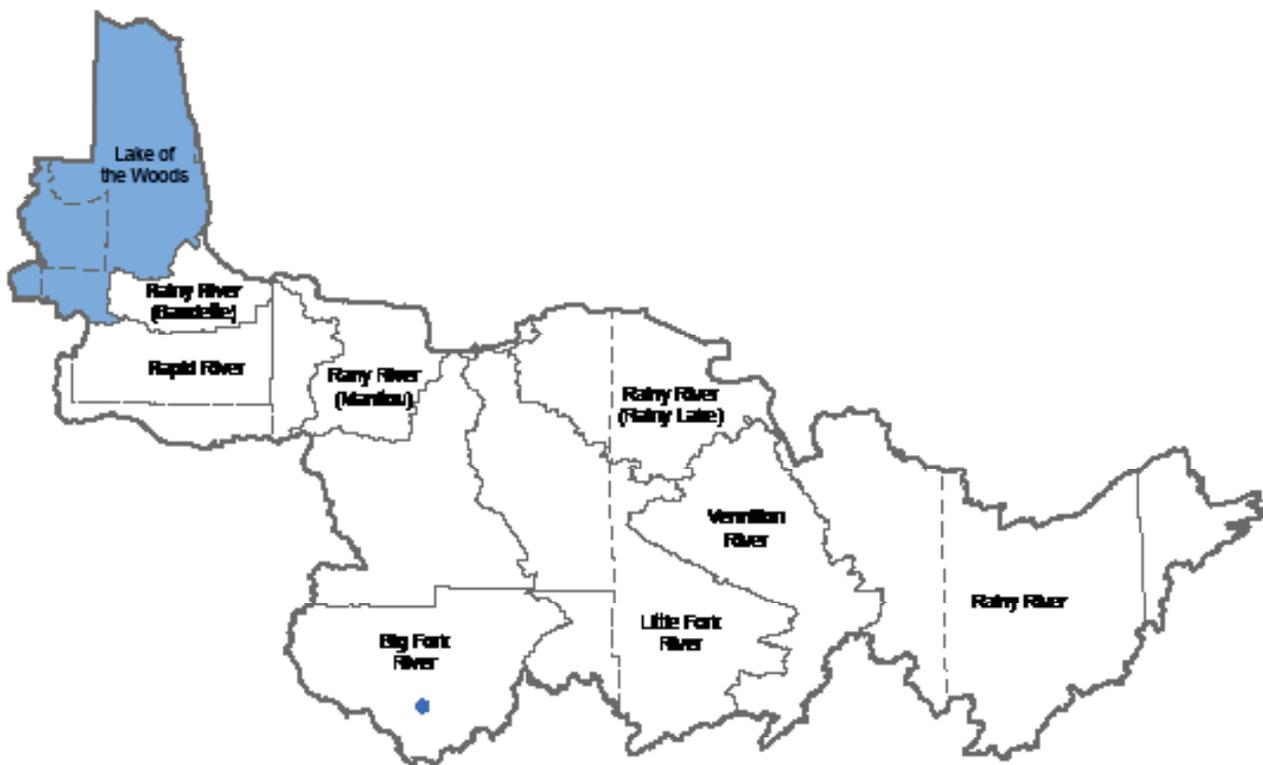
Projects completed

Lake of the Woods Watershed

Bostic and Zippel Watershed Assessment

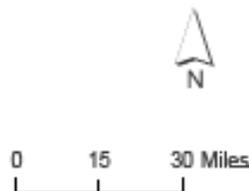
Rainy River – Headwaters Watershed

Kawishiwi Watershed Clean Water Protection Project – Phase 1



Legend

- Approved Lake TMDL
- Approved Stream TMDL
- County Boundary
- Major Watershed
- Basin Boundary
- Watershed Projects**
- Active
- Active and Completed
- Completed



Lake of the Woods Watershed

Bostic and Zippel Watershed Assessment

This project addresses water-quality concerns attributed to erosion, sedimentation, flooding, and nutrient transport occurring within the Bostic and Zippel watersheds. The Bostic and Zippel are experiencing high erosion and deposition rates. Resort owners utilizing these bays to access Lake of the Woods report having to dredge on an annual or bi-annual basis to maintain an open channel. Landowners along the main channel of both water bodies also report an increase in spring runoff and limited accessibility.

The Lake of the Woods Soil and Water Conservation District (SWCD) and USDA Natural Resources Conservation Service Water Resources Staff (NRCS) have developed a Comprehensive Watershed Assessment Project plan (available upon request) which was sent out for a multi-agency review and comment period in 2009. The overall goal of this assessment is to determine the leading contributors of sediment and develop an implementation plan that will: identify major sources of sediment within these watersheds; identify the causes of ditch systems' instabilities and erosion (i.e. flooding and peak flows, land use practices); quantify the sedimentation damages (monetary, ecological, and environmental); and identify Best Management Practices for reducing nutrient loads and sediment transport within the watersheds.

Goals

- To determine the leading contributors of sediment to Bostic and Zippel Bays and quantify amount being deposited within the bays.
- Identify best management practices for reducing nutrient loads and sediment transport within the watershed.
- Develop a plan for protection and restoration of the bays and use the data gathered to inform future efforts.

Results that count

- Estimated average sedimentation rates within the Bostic and Zippel Bays are on the order of one to two tenths of an inch per year. This is an average over the entire bay and the actual bay sedimentation occurs unevenly, with the lower stream reaches/upper bay reaches filling in first.



Zippel Watershed: Photo depicts use of the flow tracker to gather flow data and YSI sonde for collecting sampling data.

- Sediment yields within each watershed vary. Bostic Bay and South Zippel Bay see more erosion contributed from streambank erosion. The majority of sediment in the West Branch of Zippel Bay is derived from ephemeral, sheet and rill erosion.
- Concentrated efforts to aggressively track and treat erosion problems as they arise will be critical to maintaining stable watershed conditions in the future.

Financial information

Funding type: CWP

Grant amount: \$52,750

In-kind: \$49,400

Contact information

Lake of the Woods County

(On behalf of Lake of the Woods SWCD)

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Rainy River – Headwaters Watershed

Kawishiwi Watershed Clean Water Protection Project – Phase 1

A partnership of the White Iron Chain of Lakes Association (WICOLA), Lake County Soil and Water Conservation District (SWCD) and Lake County received a Clean Water Land and Legacy Grant and a Clean Water Partnership Grant in 2011 to further study water resources in the watershed. The Kawishiwi Watershed Protection Project (KWPP) is a multi-year joint effort of WICOLA, Lake County SWCD, and the Minnesota Pollution Control Agency (MPCA) to collect data which will help these partners create a comprehensive management plan to restore and maintain a healthy watershed. This project included the following elements:

- Perform water quality sampling on selected lakes and streams for nutrient and chemical analysis;
- Compile existing data into a common format and consolidation into a public source;
- Assess the condition of previously untested lakes and streams;
- Investigate the paleolimnology of selected lakes through core sediment samples to understand the historical impact of human development;
- Inventory and assess the existing condition of the Subsurface Sewage Treatment Systems (SSTS) within the watershed and provide an evaluation of the susceptibility of shallow groundwater and surface water from the existing SSTS in the area;
- Identify options for aggressively combating Aquatic Invasive Species, complete AIS Survey and assessments;
- Perform Geographic Information Systems analysis to identify environmentally sensitive areas; and
- Develop a comprehensive and integrated approach to watershed planning and management.

The Final Implementation Plan provides background information about the Kawishiwi River watershed; summarizes the findings of standalone reports prepared for each of the project elements noted above; and sets forth an Implementation Plan of actions to be undertaken by a partnership of federal, state, county, local, and private stakeholders to protect and improve the beneficial uses of the water resources within the watershed. These actions are both short and long term, and include both structural (capital and maintenance



Kawishiwi Watershed

projects) and nonstructural (education, regulation, incentives) actions.

Goals

- Collect baseline data on the condition to the Kawishiwi Watershed.
- Create a comprehensive management plan to restore and maintain a healthy Watershed.
- Develop sustainable partnership that will implement the management plan developed by the Project.

Results that count

- Aquatic Invasives - 230 Sites were sampled for Rusty Crayfish, 18 Lakes were sampled for the presence of Spiny Water Flea, Property Owners examined their boats and equipment for Zebra Mussels and Eurasian Water Milfoil. Monitoring – Water quality was assessed at 75 sites in the Watershed, 12 sites were sampled monthly for nutrient concentrations, 16 streams were sampled bi-weekly for physical parameters and heavy metals were tested at two locations in the Watershed. Geographical Information Systems – 590 Points in the Watershed were assessed for their impact on water quality, 43 lakes were visited, GPSed and photographed. SSTS Inventory – Volunteers combed through Lake and St. Louis County records and gleaned information on nearly 2200 Septic Systems in the Watershed. Analysis of this information concluded that over 50% of these septic systems fail to adequately protect groundwater.

- An implementation plan was developed that identified specific locations as priorities based on water quality data, SSTS system information and Paleolimnological data gathered as a part of the Project. Areas identified are located throughout the watershed. Additional investigation is recommended to protect and restore water quality. These include Community Assessment Reports, shoreland scoring and public education.
- Partnerships developed through this grant are already continuing forward to implement some of the recommendations. The USFS, Lake County SWCD, DNR, Sea Grant applied for a grant to control the spread of Rusty Crayfish into the BWCAW. The 1854 Treaty Authority has worked with WICOLA, DNR and Sea Grant to study the impact of Rusty Crayfish on Wild Rice and other aquatic vegetation. A move has been started to form a coalition of Lake Associations in the Laurentian (Rainy River) Watershed. USFS is monitoring stream water quality. Twin Metals is planning to share their Water Quality data.

Financial information

Funding type: CWP

Grant amount: \$174,500

In-kind: \$155,469

Matching funds: \$29,973

Contact information

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Rainy River Basin

No projects active

None awarded in 2014

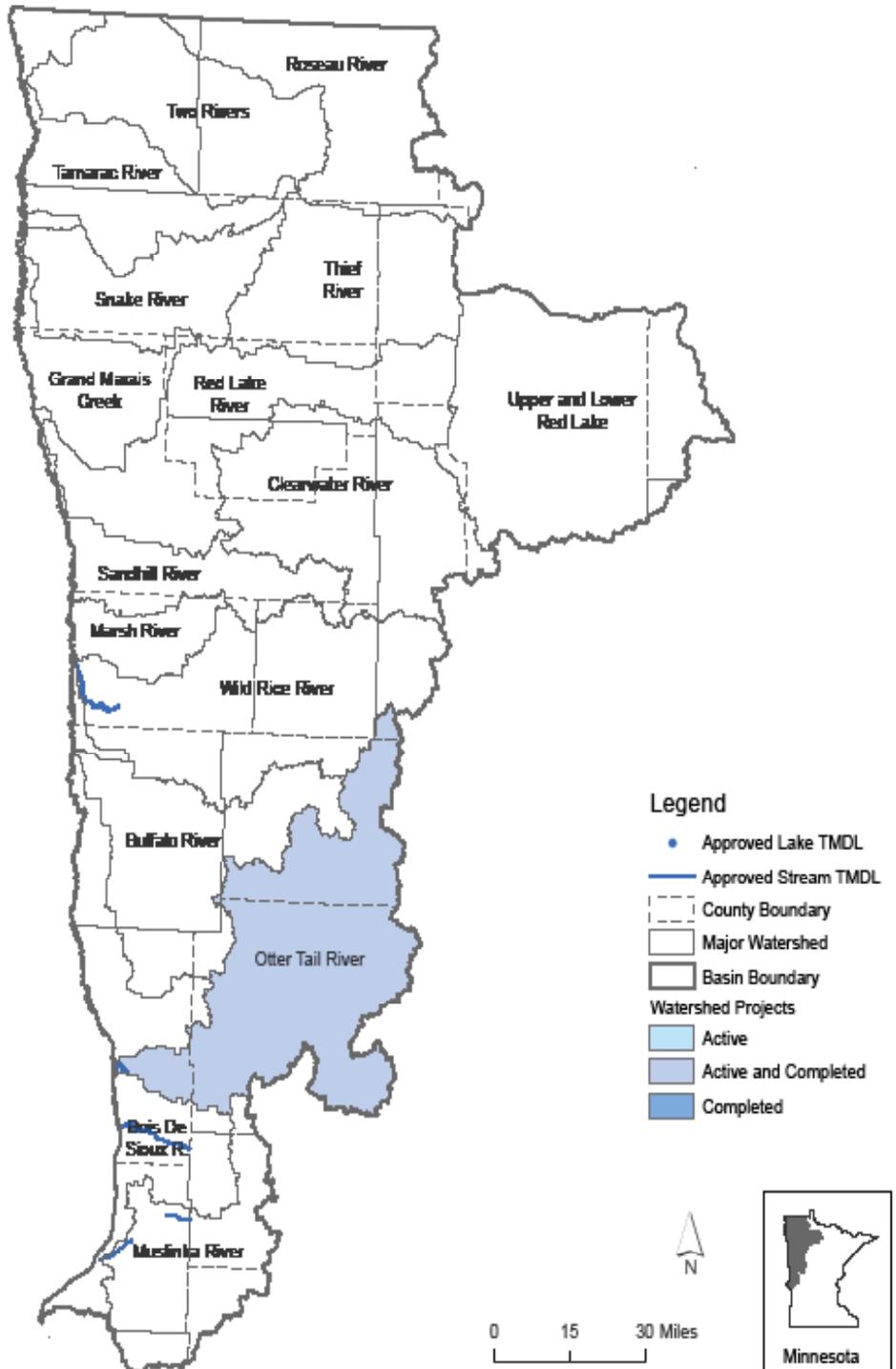
Red River Basin

Projects completed

Otter Tail River Watershed

Lake Alice Resource Investigation

Pearl Lake Diagnostic Study



Otter Tail River Watershed

Lake Alice Resource Investigation

The diagnostic study described water quality conditions leading to use impairment and loss of ecosystem services in Lake Alice and has identified the causes of that degradation. The primary causes of degradation are two fold; the storm sewer inputs have high phosphorus concentrations and the sediment from the storm sewer inputs over time have built up high phosphorus concentrations. The study also determined that groundwater interacts with Lake Alice and that concerns of punching through the seal of a perched lake are unwarranted for Lake Alice. The study presents a suite of remediation options which could be considered as part of a program to restore lost beneficial use. Evaluation of those options requires careful consideration of regulatory requirements, efficacy, cost, logistics, interim disruption of the ecosystem and benefits derived. It is proposed that these considerations be addressed as part of a second phase program involving representatives of city government, regulatory officials and community stakeholders.

Goals

- Set restoration goal
- Develop and hydraulic budget
- Develop a phosphorus budget

Results that count

- The applicable goal for this lake is an aesthetic improvement in clarity and minimizing odor. The lake characteristics do not lend themselves well to fishing or swimming.
- A hydraulic model showing inflow and outflow under various conditions was made and compared to data and it was determined there is a groundwater feed through the lake.
- The diagnostic study goes through in detail the quantity of each phosphorus input to the lake and demonstrates that the problems will continue until the storm sewers are no longer supplying phosphorus and the sediment phosphorus deposits are removed (in that order).



Lake Alice

Financial information

Funding type: CWP
 Grant amount: \$98,500
 In-kind: \$153,453
 Matching funds: \$ 22,850

Contact information

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Otter Tail River Watershed

Pearl Lake Diagnostic Study

The purpose of this project is to address water quality concerns associated with eutrophication in Pearl Lake (Minnesota DNR ID 03-048600) located entirely within Lake Eunice Township, Becker County. Currently no water quality diagnostic studies or lake management plans are in place, leaving questions in Pearl Lake's future administration. This project includes three years of background study to develop a foundation of knowledge on Pearl Lake's phosphorus budget, watershed & lake characteristics, and overall water quality. This body of knowledge allows more effective management of lake resources in support of beneficial uses for Pearl Lake. Pearl Lake (03-048600) covers 281 acres, and drains an area of 577 acres. This watershed is entirely within the North Central Hardwood Forest Ecoregion. Pearl lake is a publicly accessible water of the state, within the jurisdiction of the Pelican River Watershed District. Pearl Lake offers recreational opportunities and aesthetic rewards for residents and visitors alike.

Fisheries surveys indicate strong populations of Walleye, Northern Pike, Largemouth Bass, Bluegill, and Brown & Black Bullhead. Walleye are stocked by the DNR on a biennial basis, due to a lack of appropriate spawning habitat and angler harvest efficiency. According to the DNR's Lake Information Report for Pearl Lake (last surveyed 2009, accessed in April 2013), the lake's Northern Pike fishery is improving, while the Bluegill population is stunting from angler preference, and the bullhead prevalence is diminishing due to commercial fishing and young-of-year netting efforts.

Phosphorus is the primary nutrient of concern for Pearl Lake's eutrophication shift. Nutrient loading is predominantly from internal loading representing approximately 49% of the phosphorous load into the lake. The watershed to lake surface area is approximately 3:1, however this represents the most pragmatically treatable area of input into the lake.

Focusing on eliminating non-compliant septic systems alone can account for as much as a 10% reduction in phosphorus inputs into the lake. Some reductions through agricultural best management practices (BMP's) may be possible, and would work in cooperation with the Becker County Soil & Water Conservation District and Natural Resource Conservation District. In lake treatment



Linear drainage, possible grassed waterway

options would include alum flocculation or aeration treatments; however these treatments may not be feasible, or may be cost prohibitive in nature.

Goals

- Characterize the watershed and water quality of Pearl Lake
- Utilize lake and watershed modeling to construct an Implementation Plan
- Determine Best Management Practices (BMPs) and encourage citizen involvement

Results that count

- Generally, Pearl Lake's water quality is acceptable by state standards for the North Central Hardwood Ecoregion for growing season means for the parameters of total phosphorus, chlorophyll-a, and Secchi depth.
- Pearl Lake has the propensity to diminish in overall water quality. Modeling of the watershed and lake levels indicated that the main water export from the system came in the form of evaporation, meaning most nutrients would be deposited rather than moving through the system.
- Phosphorus is the primary nutrient of concern for Pearl Lake's eutrophication shift. Nutrient loading is predominantly from internal loading representing approximately 49% of the phosphorous load into the lake. The watershed to lake surface area is approximately 3:1, however this represents the most pragmatically treatable area of input into the lake.

- BMPs will include shoreland and watershed best management practices including filtering buffers, and shoreline revegetation; more stringent regulations to reduce the amount of runoff; use of rain gardens, native plantings, and reforestation as a means of increasing infiltration, evapotranspiration, and filtration of lake bound runoff; alum treatment and eliminating non-compliant septic systems.

Financial information

Funding type: CWP

Grant amount: \$47,188

In-kind: \$24,258

Matching funds: \$29,550

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Red River Basin

No projects active

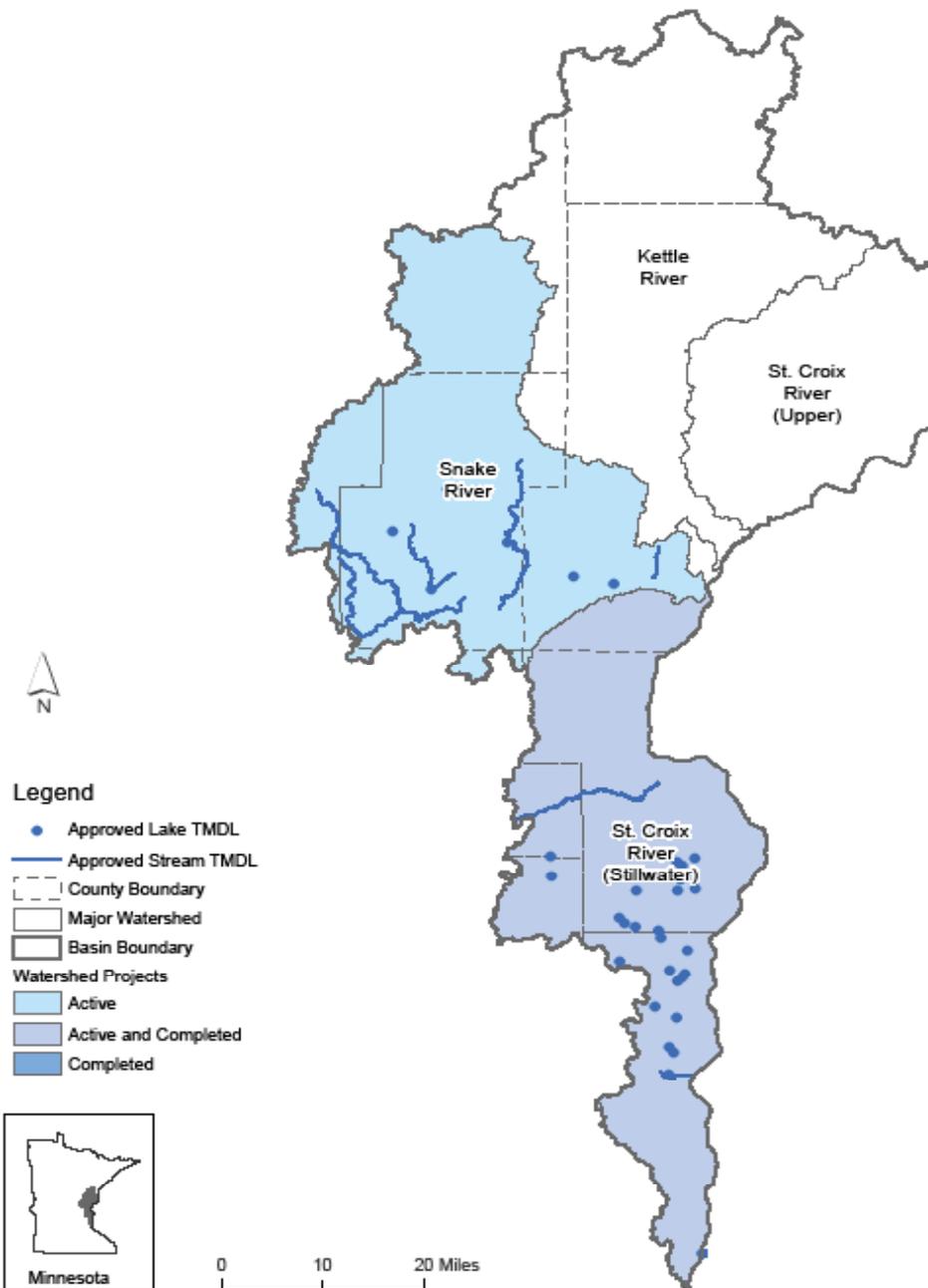
None awarded in 2014

St. Croix River Basin

Projects completed

Lower St. Croix Watershed

St. Croix Minimal Impact Design Standards Pilot Project
Square Lake Implementation Plan Refinement



Lower St. Croix River Watershed

St. Croix Minimal Impact Design Standards Pilot Project

This project is complementary to and was carried out in parallel with the work to develop Minimal Impact Design Standards (MIDS) technical standards. The project focused on implementation issues, including:

- Raising awareness on the part of local decision makers about the negative consequences of conventional development and the environmental and socio-economic benefits of low impact development-type management practices.
- Supporting local and regional visioning and planning processes that proactively assess the impacts of alternative growth and development scenarios.
- Facilitating the development and adoption of local codes and ordinances that remove barriers to low impact development-type management practices and create incentives, as appropriate.

As part of the codes and ordinances work, WCD studied ordinances currently in place in the Basin as well as example ordinances from Minnesota and the Center for Watershed Protection. WCD developed a package of model zoning codes, watershed district rules, ordinance revisions and other tools that will enable Minnesota communities to implement MIDS and meet regulatory requirements. WCD conducted outreach on codes and ordinances to local communities in the Basin and encourage adoption of updated ordinances.

Workshops and training were held to build local decision makers knowledge, identify the connections their communities have to the St. Croix River and other water resources in the basin and provide these communities with tools to make land use and land management decisions that will protect local water resources and reduce runoff volumes and phosphorus loading to the St. Croix River.

Additionally, WCD and partners worked hands-on with four communities on standards, ordinances, zoning code revisions and other tools and will include use of metrics to measure changes and effects.

Finally, WCD and partners developed a comprehensive MIDS Community Assistance Package (CAP). This package will continue to be promoted and distributed throughout the St. Croix Basin and other regions of the State.

Goals

The project focused on implementation issues, including:

- Raising awareness on the part of local decision makers about the negative consequences of conventional development and the environmental and socio-economic benefits of low impact development-type management practices;
- Supporting local and regional visioning and planning processes that proactively assess the impacts of alternative growth and development scenarios;
- Facilitating the development and adoption of local codes and ordinances that remove barriers to low impact development-type management practices and create incentives, as appropriate.

Results that count

- Numbers in attendance at NEMO [and Stormwater U] trainings (# of communities, # of elected officials, etc.): Over 30 Workshops, Trainings, and Meetings. Estimated attendance = 774 people and over 2,500 hours of attendee time.
- Number of communities expressing interest in becoming a MIDS Pilot: Six (6) plus attendees at MIDS CAP Workshops.
- Number of communities providing feedback on MIDS package: Eight (8)
- Number of communities adopting MIDS-related policy language: VBWD adopted MIDS standards. MSCWMO considering adoption.
- Number of communities revising ordinances: Pilot communities considering adoption.
- Number of communities adopting MIDS package: Pilot communities considering adoption.

Financial information

Funding type: Section 319

Grant amount: \$149,810

Final in-kind: \$104,225

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Lower St. Croix River Watershed

Square Lake Implementation Plan Refinement

Square Lake is ranked in the top 1% for water clarity in the north central hardwood forest ecoregion of Minnesota. Square Lake is of regional significance due to its very high water quality and unique recreational opportunities including trout fishing and scuba diving. From the 1970s through approximately the early 1990s, water clarity in Square Lake averaged 7 meters. In the years since then, water clarity has been consistently declining and reached a low of 4.9 meters in 2008. Whereas water clarity declines in many Minnesota lakes are linked to increasing amounts of phosphorus inputs from the landscape or from lake sediments, the water clarity trend in Square Lake does not fit this pattern. In-lake phosphorus concentrations have remained surprisingly consistent over the time period in which water transparency has declined. Previous studies suggested that the stocking of rainbow trout, which are known to be size-selective predators on *Daphnia*, may be responsible for the lower numbers of large-bodied *Daphnia*, increased levels of phytoplankton, and decreased clarity of Square Lake. This study further investigates the link between *D. pulicaria*, its predators, and Square Lake's water clarity, and to investigate sources of phosphorus from the watershed and groundwater. The results from this study provide strong evidence that an interaction between the earlier onset of summer stratification (due to climate change) and predation on *D. pulicaria* by rainbow trout during winter-early summer is responsible for the marked decline in the water clarity of Square Lake. The major outcome from this study was an agreement between the DNR Central Region Fisheries and the CMSCWD to implement a three-year stocking suspension of rainbow trout in Square Lake to evaluate whether stocking suspension results in an increase in *Daphnia pulicaria* density and water clarity of the lake.

Goals

- Evaluate the watershed and groundwatershed to determine if changes in phosphorus loading are the cause of the decline in transparency in Square Lake
- Gather environmental and water quality data to compare with historical data from Square Lake and evaluate trends in the lake's water quality



Square Lake

- Evaluate the diets of an array of predators to determine which are the most significant consumers of large-bodied *Daphnia* (*D. pulicaria*)

Results that count

- Watershed and ground watershed phosphorus loads have not changed significantly in recent years and in-lake phosphorus concentrations are not correlated with the decline in transparency in Square Lake.
- Summer water quality (water transparency and algal biomass levels) was similar to that of the past decade and substantially worse than historical water quality (before 1990).
- Rainbow trout consume the most *D. pulicaria* (per capita) of any of the species examined in this study.

Financial information

Funding type: CWP
 Grant amount: \$53,145
 Final in-kind: \$2,011
 Matching funds: \$53,132

Contact information

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 MPCA Project Manager: Christopher Klucas

St. Croix River Basin

Projects active

No projects awarded in 2014

Lower St. Croix River Watershed

Forest Lake North Shore Subwatershed Assessment — 2013

Sponsor: Comfort Lake-Forest Lake Watershed District

Funding: CWP (Grant) \$12,000

Purpose: This project will identify, prioritize, and prepare 10 to 15 feasible concept designs for specific water quality improvements capable of capturing and treating 1 inch of runoff from the direct contributing watershed of North Shore Trail.

Forest Lake Stormwater Filtration Retrofit — 2013

Sponsor: Comfort Lake-Forest Lake Watershed District

Funding: CWP (Grant) \$143,025

Purpose: This project will implement a stormwater retrofit of an existing stormwater pond and shoreline stabilization project in the Hilo Lane development, circa 1970s, located on the south shore of Forest Lake. Stormwater treatment for this 14 acre tributary drainage area comprised of residential land uses will include bio-filtration, iron enhanced sand filtration, channel stabilization and shoreline stabilization. The estimated nutrient reduction from the project is almost 12 pounds per year of total phosphorous.

Sand and Long Lakes Protection Project — 2013

Sponsor: Comfort Lake-Forest Lake Watershed District

Funding: CWF (Grant) \$132,000

Purpose: Implementation activities proposed as a part of this project include water quality monitoring, biotic surveys, sediment core sampling, mechanical treatment of curly-leaf pondweed (in accordance with regulations and permitting), an iron-enhanced sand filter, with a high capacity multi-stage outlet weir and 40,000 pounds of iron filings and stakeholder involvement in the design process and educational presentations.

Snake River Watershed

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% of the sediment load, with an additional 10% 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% 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.

Kanabec Water Resources Protection Project — 2012

Sponsor: Kanabec Soil and Water Conservation District

Funding: CWF (Grant) \$201,892

Purpose: This project will provide baseline data through water monitoring, recording and analyzing the results of six unassessed rivers/tributaries, three unassessed lakes and five storm water outlets in the city of Mora which drain to the Snake River; promote and implement approved BMPs, including feedlot runoff treatment and

control, livestock fence exclusion from streams, heavy use protection areas for cattle, roadside runoff/erosion control, critical area seeding, sediment basin and wetland restoration; sponsor an outdoor water quality learning event in 2012 for ninety Girls Scouts and their families, as a national event for the Girl Scouts of America; provide technical assistance for the development of eight nutrient management plans for landowners; develop eight forest stewardship plans for landowners; promote and implement the local agriculture. Best Management Practice Loan Program to assist landowners with BMPs that protect and improve water quality.

Snake River Watershed Resource Protection Project — 2012

Sponsor: Snake River Watershed Management Board

Funding: CWP (Loan) \$400,000

Purpose: This project will promote and install 40 SSTs and other rural best management practices in the Snake River watershed.

Sunrise River North Branch TMDL Implementation Plan — 2010

Sponsor: Chisago County

Funding: Section 319 (Grant) \$130,000

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% 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.

Upper Mississippi River Basin

Projects completed

Long Prairie River

Long Prairie River CWL 319 Non-Point Implementation Plan

Mississippi River – Brainerd

Serpent Lakeshed Protection Investigation Study

Mississippi River – Grand Rapids

Demonstrating Shoreline Buffers in Big Sandy’s Watershed

Mississippi River – Headwaters

Deer and Pokegama Lakes: A Diagnostic Study

Mississippi River – Sartell

Pelican Lake of St. Anna Diagnostic Study and Implementation Plan

Mississippi River – Twin Cities

Clear Lake Diagnostic Study

Lake Harriet Diagnostic Study and Management Plan

Shingle Creek Porous Pavement Paired Intersection Study

West Moore Lake Water Quality Enhancements

North Fork Crow River

Crow River Basin Sediment Reduction Project

Green Lake Eurasian Watermilfoil/Stormwater Study

Middle Fork Crow River Watershed Restoration and Enhancement Project Continuation

CROW – Working Together to Improve Water Quality Continuation

Pine River Watershed

Pine River Watershed Stream Baseline Water Quality

Rum River

Mille Lacs Lake Watershed Protection

Sauk River

Lower Sauk River Water Quality Protection Project

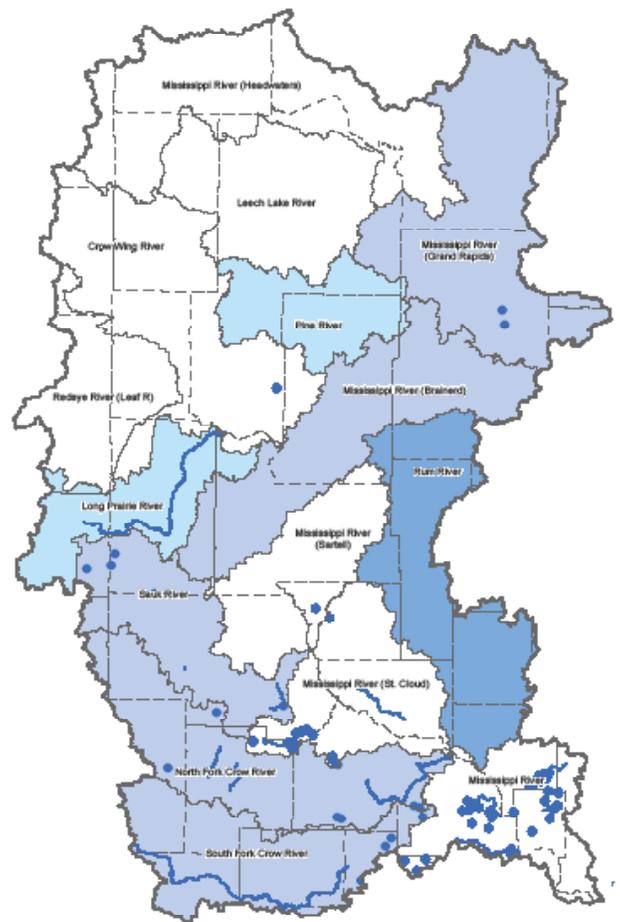
Osakis Lake Enhancement Continuation Project

Sauk River Water Quality Protection Project Phase III

SRWD Watershed-Wide Groundwater Protection Project

South Fork Crow River

CROW – Surface Water Runoff Reduction Project



Long Prairie River Watershed

Long Prairie River 319 Non-Point Implementation Plan

The MPCA has observed dissolved oxygen (DO) concentrations below the 5-mg/L standard in the lowermost portion of the river at Motley. The Todd Soil and Water Conservation District (Todd SWCD), working in cooperation with MPCA under a Clean Water Partnership (CWP), has found DO concentrations below 5-mg/L periodically in the middle reach, 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 are listed as "impaired waters" for low dissolved oxygen.

The Long Prairie River is a Class 2B water body. Its designated uses are aquatic life, recreation, canoeing, industrial consumption, agriculture, wildlife, aesthetic enjoyment and navigation. However, fish kills have occurred in the Long Prairie River, and monitoring has shown that dissolved oxygen (DO) concentrations in portions of the river intermittently fall below the state water quality standard of 5 milligrams per liter (mg/L), the minimum level considered necessary to support aquatic life.

In the course of the TMDL study, it was determined that a large percentage of the dissolved oxygen depletion stems from point sources, and that there is a potential for municipal discharges to cause ammonia toxicity during low flow conditions. The point sources will be working directly with MPCA, through the permit process, to reach compliance with their load allocations. The non-point pollutant sources in the watershed are mainly agriculture, and were addressed by this 319 implementation grant, in cooperation with continuing strong programs for implementing Best Management Practices (BMP's), that are in place through Todd SWCD and their partners.

Goals

- Installation of BMP's to address non-point agricultural runoff
- Use financial and technical assistance as an incentive to encourage landowners to install BMP's
- An overall reduction in BOD from all sources

Results that count

- There were nine animal ag practices installed to prevent agricultural runoff from reaching surface waters



Long Prairie River, HWY 10 Motley, MN. Six stream barbs and rock riprap were used to stabilize the eroding bank that was threatening HWY 10.

- Throughout the entire Long Prairie River Watershed, there was a total of 28 best management practices installed by Todd, Morrison and Douglas SWCDs, including: one sediment basin, one well decommissioning, two ag waste systems, one prescribed grazing plan, two bio-retention projects, one shelterbelt, one field windbreak, six pond abandonments, five streambank and shoreline protection projects and eight reforestations.
- We completed two ag waste projects that reduced BOD by 1,446 pounds and kept it from entering into the watershed system

Financial information

Funding type: Section 319

Grant amount: \$300,000

In-kind: \$692,950

Matching funds: \$300,000

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Mississippi River – Brainerd

Serpent Lakeshed Protection Investigation Study

Crow Wing County, received a Minnesota Pollution Control Agency Clean Water Partnership (CWP) project grant in 2011 to complete a diagnostic study of the water quality of Serpent Lake. This Report is the final report for this study.

The Report includes a summary of previous studies and reports completed for Serpent Lake and its watershed. Lake and tributary water quality data that has been archived since the 1970's was retrieved and analyzed for water quality trends and current lake water quality status. Water quality data that was collected in 2011 and 2012 was analyzed and presented in this report.

The current status of Serpent Lake water quality is declining. The lake water quality indicators are better than the large lake target levels reported by the MPCA; however, water quality trends show declining water quality from 2002-2012 compared to 1977-1981.

Recommendations include continuing lake monitoring and implementing best management practices (BMPs) that reduce loads of sediment and phosphorus to the lake.

Goals

- Characterize the chemical and physical water quality of the major streams and smaller lakes that feed into Serpent Lake.
- Model Serpent Lake using the BATHTUB model to understand how much loading Serpent Lake is able to handle to help guide future implementation.
- Identify pollution reduction BMPs to protect Serpent Lake water quality.

Results that count

- Characterized the chemical and physical water quality of Serpent Lake, Unn. Cranberry Lake, Cascade Lake, Peterson Lake, Serpent and Peterson Creek.
- Modeled Serpent Lake using the BATHTUB model: identified reduction goals for total phosphorous and orthophosphorus
- Identified Unn. Cranberry Lake has the largest contributor of phosphorus to Serpent Lake. See the following table.



Serpent Lake Association volunteers Dan Goodwin (right) and Eugene Abelson (left) collect water samples from Serpent Lake Site 201 on September 29, 2011.

Subwatershed	Load	
	kg/yr	% total
Agate Lake WS1	0.9	0.4%
Cascade Lake Ws	0.3	0.2%
Cranberry Lake Ws	26.0	12.3%
Deerwood Stormwater	25.6	12.1%
Reno Lake	0.2	0.1%
Peterson Creek	13.6	6.4%
Crosby Stormwater	24.3	11.5%
SSTS	21.0	9.9%
Shoreline Runoff	24.0	11.4%
Rainfall	67.0	31.7%
Outlet - Discharge	44.4	-21.2
Groundwater	8.4	4.0%

Financial information

Funding type: CWP
 Grant amount: \$42,744
 In-kind: \$34,263
 Matching funds: \$9,028

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Mississippi River – Grand Rapids

Demonstrating Shoreline Buffers in Big Sandy's Watershed

Since the beginning of the project in 1991, the Big Sandy Area Lakes Watershed Management Project (BSALWMP) has developed innovative projects to protect and improve water quality, wildlife, and fishery resources in the Big Sandy Lake Watershed. These projects focused on the main ecological problems and sources of nutrient loading to Big Sandy Lake, and other watershed lakes. Recent monitoring continues to indicate that there are areas in the watershed in need of improvement to achieve the goals as indicated in past Clean Water Partnership (CWP) Reports to the Minnesota Pollution Control Agency (MPCA).

The project supported by this grant promoted 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 were provided with the tools they need to implement successful shoreline buffers on their property, reducing erosion, and managing runoff. "No-Mow Zone" buffers were established at four properties in the watershed, three "hands-on" planting workshops were hosted, five educational workshops were hosted, 10 community events were participated in, and 20 newsletters were distributed within the watershed. This comprehensive effort was successful in demonstrating shoreline buffers to landowners in the Big Sandy Lake Watershed.

Goals

- Creation of 500 lineal feet of "No-Mow Zone" buffer strips
- Hosting of three Shoreline Buffer Hands-On Planting Workshops
- Education of Watershed Landowners through Newsletters

Results that count

- 547 ft of shoreline buffer strips were created through the "No-Mow Zone" Incentive Program
- Three Shoreline Buffer Hands-On Planting Workshops were hosted, revegetating 3,261 sq ft of shoreland area, and educating 37 workshop participants



Volunteers installing native vegetation at the Heinecke project on Horseshoe Lake

- Three watershed wide newsletters were sent to an average of 4,750 landowners in the spring of 2010, 2011, and 2012. Seventeen newsletters were prepared and distributed by the Big Sandy Lake Association, Lake Minnewawa Association, and Prairie Lake Improvement Association.

Financial information

Funding type: Section 319

Grant amount: \$37,384

In-kind: \$60,704

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Mississippi River – Headwaters

Deer and Pokegama Lakes: A Diagnostic Study

The Deer-Pokegama Clean Water Partnership studied two of Minnesota's highly valued recreational waters to better understand, manage and protect them and other lakes within the Northern Lakes and Forests Ecoregion. Deer Lake is a 4,097-acre recreational development lake. Pokegama Lake is a 6,612-acre general development lake with a surrounding watershed many times larger than Deer Lake and hydraulic connection to the Mississippi River.

This study determined several things that are of importance to other lakes in the area: (1) precipitation is an important source of nutrients and likely other chemicals, and (2) the lakes both have inordinately high rates of oxygen depletion in the hypolimnion. For the individual lakes we propose that (1) a more detailed and controlled groundwater monitoring network be established and tracked, (2) streams that are contributing excess phosphorus (e.g. those out of compliance with Minnesota draft standards) be carefully examined and remediated, (3) the causes of extreme deep water oxygen consumption be analyzed and experimentally managed, (4) the two lakes be monitored continuously to act as bellwethers of regional change, (5) road drainage modification be sought to alleviate high nutrient inputs, (6) the Mississippi River backflow be decreased if possible, and (7) a septic system improvement and education program be implemented.

Goals

- Characterize water quality in Deer and Pokegama lakes.
- Develop strong partnerships and utilize the community in monitoring and assessment objectives.
- Raise awareness of the potential sources of nonpoint pollution and the activities that the community can undertake to prevent it.

Results that count

- Intensive lake, stream, groundwater, and precipitation monitoring provided exceptional detail of these two systems lake-watershed characteristics and has increased public awareness and guidance with future resource management decisions.



*Highway 169 Pokegama causeway stormwater retention pond
June 2012 storm event*

- Partnerships and public engagement was a focus of this study and necessary for it to be a success. Volunteers were heavily involved throughout the project and strong partnerships were formed which will carry into the implementation phase of the project.
- The Deer and Pokegama CWP provided information and opportunities to engage the public in the importance of protecting these two high resource value lakes. Through increased knowledge and awareness this project is helping further encourage citizens to take an active role in doing their part to make good land use decisions and through the implementation plan aid in installing shoreland BMPs.

Financial information

Funding type: CWP

Grant amount: \$249,986

In-kind: \$492,282

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Mississippi River – Sartell

Pelican Lake of St. Anna Diagnostic Study and Implementation Plan

Pelican Lake of St. Anna is a 337 acre natural lake in Stearns County. The lake is known for its recreational quality, but an active Pelican Lake Association is concerned that watershed activities may be contributing excessive sediments, nutrients, and bacteria. This Diagnostic Study and Implementation Plan details the results of past monitoring on the lake and its tributaries, the results of an intensive 2011-2012 monitoring program, and recommendations for best management practices (BMPs) to maintain and improve the water quality in the lake and its tributaries.

The Diagnostic Study found that Pelican Lake has high surface water quality with respect to Secchi disk transparency (Secchi, 3.9 m), chlorophyll a (CHLA, 5 ppb), and total phosphorus (TP, 25 ppb). However, phosphorus levels in the deep lake waters rise during the summer (up to 450 ppb TP), indicating the presence of internal P loading and potential future degradation of the lake. Stream monitoring resulted in elevated P levels, and impairment levels for the bacteria *E. coli*. The Diagnostic Study concludes that *E. coli*, sediment, and TP should be controlled by appropriate BMPs to maintain and improve water quality.

The Implementation Plan reviews BMPs options to address the issues identified in the Diagnostic Study (in no particular order):

1. Manure Spreading and Nutrient Management Plan
2. Septic System Upgrades
3. Grazing Management and Pasture Practices
4. Wetland Functions Restoration
5. Riparian Zone Protection
6. In-Conveyance and Regional Treatment
7. Feedlot Systems, Siting, Manure Management, and Equipment Storage.

Seven specific implementation projects were identified to address stream water quality issues with the goals of reducing sediment and TP entering the lake and bringing the streams into compliance for bacteria. Installation of each project is estimated at approximately \$10,000. Future stream water quality monitoring is recommended to assess the effectiveness of any implementation projects.



Goals

- Characterize lake and stream water quality and determine appropriate numeric goals.
- Determine non-point source pollution areas in the watershed.
- Determination of type and location of BMPs that will most effectively improve/protect lake water quality.

Results that count

- Prior lake water quality results were affirmed by this study. Stream water quality is generally poor, with some very high *E. coli* results. It would appear that the inlets are impaired for *E. coli*. Goals have been set for stream water quality.
- The sub-watersheds were ranked according to levels and frequency of *E. coli*, TSS and TP results.
- Potential sites for BMPs were located that should positively impact stream and lake water quality. Focus is on potential sources of *E. coli* contamination.

Financial information

Funding type: CWP

Grant amount: \$35,704

In-kind: \$38,605

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Mississippi River – Twin Cities Watershed

Clear Lake Diagnostic Study

Clear Lake, located in the City of Forest Lake, Minnesota, is an important regional resource. Unfortunately, mid-summer algae blooms inhibit recreational opportunities. Although the lake currently meets State water quality standards, it does so narrowly. Additionally, it does not meet stricter goals (31 µg/L summer TP average) set by the Rice Creek Watershed District (RCWD). Nutrient loading (phosphorus) sources and magnitudes for Clear Lake were assessed in this Diagnostic Study. Additionally, nutrient reduction projects were identified. Prior to this project, little was known about phosphorus loading to Clear Lake.

In this study, a P8 model was used to estimate watershed phosphorus loading. The results of this model were used to calibrate a BATHTUB lake response model. Watershed and lake response models were calibrated using monitoring data collected by the RCWD. Modelling indicated that nutrient loading to Clear Lake is predominantly from the watershed, representing almost 75% of the total phosphorus load to the lake. Internal nutrient loading is less than 20% of the phosphorus load with the remaining load coming from direct atmospheric deposition. To meet RCWD goals, a reduction in phosphorus loading of 140 pounds is required.

Several high priority watershed projects were identified including stormwater retrofits in the Highway 61 corridor that includes retrofitting highly impervious commercial areas and providing treatment in the highway medians if site conditions are amenable. Overall, more than enough projects were identified to exceed the goal of reducing total phosphorus by 140 pounds and achieve the identified in lake phosphorus goal of 31 µg/L as a summer average. Many of the watershed projects also offer long-term protection from phosphorus loading.

Goals

- Describe the sources and magnitudes of phosphorus loading to Clear Lake.
- Establish phosphorus loading reduction goals.
- Identify phosphorus loading reduction projects needed to meet goals.

Results that count

- Watershed loading was the primary source of nutrients, primarily coming from the U.S. Hwy 61 corridor.



Collecting water quality samples on Clear Lake, July 14, 2010. Results were used to calibrate the BATHTUB model.

- To meet lake management goals, phosphorus loading must be reduced by 140 pounds annually.
- Phosphorus loading reduction projects were identified, with phosphorus reduction and cost estimates.

Financial information

Funding type: CWP

Grant amount: \$20,100

In-kind: \$5,480

Matching funds: \$16,780

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Mississippi River – Twin Cities Watershed

Lake Harriet Diagnostic Study and Management Plan

Lake Harriet is one of the premier recreational destinations in the Minneapolis Park and Recreation Board (MPRB) system. However, during peak season, recreational users express concern about conditions and issues resulting from excess nutrients in the lake. Nearly 20 years of monitoring by the MPRB has shown that implementation projects (constructed wetlands, grit chambers, an experimental littoral zone alum treatment, public education, shoreline stabilization, and increased street sweeping) have successfully improved water quality for most of the Chain of Lakes. The trend line for surface water quality measurements at Lake Harriet was slightly improved after an experimental littoral zone treatment in 2001, but the recent trend appears to be reversing and the whole-lake monitoring data indicates an increasing trend in the buildup of phosphorus in the bottom waters of the lake during the summer. Lake Harriet has not met the water quality goals set for phosphorus in the Minneapolis Surface Water Management Plan and the Minnehaha Creek Watershed District Comprehensive Watershed Plan in each of the last six years (2006-2011).

This project provided an opportunity to update and intensify existing studies at the lake and provide planning toward implementing a second-phase of improvements for water quality. The goals of the project included development of an intensive diagnostic study, a management plan that includes recommendations for implementation of best management practices (BMPs), recommendations for further study and a public participation component. Management plan recommendations included:

- An in-lake alum treatment
- Stormwater treatment retrofits involving street/alley reconstruction or reforestation/boulevard improvements
- Increase/document frequency of BMP maintenance
- Add pretreatment and retrofit of the inflow conveyance at the 43rd street subsurface flow wetland
- A stormwater treatment pilot project involving using iron-enhanced sand and/or spent lime filtration at an existing grit chamber



Lake Harriet

- Increased street sweeping frequency with higher efficiency equipment should be studied
- An aquatic vegetation management plan should be developed

Goals

- Collect additional monitoring data to better identify the trophic state of Lake Harriet and relative importance of sediment phosphorus release.
- Complete Lake Harriet Management Plan, 2013-2023.
- Engage project stakeholders and the public.

Results that count

- Monitoring results indicate that recent water quality in Lake Harriet is deteriorating and internal phosphorus loading is the primary contributor to the lake falling short of the water quality goals.
- The management plan is complete.
- Two public open houses and a technical advisory committee meeting were held and draft report questions and comments were incorporated into the process of finalizing the Lake Harriet Management Plan.

Financial information

Funding type: CWP
 Grant amount: \$55,000
 In-kind: \$3,000
 Matching funds: \$54,989

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Mississippi River – Twin Cities Watershed

Shingle Creek Porous Pavement Paired Intersection Study

The Shingle Creek Watershed Commission and city of Robbinsdale, Minnesota completed a research project to investigate whether porous asphalt can be used as a physical substitute for road salt as an ice prevention method. Shingle Creek is an Impaired Water for excess chloride, and a TMDL showed that the primary source was road salt applied for ice control. A 71% reduction in chloride is needed to meet water quality standards. Two low-volume residential intersections in Robbinsdale were selected as test sites. One leg of each was reconstructed using porous asphalt pavement. An adjacent intersection at each served as control. During the two year monitoring period, the control intersections were plowed and salted as usual. The test sections were plowed, but no salt or sand was applied. Images taken by a closed circuit camera were processed to estimate bare pavement at each intersection at 9 a.m., noon, and 3 p.m. each day. This daily percent of bare pavement was evaluated against air temperature, pavement temperature, and solar radiation to assess which factors were more predictive of melting rate. Results suggest that unsalted porous asphalt pavement can have net bare pavement comparable to a salted traditional pavement section. Salted pavement starts melting sooner, and that lag can be anywhere from a few to several hours depending on temperature and solar radiation conditions, and that performance may be less acceptable to the public. However, slush and snowmelt infiltrates and does not refreeze on porous pavement, so the net amount of bare pavement is comparable. The pavement has been durable over three winters of snow plowing. The only maintenance has been to sweep with a regenerative vacuum sweeper in the spring and fall. Porous pavement at low-volume residential intersections shows promise as a potential ice control Best Management Practice.

Goals

- Estimate the effectiveness of porous asphalt on residential streets in reducing the need for salt as a deicer.
- Determine whether porous asphalt is a BMP that can hold up to rigors of regular city street use
- Measure the water quality and quantity benefits of porous asphalt in a residential street application in both sandy and clay/loam subgrades



Abbott Avenue North looking south toward 41st Avenue North, ice-free section is porous asphalt and section with ice cover is traditional asphalt pavement.

Results that count

- Unsalted porous asphalt pavement appears to result in similar net bare pavement to traditional, salted pavement, indicating porous asphalt may be a useful de-icing substitute for road salt
- The porous asphalt withstood three winters of snowplowing and freeze-thaw cycles with minimal impact.
- The porous pavement section constructed over a sand subgrade infiltrated all rain and snowmelt, which results in 100% removal of pollutants and runoff volume. Over the clay subgrade, there appears to have been some volume and thus load reduction, but it was difficult to measure.

Financial information

Funding type: Section 319
 Grant amount: \$248,308
 In-kind: \$225,930
 Matching funds: \$30,000

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Mississippi River – Twin Cities Watershed

West Moore Lake Water Quality Enhancements

Historically, stormwater runoff flowed from the Fridley Middle School and High School parking lots and surrounding residential streets untreated into West Moore Lake near the intersection of 61st Avenue NE and West Moore Lake Drive. West Moore Lake is currently not listed as an impaired waterbody, although East Moore Lake (02-7501) is on Minnesota's 303(d) list. Long-term water quality data indicate that West Moore Lake is just barely meeting state standards. The 10-year average summer mean phosphorus concentration is 59.3 µg/L – just below the shallow lake impairment threshold of 60 µg/L. Annual summer mean phosphorus concentrations from 1998-2005 show a slight upward trend, suggesting decreasing water quality. Water quality modeling for West Moore Lake indicates watershed inputs account for 82% of the nutrient load, with internal loading accounting for the remaining 18%.

Three large raingardens were constructed to collect and treat runoff from the contributing drainage area (over 19 acres), eliminating a large direct discharge of stormwater runoff. Due to physical site constraints and a higher-than-expected water table, the depth of the raingardens was designed shallower than originally planned. Coarse sandy soils allow for rapid infiltration despite higher than desired seasonal groundwater levels and this has been shown in the performance of the raingardens through two growing seasons. Water has never been observed standing in the raingardens for longer than 18 hours beyond the end of the storm event.

One significant benefit realized from reducing the depth of the basins was the deletion of a 400-foot retaining wall to hold the slope behind the largest raingarden on the west side of the street (school property). This allowed the project to be completed significantly under budget while adding additional resources into a more advanced education station incorporating the project more thoroughly into the school's curriculum. Also, while only a secondary concern for the Rice Creek Watershed District, road flooding frequency and duration have been significantly reduced, improving public safety in this location. The City of Fridley and Fridley Middle School have expressed gratitude concerning this unplanned outcome of the project.



Southeast basin during a June 2013 rain event

Goals

- Reduce nutrient loading (phosphorus) to West Moore Lake
- Provide on-campus environmental education opportunity for Fridley Middle School
- Improve local road flooding situation

Results that count

- Constructed three raingardens, reducing TP load to West Moore Lake by approximately 14 pounds annually
- Five educational signs installed, project incorporated into school's environmental education curriculum
- Local road flooding frequency and duration greatly diminished; improved public safety

Financial information

Funding type: CWP

Grant amount: \$70,515

In-kind: \$13,409

Matching funds: \$58,672

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North Fork Crow River Watershed

Crow River Basin Sediment Reduction Project

The Crow River Watershed encompasses portions of 10 counties in central Minnesota and has a landscape that combines both urban and agricultural settings. The majority of the work that the CROW has focused on assessing the main stems and major tributaries of the Crow River. From 2000–2002 total Phosphorus data was reviewed and it is estimated that the percentage of the Anoka Mississippi River annual total phosphorus loads due to the Crow River vary from 17% in the dry 2000 to 46% during the wet 2002 conditions.

The CROW has been working over the past fourteen years to improve water quality in the Crow River Watershed. The majority of our efforts have involved monitoring and implementation. While these activities are imperative in any water quality improvement effort, they need to be paired with public education. A balance of implementation efforts while expanding upon our education efforts to help reduce nonpoint source pollution will help increase public awareness and provide support to municipalities, counties, schools and residents. A 10 year goal identified in the Crow River Diagnostic Study project lists a 25% 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 helped get projects on the ground while providing awareness of water quality issues. Completing this grant had an impact on water quality in the Crow River Basin through the reduction of TSS. CROW will continue to utilize a comprehensive approach that involves citizens actively engaging in their local resources. This project was very successful in accomplishing its overall goals.

Goals

- Implement BMP Projects to Reduce Sediment and Nutrients from entering the Crow River and its tributaries.
- Information & Education – Increase awareness of water quality efforts.
- Administration – Track grant and expenditures.



Rain Garden Project in the City of Rockford at the Rockford Middle School – Center for Environmental Studies located in Wright County.

Results that count

- The project was able to complete the following BMP projects: Stabilized Shaw Park river bank on the North Fork Crow River, installed an additional 6 streambank/lakeshore stabilization projects, completed 6 streambank stabilization projects, restored 2 shoreline restoration projects, distributed 428 rain barrels, installed 1 rain garden, installed 2 sediment basins, completed 1 grass waterway/buffer, and restored 7 wetlands in the Crow River Watershed.
- The project far exceed its expectation in the second goal of increasing awareness of water quality efforts by the following activities: CROW hosted a successful Native Shoreland Workshop on Lake Minnie-Belle, developed a Storm Water Task Force that discussed issues and outreach ideas, CROW updated the website and added a stormwater page, a total of 41 volunteers monitored 69 stream and 25 lakes sites, CROW continued to check in with CSMP volunteers, presented information at the Wright County Fair, assisted the Paynesville Trail Guards with a water quality experiment, participated in Wright SWCD Spring and Fall Field Days, provided transportation for Hanover students to attend the Metro Area Children's Festival, over 246 volunteers picked up trash from the river and removed 12.9 tons of trash, CROW attended the Renville County and Meeker /Wright

COLA meetings, participated in the Senior Envirothon while mentoring a Rockford Junior High Envirothon Team, attended the Ann/Emma Lakes TMDL meeting, provided insight on naturalized shoreline at the Lake Minnie-Belle annual meeting, in 2012 CROW staff attended and discussed water quality issues with Wright, Renville, Kandiyohi Water Planning Task Force, Meeker and Wright COLA's and provided insight on differences of a Lake Association vs Watershed District at a meeting in Hutchinson, CROW and local partners informed 42 landowners in Wright County about incentive programs, CROW helped sponsor an Earth Day Celebration, facilitated a tour for EPA staff and distributed 19 E-Currents to 300 partners, agencies and citizens throughout the watershed.

- CROW tracked the project grant, matching funds, expenditures, compiled semiannual and final reports and submit information to E-Link.

Financial information

Funding type: CWP

Grant amount: \$250,000

In-kind: \$285,752

Matching funds: \$26,901

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North Fork Crow River Watershed

Green Lake Eurasian Watermilfoil/ Stormwater Study

Green Lake is a 5,500 acre mesotrophic lake located in Kandiyohi County, in west central Minnesota. The lake's clear water and excellent fishing represent an outstanding recreational and economic resource for the City of Spicer, the County, and the entire region. However, despite the generations of memories that have been created on and around Green Lake, all is not well, and the lake needs greater protection. Once determined to possess a substrate unfit for the propagation of EWM, the lake has experienced rapid establishment and spread of EWM since the plant was first discovered in 2000. While EWM infestation on Green Lake has not yet reached nuisance levels on a widespread basis, its rapid spread further indicates the need for management. The purpose of this Research Investigation Project was to examine the relationship between the location of stormwater inlets and stands of Eurasian Watermilfoil. The simultaneous treatment of EWM might have interfered with the results of this study.

Goals

- The purpose of this Research Investigation Project was to examine the relationship between the location of stormwater inlets and stands of Eurasian Watermilfoil. Outreach was conducted via periodic articles in the Green Lake Property Owners Association newsletters, area newspapers, a poster and presentations at conferences.
- The monitoring and evaluation element was the most crucial part of this study. The MFCRWD coordinated with DNR, MPCA, EOR, and Foth staff on all elements of monitoring and evaluation.
- The MFCRWD was responsible for the reporting, tracking, and overall management of the project.

Results that count

- Of 30 surveyed sites, EWM was present at only 8 sites representing 0.5% - 42.5% of the total macrophyte biomass. Low abundance and biomass of EWM may be due to treatment efforts of EWM by the GLPOA. Therefore, survey sites in close proximity (i.e., less than 500 feet) to a treated site were also included in the analysis as a site with EWM present, assuming that treatment for EWM meant that EWM was present at



Green Lake

that location prior to treatment. Sediment samples were collected at each survey site and measured for TKN, TP, TOC, pH, and fraction of gravel, sand, silt, and clay. At the eight sites where EWM was present, EWM and non-EWM vegetation was collected, dried, and weighed.

- Treatment of EWM during the study season likely confounded the results. The results are not statistically conclusive, although the results do not reject the hypotheses. Potential additional study: Select a lake that has not been treated for EWM and in which EWM has recently invaded. Monitor over multiple years the relationship between stormwater outfall location, EWM propagation, and sediment characteristics.
- Administration included the successful approval of the work plan and the timely submittal of semiannual progress reports, incurred expenditures, and the final report requirements, along with the final budget.

Financial information

Funding type: CWP
Grant amount: \$33,000
In-kind: \$58,855

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North Fork Crow River Watershed

Middle Fork Crow River Watershed Restoration and Enhancement Project Continuation

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. The 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 continued focus on protecting high quality lakes and restoring lakes with poor water quality by: working to restore the hydraulic regime by restoring wetlands, providing educational opportunities that link people to the resources, implementing best management projects in areas identified as ecologically sensitive to reduce non-point pollution sources, and targeting specific lake management projects identified in the diagnostic studies which harnessed internal loading in lakes where this is a significant problem.

The scope of this project is to improve and preserve water quality throughout the watershed focusing on three major efforts.

1. Provide educational programs which engage citizens in active resource management.
2. Continue to examine the overall water quality of the watershed via permanent river and lake monitoring stations as well as seasonal (temporary stations)
3. Improve water resources by assisting individuals, groups, and unit of government to implement best management practices.

Along with our partners, successes of the project included increased education and outreach, monitoring, analysis and evaluation, and implementation of BMP's including, agricultural and rural land use; wetland, streambank, and shoreland restoration, and stormwater and urban BMPs.

Goals

- This project aims to continue improving water quality by utilizing a comprehensive approach that



Water erosion model creation with ACGC 4th graders

involves citizens actively engaging in their local resources through monitoring, providing educational opportunities in all age groups and interests.

- Implementing BMP projects in areas with the greatest impact in improving water quality where needed and protecting those resources with good water quality.
- The project continues the monitoring efforts established during the two diagnostic studies and previous Clean Water Partnership grant. Monitoring at existing and newly identified locations will continue to be important in determining local contributions to the continued degradation and impairment of these waters.

Results that count

- Hundreds of area students have been taught through the Districts integrated STREAM program. Local volunteers continue to gain knowledge of local monitoring practices and continue to serve as land stewards of our District lakes and streams.
- A total of 19 BMP projects were installed including 15 shoreland restoration/stabilization projects, one massive stormwater project with the City of Belgrade, two septic upgrades, and one stabilization project. All projects focus on reducing sedimentation and non-point runoff. Technical assistance was given to the City of Spicer, the City of New London, and multiple private landowners regarding land use.

- All samples were analyzed at certified labs, results were submitted to STORET and annual evaluation of monitoring data was conducted to spot trends, identify hot-spots or emerging issues, determine impacts of land-use improvements implemented by this project, and reported annually on the state of the waters to our stakeholders.

Financial information

Funding type: CWP

Grant amount: \$350,000

In-kind: \$525,507

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Macroinvertebrate identification with BBE High School

North Fork Crow River Watershed

CROW – Working Together to Improve Water Quality Continuation

From the perspective of the Upper Mississippi River Basin, the Crow River is one of its major tributaries from a water and nutrient loading standpoint. On average, discharges from the Crow River, dependent on flow, account for up to 46% of the TP and up to 53% 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. Biological data can be used to assess water quality; some sites were listed as very poor to fair. Nutrients and sediment exceed ecoregion values. Total phosphorus concentrations are well over the 50th percentile of the Western Corn Belt Plains ecoregion average. A 10 year goal identified in the Crow River Diagnostic Study project lists a 25% 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.

This project was a continuation of working with local partners and citizens to improve the water quality in the Crow River Watershed. The focus of this project included implementation efforts in identified management areas. Completing this grant had an impact on water quality in the Crow River Basin through TP, TSS and E coli reductions. CROW will continue to utilize a comprehensive approach that involves citizens actively engaging in their local resources. This project was very successful in accomplishing its overall goals and exceeded its expectations.

Goals

- Implement BMP Projects & Upgrade SSTS through Loans
- Information & Education - Provide awareness and communication with activities listed in 2nd result below.
- Water Quality Monitoring up to five sites.

Results that count

- The project was able to complete the following BMP projects: installed 1 shoreline restoration project, completed 6 streambank stabilization projects, restored 1 wetland, installed 3 rain gardens, distributed 1,620 rain barrels, conducted 2 storm drain marking projects,



Lester Prairie Steambank Stabilization and Sediment Basin project on South Fork Crow River near Lester Prairie in McLeod County.

completed 1 Ag. Waste/Milkhouse Waste project, enrolled 383.5 acres into CRP/RIM, installed 3 sediment basins, and upgraded 85 failing SSTS systems.

- The project exceeded its expectations by providing increased educational awareness of water quality issues in electronic newsletters and water quality presentations. CROW presented Water Quality Information at four McLeod County Corn & Soybean Grower's Association Banquets, participated in the McLeod for Tomorrow Leadership Program panel discussion, presented at McLeod County "Our Waters, Our Choice" workshop, presented conservation programs, cost share information and water quality issues to landowners in Meeker County and McLeod County, attended Winsted Lake Association meetings, partnered with Pheasants Forever, McLeod SWCD, McLeod NRCS and USFWS to present conservation programs, cost share information and water quality issues to over 39 landowners that attended the Cedar Lake Working Lands Initiative Landowner Workshop, provided hands-on activities for kids and citizens at the Annual Blue Bird Day Event, attended the Meeker COLA meeting, provided a presentation on shoreline naturalization projects to the Minnesota/Crow River Watershed Basin, provided an information table on natural resource conservation topics and conservation programs available to landowners at the Minnesota Garlic Festival held in Hutchinson,

sponsored the CROW's 5th Annual Photo Contest, updated information on the website and added the BMP Cost Share page that notified citizens and partners of cost share funding, forms and completed projects, enrolled 4 additional volunteers into the Citizen Stream Monitoring Program.

- CROW met its goal for collecting water quality monitoring from 2010 – 2012 at five established sites to help track long term water quality trends.

Financial information

Funding type: CWP

Grant amount: \$314,000

In-kind: \$409,196

Matching funds: \$29,673

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Rain Garden project in the City of Winsted at Winsted Adult Training and Habilitation Center (ATHC) located in McLeod County.

Pine River Watershed

Pine River Watershed Stream Baseline Water Quality

The Pine River and the Whitefish Chain of 13 lakes comprise the major surface water bodies of the Pine River Watershed which is a reservoir system controlled by a Corps of Engineers Dam at the City of Crosslake, Minnesota. This project acquired water chemistry data twice monthly during the growing season for 2010 and 2011 from four stream stations on Pine River above and one below the Chain plus one station on Daggett Brook. There are four other minor feeder streams that could influence Chain water quality that were not sampled. These minor streams are Hay Creek, Willow Creek, Spring Brook and Thompson Creek. Chemical analysis results for nine different materials are presented later in this document.

Concurrently, six Chain lakes that were influenced by the feeder streams were sampled twice monthly for the same two years at the deepest lake locations for surface and deep water chemistry. Two meter column sampling collected total phosphorus and chlorophyll a and the near bottom sampling was done for both ortho and total phosphorus. Chemical analysis results are presented later in the document.

Earlier work had shown high total phosphorus (TP) concentrations for the South Fork and Main Stem of the Pine River which was confirmed at an average of 63 ppb and 67 ppb respectively. These high levels were diluted after export to Upper Whitefish lake basin with a two meter column average of 22 ppb but raised concerns with a near bottom TP average of 93 ppb. Two sites on the North Fork displayed a respectable average TP concentration of 25 ppb as had been seen in earlier work. Surprisingly there were two *E Coli* spikes in the North Fork results of 326 MPN/100 ml. on 6/7/11 and 365 MPN/100 ml. on 7/19/11. These spikes were reflected downstream in the Main Stem as expected.

Profile data for both streams and lakes was collected by the MPCA during the same periods and will be reported elsewhere along with a report of FLUX and BATHTUB modeling.

Goals

- Characterize the chemical water quality of the major streams that feed the Whitefish Chain of lakes and in addition, the chemical attributes of the lakes affected



Stream sampling of the Pine River at the Paul Bunyan Trail

by these streams. The sampling to be performed twice monthly during the growing season for 2010 and 2011.

- Conduct physical profiling of the streams and the affected lakes for the same period, sites and rate. MPCA to arrange for FLUX, BATHTUB modeling and report from a subcontractor.

Results that count

- Duplicate samples were also collected for 10% of the samples for both lakes and streams and shipped with normal samples for comparative analysis.
- Physical profiling of the six stream locations by manual and automatic methods was done by the MPCA. Physical profiling of the six lake locations were also done by the MPCA.
- FLUX and BATHTUB modeling remains to be accomplished along with a modeling report under MPCA direction.

Financial information

Funding type: CWP
Grant amount: \$79,860
In-kind: \$91,533

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Rum River Watershed

Mille Lacs Lake Watershed Protection

Mille Lacs Lake is one of Minnesota's crown jewels. It is recognized as one of the premier walleye producing lakes in the world. Water quality in the lake is classified as mesotrophic. Mille Lacs Lake is also the headwaters of the Rum River – designated a Minnesota Wild and Scenic River.

Mille Lacs Lake has been studied by many agencies. The first major study was completed in 1976 by Adams V. Grover and Associates; the second in 1980 by the East Central Regional Development Commission (ECRDC); and the last in 1994 by the MPCA. On the basis of these studies, the lake's water quality appears to have improved. Unfortunately, due to the incomplete nature of the studies and their different methodologies, it is difficult to draw meaningful conclusions regarding the causes of improved water quality. Nonetheless, watershed-wide reduction in agricultural lands as well as the improved design and maintenance of on-site septic systems has probably been important in this regard. According to the 1994 MPCA report, phosphorus levels have decreased by 25% since 1971. While the significance of this finding is unclear, it underscores the need for a comprehensive, long-term monitoring program to document water quality trends in the lake as well as implementation of appropriate water quality protection strategies.

The Mille Lacs Lake Watershed Management Group has chosen to take a proactive approach to maintain and improve the quality of Mille Lacs Lake and its watershed. This Mille Lacs Lake Watershed Protection Clean Water Partnership Project was comprised of seven objectives; including public education efforts, implementation of best management practices, and supporting planning and zoning controls. Implementation of the objectives in this Clean Water Partnership Grant has been a significant step in reaching this water quality protection goal.

Goals

- Increase Public Awareness and Knowledge of Lake and Watershed Protection Strategies
- Implement BMP Demonstration Projects
- Support Appropriate Local Planning and Zoning Efforts



Mille Lacs Lake — brown buffer

Results that count

- The public was reached through 4,100 direct mailings; 223 citizens attended workshops. The MLLWMPG participated in 11 community events.
- 385' of eroding shoreline was stabilized; 450 square feet of eroding bank stabilized; 7,086 square feet of native vegetation shoreland buffer created.
- The Aitkin County Environmental Services Offices worked with 376 landowners/zoning issues. The Mille Lacs County Land Services Office prepared and distributed a brochure relating to Impervious Surface Impacts.

Financial information

Funding type: CWP

Grant amount: \$120,274

In-kind: \$119,678

Matching funds: \$1,619

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Sauk River Watershed

Lower Sauk River Water Quality Protection Project

The lower reach of the Sauk River was listed as impaired for turbidity in 2002. The 2008-2010 TMDL study determined that the lower reach of the Sauk River meets state standards for turbidity (Barr, April 2010) and was removed from the impaired waters (303d) list. The goal of the Lower Sauk River Water Quality Protection CWP Project was to protect the Sauk River from degrading to the point where it becomes re-listed as impaired for turbidity or newly listed for excessive nutrients. The focus area for this project included the watershed starting from the city of Cold Spring down to the confluence of the Mississippi River in St. Cloud. The SRWD worked with its consultant to identify urban target areas by conducting hydrologic assessments within the municipalities of Cold Spring, Rockville, St. Joseph, and St. Cloud. The completed assessment reports identifies where urban BMPs are needed. It included cost estimates per BMP and estimated load reductions. A watershed assessment of the River outside the five city limits was conducted to determine priority areas for rural conservation BMPs.

CWP funds were used for four shoreland/riparian restorations, 10 rain gardens, one stormwater diversion and retention project, a vacuum street sweeper and pervious pavers at one site to address storm water from a large parking lot. These projects reduced an estimated 105 pounds of total phosphorus and 103 tons of sediment per year from reaching the Sauk River. Five stormwater outfalls to the Sauk River were monitored to determine stormwater contribution to the River. Data was submitted into EQuls and used for targeting BMP efforts. Education events were held in the lower Sauk region to encourage rain gardens and rain barrels in the urban areas. The youth education events and multiple classroom visits were well received by areas schools and students.

Goals

- Implement a more advance education program with particular emphasis on stormwater
- conduct an expansive water monitoring program to determine stormwater impact to the Sauk River.
- Maintain 2006 water quality conditions, at a minimum, allowing for natural year to year variability.



Street Sweeper for City of St. Cloud – removed 533 yards of sediment the first sweep in the targeted priority area.

- Reduce summer average TSS by 10% from the 2006 recorded concentration levels
- Implement Shoreland restoration
- Educate the general public on the importance of stormwater management and erosion control
- Install three rain gardens, one stormwater retention basin and decrease impervious surfaces by installing pervious pavers at two locations

Results that count

- Completed four riparian/shoreland restoration projects on the Sauk River
- Installed 10 rain gardens to treat stormwater before reaching the Sauk River.
- Installed one stormwater diversion and retention project on agriculture land that drained to a trout stream.
- Completed a stormwater assessment for the cities of Cold Spring, Rockville, St. Joseph and St. Cloud. These reports are used by the city as tool to prioritize capital improvement projects within the city.
- Cost shared on the purchase of a vacuum street sweeper for the city of St. Cloud. The SRWD and City created a list of priority target areas that are swept more frequently. Five hundred thirty-three yards of sediment was collected the first week of use.
- Cost shared on pervious pavers installed at a Stearns County building to reduce stormwater from the large parking lot.

Financial information

Funding type: CWP
Grant amount: \$300,000
In-kind: \$275,873
Matching funds: \$60,188

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Rain Garden installed in parking lot on the east side of Cold Spring. Curb cuts were put in place after this picture.

Sauk River Watershed

Osakis Lake Enhancement Continuation Project

Lake Osakis is a heavily populated water resource located in Douglas and Todd counties. The lack of deep-rooted vegetation and fluctuating water levels plays a role in soil loss. Sediment deposited in the lake from erosion has contributed to the overall nutrient loading resulting in reduced water clarity and quality. This project focused on restoring portions of the 24 mile shoreline to a more natural state to reduce erosion and sediment loading and increase habitat around the lake. Approximately 1400 linear feet of lakeshore was restored using a combination of bioengineering methods. The 13 completed shoreland restoration projects and one rain garden reduced 47lbs of Phosphorus and 50.5 tons of sediment loading to the lake each year. The goal of the Osakis Lake Shoreland Enhancement Continuation Project was to prevent further degradation of water quality by addressing shoreland erosion and stormwater runoff to improve the current impaired conditions of Osakis Lake.

Goals

- Reduce nutrient loading from stormwater runoff by installing conservation BMPs and improve the current impaired conditions of Osakis Lake.
- Increase public awareness of the importance of stormwater management and erosion control by hosting education events using demonstration projects



Shoreland restoration on Osakis Lake — Before

and existing BMPs implemented using other funding sources.

- Reduce nutrient and sediment loading to Osakis Lake by restoring 8-10 lakeshore properties
- Address nutrient loading from septic systems by upgrading 5-10 septic systems around Osakis Lake

Results that count

- Completed 13 shoreland restoration projects and one rain garden along Osakis Lake reducing 47 pounds of Phosphorus and 50.5 tons of sediment loading to the lake each year.
- Upgraded two individual septic systems to protect the Osakis Lake from nutrients leaching through the soil.
- Properly abandoned three manure storage pits that reduced the risk of contamination to groundwater and surface waters.

Financial information

Funding type: CWP

Grant amount: \$114,849

In-kind: \$78,921

Matching funds: \$466,000

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Shoreland restoration on Osakis Lake — After

Sauk River Watershed

Sauk River Water Quality Protection Project Phase III

Current data indicated that the Sauk River is impaired for E.coli in one stretch of the river but currently meets state standards for turbidity. Through several field assessments, the Sauk River Watershed District (SRWD) found that several small towns along the Sauk River were found to have little to no stormwater retention or infiltration. Numerous erosion sites and livestock watering sites were identified along the Sauk River.

The goal of the Sauk River Water Quality Protect Phase III CWP implementation project was to prevent the Sauk River from becoming impaired for turbidity by addressing municipal and rural stormwater runoff concerns. This project addressed these stormwater runoff concerns by focusing on smaller stormwater management efforts and land use practices as part of the SRWD's "Backyard BMP" program. A series of rain gardens (31) were installed in the City of Cold Spring where many of these sites were within the watershed of Brewery Creek, which is a DNR trout stream that discharges to the Sauk River. The SRWD also provided technical and financial assistance to landowners for three stormwater retention projects, 16 shoreland restorations, seven feedlot projects, three prairie restorations and one riparian restoration. Reduction calculations determined that this CWP implementation project reduced 68.5 tons of soil and 129 pounds of phosphorus per year from reaching the Sauk River. The SRWD conducted water quality monitoring on targeted sections of the Sauk River and a stormwater outlet to Brewery Creek to determine the BMP effectiveness to these water resources.

Goals

- Protect the Sauk River from becoming impaired for turbidity and phosphorus
- Increase public awareness of human impacts to local water resources
- Install conservation BMPs that reduce sediment and nutrient reduction to the Sauk River.

Results that count

- Installed 16 shoreland restoration projects and one riparian restoration project within the Sauk River watershed, reducing TSS by 55.59 tons/yr and phosphorus by 49.81 lbs/yr.



Cold Spring, MN — rain garden

- Installed 35 rain gardens within the Sauk River watershed reducing TSS by 1.12 tons/yr and phosphorus by 7 lbs/yr.
- Installed four stormwater projects within the Sauk River watershed reducing TSS by 6.44 tons/yr and phosphorus by 13.72 lbs/yr.
- Addressed four feedlot abatement projects and properly closed three old manure storage pits reducing TSS by 5 tons/yr and phosphorus by 55.8 lbs/yr.
- Installed three prairie restorations, one of which reclaimed an old gravel pit along a natural environment lake reducing TSS by .35 tons/yr and phosphorus by 2.7 lbs/yr.
- Participated in 65 education events and activities through multiple avenues such as radio segments, school events and classroom visits, county fairs, newsletters and community education events.
- Upgraded three septic systems using the SRF loan funds.

Financial information

Funding type: CWP

Grant amount: \$235,000

In-kind: \$97,457

Matching funds: \$155,089

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Sauk River Watershed

SRWD Watershed-Wide Groundwater Protection Project

Groundwater is a very valuable resource in the Sauk River watershed. It is the primary source for drinking water throughout the entire Sauk River Watershed District (SRWD). Groundwater also recharges the lakes and streams within the Sauk River watershed. Public and private wells are susceptible to contamination from abandoned wells and noncompliant septic systems. The local county agencies and the SRWD collaborated efforts to address groundwater concerns within the Sauk River watershed. The SRWD Watershed-Wide Groundwater Protection Project was established to educate the local residents of the importance of groundwater protection and to provide financial assistance to those who need to properly abandon their unused well or to upgrade their nonconforming septic system to reduce pollutants to groundwater and surface water through groundwater permeation.

For the past three years, Stearns and Todd County agencies conducted targeted inventories for individual sewage treatment system compliance and to identify abandon wells, focusing mainly around impaired water resources. The SRWD provided residents determined to have an unused well and/or substandard septic system with information on drinking water protection and septic system maintenance. Public outreach events were held throughout the Sauk River watershed to reach all rural residents and students of the District. The SRWD collaborated with two local radio stations to host air time to discuss important water quality topics as an effort to reach a larger audience. Funds from this CWP were used to financially assist 14 septic system upgrades and four well sealing projects.

Goals

- Protect groundwater within the Sauk River watershed
- Increase public awareness on groundwater protection.
- Address failing and non-compliant septic systems and abandoned wells within the Sauk River watershed.

Results that count

- Distributed septic system maintenance guidebooks and drinking water/groundwater protection pamphlets to 560 residents following Todd and Stearns Counties' septic inspections.



Water festival showing

- Developed a groundwater education kit that is used by local schools and special groups (Boy Scouts) to educate students on groundwater protection and safe drinking water.
- Hosted 12 education events with emphasis on groundwater protection and septic systems.
- Assisted Douglas County with its Groundwater festival.
- Participated in 20 radio open-mic segments to inform the public of the funding available to upgrade non-compliant septic systems and properly seal unused wells.
- Properly sealed four abandoned wells.
- Updated 16 failing and non-compliant septic systems.

Financial information

Funding type: CWP

Grant amount: \$40,000

In-kind: \$11,001

Matching funds: \$39.69

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South Fork Crow River Watershed

CROW – Surface Water Runoff Reduction Project

Over the last 14 years the Crow River Organization of Water (CROW) has a long history of assessing water quality in its lakes and streams. From the perspective of the Upper Mississippi River Basin, the Crow River is one of its major tributaries from a water and nutrient loading standpoint. On average, discharges from the Crow River, dependent on flow, account for up to 46% of the TP and up to 53% of the TSS in the Mississippi River. From the perspective of the Upper Mississippi River Basin, the Crow River is one of its major tributaries from a water and nutrient loading standpoint. A great many of these water resources are impaired and do not meet state water quality standards, but there are some key resources that enjoy good water quality.

CROW will continue to focus their efforts to reduce TP and TSS to meet ecoregion ranges. Total phosphorus concentrations are well over the 50th percentile of the Western Corn Belt Plains ecoregion average. A 10 year goal identified in the Crow River Diagnostic Study project lists a 25% reduction in TP, TSS and point and nonpoint source contribution to the Crow River and its tributaries. This project was a continuation of working with local partners and citizens to improve the water quality in the Crow River Watershed. The focus of this project includes implementation efforts that were installed in two construction seasons. The CROW Technical Committee was ambitious, but got the job done! Completing this grant had an enormous impact on water quality in the Crow River Basin through TP, TSS and E coli reductions. CROW will continue to utilize a comprehensive approach that involves citizens actively engaging in their local resources. This project was very successful in accomplishing its overall goals and most certainly exceeded its expectations.

Goals

- Between four and eight BMP projects installed each year, depending on complexity and costs:
- Provide awareness and communication with the following activities:
- Administration



St. Michael streambank stabilization project in Wright County.

Results that count

- The following BMPs were installed in only just two construction seasons! A total of 6 stabilization projects, 3 wetland restoration projects, 1 Agriculture Waste upgrade, 9 rain gardens and 4 Safl Baffles were installed, 3 shoreline naturalization projects, 15 sediments basins and 4 waterway projects, a total of 198.4 acres were enrolled into CRP and to date 73 SSTS systems have been installed. That is a lot of projects in a short amount of time.
- Over 1,000 students in 4th- 6th grade at seven different schools received the Science Museum's Water Assembly program. Over 550 students at two schools received the "All About Water" program by Earth Adventures. CROW hosted Aquatic Planting Workshop and Shoreline Naturalization Workshop for a total of 72 people. CROW attended the Meeker COLA meeting. CROW provided a hands-on water quality activity to over 100 volunteers at the Girls Scouts Centennial Celebration. Over 450 attend a local sponsored Earth Day Celebration. CROW created and distributed Crow River Clean Up Day Newsletter, highlighting the 2012 event and over 300 copies are mailed out and or handed out at local events. CROW created a Facebook page, Crow River Lakes and Streams. The site has expanded from 8 to 79 likes. CROW has presented information regarding this grant project, water quality in general and the CROW organization during its regular scheduled Joint Powers Board, Technical

and Educational Committee meetings and electronic newsletter E-Currents

- CROW has tracked grant activities, matching funds and expenditures. All project data will be entered and submitted into E-Link in a timely manner.

Financial information

Funding type: CWP

Grant amount: \$495,912

In-kind: \$56,389

Matching funds: \$13,784

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Upper Mississippi River Basin

Projects active

Section 319 projects awarded in 2013

No projects were awarded in 2014

Long Prairie River

Long Prairie River Dissolved Oxygen TMDL Implementation — 2013

Sponsor: Todd Soil and Water Conservation District

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

Purpose: Implement 25-30 Best Management Practices (BMP's) in the Long Prairie Watershed and increase dissolved oxygen levels such that they are consistently above 5 mg/l. This would delist the Long Prairie as an impaired water body. Morrison, Douglas, and Todd SWCDs will be the primary partners on the project since they are the primary counties with land in the watershed. It is anticipated that projects implemented will annually reduce 1,409 pounds of phosphorus, 716 tons of sediment and 6,771 pounds of nitrogen from reaching the Long Prairie River system. These reductions will decrease algae growth and result in higher dissolved oxygen readings.

Mississippi River – St. Cloud

Kingston Wetland Feasibility Study and Restoration — 2011

Sponsor: Clearwater River Watershed District

Funding: Section 319 (Grant) \$404,300

Purpose: The Kingston Wetland Complex is a riparian wetland of the Clearwater River Chain of Lakes. The MPCA found that the Clearwater River between Clear Lake and Lake Betsy is impaired and does not meet Minnesota water quality standards for DO. This reach was placed on the 303(d) list in 2004 because monitoring data have revealed that DO concentrations sometimes fall below the state standard of 5 milligrams per liter, which can impair aquatic habitat. The TMDL study completed for this reach (January 2009) showed that the sediment oxygen demand (SOD) and altered wetland hydrology in the Kingston Wetland were contributing to the DO impairment. The study further showed that a reduction in the Kingston Wetland SOD, and possibly a change

in hydrology would be necessary to meet the state standard.

The project will be considered successful if the following specific targeted outcomes are achieved:

- Sixty percent reduction in wetland SOD.
- Annual nutrient loads to the lakes downstream are reduced by 20%. Wetland and riverine habitat is restored to support a wider range of wildlife.
- Recreational opportunities in the Clearwater River are enhanced by the restoration, providing a corridor to connect the upper agricultural watershed with the lower recreational lakes watershed. Kiosks are installed to mark the project and educate users about the impacts of ditching on water quality and habitat, and specifically the evolution of the Kingston Wetland through the various stages and its role in protecting downstream water quality.

Local partners are engaged to cooperate in the project, measured by attendance at project meetings and educational curriculum developed in coordination with local school district for use at local schools.

Targeted Fertilizer Application Reduction Project — 2012

Sponsor: Clearwater River Watershed District

Funding: Section 319 (Grant) \$245,475

Purpose: Clearwater River Watershed District will identify and recruit fertilizer application participants; prepare, distribute and present materials for education and outreach; collect soil samples from participants' fields on a 2.2 acre grid across up to 16,000 acres of critical crop land to determine the fertilizer needs for each field; use GPS-aided fertilizer application technology to apply fertilizer at variable rates consistent with field needs, avoiding tile intakes and providing a 50 lineal foot buffer where no fertilizer is applied; conduct water quality monitoring at drain tile outlets from selected fields, including both farms that are and are not participating in the program; annually report the extent of program application and reductions in fertilizer application over standard practice, but also corresponding water quality results; provide recommendations to optimize the program implementation and achieve the maximum load

reduction possible; and track, manage, and report on project results and finances as necessary and required.

Mississippi River – Twin Cities

Bald Eagle Lake TMDL Implementation — 2013

Sponsor: Rice Creek Watershed District

Funding: CWP (Loan) \$500,000

Purpose: This project proposes to use aluminum sulfate (“alum”) to control internal phosphorus loading to Bald Eagle Lake. Over the lifespan of the alum treatment, expected to be 15-20 years, 1,195 pounds of phosphorus will be removed from the budget each year.

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 nonpoint 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.

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% of the lakeshed that currently is untreated.

This internal load project will accomplish 90% 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.

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 DO 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% reduction in TSS and 30% reduction in BOD.

Lake McCarrons Sub-watershed BMP Project — 2012

Sponsor: Capitol Region Watershed District

Funding: CWF (Grant) \$275,000

Purpose: Capitol Region Watershed District will compile and review previously conducted studies and will prioritize BMPs based on a cost-benefit analysis of their pollutant load reductions and life cycle costs; will conduct a sub-watershed analysis to determine optimal BMP locations and types to maximize volume and pollutant removal; solicit and consider stakeholder input in prioritizing BMPs; will design and construct BMPs, such as rain gardens and infiltration practices, within the Villa Park sub-watershed of the Lake McCarrons watershed to meet phosphorus load reduction goals to the Villa Park Wetland System and ultimately maintain the long term water quality of Lake McCarrons.

Modular Green Roof Retrofit System Development — 2011

Sponsor: Shingle Creek Watershed Management Commission

Funding: Section 319 (Grant) \$27,140

Purpose: Shingle Creek, which drains the watershed, is impaired by excess chloride, low DO, and has an impaired biotic community as well. Thirteen of the sixteen lakes in the watershed are impaired due to excess nutrients. This project is based on the hypothesis that development of a light-weight, easily installed extensive green roof system suitable for installation on existing flat or gently sloping roofs can substantially reduce runoff volume from highly developed urban and suburban areas that represent some of the greatest challenges in urban stormwater management.

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.

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.

North Fork Crow River

Crow Lakes Protection and Resource Investigation — 2013

Sponsor: Crow River Organization of Water

Funding: CWP (Grant) \$124,200

Purpose: The Project's "virtual TMDL" studies will evaluate lake water quality relative to MPCA eutrophication standards, assess external and internal TP loads, quantify maximum TP allocations, and identify TP reduction (or stabilization) plans or strategies for source areas. The Project will focus on ten lakes: Minnie-Belle, Manuella, Stella, Lake Washington, Francis, West Sylvania, East Sylvania, John, Charlotte, and Martha. These lakes are located throughout Meeker and Wright County, are highly used recreational lakes with adjacent park land, and are significant contributors to the North Fork Crow River. These key lakes are parts of lake chains in which the whole chain is not impaired, and the protection strategies developed through this project will complement the TMDL implementation efforts to focus on comprehensively managing the chain as a system.

Crow River Middle Fork Watershed Resource Investigation — 2013

Sponsor: Middle Fork Crow River Watershed District

Funding: CWP (Grant) \$63,250

Purpose: This project will continue a monitoring program for the purpose of tracking the long term changes in the 8 lakes of the watershed, assist the District Board and staff in identifying key areas for BMP implementation, offer two water quality education workshops per year to area residents providing information of our investigation and many ways to protect these resources, visit area schools nine times per year to implement water quality classes into school curricula, provide one volunteer training workshop per year, informing 10-12 citizens the fine

points of stream and lake data collection to supplement our resource investigation, continue to submit regular columns and news releases for existing local newsletters and newspapers and continue the promotion of BMP and educational programs through the District website, which will also contain monitoring information on local lakes and streams.

Lake Koronis Subwatershed Protection Project — 2013

Sponsor: Stearns County SWCD

Funding: CWF (Grant) \$197,871

Purpose: This project will evaluate and prioritize approximately 13,000 lineal feet of Lake Koronis shoreline for shoreline erosion and vegetative buffer condition. Those property owners with the most erosion, stormwater and vegetative buffer issues will be targeted to stabilize, infiltrate and buffer their shoreline. This project will also evaluate an additional 300 properties in the subcatchment area and target those properties that are best able to capture and treat stormwater from impervious surfaces. Education/Outreach efforts will include a field day demonstrating the installation of typical BMPs which will be installed in the project area as well as on-site tours of practices after installation.

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.

Targeting BMPs in the Crow River Watershed — 2012

Sponsor: Crow River Organization of Water

Funding: CWP (Loan) \$1,100,000

Purpose: This project will promote and install 110 SSTs, agricultural and rural best management practices in the Crow River watershed.

Sauk River

Crooked Lake Basin Restoration Project — 2013

Sponsor: Sauk River Watershed District

Funding: CWP (Loan) \$665,000

Purpose: This project will use CWP loan funds to purchase 1,280 acres from 12 landowners in order to install a ditch weir which will hold back water to re-establish the lake basin. Under management, a restored Crooked Lake will provide 2,200 acres of submerged and emergent plants that will filter and take up nutrients and stabilize sediments from JD2.

Lower Sauk-Metro Area Water Quality Protection — 2012

Sponsor: Sauk River Watershed District

Funding: CWF (Grant) \$233,000 CWP (Loan) \$150,000
CWF \$65,000

Purpose: This Sauk River Watershed District will conduct the Whitney Park river clean-up, adopt a river program and other community events as part of their healthy living programs; will collaborate with the city of St. Cloud to install a rain garden demonstration site at Whitney Park; use local radio and public television stations to promote the District's "neighborhood rain garden initiative" and other incentive programs; interact with residents during the annual events of the Master Gardner's organization, the local Farmer's Markets, Friends of the Sauk River organization and other groups; host its first video contest for local high schools students on water quality issues; conduct three adult education workshops on designing and installing rain gardens; conduct three youth outdoor events focusing on water quality; host two radio segments to inform residents of the available funding and upcoming events; conduct three additional adult education workshops focusing on water quality protection, human impacts and BMP project maintenance; install conservation best management practices within the Sauk River watershed of St. Cloud, Waite Park and St. Joseph, including 35 rain gardens and an effective erosion control BMP to address the river bank sloughing in Whitney Park; design and install five stormwater BMPs in the three municipalities; conduct water quality monitoring on the Sauk River and two stormwater outfalls for selected sub-watersheds undergoing a neighborhood rain garden initiative; and be responsible for all reporting, tracking and overall management of this project.



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