

**SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM**

**SHERIDAN COUNTY WATERSHED IMPROVEMENTS #4  
WATERSHED PROJECT FINAL REPORT**

Sponsored by: Sheridan County Conservation District

WDEQ PROJECT NUMBER #NPS2014B

December 2017

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

Grant Number: C900863014

Keywords: *E. coli*, Fencing, Off-Channel Watering, Septic Systems, Information/Education

## Section 1.0 Executive Summary

Project Title: Sheridan County Watershed Improvements #4

Project Start Date: July 1, 2014

Project Completion Date: December 31, 2017

Budget Summary	
Total 319 Funds Awarded	\$274,750
Total 319 Funds Expended	\$274,750
Total Nonfederal Match Commitment	\$183,180
Total Nonfederal Match Expended	\$189,444.37
Total Project Budget	\$457,930
Total Project Expenditures	\$464,194.37

**Summary of Accomplishments.** The goal of this project was to reduce bacteria contributions from septic systems, livestock, urban and residential run-off through implementation of EPA Watershed Based Plans and/or TMDL Implementation Plans for the Tongue River, Goose Creek, and Prairie Dog Creek watersheds. With some modifications, the goals and objectives of this project was completed as planned.

Through this project, SCCD provided assistance on 22 projects, including 2 off-channel stockwater systems, eight septic replacement projects; 3 sewer conversion projects on eligible systems (match only), 5 sewer conversions on ineligible systems through other funding sources (not used as match), and four pet waste stations. In addition, this project supported willow planting on five sites encompassing 695 feet of streambank and technical assistance on five future projects to be funded through other sources and six ineligible or low priority projects.

Information and education activities funded through this project were designed to increase awareness of watershed issues and improvement programs. Activities included completion of a Social Indicator Survey process on the Goose Creek watershed, annual watershed newsletters, watershed signs, and additional information on the SCCD website/social media platforms and in SCCD semi-annual newsletters. Concurrent with this project, SCCD assisted the City of Sheridan with stormwater education efforts. While not funded by or applied as match to this project, the partnership developed between the City and SCCD on other activities led to this collaboration on stormwater awareness.

Interim water quality monitoring was completed in 2015, 2016, and 2017 on the Goose Creek, Tongue River, and Prairie Dog Creek watersheds, respectively. The objective of interim monitoring is to use water quality information and trends to identify and prioritize areas affected by nonpoint source pollution and evaluate the effectiveness of implementation of improvement projects and other activities. SCCD incorporated information from interim monitoring to document estimated bacteria reduction requirements. This information was presented to watershed steering committee meetings and is considered during project ranking. Under a previous grant, SCCD developed a water quality database to improve management of nearly 20 years of collected water quality data; final data validation to detect and correct any errors that occurred during data migration was completed through this grant. This database was used to upload data into the WDEQ data reporting templates.

## Section 2.0 Background

The project area includes Sheridan County, specifically the Tongue River, Goose Creek, and Prairie Dog Creek watersheds (Attachment). These waterbodies have bacteria concentrations that may indicate potential human health issues related to recreational use. Bacteria concerns are from nonpoint sources and can be partly attributed to septic systems and livestock. In addition, there are other related concerns, including sediment, manganese and temperature that impact water quality and the ability of these waters to meet the beneficial uses for a coldwater fishery and aesthetic drinking water uses. Some research suggests relationships among these parameters and levels of bacteria. In addition, increased turbidity may lead to an increase in temperature. In some locations, sediment problems in a waterbody can result from in-channel sources as much as from overland flow. Streams in Sheridan County have been subject to high levels of manipulation and channelization and annual modifications for irrigation diversions. Erosive irrigation conveyances contribute large amounts of sediment. Temperature impairments were not directly addressed through this project; however, measures to reduce excess sediment and improve riparian corridors will also have a positive impact on temperature. Manganese impairments in the Prairie Dog Creek watershed are assumed to be from natural sources and a low priority.



*The Tongue River provides recreational, agricultural, municipal, and wildlife opportunities through the region.*

This project addressed the intent of the Wyoming Non-Point Source Management Plan 2013 Update and focused on measurable water quality improvements through voluntary and incentive-based methods, which were locally led and developed through a collaborative effort that engaged local agencies, communities, watershed groups, landowners, and others.

The Prairie Dog Creek Watershed Plan and an update to the Tongue River Watershed Plan were developed to meet the nine essential elements of an EPA Watershed Based Plan. The Prairie Dog Creek Watershed Plan and the Tongue River Plan were approved by WDEQ in February 2011 and November 2012, respectively. The Goose Creek Watershed TMDL and Implementation Plan were completed in September 2010. To achieve attainment of water quality standards, bacteria levels need to be reduced by 75-82% in the Prairie Dog Creek Watershed, 61-95% in the Tongue River Watershed, and 17-84% in Goose Creek watershed. The plans established action items to address short-term targets that would allow the realization of the long-term reduction requirements.

Implementation activities funded by this project were completed with the long-term goal of achieving the load reductions established in the plans. SCCD intended to allocate the funding from this grant equally among the three watersheds rather than prioritizing one watershed over another. However, funding was ultimately distributed based on the recommended actions from the watershed plans and the requests for assistance. All projects were evaluated based on their potential impact to water quality. Self-assessments, ranking sheets, and applications, for livestock, septic, and streambank projects included questions relating to water quality impacts from the current system, operation, or management and the potential improvement to water quality from the proposed actions.



*The Goose Creek watershed is enjoyed by many Sheridan residents in parks and along pathways*

The Tongue River, Goose Creek, Big Goose Creek, Little Goose Creek, and Prairie Dog Creek are all Class 2AB-Coldwater Fisheries with a hydrologic unit code of 10090101. All are perennial streams that have been subject to varying degrees of channelization and manipulation. Aquatic habitat varies among the drainages and among locations within the drainages. The Tongue River and Goose Creek watersheds originate in the Big Horn Mountains with additional tributaries joining from the foothills and plains in the lower reaches of the watershed. Prairie Dog Creek originates in the foothills near Moncreiffe Ridge, northwest of Story, Wyoming. The project area elevation ranges from approximately 3500

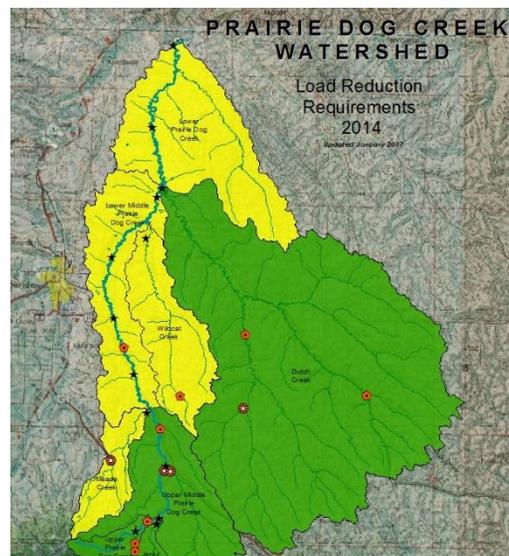
feet where the Tongue River passes into Montana up to 4500 feet at the uppermost sampling stations. In the headwaters of the Goose Creeks and the Tongue River the channels are in confined canyons and transition into meandering C-type channels.

Since the area was settled in the late 1800's, a significant amount of change has been imposed on the stream channel systems. Miles of irrigation ditches and trans-basin diversions have been created. Several reservoirs have been built for domestic and irrigation uses. Streams have been placed into straightened channels for flood control, transportation corridors, and other reasons. During the recreational season, as much as 100 cubic feet per second (cfs) is diverted from the Piney Creek drainage into Prairie Dog Creek.

Land ownership across the project area is approximately 13% federal land and 12% state land, with the remaining 75% being privately owned. Land uses in the watersheds include irrigated hay and crop lands, dry land pasture, livestock grazing, rural residential development, and wildlife habitat. The Tongue River and Goose Creek drainages also have urban areas with municipal uses. The Prairie Dog Creek watershed has no municipal discharge; however, the community of Story is hydrologically connected.

SCCD completed comprehensive watershed assessments on all three of the watersheds prior to development of watershed plans. These assessments indicated that most of the sampled parameters were within Wyoming Water Quality Standards. The primary concern, from a regulatory standpoint, was fecal coliform and/or *E. coli* bacteria. Each of the watershed plans recommends interim water quality monitoring to evaluate long-term changes in water quality. SCCD uses a three-year rotation for interim monitoring, which includes bacteria, turbidity, and discharge among other parameters.

The concerns identified in Sheridan County are the result of a combination of sources, including wildlife, livestock, humans, and sediment. The SCCD-NRCS partnership offers a water resources improvement program to address as many potential contributors as possible. The program began in 2001 with a grant to address bacteria contributions from



*Monitoring information is used to prioritize areas based on needed bacteria load reductions*

livestock facilities. Since that time, the program has expanded to include projects to address septic systems, irrigation diversions, eroding streambanks, and other types of projects. All projects are evaluated based on the potential to benefit water quality.

Funding for the program comes from a combination of federal grants (including Clean Water Act Section 319 grants), state grants, USDA program funds, and landowner contributions. Through the local watershed planning processes, SCCD-NRCS has set local priorities that have made it possible to direct more USDA program funds to water resource improvement projects. By combining funding sources, SCCD-NRCS has made improvement projects more feasible for some that otherwise would not be able to put the needed practices into place. This project was a continuation of previous efforts.

As of December 2017, the program has provided \$1,069,354.92 in federal grants, \$691,889.77 in state grants, \$35,000 in local/private grants, and \$653,688.10 in USDA program funds. These funds have been matched by \$991,921.89 in landowner contributions.

Since 2001, 105 projects have received funding through grants administered by SCCD, including 93 with funds from Section 319 of the Clean Water Act (Attachment). This project included 18 stockwater and septic system replacement projects, 9 of which received funding from the Improvements #4 grant. Four Pet Waste Stations were also included. In addition, willow cuttings have been planted on a total of 23 sites (4555 feet of streambank), five of which (770 feet) were supported through this grant. This grant also included technical and planning assistance on five additional projects that will be funded through other sources.



*Riparian fencing helps reduce bacteria contributions from livestock*

### **Section 3.0 Goals and Outcomes**

The goal of this project was to reduce bacteria contributions from septic systems, livestock, urban and residential run-off through implementation of EPA Watershed Based Plans and/or TMDL Implementation Plans for the Tongue River, Goose Creek, and Prairie Dog Creek watersheds.

To accomplish this goal, SCCD identified four environmental outcomes and associated objectives:

- Maintain a viable watershed improvement program for Sheridan County
  - Project Administration
  - Watershed Plan Implementation and Oversight
- Improve water quality in Sheridan County streams by providing technical and financial assistance for water resource improvement projects
  - Watershed Improvement projects
- Increase awareness on potential water quality impacts from and improvement opportunities for livestock operations, septic systems, and other activities and encourage participation in programs and/or changes in land-use practices
  - Information and Education Activities
- Evaluate Program Effectiveness
  - Interim Water Quality Monitoring
  - Project Final Report

For the most part, the goal of this project and the outcomes and associated objectives were achieved with some modifications to specific tasks (Table 4.1). All administrative reports and planning activities were completed as planned as was additional coordination on the development of the Prairie Dog Creek TMDL. Follow-up and documentation on all previously completed projects was not completed. Scheduling conflicts and lack of personnel resources prevented going to every site. A follow-up self-certification form and communication was discussed as an alternative, but was never completed. This continues to be a goal that the SCCD would like to work towards, but was unable to complete with this project.

SCCD provided assistance on 22 eligible projects that were funded through this grant and/or other sources, including four pet waste stations and five willow planting sites. This exceeded the number of projects planned in the proposal. Technical assistance was provided on five additional projects that are planned for future construction through other funding sources. Four septic system projects were ineligible for 319 funding because of the age requirement and one was ineligible because of it serving a commercial facility (campground with a combination of permanent residences and camper spaces). These five projects still posed significant water quality impacts to Goose Creek and the SCCD Board determined them to be high priority projects. SCCD was able to fund these projects through other sources, but did not include them in the funding/match totals because of their ineligibility. These projects are included in the summary of practices supported through this project (Table 5.1).



*Pet Waste Stations in recreation areas near streams were installed through this project*

In the project proposal, SCCD estimated a total wastewater reduction of approximately 13 million gallons. Through this project, SCCD achieved approximately 2 million gallons reduction from the eligible septic systems and 22 million gallons reduction from livestock operations based on the size of the treated area. SCCD planned to address 10% of the septic systems (11) and 15% of the animal units (1271) recommended in watershed plans. The goal was met for septic systems with 11 eligible systems completed (plus five ineligible) but not met for animal units with only 413 animal units addressed. An estimated 79 cubic yards reduction in sediment contributions from unstable stream channels was achieved out of the goal of 110 cubic yards.

## Section 4.0 Task Activities

Table 4.1. Summary of deliverables completed for each task

Task	Task Title	Task Description	Actual Deliverables
1	Project Administration	The SCCD will provide financial accounting, submit reimbursement requests, maintain all project records, and file all reports.	<ul style="list-style-type: none"> <li>• 36 reimbursement requests</li> <li>• 4 annual reports and MBE/WBE reports</li> <li>• 36 SCCD Board Meetings/project oversight</li> <li>• 56 Other Partnership Meetings, including Chamber Ag and Natural Resources Committee, Commissioners, City Staff, Legislator, Tongue River Initiative, RCPP Partners, &amp; WWDC Goose Creek Level 1</li> </ul>
2	Watershed Plan Implementation and Oversight	The SCCD will work with WDEQ and local watershed groups to provide oversight for the implementation of the Tongue River, Goose Creek, and Prairie Dog Creek Watershed Based Plans and to incorporate new data into Load Duration Curves.	<ul style="list-style-type: none"> <li>• 2 Tongue River Steering Committee Meetings</li> <li>• 2 Goose Creek Steering Committee Meetings</li> <li>• 2 Prairie Dog Creek Steering Committee Meetings</li> <li>• 10 Other Meetings/Conference Calls on the Big Goose Watershed Control Plan, Tongue River Watershed TMDL, and Prairie Dog Creek Watershed TMDL</li> <li>• Updated Load Duration Curves and Estimates and associated priorities for each watershed</li> </ul>
3	Watershed Improvements	The SCCD/NRCS partnership will provide technical and financial assistance to approximately 19 landowners through June 2016 to evaluate existing livestock operations, septic systems, irrigation diversions, unstable streambanks and channels, and sources of urban and residential run-off, to identify and implement improvement opportunities on high priority projects. SCCD will also provide follow-up and documentation on previously completed projects to ensure that BMPS are being maintained and remaining functional over time.	<ul style="list-style-type: none"> <li>• 2 off-channel stockwater projects</li> <li>• 8 septic replacement projects</li> <li>• 3 sewer conversions for eligible septic systems (Match)</li> <li>• 4 sewer conversions for age-ineligible septic systems funded through separate sources and not used as match</li> <li>• 1 sewer conversion for 4 residences and 48 camp spaces funded with separate sources and not used as match</li> <li>• 5 willow planting sites on 695 feet of streambank</li> <li>• 4 Pet Waste Stations at 3 recreation sites on Tongue River</li> <li>• 1 stockwater/fencing through USDA-RCPP Program</li> <li>• 2 irrigation projects through USDA-RCPP Program</li> <li>• 3 stockwater/fencing through USDA regular EQIP</li> <li>• 4 irrigation projects through USDA regular EQIP</li> <li>• 5 future projects technical assistance</li> <li>• 6 ineligible/low priority projects technical assistance</li> <li>• 13 Subdivision Review Comments</li> </ul>

Task	Task Title	Task Description	Actual Deliverables
4	Information and Education	<p>SCCD will implement a social indicator survey process as recommended by EPA’s webinar “Using Social Indicators in Watershed Management Projects” to determine what outreach activities/topics would be the most appropriate to encourage participation in programs and/or changes in land-use practices among watershed residents. This effort will include coordination with other groups that have an interest in local watersheds. In the meantime, SCCD will continue some of the activities that have been a consistent and successful part of the on-going effort, such as the annual watershed newsletters, the website, and the progress registers, which document completed projects and other activities.</p>	<ul style="list-style-type: none"> <li>• 1 Social Indicator Survey for Goose Creek Watershed</li> <li>• 9 Annual Watershed Newsletters <ul style="list-style-type: none"> <li>○ 3 Goose Creek to 7900-8309 residents</li> <li>○ 3 Tongue River to 1185-1225 residents</li> <li>○ 3 Prairie Dog Creek to 486-525 residents</li> </ul> </li> <li>• 2 Goose Creek Watershed signs</li> <li>• 9 Progress Register Updates (3 per watershed)</li> <li>• 7 SCCD newsletters to ~1200 residents with information on assistance programs/opportunities, Tongue River TMDL, monitoring updates, project follow-ups, pet waste, Social Indicator Survey, and workshop announcements</li> <li>• 15 Sheridan Press/Sheridan Media stories on Tongue River and Prairie Dog Creek TMDLs, social indicator project, funding and programs, and meeting notices</li> <li>• 5 Water Quality Classroom/Community Demonstrations <ul style="list-style-type: none"> <li>○ 3 Water Wall (Third Thurs and Ag Expo)</li> <li>○ 1 Enviro-scape -Sagebrush Outdoor Lab</li> <li>○ 1 Water Quality - “Unplugged”</li> </ul> </li> <li>• City Stormwater Education (funded separately) <ul style="list-style-type: none"> <li>○ 2 Plinko Board at 3<sup>rd</sup> Thursday</li> <li>○ 1 Enviro-scape Demo at Sagebrush Outdoor Lab</li> <li>○ 1 Water Wall Demo at Ag Expo</li> </ul> </li> <li>• 2 presentations to Trout Unlimited and Sheridan College</li> <li>• 2 field days with Sheridan College students</li> </ul>
5	Interim Water Quality Monitoring	<p>SCCD will continue interim water quality monitoring on the Tongue River, Goose Creek, and Prairie Dog Creek watersheds on a three-year rotation to evaluate long-term trends in water quality. Where appropriate and supported by the landowner, SCCD will consider supplementing the watershed scale monitoring with more specific project by project effectiveness monitoring. SCCD will use information collected to assess whether changes need to be made for future monitoring, information and education, and improvement programs.</p>	<ul style="list-style-type: none"> <li>• 3 Approved Sampling Analysis Plans (1 per watershed)</li> <li>• 1 Approved Monitoring Report</li> <li>• 2 Monitoring Reports Pending approval</li> <li>• 2593 credible accepted data pending WDEQ approval</li> <li>• 377 accepted bacteria/turbidity sample sets</li> <li>• Adjustment to monitoring program per evaluation of cost-effectiveness: reduced number of sample sites</li> </ul>
6	Final Report	<p>SCCD will develop and submit the final report for the project. The draft report will be submitted 60 days prior to the termination of the project and final reimbursement request.</p>	<ul style="list-style-type: none"> <li>• 1 Draft Report</li> <li>• 1 Final Report</li> </ul>

## Section 5.0 BMP Implementation

A primary component of this project was to facilitate the implementation of water quality improvement projects. SCCD calculated bacteria load reduction estimates assistance on 22 projects that were funded through this grant and/or other sources (Table 5.1). These projects include two stockwater systems, 11 eligible septic system replacements/sewer conversion projects, five ineligible septic to sewer conversion projects, and four pet waste stations. SCCD calculated potential sediment load reductions from five willow planting sites (Table 5.1). In addition to those 22 projects, SCCD provided technical assistance on five projects that are expected to be funded through future grants and/or other sources.

*Livestock Operations.* Bacteria load reductions from livestock projects were calculated by multiplying the acre inches of run-off for the pasture by a conversion factor of organisms per acre inch of run-off:

$$\text{organisms/acre inch} = (27154 \text{ gal/ai})(3.7854 \text{ l/gal})(1000 \text{ ml/l})(120 \text{ organisms/100 ml}).$$

SCCD used fecal coliform bacteria figures from the Protocol for Developing Pathogen TMDLs (USEPA, 2001) for grazed pasture run-off (Doran et al., 1981 from USEPA, 2001). Run-off was calculated using USDA NRCS run-off equation 2-3 from the NRCS Engineering Field Manual Chapter 2 (NRCS, 1989):

$$Q=(P-0.2(S))^2 / (P+ 0.8 (S))$$

where Q is runoff in inches; P is the rainfall amount for the 25 year/24 hour event; and S is the potential maximum retention after run-off begins in inches. S was determined from Table 2 of the USDA NRCS Agronomy Technote 20 (NRCS, 2002):

$$S = ((1000 / CN) - 10)$$

where CN is a run-off curve number for a pasture area (79). For this grant, SCCD treated both stockwater projects as “contributing areas” as opposed to facility run-off. There were no corrals or intensely grazed areas that would correspond to feedlots for this project.

*Septic Systems.* To determine bacteria load reductions from septic systems, SCCD used the WDEQ NPS Septic System Load Reduction Model. This model consists of spreadsheets for various situations in which certain variables are entered. The “Tank without Leachfield” model did not require any variable entry and was used for systems where effluent from a septic tank discharged directly into a waterbody. The “Surface Seepage” Model was used for projects where sewage effluent was present on the surface and in areas where groundwater/surface water interactions were likely. The “Tank with Overland Flow” Model was applied to systems that may have had an absorption field (location unknown) because there was no model for systems with an absorption field. SCCD entered variable information into the spreadsheets and presented the load reductions as reported.

*Pet Waste Stations.* There is little information available on estimating bacteria loads from pet waste. SCCD used fecal coliform bacteria estimates of 5E+9 organisms per day for Dogs and Cats based on Horsely and Witten (1996) in the Protocol for Developing Pathogen TMDLs (USEPA, 2001). For a conservative estimate, SCCD assumed 1 pet per day for 365 days per station.

*Willow Planting Sites.* Estimates of sediment load reductions for the willow planting projects were calculated using the width of streambank (or cut) lost per year (up to 1 foot per year), the length of the eroding area, and the height of the bank.

**Table 5.1 Summary of BMPs funded and/or supported by this project**

BMP Name/Description	HUC12	Date Completed	Targeted Pollutant(s)	Load Reduction Estimate(s)	Load Reduction Estimate Method(s)*
<b><u>PROJECTS FUNDED DIRECTLY THROUGH THIS GRANT</u></b>					
Warren Beaver Creek Stockwater	100901010108 Lower Big Goose	12/2017	Bacteria	7.40E+08	USDA Runoff w/ USEPA Pathogen Figures
SR Cattle Wolf Creek Stockwater	100901010209 Lower Wolf Creek	12/2017	Bacteria	9.74E+10	USDA Runoff w/ USEPA Pathogen Figures
Flowers Big Goose Creek Septic Replacement	100901010108 Lower Big Goose	5/2015	Bacteria	8.965E+11	WDEQ Model Tank w/ Overland Flow
McPhie Tongue River Septic Replacement	100901010210 Fivemile-Tongue	7/2015	Bacteria	2.930E+10	WDEQ Model Surface Seepage
Jongsma Little Goose Creek Septic Replacement	100901010107 Lower Little Goose	7/15	Bacteria	7.137E+11	WDEQ Model Tank w/ Overland Flow
Ingram Tongue River Septic Replacement	100901010211 Slater-Tongue	8/15	Bacteria	1.095E+12	WDEQ Model Tank w/ Overland Flow
Williams Prairie Dog Creek Septic Replacement	100901010301 Upper Prairie Dog	12/2015	Bacteria	2.418E + 12	WDEQ Model Tank w/o Leachfield
Barkan Big Goose Creek Septic Replacement	100901010108 Lower Big Goose	6/2017	Bacteria	9.833E+11	WDEQ Model Tank w/ Overland Flow
Hogarty Little Goose Creek Septic Replacement	100901010106 Middle Little Goose	11/2017	Bacteria	4.36E+09	WDEQ Model Surface Seepage
<b><u>ELIGIBLE PROJECTS USED TO MATCH THIS GRANT</u></b>					
Kobielusz Dow Prong Dutch Creek Septic Replacement (Match Only)	100901010304 Dow Prong	3/2016	Bacteria	2.418E+12	WDEQ Model Straight Pipe w/ Tank
Ash Little Goose Creek Septic to Sewer Conversion (Match Only)	100901010107 Lower Little Goose	3/2015	Bacteria	8.456E+11	WDEQ Model Tank w/ Overland Flow
Wilson Goose Creek Septic to Sewer Conversion (Match Only)	100901010109 Soldier-Goose	11/2015	Bacteria	8.965E+11	WDEQ Model Tank w/ Overland Flow
Daniels Goose Creek Septic to Sewer Conversion #1 (Match Only)	100901010109 Soldier-Goose	10/2017	Bacteria	1.117E+10	WDEQ Model Surface Seepage

\*See descriptions for calculations of load reduction estimates in preceding discussion in Section 5.0

**Table 5.1 (continued). Summary of BMPs funded and/or supported by this project**

BMP Name/Description	HUC12	Date Completed	Targeted Pollutant(s)	Load Reduction Estimate(s)	Load Reduction Estimate Method(s)*
<b>PROJECTS INELIGIBLE FOR FUNDING OR MATCH, BUT SUPPORTED BY OVERALL GRANT PROGRAM</b>					
Daniels Goose Creek Septic to Sewer Conversion #2 (Age Ineligible)	100901010109 Soldier-Goose	10/2017	Bacteria	4.364E+09	WDEQ Model Surface Seepage
Daniels Goose Creek Septic to Sewer Conversion #3 (Age Ineligible)	100901010109 Soldier-Goose	10/2017	Bacteria	1.245E+10	WDEQ Model Surface Seepage
Daniels Goose Creek Septic to Sewer Conversion #4 (Age Ineligible)	100901010109 Soldier-Goose	10/2017	Bacteria	1.245E+10	WDEQ Model Surface Seepage
Daniels Goose Creek Septic to Sewer Conversion #5 (Age Ineligible)	100901010109 Soldier-Goose	10/2017	Bacteria	1.029E+10	WDEQ Model Surface Seepage
KOA Residence Goose Creek Sewer Conversion (Ineligible) (4 permanent mobile homes & 48 camper spaces)	100901010109 Soldier-Goose	11/2017	Bacteria	2.418E+12	WDEQ Model Tank w/o Leachfield
<b>PET WASTE STATIONS FUNDED THROUGH THIS GRANT</b>					
Kleenburn Pet Waste Station	100901010211 Slater-Tongue	5/2017	Bacteria	1.825E+12	USEPA daily *365
Canyon Pet Waste Station	100901010207 Columbus-Tongue	5/2017	Bacteria	1.825E+12	USEPA daily *365
Ranchester Pet Waste Stations-2	100901010210 Fivemile-Tongue	5/2017	Bacteria	3.65E+12	USEPA daily *365 Doubled for 2 stations
<b>WILLOW PLANTING SITES SUPPORTED THROUGH THIS GRANT</b>					
Mills Big Goose Creek Willow establishment 120 feet	100901010108 Lower Big Goose	5/2016	Sediment	18 cy	Bank Length * Height Assume 1 foot width
Mock Smith Creek Willow establishment 200 feet	100901010207 Columbus-Tongue	5/2016	Sediment	15 cy	Bank Length * Height Assume 1 foot width
Flowers Big Goose Creek Willow establishment 100 feet	100901010108 Lower Big Goose	5/2016	Sediment	15 cy	Bank Length * Height Assume 1 foot width
Padlock Columbus Creek Willow establishment 200 feet	100901010207 Columbus-Tongue	5/2016	Sediment	15 cy	Bank Length * Height Assume 1 foot width
Padlock Tongue River Willow establishment 75 feet	100901010207 Columbus-Tongue	5/2016	Sediment	16 cy	Bank Length * Height Assume 1 foot width
<b>POTENTIAL PROJECT RECEIVING TECHNICAL ASSISTANCE THROUGH THIS GRANT</b>					
Prairie Dog Creek Fencing/Stockwater- Contracted for construction with Improvements #5					
Prairie Dog Creek Fencing-Landowner not ready to pursue; potential for later					
Tongue River Canyon Diversion-Pending NRCS designs for future completion					
Tongue River Canyon Stabilization- Pending NRCS designs for future completion					
Tongue River Dayton Stabilization- Pending NRCS RCPP Agreement Amendment					

\*See descriptions for calculations of load reduction estimates in preceding discussion in Section 5.0

The Division 4 Local Workgroup for USDA (including Sheridan and Johnson Counties) identified water quality as their top resource priority. Project impact on water quality is one consideration during project prioritization. Though not funded by or included as match for this project, several other projects were completed through USDA programs:

- Masters Tongue River Fencing/Stockwater USDA Regular EQIP
- Reinke Big Goose Fencing/Stockwater USDA Regular EQIP
- Masters (2) Tongue River Fencing/Stockwater USDA Regular EQIP
- Frake Big Goose Creek Fencing/Stockwater USDA-RCPP
- Harper Prairie Dog Creek Irrigation USDA Regular EQIP
- Prado Prairie Dog Creek Irrigation USDA Regular EQIP
- Weaver Tongue River Irrigation USDA Regular EQIP
- Forbes Big Goose Creek Irrigation USDA Regular EQIP
- Bland Big Goose Creek Irrigation USDA-RCPP
- Fiedor Tongue River Irrigation USDA-RCPP

SCCD, in partnership with NRCS, provided general technical assistance on sites that were either ineligible and/or low priority for funding assistance:

- Goose Creek Septic,
- Little Goose Stream Stabilization,
- Tongue River Wetland Development,
- Little Goose City Irrigation,
- Tongue River Tributary Stabilization, and
- Little Goose Pond algae issues.

Some of these projects were completed by the landowner or were addressed in some other way.

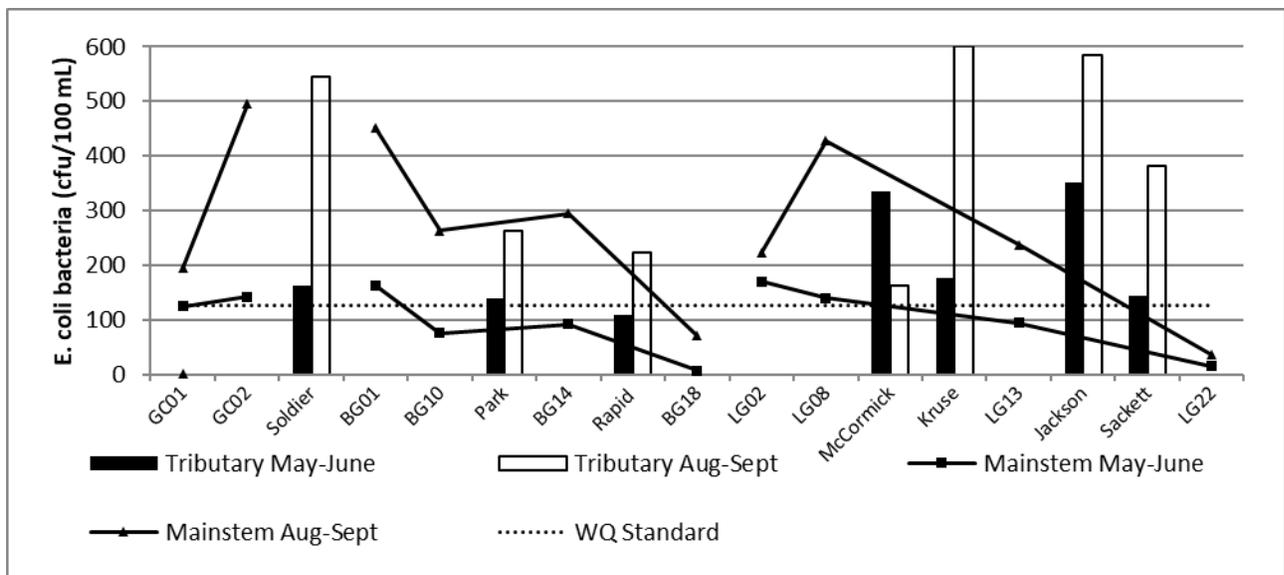
## **Section 6.0 Monitoring Results**

The SCCD uses a three-year rotation for interim monitoring on watersheds after a successful assessment and planning effort. SCCD conducted interim monitoring on the Goose Creek watershed in 2015, on the Tongue River watershed in 2016, and the Prairie Dog Creek watershed in 2017. The objective of interim monitoring is to use water quality information and trends to identify and prioritize areas affected by non-point source pollution and evaluate the effectiveness of implementation of improvement projects and other activities. Planning efforts used water quality monitoring information to determine the percent reductions needed for bacteria levels to meet water quality standards. Using a similar process, SCCD incorporated information from interim monitoring to document estimated reduction requirements for each subwatershed in relation to installed improvement projects (Attachment). For each monitoring season, SCCD submitted a Sampling Analysis Plan (SAP) to WDEQ that described sampling protocols, locations, and data analysis and validation procedures. Following the sampling season, SCCD submitted a detailed monitoring report that discussed the credibility of the data and sampling results. In addition to the monitoring reports, SCCD provided a supplemental Data Package, which included copies of all lab sheets, calibration and field logs, data sheets, and data validation workbooks. SCCD developed a water quality database to house nearly 20 years of collected water quality data. The initial development was completed under a previous grant; data validation to correct any errors that occurred during data migration was completed in 2017. SCCD uploaded water quality information into WDEQ water quality and site information data templates for 2015 and 2016 monitoring on the Goose Creek and Tongue River watersheds, respectively. Data for 2017 monitoring on the Prairie Dog Creek watershed will be submitted upon submission and approval on the monitoring report and data. SCCD will continue to work with WDEQ on the electronic macroinvertebrate data submission.

**Goose Creek Watershed Monitoring.** In 2015, SCCD monitored water temperature, pH, conductivity, dissolved oxygen, discharge, turbidity, and *E. coli* at 17 stations. Continuous water temperature data loggers were used to monitor temperature at 15-minute intervals at seven stations. Macroinvertebrate sampling and habitat assessments were also performed at six stations. Of the 17 stations, there were two sites on Goose Creek, four on Big Goose Creek, four on Little Goose Creek, and one each on Soldier Creek, Park Creek, Rapid Creek, McCormick Creek, Kruse Creek, Jackson Creek, and Sackett Creek. The landowner on Beaver Creek chose not to allow access in 2015; that site was not monitored nor included in the discussion of results.

Instantaneous water temperature measurements were recorded above the maximum 20°C at the lower mainstem stations and on five tributaries during 2015. Continuous temperature loggers reported temperatures that exceeded 20°C at all but the uppermost canyon stations (BG18 and LG22). For the most part, pH and conductivity were within the expected ranges with two pH values above 9.0 SU in Little Goose Canyon and two tributary stations (Park Creek and McCormick Creek) with conductivity values above 1000 µS. With one exception, all sites met the minimum dissolved oxygen concentration for early and other life stages. Three mainstem stations and four tributary stations returned at least one dissolved oxygen measurement below the water column concentration recommended to achieve the intergravel concentration for early life stages. High discharge in early June corresponds to higher than normal precipitation for the period. Turbidity values were considered normal for the watershed with occasional high values occurring during late-spring, early summer precipitation and run-off events. Tributary stations typically had higher turbidity than adjacent mainstem sites, except for Park Creek.

Bacteria concentrations were typically lower in May-June than in August-September; with the exception of McCormick Creek. Mainstem sites typically had lower bacteria concentrations than tributary sites. Most stations had at least one geometric mean that exceeded Wyoming Water Quality Standards in 2015, including six mainstem stations and six tributaries in May-June and eight mainstem stations and seven tributaries in August-September. The only stations that were below the standards for the entire season were BG18 and LG22.



2015 Bacteria geometric means on the Goose Creek Watershed

A decrease in bacteria concentrations was observed from 2012-2015 at all but one of the mainstem stations in May-June. At the station in Little Goose Canyon (LG22) bacteria concentrations increased, but were still well within water quality standards. For August-September, however, bacteria concentrations increased at some stations. All but two of the tributary stations had higher bacteria concentrations in May-June 2015 than in 2012. During the late season, the percent change from 2012-2015 among tributary stations was less consistent, with four tributaries showing increases and three showing decreases. From 2001 to 2015, an increase in bacteria concentrations was observed at every comparable site and sampling period, except for Soldier Creek during the early season and Soldier Creek and McCormick Creek during the late season.

Benthic macroinvertebrate sampling was conducted at six stations in October of 2015. Biological condition at Goose Creek station GC1 was indeterminate for all years except for 2012 when it was partial/non-supporting. Biological condition has declined since 1998. However, biological condition at the lower Goose Creek station GC1 was better than biological condition at the upper Goose Creek station GC2. This observation was in contrast to a general decline in biological condition from upstream to downstream stations noted at Big Goose Creek and Little Goose Creek stations.

Biological condition was partial/non-supporting at Big Goose Creek station BG2 during 2015. Biological condition varied at this station from full support in 1998 to partial/non-supporting in 2005 and 2015. Biological condition at Big Goose Creek station BG10 has been variable since sampling began in 2001. Biological condition was fully supporting in 2001 with a subsequent decline to Indeterminate support from 2002 to 2009. Biological condition increased in 2009, decreased to partial/non-supporting in 2012, and increased to Indeterminate support in 2015.

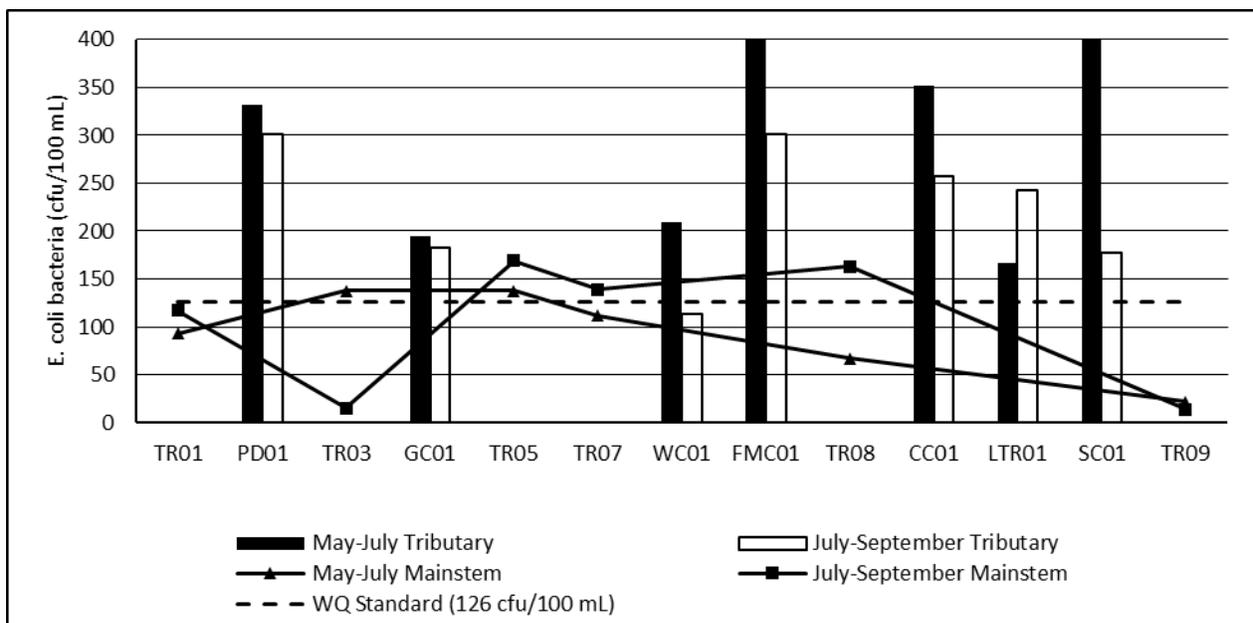
The biological condition at Little Goose Creek station LG2A has been variable since sampling by WDEQ began in 1994. Since 1994, biological condition was Indeterminate during 50 percent of samples collected and partial/non-supporting during 50 percent of samples collected. The trend in biological condition has improved since 1994 at station LG2. This is an important observation since no other station sampled in 2015 in the Goose Creek watershed exhibited an improving trend in biological condition. Biological condition at station LG10 was Indeterminate from 1998 to 2002, then decreased to partial/non-supporting from 2005 to 2015. Although biological condition decreased from the 1998-2002 period to the 2005-2015 period, biological condition gradually increased during each sampling event from 2005 to 2015.

**Tongue River Results Watershed Monitoring.** Tongue River water quality monitoring for 2016 was performed at 13 stations; six sites on the mainstem of the Tongue River, and seven sites on the major tributaries that flow into the Tongue River. These seven tributaries included Smith Creek, Little Tongue River, Columbus Creek, Five Mile Creek, Wolf Creek, Goose Creek, and Prairie Dog Creek. Stations were equipped with a SCCD calibrated staff gauge or located at USGS gauging stations. Grab samples for bacteria and turbidity were collected five times in the early season from May-July and five times in the late season from July-September. Instantaneous temperature, pH, conductivity, dissolved oxygen (% and mg/L), and gauge height were measured on-site during sampling events. Continuous temperature loggers were used to monitor water temperature at the seven mainstem stations. Macroinvertebrate collections and habitat assessments were conducted on five mainstem sites of the Tongue River during the month of September.

Conductivity and pH were within the expected ranges during 2016. Turbidity values were considered normal for the watershed with occasional high values occurring during late-spring, early summer

precipitation and run-off events. All sites met the minimum instantaneous dissolved oxygen concentration for early and other life stages. Four tributary stations and four mainstem stations had one or more samples that were below the 8.0 mg/L water column concentration recommended to achieve the intergravel concentrations for early life stages.

Bacteria geometric mean concentrations in the early season were typically higher than in the late season on tributary sites. In contrast, mainstem sites had higher bacteria concentrations in the late season except on TR03 and TR09. While some mainstem sites did not meet Wyoming Water Quality Standards, the highest bacteria concentration observed at a mainstem site was 169 cfu/100 mL or 25% above the standard. Bacteria concentrations at tributary stations appeared to contribute to bacteria increases on the Tongue River at adjacent downstream stations in the upper portion of the watershed during the early season. Except for Wolf Creek during the late season, bacteria concentrations at all tributary stations exceeded Wyoming Water Quality standards in both the early season and the late season.



2016 Bacteria geometric means on the Tongue River Watershed

For the most part, bacteria concentrations decreased from 2003-2016 and from 2013-2016 at all mainstem sites in the early season but increased in the late season. In contrast, bacteria concentrations at TR09 in the early season increased since 2003, but were still well below Wyoming Water Quality standards.

The collection and analysis of stream benthic macroinvertebrate samples during 2016 revealed similar trends in biological condition observed during previous monitoring at Tongue River mainstem stations. Biological condition scores at reference station TR09 varied little over the years. With the exception of 1995 and 2007, the biological condition scores indicated full support for aquatic life use. The slightly positive trendline indicating improvement in biological condition at station TR09 over the years indicated stability in the biological community and confirmed that station TR09 was a representative reference station. The biological condition of the benthic macroinvertebrate community at Tongue River TR07 station varied little from the period of 1996 through 1999 and indicated indeterminate or full support for aquatic life use each year. However, a negative trendline indicated a general decline in

biological condition since sampling began in 1996. The biological condition scores at station TR05 in from 1995 to 2004 indicated full support for aquatic life use. Sampling from 2006 to 2016 indicated indeterminate support for aquatic life use. The negative trendline for biological condition at TR05 indicated a gradual downward trend in biological condition since sampling in 1995. Full support for aquatic life use may change should the decline in biological condition continue. Biological condition scores at the most downstream station TR01 located near the Montana border indicated full support for aquatic life use during each year since 1998. However, a graph of biological condition scores indicated that biological condition has declined over time. Full support for aquatic life use may change should the decline in biological condition continue.

### **Prairie Dog Creek Watershed Monitoring.**

Monitoring on the Prairie Dog Creek Watershed occurred in 2017 and included 8 sample sites, including 5 mainstem sites and three tributaries (Wildcat Creek, Meade Creek, and Jenks Creek). The landowner on Dutch Creek chose not to allow access in 2017; that site was not monitored nor included in the discussion of results. Grab samples for bacteria and turbidity were collected five times in the early season from May-July and five times in the late season from July-September. Instantaneous temperature, pH, conductivity, dissolved oxygen (% and mg/L), and gauge height were measured on-site during sampling events.



*2017 monitoring was on the Prairie Dog Creek Watershed*

Continuous temperature loggers were used to monitor water temperature at four mainstem stations. Macroinvertebrate collections and habitat assessments were conducted on three mainstem sites during October. The monitoring report, including data interpretation and results, will be completed upon final data validation procedures have been applied. Preliminary reviews indicate that bacteria concentrations at all sites continue to exceed Wyoming Water Quality standards for at least one period.

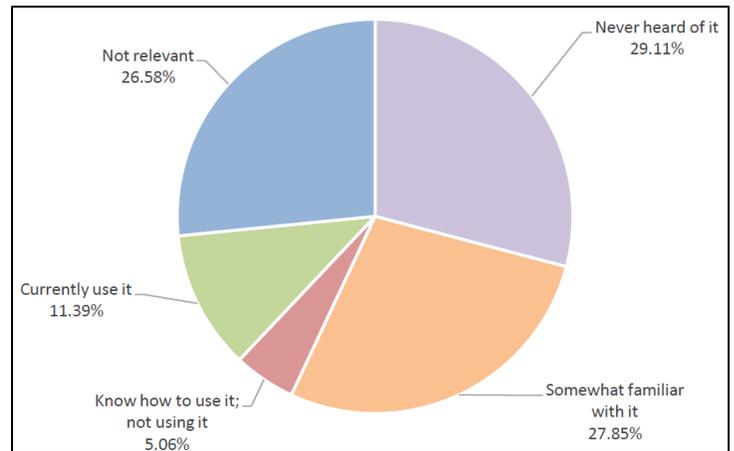
**Goose Creek Social Indicator Survey.** In 2015, SCCD invited several local agencies/organizations to participate in a survey process for the Goose Creek Watershed. SCCD partnered with PB Communications to administer and assess the surveys. The purpose was to help improve planning and evaluation of watershed projects by identifying the capacity, skills, awareness, knowledge, values, beliefs and behaviors of individuals within the watershed. The information gained through this survey process will be used to tailor the priorities and projects of individual organizations in support of the overall goal of improving the quality of water in the Goose Creeks watershed.

The agencies/organizations that participated in the initial meetings and subsequent communications included: SCCD, WDEQ, Sheridan County, Sheridan Area Water Supply, City of Sheridan, Downtown Sheridan Association, North Main Association, Sheridan College, Bighorn National Forest, Wyoming Game and Fish, Trout Unlimited, Sheridan Community Land Trust, The Nature Conservancy, UW Cooperative Extension, and Sheridan County Chamber of Commerce. Participants provided valuable insight into the development of the survey questions and distribution mechanisms.

Two versions of the survey were developed to appropriately capture the indicators for two target groups; one version was targeted toward urban residents and one toward rural residents. The urban survey was distributed to a random sampling of residents within the City of Sheridan and one-mile

outside the city limits. The rural survey was distributed to a sampling of residents outside of the urban survey area within ½ mile of major drainages in the Goose Creek watershed or within ¼ mile of smaller tributaries. A letter (with a unique passcode) requesting online completion was sent in April 2016 and was followed by a printed version to those households that had not completed the online version. During the initial summarization, it was observed that there were very few responses from large landowners. As a result, a follow-up letter and survey were sent to approximately 150 households in November 2016. The follow-up only yielded an additional 3 responses, but these were incorporated into the final report summary. The report and summary data were submitted to all of the participating agencies/organizations for their specific use.

Although overall response to the survey was lower than anticipated (especially among larger landowners), there were some things that stood out. Many of the respondents had some awareness of water quality issues and potential impacts. There was less understanding about practices to improve water quality and the availability of assistance programs. Additional questions related to the ways in which people prefer to receive information. From the report, it was clear that there is a need for additional education on riparian management, even in urban areas and subdivisions. Results also showed that urban respondents generally did not indicate run-off and stormwater as contributors to water quality issues.



*Respondents familiarity with riparian buffer maintenance.*

## Section 7.0 Partners

**Local Partners.** The success of this project was highly dependent on collaborations and input from other groups. Steering Committees for the Tongue River, Goose Creek, and Prairie Dog Creek Watersheds continued to provide input on local watershed activities as well as increasing awareness of other members of the community. These groups consist of local landowners and representatives from



*Through a partnership with the City of Sheridan, SCCD provided activities to increase stormwater awareness*

municipal and county governments. The Sheridan County Public Works Department and City of Sheridan Public Works Department were active and involved in several of the education/awareness and planning activities. Throughout this project, SCCD expanded partnerships and collaborative efforts with other agencies/local groups, including The Nature Conservancy, the Sheridan Community Land Trust, and the Downtown Sheridan Association. The Nature Conservancy, the City of Sheridan, and Sheridan County also provided some funding support for improvement projects and monitoring activities. Local contractors/professionals selected and retained by the landowners installed septic systems and provided additional construction on other projects.

Initiated by the Sheridan Community Land Trust, the Tongue River Initiative was formed as a loose collaboration among the Sheridan Community Land Trust, The Nature Conservancy, and the SCCD. Each has had active programs within the Tongue River watershed for several years in separate capacities reflective of their missions. The Tongue River Initiative engages in a large-scale approach to conservation by encouraging agencies and landowners to address conservation needs across the entire landscape in the greater Tongue River Watershed. In July 2015, The Tongue River Initiative partnership received a \$1.9 million grant from the USDA Regional Conservation Partnership Program.

For the Goose Creek Social Indicator Survey process, SCCD convened a group of 14 agencies and organizations interested in the Goose Creek watershed. Participants included Sheridan County, the City of Sheridan, the Downtown Sheridan Association, University of Wyoming Cooperative Extension, Chamber of Commerce Agriculture and Natural Resources Committee, Wyoming Game and Fish, Sheridan Community Land Trust, The Nature Conservancy, Sheridan Area Water Supply, Wyoming Game and Fish Department, Trout Unlimited, Sheridan College Department of Agriculture, Bighorn National Forest, Wyoming Department of Environmental Quality, and SCCD. Representatives of these groups discussed their concerns and priorities for the Goose Creek watershed and provided input on survey questions, distribution, and demographic areas. Once completed, the results of this survey were provided to the participating entities.

**State agencies.** Representatives from the WDEQ attended some watershed group meetings and provided funding and guidance. WDEQ staff participated in workshops and tours. The Wyoming Department of Agriculture provided additional funding for improvement projects and water quality monitoring. Additional funding and technical assistance on projects was provided through the Wyoming Game and Fish Department and the Wyoming Wildlife and Natural Resource Trust. The additional funds are used as match for the 319 grant funds and increased to amount of financial assistance to make improvement projects more cost-effective for landowners. In addition to funding assistance, representatives from the Wyoming Game and Fish Department also participated in some watershed meetings and provided valuable input.

**Federal agencies.** The partnership with the USDA-NRCS continues to be critical to the success of this program. NRCS personnel participated in some watershed group meetings and other meetings/presentations relative to this project. As the primary government agency charged with conservation planning, the NRCS provided some of the technical and planning assistance needed to ensure that the improvement projects met the intended objectives. Their expertise with soil characteristics and other resource related concerns makes them invaluable for improvements to septic systems. NRCS Engineers provided designs and assisted with installation of some of the stream restoration projects. In addition, the additional USDA program funding helped to make some projects more feasible for producers. Personnel from the Bighorn National Forest also participate in watershed groups and provide additional input.

**Other sources of funding.** In addition to the funding provided by the Section 319 funds, SCCD utilized state grants from the Wyoming Department of Agriculture, the Wyoming Game and Fish Department, the Wyoming Wildlife and Natural Resource Trust, The Nature Conservancy, the City of Sheridan, Sheridan County, and cash and in-kind services provided by the landowners and SCCD for individual projects. USDA program funds were used to help improve cost-share rates for landowners on some projects, but were not applied as match to the 319 funds. Funding support from the USDA for improvements within the project area come from the Environmental Quality Incentives Program (EQIP) base county allocation and through an RCPP grant administered by SCCD on behalf of other partners. The SCCD-NRCS will continue to use a combination of funds on improvement projects to encourage

greater participation. By combining a variety of federal, state, and local funds, improvement projects have been made more feasible for some that otherwise would not be able to put the needed practices into place.

## **Section 8.0 Information and Education**

The watershed groups determined information and awareness activities were a top priority for the individual watershed efforts. They believed most people would make changes in land-use practices if they understood the impacts. As a result, many of the activities in the Tongue River, Goose Creek, and Prairie Dog Creek watershed plans were to provide information and education. This was done (and will continue to be done) through a variety of means, including items specific to the individual watersheds as well as items with a broader distribution. These items included news releases, newsletters, and presentations at a variety of workshops, seminars, and meetings. Some of the information and education activities include: annual watershed newsletters distributed to watershed residents, reports to Wyoming legislators, updates to watershed progress registers, water quality/non-point source pollution demonstrations with high school and elementary school students, and other activities.



*Demonstrations for students and their teachers/parents stress the importance of water quality*

## **Section 9.0 Complications**

There were two amendments to this grant. The first was initiated by WDEQ in 2014 to clarify reporting obligations. The second, in 2016, was requested by SCCD to extend the grant for a period of one year and to modify the budget by transferring dollars among tasks.

Completion of individual improvement projects can sometimes take much longer than originally anticipated. This causes difficulties in meeting grant deadlines and may also result in budget issues and cost overruns for the specific project. Project delays can occur for various reasons. Delays may result from the SCCD-NRCS partnership's inability to provide the technical assistance necessary. Coordinating with outside engineering services was tried, but did not always result in faster service, especially with diversion replacements and stream restoration projects. In addition, there were issues with oversight and construction supervision, which resulted in projects needing repairs/modifications. Allowing installers and landowners to prepare their own septic permit applications and designs, with some oversight from SCCD and Sheridan County, did seem to provide faster service without sacrificing quality installation.

In addition to limited personnel and time resources related to septic system replacements, there are other limitations on the funding sources. The pre-1973 eligibility requirement for septic systems has prevented participation for some systems with severe impacts to water quality. SCCD is currently working with other funding entities to reach some of these systems. Because they are "ineligible", the funds for these systems cannot be included as part of the project match. SCCD has also identified alternative funding sources for sewer connections to replace septic systems. When these connections are used to replace septic systems that otherwise meet the WDEQ eligibility requirements, the funds are applied as match to septic system projects supported by 319 grants.

## Section 10.0 Recommendations

The SCCD will continue to offer cost-share and planning assistance for water resource improvements as long as funding is available. These improvements will not be limited to a single practice, but all projects will be evaluated based on their overall benefit to water quality. The SCCD continues to review, and update as necessary, program policies, applications, and ranking sheets to improve project prioritization and consistency. Load reduction priorities are one of the criteria used in project ranking.

The SCCD will continue to work with the local watershed residents, municipalities, County governments, WDEQ, and other agencies to implement the Tongue River and Prairie Dog Creek watershed based plans and the Goose Creek watershed implementation strategy using the Sheridan County Improvements #5 319 grant and other funds. Additional funds will be sought as needed.

SCCD will increase outreach efforts to encourage more participation in programs, especially for direct sources, such as domestic animal owners and septic systems in priority areas. To ensure the projects continue to meet water quality objectives, SCCD initiated an effort to provide more consistent follow-up on completed projects. Initial surveys provided some information but SCCD was unable to complete all of the intended follow-up site visits as planned. SCCD is currently working on the best way to accomplish this with the limited resources available.

## Section 11.0 Financial Summary

Provide a financial summary of the project by completing a table in the following format.

Task #	Task Title	319 Funds Expended	Nonfederal Match Expended	Total NPS Expenditures	Other Federal Funds Expended
1	Administration	27,475.00	2278.68	29,753.68	
2	Plan Implementation	7016.17	1269.32	8285.49	
3	Improvements	141,431.54	138,170.15	279,601.69	
4	Education	37,512.42	7111.46	44,623.88	
5	Monitoring	57,987.08	40,614.76	98,601.84	
6	Final Report	3327.79		3327.79	
	<b>TOTALS</b>	<b>\$274,750</b>	<b>\$189,444.37</b>	<b>\$464,194.37</b>	

## **Section 12.0 Attachments**

### **Attachments included with this submission**

Progress Register Maps  
Load Reduction Priority Maps  
Annual Watershed Newsletters  
Press Releases/Articles  
SCCD newsletters  
Goose Creek Watershed Signs PDF

### **Documentation Already Submitted and Approved by WDEQ**

Goose Creek Watershed TMDL Implementation Strategy Update  
Prairie Dog Creek Watershed Based Plan 2016 Update  
2015 Goose Creek Watershed Sampling Analysis Plan  
2016 Tongue River Watershed Sampling Analysis Plan  
2017 Prairie Dog Creek Watershed Sampling Analysis Plan  
2015 Goose Creek Watershed Interim Monitoring Report  
2015 Goose Creek Watershed Interim Monitoring Data Package and validation log  
2015 SCCD Water Quality Monitoring Program Quality Assurance Project Plan  
Summary Report for the Goose Creek Social Indicators Survey Project

### **Documentation To Be Submitted to WDEQ separately for approval**

2016 Tongue River Watershed Interim Monitoring Report  
2016 Tongue River Watershed Interim Monitoring Data Package and validation log  
WDEQ Data Templates for Water Chemistry and Monitoring Sites