SECTION 319 NONPOINT POLLUTION CONTROL PROGRAM

WATERSHED PROJECT FINAL REPORT

BLUE DOG LAKE WATERSHED IMPROVEMENT PROJECT

By

Dennis R. Skadsen
Project Coordinator
Day Conservation District

July 2006

This project was completed in cooperation with the South Dakota Department of Environment and Natural Resources and the United States Environmental Protection Agency, Region 8.

Grant # C9998185-00

EXECUTIVE SUMMARY

PROJECT TITLE: Blue Dog Lake Watershed Improvement Project

PROJECT START DATE: 13 March 2000

PROJECT COMPLETION DATE: 1 July 2006

FUNDING:

Funding Sources	Original Budget	Revised Budget	Expended
U.S. EPA Section 319 Grant	$375,000.00	$375,000.00	$218,799.77
SD Consolidated Water Grant	$90,000.00	$0.00	$0.00
SD Coordinated Soil & Water Grant	$104,638.00	$53,442.99	$53,442.99
USDA EQIP and USF&WS Funds	$259,106.00	$109,037.47	$70,322.66
Local Cash and In-Kind Match	$254,800.00	$172,720.35	$106,278.82
Total:	$1,083,544.00	$710,200.81	$448,844.24

The project goal was:

"Reduce in-lake phosphorus by thirty-five percent (35%) moving the lake's TSI from a hypereutrophic to eutrophic state".

The project goal was established based on in-lake water quality data collected during a two-year watershed and lake assessment completed in 1998. The study determined that the in-lake phosphorus trophic state index (TSI) was in the hypereutrophic range. To attain the goal, a project implementation plan (PIP) was developed to install best management practices (BMPs) designed to reduce phosphorus loading to the lake.

While the project cost-shared the installation of numerous conservation practices , the USDA Conservation Reserve Program (CRP) was determined to be the most effective practice for reducing nonpoint source loads from the watershed. During the project, 1,573 acres of cropland were enrolled in CRP. CRP and other BMPs installed during the project reduced the number of cropland acres in the watershed by nineteen percent (19%) which resulted in a calculated reduction of 4,192 pounds per year of phosphorus delivered by runoff from cropland.

Practices were installed to improve grazing management on 7,684 acres of rangeland, the major land use in the watershed. These included 26,220 lineal feet of fence to protect riparian areas and 83,161 lineal feet of cross and perimeter fence to implement managed grazing on expired CRP contract acres or improve grazing distribution on existing range and pastureland. Improved management of pasture and rangeland resulted in a calculated reduction of 776 pounds per year of phosphorus delivered by runoff.

The project goal of moving Blue Dog Lake's Trophic State Index (TSI) from a hypereutrophic to eutrophic state has been attained. Recent water quality data from the South Dakota Statewide Lake Assessment (Paul Lorenzen, personal communication) shows the lake TSI at 63.33, slightly lower than the target 63.75 TSI.

TABLE OF CONTENTS

List of Figures

INTRODUCTION

Project Area

The Blue Dog Lake watershed is part of the North Big Sioux Couteau watershed, Hydrologic Unit Control (HUC) #10160010. The 51,319-acre (20,527-hectare) watershed is located in northeastern Day County and west central Roberts County, South Dakota. Sixty-six percent (66%) of the watershed is native range, pasture, or cropland enrolled in the Conservation Reserve Program (CRP). The major land-use in the watershed is grazing. The remaining thirty-four percent (34%) of the watershed is mostly cropland (Stueven and Bren, 2000).

Waterbody Description

Blue Dog is an ice block lake formed 12,000 years ago during the Late Wisconsin Glaciations. Melt water from the glaciers cut channels and deposited outwash that formed the Eastern Lakes Subsystem, a group of several aquifers that surround and connect Blue Dog, Enemy Swim, Pickerel, Minnewasta, Waubay, and Bitter Lakes. The Coteau des Prairie is the major physiographic formation that encompasses the Blue Dog Lake watershed and much of eastern South Dakota.

Blue Dog Lake is a 1,502-acre (608-hectare) natural lake located in northeast Day County, South Dakota (Figure 1). The lake has a maximum depth of 8 feet (2.4 meters), a mean depth of 6.2 feet (1.9 meters), and a shoreline length of approximately 8.7 miles (5.4 kilometers). The ordinary high water mark elevation of Blue Dog Lake is 1,800.7 feet above mean sea level (msl). The watershed encompasses 51,319 acres (20,527 hectares) resulting in a watershed to lake ratio of 33:1.

In response to above-normal precipitation, the elevation of the lake rose to four feet over the 1,799.93 foot msl outlet elevation during the 1993 to 1998 time period. The lake has since returned to its normal elevation.

Two major tributaries flow into the lake. Owen's Creek enters the lake from the east; the outlet from Enemy Swim Lake enters from the north.

Owen's Creek:

- drains most of the 51,319-acre Blue Dog Lake watershed;
- is a perennial stream, which drains through cropland, pasture, and rangeland; and;
- has a base flow of 23 cubic feet per second (cfs) near its confluence with Blue Dog Lake.

The outlet of Enemy Swim Lake:

- flows when the lake's elevation is higher than 1,853.6 feet above msl, the elevation of the outlet weir located on the southwest corner of Campbell Slough;
- ceases to flow when lake levels drop below the outlet elevation;

- has a base flow of 12 cubic feet per second (cfs), and;
- passes through mainly pasture and hayland as it flows to Blue Dog Lake.

Assigned beneficial uses of Blue Dog Lake include:

- warm water permanent fish life propagation
- immersion recreation
- limited contact recreation
- wildlife propagation and stock watering

The results of a two-year watershed assessment of Blue Dog Lake completed in 1998 (Stueven and Bren, 1999) found that the lake is hypereutrophic with use impairments being related to shallow depth, frequent algal blooms, and fecal coliform bacteria.

Nonpoint Source Pollutants

Fecal coliform bacteria were found in nearly all samples collected in the Blue Dog Lake watershed during the assessment. The most likely source of the fecal coliform bacteria was identified as runoff from animal feeding areas, and improper application of manure on cropland. High nitrate concentrations were found at some sample sites. High nitrate levels in ground water were the most likely source of these increased concentrations. Suspended solids concentrations were high during several sampling periods. Based on information available, sources of the elevated suspended solids were projected to be pastures with livestock standing in or crossing streams, animal waste runoff, and cropland and pastures with higher slopes. Although the nutrient and sediment loadings are not as high as many other lakes in eastern South Dakota, loads entering Blue Dog Lake are sufficient to produce nuisance algal blooms.

The Agricultural Non-point Source (AGNPS) model results agreed with the water quality data collected during the assessment project. The AGNPS model predicted that:

- a seventeen percent (17%) phosphorus reduction could be achieved by installing animal nutrient management systems (ANMSs) at twelve of the highest ranking feedlots in the watershed;
- an additional seventeen percent (17%) reduction of phosphorus could be accomplished by treating 1,640 acres of cropland, and;
- the estimated thirty-five percent (35%) reduction in phosphorus inputs would reduce in-lake phosphorus trophic state index (TSI) levels to eutrophic.

Summary of Project Activities

Best management practices (BMPs) were selected to attain the project goal of reducing in-lake phosphorus by thirty-five percent (35%). Cost-share funds for installing the practices were provided by a United States Environmental Protection Agency (U.S. EPA) Section 319 Nonpoint

Source Pollution Control Grant, a South Dakota Department of Agriculture Coordinated Soil and Water Conservation Commission grant, and through the Natural Resources Conservation Service Environmental Quality Incentive Program (EQIP). Best management practices installed with cost-share funds included clean water diversion systems, fence and water development to improve grazing management, and conversion of cropland to grass in critical areas.

Numerous information and education (I&E) activities were completed during the project. Watershed and lake property owners were provided with project information by using fact sheets, news articles, newsletters, and informational booths at community events. Many of the fact sheets were designed to bring about change in how lakeshore property owners manage their property. The most notable change achieved from the outreach material is that lakeshore property owners are now using lawn fertilizers with no phosphorus ingredients.

Table 1 illustrates a comparison of planned versus completed project activities.

Table 1. Planned Versus Completed Project Activities

Activity	Original	Milestone Amended	Completed
Objective 1 - Task 1			
Animal Waste Nutrient Mgt. System	7	2	0
Clean Water Diversion Systems	5	1	1
Nutrient Management Plans	15	1	1
Objective 2 - Task 2			
Cattle Stream Crossing	4	2	0
Grass Waterway	5	0	0
Pasture Renovation	1000 acres	0	0
Critical Area Planting	2000 acres	2000 acres	2,705 acres
Grass Buffer Strips	500 acres	0	0
Grazing Systems - Fence	79,200 lf.	NC	109,381 lf.
Grazing Systems - Water			
Tanks	8	14	16
Pipelines	8	5	5
Water Wells	4	5	5
New Stock Ponds	4	NC	11
Stock Pond Restoration	2	4	7
Nose Pumps	6	NC	5
Objective 3 - Task3			
Lake Friendly Farmer Signs	20	0	0
Newsletters	8	6	4
Fact Sheets	12	9	6
Public Meetings/Workshops	6	NC	6
Objective 4			
Task 4 - Monitor water quality			
Clean Water Diversion Systems	24 (samples)	NC	11
Task 5 - Monitor BMPs			
Grass Buffer Strips	4	0	0
Critical Area Planting	4	0	0
Task 6 -QA/QC Samples	4	NC	1

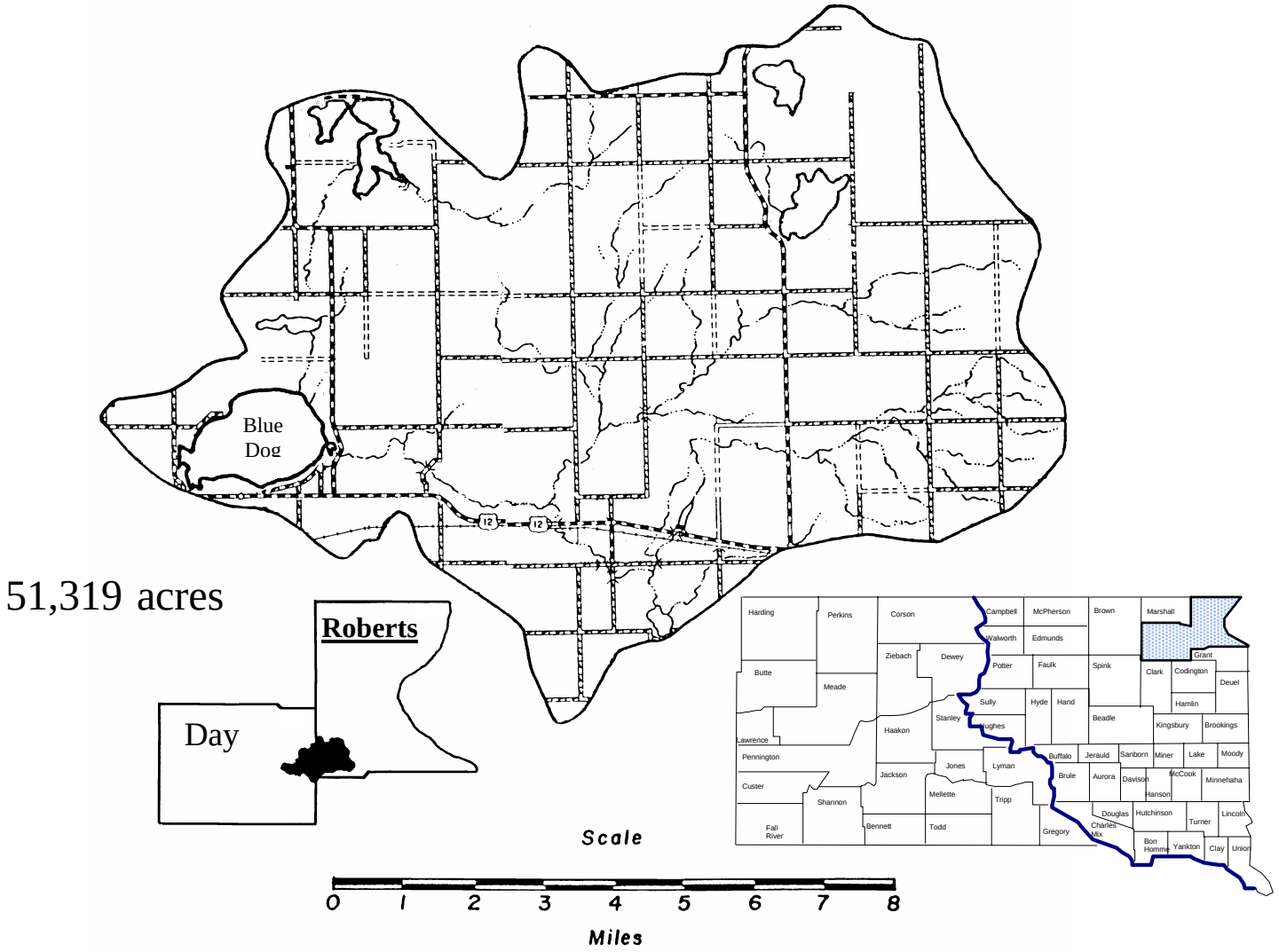

Figure 1. Blue Dog Lake Watershed.

PROJECT ACTIVITIES

Project Goals and Objectives

The project goal was developed based on water quality assessment results reported in the Lake Assessment Report for Blue Dog Lake (Stueven and Bren, 1999). Objectives and tasks to install the BMPs that would reduce the sediment and nutrients reaching the lake were developed to support attaining the goal. Producers were encouraged to implement these BMPs through news releases, fact sheets, and direct contacts by NRCS personnel and the Project Coordinator. BMPs were cost-shared using U.S. EPA Clean Water Act Section 319 grant funds, South Dakota Department of Agriculture's Coordinated Soil and Water Conservation Commission grant funds, and the USDA Natural Resource Conservation Service's (NRCS) Environmental Quality Incentive Program (EQIP) funds. BMP costs were based on the South Dakota NRCS Technical Committee's South Dakota Cost List docket which is updated each year by the NRCS. Cost share payments ranged from sixty percent (60%) to seventy-five percent (75%) of the total practice cost. Producers receiving cost share payments were required to sign contracts which contained requirements and conditions to ensure that BMPs will be properly maintained over the life expectancy of the practices. Producer participation in this project was voluntary.

Planned and Completed Milestones and Products

Objective 1: Reduce Phosphorus Loading from Animal Feeding Operations

The AGNPS model identified twelve (12) animal feeding operations (AFOs) for which installing BMPs to control animal waste runoff would result in a seventeen percent (17%) reduction in phosphorus loads to Blue Dog Lake. The original Project Implementation Plan (PIP) included funds for the design and construction of seven (7) animal nutrient management systems (ANMSs), five (5) clean water diversion systems, and develop fifteen (15) nutrient management plans for agricultural producers in the watershed.

Of the eleven feedlots (AFOs) rated at 55 or above by the AGNPS model, five have been addressed either by implementation of BMPs to reduce feedlot runoff, or have had changes in usage that reduced the phosphorus loads calculated by AGNPS. Of these; one AFO received treatment, two are no longer in use, and one feedlot may be relocated during the Northeast Glacial Lakes Watershed Protection and Improvement Project. Another AFO was dropped from the list of rated feedlots after it was found that a containment system had already been constructed at the site.

Products:

Product 1: Animal Nutrient Management Systems

Milestone
Original PIP: 7
Amended PIP: 2
Completed: 0

Designs were completed for one system; however the producer did not proceed with construction because of higher than anticipated cost. This system may be constructed at a later date utilizing Natural Resource Conservation Service (NRCS) EQIP funding. A preliminary design for a second system was also completed. However, soil tests determined that the site was unsuitable for a holding pond and wastewater treatment strip, and would pose a contamination threat to the adjacent town's groundwater supply. This feedlot will be relocated to a more suitable site during the planned Northeast Glacial Lakes Watershed Protection and Implementation Project.

Product 2: Clean Water Diversion Systems

Milestone
Original PIP: 5
Amended PIP: 1
Completed: 1

A clean water diversion system was constructed at the feedlot receiving the highest AGNPS rating during the watershed assessment study (Figure 2). Construction of the system used all funds budgeted for this practice. A wastewater lagoon may be added to this system in the future. No other producers in the project area were interested in installing this practice.

Product 3: Nutrient Management Planning

Milestone
Original PIP: 15 producers
Amended PIP: 0
Completed: 0

This practice, funded by a South Dakota Coordinated Soil and Water Conservation Commission grant, would have paid up to $1,200 per producer for soil and manure nutrient tests needed to implement a nutrient management plan. No producers were interested in this practice. A possible reason was because cost share paid for only one year of testing.

Product 4: Technical Assistance

Milestone
Original PIP: $60,000.00
Amended PIP: $20,000.00
Completed: $3,652.00

These funds were earmarked to hire engineering firms to design and oversee the construction of animal nutrient management systems and clean water diversion systems. One animal nutrient management system design was completed using the funds. All other system designs were completed by the South Dakota Animal Nutrient Management Team at no cost to the project.

Figure 2. Clean Water Diversion System.

Objective 2/Task 2: Reduce Nutrient and Sediment Loading from Watershed Pasture, Rangeland, and Cropland

The project provided technical assistance and cost-share funds to producers who installed BMPs that reduced nutrient and sediment loads entering surface waters in the watershed. Targeted areas were those identified during the watershed assessment using the AGNPS runoff model, and water quality monitoring. Unit costs for conservation practices were determined using the South Dakota Cost List (1999-2006) as stated previously.

Products:

Product 1: Cattle Stream Crossings

Milestone:
Original PIP: 4
Amended PIP: 2
Completed: 0

Seven cattle stream crossings were designed. However, because of higher than expected construction costs, producers did not implement the plans.

Product 2: Grass Waterways

Milestone:
Original PIP: 5
Amended PIP: 0
Completed: 0

The continuous Conservation Reserve Program (CRP) was a better option for producers interested in installing grass waterways. CRP paid a higher cost-share rate than possible with 319 plus the program offered an incentive payment for installing the practice. It is not known how many acres of grass waterways were replaced by the Conservation Reserve Program. With the development of round-up ready corn and soybeans, producers no longer want grassed waterways in these cropped fields that require more attention when applying herbicides.

Product 3: Pasture Renovation

Milestone:
Original PIP: 1,000 acres
Amended PIP: 0 acres
Completed: 0 acres

Early in the project, it was determined there was no interest in this practice. Therefore it was deleted when the revised PIP was prepared.

Product 4: Critical Area Planting

Milestone:
Original PIP: 2,000 acres
Amended PIP: 2,000 acres
Completed: 2,705 acres (70 acres 319 funds, 1,573 acres CRP, 1,062 acres no cost–share)

Generally the Conservation Reserve Program (CRP) paid higher cost-share rates and incentives than was possible using 319 funds. However, 319 funds were used to plant 70 acres of cropland to grass on three fields which were highly susceptible to erosion. When planted to row crops, these three fields had an estimated soil loss of 5.1 tons/acre/year (RUSLE2 model), slightly above the acceptable soil loss tolerance of 5.0 tons/acre/year. Planting these three fields to warm season grasses reduced erosion rates to 0.0021 tons/acre/year. Another 1,062 acres of cropland were planted to alfalfa/grass hay during the project period.

Product 5: Grass Buffer Strips

Milestone:
Original PIP: 100 acres
Amended PIP: 0 acres
Completed: 0

There was no interest in this product. The Conservation Reserve Program (CRP) was a better option for producers interested in installing grass buffer strips. CRP paid a higher cost-share rate than was possible using 319 funds plus an incentive for installing the practice. Therefore, grass buffer strips were installed using CRP program funds rather than project funds.

Product 6: Fence

Milestone:
Original PIP: 79,200 lf
Amended PIP: 79,200 lf
Completed: 109,381 lf

The project provided cost-share funds for the installation of 46,760 lineal feet of perimeter and cross fence on 7,684 acres of range and pastureland in the watershed. Financial assistance for the installation of an additional 36,401 lineal feet of perimeter and cross fencing was provided through the U.S. Fish and Wildlife Service and Duck's Unlimited, private lands program, allowing a producer to improve grazing on 927 acres. The new perimeter and cross fences will allow producers to graze grasslands, especially areas with expired Conservation Reserve Program (CRP) contracts that were cropland prior to the implementation project. Cross fences will allow producers to evenly distribute grazing across their pastures for better utilization of the grassland vegetation. The RUSLE2 Model shows a decrease of soil loss to near zero tons/acre/year when cropland is converted to grassland and grazing systems are used to manage livestock use of pastures.

Twenty-six thousand two-hundred twenty (26,220) lineal feet of buffer fence was installed along the shoreline of Blue Dog Lake and the north tributary to the lake. The fences will exclude livestock from shorelines and stream beds, thereby protecting these sensitive areas from erosion and providing vegetative buffers that will trap nonpoint source pollutants (Figures 3 and 4). The buffer fences will also protect numerous cultural resources, including several species of wetland plants used by the Sisseton-Wahpeton Oyate for medicinal and ceremonial purposes.

Figure 3. Buffer Fence Along Blue Dog Lake Shoreline.

Pasture Watering Systems

Installation of the following practices afforded many producers an opportunity to use land where CRP contracts were not extended for grazing rather than conversion back to cropland (Figure 6). These practices also improved grazing distribution, allowing livestock to better utilize grasslands. The project PIP was amended, during 2004, to re-allocate 319 funds to pasture watering systems after the loss of EQIP Priority Area funds during 2003. In addition to the practices listed below, the installations of one solar array (Figure 5) and one propane generator were cost-shared to provide electricity to wells located in remote pastures.

Product 7: Stock Watering Tanks and Pipelines

Milestone:
Original PIP: 8 tanks: 8 pipelines
Amended PIP: 14 tanks; 5 pipelines
Completed: 16 stock watering tanks; 5 pipelines

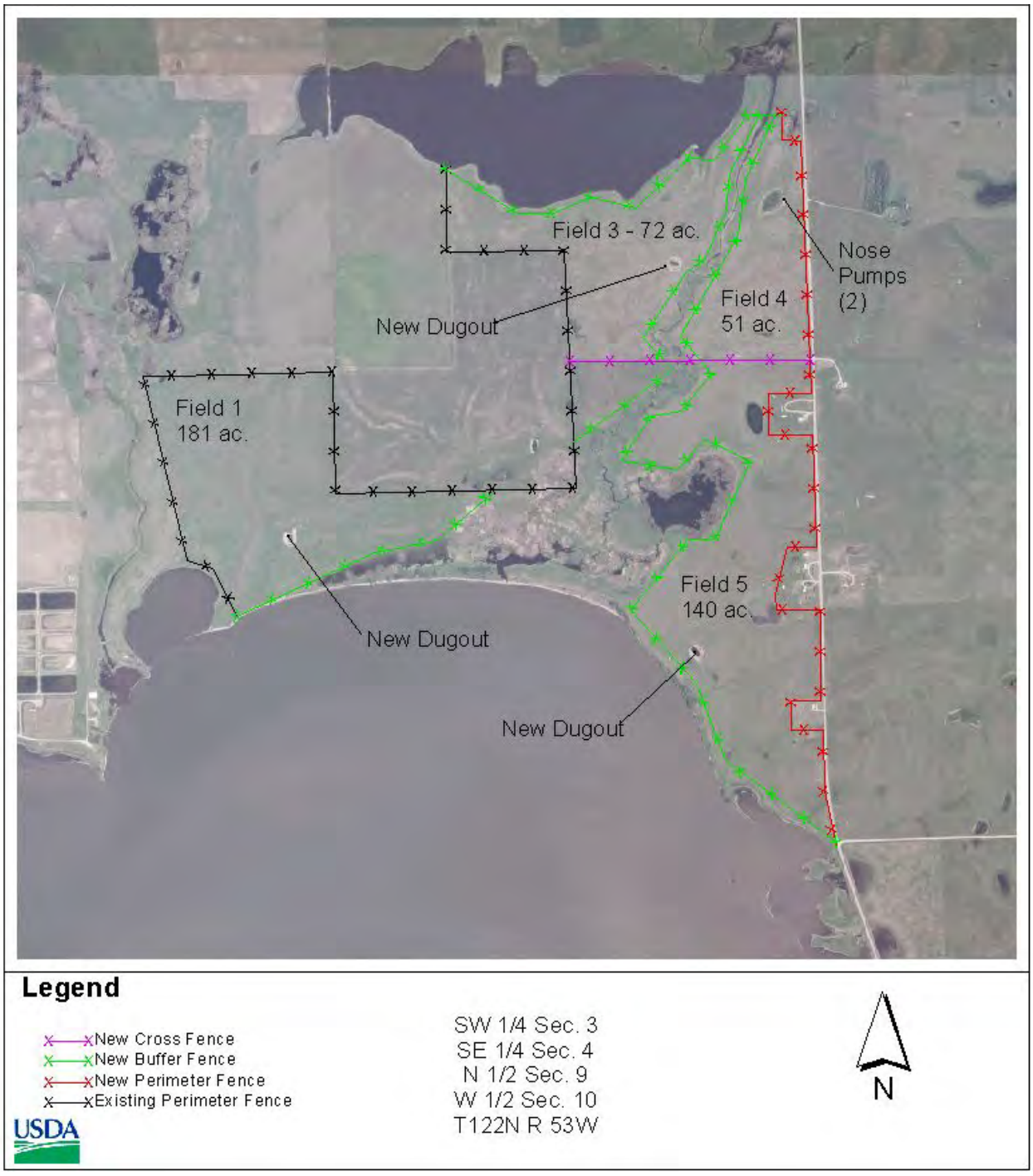

Figure 4. Blue Dog Lake Grazing Project.

Product 8: Water Wells

Milestone:
Original PIP: 4
Amended PIP: 5
Completed: 5

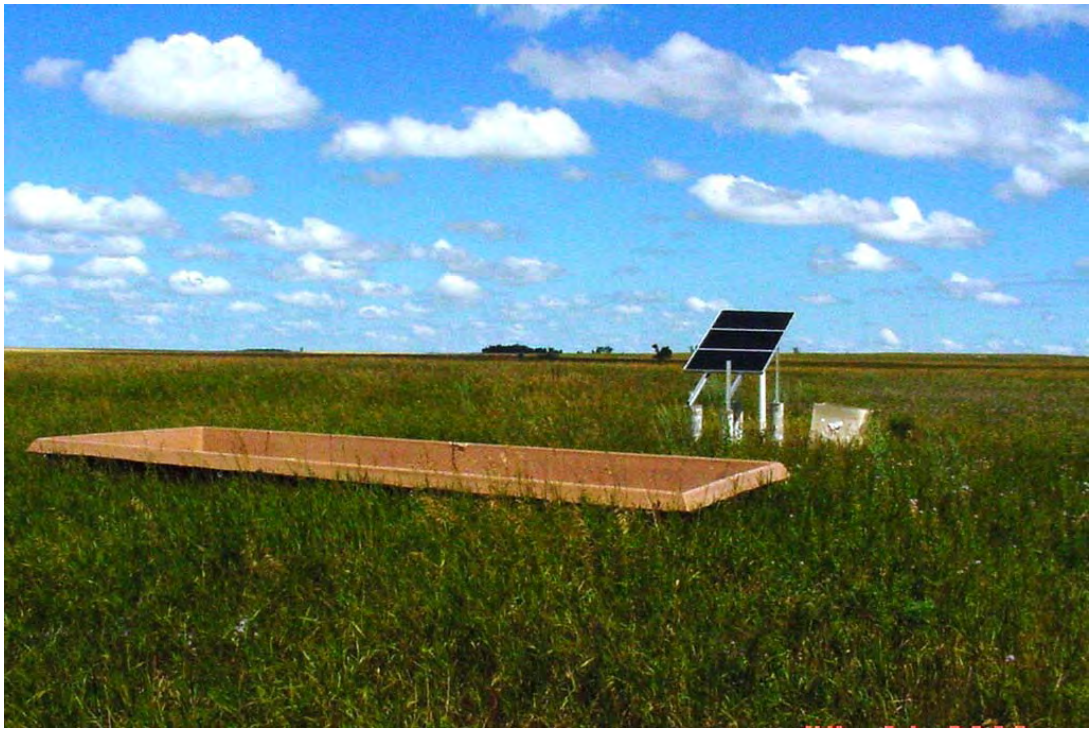

Figure 5. Solar Powered Well and Stock Watering Tank.

Product 9: Stock Ponds (new)

Milestone:
Original PIP: 4
Amended PIP 4
Completed: 11

Product 10: Stock Pond Restoration

Milestone:
Original PIP: 2
Amended PIP: 4
Completed: 7

Product 11: Pasture Nose Pumps

Milestone:

Original PIP: 6
Amended PIP: 6
Completed: 5

Figure 6. Managed Grazing System Implemented on Expired CRP.

Figure 7. New Stock Pond Installed on Expired CRP Field**.**

Water development improved livestock distribution and provided alternate watering sources on 6,918 acres of rangeland and pasture in the Blue Dog Lake watershed.

Table 2 lists the cost-share contracts for practices included in Objectives 1 and 2 of the PIP. In some instances, planned conservation practices funded by 319 or EQIP were cancelled or not completed during the project period.

Table 2. Cost Share Participants and Practices Completed

Contract #	Completed Practices	Acres	Contract Completed
1-AF	stock pond restoration (1), animal nutrient management. system (design only)	101	no
2-JA	perimeter fence (1,964 l.f.), stock pond (1), stock pond restoration (1)	920	yes
3-BV	perimeter and cross fence (36,401 l.f.), stock watering tanks (4), wells (3), pipeline (1) solar pump (1), propane generator (1)	927	yes
4-MB	cross fence (1,905 l.f.), stock watering tanks (3), well (1)	1,905	yes
5-DRR	cross fence (6,533 l.f.)	640	no (EQIP)
6-DeG	perimeter fence (10,148 l.f.), well (1), pipeline (2), stock watering tanks (3), stream crossing (3 designs only)	156	no
7-DuG	clean water diversion system, stream crossings (3 designs only)	0	no
8-J&GG	pipelines (2), pasture nose pumps (2), stock watering tanks (2)	214	yes
9-SH	stock pond (1)	200	yes
10-DL	critical area seeding (70 acres)	70	yes
11-DP	cross fence (2,616 l.f.), stock watering tanks (4), stock pond (1), stock pond restoration (1)	160	yes
12-DS	stock pond (1), cross fence (design only)	240	no (EQIP)
13-JS	stock pond restoration (2)	602	yes
14-SWSTBDL	perimeter and cross fence (39,074 l.f.), stock ponds (3), pasture nose pumps (2)	390	yes
15-SWSTBR	stock pond (1), stock pond restoration (1)	206	yes
16-SWSTG	stock pond restoration (1), cross fence (design only)	330	no (EQIP)
17-SWSTH1&2	stock pond (1), perimeter and cross fence (design only)	161	no (EQIP)
18-SWSTOL	cross fence (4,290 l.f.)	126	yes
19-CW	stock pond (1)	126	yes
20-EW	perimeter fence (6,450 l.f.), stock pond (1)	280	yes
21- GA	stock pond restoration, nose pump (design only)	0	no (EQIP)

Objective 3/Task 3: Implement an Information and Education Program

The project funded activities that provided information and education about the goals, objectives, progress, and best management practices that were being implemented. These were targeted to the general public, local schools, lakeshore and watershed property owners, and agricultural

producers. Outreach materials included newsletters, fact sheets, press releases, demonstration sites, workshops, and information booths at public events.

Products:

Product 1: Lake Friendly Farmer Program

Milestone:
Original PIP: 20 signs
Amended PIP: discontinued
Completed: 0

There was no producer interest in this product. This activity was based on a similar program in Minnesota that recognized producers who implemented best management practices beneficial to water quality. Recognition was to have been made at award banquets, through press releases, and by the placement of yard signs to recognize the producers commitment to water quality and conservation.

Product 2: Newsletters

Milestone:
Original PIP: 8
Amended PIP: 6
Completed: 4

Four newsletters dedicated solely to project information were mailed to 85 watershed landowners and agricultural producers, and 146 lakeshore property owners. The Coordinator wrote short articles on the project in twelve issues of the Day County Conservation District newsletter. Copies of project newsletters are shown in Appendix A, "Project Brochures, Newsletters, and Fact Sheets".

Product 3: Fact Sheets

Milestone:
Original PIP: 12
Amended PIP: 9
Completed: 6

Six fact sheets were developed and distributed to watershed landowners and agricultural producers, and lakeshore property owners. Distribution was accomplished through mailings and at lake association meetings, and local farm, home, and sports shows.

Fact sheets that were developed included the following titles:

- Controlling Shoreline Erosion
- Blue Dog Lake Levels (Historic and Recent)
- Nonpoint Source Pollution – A Primer for Landowners & Operators

- Reducing Nonpoint Source Pollution - Protection Tips for Lake Property Owners
- Upper Waubay Watershed Improvement Project
- WaterWise Boating.

Several of the fact sheets list conservation practices that the 146 lakeshore property owners can implement to protect water quality. Notable results of this milestone are many property owners are switching to non-phosphorus lawn fertilizers, and becoming pro-active in how lakes are managed and developed.

Copies of fact sheets developed are included in Appendix A, "Project Brochures, Newsletters, and Fact Sheets".

Product 4: Public Meetings/Workshops

Milestone:
Original PIP: 6
Amended PIP: 6
Completed: 6

The Project Coordinator made presentations and distributed information about the project during the 2001 Day County Fair, and at all the Webster "Farm, Home, and Sports Shows" from 2001 through 2005. In addition, the Coordinator attended or presented information at 135 meetings, workshops, and programs during the project time period. Many of the presentations about the project were made to schools, civic groups, resource agencies, and lake associations. The Coordinator attended numerous NRCS training workshops for cultural resources, nutrient management and engineering, and training for the following programs; Environmental Quality Incentive Program (EQIP), Conservation Reserve Program (CRP), Emergency Wetland Program (EWP), Wetland Reserved Program (WRP), and Wildlife Habitat Incentive Program (WHIP).

Objective 4: Water Quality Monitoring

Task 4: Monitor Water Quality Improvements of Clean Water Diversion Systems

Water quality in streams and waterways downstream of clean water diversion systems were to be monitored twice prior to construction, and twice after system completion. Sampling was to occur during spring snowmelt and rain storm events.

Milestone:
Original PIP: 12 sample sets
Amended PIP: 12 sample sets
Completed: 11 sample sets

Eleven samples were collected during spring snowmelt, and spring and summer rain storm events, downstream from a clean water diversion system, a partially relocated animal feeding operation, and a proposed animal nutrient management system. Six samples were taken during pre-construction and relocation, and five samples were taken during post–construction and

relocation. All sampling sites were located on perennial streams that were monitored during the Blue Dog Lake Assessment Project. The analytical results for the samples are found on page 27.

Task 5: Monitor Water Quality Improvements of Implemented Best Management Practices.

The water quality in streams and waterways downstream of grass buffer strips and critical area plantings that were completed during the project were to be monitored twice prior to implementation, and twice after implementation. Sample collection was planned during spring snowmelt, and rain storm events.

Milestone: Monitor Grass Buffer Strips
Original PIP: 4 sample sets
Amended PIP: 0 sample sets

Milestone: Monitor Critical Area Plantings
Original PIP: 4 sample sets
Amended PIP: 0 sample sets

Because of the popularity of the Conservation Reserve Program, these practices were not installed using project funds, and were therefore discontinued in the amended PIP. Consequently, samples were not collected.

Task 6: Quality Assurance/Quality Control Water Samples

The collection of Quality Assurance/Quality Control (QA/QC) duplicate and blank water samples were planned for Tasks 4 and 5.

Milestone:
Original PIP: 4 sample sets
Amended PIP: 4 sample sets
Completed: 1 sample set

QA/QC results are shown in Table 5.

Task 7: Project Reporting and Documentation

319 funds were used to purchase a computer and software for use by the Project Coordinator. The computer and software were used for project correspondence, to document project activities, to generate progress reports, for information and education (fact sheets, newsletters, news releases), and to track project budgets. In addition, the computer equipment was used to provide access to the internet and e-mail, and to generate producer contracts and conservation plan maps. Computer hardware and software will be used during the planned "Northeast Glacial Lakes Watershed Protection and Improvement Project".

Activities:
GRTS Annual and Semi-annual Progress Reports – 12
Monthly Financial Reports – 77
Progress Reports – 50
Reimbursement Requests – 21
Legislative Reports - 3

EVALUATION OF PROJECT GOALS AND OBJECTIVES

The goal of the Blue Dog Lake Watershed Improvement Project was:

"Reduce in-lake phosphorus by thirty-five percent, moving the lake's TSI from a hypereutrophic to a eutrophic state."

The goal was established because the AGNPS model estimated that by eliminating runoff from selected animal feeding operations and improving nutrient and cropland management, an estimated thirty-five percent (35%) reduction of phosphorus would be realized. The reduction in phosphorus would move Blue Dog Lake's Trophic State Index (TSI) from hypereutrophic to eutrophic. The target TSI for the project was 63.75. Recent water quality data from the South Dakota Statewide Lake Assessment (Paul Lorenzen, personal communication) found the current lake TSI is 63.33. This TSI is within the eutrophic numeric range indicating the project attained the goal of moving from a hypereutrophic to a eutrophic state.

The Conservation Reserve Program (CRP) was the most widely accepted conservation program in the Blue Dog Lake watershed during the project period. Because of the CRP payment structure, there was minimal producer interest in many of the conservation practices that had been planned using EPA 319 and Coordinated Soil and Water Conservation Commission grant funds.

A total of 9,984 acres in the watershed were enrolled in CRP during the combined assessment and implementation project periods (1996 - 2005). The 1,573 acres of CRP planted during the implementation project, the 70 acres of critical area planted using EPA 319 grant funds, and an additional 1,062 acres converted to alfalfa and grass hay reduced cropland in the watershed from approximately 14,320 acres to 11,615 acres. This was equivalent to a nineteen percent (19%) reduction in cropland.

The AGNPS model identified fifty-five (55) cells with erosion rates higher than five tons/acre, one-hundred twenty-seven (127) cells with an annual nitrogen output of 10 pounds per acre or more, and sixty-five (65) cells above the 4 pounds per acre phosphorus [cutoff]. Eleven of the 55 sediment cells, twelve of the 127 nitrogen cells, and ten of the 65 phosphorus cells were enrolled in CRP during the project and were, therefore, converted to grassland. Thirteen percent (13%) (920 acres) of the 6,840 watershed acres identified as critical by AGNPS received treatment with CRP. Thirty-one (31) critical cells (1,240 acres) identified by AGNPS were converted to hay pasture, primarily grass and alfalfa.

The RUSLE2 model indicates that conversion of cropland to grassland reduces erosion to near zero. Soil loss computed by the RUSLE2 program for cropland acres converted to grass showed a reduction of 8,384.92 tons per year of sediment and 4,192 pounds per year of phosphorus delivered by runoff (Table 4).

Thirty-five percent (35%) of the Blue Dog Lake watershed is rangeland. Most of the producers participating in the project received cost share to implement conservation practices that improved livestock grazing distribution and rotation. The condition of 2,138.8 acres of range and pastureland was improved with the implementation of these practices. The RUSLE2 model computed a reduction of 1,553 tons per year for sediment and 776 pounds per year for phosphorus delivered by runoff due to improved grazing management and distribution (Table 4).

Twenty-five (25) animal feeding operations (AFOs) were identified in the watershed during the assessment project. Twelve (12) AFOs rated at 55 or higher by the AGNPS model were targeted for implementation of conservation practices to reduce feedlot runoff in the original PIP. During the project one of the twelve rated AFOs was removed from the list because runoff from the site was already contained by an underground storage tank, two AFOs were abandoned, one AFO was treated with a clean water diversion system, and one AFO will be abandoned when a more suitable location is found.

Four (4) lower rated AFOs (rated below 55 by the AGNPS model) received attention during the project. Two were abandoned, one was partially relocated, and one AFO had a completed system design, however the producer chose not to implement the system due to cost.

A reduction of 580 pounds per year of on-site phosphorus was calculated for the AFOs that received treatment or were abandoned during the project period (Table 3). Reductions were calculated using the phosphorus loads determined by the AGNPS model (Stueven and Bren, 1999).

Table 3. Status of AGNPS Rated Feedlots and Reductions

Cell #	AGNPS Rating	BMP	Percent Reduction	Reduction Lbs/Year
623	77	clean water diversion	80%	214.394
1264	70	to be relocated during future project	NR	NR
1255	68	removed from list, site contained	NR	NR
627	64	feedlot abandoned	100%	123.334
1357	57	feedlot abandoned	100%	82.847
887	52	partial relocation	36%	120
876	51	system designed, not implemented	NR	NR
1117	43	feedlot abandoned	100%	23.718
299	38	feedlot abandoned	100%	16.452
			Total:	**580.745**

Table 4 lists the phosphorus reductions calculated using RUSLE2 for cropland converted to grass, and grazing improvements on watershed pasture and rangeland, and reductions for animal feeding operations using the AGNPS model data.

Table 4. Calculated Phosphorus Reductions

Source	Acres/ #AFO	Sediment Tons/Year	Phosphorus Lbs/Year
Converted Cropland	2705.2	8384.92	4192.54
Pasture/Range Improvements	2138.8	1553.07	776.55
Animal Feeding Operations	6	NA	580.74
	Total:	**9937.99**	**5549.83**

Locations of Conservation Reserve Program acreages, critical area grass plantings, converted cropland, and grazing management improvements are shown in Figure 8. It should be noted that the location of several of the installed conservation practices provide grass buffers along many of Blue Dog Lake's tributaries.

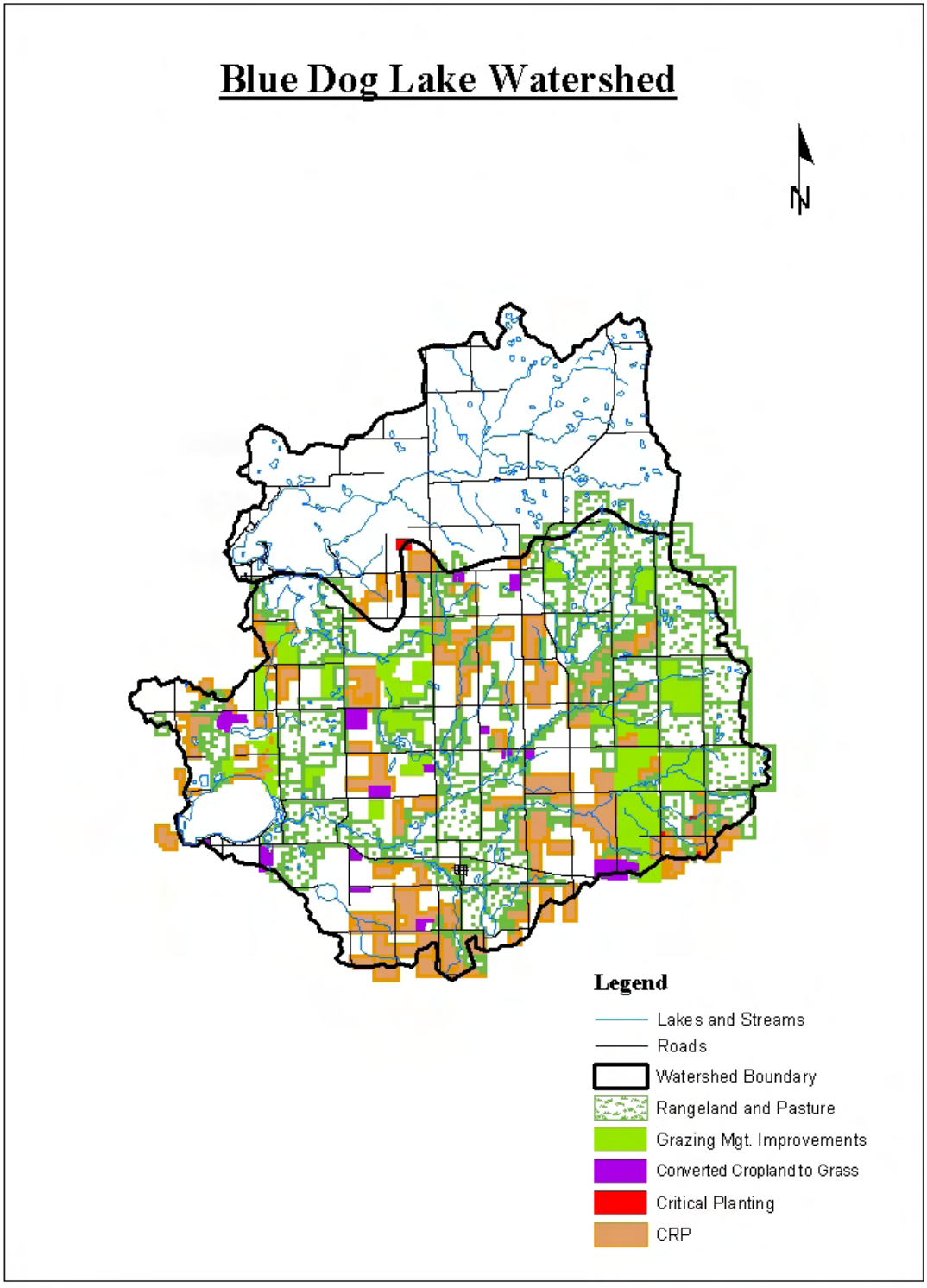

Figure 8. Best Management Practice Locations and Watershed Land Use.

MONITORING RESULTS

Tributary monitoring was conducted below one proposed and two implemented conservation practices. Site CWD-1 was located downstream of a clean water diversion system constructed on one of the watershed's largest animal feeding operations the fall of 2003. Site BDL-6 was located downstream from the clean water diversion system and a partially relocated animal feeding operation completed in 2001. Site BDL-7 was located below a proposed animal nutrient management system. This site was found unsuitable for a full containment system and tributary sampling was discontinued. Tributary sites BDL-6 and BDL-7 were sampled during the assessment project. Due to a lack of spring snowmelt, except for the winter of 2002, only rain storm events were sampled.

Neither of the AFOs treated and monitored were fully contained which may explain the high bacteria counts still found in some tributary samples. The grass buffer between the basin drain tubes of the clean water diversion system and tributary may not have been fully developed when sampling took place at CWD-1, or the buffer may not be large enough to trap nutrients and sediments draining from the system. The AGNPS model calculated only a thirty-six percent (36%) reduction in phosphorus from the partially relocated feedlot based on a 50% reduction in the number of livestock. When comparing recent samples from site BDL-6 with samples taken during the assessment project from 1996 to 1998, bacteria counts are not as high. Bacteria counts in samples taken during rain storm events during the period 1996 to 1998 ranged from 11,000/100 ml to 59,000/100 ml with a mean of 35,000/100 ml. Only one sample taken during this project fell within this range on July 5, 2004.

Table 5. BMP Water Quality Data - Clean Water Diversion System/Feedlot Relocation

Site	Date	Type	TALKA mg/L	TSOL mg/L	TSSOL mg/L	AMMO mg/L	NIT mg/L	TKN mg/L	TPO4 mg/L	TDPO4 mg/L	FEC 100 ml	E.COLI 100 ml
CWD-1	6/5/01	Pre	289	383	41	<0.02	0.5	0.72	0.249	0.114	560	1300
CWD-1	2/19/02	Pre	159	318	35	3.22	1.2	9.29	1.51	1.02	13000	>2420
CWD-1	4/21/04	Post	274	555	62	1.18	1	7.47	1.12	0.734	150000	>2420
CWD-1	7/5/04	Post	221	713	12	0.65	0.6	9.11	3.48	0.498	25000	>2420
BDL-6	6/5/01	Pre	271	348	18	<0.02	0.3	<0.36	0.065	0.034	250	299
BDL-6	2/19/02	Pre	168	301	39	0.11	0.8	1.24	0.276	0.172	1500	>2420
BDL-6	4/21/04	Post	248	376	15	<0.02	0.3	0.9	0.122	0.088	520	461
BDL-6	4/21/04	replicate	246	380	17	<0.02	0.3	0.12	0.12	0.087	420	345
BDL-6	4/21/04	blank	<6	<7	<1	<0.02	<0.1	<0.23	<0.002	0.003	<10	<1
BDL-6	6/2/04	Post	275	359	21	<0.02	0.1	0.61	0.093	0.07	670	1550
BDL-6	7/5/04	Post	184	287	18	<0.02	<0.1	0.58	0.206	0.13	20000	>2420
BDL-7	6/2/04	Pre	245	331	6	<0.02	0.1	0.9	0.14	0.134	160	78
BDL-7	7/7/04	Pre	218	336	4	<0.02	<0.1	0.52	0.145	0.107	72000	>2420

In-lake water quality sampling on Blue Dog Lake was conducted by South Dakota Department of Environment and Natural Resource personnel in 2000 and 2004. Statewide Lake Assessment water quality data indicates the goal of moving Blue Dog Lake's TSI from a hypereutrophic to eutrophic range has been achieved as previously discussed.

COORDINATION EFFORTS

The Day County Conservation District served as the project sponsor. Numerous federal, state, and local agencies and organizations contributed grant funds, technical services, and cash and in-kind match, to attain the project goal (see Table 6). Participating agencies and their contributions to the project are summarized below.

Sisseton-Wahpeton Oyate

The Sisseton-Wahpeton Oyate received cost-share funds to install conservation practices on tribal land located within the Blue Dog Lake watershed. The Project Coordinator worked with the Natural Resources Conservation Service Tribal Liaison stationed in Sisseton, South Dakota, and tribal land managers, to locate sites and plan practices.

Roberts County Conservation District

The Roberts County Conservation District supported the project with a cash contribution and allowed the Project Coordinator to disseminate information through its office located in Sisseton, South Dakota. In addition, project information was distributed at the Sisseton "Farm and Home Shows" in the years 2000 and 2001. The Roberts County Conservation District Board of Supervisors was represented on the project planning committee and EQIP work groups.

South Dakota Department of Agriculture, Division of Resource Conservation and Forestry

The Day County Conservation District obtained a Coordinated Soil and Water Conservation Commission grant to provide cost-share funds for BMP installation. Commission grant funds were available only during the first three years of the project, from March 13, 2000 to December 31, 2002.

South Dakota Department of Environment and Natural Resources

The South Dakota Department of Environment and Natural Resources (SD DENR) administered the U.S. EPA Section 319 grant and provided oversight of all project activities. Project administration included on-site office visits, watershed tours, review of reports, and approval of payment requests. The Project Coordinator attended training workshops and meetings sponsored by SD DENR.

United States Department of Agriculture - Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) provided technical assistance for the design and installation of conservation practices. NRCS staff that provided assistance included a tribal liaison, a soil scientist, range and soil conservationists, and district conservations from the Webster and Sisseton, South Dakota, Field Offices. In addition to personnel, the NRCS provided computer hardware and software to generate conservation plans, contracts, and maps. The project utilized the USDA Environmental Quality Incentive Program (EQIP), and Conservation Reserve Program (CRP) administered by the Farm Service Agency (FSA).

United States Environmental Protection Agency

The United States Environmental Protection Agency provided the EPA Section 319 grant, the primary funding source for the improvement project administered by the South Dakota Department of Environment and Natural Resources. EPA officials from the Region 8 office in Denver, Colorado, participated in one on-site project tour and review.

PUBLIC PARTICIPATION

The public was notified of opportunities to participate in the project through press releases, newsletters, and facts sheets distributed by mail. Meetings and other public forums were likewise used to inform and educate the public about the project. Examples of media used to inform the public are included in Appendix A, "Project Brochures, Newsletters, and Fact Sheets". Audiences were advised of the project and its goals. These included watershed landowners and agricultural producers, lake shore property owners, sportsmen, and recreational lake users.

Figure 9. Webster Farm and Home Show Booth (2002).

Watershed Landowners and Agricultural Producers

A fact sheet listing best management practices that would be cost-shared through the project was mailed to 85 watershed landowners and agricultural producers at the beginning of the project. A

newsletter describing new agricultural technologies, including livestock nose pumps, was specifically written for this audience. Watershed landowners and agricultural producers were also invited to participate in the Environmental Quality Incentive Program (EQIP) work groups convened to set conservation priorities in the watershed during 2002. Details about the project were also distributed at the Day County Fair (2000, 2001); the Webster "Farm, Home, and Sports Show" (2001 to 2005) (Figure 9); and the Sisseton "Farm and Home Show" (2000, 2001).

Seventeen watershed landowners participated in the project by installing conservation practices cost-shared by project funds. This participation included five project sites on land held in trust for tribal members and managed by the Sisseton-Wahpeton Oyate.

Lake Shore Property Owners

Although no cost-share programs for lake shore property owners were included in the project work plan, numerous fact sheets were written specifically for this audience to promote best management practices that they could voluntarily implement on their property. Fact sheets and other information pertinent to the watershed project were distributed to property owners at lake association meetings, the Webster and Sisseton "Farm, Home, and Sports Shows", and the Day County Fair. A survey requesting information on shoreline erosion and two newsletters describing project activities were mailed to 146 lakeshore property owners.

PROJECT GOALS AND MILESTONES NOT MET

The milestones for designing and implementing seven animal nutrient management systems and five clean water diversions in the Blue Dog Lake watershed were not met as planned. However, runoff from several animal feeding operations was addressed during the project as previously discussed. The high cost of these practices, and the uncertainty that many older producers had in the future of their cattle operations, were two reasons that many of the operators would not commit to these BMPs. In addition, because of prior commitments, both private engineering firms and the South Dakota Agricultural Nutrient Management Team were unable to provide technical assistance in a timely matter. To address this challenge, the project period was extended an additional twenty-seven months to complete the designs for two animal nutrient management systems. Funds for systems not constructed were reverted to the South Dakota Department of Environment and Natural Resources.

Because of the popularity and payment structure of the USDA Conservation Reserve Program, CRP funds replaced other project funds that were earmarked for numerous practices planned for financial assistance through the project. This resulted in cost-share funds and milestones for grass waterways, pasture renovations, critical area plantings, and grass buffer strips, being reduced or deleted in the amended Project Implementation Plan. These funds were re-allocated to other project activities, in particular grazing management practices. During the project period, several new continuous CRP contracts were also initiated by USDA. The use of Conservation Reserve Program funds allowed the project to successfully address identified resource concerns on 1,573 acres of watershed cropland.

Five EQIP contracts written for watershed producers were not completed during the project period. Producers typically have five years to complete EQIP contracts. Quite often, best management practices are not implemented until the final years of the contract. Practices funded by EQIP that would not be implemented until after July 1, 2006, resulted in a loss of in-kind and cash match, and a reduction in reportable accomplishments.

Midway through the project, both Day and Roberts Counties initiated a 911 address system which eliminated the use of rural route addresses. The Project Coordinator was unable to collect all the new watershed and lake property owner address changes during the project period. Up to the time of the address system changes, project staff utilized bulk mailing rates for newsletters and other project mailings. Mail sent by bulk rate is not forwarded to a new address or returned to the sender; instead it is destroyed by the U.S. Postal Service. Consequently, the use of newsletters and bulk mailings to disseminate project information was discontinued midway through project implementation.

PROJECT BUDGET

The Blue Dog Lake Watershed Improvement Project was funded by an EPA Section 319 grant administered through the South Dakota Department of Environment and Natural Resources; a South Dakota Coordinated Soil and Water Conservation Commission grant provided by the South Dakota Department of Agriculture, Division of Resource Conservation and Forestry; and the Natural Resources Conservation Service Environmental Quality Incentive Program (EQIP).

U.S. Environmental Protection Agency Section 319 Grant

The original project budget included $375,000.00 in EPA 319 funds to provide wages and benefits for a Project Coordinator and the Conservation District Business Manager; to cost-share BMPs; and to fund information and education activities. The project budget was revised during 2004 because several 319 grant-funded activities were not being installed by producers. Many of the deleted or reduced tasks were for installing practices that were replaced by the Conservation Reserve Program (CRP) or were not accepted by producers. Consequently, grant funds for these practices were re-allocated in the amended budget during 2004. EPA 319 grant funds expended during the project totaled $218,799.77, which was forty-nine percent (49%) of the project cost.

South Dakota Coordinated Soil and Water Conservation Commission Grant

The original project budget included $104,638.00 in Commission grant funds to cost-share the installation of conservation practices. The majority of the Commission grant was used to fund grazing improvements including fencing and water development. Funds from the grant were also available to construct grassed waterways; however, there was no interest by producers in this practice because of the payment structure of the Conservation Reserve Program (CRP). In addition, Commission grant funds were available only during the first three years of the project. The amended project budget deleted Commission grant funds, as they were no longer available. A total of $53,442.99, or twelve percent (12%) of the project cost, was funded by the Commission grant.

USDA Environmental Quality Incentive Program (EQIP)

The Project Coordinator applied for EQIP Priority Area funds the first three years of the project. Priority Area EQIP funds were dedicated for use in watersheds implementing 319 projects. Priority EQIP Areas had specific earmarked funds, sign-up periods, and ranking sheets separate from the general EQIP sign-up. However, after Federal Fiscal Year 2002 the Natural Resources Conservation Service eliminated Priority Area funding, and EQIP applicants in the Blue Dog Lake watershed were ranked along with all other applicants. This significantly reduced the chance of EQIP contracts being accepted in the project area. Because of the loss of EQIP priority funds, 319 funds were re-allocated to cost-share the installation of practices not likely to be funded by EQIP. Total EQIP funds expended during the project were $47,774.12, eleven percent (11%) of the project cost.

Local Match

The Day County Conservation District, the project sponsor, contributed $6,452.77 in cash, and $2,855.32 of in-kind match during the project period. Operator match for installing practices totaled $96,970.83, to bring the total of local cash and in-kind contributions to $106,278.92, or twenty-four percent (24%) of the project cost.

Table 6 below shows the total expenditures for each funding source.

Table 6. Planned Versus Actual Budget Expenditures

	Planned	Revised	Expended
U.S. EPA Section 319 Grant	$375,000.00	$375,000.00	$218,799.77
SD Consolidated Water Grant	$90,000.00	$0.00	$0.00
SD Coordinated Soil & Water Grant	$104,638.00	$53,442.99	$53,442.99
USDA EQIP and USF&WS Funds	$259,106.00	$109,037.47	$70,322.66
Local Cash and In-Kind Match	$254,800.00	$172,720.35	$106,278.82
Total:	$1,083,544.00	$710,200.81	$448,844.24

Table 7. Itemized Project Budget and Actual Expenditures

	EPA 319			SD Consolidated		SD Commission Grant			NRCS EQIP/USF&WS			Local Match		
Personnel/Support	Original	Amended	Actual	Original	Amended	Original	Amended	Actual	Original	Amended	Actual	Original	Amended	Actual
Project Coordinator	$ 82,273.00	$ 94,974.00	$ 94,869.66	$ -	$ -	$ 43,655.00	$ 41,530.52	$ 41,530.52	$ -	$ 3,587.84	$ 3,587.84	$ -	$ -	$ -
District Business Mgr.	$ 18,817.00	$ 23,817.00	$ 23,921.34	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,102.22
District Supervisors	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000.00	$ 2,000.00	$ 516.65
Administrative														
Phone	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00	$ -	$ -
Office Supplies	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 800.00	$ 800.00	$ 338.75
Office Rent	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,800.00	$ -	$ 2,338.67
Objective 1: Reduce Phosphorus Loading from Animal Feeding Operations														
Animal Waste Systems	$ 60,000.00	$ 142,500.00	$ -	$ 90,000.00	$ -	$ -	$ -	$ -	$ 60,000.00	$ -	$ -	$ 70,000.00	$ 92,500.00	$ -
Clean Water Diversions	$ 22,500.00	$ 26,250.00	$ 29,218.00	$ -	$ -	$ -	$ -	$ -	$ 33,750.00	$ -	$ -	$ 18,750.00	$ 8,750.00	$ 8,689.87
Waste Utilization/Testing	$ -	$ -	$ -	$ -	$ -	$ 18,000.00	$ -	$ -	$ -	$ -	$ -	$ 6,000.00	$ -	$ -
Technical Assistance	$ 60,000.00	$ 15,000.00	$ 3,562.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ -
Objective 2: Reduce Nutrient and Sediment Loading from Wateshed Pasture, Rangland, and Cropland														
Grazing Systems (Fence)	$ -	$ 14,250.00	$ 7,404.14	$ -	$ -	$ 13,042.00	$ 7,550.47	$ 7,550.47	$ 39,126.00	$ 54,700.40	$ 39,699.77	$ 50,000.00	$ 28,063.59	$ 45,783.71
Grazing Systems (Water)	$ 2,743.00	$ 34,018.00	$ 49,269.78	$ -	$ -	$ 10,500.00	$ 4,362.00	$ 4,362.00	$ 26,100.00	$ 50,749.23	$ 25,926.05	$ 13,114.00	$ 25,727.76	$ 40,549.56
Pasture Renovation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 95,530.00	$ -	$ -	$ 31,843.00	$ -	$ -
Grassed Waterways	$ -	$ -	$ -	$ -	$ -	$ 19,441.00	$ -	$ -	$ -	$ -	$ -	$ 6,480.00	$ -	$ -
Cattle Stream Crossings	$ 8,550.00	$ 9,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,850.00	$ 3,000.00	$ -
Critical Area Planting	$ 85,500.00	$ 4,275.00	$ 3,744.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 21,375.00	$ 1,425.00	$ 1,604.69
Grass Buffer Strips	$ 21,375.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 14,250.00	$ -	$ -
Tree Planting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,109.00	$ -	$ -	$ 343.00
Objective 3: Implement an Information and Education Program														
Newsletters	$ 1,500.00	$ 1,500.00	$ 639.83	$ -	$ -	$ -	$ -	$ -	$ 500.00	$ -	$ -	$ 720.00	$ 720.00	$ 233.19
Fact Sheets	$ 200.00	$ 200.00	$ 157.50	$ -	$ -	$ -	$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	$ 100.00	$ 82.50
Public Meetings/Workshops	$ 990.00	$ 1,490.00	$ 1,322.89	$ -	$ -	$ -	$ -	$ -	$ 4,000.00	$ -	$ -	$ 330.00	$ 330.00	$ 392.87
Lake Friendly Farmer	$ 500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Equipment	$ -	$ 154.00	$ 153.21	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,494.00	$ 1,496.25
Objective 4: Water Quality Monitoring														
Clean Water Diversions	$ 3,720.00	$ 3,720.00	$ 1,661.42	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
BMP's	$ 2,480.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
QA/QC Samples	$ 1,240.00	$ 1,240.00	$ 264.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000.00	$ 2,370.00	$ 2,369.52
Computer Software	$ 2,612.00	$ 2,612.00	$ 2,612.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,388.00	$ 440.00	$ 437.47
Totals:	$ 375,000.00	$ 375,000.00	**$ 218,799.77**	$ 90,000.00	**$ -**	$ 104,638.00	$ 53,442.99	**$ 53,442.99**	$ 259,106.00	$ 109,037.47	**$ 70,322.66**	$ 254,800.00	$ 172,720.35	**$ 106,278.92**
			48%		0%			12%			16%			24%

FUTURE RECOMMENDATIONS

During the project, the Conservation Reserve Program (CRP) most likely had the greatest effect on improving the water quality of Blue Dog Lake. Efforts should be made by all federal, state, and local resource agencies to maintain the CRP program in this watershed at, or above, the current acreage. If another general CRP sign-up is offered resource personnel should concentrate on those areas identified as critical by the AGNPS model.

Resource personnel should continue to work with agricultural producers who had animal nutrient management systems designed but did not complete construction during the project. Agricultural producers with completed designs could still receive cost share and technical help through the Natural Resources Conservation Service's EQIP program. It is anticipated that the planned, "Northeast Glacial Lakes Watershed Protection and Improvement Project", will also address water quality issues not resolved during this project, including animal nutrient management systems.

The North Big Sioux Coteau Hydrological Unit, that includes the Blue Dog Lake watershed, was recently named as one of two hydrological units in Day County to be eligible for the USDA Conservation Security Program (CSP). This program, administered by the Natural Resources Conservation Service, rewards agricultural producers who are currently utilizing conservation practices to improve soil condition and water quality on their land. It is anticipated that many producers who participated in the Blue Dog Lake Watershed Improvement Project may be rewarded through CSP for practices funded by the improvement project. If the Conservation Security Program is a success and continues to be funded, this program may provide an incentive for agricultural producers in future watershed improvement project areas to participate and implement conservation practices.

Literature Cited

1994 South Dakota Lakes Assessment Final Report, South Dakota Department of Environment and Natural Resources, Pierre, South Dakota. March 1994.

Stueven, Gene, and Ron Bren. 1999. Phase I Watershed Assessment Final Report, Blue Dog Lake, Day County, South Dakota. South Dakota Department of Environment and Natural Resources. September 1999.

Appendix A