WATERSHED PROJECT FINAL REPORT

SECTION 319
NONPOINT SOURCE POLLUNTION CONTROL PROGRAM

BACHELOR CREEK HYDROLOGIC UNIT PROJECT

PREPARED FOR

MOODY COUNTY CONSERVATION DISTRICT

BY

JOHN HAY, PROJECT COORDINATOR

JANUARY, 2006

This project was conducted in cooperation with the South Dakota Department of Environment and Natural Resources and the United States Environmental Protection Agency, Region VIII.

Grant # C-9998185-01

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

PROJECT TITLE **Bachelor Creek Hydrologic Unit Project**

GRANT NUMBER **C9998185-01**

PROJECT START DATE **10/30/2001** PROJECT COMPETION DATE **12/31/05**

FUNDING:	TOTAL BUDGET	**593,430.00**
	EPA GRANT	**200,000.00**
	TOTAL EXPENDITURES OF EPA FUNDS	**166,634.52**
	TOTAL SECTION 319 MATCH ACCRUED	**178,698.41**
	OTHER FEDERAL	**161,844.00**
	TOTAL EXPENDITURES	**507,176.93**

SUMMARY OF GOALS and ACCOMPLISHMENTS

The project goal was:

> ”Improve water quality in Bachelor Creek by reducing sediment, nitrogen, and phosphorus entering the creek from the watershed 18.4, 12.4, and 16.5 percent respectively.”

The goal was to be attained by:

1. Increasing residue management and implementing integrated crop management on cropland.
2. Completing Riparian site projects to stabilize stream banks.
3. Developing and installing managed grazing systems.
4. Establishing riparian buffers along the creek and its tributaries.
5. Constructing or repairing grass waterways.
6. Establishing nutrient management systems at priority animal feeding operations.
7. Conducting a public awareness program.

To reach workplan Objective 1, reduce sediment and nutrient loading, 3,550 feet of grassed waterways were installed, 9,000 acres were converted to no-till cropping, and integrated crop management was initiated on 4,803 acres. These BMPs reduced sediment, nitrogen, and phosphorus loading by 18.2, 11.8, and 20.2 percent respectively.

Three rotational grazing systems and three animal waste management systems (AWMS) were also installed to reduce sediment and nutrient loading. The grazing systems resulted in a 12 percent reduction in sediment loading and minimal reductions of nitrogen and phosphorous. The (AWMS) Systems installed reduced nitrogen loading by 1 percent; phosphorus by 1.2 percent.

Practices installed under workplan Objective 2 were selected to reduce fecal coliform bacteria originating from grazing of riparian areas. The project milestone of 145 acres of livestock exclusion was exceeded. The 186 acres installed equals a combined total of 7.2 miles of tributary and creek streambank protected. Load reductions realized by excluding livestock are sediment 1.7 percent, nitrogen .03 percent and phosphorous .04 percent.

Objective three, public awareness, was accomplished using tours, meetings, mailings, and news articles to inform project area residents about BMP installation assistance and project progress.

Total reductions using AGNPS modeling and the Revised Universal Soil Loss Equation (RULSE) were sediment 29 percent, nitrogen 15.8 percent, and phosphorous 17.2 percent.

INTRODUCTION

Bachelor Creek is a fourth order tributary of the Big Sioux River**.** The Bachelor Creek Watershed is located in portions of southwest Moody County and east-central Lake County, South Dakota (Figure 1). The watershed encompasses approximately 62,898 acres. The creek drains glacial till materials deposited following the Wisconsin glaciations over a landscape of flat plains with gently undulating hills. A large number of prairie pothole wetlands dot the watershed.

Bachelor Creek may be divided into two sections based on assigned beneficial uses (Figure 2). The lower section consists of a single reach (Reach 1); the upper five reaches (Reaches 2-5). The assigned beneficial uses for each reach are indicated in Table 1.

Table 1. Beneficial Uses Assigned to Reaches of Bachelor Creek.

Beneficial Use	Segment 1	Segment 2			
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5
Irrigation	X	X	X	X	X
Fish and wildlife propagation, recreation, and stock watering	X	X	X	X	X
Warmwater marginal fish life propagation	X				
Limited-contact recreation	X				

Major crops grown in the area include dryland corn, soybeans, alfalfa and small grains. Several cow/calf, cattle feeding, dairy, hog, and horse enterprises are located in the project area. In the past, livestock were allowed to overgraze pastures during the summer months. Largely because producers did not allow adequate time for the grasses to recover, most pastures in the project area are rated as having a poor to fair ecological (= range) condition. In addition, livestock had unrestricted access to the creek which caused stream bank erosion and elevated fecal coliform levels.

Water quality and biological assessments completed during 1998 and 1999 respectively identified several water quality impairments in the watershed. High sediment, nitrogen, phosphorus, and fecal coliform bacteria loads were found to be impairing in stream beneficial and aquatic life uses and contributing to total loads entering the Big Sioux River. Agricultural Nonpoint Source (AGNPS) model simulations suggested that the primary sources of the nonpoint source pollutants were cropland with steeper slopes and animal feeding operations. Field observations suggested that livestock use of the riparian corridor was also a major source of NPS loads. Fecal coliform counts and the incidence bed and bank erosion were found to be high in stream reaches with greater livestock densities.

Based on the results of the studies, best management practices (BMPs) were selected to reduce nutrient and sediment loading and fecal coliform levels. The BMPs selected included no-till farming, integrated crop management, riparian buffers, animal waste management systems and grazing management.

Extremely wet conditions during the project period necessitated extending the project period an additional year (see Tables 3 and 4, original and revised milestone tables).

Figure 1. Bachelor Creek Watershed in Lake County and Moody County, South Dakota.

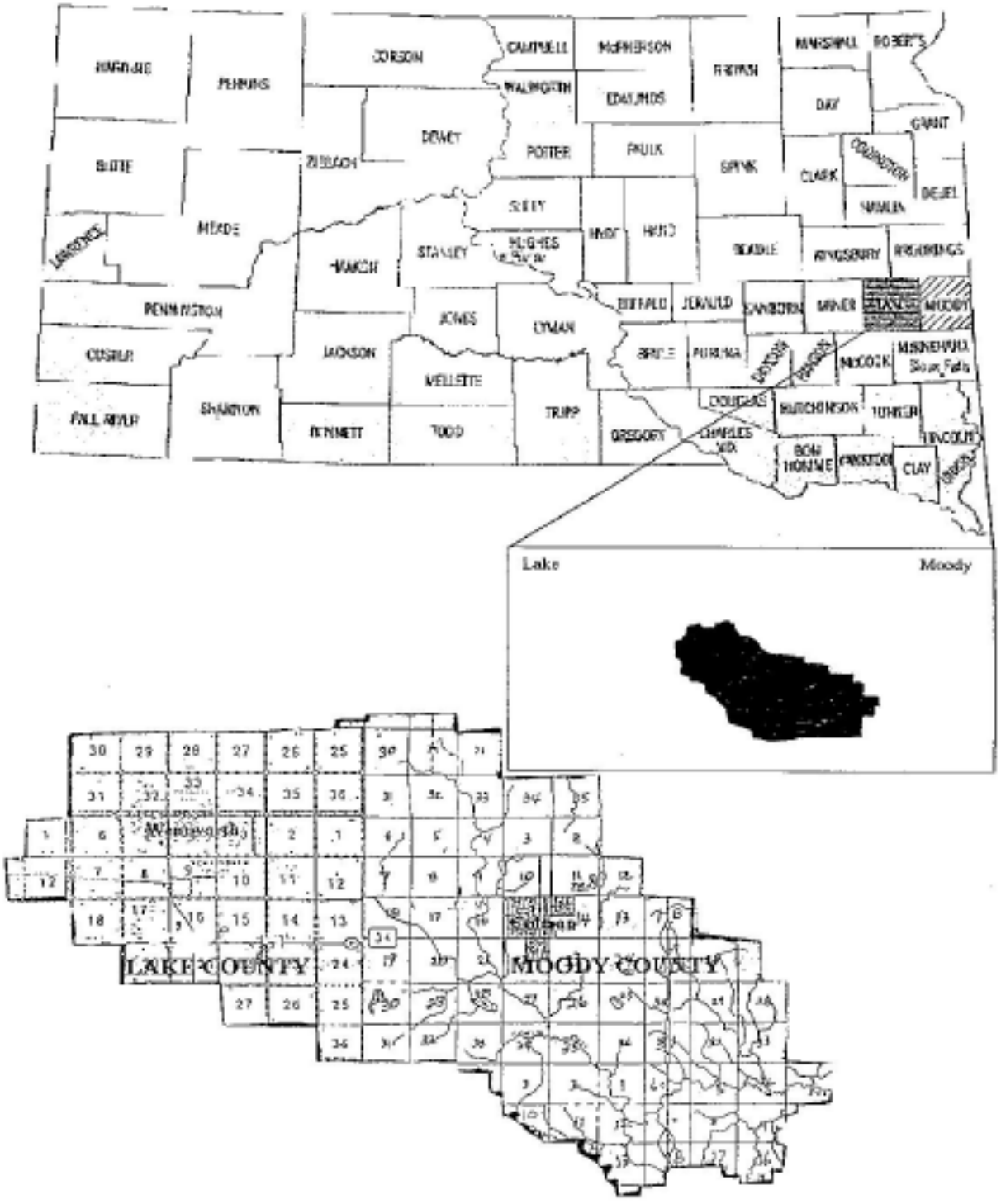
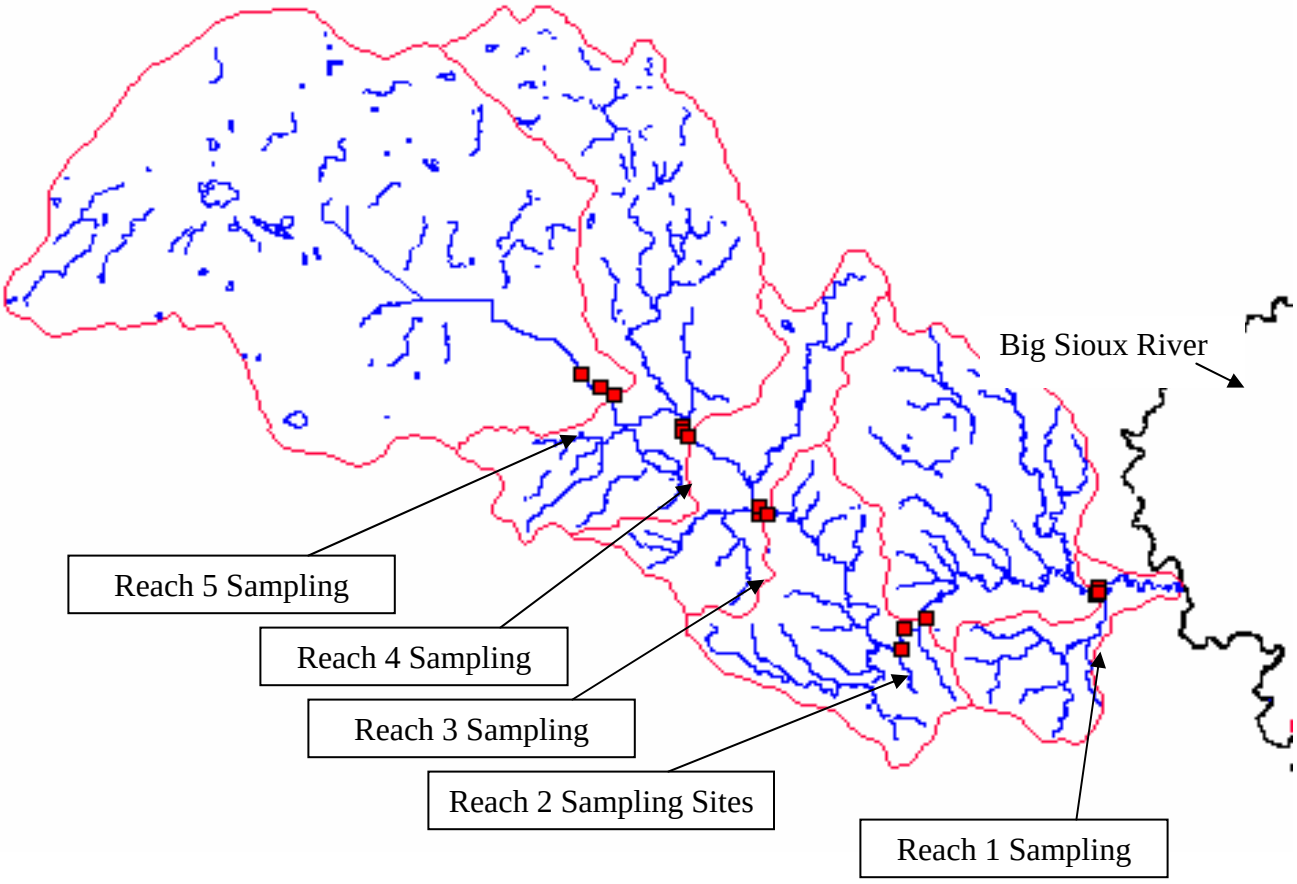


Figure 2. Bachelor Creek Reaches and Sampling Sites.



PROJECT ACTIVITIES

Project activities completed to attain the project goal,

> "Improve water quality in Bachelor Creek by reducing sediment, nitrogen, and phosphorus entering the creek from the watershed 18.4, 12.4, and 16.5 percent respectively"

are described below by task. The description includes milestones and accomplishments for each product. Tables showing the planned and actual milestone scheduled and a table showing a comparison of planned versus installed milestones with load reductions realized from the BMPs installed are located at the end of the section.

Objectives, Milestones, and Accomplishments

OBJECTIVE 1. Reduce sediment and nutrient loading.

The BMPs installed by completing the tasks included in Objective One were selected to reduce sediment and nutrient loading. The BMPs included the construction of grassed waterways, no-till farming to improve residue management, and increased use of Integrated Crop Management (ICM) to minimize nutrient loading and sediment loading . Rotational grazing systems, riparian improvement projects, and nutrient management systems were also installed to meet project the project goal.

Task 1. Improve cropping management systems to reduce sediment and nutrient loading.

Product 1. Install grassed waterways in the watershed.

Milestone: Establish 3,200 linear feet of grassed waterways in the watershed during 2001-2005.

Accomplished: The milestone was exceeded. During the project, 3,550 linear feet of grass waterways were constructed. The waterways were designed by NRCS technicians and engineers.

Product 2. Initiate the use of conservation tillage practices on cropland.

Milestone: Implement conservation tillage practices on 5,000 acres of cropland during 2001-2005.

Accomplished: No-till practices (Figure 3) were cost shared on 434 acres identified by using the Agricultural Nonpoint Source (AGNPS) model. The project milestone was 5,000 acres. While no-till was not widely adopted as part of the project, it was found that producers were adopting the practice without cost share assistance. For example, when the project coordinator and the NRCS District Conservationist for Moody County surveyed the project area it was determined that an estimated 50 percent of soybeans were being planted

Figure 3. No-Till Planting.

using no-till or other tillage practices which increased crop residue. Calculations of load reductions realized from the adoption of no-till since the assessment of the watershed was completed indicate the sediment and nutrient reduction goals for this BMP have been exceeded. (See Appendix A). Reductions achieved for sediment, nitrogen, and phosphorous equal 18.2, 7.86 and 11.92 percent respectively. Adoption of this BMP by producers resulted in the project attaining 99 percent of the sediment, 63 percent of the nitrogen and 72 percent of the phosphorus reduction goals.

Product 3. Integrated crop management (ICM) on cropland.

Milestone: Implement ICM on 5,000 acres of cropland during 2001-2005.

Accomplished: ICM was promoted in the watershed. Producer contacts and documentation by the project coordinator confirmed that ICM was being implemented by 22 producers on approximately 4,803 acres in the project area. (See Appendix A)

Task 2. Promote grazing management systems that defer grazing and reduce nutrient and sediment loading.

Product 4. Grazing management systems and alternative watering sources.

Milestone: Implement five grazing management systems and alternative watering sources during the 2001-2005 project period.

Accomplished: Technical assistance for the development of rotational grazing systems was provided by the SD Grasslands Coalition though the 319 funded Grassland Planning and Management Project. Three grazing systems totaling approximately 905 acres were installed using plans developed by Grassland Project staff. Development of the systems required the installation of 5,205 linear feet of cross fence. Figure 4a shows one of the paddock in a system dominated by Big Blue Stem; 4b a cross fence used to divide a pasture into paddocks.

Figure 4a. Rotational Grazing System Dominated by Big Blue Stem.

Figure4b. Cross Fence Dividing Rotational Grazing System Paddocks.

The three systems equal sixty percent of the practice milestone. However, selecting the number of systems as a milestone was probably incorrect. A milestone based on acres would have provided a more

meaningful measure of project success relative to load reduction. The AGNPS model does not have the capability to measure reductions for this BMP.

Product 5. Alternative watering sources.

Milestone: Install 25 alternative watering sources during 2001-2005.

Accomplished: During the project, five alternative watering sources were installed. Installation was planned for an additional watering source. However, because of wet conditions, installation could not be completed by the end of the project. Additional cost share funding is being sought to install the additional alternative water source. Examples of two types of alternative water sources installed are illustrated in Figures 5a and b.

Figure 5a. Dugout.

Figure 5b. Tank Supplied by Rural Water with Above Ground Pipeline.

Task 3. Establish riparian improvement projects that include rock crossings and exclusion fencing will help stabilize stream banks and provide suitable stream crossings.

Product 6. Riparian improvement projects to stabilize stream banks and provide suitable livestock crossings.

Milestone: Establish six riparian improvement projects to stabilize stream banks and provide livestock crossings during the 2001-2005 project period.

Accomplished: Six riparian rock crossings were installed during the project to stabilize stream banks and provide livestock crossings. Six additional rock crossings were designed but not constructed because of an extended period of wet conditions during 2004 and 2005. These crossings will be installed at a later date if cost share funds can be obtained. Figures 5a and b illustrate two of the rock crossings installed.

Figure 6a. Rock Crossing.

Figure 6b. Rock Crossing.

Task 4. Construct nutrient management systems on feedlots prioritized by AGNPS.

Product 7. Animal Nutrient Management Systems.

Milestone: Construct four Animal Nutrient Management systems at feedlots with AGNPS feedlot ratings of 50 or greater.

Accomplished: Because of increased costs associated with the installation of animal nutrient management systems between the time the project was planned and the systems were ready for construction, funds were sufficient to construct only three of the four priority feedlots identified during the watershed assessment. Design assistance was provided by the SD Nutrient Management Team. The team is funded by a 319 grant awarded to the South Dakota Association of Conservation Districts (SDACD) through DENR. Information about the systems and the load reductions realized from their construction is summarized in Table 2.

Because of excessively wet conditions the work plan was amended to extend the project period to allow completion of one of the systems (See Table 3 Revised Milestone).

Table 2. AWMS Installed with Load Reductions.

Type of Operation		**Load Reduction**			
		Site		Delivered.	
Type of Livestock	# Head	N lb/yr	P lb/yr	N lb/yr	P lb/yr
Beef	499 head	818	232	785	223
Beef	999 head	288	212	288	212
Beef, dairy, swine	221 head	761.5	167.5	746	164
Total		**1,867.5**	**611.5**	**1,819**	**599**

OBJECTIVE 2. Reduce fecal coliform bacteria resulting from grazing of riparian areas.

Objective two was reached by installing riparian buffers that exclude livestock from entering the stream. Livestock exclusion and implementation of rotational grazing systems complemented each other as practices for reaching the fecal coliform level reduction objective.

Figure 7. Riparian Buffer.

Task 5. Establish riparian buffers to reduce fecal coliform levels.

Product 8. Reduced fecal coliform bacteria levels in the surface water of Bachelor Creek

Milestone: Reduce fecal coliform bacteria levels in the surface water of Bachelor Creek by excluding livestock from 145 acres of riparian area during 2001-2005.

Accomplished: Buffers (Figures 7 and 8a and b) were installed on 186 acres to exclude livestock from riparian areas. The total acres equals approximately 7.2 miles of stream bank on the tributary and creek main stream. The milestone for the practice was exceeded by 28 percent.

Figure 8a. Wildlife Planting and Buffer.

Figure 8b. Riparian Forest Buffer between Crop Fields.

Riparian buffers were installed using the Farm Service Agency's Conservation Reserve Program (CRP). CRP provides funding to establish riparian buffers and an annual rental payment for up to 15 years. The project coordinator and NRCS provided technical assistance to develop the conservation plan for each tract enrolled in the program. The use of CRP funds for this practice allowed 319 grant funds to be used to install other BMPs needed to attain the project goal.

OBJECTIVE 3. Public Awareness Program.

Objective three was reached using mailings, public awareness meetings and informational tours. Copies of mailings and other outreach materials produced are located in Appendix B.

Task 6. Develop and implement a public awareness program to provide project information to the public.

Product 9. Public awareness program to provide project information to the public.

Milestone: Develop and implement a public awareness program to provide project information to the public.

Accomplished: Three mailings totaling 1,120 copies were sent to landowners and producers in the project area. The mailings were used to invite project area landowners and operators to informational meetings. East Dakota Water Development District provided funding for the mailings. A copy of each mailing is located in Appendix B.

Task 7. Hold public awareness meetings to inform residents of programs available to them and how to apply for assistance.

Product 10. Public awareness meetings to inform residents of programs available, how to apply for assistance, and project progress.

Milestone: Hold three public awareness meetings to inform residents of programs available to them, how to apply for assistance and project updates during 2001-2005.

Accomplished: Three public awareness meeting were held. A total of 60 watershed residents attended the meetings. At the first meeting, project staff informed those attending of the project goals, BMPs that would accomplish the goals, and the cost share available to producers for the implementation of the BMPs. The second and third meetings provided information regarding project progress. The meetings sparked producer interest in participating in the project and provided an opportunity to ask questions. East Dakota Water Development District provided financial assistance for the meetings.

Task 8. Conduct tours to promote the project and practices.

Product 11. Tours to promote the project and practices.

Milestone: Conduct two tours to promote the project and practices during 2001-2005.

Accomplished: Four producer and media tours were conducted to promote project practices. One tour provided feedlot owners an opportunity to view constructed waste systems and encouraged them to install systems. The other tours were conducted to promote the implementation of rotational grazing systems, alternative watering sources and riparian area practices. East Dakota Water Development District provided financial assistance for the tours.

Task 9. Submit semi-annual and annual reports to DENR to document progress toward attaining project goals.

Product 12. Reports to document progress.

Milestone: Submit semi-annual and annual reports to DENR to document progress toward attaining the project goal. Submit a final report to DENR to document project accomplishments.

Accomplished: Nine semi-annual and annual reports were submitted to document progress to meet project goals as scheduled. A final project report was also submitted as required.

MILESTONES

As indicated previously, wet conditions necessitated extending the project period one year to complete installation of planned BMPS. The original and revised milestone schedules are shown in Tables 3 and 4 respectively.

Table 3. Original Milestone Table.

	Quantity	YEAR 1 10/01 - 10/02				YEAR 2 10/02 - 10/03				YEAR 3 10/03 - 10/04			
Objective I Task 1	Improved Cropping Systems												
Task 2	Grazing Management												
Task 3	Riparian												
Task 4	Animal Waste Systems												
Objective II Task 5	Riparian Buffers												
Objective III Task 6	Mailings												
Task 7	Meetings												
Task 8	Tours												
Task 9	Reports												

Table 4. Revised Milestone Table.

	Quantity	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
		10/01			10/02	10/02			10/03	10/03			10/04	10/04			12/05
Objective I Task 1	Improved Cropping Systems																
Task 2	Grazing Management																
Task 3	Riparian																
Task 4	Animal Waste Systems																
Objective II Task5	Riparian Buffers																
Objective III Task 6	Mailings																
Task 7	Meetings																
Task 8	Tours																
Task 9	Reports																

The milestone for each project activity with a comparison to the amount installed was discussed by in a previous section of this report. Table 5 contains a summary of that information and lists load reductions realized.

Table 5. BMP Milestone Comparison with Load Reductions.

BMP	Planned	Installed	Load Reductions		
			N (lbs)	P (lbs)	Sediment (tons)
Grassed Waterways	3,200 linear feet	3,500 linear feet	-	-	11
Conservation Tillage	5,000 acres	9,000 acres	26,597	11,945	2,333
Integrated Crop Management	5,000 acres	4,803 acres	24,259	3,921	-
Grazing Management	5 systems	3 systems (905 acres)		39	1,240
Alternative Watering Systems	25 systems	5 systems	-	-	-
Riparian Improvement Projects	6 Rock Crossings	6 Rock Crossings	-	-	-
Nutrient Management Systems	4 ANMS	3 ANMS	1819	599	-
Reduced Fecal Coliform levels	145 acres of livestock exclusion	186 acres livestock exclusion (= 7.2 miles streambank)	1083	487	225
Total Reduction Percentage			15.8%	17.2%	29%

COORDINATION EFFORTS

The Moody County Conservation District served as the project sponsor. District staff included the project coordinator and district secretary who were supervised by the District Board of Supervisors. The district coordinated project activities, reported on progress, submitted vouchers for grant funds, provided record keeping services and coordinated efforts with other agencies as described below.

State

- SD Department of Environment and Natural Resources:
  - administered the project grant, provided oversight of all project activities through onsite office visits and watershed tours,, reviewed reports, and approved payment requests; and
  - conducted annual Project Coordinator workshops which were attended by the Project Coordinator to review programs, policies, and procedures.

- Consolidated Water Facilities Construction Program for the construction of nutrient management systems awarded through the Board of Water and Natural Resources.

- SD Department of Agriculture, Division of Resource Conservation & Forestry:

  - SD Soil and Water Conservation grant through the SD Conservation Commission to provide cost-share funds for conservation activities on land in the watershed. Practices funded included nutrient management systems (3 systems), tree plantings (23 acres), weed barrier fabric (55,004 linear feet of fabric) and seal abandoned wells (7 wells).

- SD Game, Fish and Parks:

  - Financial assistance for cross fencing and seeding of marginal cropland to grass to establish a rotational grazing system.

Federal

- USDA Natural Resources Conservation Service (NRCS):

  - Technical assistance for the design and construction of nutrient management systems and riparian projects.

- USDA Farm Service Agency (FSA):

  - Financial assistance for establishing buffer in riparian areas through the Conservation Reserve Program (CRP).

- US Environmental Protection Agency:

  - Clean Water Act Section 319 grant through DENR for personnel needed to carry out the project and install BMPs in the watershed.

- US Fish and Wildlife Service:

  - Financial assistance for cross fencing to implement rotation grazing systems.

Other

- South Dakota Association of Conservation Districts (SDACD):

  - Assistance with the design of animal nutrient management systems in partnership NRCS through the SD Nutrient Management Team. The team is funded by a 319 grant awarded to the through DENR

- SD Grasslands Coalition:

- Technical assistance for the development of managed grazing systems through a 319 grant administered by SDACD for the coalition.

- East Dakota Water Development District (EDWDD):

  - Financial assistance to fund the information and education portion of the project.

  - Along with the Moody County Conservation District, Minnehaha Community Water Corporation, Big Sioux Community Water System, and the SD Lakes and Streams Association funded a stream monitoring project.

- Lake County Conservation District:

  - Technical assistance and served as the local, point of contact for producers to apply for information and BMP cost share.

- Landowners:

  - Installed watershed BMPs and contributed in-kind and cash match to leverage the other funding sources used to construct the BMPs.

COMMUNITY OUT REACH

Figure 9a. Water Sampling By Students.

Figure 9b. Students Testing Water Samples.

In addition to producer meetings and public tours (Figure 10b), a water quality monitoring project was implemented as part of the community outreach activities (Figures 9a-9b). The project was implemented by the Colman-Egan High School. The School received funds to purchase water sampling and testing equipment from the Moody County Conservation District, East Dakota Water Development District, Big Sioux Community Water System, Minnehaha Community Water Corporation and the SD Lakes and Streams Association. The monitoring project provided the Colman-Egan High School biology class the opportunity to receive hands-on experience and learn the importance of water quality to the environment. Ms. Bonnie Gilbertson, Colman-Egan High School biology teacher advised the students.

Figure 10a. School for the Deaf Students Fishing.

Figure 10b. Team and Wagon Using a Rock Crossing.

Colman-Egan Schools are located in the watershed. The conservation district hosted a field trip for the first and second grade students to view a shelterbelt planting demonstration. The project coordinator gave a presentation on how to and the importance of planting trees. Different types of trees and shrubs were shown and their benefits discussed.

A landowner in the watershed has developed a major portion of his property along the Bachelor Creek and Big Sioux River for wildlife. He holds field trips for SD School for the Deaf students and disabled students from the Sioux Vocational School (Figures 10a and 10b). The students are treated to a day of fishing, horse drawn wagon rides along the groomed trails and other outdoor activities. The project coordinator and district staff assisted with this project.

RESULTS AND FUTURE ACTIVITY RECOMMENDATIONS

The project goal:

> "Improve water quality in Bachelor Creek by reducing sediment, nitrogen, and phosphorus entering the creek" was attained."

This conclusion is based on the BMPs installed and being maintained in the watershed.

Installing an AWS is a lengthy process under the best of conditions. The time needed to make producer contacts, convince the landowners of the value of an AWS, move through the prioritization process, and then for the design team to complete the design usually exceeds the projected. Once these steps are complete, additional time is required to advertise for bids and receive county zoning approval. Unless construction goes smoothly time extensions are needed to complete a system. During this project additional time was necessary when wet conditions slowed BMP installation.

The installation of six riparian and one alternative water source projects were not completed because of construction delays related to wet conditions. The conservation district is identifying sources of funds to complete the installation of the practices.

Integrated crop management was selected as a BMP to be implemented during the project. While producers appeared to show little interest in the practice it was found that several producers were soil testing and following the recommendations, but were not using the full field scouting which was a requirement to qualify for cost share assistance for the practice. The conservation district will continue to promote the benefits and aid in the implementation of this BMP.

Follow-up contacts are planned to insure that rotational grazing systems are functioning as planned or if modifications are needed. The assistance will be provided by conservation district and Grassland Planning and Management Project staff.

Conservation work will continue in the Bachelor Creek watershed using funds offered through USDA NRCS and FSA programs. Marginal Pastureland, filter strips, and the farmable wetlands pilot project are among the practices producers are implementing.

BUDGET

The original Bachelor Creek project budget is shown in Table 6. Table 7 includes the budget amendment completed November 30, 2004, and an emailed budget change dated March 11, 2005. The actual project expenditures are displayed in Table 8.

Table 6. Original Project Budget.

OBJECTIVE/ TASK	Funding Source									
	EPA 319	**FSA**	**CWFCP**	**US FWS**	**CONS. COMM.**	**MCCD**	**EDWDD**	**LAND OWNER**	**LCCD**	**TOTALS**
PERSONNEL SUPPORT										
1) Project Coordinator	$52,650					$17,550				$70,200
2) Travel/Vehicle	$6,750					$6,750				$13,500
3) GPS Equipment and Supplies	$200									$200
ADMINISTRATIVE										
1) Secretary	$6,000					$6,000				$12,000
2) Planning and Coordinating	$800					$800				$1,600
3) Tech. Support									$18,000	$18,000
SUPPORT TOTAL	**$66,400**					**$31,100**			**$18,000**	**$115,500**
OBJECTIVE 1: Reduce sediment & nutrient loading										
1) Cropping Systems	$65,600							$31,600		$97,200
2) Grazing Systems	$18,750			$2,700				$6,250		$27,700
3) Riparian	$11,250							$3,750		$15,000
4) Nutrient Management Systems	$38,000		$85,000		$21,000			$16,000		$160,000
OBJECTIVE 1 TOTAL	**$133,600**		**$85,000**	**$2,700**	**$21,000**			**$57,600**		**$299,900**

Table 6. (Cont'd).

OBJECTIVE/ TASK	Funding Source									
	EPA 319	FSA	CWFCP	USFWS	CONS. COMM.	MCCD	EDWDD	LAND OWNER	LCCD	TOTAL
OBJECTIVE 2: Reduce fecal coliform bacteria										
5) Riparian Forest Buffer		$175,680								$175,680
OBJECTIVE 2 TOTAL		**$175,680**								**$175,680**
OBJECTIVE 3: Public Awareness Program										
6) I & E							$1,200			$1,200
7) Annual Meetings							$750			$750
8) Demo Tours							$400			$400
OBECTIVE 3 TOTAL							**$2,350**			**$2,350**
TOTAL PROJECT COST	**$200,000**	**$175,680**	**$85,000**	**$2,700**	**$21,000**	**$31,100**	**$2,350**	**$57,600**	**$18,000**	**$593,430**

FSA	US Department of Agriculture, Farm Service Agency
LCCD	Lake County Conservation District
CWFCP	Consolidated Water Facilities Construction Program
USFWS	US Fish and Wildlife Service
Cons. Comm.	South Dakota Department of Agriculture, Conservation Commission
MCCD	Moody County Conservation District
EDWDD	East Dakota Water Development District

Table 7. Amended Project Budget.

OBJECTIVE/ TASK	Funding Source									
	EPA 319	**FSA**	**CWFCP**	**US FWS**	**CONS. COMM.**	**MCCD**	**EDWDD**	**LAND OWNER**	**LCCD**	**TOTALS**
PERSONNEL SUPPORT										
1) Project Coordinator	$60,650					$20,217				$80,867
2) Travel/Vehicle	$6,750					$6,750				$13,500
3) GPS Equipment and Supplies	$200									$200
ADMINISTRATIVE										
1) Secretary	$5,800					$5,800				$11,600
2) Planning and Coordinating	$1,000					$1,000				$2,000
3) Tech. Support									$18,000	$18,000
SUPPORT TOTAL	**$74,400**					**$33,767**			**$18,000**	**$126,167**
OBJECTIVE 1: Reduce sediment & nutrient loading										
1) Cropping Systems	$52,100							$27,100		$79,200
2) Grazing Systems	$18,750			$2,700				$6,250		$27,700
3) Riparian	$11,250							$3,750		$15,000
4) Nutrient Management Systems	$38,000		$85,000		$21,000			$16,000		$160,000
OBJECTIVE 1 TOTAL	**$125,600**		**$85,000**	**$2,700**	**$21,000**			**$54,933**		**$289,233**

Table 7. (Cont'd).

OBJECTIVE/ TASK	Funding Source									
	EPA 319	**FSA**	**CWFCP**	**USFWS**	**CONS. COMM.**	**MCCD**	**EDWDD**	**LAND OWNER**	**LCCD**	**TOTAL**
OBJECTIVE 2: Reduce fecal coliform bacteria										
5) Riparian Forest Buffer		$175,680								$175,680
OBJECTIVE 2 TOTAL		**$175,680**								**$175,680**
OBJECTIVE 3: Public Awareness Program										
6) I & E							$1,200			$1,200
7) Annual Meetings							$750			$750
8) Demo Tours							$400			$400
OBECTIVE 3 TOTAL							**$2,350**			**$2,350**
TOTAL PROJECT COST	**$200,000**	**$175,680**	**$85,000**	**$2,700**	**$21,000**	**$33,767**	**$2,350**	**$54,933**	**$18,000**	**$593,430**

Table 8. Actual Project Expenditures.

OBJECTIVE/ TASK	Funding Source									
	EPA 319	**FSA**	**CWFCP**	**US FWS**	**CONS. COMM.**	**MCCD**	**EDWDD**	**LAND OWNER**	**LCCD**	**TOTALS**
PERSONNEL SUPPORT										
1) Project Coordinator	$42,256.71		$18,526.32			$20,229.87				$81,012.90
2) Travel/Vehicle	$2,705.03					$2,705.01				$5,410.04
3) GPS Equipment and Supplies	$185.42									$185.42
ADMINISTRATIVE										
1) Secretary	$5,453.43					$5,453.43				$10,906.86
2) Planning and Coordinating	$1,350.00					$1,360.00				$2,710.00
3) Tech. Support									$382.50	$382.50
SUPPORT TOTAL	**$51,950.59**		**$18,526.32**			**$29,748.31**			**$382.50**	**$100,607.72**
OBJECTIVE 1: Reduce sediment & nutrient loading										
1) Cropping Systems	$9,316.79							$3,974.79		$13,291.58
2) Grazing Systems	$7,787.45			$1,705.00				$5,669.77		$15162.22
3) Riparian	$7,038.55							$2,346.18		$9,384.73
4) Nutrient Management Systems	$90,541.14		$66,473.68		$21,000.00		$2,500.00	$18586.15		$199,100.97
OBJECTIVE 1 TOTAL	**$114,683.93**		**$66,473.68**	**$1,705.00**	**$21,000.00**		**$2,500.00**	**$29,723.29**		**$236,939.50**

Table 8. (Cont'd).

OBJECTIVE/ TASK	Funding Source									
	EPA 319	**FSA**	**CWFCP**	**USFWS**	**CONS. COMM.**	**MCCD**	**ED WDD**	**LAND OWNER**	**LCCD**	**TOTAL**
OBJECTIVE 2: Reduce fecal coliform bacteria										
5) Riparian Forest Buffer		$160,139.00						$8,507.82		$168,646.82
OBJECTIVE 2 TOTAL		**$160,139.00**								**$168,646.82**
OBJECTIVE 3: Public Awareness Program										
6) I & E							$280.05			$280.05
7) Annual Meetings							$131.77			$131.77
8) Demo Tours							$571.07			$571.07
OBECTIVE 3 TOTAL							**$983.55**			**$982.89**
TOTAL PROJECT COST	**$166,634.52**	**$160,139.00**	**$85,000.00**	**$1,705.00**	**$21,000.00**	**$29,748.31**	**$3,482.89**	**$39,084.71**	**$382.50**	**$507,176.93**

APPENDIX A

BACHELOR CREEK HYDROLOGIC UNIT PROJECT REVIEW

John Hay coordinator for Bachelor Creek Hydrologic Unit Project in Moody County, South Dakota contacted Ken Madison in May of 2003. He was concerned that the project had funding for residue management and integrated crop management included in the 319 portion the plan and very little activity was occurring to result in funding of these two items. Operators in the project area were improving their residue management and in many cases implementing integrated crop management but they were not doing it as a part of the incentive payments originally developed in the project plan. John was also concerned that the project had four animal waste management systems that would be implemented in 2004 or 2005 and the cost of these projects was estimated to exceed the funds provided in the project plan.

Ken Madison and I met John Hay on May 22, 2003, and after reviewing the PIP for the 319 funding of the project toured the project area. The project goal is to improve water quality in Bachelor Creek by reducing sediment (18.4 percent), nitrogen (12.4 percent) and phosphorous (16.5 percent). It was obvious that the cropland in the project had a large percentage of the area utilizing good residue management. We checked two or three of the fields with apparent lower residue cover and found at least 30percent ground cover using the 25 foot rope method. Some of the fields that had been planted to soybeans appeared undisturbed. Ken and I suggested that John and Joel Kern the District Conservationist for Moody County complete a survey of the project area and determine how much no till crop was being planted as of 2003. We also suggested that they determine what the current "c" values would be for the existing residue conditions.

John notified Ken in July that they had completed the suggested survey and John had calculated the amount of cropland that had significant changes in residue management. They concluded that 50percent of the beans planted into corn stubble were now no till and 5percent of the corn into bean stubble was no till. This was a significant change from the study period when 4.3 percent of the beans were no till and there was less than 0.1 percent of the corn no tilled. About 95 percent of the cropland in the project area where tillage occurs for seedbed preparation or planting of crops is planted to either beans or corn each year. The land use has remained about the same as when the study was conducted.

John also indicated that he felt the "c" values used in the study were in error when he compared them to the present South Dakota Field Office Technical Guide.

Ken and I met September 24, 2003, with John and went over the "c" values for the various crops and tillage methods. The "c" values that John had developed were significantly different that those used in the original study. We had the AGNPS data from the original study with us and we attempted to enter this data and determine the amount of change in nutrient yield. This was a slow process and we finally took John's new values and returned to enter the data at a latter date.

John's "c" values were entered into the AGNPS program and new annual yield data for sediment and nutrients were determined. Changing the "c" values resulted in a (43.6 percent) reduction in

sediment, a (15.89 percent) reduction in total phosphorous and a (8.39 percent) reduction in total nitrogen.
This change seemed too good to be true which is what it turned out to be. The "c" values that John provided were from the revised soil loss method now used by NRCS to compute soil losses. This system is referred to as the Revised Universal Soil Loss Equation (RUSLE) and normally computes soil loss value 30 to 40 percent less than the original Universal Soil Loss Equation (USLE) that was used in AGNPS 3.65, which was used in the original Bachelor Creek Study.

The Bachelor Creek Study was completed in October of 2000. Most of the study data was obtained in 1998 and 1999. The AGNPS cropping history would have been for 1996 and 1997. Table 1shows the land use for the Bachelor Creek Watershed.

Table 1. BACHELOR CREEK LAND USE.

LAND USE	ACRES	PERCENT
Cropland	50,360	81.3
CRP	1,760	2.8
Pasture	6,160	9.9
Wetland and Water	1,880	3.0
Wildlife Area	1,040	1.7
Towns, Farmsteads, and Roads	800	1.3
TOTAL	62,000	100.0

The cropland is basically a corn and soybean rotation. Table 2 shows the cropland uses set up in the study. Since John and Joel had determined that the cropping was about the same but that the residue management had changed the "c" values for present day land use were computed using the old USLE data and this data was entered into the AGNPS 3.65 model

Table 2 CROPS PLANTED IN BACHELOR CREEK WATERSHED.

CROPLAND	ACRES	PERCENT	CUMULATIVE
Beans	20,600	39.5	39.5
Corn	19,480	37.4	76.9
Beans NT	2,520	4.8	81.7
Corn NT	120	0.2	81.9
Continuous Beans	2,600	5.0	86.9
Continuous Corn	1,520	2.9	89.8
Other	680	1.3	91.1
Alfalfa	2,840	5.5	96.6
CRP	1,760	3.4	100
Total	52,120	100.0	

The results of the new data when computed on an annual basis were a sediment reduction (18.2 percent), nitrogen reduction (7.86 percent), and phosphorous reduction (11.92 percent). At the present time with the residue management alone 99 percent of the sediment goal, 63 percent of the nitrogen goal and 72 percent of the phosphorous goal is completed or obtained.

The last GRTS report indicates that there is additional progress is being made on implementing grazing management systems and riparian management. I discussed these practices with John in regard to what was being done on riparian management besides the rock crossings that have been installed. He stated that before the contract with DENR had been signed that several riparian forest buffers had been installed. This practice was planed as a part of the project but was completed early because the Section 319 project was held up due to problems related to the Topeka Shiner. The AGNPS model will not show any change in nutrient value for buffers since the model only computes sheet and rill erosion and doesn't address channel factors or trapping benefits. We need to come up with some nutrient reduction value for these practices. John did state that there continues to be increasing interest in grazing management systems in the project area and he continues to develop grazing plans. This may require some additional funding.

John also indicated that there were farmers in the project area that were applying the effort necessary to meet the standards for integrated cropland management but were not receiving funds from the project for this effort. I suggested that he document the land that these operators were implementing this practice in the next GRTS report and continue to add any land that the operator started to meet integrated crop management. The amount of nutrient value for this practice is difficult to quantify since the amount of applied fertilizer may not change due to the soil test information and the fact that most of the operators are increasing the seeding rate to increase crop yield. The improved residue management and the use of soil test and scouting should result in improve water quality. We need to find a way to quantify.

The last GRTS report indicates that the animals waste management systems were being designed and would be implemented on three of the four sites. The fourth site is in question because the operation involves a father and two sons. The father is interested in the feeding operation and somewhat interested in a waste management system. The two sons indicate that when they are fully in control of the operation that the feeding operation will be discontinued. Funding for the animal waste systems is still undetermined as the designs are not complete. Funding is available from the Conservation Commission and Section 319. The Conservation Commission grant only runs through June of 2004 and will have to be extended to assure these funds are available for the waste systems.

A request to extend the Conservation Commission for one year or through July 1, 2005 will be submitted to the Commission. Since it is questionable on whether all of the animal waste systems will be completed in 2004 we may also want to extend the Section 319 contract to the same date.

SUPPORTING DATA DEVELOPED FOR THIS REPORT.

Bachelor Creek Nutrient Yield Comparison Tables An Excel file that shows the supporting data and the nutrient yields for the original study, the rerun using the RUSLE soil loss data and the rerun using USLE data for NT beans after corn and corn after beans.

Bachelor Creek Rotation An Excel file that computes the "c" values for different tillage methods for beans after corn for both 150 bushel yield and 125 bushel yield, beans after beans, corn after beans. Also shows a table that shows "c" values used in the original study.

AGNPS Folder dat files for the various conditions used to obtain the annual nutrient yield data. Files are as follows:

- BACHELOR Bachelor Creek original study dat. file
- OBACHANN Bachelor Creek original study annual yield dat. file
- OBACHSEM Bachelor Creek original study semiannual yield dat. file
- OBACHMON Bachelor Creek original study monthly yield dat. file

- BACH1RED Bachelor Creek redetermined RUSLE data dat. file
- BACHANNL Bachelor Creek redetermined RUSLE annual yield dat file
- BACHSEMI Bachelor Creek redetermined RUSLE semiannual yield dat. file
- BACK1MON Bachelor Creek redetermined RUSLE monthly yield dat. file

- BACH03RE Bachelor Creek redetermined USLE data dat. file
- BACH03AN Bachelor Creek redetermined USLE annual yield dat. file
- BACH3SEM Bachelor Creek redetermined USLE semiannual yield dat. file
- BACH3MON Bachelor Creek redetermined USLE monthly yield dat file

Appendix B

INFORMATIONAL MEETING

January 22, 2002

1:30 PM

Colman Community Center

Colman, SD

All producers, landowners and residents within the Bachelor Creek Watershed are invited to an informational meeting at the Colman Community Center at 1:30 PM on Tuesday, January 22, 2002. The Moody County Conservation District with the support of the Lake County Conservation District has received grants from SD DENR and the SD Department of Ag., Division of Resource Conservation and Forestry. These grants are to provide cost share for the implementation of practices to improve water quality in Bachelor Creek.

Projects available for cost share will be grass waterways, grazing plans, alternative watering sites, nutrient management systems, tree plantings, tree fabric installation, and abandoned well sealing.

Practices such as no-till and integrated crop management can also be cost shared on areas prioritized during the assessment of the watershed.

What cost share is being made available for this project?

Do I qualify for this cost share?

How do I apply for cost share?

Please plan on attending the informational meeting Tuesday, January 22, 2002 at the Community Center in Colman at 1:30 PM. Refreshments will be served.

BACHELOR CREEK
Implementation Project

Informational Meeting and Progress Report

for Bachelor Creek Landowners, Producers

and Anyone Interested in the Project

1:00 PM

February 24, 2003

Colman Area Recreation Clubhouse

Colman, SD

Refreshments will be served

BACHELOR CREEK H.U.
Implementation Project

Informational Meeting and Progress Report

for Bachelor Creek Landowners, Producers

and Anyone Interested in the Project

1:00 PM

February 23, 2004

Colman Area Recreation Clubhouse

Colman, SD

Refreshments will be served