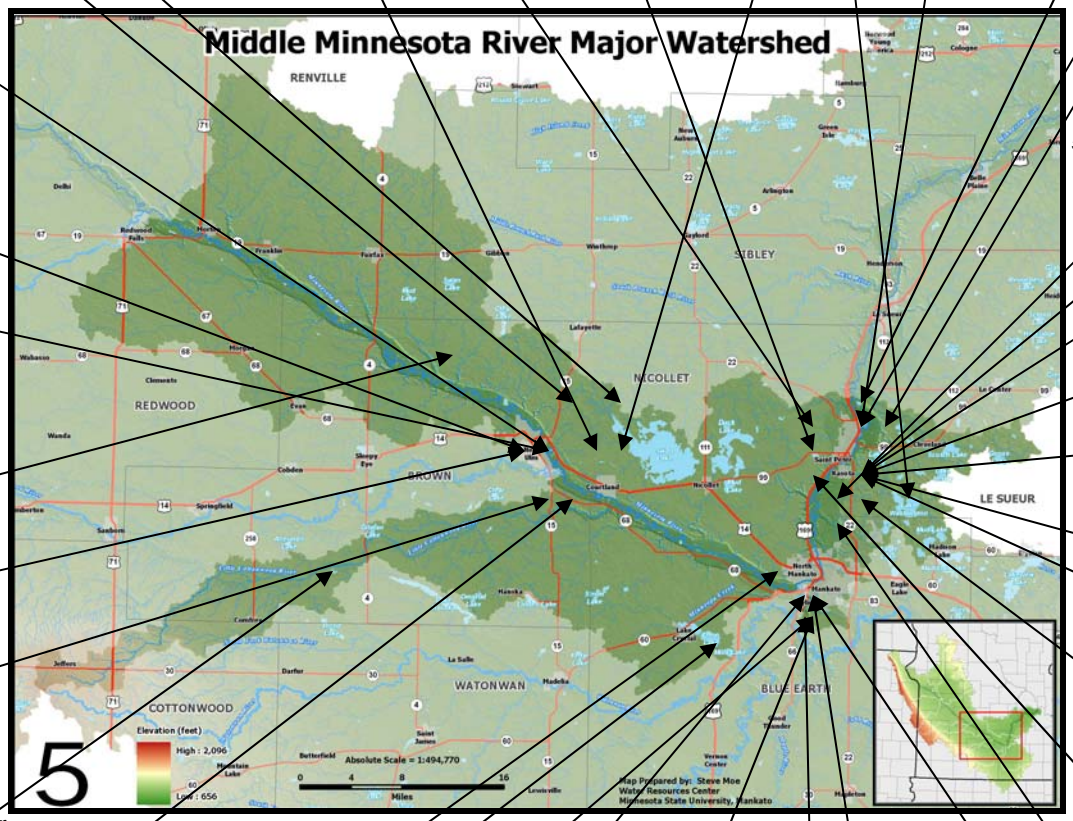
# MIDDLE MINNESOTA RIVER WATERSHED

This major watershed is characterized by its irregular shape compared to the other major watersheds in the Minnesota River Basin and the fact it is drained by a numerous smaller tributaries but no major river. The only other major watershed not defined by a main stem tributary in the basin is the Lower Minnesota River Watershed. Little Cottonwood River is the largest sub-watershed, a total of 230 square miles. Ranked sixth in size compared to 12 major watersheds, the Middle Minnesota is approximately 1,347 square miles or 862,060 acres. Agriculture dominates much of the watershed with a number of major river communities found within its boundaries including parts of Redwood Falls, New Ulm and Mankato along with St. Peter, located right before the Minnesota River flows into the Lower Minnesota River Watershed.


Morgan Creek Vineyard

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*We paddled away at the rate of four or five miles an hour, the men singing Canadian boat-songs, and only interrupting them to halloo at top of their voices, now and then, when the otters were seen swimming amongst the zizania. As we advanced through these low rice-grounds, clouds of wild ducks rose on the wing, and we killed them at our leisure from the canoe.* – George Featherstonhaugh, 1835

## MIDDLE MINNESOTA RIVER WATERSHED

No one organization is coordinating water quality efforts in this watershed with Brown Nicollet Cottonwood Environmental Health Board taking a lead in those counties and the sub-watersheds of the Little Cottonwood and Seven Mile Creek. Other water quality improvement efforts come from SWCDs, non-profit organizations, clean water partnerships and individuals. A unique initiative in the Middle Minnesota features the wetland litigation by the Swan Lake Area Wildlife Association.

### 1. St. Peter Water Treatment Plant

In July 2009, the City of St. Peter approved a $16.8 million drinking water improvement plant that involves wells, a new treatment plant and an improved filtration system for the existing St. Julien Street plant. This new plant complies with increasingly stringent government standards for water quality and a growing demand for water usage. Part of the plan will let the city seal up wells located at the Jefferson Street treatment plant tapping into three different aquifers at different depths. State water regulars frown on this type of practice because it allows contaminants to flow from one aquifer to another. By adding a reverse osmosis water filtration system to the both new Broadway and St. Julien plants, the level of chloride discharged into the Minnesota River will be reduced. The estimated completion date of the project is May or June 2011.

Construction of the plant

### 2. St. Peter Treaty Site History Center

Located along Hwy. 169 just north of St. Peter, the Treaty Site History Center was constructed in the late 1990s to tell the story of the Traverse des Sioux and its importance to the state of Minnesota and the Minnesota River Basin. The center serves as a natural and historical gateway to the Minnesota River with its exhibits, interpretive trail and the former Traverse des Sioux, or Oiyuwege (place of crossing).

In fall 2006, this important crossing to the Dakota Indians on the Minnesota River was rediscovered by the Bolton and Menk Engineering Firm used historic documents and modern survey techniques to locate the original crossing. Originally, the Traverse des Sioux had been a shallow gravel bend in the river, reportedly making it an easy walk across the river year- round except at flood stage.

Native Prairie Restoration

Managed by the Nicollet County Historical Society, the Treaty Site History Center sponsors a wide range of presentations related to the Minnesota River Basin including a photography and literature exhibit titled "Giving Vision and Voice to the Minnesota River Valley," John Cross and Tim Krohn's 2008, 335-mile, 11 day "Trip Down the Minnesota River," and the 2,000 plus mile journey of Sean Bloomfield and Colton Witte from Chaska to the Hudson Bay in 45 days.

### 3. Recycle Mania at GAC

Students and staff at this St. Peter institution – Gustavus Adolphus College (GAC) – got involved with Recycle Mania, a friendly competition for college and university recycling programs to promote waste-reduction activities on campus. Over 400 schools are competing by reporting recycling and trash data that will be turned into rankings according to who collects the largest amount of recyclables per capita, the largest amount of recyclables per capita, the largest amount of recyclables and the least amount of trash per capita. The competition ran through the spring of 2009 and part of it measured how much material went into a landfill, with GAC successfully diverting 85 percent of its waste.


### 4. Project Spotlight – Lake Emily Clean-up

A different-type of clean-up took place on Lake Emily on Le Sueur County in the spring of 2008 when scuba divers spread out across this 235 acre lake. The scuba divers used a forensic grid and sonar surveys to methodically recover dozens of debris piles located in the south and southwest portions of the lake. They were hauling away debris deposited by the 2006 tornado including a dented steel dumpster, computers, lawnmowers, sheet metal and aluminum lawn chair. Only environmentally incompatible items were removed while biodegradable debris that didn't threaten fish habitat stayed. Located near St. Peter, the lake has a maximum depth of 37 feet with an average depth of five feet. All clean-up was handled at 10 feet or above. Le Sueur County Emergency Services sponsored the Lake Emily Clean-up.


**5. Seven Mile Creek Watershed Project (SMCWP)**

In 1999, a Middle Minnesota Basin Project undertook a water resource study of Seven Mile Creek Watershed. Initially this one-year project on the 23,550 acre watershed focused on resource investigation involving hydrology and water quality Parameters along with public outreach. To help increase awareness of the watershed boundaries, seven "Entering Seven Mile Creek Watershed" signs were installed along all the major roads entering he watershed. The project also sponsored nitrogen rate demonstrations on cropfields in the watershed. Cooperating producers applied a wide range of different application rates of nitrogen including zero pounds on a 2.5 acre strip. By using combines equipped with global positioning to harvest the soybean crop, it showed the producers how much money could be saved by using less fertilizer.


Water quality-related accomplishments in Seven Mile Creek Watershed include being part of a large scale groundwater study in the area that defined the connection between groundwater and surface water quality. A grant from BWSR resulted in digitally archiving aging ditch maps and physically inventorying the ditches in Seven Mile Creek Watershed. The inventory allowed the staff to ground truth and document location, size and condition of tile outlets in the system.

A partnership with the Minnesota Department of Agriculture, University of Minnesota and other agencies set up a demonstration farm site under the Conservation Innovations Grant. The project was developed to support quantifying the environmental benefits of conservation drainage practices and to help establish / reinforce cost share standards for accelerating their adoption.

Conservation buffer protection increased from 10 to 21 percent on drainage ditches in Seven Mile Creek Watershed and from zero to 15 percent for cropland ravine interface. In addition to wetland restorations, project accomplishments included the installation of three grade stabilization structures, installation of targeted grassed waterways, 12 on farm nitrogen rate demonstrations, replacement of 13 open tile intakes, installation of a 100 acre conservation drainage demonstration farm, three grade-stabilization structures and stabilizing 1,000 feet of stream bank. Fifty one septic systems were upgraded during the project, resulting in the increased septic compliance rate from 41 to 67 percent.

**6. SMCWP Wetland Restorations**

Prior to Euro-American settlement of Seven Mile Creek, this watershed was dominated by wetlands with over 11,000 acres. By 1985, most of the wetlands had been drained with only 1,307 acres remaining. To show the effectiveness of wetland restorations on water quality in Seven Mile Creek, the Seven Mile Creek Watershed Project worked hard to build relationships with the landowners and producers to restore wetlands on cropfields that had a history of flooding and planting native grass and wildflower buffers.

In 2004, Seven Mile Creek Watershed Project led the effort to request a first-of-its kind petition in Nicollet County to route a county drainage tile line into a restored wetland. A 50 acre wetland easement was developed through the CREP and CRP programs designed to store 55 acre feet of water during a 100 year flood event. Two drainage tiles (a 12" county tile and an 8" private tile) were routed into the wetland with a water level control structure placed at the outlet.


On one restoration project, a field tile line was angled upward on one end to force the water to the surface to use the wetland to purify it by allowing sediment to settle out and plants to utilize the excessive nitrogen before flowing back out the tile line at the other end. Water quality monitoring on these wetland restoration projects found nitrates dropped 50 to 80

percent from the tile system, reduced peak flows and increased wildlife diversity. One grant from the McKnight Foundation funded the restoration of 300 acres of wetlands at 16 locations. Other agencies involved in the project were: NRCS, BWSR, Farm Service Agency (FSA), DNR, and Nicollet County SWCD. At the end of the six-year project, a total of 168 acres of tile intercepting wetlands and associated buffers were restored along with the installation of 60 acres of conservation buffers. These wetlands are expected to remove 6,300 pounds of nitrate per year from the drainage tile system.


Wetland Restoration

**7. SMCWP Conservation Highlights for 2004**

Seven Mile Creek Watershed Project, under the direction of the Brown Nicollet Cottonwood Water Quality Board has seen impressive results for implementing conservation practices and educating the public about water quality problems. In 2004 alone, the project enrolled five CRP filter strip contracts (25 acres) along drainage ditches ravines, completed the petition to rout a branch of County Ditch (CD) 58 county drainage tile into a restored wetland and completed the construction of a 20 acre CREP/CRP wetland restoration and a 30 acre upland buffer on the CD58 impoundment project.

Other accomplishments include coordinating an EQIP contract for 250 acres of no-till on highly erodable soybean ground near ravines of Seven Mile Creek, replaced 12 open intakes with rock inlets, conducted On Farm Nitrogen Rate Demonstrations on five farms covering 250 acres, and upgraded 18 septic systems. Project staff also assisted with the seeding of 15 acres of filter strips and coordinated the maintenance (mowing, spot spraying) of 100 acres of CRP filter strips and wetlands.


Slotted Riser

**8. SMCWP Farm Practice Survey**

In 2004, the project undertook a farm practice survey to gather information on current nutrient, tillage and pesticide use on farms within the Seven Mile Creek Study Area. The purpose of the study was to: Help determine realistic water quality goals by documenting current practices; Use information as a "benchmark" to measure the effectiveness of the watershed project; Use information to help model what impact selected BMPs will have on water quality; and Help watershed managers identify current environmental stewardship practices and future conservation needs. The survey found strong evidence that producers were voluntarily adopting the recommended nitrogen management strategies with the help of educational materials.

**9. SMCWP Groundwater Vulnerability**

A Groundwater Vulnerability Zoning Pilot Project used 16 years of well water data in conjunction with hydrogeologic land use, and other information to develop County Nitrate Probability maps. The maps identify areas with a higher probability for nitrate – nitrogen groundwater contamination, provide probability information for the land-use application process at the country level and alerts county Planning and Zoning staff of potential groundwater concerns that merit the addition of possible conditions to a land use permit to further protect or improve water quality.

**10. SMCWP Fecal Coliform Bacteria Study**

Staff of the BNC Water Quality Board came across a tile drain connected to a house while assisting a farmer with the installation of a filter strip. After convincing the homeowner to upgrade its non-complaint septic system the BNC staff capitalized on the opportunity to test the effectiveness of these systems for reducing fecal coliform bacteria. Water sampling was conducted by the MSUM Water Resources Center before and after the installation of the septic system.


Monitoring station

Before the upgrade, water concentrations from the pipe for fecal coliform bacteria averaged 350 colonies per 100 ml of water (state standard is 126 colonies per 100 ml of water) and reached as high as 7,000 colonies per 100 ml of water. Concentrations decreased by 98 percent (eight colonies per 100 ml of water) after the system was upgraded.

**11. SMCWP Nitrogen Validation Project**

From 2000 to 2003, 15 farmers participated in the nitrogen validation project within the St. Peter Wellhead Protection Area to study how much nitrogen needed to be applied for growing corn while balancing profit and water quality. Nitrate levels in some of the aquifers tapped by the City of St. Peter for drinking water had been steadily increasing since the 1980s.


Farmer Nitrogen Workshop

In 2002, 34 additional farmers in Nicollet and Blue Earth counties participated in the validation trail. Nitrogen application rates (0, 60, 90, 120, and 150 pounds per acre) were replicated three times at each site. Results from the study involving the 15 farmers showed that nitrogen rates of 90 to 120 lbs were the most economically optimum, validating the University of Minnesota recommendations.

By reducing rates from 150 to 120 lbs allowed producers to save an average of $6 to $10 per acre on fertilizer costs and preventing 38 tons of nitrogen from leaching into the drinking water system. Trials for the 35 farmer study showed the maximum profit rate hit at 105 lbs of nitrogen applied per acre.


Seven Mile Creek

**12. Seven Mile Creek Sediment Fingerprinting**

A collaborative effort among county and government agencies and the University of Minnesota is using innovative sediment isotopic fingerprinting techniques to identify suspended sediment sources tied to a specific geologic sources area in the watershed.

The data will be inputted into the Middle Minnesota Basin Model HSPF to stimulate pollutant transport from land segments to water bodies. Samples for Total Suspended Solids are being collected from Seven Mile Creek along with nearby sites in the Minnesota River (Kasota Backwater) and comparable tributaries (Le Sueur River, Blue Earth River, Carver and Bevens creeks) to determine chronology, sediment accumulation rates and amount of radioisotopes $^{210}Pb$ or $^{137}Cs$.

The data is being collected for the sediment fingerprinting study by St. Croix Watershed Research Station in partnership with the Brown-Nicollet-Cottonwood Water Quality Board and MPCA. The study is synthesizing the relationship of radioisotope fluxes to sediment accumulation rate for a number of reference lakes and combine it with the existing dataset of Minnesota watershed reference to define the regional fingerprint of field and nonfield erosion sources.

**13. Organization Spotlight - BNC**

As a multi-county alliance, the Brown Nicollet Cottonwood (BNC) Water Quality Board collaborates with public and private organizations and institutions that share an interest and commitment toward the long-term protection and improvement of water quality. The BNC focuses on conservation and protection efforts in the Middle Minnesota River Watershed, primary in the Seven Mile Creek and Little Cottonwood watersheds. Promotion of conservation practices and education about water quality issues are two major directives of this joint-powers board. This effort is accomplished through partnerships with federal, state and local government agencies, industry and business representatives, university personnel, scientists and citizen groups.

Accomplishments of the BNC Water Quality Board include loaning out a million dollars for septic system upgrades over a three year, funding for alternative intake structures (primarily rock tile intakes), and ravine stabilization projects (earthen berms, drop structures, sediment basins and in the future – controlled drainage structures). Other BNC projects include implementation of filter strips and wetland restorations under CRP, installation of stream bank stabilization projects, and funds for nutrient and conservation tillage practices. The BNC has also completed a conservation drainage pilot project, expansion of water quality monitoring on 15 streams and a transparent-tube survey of the entire Little Cottonwood River.

Top five accomplishments of the Brown Nicollet Cottonwood Water Quality Board are: (1). Enrollment of 116 permanent easements covering approximately 5,200 acres under CREP; (2). Enrollment of 800 CRP contracts for a total of 11,330 acres; (3). Installation of 100 rock tile intakes replacing open tile intakes; (4). Signing up producers for a variety of practices – conservation tillage, nutrient management and pest management – with Environmental Quality Incentives Program (EQIP); and (5). Installation of other BMPs like terraces, grass waterways, water and sediment control basins and grade stabilization structures.

BNC Water Quality Board

### 14. Water Testing, Health & Conservation Road Shows

Brown Nicollet Environmental Health Board worked with commissioners from Brown, Nicollet and Cottonwood counties to offer rural residents with private well water tests for free or at a reduced rate in all the townships. Tests covered nitrates, arsenic and bacteria along with information on cost-share and land conservation program information, Conservation Reserve Program calculation estimates, free manure and soil tests to watershed residents for nutrient management, information on low interest loan septic system upgrades, home radon test kits, along with free blood pressure screening, information on asbestos, mold, home food safety and West Nile Virus.

### 15. Seven Mile Creek Park

Created in 1967 with the purchase of the Sid Meyer property by Nicollet County, the park has grown to 628 acres with an estimated annual visitation of over 150,000 people. Improvements over the years have included the construction of a duck pond, release of wild turkeys and streambank restoration project. Located between the communities of Mankato and St. Peter, the public has access to eight miles of multi-use trails, a Minnesota River boat landing and a stocked Brown Trout stream by the MN DNR.


Trail at Seven Mile Creek Park

To maintain a cold-stream habitat for the trout, numerous water quality improvements have been completed (construction of cross and j-hook vanes in the stream) to redirect water from the stream banks, reestablishment of riparian vegetation with willow cuttings and the planting of native plants – trees, shrubs, grasses and wildflowers. Information kiosks were put up in the park including one as part of an Eagle Scout project to educate the public about the park, water quality in Seven Mille Creek and watershed.

***Construction of stream barbs on Seven Mile Creek to reduce bank erosion.***


Entrance to Seven Mile Creek Park

### 16. One Million Trees By 2020 Initiative

An urban reforestation project for the Mankato-North Mankato area kicked off in 2007 driven by volunteers to plant one million trees by 2020. Benefits of reforestation will include beautification, carbon sequestration, hardwood and biomass production, wildlife habitat, summer cooling, groundwater recharge and soil stabilization, fuel savings, recycling of auto tailpipe emissions and noise abatement. Community service groups, boy and girl scout troops, Future Farmers of America (FFA) chapters, along with adopt a hillside/roadside type programs along with citizen volunteers come together every spring for a two-week period to plant trees.


Planting trees in Mankato

In 2008, close to 400 people came out to put in almost 10,000 hours and plant 13,500 trees, this included 86 school kids and their parents. Money to pay for the trees came from individual and corporate donors. The vision is to a plant a million trees in Mankato and North Mankato, reforesting areas that had been needlessly cleared of trees during construction projects and park development. Sites for the tree plantings have included Highway 14, Good Counsel, ADM and County Road 90.


Community Gardens

### 17. Center for Earth Spirituality and Rural Ministry

Founded in 1996 by the School Sisters of Notre Dame of Mankato, this center exists to work collaboratively toward a sustainable future for all. The Center for Earth Spirituality and Rural Ministry promotes living interdependently within the community of life through four major initiatives: (1). Educational and Spiritual Enrichments; (2). Community Garden; (3). Advocacy and Networking; and (4). Earth Education and Resource Centers. A main focus of the Center is an annual Earth Conference that covers issues like water, food justice and the natural environment.

Under the Community Garden Initiative, the center provides a two acre organic garden to let families and individuals grow their own food and in turn create a self-sufficient community. This program also provides educational workshops, Sprouts Pre-school garden class, and a variety of events highlighting sustainable living. One of the environmental-friendly outreach products offered through this initiative is a natural fertilizer, sold to the public on a limited basis.

**18. Mankato Area Environmentalists (MAE)**

This loosely organized, totally grassroots nonprofit organization works on issues affecting the natural environment in the Mankato area. One of their main focuses is promoting environmental efforts by other organizations and groups.

The mission of MAE is to be an ongoing voice for environmental quality, a resource to other environmental and community groups, and a source of action to shape environmental policies and practices in the Minnesota River Valley – Bend of the River area of south-central Minnesota.


Erosion on the banks of Indian Creek

The group meets monthly to discuss environmental issues related to the Mankato area and also on the state, national and world level. MAE advocates cleaning up polluting feedlots, setting aside flood plain and riverbank buffer land, enhancing water quality through sustainable agricultural and urban storm water management.


Watering the garden

**19. Farm in the City**

A new summer program for kids was launched in spring 2009 by South Central College in North Mankato to teach kids about sustainable living through hands-on activities. Targeted for the ages of 7 to 12, the kids learned about gardening and cooking along with writing about their experiences, going on field trips and working with technology. A $20,000 grant from the Southern Minnesota Initiative Foundation got the three-week program up and running.

**20. Mankato Healthy Lawns Team**

This group started to spread the word of growing healthy, organically-maintained lawns, school playgrounds and public parks is possible and preferable to using lots of weed killers/pesticides and chemical fertilizers. Funding from the Minnesota Pollution Control Agency has been used for an "Organic Turf grass Project" in the Mankato / North Mankato community to test the effectiveness of organic methods of maintaining school playing fields and playgrounds.

**21. Indian Creek Clean Water Partnership**

The City of Mankato, Blue Earth County and the MPCA worked together to study Indian Creek located partially within the city limits. The project undertook studies of several elements – water quality monitoring, geomorphology assessment, urban design strategies for water quality and stormwater management. Watershed and engineering studies used to determine sediment sources attributed the source of the problems areas to erosion caused by older, ineffective storm water management systems in the Indian Creek Watershed. A number of locations were identified including a subwatershed holding part of the Minnesota State University Mankato campus.

After the project findings and recommendations were presented to the City Council and Planning Commission during several workshops focused on stormwater and land development, the City of Mankato implemented many of the recommendations with more planned. The City of Mankato revised their set back requirements for steep slopes to reduce encroachment by residential development and increased their stormwater fee. Other recommendations to be put into action consist of preparing a Stormwater Pollution Prevention Plan and using cheaper and more attractive stormwater management systems for new city developments.


Indian Creek Wetland

**22. Hutton Junior Fisheries Biology Grant**

Lina Wang, a high school student was one of 35 across the United States to receive a Hutton Junior Fisheries Biology grant and the one of only three who received the award for a second consecutive year. The $3,000 grant is designed to stimulate interest in fish science and water management careers, especially among minorities and women.


Lina Wang studies fish

Wang's second year study focused on analyzing darter populations in rivers of the Minnesota River Basin to shed light on the effects of pollution on ecological systems. Some species of this small, finger-size fish are pollutant-sensitive and are used as an indicator of water quality. Her first study examined parasites in snail populations, also looking at the effects of pollutants on water ecologically systems.

These two studies were conducted under the leadership of the Water Resources Center (WRC) at Minnesota State University Mankato. According to WRC staff, the studies are important on a large scale and represent a divergence from previous research in the Minnesota River Basin, especially with determining how water quality impacts ecology.


Netting fish on the Le Sueur River

**23. Crystal Loon Mills Clean Water Partnership**

This locally managed project addresses water quality issues in three Southern Minnesota lakes: Crystal, Loon and Mill. The goal of the Crystal Loon Mills Clean Water Partnership (CWP) is to install Best Management Practices in the watershed to improve water quality along with educating the public on ways to restore and protect the natural resource of these three lakes.

City of Lake Crystal Parade

The top five accomplishments of the Crystal Loon Mills CWP are the Enrollment of over 35% of the agricultural watershed in soil testing and/or associated nutrient management practices; Organization of fishing festival for Take a Kid Fishing Weekend with over 40 kids and their families participating; Promotion and offering of cost-share for over 80 rain barrels; The coordination of 22 community outreach and education events; and The creation and launching of an interactive web site.


Lake Crystal Take A Kid Fishing

Cost-share for conservation practices has included rain gardens (18), rain barrels (82), wetland restorations (11 acres), vegetative buffers (1 acres), alternative tile intakes (15) and nutrient management/soil sampling (4,078 acres). Interest in the project started out on a high note when over 70 people attended the first open house. Presentations at this evening meeting focused on water quality, conservation practices and other project initiatives. One clean-up effort involved a boy scout troop Lake Crystal coming out to pick up trash and other debris around the lake. They also learned about water quality issues from the project staff. An open house was held as an informational session for the general public to learn about a TMDL study.

**24. Morgan Creek Vineyards**

Paula and Georg Marti established this vineyard in 1993 located in the Little Cottonwood River Watershed, They produced their first crop in the fall of 1998 and opened Minnesota's only underground winery. An ambient temperature of 55 degrees in the underground earth shelter creates a perfect cellar temperature for wine production and aging, along with an inviting atmosphere for a tasting its many wines. Morgan Creek Vineyards offers a wide range of events in a scenic location along a tributary of the Little Cottonwood River. There are live jazz and classical, art events, an October grape stomp, winter sleigh rides, and author readings. To develop a more sustainable product, the winery will be producing its own biodynamic (organic) wines and producing solar power.


Georg & Paula Marti

**25. Little Cottonwood River Watershed Project**

This watershed project entered the implementation phase in 2001 after the completion of a three-year water quality study of the Little Cottonwood River and surrounding 108,000 acre watershed. Promotion of conservation practices included mailing out information on the Continuous CRP filter strip program. In 2004 alone, they helped secure 10 new CRP contracts covering 268 acres. Another educational component of the project involved conducting a tour of conservation practices in the watershed and promoting septic system upgrades (a total of 8 completed in 2004).

***The project achieved an 11 percent decrease in sediment. Nutrient levels have continued to increase on an upward trend of 23 percent, including a 61 jump in nitrate levels.***

Nearly 90 percent of the watershed's landscape is tied to row-crop cultivation with this watershed project utilizing two staff positions to help facilitate the adoption of conservation practices. These positions were instrumental in leveraging the skills of conservation partners, new and existing conservation programs, and ultimately increasing conservation adoption rates. The project surpassed its CREP goal by enrolling 2,835 acres, with 45 percent located within the floodplain. In addition, the project helped to restore another 1,500 acres of wetlands and 60 miles of buffer strips. As a result of these conservation practices, the project achieved an 11 percent decrease in sediment. Nutrient levels have continued to increase on an upward trend of 23 percent, including a 61percent jump in nitrate levels.

**26. Brown SWCD CREP Wetland Restorations**

A total of 26 wetland restoration projects on easements totaling 1,974 acres with 975 acres of wetland restorations were completed by the Brown SWCD. According to the Brown SWCD staff, CREP was a very successful program for the county. They pointed to the important economic benefits for both the landowner and contractor along with larger benefits when it came to water quality and wildlife habitat.

*CREP Easement*

The Brown SWCD office also worked with the Brown Nicollet Cottonwood Water Quality Board to promote conservation practices in the Little Cottonwood River Basin including the enrollment of CREP and CRP acres. Funding of this promotion work came from the Brown SWCD, BWSR and local Pheasants Forever chapter.

**27. Putting Green Inc. Sustainable Gardens**

Putting Green Environmental Adventure Park was planned, developed and operated by local high school students to offer an environmentally themed mini golf course, a concession offering eco-friendly foods, an interpretive river trail, solar-powered clubhouse, native plant gardens and walkways with educational exhibits.

*Putting Green 9-hole miniature golf course*

The mission of this nine acre riverside park and environmental learning center is to educate and also inspire people to make choices to create a healthier planet. Field trip opportunities are offered to schools and other organizations and groups to learn about Putting Green and the natural environment of the Minnesota River. Putting Green Inc. stresses the involvement of high school students in the overall operation of the site and programs.

A cooperative project between MRCI Worksource New Ulm (creates opportunities for people with disabilities or disadvantages to help them to play a role in the community) and Putting Green, Inc. was launched in the spring of 2008 to develop a sustainable farm on the Putting Green property along the Minnesota River in New Ulm. The goals of the project included providing sustainable work opportunities for MRCI clients while enhancing community engagement and providing healthy, locally-grown fresh food.

Two acres of the property not being used were cultivated to produce flowers, herbs, vegetables and fruits under the title of "Growing Green Mini-Farm." The food is grown in environmentally-friendly ways by using no herbicides or pesticides and sold locally to protect environmental resources and reduce transportation costs. Over 30 different vegetables and herbs have been grown and distributed in weekly allotments through the Community Support Agriculture Program (CSA).

*Sustainable Gardens at Putting Green*

**28. Coalition for a Clean Minnesota River (CCMR)**
Founded in 1990 by New Ulm area citizens concerned with water quality problems in the Minnesota River, this non-profit organization continues to celebrate the river, promote the potential of the river and fight for its future. CCMR works with over 40 organizations and hundreds of citizens to build effective networks on the state and national level to develop public policy to improve and protect the Minnesota River.

Accomplishments have ranged from successfully lobbying for the establishment of Conservation Reserve Enhancement Program (CREP) in the Minnesota River Basin, producing the Minnesota River Watershed Drainage Policy Reform Report and hosting the successful Riverblast celebration annually at Riverside Park in New Ulm. CCMR works closely with the other two major citizen groups in the basin – Clean Up the River Environment (CURE) and Friends of the Minnesota Valley – on a variety of projects including Conservation Drainage workshops, Community Clean-ups and raising the profile of a citizen-based effort to stop the construction of the proposed Big Stone II Coal Plant.


Water Parade at Riverblast

CCMR sponsors an annual Minnesota River Banquet focusing on issues and success stories related to the basin. Experts have come across the basin to answer questions about Fish and Fishing on the river, Hard Rock Outcroppings, Conservation Drainage Symposiums, Community Clean Ups for Water Quality and The Minnesota River.

**29. Minnesota River and Cottonwood River Regional River History & Information Center**
The Coalition for a Clean Minnesota River along with local citizens worked together to renovate and open the old Riverside Park schoolhouse into a Regional River History and Information Center. The center provides the public access to online water quality data information on the Minnesota River and Cottonwood River watersheds, along with displays highlighting historical and cultural artifacts. Educational outreach is a main focus of the center including offering environmental education programs and public presentations. Curator and nature photographer Ron Bolduan offers a wide range of presentations including "Bison Skulls to Turtle Shells," "Camouflaged Critter Hunt," and "Life on the River" throughout the basin.


Interior of the River Center

**River Advocate – Scott Sparlin**
Scott Sparlin first became interested in the degraded water quality of the Minnesota River in the 1980s when his son asked why they weren't catching more fish. As a result, Sparlin helped organize the Coalition for a Clean Minnesota River (CCMR) in 1989, becoming its first and only executive director. Focusing on the middle portion of the Minnesota River, CCMR and Scott Sparlin work with over 40 organizations and hundreds of citizens to create and nurture relationships among the public and provide an extensive network to link river supporters together. Sparlin also works as a watershed coordinator for the Friends of the Minnesota Valley focusing on the watersheds of Le Sueur Creek, Rush River and High Island Creek. As one of the first people to recognize the need for a healthy Minnesota River, Scott has spent a lot of time exploring, fishing and observing this important resource.


Joe Michel, Scott Sparlin and Del Wehrspann

**30. New Ulm Wastewater Treatment Plant**
To meet the new state phosphorus standards for the Minnesota River phosphorus, the City of New Ulm built a new $3 million system to biologically reduce phosphorus levels. Single-cell organisms in the wastewater, similar to amoebas, eat the phosphorus and after dying off they are collected along the produced sludge. New Ulm wanted to be proactive and lead by example as one of the largest municipal wastewater treatment plants in the Lower Minnesota River to protect the river environment. In 2007, the wastewater plant discharged over 30,000 pounds of phosphorus into the Minnesota River and now reduced by 80 percent or fewer than 6,000 pounds annually with the new wastewater system.


New Ulm Wastewater Treatment Plant

**31. Capitol for a Day – New Ulm**

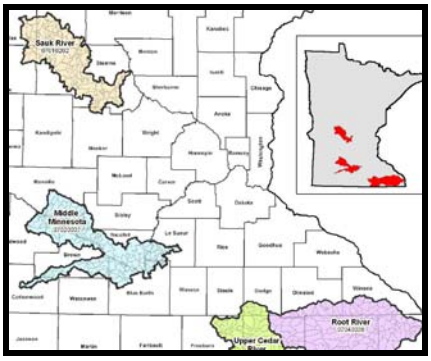
In May 2009, New Ulm hosted Capitol for a Day to celebrate the Minnesota River at the Riverside Park. The main focus of the event was the release of a huge, tagged flathead catfish by Lt. Governor Carol Molnau and an elementary school student who won a catfish essay contest. The fish was released by a boat in the middle of the Minnesota River.

*Release of a catfish into the Minnesota River*

A variety of activities for kids were offered including learning how to cast for fish, making fish prints and learning about fish species who make their home in the Minnesota River along with informational booths on invasive species, a turtle telemetry study, shoreline planting, invertebrates and mussels. The goal of the day was to highlight New Ulm as a proud historic town, promote a greater understanding of why our state's namesake river deserves better treatment than it has received in the past, and provide a fun outdoor recreation experience for kids. The event was sponsored by the DNR, City of New Ulm, the New Ulm Sport Fishermen's Club and KNUJ Radio.

**32. Miss. River Basin Healthy Watersheds Initiative**

Launched by the U.S. Department of Agriculture, this initiative will provide $320 million to 41 watersheds in 12 states including the Middle Minnesota River Watershed to implement BMPs on agriculture land to reduce hypoxia in the Gulf of Mexico. Smaller watershed projects will be selected through a competitive process under the Cooperative Conservation Partnership Initiative, overseen by the NRCS. Federal funds will be used to help farmers implement conservation practices to prevent, control and trap runoff, primarily nutrients like nitrogen and phosphorus – from agricultural land. Practices under this program include planting buffers and restoring wetlands to controlling soil erosion, improving water quality and providing wildlife locally while also shrinking the Gulf of Mexico's "dead zone," a large area affected by low dissolved oxygen.




**33. Swan Lake Wetland Litigation**

The Swan Lake Area Wildlife Association has been pursuing a lawsuit against the Nicollet County Board of Directors since 2003 over county officials approving the drainage of two shallow lakes and associated surrounding wetlands. The two lakes – Little Lake and Mud Lake – are located two miles east of the City of Nicollet. Mud Lake is part of Little Lake's tributary system. Both lake's water levels had been maintained by a dam built in 1949 at Little Lake's outlet.

After the dam began to fall apart in 1960s, the county requested a permit to build a new, longer dam. When the Commission of Natural Resources (now the Department of Natural Resources) noted the natural elevation of the lake should be higher, the county didn't repair or replace the dam. Under a recent court ruling, the county will be responsible for maintaining water levels set by the DNR. Ultimately, the Swan Lake Area Wildlife Association is hoping 1,200 acres of wetlands will be restored.

*Swan Lake*

**34. Paired Watershed Studies for Nutrient Reduction**

Two adjacent watersheds in Nicollet County were part of a study to evaluate the effectiveness of Best Management Practices for improving water quality. A coalition of partners – University of Minnesota, Nicollet SWCD, Nicollet County Environmental Services and United Farmers Cooperative worked with 26 producers in the two 2,800 acre watersheds. To obtain a baseline water quality data, three years of monitoring was conducted in both the treatment and control watersheds along with conducting farmer surveys to determine management practices and production costs.

During the implementation phase during the 2003 to 2005 crop years, a number of BMPs were utilized: grid soil sampling for phosphorus (41 percent of the crop acres, 20 percent of total watershed acreage), fall no till of soybean residue (10 percent of eligible acreage), manure hauling, replacing surface tile inlets with rock tile intakes (33 percent of inlets), replacing surface tile inlets with hinkenbottom risers (20 percent of inlets), and installation of riparian buffer strips (12 acres along one mile of the drainage ditch).

The control watershed implemented no BMPs. Water quality data showed no significant reduction in sediment, phosphorus or nitrogen rates were observed. Farmers were very receptive to reduced tillage of corn residue, grid soil sampling for variable rates phosphorus application and elimination of surface tile inlets. The installation of riparian filter strips and fall no-tillage of soybean residue were moderately accepted by farmers. They showed little desire to make changes in nitrogen fertilizer management.

**35. Red Top Farm Demonstration Site**

In 1993, the Minnesota Department of Agriculture established a long-term research/demonstration site to show the effects of farm practices on tile water quality in Section 23 of Oshawa Township in Nicollet County. The field tiles drain to County Ditch #13 and into Seven Mile Creek. The 80 acre site provides a unique opportunity to study the quality and quantity of water and agricultural chemicals moving through the subsurface tile drainage system from a field scale setting. The overall concept of the Red Top Farm is to provide an educational hands on site for farmers, agricultural professionals and the non-agricultural community to learn about the effects of subsurface drainage system. The site has hosted many educational field days, featured in numerous agricultural magazines and newspaper articles, and allowed opportunities for educational outreach at various meetings. Long term data has proven to be instrumental in understanding water quality from field scale drainage under different management strategies.

Field Tour at Red Top Farm

**36. State Highway 169 Erosion Control**

Nicollet Soil and Water Conservation District worked NRCS on behalf of the Minnesota Department of Transportation to reduce sedimentation along State Highway 169 between Mankato and Le Sueur. The NRCS and SWCD worked together on intensive engineering and construction inspection, saving the project thousands of dollars over hiring a private firm to do the work. Seven landowners in upland areas used cost-share from the SWCD and NRCS to complete 25 sedimentation reduction projects with an estimated 657 tons of soil saved annually and a total of 150 percent reduction of peak flow.

Sediment Control Basin

**37. Pehling Farm**

Joe and Liza Domeier run a pasture-fed livestock and poultry on a 30 acre farm near Nicollet. Instead of going the row crop farming route, the Domeier's choose to raise pasture-fed animals like sheep, hogs, chickens and beef. While it may mean slower growth, it also makes for healthier and more flavorful meats. To be profitable on this small of acreage, they sell their meat and fiber from their sheep flock wholesale directly to their customers from their web site. Direct marketing allows more money to be generated from the land. Along with livestock and fiber, the couple are involved in community-supported agriculture (CSA) by selling shares of their farm's garden. The long-term goal of the Domeier's farm is to make a living. They help promote the CSA program through presentations including at the Organic Community Gardening sponsored by the Center for Earth Spirituality and Rural Ministry.

**38. Lake Washington Water Quality Project**

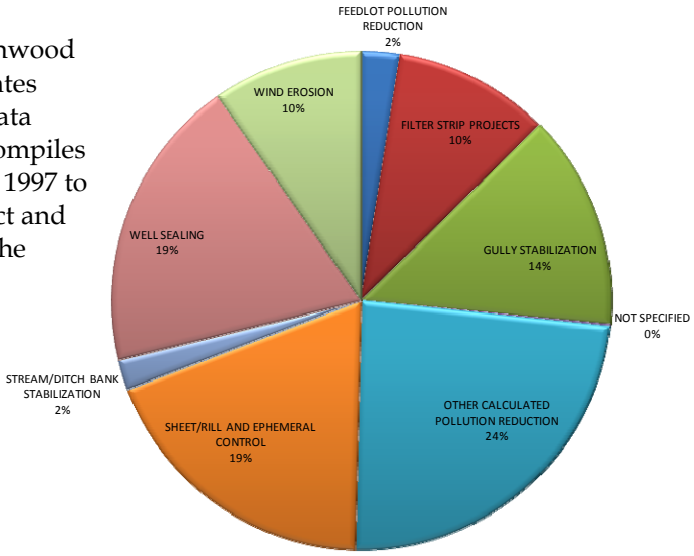
Le Sueur County sponsored a project organized by the Lake Washington Improvement Project Board to conduct a watershed assessment, stream and lake monitoring, an information and awareness programs and comprehensive planning for this 1,600 acre lake. Other cooperators involved in the project were Blue Earth County, Blue Earth SWCD, Minnesota State University Mankato WRC, and MPCA. Results of the implementation phase included the establishment of a Lake Washington Sanitary District that provided wastewater hook-ups to about 500 properties by connecting it to the City of Mankato's wastewater treatment plant. Other water quality improvements included upgrading 39 septic systems, construction of three water retention ponds and five rain gardens to reduce sediment and nutrient loading and seasonal lake monitoring to analyze any potential water quality changes. A wetland bank has also been established in the watershed.

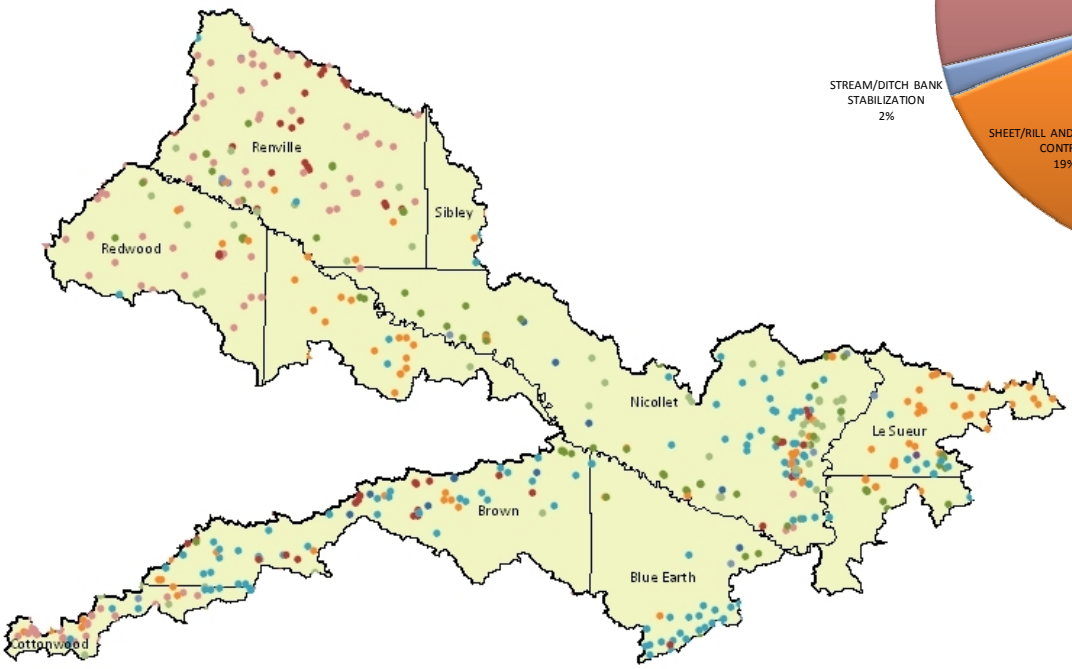
# Middle Minnesota River Watershed Conservation Practices and Land Use

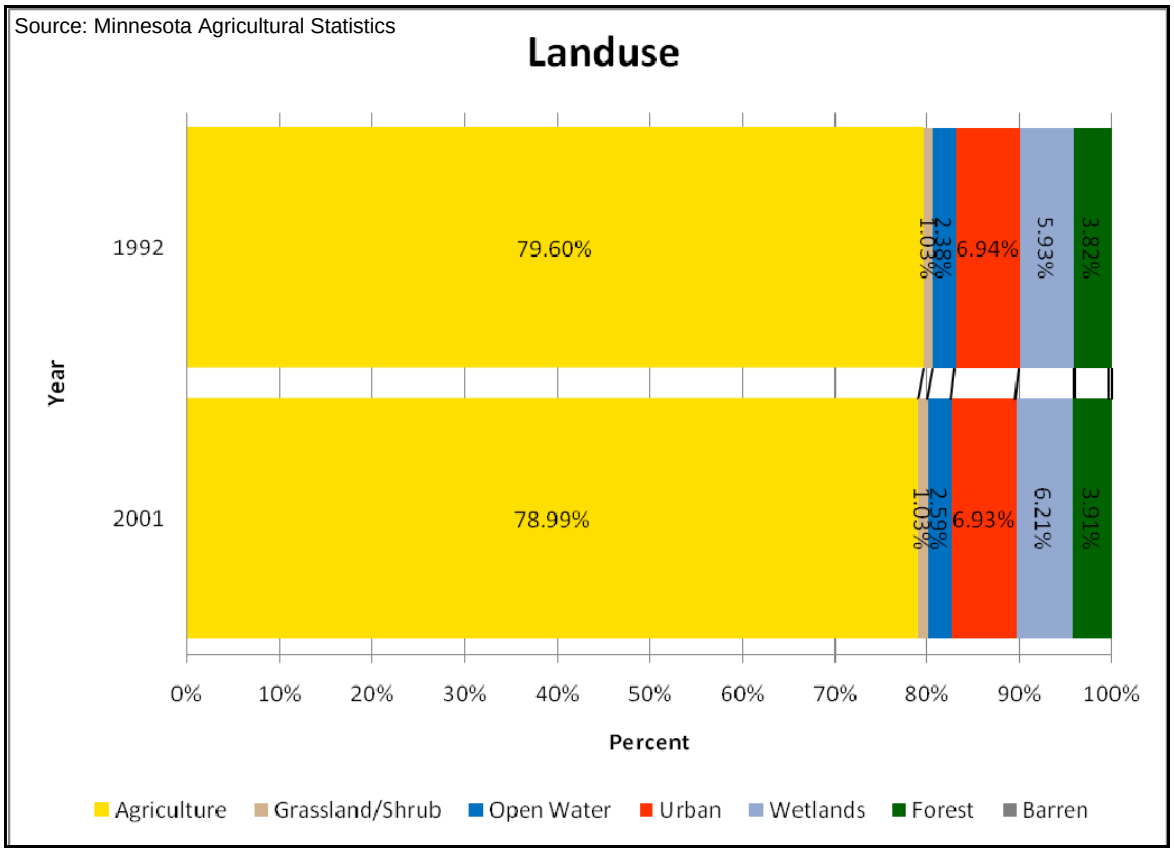
## Conservation Practices

Work on understanding water quality issues in the Middle Minnesota Watershed started in the late 1990s with the Brown Nicollet and Cottonwood Water Quality Board. The map below and pie chart at the right illustrates conservation practices in this watershed. The conservation practices data comes from the Board of Water and Soil Resources (BWSR) program compiles information on a county, watershed, and individual-project basis from 1997 to 2008. The number of conservation practices reflects only actual contract and not the acres. There are additional conservation practices installed in the Minnesota River Basin but not recorded in either LARS or eLINK.

**Middle Minnesota River Major Watershed**



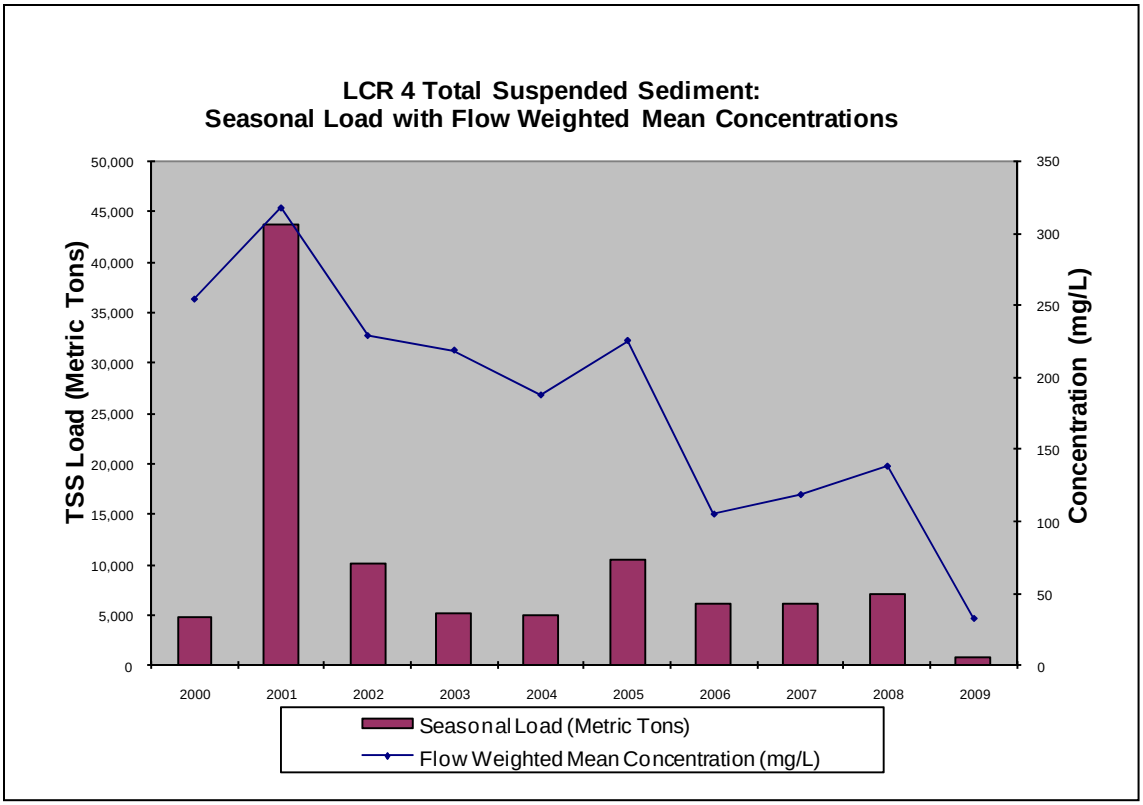



# Middle Minnesota River Watershed Pollution Reduction

Water quality sampling for the Middle Minnesota River Watershed has primarily focused on the Little Cottonwood River, the watershed's majority tributary. The Brown Nicollet Cottonwood Water Quality Board (BNC) handled water quality monitoring on the Little Cottonwood River from 1996 to 2009.

Analysis of the general runoff conditions in the watershed must be considered when evaluating possible trends in pollutant loads. In an effort to determine relative deviations from normal, runoff values were compared for each year. The 30 year runoff average or normal for the Little Cottonwood River Watershed has been calculated to equal 5.8 inches.

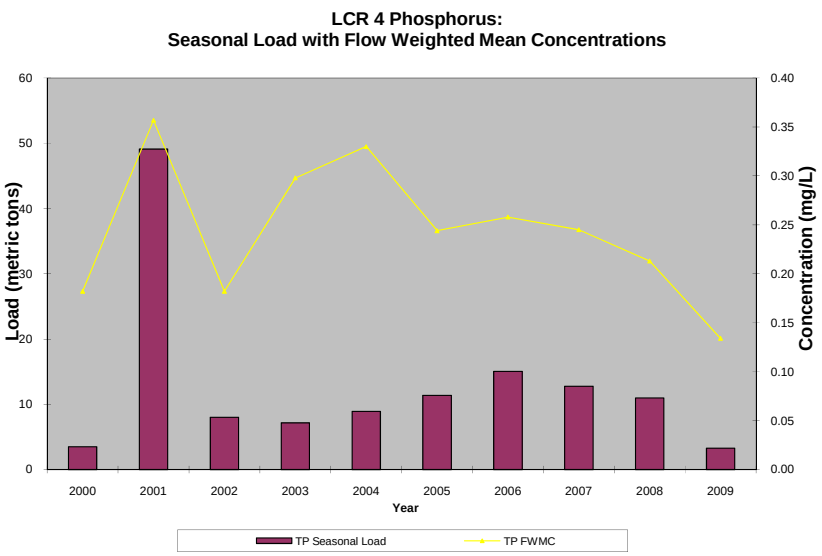



**Total Suspended Solids**

A total of 203 Total Suspended Solids (TSS) samples were taken between 1996 and 2009 by the Brown – Nicollet – Cottonwood Water Quality Board (BNC) at the outlet of the Little Cottonwood River. When concentrations are plotted by year, a statistically non - significant decreasing trend is observed from 1996-2009 ($p < 0.12$, $n=203$). In addition to total annual runoff, timing and intensity of precipitation drives sediment transport and delivery. Because of seasonal differences in precipitation and land cover, the watershed also shows seasonal differences in water quality.

TSS concentrations are typically higher early in the monitoring season with peak concentrations occurring in June. By late June to early July, the Little Cottonwood River generally has receding flows due to limited precipitation and high rates of evapotranspiration. These factors combined with a developed vegetative canopy reduce surface runoff and near channel erosion, resulting in lower TSS concentrations as the season progresses.

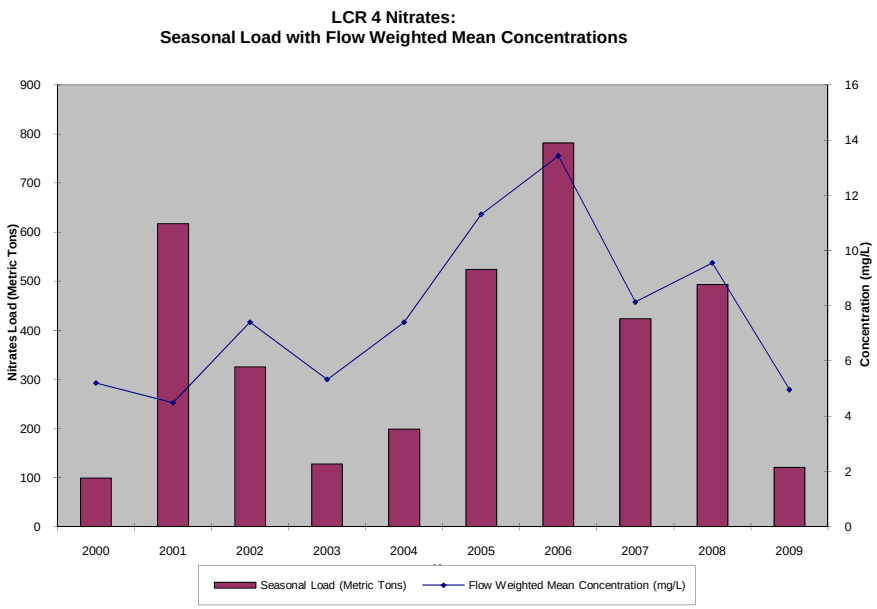
On average, a total of 9,963 metric tons or 203 lbs./acre of sediment was delivered to the Minnesota River from the Little Cottonwood River per year. This resulted in an average flow weighted mean concentration of 183 mg/l. Despite these concentrations the figure does indicate a decreasing trend for sediment load delivery to the Minnesota River. This "trend" might be partially an artifact of the extreme 2001 sediment loading event rather than an actual marked improvement to water quality. However, thousands of acres of marginal land were enrolled in conservation programs such as CREP and CRP in the Little Cottonwood Watershed over the past decade. These efforts have likely reduced sediment delivery to the river and therefore improved water quality.




**Total Phosphorus**

A total of 203 Total Phosphorus (TP) samples were taken between 1996 and 2009 by BNC at the outlet of the Little Cottonwood River. TP concentrations did not show a statistically significant trend when plotted by year. As with TSS, TP shows temporal concentration differences. This can be seen by average monthly concentrations of TP with relatively high phosphorus levels during the early season high flow conditions followed by gradually declining concentrations as the season progresses.

On average, a total of 13 metric tons or 0.26 lbs./acre of TP was delivered to the Minnesota River from the Little Cottonwood River per year. This resulted in an average flow weighted mean concentration of 0.244 mg/l. Phosphorus has an affinity to bind to soil particles. Therefore, it is not surprising that seasonal TP loads closely mirror the TSS loads shown in Figure 4. Likewise, conservation measures such as CREP and CRP that reduced sediment transport likely reduced the amount of sediment bound phosphorus reaching the Little Cottonwood River.




**Nitrate Nitrogen**

A total of 201 samples have been analyzed for nitrate-nitrogen from the Little Cottonwood River outlet site by BNC. The median $NO_3$-N concentration at the outlet of the watershed was 7.97 mg/L. When $NO_3$-N concentrations are plotted by year, no statistically significant trend exists ($n = 201$; $p < 0.63$). According to average monthly concentrations of $NO_3$-N at the Little Cottonwood River outlet, concentrations rose to a peak in June, followed by a steady decline until fall rains and reduced evapotranspiration increased tile and ditch run-off.

On average, a total of 371 metric tons or 7.57 lbs./acre of $NO_3$-N was delivered to the Minnesota River from the Little Cottonwood River per year. This resulted in an average flow weighted mean concentration of 7.72 mg/l. Peak nitrate loads were observed in 2006, though this year experienced only slightly higher than normal runoff conditions (9.5% greater than normal). Nitrogen application rates and crop rotations might have played a part in the elevated nitrate loading.