

SECTION 319 NONPOINT SOURCE POLLUTION CONTROL  
PROGRAM ASSESSMENTS/PLANNING PROJECT FINAL REPORT

POCASSE/CAMPBELL WATERSHED ASSESSMENT PROJECT

By

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This project was conducted in cooperation with the State of South Dakota and the United States Environmental Protection Agency, Region 8.

**Grant #: 9998185-06**

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## EXECUTIVE SUMMARY

PROJECT TITLE: POCASSE/CAMPBELL WATERSHED ASSESSMENT PROJECT

SECTION GRANT NUMBER(S): 9998185-06

PROJECT START DATE July 18, 2006 PROJECT COMPLETION DATE December, 31, 2008

FUNDING:	TOTAL BUDGET	\$200,000
	TOTAL EPA GRANT(S)	\$120,000
	TOTAL EXPENDITURES OF EPA FUNDS	\$53,048.13
	TOTAL SECTION 319 MATCH ACCRUED	\$70,144.20
	BUDGET REVISIONS	None
	TOTAL EXPENDITURES	\$123,192.33

### SUMMARY OF ACCOMPLISHMENTS

The long term goal of the Pocasse/Campbell Watershed Assessment Project is to locate and document sources of nonpoint source pollution in the watershed and produce feasible restoration alternatives in order to provide adequate background information needed to drive a watershed implementation project to improve sediment and nutrient problems with the creeks and lakes as well as creating a Total Maximum Daily Load Report for each of the 303(d) listed water bodies.

The Pocasse/Campbell Watershed Assessment Project was conducted from September 18, 2006 through December 31, 2008. The Campbell County Conservation District (sponsor) managed the budget and encouraged public participation in the project. The McPherson County Conservation District provided financial assistance to the project. The South Dakota Department of Environment and Natural Resources (SD DENR) provided technical assistance, financial assistance through State "fee funds", and will prepare the final assessment report.

Nineteen monitoring sites were set up throughout the watershed to measure stream stage. During the span of the project, 69 samples were collected from the tributary sites, 83 samples were collected from Lake Pocasse and Lake Campbell, and 12 samples were collected for Quality Assurance/Quality Control.

Campbell County experienced a severe drought prior to and during the project period which lead to project deficiencies. However, water quality and continuous flow data was collected in the Spring Creek Watershed when possible. SD DENR will use the stream-flow information collected and supplement it with historic gage information to estimate mean annual stream flow for Spring Creek. The concentration data will be applied to the mean annual stream flow to calculate loadings for TMDL development.

The results of this assessment will enable the SD DENR to prepare a final assessment and TMDL report. Preliminary results of this effort are currently being used to support a 319 Watershed Implementation Project for the Spring Creek Watershed.

## 1.0 Introduction

Spring Creek is a natural stream that drains portions of Campbell and McPherson Counties and is the primary tributary to Lake Pocasse in Campbell County. Lake Campbell is also located within the Spring Creek watershed, and contributes outflow that eventually reaches Lake Pocasse. Lake Pocasse ultimately drains into the Missouri River. The Spring Creek Watershed is dominated by agriculture, with grazing and cropland as the primary land uses. The creek receives runoff from agricultural operations and the lakes have experienced declining water quality.

The purpose of this pre-implementation assessment is to locate the sources of impairments to Lake Pocasse, Lake Campbell, and the tributaries in the watershed. Spring Creek and its numerous intermittent drainages are tributaries to Lake Pocasse and Lake Campbell, and since this stream network drains a combination of grazing and cropland acres, they carry sediment and nutrient loads to both lakes, which in turn degrades water quality.

There are 4 federally threatened or endangered species documented in the Spring Creek Watershed. The US Fish and Wildlife Service lists the Whooping Crane (*Grus americana*), Piping Plover (*Charadrius melodus*), and the Least Tern (*Sterna antillarum*) as species that have been documented in the Spring Creek Watershed. The Pallid Sturgeon (*Scaphirhynchus albus*) is listed as a species that could possibly be found within the watershed. None of these species were encountered during the Pocasse/Campbell Watershed Assessment.

## 2.0 Project Goals, Objectives and Activities

### **OBJECTIVE 1:**

Collect water quality data for the evaluation of current water quality conditions and calculate the trophic state of each reservoir. DENR will use this information to determine the total amount of nutrient trapping that is occurring in each of the reservoirs and the amount of nutrient reduction required to improve the trophic condition of both Lake Campbell and Lake Pocasse.

### **Task 1: Collect water quality data in both Lake Pocasse and Lake Campbell.**

Nutrient and solids parameters will be sampled at three basin sites on Lake Pocasse (Fig 2) and two basin sites on Lake Campbell (Fig 3). Only surface samples will be collected from both sites on Lake Campbell. Samples on Lake Pocasse will be collected from the surface and bottom at the two sites north and west of highway 10 and a surface sample will be collected at the remaining site south and east of highway 10. Samples will be collected on a monthly basis for a two year period. The lake will be sampled except during periods of unsafe ice cover. During June, July and August, samples will be collected bi-monthly. A total of 182 reservoir samples will be collected during the project period. All samples will be collected using the methods described in the SD DENR Standard Operating Procedures for Field Samplers (SDWRAP SOP). The South Dakota State Health Laboratory in Pierre will analyze most samples. DENR will analyze chlorophyll a.

The purpose of the lake samples is to assess ambient nutrient concentrations and identify trophic states in the reservoirs. Water column dissolved oxygen and temperature profiles will be collected with a submersible data sonde. Algae samples will be collected during the project period to assist in documenting eutrophication. Water samples will be collected with a Van Dorn Sampler and the sample bottles will be shipped to the state health lab by the most rapid means available. The following paragraph lists the parameters to be sampled. Physical measurements will be collected by field staff. Chemical and some biological parameters (Fecal coliform and E. Coli) will be analyzed by the State Health Lab. Other biological samples (Chlorophyll *a* and Algae) will be analyzed by staff from Watershed Protection Program.

## Lake Pocasse Monitoring Sites



**Figure 1: Lake Pocasse Monitoring Sites**

### Lake Pocasse - Reservoir Sampling Locations

LP-1 This site is located in the middle of the basin south of Highway 10.

LP-2 This site is located in the southern portion of the basin north of Highway 10.

LP-3 This site is located in the northern portion of the basin north of Highway 10.

## Lake Campbell Monitoring Sites



**Figure 2: Lake Campbell Monitoring Sites**

### Lake Campbell - Reservoir Sampling Locations

LC-1 This site is located in the upstream portion of the basin.

LC-2 This site is located in the downstream portion of the basin near the dam.

## BASIN PARAMETERS MEASURED

<u>Field Measurements</u>	<u>Chemical</u>	<u>Biological</u>
Air Temperature	Total Alkalinity	Fecal Coliform
Water Temperature	Total Solids	<i>E coli</i>
Secchi Transparency	*Total Dissolved Solids	Chlorophyll <i>a</i>
Depth	Total Suspended Solids	
Visual Observations	Ammonia	
Field pH	*Un-ionized Ammonia	
Dissolved Oxygen	Nitrate	
Total Kjeldahl Nitrogen		
Total Phosphorus		
Total Dissolved Phosphorus		
* Calculated Values		

All samples will be collected using the methods described in the Standard Operating Procedures for Field Samplers by the State of South Dakota Watershed Protection Program.

### **Accomplishment:**

A total of 83 samples were collected from the lake sampling sites. Forty-eight of these samples were collected from Lake Campbell, 28 samples were collected from Lake Pocasse and the remaining 7 samples were QA/QC. Water levels on Lake Pocasse remained fairly low throughout the project period. During the first year of the project, only two of the three sites on Lake Pocasse could be sampled due to the low water levels. As water levels continued to drop, samples could only be collected at the boat ramp during the second year. Lake Campbell remained relatively full throughout the project, and samples were collected as scheduled.

### **Task 2: Reservoir Sediment Survey**

Sediment depth will be measured on both Lake Pocasse and Lake Campbell during ice covered periods. Survey transects will be spaced at approximately 200 feet. A depth sounding and sediment probe, using a length of rebar, will be completed along each transect. The results of the survey will be used to calculate the volume of soft sediment in the reservoirs and to create a bathymetric map of each reservoir.

An elutriate sample will be collected from a point near the center of each reservoir to determine the presence or absence of contaminants in the bottom sediments.

### **Accomplishment:**

A lake sediment survey was conducted February 2008 on both Lake Pocasse and Lake Campbell. Sediment volumes and maps of the sediment depth contours will be completed by SD DENR. This information will be incorporated into the final assessment report. Preliminary findings suggest that most of the accumulated sediments occur in the upstream portion of both reservoirs, respectively.

Elutriate samples were not collected during this project on either lake. In the highly unlikely event that dredging was to occur on either lake during a potential implementation project, elutriate samples should be collected accordingly.

### **Task 3: Reservoir Shoreline Survey**

The shoreline of both reservoirs will be assessed once during the project to characterize shoreline stability. Visual estimates of erosion areas and erosion potential will be documented.



**Accomplishment:**

A reservoir shoreline survey was conducted on Lake Campbell in August 2008 based on protocols established in the SDWRAP SOP. Due to access issues a shoreline survey was conducted visually on Lake Pocasse from various access points. Results of the shoreline survey will be quantified and described in the final assessment report produced by DENR. Preliminary findings suggest that both lake shorelines displayed relatively good riparian health with minimal erosion.

**Task 4: Reservoir Macrophyte Survey**

A macrophyte survey will be completed during July 2007 to determine species composition and abundance of the macrophyte communities of both reservoirs. Methods will follow protocol in the SDWRAP SOP.

**Accomplishment:**

A macrophyte survey was conducted in August 2008 based on protocols established in the SDWRAP SOP. The macrophyte surveys were pushed to the second year of the project due to time constraints related to tributary sampling in the summer of 2007. Nonetheless, visual observations in the summer of 2007 suggested Lake Campbell contained a relatively sparse aquatic macrophyte community. Most macrophytes were observed in littoral zone near the boat ramp access. During the actual survey macrophyte (2008) density was considered heavy throughout most of the basin with the exception of the deepest portion of the old channel. Species diversity was low with only two *Potamogeton spp.* identified. The increase in Macrophyte density observed in 2008 was attributed to improved water clarity displayed by Lake Campbell.

Due to low water levels in Lake Pocasse a formal macrophyte survey was not conducted during the project period. Visual observations from shoreline access points suggested little to no submergent macrophytes present in Lake Pocasse. The north shoreline contained heavy emergent macrophyte cover consisting of cattails and rush spp. Lake Pocasse also experienced relatively good water clarity during most of the project period. However, Lake Pocasse was dominated by phytoplankton.

SD DENR will incorporate the results of the macrophyte survey on Lake Campbell and the visual observations on Lake Pocasse into the final assessment report.

**Products:**

Water quality data collected for both reservoirs.  
A bathymetric sediment map of both reservoirs.  
Macrophyte and shoreline survey report for both reservoirs.

**OBJECTIVE 2:**

Collect sediment and nutrient loading data from Spring Creek and its tributaries through hydrologic and chemical monitoring. The information will be used to locate critical areas in the watershed to be targeted for nutrient and/or sediment reduction.

**Task 5: Develop hydrographs for the tributary sites within the project.**

Install water level recorders at 17 tributary monitoring sites and 2 reservoir outlets (Table 1 and Figure 3) and maintain a continuous stage record for the project period, except during winter months after freeze up.



TRIBUTARY SITE LOCATIONS

**Table 1: Tributary Site Locations**

<u>Site</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Site</u>	<u>Latitude</u>	<u>Longitude</u>
SCT-1	45.929	-100.289	SCT-11	45.910	-100.006
SCT-2	45.928	-100.277	SCT-12	45.885	-99.764
SCT-3	45.926	-100.259	SCT-13	45.886	-99.764
SCT-4	45.913	-100.245	SCT-14	45.877	-99.672
SCT-5	45.885	-100.195	LCT1	45.745	-100.154
SCT-6	45.855	-100.212	LCT2	45.726	-100.155
SCT-7	45.830	-100.173	LCT3	45.724	-100.138
SCT-8	45.812	-100.175	LCO	45.744	-100.122
SCT-9	45.812	-100.089	LPO	45.905	-100.305
SCT-10	45.891	-100.111			

Discharge measurements will be taken on a regular schedule and during storm surges to provide adequate stage/discharge relationship for each site. Discharge measurements will be taken with a hand held current velocity meter.

Discharge measurements and water level data will be used to calculate a hydrologic budget for the Spring Creek drainage network. This information will be used with concentrations of sediment and nutrients to calculate loadings from the watershed.

**Accomplishment:**

Continuous stream stage (water level) recorders were installed at each of the proposed study sites along the profile of Spring Creek and one of its main tributaries in October 2006. Though there were numerous rainfall events, the watershed was considerably dry from previous drought years resulting in minimal measurable flow within Spring Creek. Several heavy rains resulted in substantial flow during Spring 2007, but measurable flow subsided at most sites by mid-June. Rainfall in mid-June 2008 also allowed for samples to be collected at several sites on the creek, but for the most part Spring Creek remained dry. Nonetheless, a total of 69 flow measurements were collected throughout the tributary monitoring sites during the project. Stage recorders also logged the entire time and the information was assembled in a database to document flow hydrographs. SD DENR will use these data in the final assessment report.

## Spring Creek Watershed and Tributary Monitoring Sites

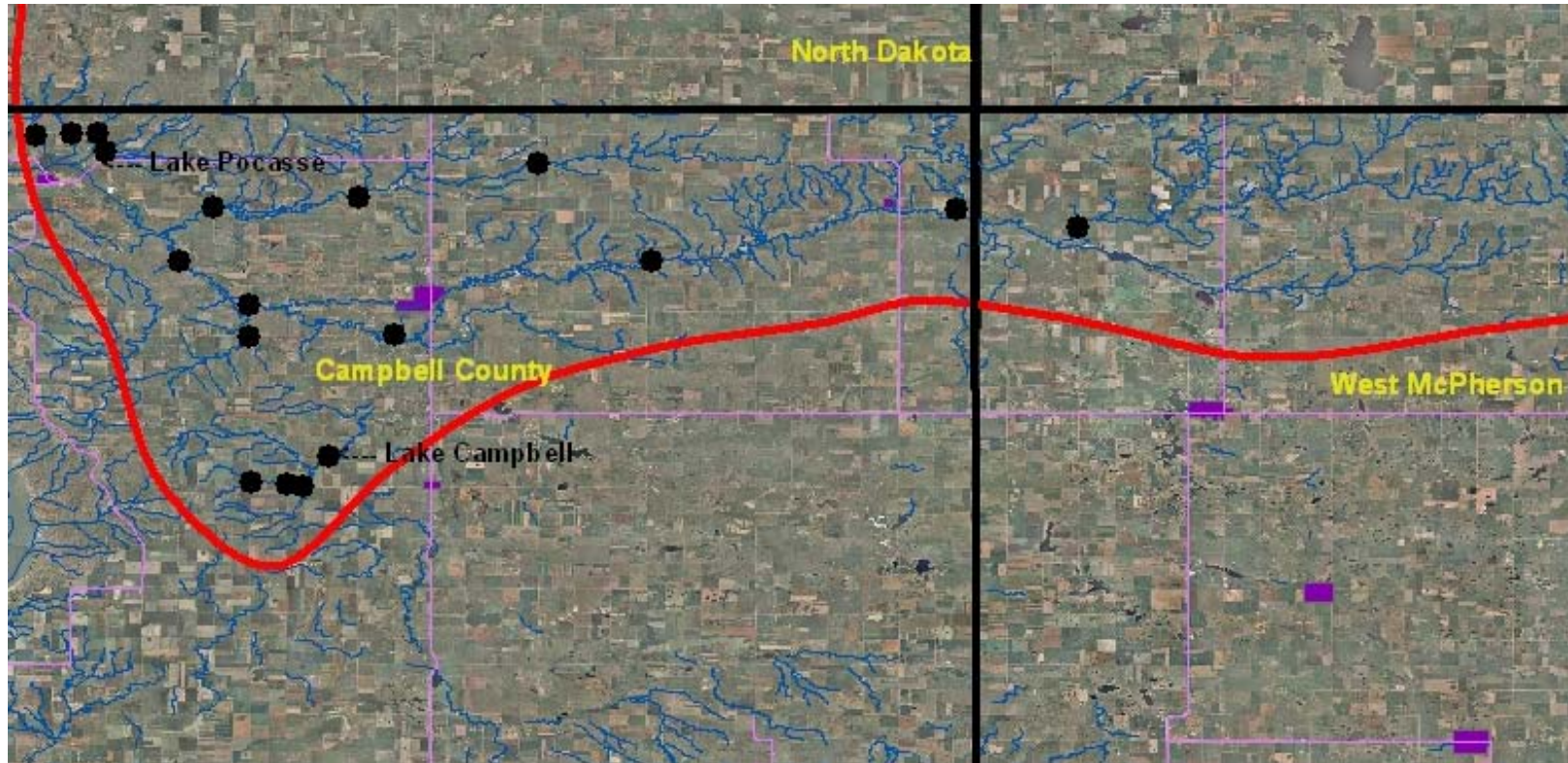


Figure 3: Spring Creek Watershed and Tributary Monitoring Sites

**Task 6: Collect water quality samples**

Collect water quality samples at 19 tributary monitoring stations using a combination of sites thought to contribute the greatest influence to both reservoirs and the main stem profile of Spring Creek including influences from North Dakota.

Samples will be collected during spring runoff, storm events, and monthly base flows. Approximately 170 water samples will be collected during the project period. Sites located further upstream in the watershed typically have less flow and will have fewer samples collected than sites downstream of the larger drainages. In addition, five outlet samples will be collected at both reservoirs totaling 10 samples for a cumulative estimate of 180 tributary samples.

Nutrient and solids samples will be collected twice weekly during the first week of spring snowmelt runoff and once a weekly thereafter until runoff ceases. Storm events and base flows will be sampled throughout the project period for an estimated total of 180 samples.

Water samples will be collected using an integrated sediment sampler when possible. All sample bottles will be packed with iced and shipped to the lab and collected using the methods described in the SDWRAP SOP. The South Dakota State Health Laboratory in Pierre, SD, will analyze all chemical parameters plus *E. coli* and fecal coliform. For the TMDL, the water quality data will be integrated together with the hydrologic loadings to provide a complete analysis of the Spring Creek system.

PARAMETERS MEASURED FOR TRIBUTARY SAMPLES

Field Measurements

Air Temperature  
Water Temperature  
Discharge  
Depth  
Visual Observations  
Water Level  
Field pH  
Dissolved Oxygen

Chemical

Total Alkalinity  
Total Solids  
\*Total Dissolved Solids  
Total Suspended Solids  
Ammonia  
\*Un-Ionized Ammonia  
Nitrate  
Total Kjeldahl Nitrogen  
Total Phosphorus  
Total Dissolved Phosphorus

Biological

Fecal Coliform  
*E Coli*

**Accomplishment:**

A total of 51 tributary samples and 5 QA/QC samples were collected from the monitoring sites on Spring Creek. Though there were numerous rainfall events, the watershed was considerably dry from previous drought years resulting in minimal sampling opportunities within Spring Creek. Several heavy rains resulted in substantial flow during Spring 2007, and water quality samples were collected as scheduled until measurable flow subsided at most sites in mid-June. Rainfall in mid-June 2008 also allowed for samples to be collected at several sites on the creek, but for the most part Spring Creek remained dry. SD DENR will use the stream-flow information collected and supplement it with historic gage information to provide a model estimate of mean annual stream flow for Spring Creek. Results of this effort will be compared to that from the U.S Geological Survey (USGS) derived Elevation Derivatives for National Applications or EDNA stream-flow model to provide a confident prediction of mean annual stream flow for Spring Creek and its tributaries. The concentration data will be applied to the annual stream flow to calculate loadings. SDDENR will present this load information in the final assessment report. Furthermore, this information will be used for Spring Creek TMDL development with respect to the 303(d) listed parameters.

**Products:**

Tributary water quality report  
Hydrologic and nutrient loads will be calculated for the entire watershed.

### **OBJECTIVE 3:**

Complete a habitat assessment and macroinvertebrate biosurvey. This data will be used to compliment physiochemical data and help define areas of degradation along the profile of Spring Creek.

#### **Task 7: Habitat assessment**

Complete a habitat assessment at six main stem sites along the profile of Spring Creek once each year to document the health of channel, bank and riparian characteristics.

#### **Accomplishment:**

A habitat assessment was conducted on five Spring Creek mainstem sites in September 2007. All riparian, channel and bank information was collected in accordance with methods described in the SDWRAP SOP. A combination of GPS, manual measurements and visual observations were used to complete the assessment. The furthest upstream site originally proposed (sixth site) for assessment was eliminated due to a lack of channel morphology. The site was described as a linear wetland near the headwaters of Spring Creek. The habitat assessment was only conducted once during the project period due to time constraints associated with prioritizing tributary sampling during the growing season of 2007. Spring Creek produced sporadic flood flows during the spring and early summer of 2007, which required a considerable amount of attention from the local coordinator. The stream was nearly dry by late summer and early fall which impeded the ability to collect macroinvertebrate samples. Preliminary results of the habitat assessment found some sites in relatively good shape with healthy stream and riparian features, while others were heavily impacted by adjacent land-use practices mostly associated with livestock grazing.

#### **Task 8: Macroinvertebrate biosurvey**

Macroinvertebrate samples will be collected at each of the six predetermined habitat assessment reaches twice yearly over the course of the project for a total of 24 samples.

Due to intermittency, macroinvertebrates will be collected during a period with optimal hydrologic condition to ensure the probable presence of optimal aquatic life stages. Historic USGS gage station data will be used to determine an optimal hydrologic index period to collect macroinvertebrates. Macroinvertebrate samples will be collected twice a year during both years of the study to account for within and between year variability. The habitat data will be used to quantify stream condition and explain variability in macroinvertebrate attributes. Habitat and macroinvertebrate sampling will follow protocols stated in the SDWRAP SOP Vol. II.

#### **Accomplishment:**

Time constraints related to routine tributary sampling and intermittent stream flow limited macroinvertebrate sampling to once during June of 2008. The same five habitat assessment sites were sampled for macroinvertebrates. As a result, five composite samples were collected according to methods defined in the SD WRAP SOP Vol. II. All samples were preserved in the field with 90% ethanol. The samples were shipped to a consultant for identification, enumeration and community metric calculation for each individual site. Preliminary results suggest Spring Creek is dominated by taxa from the orders Diptera and Coleoptera. Macroinvertebrates from these major groups are often associated with depositional habitats and are well adapted to intermittent conditions. SD DENR will provide an overall description of the macroinvertebrate community, a site by site comparison of community attributes and a correlation analysis to describe associations between macroinvertebrate community metrics and habitat attributes. All information associated with the habitat and macroinvertebrate sampling effort will be incorporated into the final assessment report conducted by SD DENR.

**OBJECTIVE 4:**

Ensure that all water quality and biological samples are accurate and defensible through the use of Department approved Quality Assurance/Quality Control procedures

**Task 5: Collect required QA/QC samples**

The collection of all field water quality data will be accomplished in accordance with the SDWRAP SOP.

A minimum of 10 percent of all the water quality samples collected will be QA/QC samples. QA/QC sample sets will consist of a field blanks and a field duplicate sample. An estimated 36 sample sets will be collected during the project. All QA/QC activities will be conducted in accordance with the Nonpoint Source Program Quality Assurance Project Plan.

**Products:**

A Quality Assurance/Quality Control monitoring report

**Accomplishment:**

Twelve duplicate samples and 12 blank samples were collected during the project, which meets the 10% QA/QC samples required. The result of this data will be presented by SD DENR in the final assessment report.

**OBJECTIVE 5:**

Evaluation of agricultural impacts to the water quality of the watersheds through the use of the Annualized Agricultural Non Point Source (AnnAGNPS) Model.

**Task 10: Develop AnnAGNPS model**

The Spring Creek watershed will be modeled using the AnnAGNPS model. AnnAGNPS is a comprehensive land-use model, which predicts soil erosion and nutrient transport/loading risks for agricultural watersheds.

Required data layers for the execution of this model include land-use, soils, topography, and hydrology. Collection of this data will be determined by the availability and accuracy of available data layers.

**Accomplishment:**

The project coordinator has collected feedlot and other pertinent information to satisfy the AnnAGNPS model requirements and submitted this information to SDDENR. SDDENR will finalize data inputs and execute the model. The results of the simulation will be presented in the final assessment report; AnnAGNPS section.

**Products:**

Electronic files of completed AnnAGNPs model.

**OBJECTIVE 6:**

Public participation and involvement.

**Task 11: Informational meetings and news releases**

Informational meetings will be held to inform the project partners and the general public of project progress. The meetings will provide an avenue for input from the area residents. It is anticipated that the project coordinator will be asked to present information at these meetings.

News releases will be prepared and sent to the local news media on a quarterly basis. These releases will be provided to the local newspapers, radio stations and TV stations if available.

**Accomplishment:**

To inform the general public of the project's activities and progress, several public meetings were held at different locations throughout the project area. There was no attendance from the public, despite adequate advertisement in several newspapers throughout the watershed. Subsequent meetings were held in conjunction with monthly board meetings of the Campbell County Conservation District, McPherson County Conservation District, and the Pocasse/Campbell Watershed Assessment board. These meetings were comprised of board members of both Conservation Districts, the Pocasse/Campbell Watershed Assessment board members, Natural Resources Conservation Service (NRCS) staff, and the County Extension Agent. The public was openly invited to these board meetings, however there was no participation from the public.

Two news releases were published in the local newspapers within the project area.

**Products:**

6 public meetings  
2 news releases

**OBJECTIVE 7:**

Provide reports as part of state and federal grant requirements.

**Task 12: Progress Reports**

The local sponsor will use the SD DENR Project Tracking Program to track project objectives and expenditures. Annual and semi-annual progress reports (GRTS) will be completed and presented at the appropriate general public meetings to keep the involved parties up-to-date with work activities and ensure their timely completion. These GRTS reports, as required by EPA, will be submitted to DENR on April 1 and October 1 of every year until the project contract has expired.

**Accomplishment:**

All GRTS reporting requirements have been met to date. SD DENR will prepare the final assessment report.

**Task 13: Final Report**

The local sponsor will produce a final report of the tasks and Objectives listed in this work plan. The report will follow the EPA guidance for final reports format. <http://www.epa.gov/owow/nps/sec-319.pdf>. The final report will include a summary of all activities during the project as well as the data collected during the project.

Development of a the TMDL (including remediation activities) summary for the parameters included on the 2008 Integrated Report list and any other parameters that may need a TMDL will be completed by DENR through other funds.

### **Accomplishment:**

The local sponsor (project coordinator) prepared the final administrative report according to EPA guidance requirements. This report summarizes project activities and data collection. The final administrative report was reviewed by the SD DENR project officer prior to submission to EPA for approval. SD DENR will prepare the final assessment report and the required TMDL reports.

### **Product:**

Semi-annual progress reports for GRTS

Final project report and TMDL

## **2.1 Planned and Actual Milestones, Products and Completion Dates**

Table 2 summarizes the planned dates versus the actual dates that the objectives were scheduled for completion. Objective 1: lake sampling was on task according to the milestone. At times during the project, Lake Pocasse could not be sampled due to low water levels. Site LP-1 was not sampled at all throughout the project period due to low water levels. Periods of unsafe ice cover and equipment failure also resulted in changes in lake sampling dates. The sediment, macrophyte, and shoreline surveys were conducted in 2008 rather than 2007 due to scheduling conflicts. Objective 2: tributary sampling was on task according to the milestone. Sampling was limited due to the drought conditions affecting the watershed, but samples were collected as scheduled when possible. Objective 3: habitat and invertebrate sampling was completed once in June 2008 rather than twice yearly due to scheduling conflicts. Objective 4: the Quality Assurance/Quality Control was on task according to the milestone, and all required samples were collected. Objective 5: watershed modeling was on task according to the milestone and the project coordinator has supplied SD DENR with required feedlot information, but completion has been delayed due to scheduling conflicts. SDDENR will finalize data inputs and execute the model in 2009. Objective 6: public participation was completed throughout the scope of the project. Objective 7: all required mid-year and annual reports were completed on task according to the milestone. Completion of the final assessment report is projected for 2009.

## **2.2 Evaluation of Goal Achievement and Relationship to the State NPS Management Plan**

The long term goals of the Pocasse/Campbell Watershed Assessment Project are to locate and document sources of nonpoint source pollution in the watershed and produce feasible restoration alternatives in order to provide adequate background information needed to drive a watershed implementation project to improve sedimentation and nutrient problems with the creeks and lakes as well as creating a Total Maximum Daily Load Report for each of the 303(d) listed water bodies. Spring Creek, Lake Campbell and Lake Pocasse are listed on the 2008 303(d) list in the South Dakota Integrated Report, it is essential to the NPS Management Program that this assessment be completed.

## **3.0 Monitoring Results**

Water quality data were sent to SD DENR for analysis. Field data recorded either on a laptop computer or into field log books, were sent to SD DENR after the sampling effort was complete. SD DENR has taken the responsibility to analyze the data and prepare the final assessment report and TMDLs.

The final assessment report will consist of an analysis of the data and include:

1. A summary of project goals, milestones and accomplishments;
2. Discussion of the general limnology of the lake, seasonality, trophic state, stratification, long-term trends in water quality, and any exceedances of state water quality standards criteria;



3. Discussion of tributary water quality, seasonality, and any exceedances of state water quality standards criteria;
4. Use of the BATHTUB computer program to predict lake responses to nutrient loadings;
5. Use of the AGNPS model to predict effects of various watershed BMPs on nutrient and sediment yields;
6. Determination of water quality and loading targets to ensure beneficial use attainment;
7. Discussion of outreach efforts in the watershed;
8. Presentation of lake and watershed restoration techniques that should be considered for implementation in the lake or the watershed;
9. A summary of project expenditures; and
10. TMDL summaries.

## **4.0 Public Involvement and Coordination**

To inform the general public of the project's activities and progress, several public meetings were held at different locations throughout the project area. There was no attendance from the public, despite adequate advertisement in several newspapers throughout the watershed. Subsequent meetings were held in conjunction with monthly board meetings of the Campbell County Conservation District, McPherson County Conservation District, and the Pocasse/Campbell Watershed Assessment board. These meetings were comprised of board members of both Conservation Districts, the Pocasse/Campbell Watershed Assessment board members, Natural Resources Conservation Service (NRCS) staff, and the County Extension Agent. The public was openly invited to these board meetings, however there was no participation from the public.

### **4.1 State Agencies**

The South Dakota Department of Environment and Natural Resources (SDDENR) administered the 319 funds for the project, provided \$40,000 in State "fee funds" and provided technical assistance. The SDDENR is also preparing the Final Assessment Report. The South Dakota Department of Game, Fish and Parks provided information about threatened and endangered species within the watershed, as well as a history of fish populations and water quality data of Lake Pocasse and Lake Campbell. The Conservation Commission provided \$18,000 in assistance.

### **4.2 Federal Agencies**

The US Environmental Protection Agency provided 319 Program funds. The USDA Natural Resource Conservation Service provided technical assistance.

### **4.3 Local Governments, other Groups, Public at Large**

The Campbell County Conservation District was the sponsor for the project, and provided \$18,500 in financial assistance. The project coordinator administered vouchers to SD DENR, bookkeeping and applying financial data to the web-based Tracker System. Other District personnel provided assistance to the project coordinator. The McPherson County Conservation District provided \$3,500 in assistance.

### **4.4 Other Sources of Funds**

There were no other sources of funds.

## **5.0 Aspects of the Project That Did Not Work Well**

The project progressed well except for below-normal precipitation throughout the watershed. Samples were collected as scheduled whenever possible; however the total number of water quality samples and flow measurements was less than desired due to the lack of runoff.

## **6.0 Future Activity Recommendations**

The results of the assessment could justify the proposal of a 319 Watershed Implementation Project to provide Best Management Practices within the Spring Creek Watershed.

**Table 2. Planned and actual objective milestone table**

