

Grant Project Summary

Project title: South Branch Root River Watershed Fecal Coliform Bacteria Reduction Project

Organization (Grantee): Fillmore County

Project start date: 8/30/05 Project end date: 9/30/08 Report submittal date: _____

Grantee contact name: Donna Rasmussen Title: Fillmore SWCD Administrator

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Basin (Red, Minnesota, St. Croix, etc.): Lower Mississippi/Cedar County: Fillmore

Project type (check one):

- Clean Water Partnership (CWP) Diagnostic
- CWP Implementation
- Total Maximum Daily Load (TMDL) Development
- 319 Implementation
- 319 Demonstration, Education, Research
- TMDL Implementation

Grant Funding

Final grant amount: \$199,420 Final total project costs: \$190,480

Matching funds: Final cash: \$ Final in-kind: \$56,931 Final Loan: \$135,342

Contract number: C9975935-04-0 MPCA project manager: Shaina Keseley

For TMDL Development or TMDL Implementation Projects only

Impaired reach name(s): _____

AUID or DNR Lake ID(s): _____

Listed pollutant(s): _____

303(d) List scheduled start date: _____ Scheduled completion date: _____

AUID = Assessment Unit ID
DNR = Minnesota Department of Natural Resources

Executive Summary of Project

This summary will help us prepare the Watershed Achievements Report to the Environmental Protection Agency. (Include any specific project history, purpose, and timeline.)

The South Branch Root River Watershed Project began in 1998 with a Clean Water Partnership Phase I Diagnostic Study, which was completed in 2002. The South Branch had fecal coliform bacteria levels 2.8 times the water quality standard, which are levels consistent with those seen in other streams in the region. As a stream representative of those in the region with headwaters in the glacial till in the west flowing east through karst and bluffslands to the Mississippi, the Governor's Ten-Year Clean Water Initiative targeted the Root River as a pilot watershed for cleaning up waters with uses impaired by fecal coliform bacteria and turbidity. Notification was received in December 2003 that a 319 Implementation Grant for \$299,420 and a Clean Water Partnership Low-Interest Loan Fund application for \$300,000 were awarded to Fillmore County with the agreements signed in 2005. Implementation began in August 2005 and continued to September 2008.

Preliminary conclusions from just four years of data indicate that fecal coliform bacteria concentrations have dropped by about 40% from 553 org/100 ml (the 1999-2002 geometric mean measured at Forestville) to 328 org/100 ml in 2005-2008. The project's goal was a 20% reduction. Nineteen septic system loans have been processed representing 8550 gallons of sewage now being properly treated each day. Five of seven open feedlots in need of fixes were fixed. The number of registered feedlots has dropped by about 40% countywide according to the County Feedlot Officer, which could be another contributing factor to decreasing bacteria numbers. The rise in the adoption of practices such as no-till and mulch till (>30% crop residue) from 65% of the cropland in the watershed in 2004 to 80% in 2008 also contributes to reduced runoff and pollutant transport. The project has also been a springboard for other projects in the entire Root River watershed.

Goals

- | | | |
|-----------------|-------|--|
| 1st | Goal: | <u>Complete 30 feedlot fixes by providing cost share of 50% up to a maximum of \$1000</u> |
| 2nd | Goal: | <u>Enroll 500 acres in Buffer Bonus Program in conservation tillage, cover crops, or nutrient management</u> |
| 3 rd | Goal: | <u>Enroll 10 cooperators or 200 acres in the Hay Set-Aside Program</u> |

Results that count (Include the results from your established goals.)

- | | | |
|-----------------|---------|--|
| 1st | Result: | <u>5 feedlot fixes were completed out of 7 identified as needing fixes; number of registered feedlots dropped significantly since 2005</u> |
| 2nd | Result: | <u>580 acres enrolled in no-till or cover crops (381 acres of no-till and 199 acres of cover crops)</u> |
| 3 rd | Result: | <u>9 cooperators enrolled 105 acres in Hay Set-Aside</u> |

Pictures



Boland Hay Set-Aside: This 120-ft. field buffer is shown 2 weeks after record rains fell on the area from June 8-15, 2008. Sediment moving off the adjacent bean field was trapped in the buffer even though the buffer had been recently harvested for hay.



No Till Corn: An incentive was offered to implement no till. This picture shows a field of no till corn, a practice that is still not widely used. No till constitutes the tillage method used on 52% of the soybean acres surveyed.



Cover crops: Aerial seeding of winter rye was tried by several farmers. This picture was taken in October 2006 about 6 weeks after seeding into a soybean field. The soybeans were harvested about 2-3 weeks after the seeding.



Feedlot Fix: The picket fence holds back the solids from the feedlot and allows the liquids to go through an area of crushed rock to diffuse the flow. The liquids then enter a 50-foot grass buffer and additional crop ground before reaching an area of concentrated flow. The grass buffer was planted after the corn was harvested.

Acronyms (Name all project acronyms and their meanings.)

MPCA = MN Pollution Control Agency

MDA = MN Department of Agriculture

DNR = Department of Natural Resources

TMDL = Total Maximum Daily Load

CRP = Conservation Reserve Program

JD = Judicial Ditch

BMP = Best Management Practice

Partnerships (Name all partners and indicate relationship to project)

MPCA: project management, assistance with water quality monitoring, watershed steering committee

MDA: education, nitrate clinic equipment, SWAT model development with University of Minnesota, pesticide and nutrient monitoring, watershed steering committee, conservation drainage demonstration site

DNR Waters: dye trace studies, watershed steering committee

DNR Parks: water quality monitoring station located in state park, assistance with watershed education, watershed steering committee

DNR Forestry: assistance with education, provided Woodland Stewardship Plans to landowners

University of Minnesota Extension: Woodland Advisor Classes, assistance with tillage, grazing, and manure field days

Fillmore SWCD and Mower SWCD: technical assistance with landowners and landowner contacts, GIS assistance, office space and support for project coordinator

The Nature Conservancy: construction of surge ponds (infiltration basins) in JD#1, watershed steering committee

Winona State University: fish and invertebrate surveys, stream geomorphology surveys and karst investigations

Section 1 – Work Plan Review

There were four amendments made to this work plan, all happening within the last four months of the project. Amendment 1 was approved in May and provided an extension from June 30, 2008 to September 30, 2008. Amendment 2 was approved in July which subtracted \$70,000 in funding from the original grant to reflect grant funds not to be used for BMP implementation before the end of the grant period on September 30th. Another key factor in this decision related to the local project coordinator accepting another position and other staffing changes at the Fillmore SWCD. In Amendment 3 approved in August, the grant amount was reduced by \$25,000 due to shortage of time remaining in the grant period to complete a flood storage area in JD#1. Amendment 4 was for a \$5,000 reduction in the grant amount when it was determined that cost share funds for a grazing plan and for a feedlot fix would not be used by the end of the grant period.

Original Grant Amount	Project Element	Revised Grant Amount
\$30,000	Feedlot Fixes	\$6,000
19,375	Buffer Bonus (no till, cover crops)	6,855
30,000	Hay Set Aside	15,165
30,000	Riparian Wetland Restoration	0
11,625	Forest and natural areas management	983
500	New Look at Livestock Initiative	500
12,960	Grazing Economic analyses	6300
64,160	Administration/Coordination	73,152
500	Grazing workshops	840
500	ISTS workshops	0
500	Forestry field days and classes	135
5,000	Education and information – newsletters	5,500
5,800	Private well testing – bacteria/atrazine	752
6,000	Stream monitoring	7,036
15,000	Dye trace studies	15,000
17,500	SWCD assistance – surveys, GIS	11,936
50,000	Evaluation and modeling	49,266
\$299,420.00	TOTAL	\$199,420.00

Provide 50% cost-share for non-engineered feedlot fixes up to a maximum of \$1000: The work plan had a goal of completing 30 feedlot fixes in the watershed to control runoff from open lots with practices such as grass filter strips, rain gutters, freshwater diversions, and fencing. Five feedlot fixes were completed, which addressed all but two of the feedlots in need of runoff control in the watershed. Due to the declining number of open feedlots registered in the county (the County Feedlot Officer estimates a 40% drop from the beginning of this project), the demand for this funding dropped significantly from 2003 when the application was submitted until 2008 when the grant period ended. Livestock producers who had completed grazing plans were also offered cost-share from these funds to implement practices in their grazing plans, but those that were implementing the practices either refused cost-share or would not be able to complete installation of the practices before the end of the grant period.

Buffer Bonus Initiative: Incentives were offered for implementing practices such as no-till, cover crops, and nutrient management with a goal of 500 acres enrolled for three years. A total of 580 acres were enrolled (no-till on 381 acres and cover crops on 199 acres). However, three year contracts could not be completed since grant funds could not be kept beyond the end of the grant period to make the annual payments in years 2 and 3 for those contracts signed in 2007 and 2008. Nine of the ten contracts signed fell into this category. Only 40 acres were enrolled for the full three years, 301 acres were enrolled for

two years, and 40 acres were enrolled for one year. The cover crop payments were not tied to a three-year contract since aerial seeding was being promoted as the seeding method. This is a relatively innovative practice that many producers wanted to try on a year-to-year basis. The cover crops seeded in 2007 were not aerial seeded since the helicopter was not able to do the seeding due to weather conditions, so 70 acres were drilled that year. Nutrient management incentives were not used at all. Those needing nutrient management plans were already implementing them. Those not required to have a nutrient management plan were not interested in the incentive. Mini manure management plans were completed for those completing feedlot fixes.

Hay Set-Aside Program: This program allowed producers to plant buffers in hay that could be harvested on a limited basis while receiving a rental payment of \$50/acre (about half of the annual rental payment from CRP) for three years on up to 20 acres. A goal was set for 10 cooperators or 200 acres to be enrolled. Nine cooperators signed up for a total of 105 acres. The popularity of this program seemed to be growing, but was again limited by the inability to keep grant funds beyond the end of the grant period to make annual payments in years 2 and 3. The benefits of the buffers were noted in at least two cases. In one location, the landowner noted significantly reduced runoff from the adjoining crop field after the buffer was installed. In the second location, sediment from the adjoining soybean field was trapped in the buffer during record rainfalls (see picture attached to the project summary).

Riparian Wetland Restoration: The goal of the riparian wetland restoration was to provide temporary water storage in the headwaters of the watershed in JD#1 to reduce peak flows downstream. Three potential sites were identified by the Mower SWCD. The landowners were contacted but there was no interest from them. Due to the large ditch cleanout that was completed in 2007, the Mower SWCD had been contacting landowners about installing CRP buffers along the ditch. Rising crop prices were making it more difficult to create interest, so it was decided to utilize these funds to provide a sign up bonus to the landowners, especially those with side inlets where sediment transport into the ditch would be greatest. A bonus of \$500 to \$1000 per acre was offered based on the width of the buffer, but, again, there was little interest with crop prices continuing to rise. With little time left, a non-cropped area was identified that could serve as a temporary flood storage area, but time was too short to complete this project. None of the grant funds were used and were subtracted in Amendment 3. In the meantime, The Nature Conservancy (TNC) had acquired funds to install infiltration basins (surge ponds) in non-cropland which hold tile discharge water temporarily to reduce peak flows and remediate nitrogen and phosphorus concentrations, a function similar to the original objective of the wetland restoration area. Construction on these ponds was begun in late September utilizing TNC funds.

Forest and Natural Areas Management Incentives: The goal was to develop 20-25 Woodland Stewardship Plans and assist the MN Land Trust to establish up to four donated voluntary conservation easements in the watershed. Very limited demand was seen for these incentives. A total of six Woodland Stewardship plans were completed in the watershed, but only one was completed by a consultant and charged to the grant with the remainder completed by the DNR Forester. One family did express interest in working with the MN Land Trust on a donated voluntary conservation easement, but delays due to health problems delayed the long process preventing completion before the end of the grant period. Most of the funding for these activities was not used and was subtracted in Amendment 2.

The New Look at Livestock Initiative: This was a pilot of an initiative proposed by the Basin Alliance for the Lower Mississippi in Minnesota (BALMM) to develop ways to promote livestock agriculture in the basin that would encourage the use of more hay and pasture and slow the conversion of hay and pasture to row crops. A steering committee was established that met 13 times over 3 years. Hog, dairy, and beef producers were represented as well as Extension, MDA, MPCA, and SWCD. Their first accomplishment was developing a list of recommendations for the Fillmore County Comprehensive Plan that was being updated in 2006. Most of the recommendations were incorporated into the Comprehensive Plan. Their second accomplishment was developing a DVD about the value of livestock production in this part of the state both economically and environmentally (Livestock on the Land). Donations for the project were received from Fillmore County and Olmsted County Farm Bureau, Farmers' Union, Pork Producers, Dairyland Power Cooperative, and Land Stewardship Project. Three hundred copies have been

produced and are being distributed among non-agricultural groups in a five-county area with the assistance of Extension.

Grazing Economic Analyses: Grazers were offered the opportunity to work with a farm management consultant to analyze their grazing operations from an economic standpoint. The goal was to complete 10-15 of these analyses. Of the 12 producers who were contacted by both the project coordinator and the farm management consultant, three producers took advantage of this. Finding a time to meet with the producers proved to be difficult which limited the number who participated.

Administration/Coordination and Education/Information: The halftime project coordinator organized watershed steering committee meetings, developed promotional materials, made presentations to elected officials, civic and church groups, and made landowner contacts. The watershed steering committee met every other month for three years. Meetings were publicized in five local newspapers, and agendas were mailed or emailed to over 90 contacts. Education and information about the watershed project were disseminated through various means including newsletters, workshops and classes, nitrate clinics, field days, displays, and promotional materials listed later in this report. The watershed steering committee was comprised of township officers, landowners, and representatives of MDA, DNR Divisions of Fisheries, Parks, and Waters, the Board of Water and Soil Resources, the SWCDs, and The Nature Conservancy. Coordination with these agencies enabled the initiation of related projects in the watershed such as the MDA conservation drainage demonstration project, the MDA watershed modeling project using the SWAT model, and TNC's infiltration pond project.

Measuring Results: A permanent water quality monitoring station was activated in April 2005 at the historic bridge at Forestville in the state park. Probes to measure temperature, dissolved oxygen, pH, conductivity, turbidity, and stage were installed. This station will not be operational after this sampling season but is being replaced by a Tier 3 pesticide and nutrient sampling station that has been installed by MDA about 2-3 miles downstream at Carimona, which became operational in August of 2008. Grab samples were collected twice a month and analyzed for fecal coliform bacteria (except 2008 when only E. coli was collected), E. coli, and nutrients, plus turbidity and TSS if it was a runoff event. In-field measurements were recorded for dissolved oxygen, temperature, conductivity, stage, and transparency as well as stream condition and appearance.

Pesticide samples were collected in cooperation with MDA at the Forestville site initially as a Tier 1 site from 2002 to 2005. Tier 1 sites are sampled four times (once every two weeks) from May 1 to July 1 during runoff events if one occurs during the two week period, or during base flow if no runoff event occurs. Tier 1 assessment compares measured concentrations to a reference value (in this case, 50% of the water quality standard) to identify those sites that exhibit concentrations at levels of concern. In 2006, the Forestville site was changed to a Tier 2 site based on the previous years' data. Tier 2 assessment compares "time-weighted" average concentrations to the reference value. Time weighted samples are collected during runoff events on the same schedule as Tier 1 with an additional sample collected within 24 to 96 hours after the initial sample because aquatic life and human health standards are duration based. In 2007, Forestville was scheduled to be advanced to a Tier 3 site using an automated sampler to collect composite samples. However, an appropriate site for the automated sampler was not established, so that switch was delayed until late in the 2008 season (August). However, in 2007, two automated Tier 3 sampling stations were installed in Judicial Ditch #1 and the South Branch in Mower County.

Fish and invertebrate monitoring was completed by WSU at 14 sites in the watershed as a follow up to data that were collected in 1998 and 1999. Four sites in the watershed have also been monitored for 5 years for macroinvertebrates by volunteers using DNR protocol. The samples are analyzed by Neal Mundahl and students at Winona State University. Six Citizen Stream Monitoring Program volunteers continue to monitor 10 sites in the watershed.

Tillage transect surveys have been completed each year in June from 2004 to 2008 with the data entered and graphed in Excel. There are MDA conducted FANMAP surveys with 61 farmers in 2004 and with 60 farmers in 2008 to get current information about their tillage and nutrient and pesticide management

practices for the 2003 and 2007 crop seasons. Also, ten separate dye traces were completed for this project to refine springshed (ground water basin) boundaries on the northern boundary of the watershed between Spring Valley and Wykoff as well as smaller springsheds in the watershed. This expands on the information about ground water flow patterns in the county that began with the 1995 Fillmore County Geologic Atlas.

Section II – Grant Results

Measurements: Methods for measuring results are listed above.

- **BMP Implementation:**

Hay Set Aside					
Contract #	Contract Date	Bd Approval Date	Acres	Total Pymt	Comments
SB05-01	7/20/2005	9/14/2005	2.5	345.00	CCRP waterway sign up bonus
SB06-01	2/1/2006	2/8/2006	20	3,000.00	10.5 acres seeded in 2005, 15 A to seed in 2006 Also seeded 8 A field border in 2005 but not enrolling
SB06-02	3/3/2006	3/15/2006	17.2	2,580.00	7.2 A and 6.2 A fields in section 9, 3.8 A in sect. 10 (not pd in 2008)
SB06-05	4/10/2006	6/8/2006	9.3	1,500.00	60' Field border on west, south and east sides of field; east border seeded in 2005
SB06-03	4/5/2006	6/8/2006	9.2	1,380.00	200' field border seeded in 2005 on east side of field
SB06-04	4/6/2006	6/8/2006	19.9	2,985.00	3 field borders: 3.7 acres in sect 20, 8.0 acres in sect 29, 8.2 acres in sect 29
SB06-06	5/8/2006	6/8/2006	6.2	930.00	100' buffer planted on east side and 1/2 of north side of North cornfield; 100' buffer left in hay on east side of south field, rest of field planted to corn
SB06-07	12/5/2006	12/13/2006	7.5	1,125.00	7.5 acres of highly erodible land bordering crop field; CRP bonus
SUBTOTAL as of 12/31/07			91.8	13,845.00	
SB07-01*	5/7/2007	5/10/2007	13.2	1,980.00	120-ft field border planted on 35-acre field in York sect. 3
TOTAL			105	15,825.00*	*\$14,975 actual pd (no yr 3 payment)

Buffer Bonus					
Contract #	Contract Date	Bd Approval Date	Acres	Total Pymt	Comments
SB05-2	7/20/2005	9/14/2005	40	\$840	40 acres of no-till; Bennington 8
2006 Cover crop aerial seeding		129 acres		1349	Plus 161 acres paid by farmers
SB07-02	5/7/2007	5/10/2007	40	840	40 acres no-till; Bloomfield 20
SB07-03	5/7/2007	5/10/2007	40	840	40 acres no till corn; Forestville 15
SB07-04	5/7/2007	5/10/2007	40	840	40 acres no till corn; Forestville 15
SB07-05	6/11/2007	6/13/2007	40	840	40 acres no till beans, Bloomfield 14
SB07-06	6/11/2007	6/13/2007	40	840	40 acres no till corn, Forestville 19,30
SB07-07	6/11/2007		40	840	40 acres no till corn, Bennington 11,16
SB07-08	7/3/2007	7/12/2007	21	441	up to 40 acres no till beans, York 2
SB07-09	7/5/2007	7/12/2007	40	840	40 acres no till beans, Bloomfield 35,36; only 13 acres in 2008
2007 Cover crops		70 acres		452	\$6,391
SB08-01	8/4/2008	8/13/2008	40	280	40 acres no till beans; York Twp 11 & 12
TOTAL			381	\$9,242*	*\$6949 actual pd(no yr 2 & 3 payments)

* 40 acres were in no till for 3 years; 301 acres were in no-till for 2 years; and 40 acres were in no-till for 1 year.

- No-till: Tillage transect surveys indicate an increase from 15% of the surveyed acres in no till in 2004 to 23% in 2008, which correlates with the numbers found in the FANMAP surveys. The combination of no till and mulch till (>30% crop residue) increased from 65% in 2004 to 80% of the acres in 2008. No till increased from 30% of the soybean acres in 2004 to 52% in 2008. Conventional tillage (<15% residue) decreased from 10% of the surveyed acres in 2004 to 1% in 2008 (Figure 1a-d). Savings in fuel and time are major factors contributing to this trend.

Figure 1a.
South Branch Root River Tillage Practices (2004)

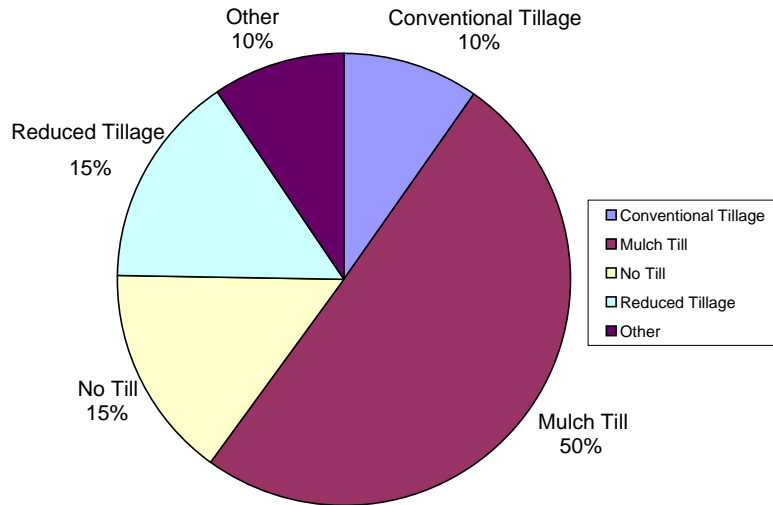
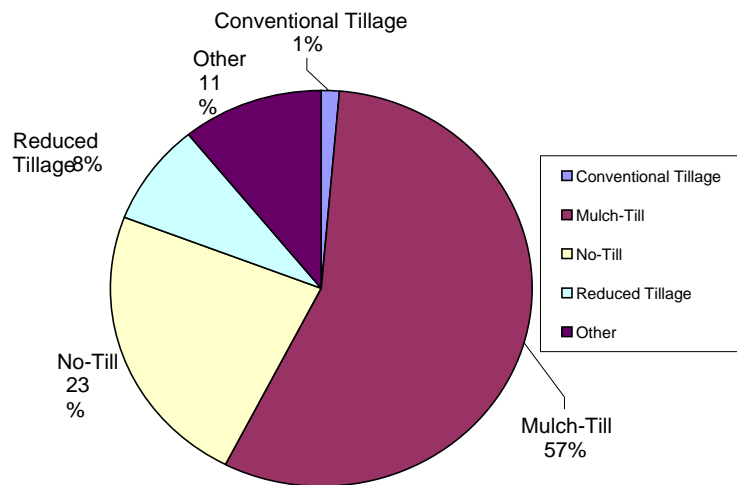
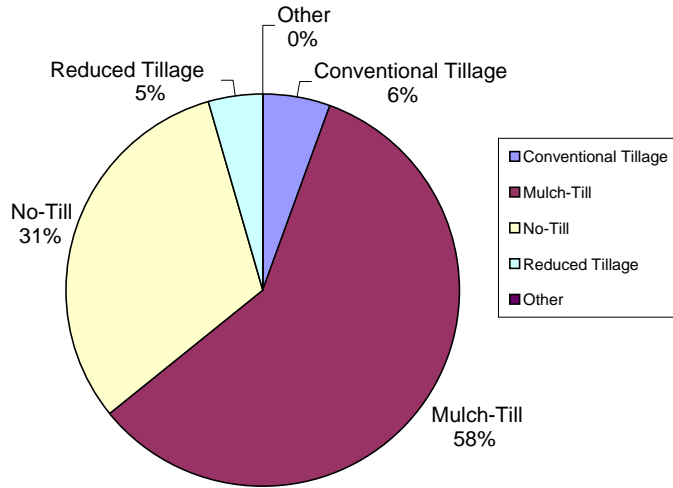


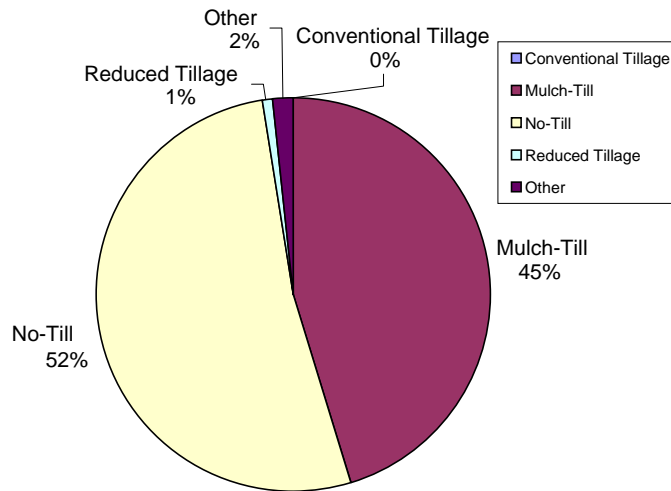
Figure 1b.
South Branch Root River Tillage Practices (2008)



South Branch Root River Soybean Tillage Practices (2004)



South Branch Root River Soybean Tillage Practices (2008)



- Feedlot fixes: 5 feedlot fixes were completed eliminating 100% of runoff from associated open lots; two additional sites were identified as needing fixes but the owners did not complete the fixes by the end of the grant period.

<u>Contract #</u>	<u>Total Project Cost</u>	<u>SBRR Cost-share \$ Paid</u>	<u>Other Cost-share \$ Paid</u>	<u>Description of Fix</u>
SB05-01	\$3,130.09	\$1,000.00	\$565.05	Shorten up lot size, picket fence on edge of lot, buffer through permanent grass cover then cropland
SB05-02	\$8,740.41	\$1,000.00	\$3,000.00	Shorten up lot in front by road, grade lot to discharge out back, picket fence and buffer through cropland
SB06-01	\$3,571.00	\$1,000.00	\$785.50	Earthen diversion to direct runoff into buffer area of pasture/hay land, create cattle crossing
SB06-02	\$82,785.05	\$1,000.00	\$48,500.00	Build up lot area, clean water diversion underneath lot, concrete curbing to contain runoff on lot
SB08-01	\$6,000.00	\$1,000.00	\$2,000.00	Catch area with picket fence in discharge point, clean water diversion, buffer of permanent grasses
Totals	\$104,226.55	\$5,000.00	\$54,850.55	

- Septic System upgrades: 19 low-interest loans processed; approximately 8,550 gallons of sewage properly treated per day (assuming an average 3-4 bedroom home producing 450 gallons a day per Chapter 7080 rules)

<i>2006</i>	<i>Loan \$ Amt</i>
	5466.85
	8,000.00
	7,007.56
	8,340.00
Total	\$ 23,347.56
<i>2007</i>	
	3,054.00
	7,370.63
	10,500.00
	6,126.53
	9,663.00
	5,250.00
	6,120.00
	7,177.13
Total	\$ 55,261.29
<i>2008</i>	
	6,300.00
	7,426.00
	5,250.00
	10,500.00
	4,405.00

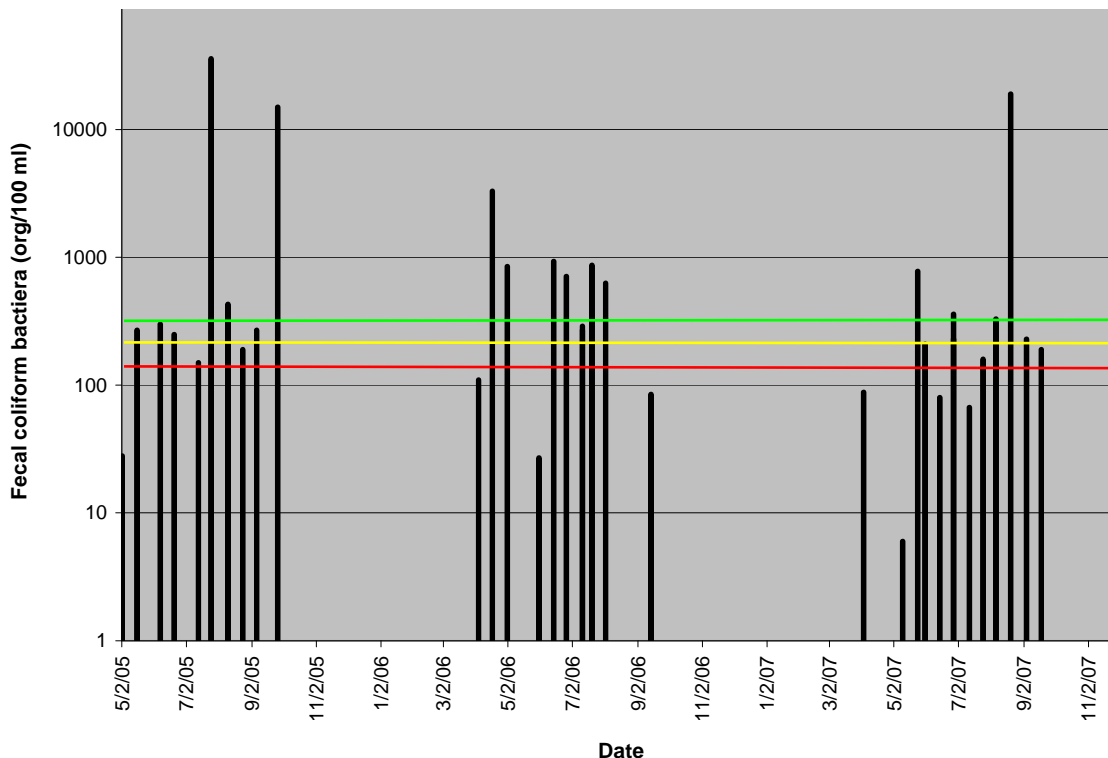
	7,300.00
Total	\$ 41,181.00
2009	
	\$ 15,552.26
TOTAL LOAN DOLLARS PAID	\$135,342.11

Water Quality Monitoring Data:

Bacteria:

The primary goal of this project was to reduce fecal coliform bacteria concentrations by 20% over 3 years, which is consistent with the goals of the Governor's 2003 Clean Water Initiative to reduce bacteria levels by 65% in 10 years. Based on the water quality monitoring conducted during the Phase I Diagnostic Study, the geometric mean for fecal coliform bacteria was 553 organisms (org)/100 ml at Forestville from 1999 to 2002, which is about 2.8 times the water quality standard of 200 org/100 ml. Based on the data from 2005 to 2007, the geometric mean was 328 org/100 ml, a 40% decrease but still 1.6 times the water quality standard (Figure 2). The geometric mean for *E.coli* from 2005 to 2008 was 219 colony forming units (cfu)/100 ml, or 1.7 times the water quality standard of 126 cfu/100 ml (Figure 3). This exceeded the project's goal for a 20% reduction in bacteria but shows that work remains to be done to meet the water quality standard. Most of the feedlots in need of controls to eliminate polluted runoff were fixed, and almost half of the septic systems identified as imminent public health threats have been upgraded. The FANMAP surveys indicated that producers using manure as fertilizer are doing a good job of crediting nutrients and are not over applying. However, where and when the manure is applied could be a factor in bacteria still entering waterways during runoff events. A significant reduction in the number of registered feedlots in the watershed, and the county as a whole, is another likely factor in reduced bacteria numbers.

Figure 2. Fecal coliform bacteria results for the South Branch Root River, 2005-2007. Green line indicates geometric mean of 553 org/100 mL for 1999-2002. Yellow line indicates geometric mean of 328 org/100 mL for 2005-2007. Red line indicates the water quality standard of 200 org/100 mL.



Turbidity and Total Suspended Solids (TSS):

Another goal of this project was to reduce turbidity and TSS by 30% in the South Branch Root River. Turbidity and TSS analyses were done only when transparency tube readings indicated that the water quality standard might be exceeded (Figure 4). Three reaches in the South Branch Root River were placed on the impaired waters 303(d) list in 2006. These and other reaches throughout the greater Root River watershed are part of a turbidity TMDL project that encompasses 2008-2010 seasons. Therefore, turbidity and TSS were discontinued as part of this project in 2008 to avoid duplication of efforts with the Root River Turbidity TMDL Project. In 2008, the TMDL project utilized the monitoring station at Forestville Park as a TMDL station. At this time, not enough data was collected to determine if the 30% reduction goal was met. However, data will continue to be collected and analyzed for this segment of the Root River through the duration of the TMDL project. A more thorough analysis of TSS and turbidity will be made in the TMDL report in 2011 utilizing the data collected for this project.

Figure 4. Transparency (by 60 cm or 100 cm t-tube measurements) and turbidity measurements for the South Branch Root River, 2005-2008. Turbidity measurements were taken when transparency was below 40 cm. The water quality standard for turbidity on trout streams is 10 NTUs (blue line). The indicator value of 20 cm transparency is used as the exceedance for assessment (black line). Six paired samples exceeded the water quality standard over this time period.

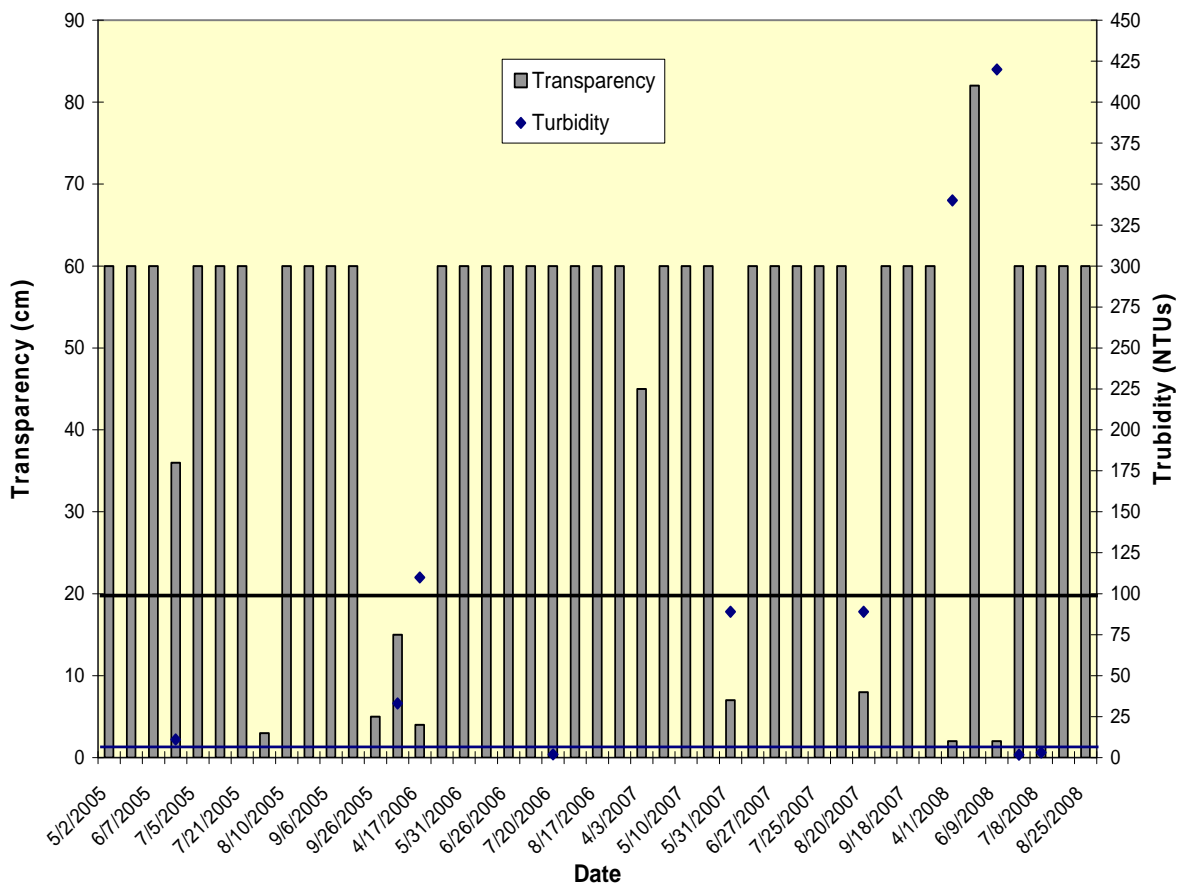
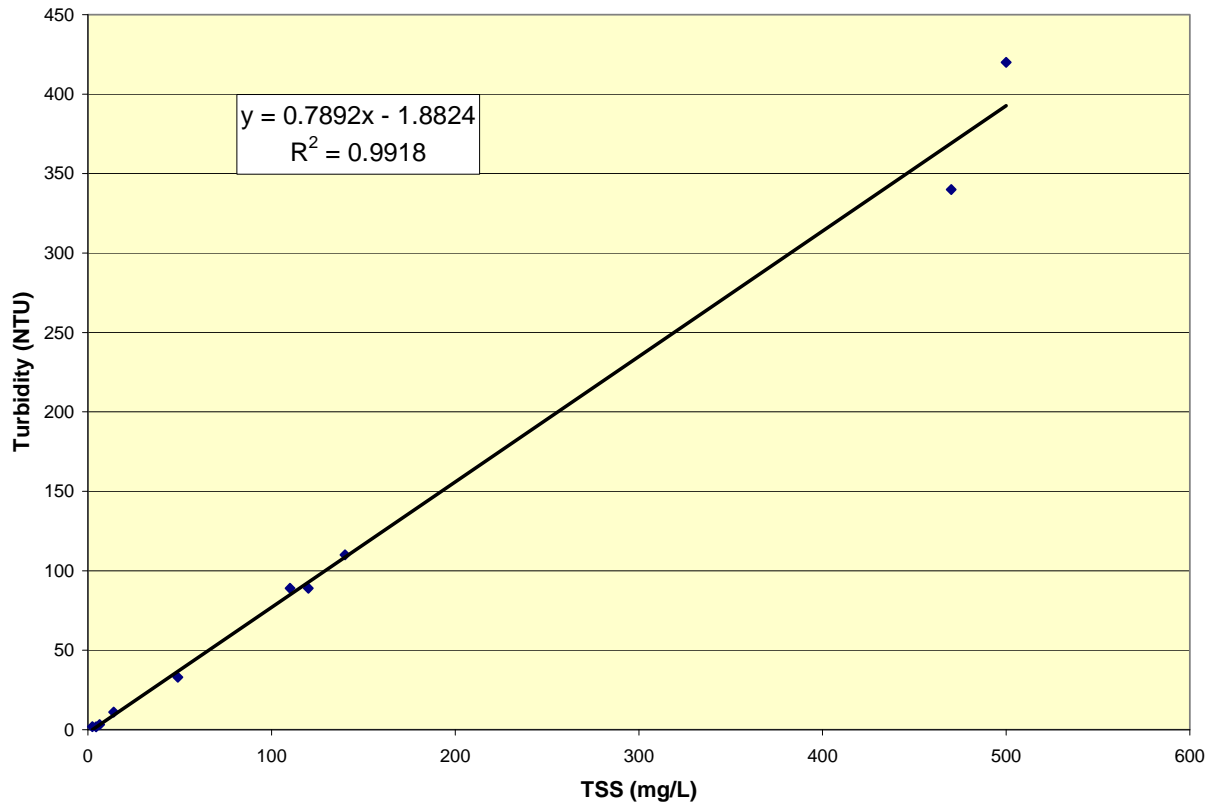


Figure 5. Relationship between turbidity and total suspended solids (TSS) measurements for the South Branch Root River, 2005-2008.



Pesticides and Nutrients:

Although not among the primary concerns, pesticides and nutrients were also monitored in the interest of gathering as much information as possible when samples were being collected. In cooperation with MDA, pesticide sampling occurred from May to July each year. As a Tier 1 site, the South Branch had exceeded the water quality standard for atrazine at least once in 2002, 2003, and 2004. The site was changed to a Tier 2 site in 2006, which means a second sample is collected within 24-96 hours after the first sample during a runoff event. From May through July, conditions were dry in both 2005 and 2006 without any runoff events so no samples had values above the reference values (Figure 6). Still a decision was made by MDA to establish the South Branch site as a Tier 3 monitoring site based on historical data and the potential for elevated atrazine levels as shown in the past. An automated station for collection of time-based composite samples was to be installed in the park but was subsequently moved downstream to Carimona and was not installed until August of 2008. In 2007, two automated samplers were installed on Judicial Ditch (JD) #1 (a direct South Branch tributary) and on the South Branch in Mower County (Figure 7a, 7b). Pesticide and nutrient data are available from MDA for all of these stations. Baseline samples were also collected in the winters of 2003, 2004, and 2005 in Forestville. Low levels (0.17 ppb or less) of atrazine and metolachlor were detected in those samples (with the exception of metolachlor in 2003).

Figure 6. Atrazine results from MDA for the South Branch Root River at Forestville Park, 2003-2006. Red line indicates the water quality standard of 3.4 ppb.

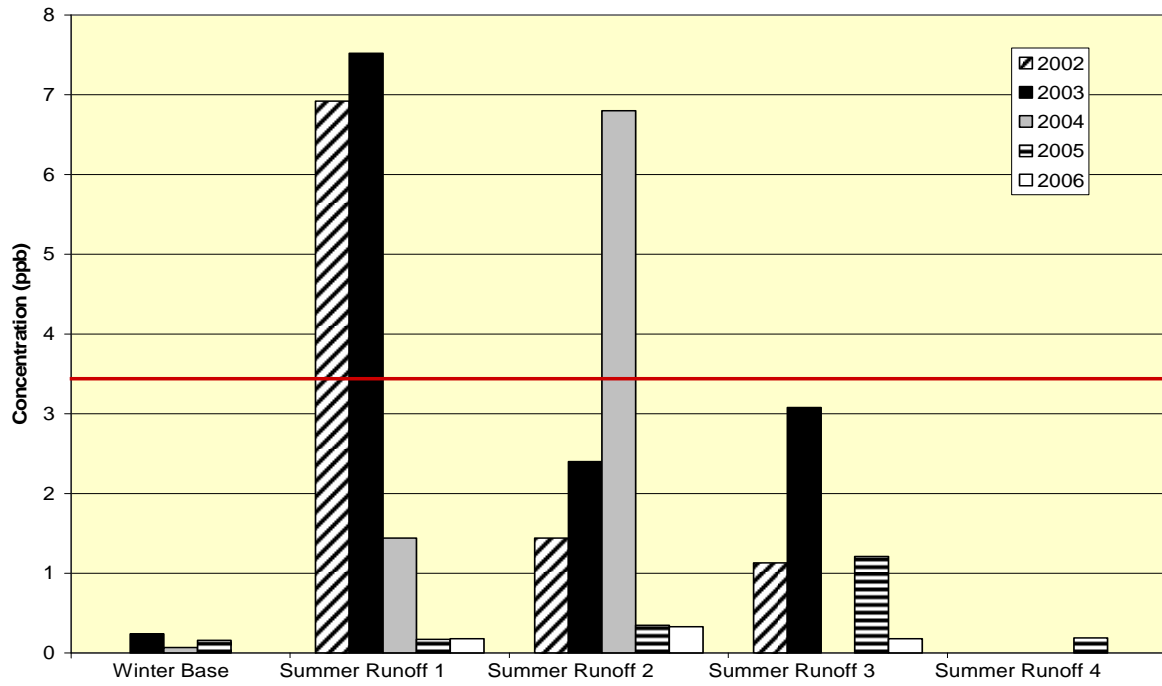


Figure 7a. Pesticide results from MDA for the South Branch Root River at JD #1, 2007. None of the samples exceeded the water quality standard of 3.4 ppb.

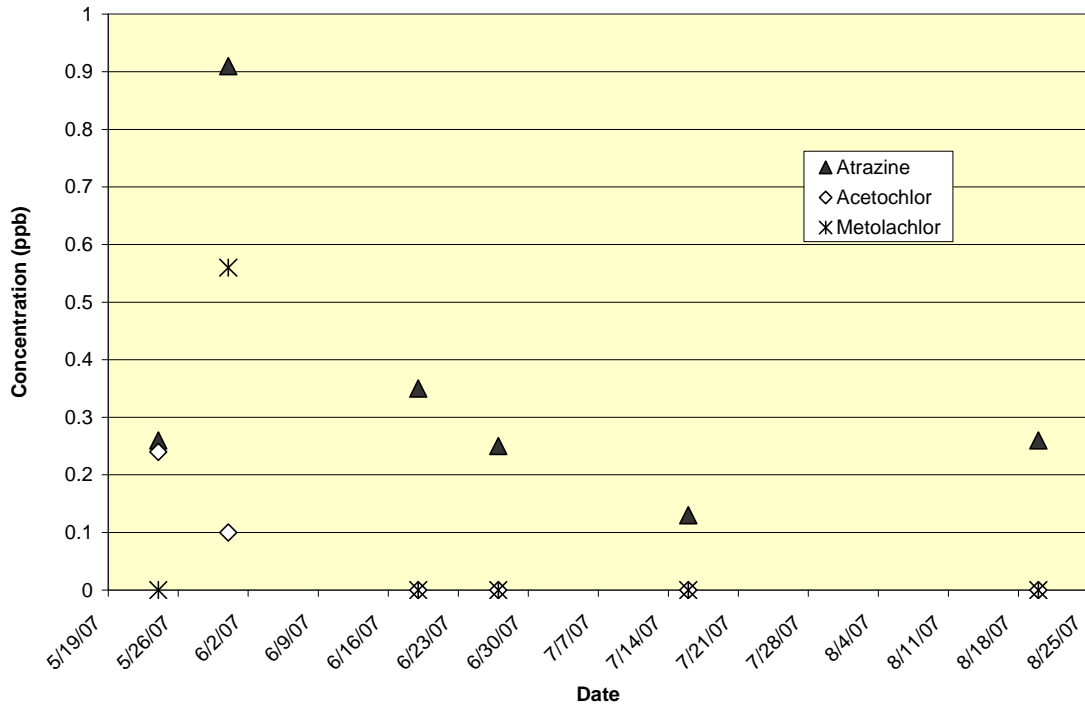
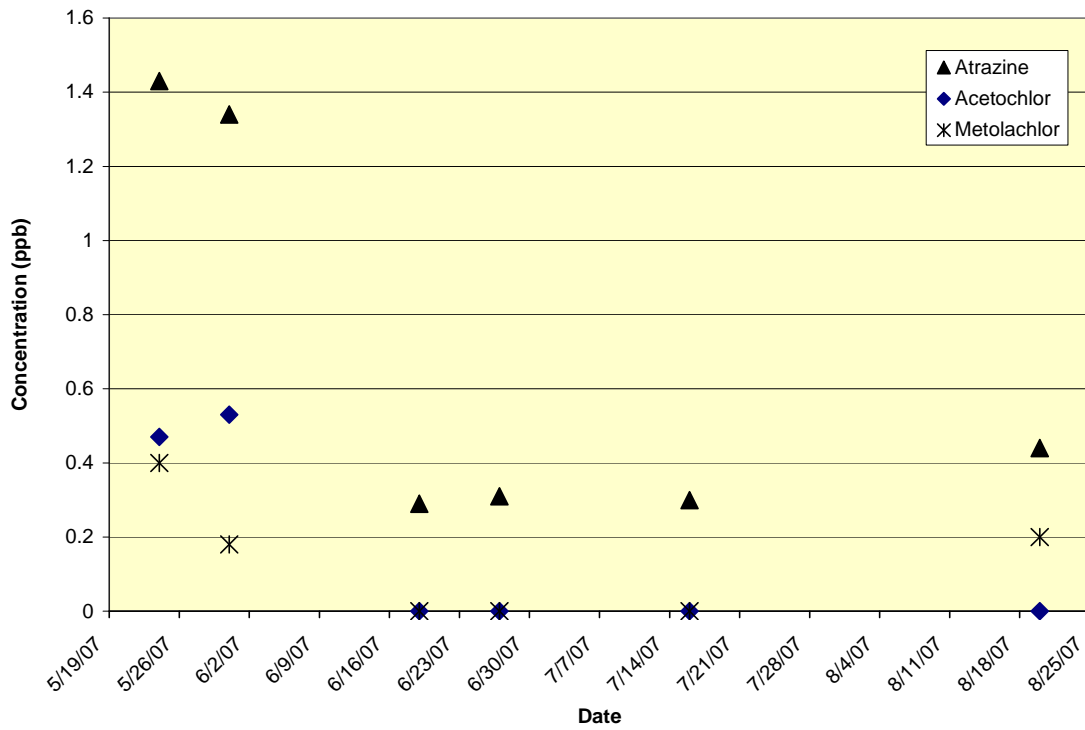
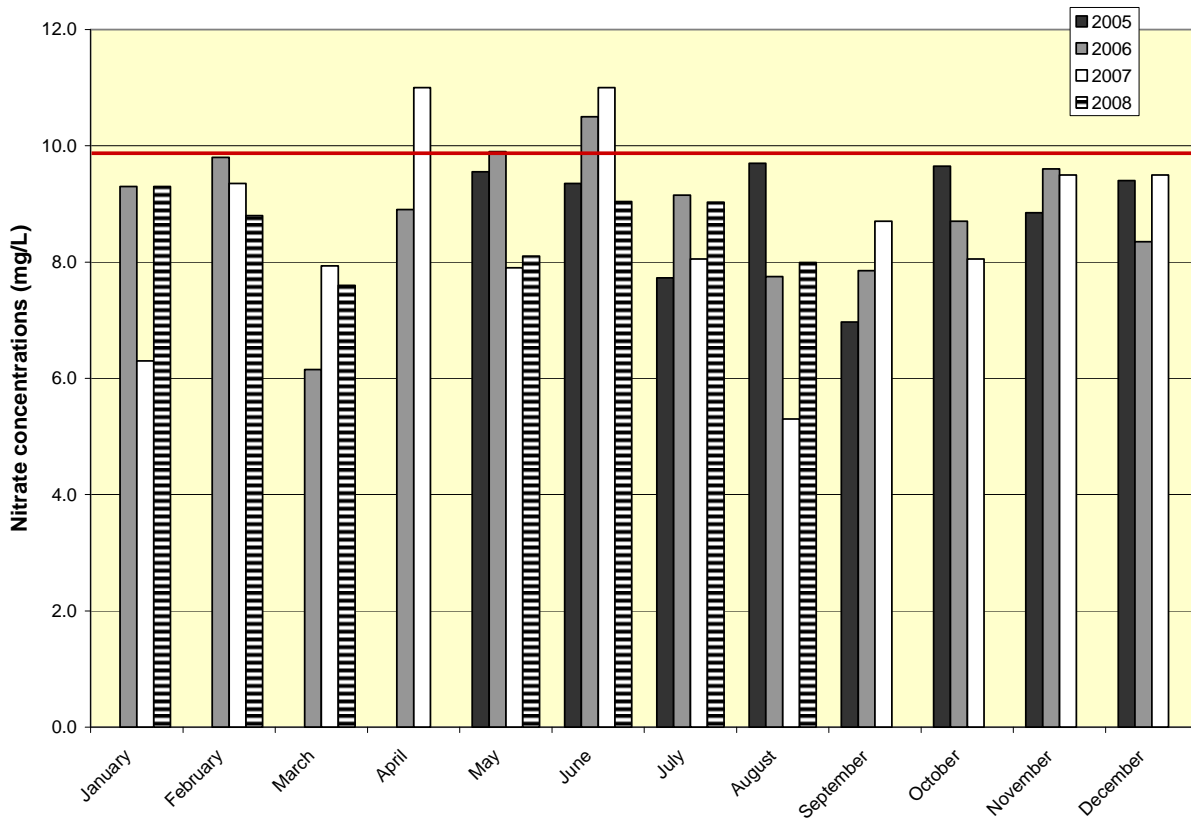


Figure 7b. Pesticide results from MDA for the South Branch Root River in Mower County (also Pickeral Creek), 2007. None of the samples exceeded the water quality standard of 3.4 ppb.



Nitrogen-nitrate concentrations were measured over the course of the project. In 1999, the average total nitrogen concentration at Forestville was 8.3 mg/l. In 2000, it was 7.5 mg/l, and in 2001, it was 8.1 mg/l. From 2005 to 2008, the yearly averages were 8.7 mg/L, 8.7 mg/L, 8.3 mg/L, and 8.6 mg/L, respectively (based on 17 samples from January to August). There were 8 samples out of a total of 72 that were 10 mg/L or higher from 2005 to 2008 with the highest being 11 mg/l. Although there is no water quality standard for nitrate in surface waters, due to the karst conditions in the watershed and interconnectedness of surface water and ground water, a threshold of 10 ppm (Minnesota drinking water standard) was used due to the potential impact to drinking water supplies (Figure 8).

Figure 8. Nitrate concentrations shown in monthly averages from May, 2005 to August, 2008. Red line indicates the drinking water quality standard of 10 mg/L.



Products:

- Watershed brochure and program flyers
- New Look at Livestock DVD
- New Look at Livestock recommendations for the Fillmore County Comprehensive Plan
- South Branch Root River Watershed web page www.co.fillmore.mn.us/RRWS/index.html
- Rochester Post Bulletin article 4/24/08
- Fillmore County Journal article 11/21/05
- Winona State University Fish and Invertebrate Surveys
- Winona State University Water Resources Center SWAT Model Geomorphic
- Assessment in the South Branch of the Root River Project
- MN Department of Natural Resources Division of Waters Dye Trace Study Report
- MN Department of Ag's 2003 and 2007 Nutrient Management Assessment reports
- Watershed News newsletters 2005-2008

Public Outreach and Education:

- A watershed newsletter was mailed to over 800 watershed landowners twice a year from 2005 to 2008.
- Presentations about the watershed project were made to about 20 groups in and around the watershed, such as Lions Clubs, Rotary Clubs, Kiwanis, city councils, township boards, and church and school groups.
- A watershed tour for township officials was held June 9, 2005 to kick off the implementation phase. Four of the six townships were represented. The project coordinator also met with each township board three times throughout the grant period.
- A display board about the project was displayed at various local businesses.
- Fillmore County maintained a website about the project.
- Six nitrate clinics were held for watershed residents from 2005 to 2007, 3 in Ostrander, 2 in Spring Valley, and 1 in Wykoff.
- A septic system operation and maintenance class was held in Ostrander in April 2006 in conjunction with the Fillmore County Septic System Inventory Pilot Project.
- Grazers in the watershed received direct mailings for four grazing workshops, three of which were held in the watershed and one was held in Preston. A total of about 120 producers attended the workshops.
- Workshop held February 8, 2007 called "Considering Conservation in Estate Planning" was co-sponsored with MN Land Trust. This was publicized through the Retired Senior Volunteer Program (RSVP), SEMCAC meal sites, and the local newspapers. Speakers were Clint Miller from MN Land Trust, Bill Volkmar, an attorney with Dunlap and Seeger, Rich Biske with The Nature Conservancy, Kim Wubbels with USDA Farm Service Agency, and Jim Edgar, DNR Forester. Five people attended on a bitterly cold night.
- A manure application field day was held in the watershed in August 2006 in cooperation with U of M Extension.
- A meeting for ag professionals was held in Ostrander in February 2006 to review the findings from the 2003 FANMAP study and to introduce them to the new U of M nitrogen recommendations.
- Five woodland advisor classes were sponsored with Extension in 2008, two of which were held in the watershed (Tree ID and Forest Wildlife) with 25 people attending. About 80 postcards were sent to landowners with forest land in the watershed prior to each class. Six scholarships were paid to watershed residents who attended the classes.
- Citizen Stream Monitoring Program volunteers were recognized at two events in 2005 and 2008. In 2008, the recognition was held in conjunction with a Stream Ecology class taught by Extension for a Community Education class in Spring Valley.
- Presentations were made to five high school Fisheries and Natural Resources classes at Kingsland in 2006 and 2007 using water quality data from the South Branch Root River.
- Bacteria and atrazine tests for well water were offered for \$5 and \$10, respectively, which is about one-quarter the normal cost. Of the 21 samples that were tested for bacteria, 10 (48%) had bacteria

present. There were 15 samples tested for atrazine with 9 or 60% with detections between 0.1 and 0.3 ppb; none above the drinking water standard of 3.4 ppb.

Long Term Results:

Do the results of this project build capacity that can increase the likelihood of long-term outcomes? Did you form new partnerships or alliances as a result of the project?

Yes, the project developed a much needed baseline for evaluating future land use and water quality changes. Very little of this information existed prior to the project. It also built capacity for continued water quality monitoring and for working across county and agency boundaries, which is becoming increasingly more important with limited resources at every level. There has been much better coordination among the many agencies that have water quality monitoring and BMP implementation as part of their mission, such as MPCA, MDA, DNR Divisions of Waters and Fisheries. Those relationships should continue.

Follow up projects have begun that are built on the information gathered from this project. The MDA established nutrient and pesticide monitoring stations because of the data that already existed in the watershed. The stations are gathering the water quality data to be used in the SWAT watershed model along with the FANMAP results, tillage transect data, DNR dye trace results, and WSU stream geomorphology and karst hydraulic conductivity data which were gathered as part of this project. This will be the first application of SWAT in southern Minnesota, and one of few in the nation incorporating karst into the model. This modeling will also lay the groundwork for the modeling that is needed for completion of the Root River Turbidity TMDL and the implementation that will follow. The MDA stations, including the Tier 3 station at Carimona that is replacing the station at Forestville Park, will be in place long-term to continue evaluating water quality in this part of the Root River watershed. Other projects resulting from the availability of data in the upper watershed in Mower County are the MDA's conservation drainage demonstration project and The Nature Conservancy's infiltration pond demonstration project. Cooperation with all of these agencies has been beneficial to implementing future projects and programs. The MDA and The Nature Conservancy have been partners on several grant applications for other projects in the Root River watershed.

Is there a plan to continue the project beyond the end date of the grant agreement or contract? No, not as an independent project.

Describe how you shared the results of your project. List any information or technology transfer and dissemination (newsletters, web sites, training, reports, disseminated project activities, accomplishments, and lessons to the general public). Where and to what audiences have you made presentations?

See the list of education and information activities listed above, which include newsletters, a video and a website. Watershed project meetings were publicized and open to the public. Meetings with the county board resulted in articles in the local newspapers. An article in 2005 focused on the volunteer stream monitoring in the watershed. There was also coverage in the Rochester Post-Bulletin, a regional newspaper, in October 2005 and April 2008. The meeting with the ag consultants in February 2006 was specifically planned to relate the findings from the 2004 FANMAP surveys to the fertilizer recommendations they were making to their customers. A presentation was made about the project to the Governor's Clean Water Council in July 2006 as an example of how funding for addressing impaired waters could be utilized. Two students from St. Mary's University utilized information from the watershed for their graduate studies related to watershed modeling and GIS applications.

What other audiences (media, businesses, other agencies, etc.) would be most interested in the results of this project?

Agriculture professionals could gain valuable insights from the FANMAP survey results to better understand their customers' fertilizer and pesticide needs and how they relate to the U of M fertilizer recommendations. U of M Extension could also benefit from this information. Providing information to agriculture and producer groups could help them make the connection between the practices and programs their producers are using and their effect on our water resources.

Please describe any lessons learned during this project that would be valuable for future projects, even if the project didn't succeed as expected. What other recommendations or advice would you make for future activities related to this priority project area?

- The project did point out the need to better understand the effectiveness of BMPs at the field and small watershed scale. These types of studies are now being planned for the Root River Turbidity TMDL in order to better target BMP implementation and predict the water quality outcomes.
- The project also pointed out the limitations of projects that are dependent on 2-3 year funding cycles. We were unable to provide incentives for three years for BMPs that are most effective if they are implemented for at least three years.
- This project probably tried to address too many issues and became too broad because of the diverse landscape and variety of land uses throughout the watershed. It could have been more focused on some primary practices that had a high demand.

Please provide any feedback or suggestions that you would like to share with the MPCA to improve their grant programs.

- The need for stable, long-term funding for watershed projects is necessary to gain consistent and reliable data over the long term and to allow time to build trust and communication with landowners.
- The reimbursement process for 319 grants tends to be cumbersome and puts a burden on the fiscal agent to have funds available upfront to expend on a project until funds are reimbursed.