

**SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM
WATERSHED PROJECT FINAL REPORT**

**SHERIDAN COUNTY WATERSHED IMPROVEMENT PROJECT#3
WDEQ PROJECT NUMBER #NPS2011A**

by

Sheridan County Conservation District
Sheridan, Wyoming

December 15, 2015

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: C9008630-11

EXECUTIVE SUMMARY

PROJECT TITLE: Sheridan County Watershed Improvement Project #3

PROJECT START DATE: July 19, 2011 PROJECT COMPLETION DATE: December 15, 2015

FUNDING:	TOTAL BUDGET:
TOTAL EPA GRANT	\$ 454,780.00
TOTAL BUDGETED MATCH	\$304,020.00
TOTAL EXPENDITURES OF EPA FUNDS	\$ 454,780.00
TOTAL SECTION 319 MATCH ACCRUED	\$ 427,745.84
BUDGET REVISIONS	<u>\$ 0.00</u>
TOTAL EXPENDITURES	\$ 882,525.84

SUMMARY OF ACCOMPLISHMENTS:

The Sheridan County Conservation District (SCCD), in partnership with USDA Natural Resources Conservation Service (NRCS), worked with local watershed residents to address water quality concerns in the Tongue River, Goose Creek, and Prairie Dog Creek watersheds, which are considered impaired for bacteria. This grant provided funds needed to install water quality improvement projects on the Tongue River, Goose Creek, and Prairie Dog Creek watersheds, to conduct information and education activities, and continue interim water quality monitoring. SCCD provided technical and/or financial assistance on 54 water resource projects using funds from this grant. Activities were completed with 319 grant funds, which were combined with state grants, as well as USDA program funding and other funds, to make improvement projects feasible for landowners. All improvement projects are evaluated based on their potential improvement to water quality.

The SCCD-NRCS is pleased with the outcome of this project. Since 2001, 91 water resource improvement projects have been completed in Sheridan County using funds from 319 grants combined with other sources. This includes 27 projects on livestock facilities, 34 septic systems, 11 irrigation diversions, 12 streambank and/or channel stabilization projects, and seven riparian fencing/stockwater developments. There were 33 projects on the Tongue River watershed, 39 projects on the Goose Creek Watershed, 16 projects on the Prairie Dog Creek watershed, and three projects on other watersheds in Sheridan County. The awareness generated by local watershed efforts has encouraged a wide variety of activities by the primary partners and others, only some of which were funded through this grant. There are likely other activities and improvements being done without the direct involvement/assistance of the SCCD-NRCS. Though not measurable at this time, these changes will have a significant impact on water quality and watershed health in the long-term.

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INTRODUCTION

The Sheridan County Conservation District (SCCD), in partnership with the USDA Natural Resource Conservation Service (NRCS), has been working in the area of watershed assessment, planning, and improvement since 1996. This involvement began with a 3+ year watershed assessment on the Upper Tongue River watershed, which resulted in the development of the Tongue River Watershed Plan in 2000. The Tongue River Watershed Plan was updated and submitted to the Wyoming Department of Environmental Quality (WDEQ) in 2007. It was updated again in 2011-2012 to meet the requirements of an EPA Watershed Based Plan. In partnership with Sheridan County and the City of Sheridan, SCCD-NRCS completed an assessment of the Goose Creek, Big Goose Creek, and Little Goose Creek watersheds in 2001-2002. The Goose Creek Watershed Plan was submitted to WDEQ in 2004. After approval by WDEQ in 2005, the plan was filed with the Sheridan County Clerk. In September of 2010, the Wyoming Department of Environmental Quality completed the Goose Creek Watershed TMDL. The SCCD and Goose Creek Watershed Group are currently addressing recommendations from the TMDL through an implementation strategy developed in January 2012. In 2007, SCCD-NRCS initiated an assessment and planning effort on the Prairie Dog Creek watershed; the Prairie Dog Creek Watershed Based Plan was approved by WDEQ in February 2011.

The Tongue River, Goose Creek, Big Goose Creek, Little Goose Creek, and Prairie Dog Creek, are all Class 2AB- Coldwater Fisheries (WDEQ, 2001) with a hydrologic unit code of 10090101. Tributaries to and segments of Goose Creek, Big Goose Creek, Little Goose Creek, Prairie Dog Creek, and Tongue River, are identified as impaired for bacteria (Table 1). The impairments are based on primary contact recreation and are a potential human health issue (WDEQ, 2012).

Table 1. Sheridan County streams identified as impaired for bacteria related to recreational use that are included in a TMDL or EPA Watershed Based Plan

Little Goose Creek	Rapid Creek	Little Tongue River
McCormick Creek	Park Creek	Five Mile Creek
Sackett Creek	Goose Creek	Columbus Creek
Jackson Creek	Soldier Creek	Prairie Dog Creek
Kruse Creek	Tongue River	Meade Creek
Big Goose Creek	Wolf Creek	Wildcat Creek
Beaver Creek	Smith Creek	Dutch Creek

Other water quality impairments in Sheridan County, as of 2012 and applicable to this grant, include (WDEQ, 2012):

- Little Goose Creek because of sediment and habitat for aquatic life and cold water fish uses;
- Goose Creek because of sediment and habitat for aquatic life and cold water fish uses;
- Tongue River,, because of temperature impairments for cold water fish;
- North Tongue river, above the project area, because of bacteria impairments for recreation;
- Prairie Dog Creek because of temperature impairments for cold water fish;
- Prairie Dog Creek because of manganese for aesthetic drinking water uses;
- Meade Creek because of manganese for aesthetic drinking water uses;
- North Piney Creek because of bacteria impairments for recreation;
- Dalton Ditch because of bacteria impairments for recreation; and
- Piney-Cruse Ditch because of bacteria impairments for recreation.

All of the watersheds are characterized by a wide variety of land uses ranging from national forest, agricultural, and urban activities. Residents identified faulty septic systems, domestic animals and

livestock, wildlife, and instream sediment as potential contributors to bacteria concerns. In addition, the groups identified other related concerns, including sediment, temperature, and nutrients that impact water quality and the ability of the waterbodies to meet beneficial uses for cold water fisheries. Though not completely understood, some research suggests relationships among these additional parameters and bacteria levels. Bed sediments have been found to contain elevated levels of bacteria. In some locations, sediment problems in a waterbody can result from in-channel sources as much as from overland flow. Waterbodies in Sheridan County have been subject to high levels of manipulation and channelization and annual modifications for irrigation diversions. Some projects include channel stabilization activities to minimize the channel erosion and sedimentation and irrigation upgrades to eliminate the need for annual channel/diversion modifications.

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 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. As of June 2015, the program has provided \$980,481.83 in federal grants, \$638,618.71 in state grants, \$9282.00 in local/private grant, and \$653,688.10 in USDA program funds. These funds have been matched by \$883,310.28 in landowner contributions. These figures do not include additional dollars and contributions that are currently obligated in contracts. Since 2001, 91 projects have received funding through grants from Section 319 of the Clean Water Act; 21 of these are included in this grant. In addition, willow cuttings were planted on 14 sites through this grant. This grant also included technical and planning assistance on 19 additional projects that were or will be funded through other sources. Projects are tracked on "Progress Registers" for each watershed (Attachment A). In addition, information on resource concerns and potential practices/cost-share programs was provided in Annual Watershed Newsletters and other materials (Attachment B).

SCCD and NRCS are committed to local watershed planning and improvement efforts, partly because of the emphasis placed on voluntary participation. The landowners and residents of the watershed have the ability and responsibility to make the actual changes and their support and participation is vital for broad-scale, sustainable resource improvements. The cost-effective, voluntary program, directed by the local watershed plans, continues to encourage widespread cooperation and participation from landowners.

PROJECT PRODUCT OUTCOMES, TARGETS, AND TASK ACTIVITY

PROJECT PRODUCT SUMMARY

Outcome: Through individual watershed improvement projects, including, but not limited to improvements to high priority AFOs and septic systems, implementation of urban and rural residential BMPs, stream restoration projects, and riparian zone enhancements, reduce bacterial loading in the Tongue River, Goose Creek, and Prairie Dog Creek watersheds by minimizing the volume of untreated wastewater entering surface waters in the short term so that in the long term State of Wyoming water quality criteria and designated beneficial uses for Class 2AB surface waters are met. High priority projects are those that have an obvious water quality impact and meet local program criteria.

Target 1: Maintain a viable watershed improvement program for Sheridan County

Task 1: The SCCD will administer the project, provide financial accounting, submit reimbursement requests, maintain all project records, and file all reports for the life of the project.

Anticipated Cost: \$48,960.00

Outputs: Timely reimbursement requests, complete annual reports and MBE/WBE reports as required by WDEQ, project accounting/records.

Task2: The SCCD will work with WDEQ and local watershed groups to provide oversight for the implementation of the Tongue River and Prairie Dog Creek Watershed Based Plans and the Goose Creek TMDL Implementation Plan, which address the nine mandatory elements required in EPA Watershed-Based Plans.

Anticipated Cost: \$9360.00

Outputs: Watershed Plan reviews and progress reports for the EPA Watershed Based Plans on Tongue River and Prairie Dog Creek watersheds and the Goose Creek watershed TMDL Implementation Plan. Annual watershed committee meetings for plan review and updates.

Target 2: Improve water quality in Sheridan County streams by providing technical and financial assistance for water resource improvement projects

Task 3: The SCCD-NRCS partnership will provide technical and financial assistance to approximately 36 landowners through September 2015 to evaluate existing AFOs, septic systems, stream channels, riparian zones, urban and residential run-off, and other situations to identify and implement improvement opportunities on high priority projects. High priority projects are those where there is an obvious water quality impact and that meet local program criteria.

Anticipated Cost: \$593,040.00 + \$226,633.31 in Other Federal Funds

Outputs: Estimated 1,452,000 cf (194,103 gallon) reduction in untreated run-off from livestock facilities; estimated 1,971,000 gallon reduction of untreated wastewater from septic systems; reduction in sediment contributions from unstable stream channels and irrigation diversions; reduction of unfiltered run-off through degraded riparian areas; and reduction of unfiltered/treated stormwater run-off from urban and rural residential areas.

Target 3: Increase awareness and encourage implementation of watershed improvement activities through implementation of watershed plans and development of an education strategy that provides information/education on potential water quality impacts from and improvement opportunities for small acreage and/or livestock operations, septic systems, and other activities.

Task 4: SCCD has a need to expand and improve watershed outreach. While previous efforts have met the intended objectives, they need to be more comprehensive and reach a larger audience. SCCD will develop a watershed outreach strategy, using information from EPA's "Getting In Step: A Guide for Conducting Watershed Outreach Campaigns" and other successful programs. In particular, SCCD will identify ways to reach small acreage landowners and urban residents and address stormwater issues. The SCCD will continue to develop information and education activities needed to implement local watershed plans, including annual watershed newsletters. Progress Registers for each watershed will be updated at least annually, or as needed for use in education activities.

Anticipated Cost: \$42,300.00

Outputs: A watershed outreach strategy that identifies ways to reach small acreage landowners and urban residents and provides information on watershed issues including bacteria/sediment sources, stormwater/run-off, and improvement opportunities; increased public awareness and participation in local improvement efforts from 4 watershed newsletters distributed to ~1200 Tongue River watershed residents, 4 watershed newsletters distributed to ~9500 Goose Creek watershed residents, 4 watershed newsletters distributed to ~500 Prairie Dog Creek watershed residents, 3 progress registers (one for each watershed) distributed to local governments, WDEQ, and others as requested.

Target 4: Evaluate program effectiveness

Task 5: SCCD will continue interim monitoring on the Tongue River, Goose Creek, and Prairie Dog watersheds on a three year rotation to evaluate long term trends in water quality. SCCD will use information collected to assess whether changes need to be made for future monitoring, information and education, and improvement programs. Where appropriate and supported by the landowner, SCCD will consider supplementing the watershed scale monitoring with more specific project by project effectiveness monitoring. Because of the variability in bacteria samples, water quality samples specific to an individual project may have little to no value unless part of a larger monitoring program, but may be useful in some situations. SCCD has over 10 years of water quality data from the three watersheds. SCCD will convert all previous datasets into the WDEQ ACCESS database format and ensure that data collected under this grant meets that requirement.

Anticipated Cost: \$62,740.00

Outputs: 620 credible data collected and validated under accepted Quality Assurance/Quality Control protocols and approved Sampling Analysis Plans and Quality Assurance Project Plans and accurately interpreted and reported to WDEQ and other entities through the WDEQ ACCESS database; ACCESS database with water quality data from 1996-2010.

Task 6: The SCCD will develop and submit the final report for the project to WDEQ. The draft report will be submitted to WDEQ 60 days prior to the termination of the project and the final reimbursement request.

Anticipated Cost: \$2400.00

Outputs: Approved Final Report that satisfies 319 program requirements

PLANNED AND ACTUAL MILESTONES AND COMPLETION DATES (Table 2)

Table 2. Planned and Actual Milestones

Planned Products	Planned Completion Date	Actual Products	Actual Completion Date
Task 1. Project administration			
Records & reimbursements	September 2015	32 reimbursement requests (as of 9/30)	September 2015
4 WDEQ progress reports	September 2015	4 annual progress reports (12/11, 12/12, 12/13, 12/14)	December 2014
4 MBE/WBE Reports	September 2015	4 annual MBE/WBE reports (10/11, 10/12, 10/13, 10/14)	October 2014
40 SCCD Board meetings	September 2015	28 meetings for project reviews 7/12, 8/12, 9/12, 10/12, 11/12, 12/12, 1/13, 2/13, 3/13, 4/13, 5/13, 6/13, 7/13, 8/13, 9/13, 10/13, 11/13, 12/13, 1/14, 4/14, 5/14, 6/14, 7/14, 8/14, 9/14, 10/14, 11/14, 12/14	December 2014
Other meetings		LWG mtgs 9/13, 10/14, ?/15 Big Goose Plan mtgs Tongue River Initiative mtgs Plank Stewardship mtgs	
Task 2. Watershed Plan Implementation/Oversight			
4 GC Watershed Plan meetings	March 2015	4 GC-TMDL workplan (10/12, 3/13, 2/14, 2/15)	March 2015
4 TR Watershed Plan meetings	March 2015	5 TR watershed plan (8/12, 10/12, 3/13, 2/14, 3/15)	March 2015
4 PD Watershed Plan meetings	March 2015	3PD watershed plan- (2/12 cancelled, 2/13, 2/14, 2/15)	March 2015
Task 3. Watershed Improvement Projects			
Assistance on 36 projects	September 2014	<p><u>Funds and/or match provided on:</u> 1 corral relocation projects 9 septic system replacements 6 fence/water improvements 3 irrigation diversion replacements 2 streambank/channel stabilization 14 willow/cutting plantings</p> <p><u>Planning assistance for future:</u> 7 septic system replacements 1 corral relocations 1 riparian fence/water improvement</p> <p><u>Technical assistance on USDA projects:</u> 1 stockwater development/fencing 1 stream restoration 8 irrigation system upgrades</p> <p>Other technical/planning assistance was provided on projects in other watersheds and for projects that were ineligible for funding or not initiated, including one septic system that did not meet the age requirement, but had a considerable water quality impact. That project was funded through local and other state grants.</p>	September 2015

Table 2. Planned and Actual Milestones (continued).

Planned Products	Planned Completion Date	Actual Products	Actual Completion Date
Task 4. Information and Education			
1 Outreach Strategy	July 2015	Outreach calendar, updated annually	January 2015
		EPA Getting in Step Modules	July 2012
4 GC Watershed Newsletters	July 2015	2 GC Watershed newsletters 7/12 (resulted in 1 project request), 1/14	January 2014
4 TR Watershed Newsletters	July 2015	2 TR Watershed Newsletters 12/12 (resulted in 1 project request), 1/14	January 2014
4 PD Watershed Newsletters	July 2015	2 PD Watershed Newsletters 12/12 (resulted in 2 project requests), 2/14 (resulted in 1 project request)	February 2014
4 GC Progress Register Updates		3 Progress Register Updates 1/13, 2/14, 2/15	February 2015
4 TR Progress Register Updates		3 Progress Register Updates 1/13, 2/14, 2/15	February 2015
4 PD Progress Register Updates		3 Progress Register Updates 1/13, 2/14, 2/15	February 2015
Publications/Materials		Livestock Post/rack card 4/13 (resulted in 2 project requests) Display Boards/Open House 5/13, 5/14 Septic Inserts/folders 3/13, Septic Fact Sheet in SAWS bill 9/14 TRI Booklet w/ SCLT/TNC 8/13 TR Canyon Summary Booklets 6/15	April 2013 May 2013 & 2014 March 2013 September 2014 August 2013 June 2015
Presentations		Sheridan Trout Unlimited 10/12 Chamber Ag Committee 10/12 WACD BMP Training 10/13 Sheridan Wellness Festival 2/14 Sheridan College Lecture Series 9/14 Sheridan College Env. Class 4/15	December 2012 December 2012 October 2013 February 2014 September 2014 April 2015
Tours/Workshops		1 City Staff Tour 2 Commissioner Tours Small Acreage Workshop-3 nights	September 2014 2012 2014 May 2014
Public Meetings/Local Events		BLM RMP meeting and comments Governor's Water Strategy Local Foods Expo Booth/Ad Earth Day Booths/Coordination Fair Display 3 rd Thursday Street Festivals 3 annual reports to Wyoming legislators	September 2013 November 2013 April 2013 April 2013, 2014 August 2013 2013 & 2014 December 2012 January 2014 November 2014
Education Demos		Sagebrush School Outdoor Lab Meadowlark School Watershed Demos Sheridan College Survey Field Class Tongue River High School Field Class Sheridan High School Biology Field Class Trout Unlimited/TRMS Adopt a Trout SCLT Unplugged Water Quality Demos	2013, 2014, 2015 April 2014 2013, 2014 2013, 2014 2013, 2014 2014 2014, 2015

Table 2. Planned and Actual Milestones (continued).

Planned Products	Planned Completion Date	Actual Products	Actual Completion Date
Task 4. Information and Education (continued)			
Press releases/Media		13 Sheridan Press articles and/or photos: Tongue River Watershed Plan Watershed Committee Mtgs Goose Creek City fund request Cost-Share programs Soil and Water Stewardship Tongue River Monitoring TR High School Field Day TR Steering Committee Sheridan HS Field Day Candidates/Water Quality TU/TRMS Adopt a Trout SCLT Unplugged Demo TR Middle School Field Day 2 Sheridan Media News stories Water Monitoring Program Watershed Committee Mtgs	October 2012 March 2013 March 2013 March 2013 April 2013 May 2013 September 2013 February 2014 September 2014 October 2014 October 2014 May 2015 May 2015 January 2015 February 2015
SCCD Newsletters		4 SCCD newsletters with information on: Cost-share programs/TR Asses Project feature, monitoring, TRI Workshop/updates/cost-share Stinger/willow planting	Fall 2012 Fall 2013 Spring 2014 Fall 2014
Other		WACD Small Acreage BMP video updates to website/social media, distribution of Septic System Folders	July 2013 On-going On-going
Task 5. Interim Water Quality Monitoring			
4 Monitoring Plans/SAPs			
GC Plans	March 2012, 2015	GC 2012	May 2012
TR Plans	March 2013	TR 2013	May 2013
PD Plans	March 2014	PD 2014	May 2014
620 Water Quality Samples			
GC Samples	October 2012, 2015	480 bacteria and turbidity in 2012	October 2012
TR Samples	October 2013	280 bacteria and turbidity in 2013	October 2013
PD Samples	October 2014	280 bacteria and turbidity in 2014	October 2014
4 Monitoring Reports			
GC Reports	November 2012	GC 2012 Report approved by WDEQ	July 2014
TR Reports	November 2013	TR2013 Report approved by WDEQ	October 2015
PD Reports	November 2014	PD2014 Report submitted for peer review Will be submitted to WDEQ in 1/2016.	December 2015
1 ACCESS Database	November 2014	Water Quality Database complete; verification and Macroinvertebrate Database in progress	March 2015
		Data Archiving of past data sheets	In Progress
Task 6. Final Report			
1 Draft Report	May 2015	Draft Report	June 2015
1 Final Report	July 2015	Final Report approved by WDEQ	December 2015

EVALUATION OF PRODUCT OUTCOME ACHIEVEMENT AND RELATIONSHIP TO THE STATE NPS MANAGEMENT PLAN

For the most part, the planned project products were achieved, though some modifications were made. SCCD provided technical and financial assistance from this grant or matching funds on 35 projects and provided technical assistance on 19 projects that were or will be funded through other sources and/or future 319 grants. This exceeded the number of projects planned in the proposal. One septic system project was ineligible for 319 funding because of the age requirement but was still a significant water quality impact. SCCD was able to fund this project through other sources, but did not include it in the funding/match totals because of its ineligibility. It was included for the calculation of load reductions. SCCD estimated a reduction of 2,165,103 gallons of untreated wastewater through implementation of this project, including 194,103 gallons (1,452,000 cf) from livestock and 1,971,000 gallons from septic systems. SCCD achieved a higher reduction of 2,869,418 gallons through improvements to livestock operations (1,281,668 gallons) and septic systems (1,587,750 gallons). This figure does not include the potential reductions that result from improved riparian buffers and reduced run-off from improvements to irrigation systems and rangelands that were also addressed.

This project addressed the intent of the Wyoming Non Point Source Management Plan Update (WDEQ, 2000), which was applicable at the time the project was approved, and meets the top priorities as defined in the Overarching Principals. As "...a proactive information and education program . . .", the project has increased public and government official awareness of nonpoint source pollution as it relates to septic systems, domestic animals, and other sources. Through this increased awareness, the project has successfully "...encourage[d] participation in voluntary efforts to prevent, reduce, and eliminate pollution..." (WDEQ, 2000). The Plan Update further states

the [Water Quality Division] (WQD) program to address [Animal Feeding Operations] (AFOs)...is a voluntary, incentive-based approach [and] landowners can voluntarily address potential water quality problems through adoption of appropriate Best Management Practices and development of Comprehensive Nutrient Management Plans [that] may make permitting unnecessary . . . WQD will continue to...coordinate with Conservation Districts and the Natural Resources Conservation Service in meeting the goals of Wyoming's Animal Feeding Operation strategy (WDEQ, 2000).

While both the USDA/EPA AFO strategy (USDA, 1999) and the Wyoming Non-Point Source Management Plan Update (WDEQ, 2000) focus on a voluntary approach, regulatory means can be used where a voluntary program fails to achieve the goals. Since voluntary assistance is no longer available to landowners once a regulatory action has begun, it is imperative to make voluntary programs available and effectively promote their use. Sheridan County watershed efforts used the local planning process to encourage broader participation in programs.

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 2012; 2015 monitoring was completed under a separate grant. Monitoring on the Tongue River watershed occurred in 2013 and on the Prairie Dog Creek watershed in 2014 (Table 3).

Table 3. Interim Watershed Monitoring Rotation for Sheridan County Conservation District

Watershed	Assessment	Additional Monitoring	Scheduled Monitoring	Observed trends
Tongue River	1996-1999	2003, 2006, 2010, 2013	2016	decrease in bacteria from 2003 to 2006 increase in bacteria from 2006 to 2010 decrease in bacteria from 2010-2013
Goose Creek	2001-2002	2005, 2009, 2012, 2015	2018	increase in bacteria from 2001-2002 to 2005 increase in bacteria from 2005 to 2009 increase in bacteria from 2009-2012
Prairie Dog	2007-2008	2011, 2014	2017	decrease in bacteria from 2007 to 2008 increase in bacteria from 2008 to 2011 decrease in bacteria from 2011-2014

The general trend in bacteria concentrations on the Goose Creek watershed appears to be increasing since 2001, despite implementation of improvement projects. May bacteria concentrations in the Goose Creek watershed increased an average of 105% from 2009-2012 on mainstem sites and 238% on tributary stations. August 2012 bacteria concentrations decreased by 0.2% from 2009 on mainstem sites but increased 90% on tributary sites. In addition, the number of comparable mainstem sites exceeding the standard increased from 2001-2012 in May and August. Bacteria concentrations at mainstem stations were typically lower than tributary stations. Drought conditions in 2001-2002 may have contributed to the lower concentrations in those years. Regardless of the possible hydrologic effects on bacteria concentrations, the data show that, in general, the same stream reaches were found to be impaired as those found during previous monitoring efforts.

In the Tongue River watershed, bacteria concentrations decreased by 7 to 65% at a majority of the comparable sites from 2010-2013. May bacteria concentrations increased at the two uppermost Tongue River stations, though geometric means continued to meet water quality standards. Increases were also observed in August at two mainstem stations, though one of these continued to meet water quality standards. Although bacteria decreases were observed on five of the seven tributaries from May 2010 to May 2013, all but one of the tributary stations continued to exceed water quality standards.

Prior to 2014, geometric means were calculated on 5 samples collected within two separate 30 day periods (May-June and July-August). In 2014, SCCD calculated geometric means on 5 samples collected within two separate 60 day periods on the Prairie Dog Creek Watershed in anticipation of a change in the accepted methodology (WDEQ, 2014). Comparisons among years are still valuable for evaluating water quality trends; both the 30 day geometric means and the 60 day geometric means capture samples collected during early season (May-June/July) and late season (July-August/September) conditions. Comparisons among years could be made at all stations with the exception of Jenks Creek, which was a new site in 2014. In the Prairie Dog Creek Watershed, bacteria concentrations decreased by 13-84% from 2011 to 2014 at a majority of the comparable sites in May-July and in July-September. May-July bacteria concentrations increased at the upper mainstem station (PD10), on Wildcat Creek, and Prairie Dog Ditch by 101%, 20%, and 263%, respectively, though geometric means at PD10 and on Prairie Dog Ditch continued to meet water quality standards in 2014. Increases from July-August 2011

to July-September 2014 were observed at two mainstem stations (PD3A and PD09) and on Dutch Creek and Meade Creek. Although bacteria decreases were observed at a majority of the sites from 2011-2014, all but one of the stations (PDDitch) continued to exceed Wyoming Water Quality standards in July-August 2014.

IMPLEMENTATION OF WATER QUALITY IMPROVEMENT PRACTICES

Thirty-five projects were installed using funds from or applied as match to this grant. The projects include one corral relocation project, nine septic system replacements, six riparian stockwater and/or fencing projects, three irrigation diversion replacements, and two stream channel/bank stabilization projects. This grant also included funds for technical and planning assistance on an additional 19 projects that were or will be funded through other sources or future 319 grants. Technical and planning assistance was also provided on other projects that were either located in other watersheds, were ineligible for funding assistance, or were not initiated.

Apart from the projects in which the SCCD-NRCS and other partners are directly involved, there are other activities and practices being implemented by individuals and other entities. The awareness generated by this project has encouraged small changes, in addition to larger, more intensive improvement projects. Examples include a stream restoration effort by the City of Sheridan on Big Goose and Little Goose Creeks, a septic impact study by the City of Sheridan, a feasibility study by Sheridan County on wastewater treatment in the Little Goose Creek valley, and installation of stormwater interceptors by the City of Sheridan to reduce sediment contributions. Though not measurable at this time, individual changes in land use practices will have a significant benefit to water quality and watershed health in the long-term.

WATER QUALITY IMPROVEMENT THROUGH MEASURED OR ESTIMATED LOAD REDUCTIONS

The SCCD-NRCS has attempted to provide information on load reduction estimates, based on the size and type of the improvement project (Table 4). However, because of the complexity of non-point source pollution, these are only theoretical estimates of what is actually occurring on the watershed in the short term. Rather than attempting to use these estimates to make conclusions as to the overall impact on the watershed, SCCD-NRCS will continue to use the existing monitoring network to evaluate long term changes in water quality.

Livestock Operations. To determine load reduction estimates for improvements to livestock operations (Table 4a), SCCD-NRCS first calculated the reduction in run-off with the 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 (from NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States); and

S is the potential maximum retention after run-off begins in inches. S is calculated using the equation

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

where CN is a run-off curve number. The CN used for an earthen corral is 90, 79 for a pasture area, 98 for a barn roof, and 89 for driveways/county roads.

In addition, SCCD-NRCS used Table 2 of the Agronomy Technote #20 (NRCS, 2002) to estimate run-off from a contributing area outside of the facility area, using a CN of 80 and a 3.0 inch rainfall, which is comparable to a 25 year/24 hour event in Sheridan County. While it is relatively simple to estimate volume of run-off from a given storm event using the above formulas, estimates of average annual run-off are less reliable. There is some indication that average annual run-off may exceed the 25 year/24 hour run-off; therefore the figures provided may under-estimate the actual wastewater reduction.

To estimate the potential bacteria load reduction, SCCD used fecal coliform bacteria figures from the Protocol for Developing Pathogen TMDLs (USEPA, 2001) for grazed pasture and feedlot runoff. SCCD used fecal coliform concentrations of 1.35E+6 organisms/100ml for feedlot runoff (Baxter-Potter and Gilliland, 1988 from USEPA, 2001) and 120 organisms/100 ml for grazed pasture runoff (Doran et al., 1981 from USEPA, 2001). For the purposes of this report, the corral or facility area was assumed to be similar to a feedlot; the additional areas contributing run-off were assumed to be similar to a grazed pasture. Small-acreage pastures that were heavily grazed with little perennial vegetation were treated as corral facilities, while small-acreage pastures that had healthy vegetative cover and buffer areas were considered grazed pastures. To determine the conversion factors for the potential number of organisms per acre inch of run-off, SCCD used two calculations:

$$\text{Organisms/acre inch feedlot runoff} = (27,154 \text{ gal/ai})(3.7854 \text{ l/gal})(1000 \text{ ml/l})(1,350,000 \text{ organisms/100 ml});$$

and

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

The calculated number of organisms per acre inch of feedlot run-off is 1.4E+14 organisms, which was multiplied by the acre inches of runoff from the facility. The calculated number of organisms per acre inch of grazed pasture is 1.2E+8 organisms, which was multiplied by the number of acre inches of run-off from the contributing area.

Septic Systems. To determine load reduction estimates for improvements to septic systems (Table 4b), SCCD first estimated the reduction in contaminated wastewater from the peak design flows for single family dwellings. Table 1 of Sheridan County Regulations for a Permit to Construct, Install, or Modify Small Wastewater Facilities and Related Design Standards (Sheridan County, 1984) estimates the quantity of domestic sewage flows from a single family dwelling to be 150 gallons per bedroom per day. To estimate the annual reduction in wastewater from a septic system improvement, SCCD used the number of bedrooms in the residence to determine the daily input of wastewater into the waterbody prior to the project. This was multiplied by 365 to estimate the annual reduction in wastewater upon improvement of the system.

To determine bacteria load reductions, 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. For systems that discharged into a ditch, SCCD applied the “Tank Seasonal” Model. The “Surface Seepage” Model was used for projects where sewage effluent was present on the surface. 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 and because the systems were in areas where groundwater/surface water interactions were likely. SCCD entered variable information into the spreadsheets and presented the load reductions as reported.

Stream Restoration. Estimates of sediment load reductions for the stream restoration projects (Table 4c) were calculated in two ways. Seven of the projects included in-channel structures, bank grading, and revegetation to repair severely eroding streambanks. The approximate annual sediment contribution from the eroding bank was calculated using the width of streambank (or cut) lost per year (based on discussions with landowners and documented in project files up to 1 foot per year), the length of the eroding area, and the height of the bank. Three of the projects included replacement of irrigation diversions to prevent the need for annual construction of cofferdams in the channel and the subsequent washout of the dams. The approximate annual sediment resuspension from the dam construction was calculated by determining the area of the dam, assuming 5:1 slopes on the sides, and 50% fine material. The remaining material is assumed to consist of cobbles and coarse gravels that do not remain suspended in the water column.

In 2010, SCCD received a grant to build a waterjet stinger to aid improve establishment of willows and other cuttings along streambanks. SCCD encouraged vegetation establishment as an alternative to or in combination with structural stabilization techniques at several locations. SCCD currently provides planting assistance with the stinger under a contract with Forster Enterprises, who coordinates with landowners and assists with willow harvesting and planting. Under this contract, Forster Enterprises also performs site follow-up and provides a report and photo documentation to SCCD that includes information on survivability. The service is currently provided to landowners free of charge; any interested landowner with bank stabilization needs can request assistance.

Table 4a. Run-off reduction for livestock operation improvement projects

Project ID	319 funds	Matching funds ¹	Facility Area (acres)	Other Area (acres)	Practices Installed	Length of stream fenced/protected	Event-based Run-off Reduction ² (acre-inches)	
							Facility	Other
RW*- Big Goose Creek	\$14,891.71	\$5227.86	0.3	0.6	Corral Relocation Corral run-off management Clean water management		0.5*	0.7*
JRM- Five Mile Creek	\$23,557.52	\$12,817.97	4.1	N/A	Corral installation Riparian & Cross Fencing Stockwater Irrigation System	710 feet	8.2	N/A
MD- Little Goose Creek	\$9232.19	\$2308.05	3.8	N/A	Water gap fencing Stockwater	68 feet	7.6	N/A
BD- Murphy Gulch/Prairie Dog Creek	\$7024.50	\$7024.50	N/A	3.0	Riparian fencing Stockwater	623 feet	N/A	3.6
LB- Meade Creek	\$35,129.21	\$8807.27	1.5	8.0	Riparian fencing Stockwater	1615 feet	3.0	9.6
SCLT- Dry Creek/Tongue River	\$7791.00	\$7791.00	N/A	6.0	Riparian fencing	5280 feet	N/A	7.2
LWB- Soldier Creek	\$29,153.61	\$7458.16	4.0	N/A	Corral Installation Fencing Stockwater	1078 feet	8.0	N/A
TOTAL LENGTH AND ACRE INCHES OF WASTEWATER RUN-OFF						9374 feet	26.8	20.4
TOTAL GALLONS OF WASTEWATER RUN-OFF							727,727	553,941
CONVERSION FACTOR (ORGANISMS/ACRE INCH)							1.4E+14	1.2E+8
BACTERIA REDUCTION IN ORGANISMS³							3.8E+15	2.4E+9
*Note: RW project was funded through Sheridan Improvements #2 grant; load reduction amounts were included in the final report for that grant. The information is repeated here for reference and are not included in the totals.								

¹ Includes state grant funds and landowner match; does not include USDA program funds, where applicable. Landowner match applied to other funding sources.

² Load reductions are determined using Table 2 of the USDA NRCS Agronomy Technote 20, where the CN is 80 and the rainfall is 3.0 inches, and the USDA NRCS run-off equation 2-3 from the NRCS Engineering Field Manual Chapter 2: $Q=(P-0.2(S))^2 / (P+ 0.8 (S))$ 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 is calculated using the equation $S = (1000 / CN) - 10$; where CN is a run-off curve number; where the CN for an earthen corral is 90, for a pasture area is 79, for a barn roof is 98, for a stackyard/parking area is 85, and for a road or driveway is 89.

³ Bacteria load reductions calculated by multiplying the acre inches of run-off for the facility or the contributing area by a conversion factor of organisms per acre inch of run-off, where organisms/acre inch facility runoff = $(27,154 \text{ gal/ai})(3.7854 \text{ l/gal})(1000 \text{ ml/l})(1,350,000 \text{ organisms/100 ml})$ and organisms/acre inch contributing area runoff = $(27154 \text{ gal/ai})(3.7854 \text{ l/gal})(1000 \text{ ml/l})(120 \text{ organisms/100 ml})$. SCCD used 1.35×10^6 organisms/100 ml as the facility run-off concentration (Baxter-Potter and Gillilan, 1988 from USEPA, 2001 for feedlot runoff) and 120 organisms/100 ml as the contributing area concentration (Doran et al., 1981 from USEPA, 2001 for grazed pasture runoff).

Table 4b. Wastewater reduction for septic improvement projects funded through or applied as match to this 319 grant

Project ID	319 funds	Matching funds	Bed-rooms	Description	Wastewater Reduction ¹ (gallons/year)	Bacteria Load Reduction ² (organisms/year)
MC-Dutch Creek	\$4590.64	\$4590.64	2	Septic tank of unknown size and age for house built ~1928, approximately 36 feet from Dow Prong (tributary to Dutch Creek) with discharge from tank going directly into the drainage. Installed septic tank and absorption field.	109,500	2.418E+12 Tank without Leachfield Model
JMK-Wildcat Creek	\$5546.12	\$5546.11	3	Septic tank of unknown size and type discharging into West Fork of Wildcat Creek. The house was built in 1906, but the septic system is believed to have been installed sometime in the 1960s. Installed septic tank and absorption field.	164,250	2.418E+12 Tank without Leachfield Model
DZ-Jackson Creek	\$7837.50	\$7837.50	4	Septic tank of unknown size and type with sewage surfacing within 220 feet of Jackson Creek. The system serviced two single-family dwellings. Installed septic tank and chambered absorption field.	219,000	1.601E+11 Surface Seepage Model
LB-Meade Creek	\$6852.27	\$6852.27	3	Two separate systems with the newer one being installed around 1968 with an absorption field within 50 feet of Meade Creek. The older of the two systems is believed to have a concrete septic tank of unknown size that discharges into a draw that drains to Meade Creek. Installed single septic tank, dosing tank with pump, and an absorption field.	164,250	5.560E+11 Tank and Overland Flow Model
BB-Wolf Creek	\$4938.73	\$4938.72	3	System of unknown age (house built in 1902), which consists of a seepage pit, within 47 feet of a ditch that flows into Wolf Creek. Installed septic tank and absorption field.	164,250	1.671E+12 Tank Seasonal Model
MM-Tongue River	\$3563.00	\$3563.00	4	System consisted of a leach pit with a pipe that discharged into the bank of a spring-fed oxbow to the Tongue River about 300 feet from the water surface. The flow entered the Tongue River about 650 feet downstream. Installed septic tank and absorption field.	219,000	2.418E+12 Tank without Leachfield Model
DS-Prairie Dog Creek	\$9137.46	\$9137.46	2	Septic tank of unknown size and age, for house built around 1928, approximately 10 feet from an irrigation ditch that flows into Prairie Dog Creek with discharge from tank going directly into the drainage. Installed septic tank and slightly mounded absorption field.	109,500	2.418E+12 Tank without Leachfield Model
BLP-McCormick Creek	\$6302.51	\$6302.51	3	System of unknown age (house built in 1910), which consists of a septic tank with 2 trenches within 50' of McCormick Creek. Effluent surfaces at the tank if not pumped. The tank was within 100 feet the creek. Installed septic tank and absorption field.	164,250	3.135E+11 Surface Seepage Model
CNB-Sackett Creek	\$8000.00	\$8000.00	3	System with bottomless concrete tank within 50' of perennial drainage to Sackett Creek. The flow enters Sackett Creek about 800 feet downstream. Effluent surfacing at the tank. Installed septic tank, dosing tank with pump, and mounded absorption field.	164,250	4.688E+11 Surface Seepage Model
MUSIC-McCormick Creek	\$0.00	\$0.00	2	Corroded metal tank/seepage pit with no leachfield and surfacing effluent within 70' of McCormick Creek. Small lot with trailer not eligible for 319 (age-1978); applied other funding sources. Installed septic tank, dosing tank with pump, and mounded chambered absorption field	109,500	3.828E+11 Surface Seepage Model
TOTAL WASTEWATER AND LOAD REDUCTION					1,587,750	1.32E+13

¹ Annual wastewater reduction from a septic system is estimated using the daily flow of the dwelling (based on number of bedrooms * 150 gallons) * 365 days in a year.

² Fecal Coliform bacteria reduction determined using the WDEQ NPS Septic System Load Reduction Model spreadsheets using the indicated model.

Table 4c. Stream restoration, irrigation diversion, and willow plantings improvement projects

Stream Restoration/Diversion Upgrade projects funded through this 319 grant						
Project ID	319 funds	Matching funds¹	USDA Funds	Description	Stream length (feet)	Annual sediment reduction (cubic yards)
RH Ditch*-diversion Big Goose Creek	\$19,348.59	\$36,947.18		Replacement of an irrigation diversion structure with a permanent 5-drop cross vane diversion with grade stabilization. Modifications in 2014 to address functionality and access issues.		40*
York Ditch-diversion York Ditch-EWP Tongue River	\$14,551.15	\$37,484.75	\$121,222.42	Replacement of a push-up/rubble diversion with a block cross vane diversion. The project was completed in 2012 and modified in 2014 under a USDA EWP project to address flood damage and passage concerns. Modifications included a ramp structure with constructed riffle.		65
FK-restoration Tongue River	\$9000.00	\$59,432.23		Originally planned and constructed under the USDA WRP program; however funding was not available. Stabilization of eroding vertical banks, which threatened to cut-off the oxbow of the channel.	514	95
City KP-restoration Big Goose Creek	\$15,119.88	\$35,179.81		High water and heavy foot traffic from recreational activities created erosion concerns around several structures and bank work completed in 2008. The project provided the opportunity to use some creative materials, including biologs, and education opportunities in the Park. Willow planting and fencing were also added, though not included in the cost.	600	22
Heald Ditch-diversion Big Goose Creek	\$7,757	\$56,969.44	\$97,451.56	Replacement of a push-up/rubble diversion with a block cross-vane with a rock ramp and constructed riffle.		192
Willow Plantings with waterjet stinger through contract with Forster Enterprises	\$4694.93			Tongue River-5 sites	1010	224
				Columbus Creek-1 site	120	13
				Goose Creek-1 site	240	44
				Little Goose Creek- 4 sites	890	132
				Big Goose Creek-2 sites	550	81
				Soldier Creek-1 site	250	28
TOTAL STREAM LENGTH AND SEDIMENT REDUCTION					4174	896

*Note: RH Ditch diversion project was initially funded through Sheridan Improvements #2 grant,; load reduction amounts were included in the final report for that grant. The information is repeated here for reference and are not included in the totals.

¹ Includes state grant funds and landowner match; does not include USDA program funds, where applicable.

Table 4d. Projects funded through USDA EQIP and receiving some support/technical assistance through this project

<u>Stockwater development Projects</u>		
Project ID	Description	Area
CJost-Big Goose	Spring development and stockwater pipeline and tanks with fencing to eliminate livestock access to Big Goose Creek, improve vegetative cover and range condition to reduce run-off and minimize pollutant transport.	33 Acres
<u>Stream Rehabilitation and Wetland Restoration Projects</u>		
RMischke-Tongue	Streambank stabilization and revegetation, includes fencing.	1500 Feet
<u>Irrigation Improvement/Management Projects</u>		
DMunsick-Tongue River	Replace flood irrigation system with gated pipe to reduce run-off, minimize pollutant transport, and improve efficiency.	8 acres
BHolliday Tongue	Replace flood irrigation system with gated pipe to reduce run-off, minimize pollutant transport, and improve efficiency.	6 Acres
DR-Big Goose	Replace flood irrigation system with sideroll sprinkler to reduce run-off, minimize pollutant transport, and improve efficiency.	42 Acres
WBurke-Big Goose	Replace flood irrigation system with gated pipe to reduce run-off, minimize pollutant transport, and improve efficiency.	48 Acres
CForbes-Big Goose	Replace flood irrigation system with big gun sprinklers to address erosion concerns, reduce run-off, and minimize pollutant transport.	37 Acres
CForbes-Big Goose	Replace flood/gated pipe irrigation with center pivot to reduce run-off, minimize pollutant transport, and improve efficiency.	167 Acres
JPeldo Little Goose	Replace flood irrigation system with sideroll and pipeline to reduce run-off, minimize pollutant transport, and improve efficiency.	16 Acres
THarper Prairie Dog	Replace flood irrigation with big gun sprinklers to address erosion concerns, reduce run-off, and minimize pollutant transport.	21 Acres

PUBLIC INVOLVEMENT AND COORDINATION

LOCAL GOVERNMENTS; INDUSTRY, ENVIRONMENTAL, AND OTHER GROUPS; PUBLIC AT LARGE.

The Tongue River Watershed Group, Goose Creek Watershed Group, and Prairie Dog Creek Watershed Group continued to provide oversight and direction to the local watershed efforts. These groups consist of local landowners and representatives from 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 professional hydrologists and engineers provided some of the design/planning services on various projects, local contractors installed septic systems and provided additional construction on other projects. Local contractors/professionals were selected and retained by the landowners.

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.

EDUCATION AND INFORMATION

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 are 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.

Tours of completed projects were provided to the Sheridan County Commissioners and the City of Sheridan. Media relationships resulted in 13 newspaper articles and/or photos in the Sheridan Press and 2 stories on Sheridan Media that included watershed meetings, the Tongue River Watershed Plan, Goose Creek Monitoring, cost-share programs and classroom/field activities.

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. 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.

ASPECTS OF THE PROGRAM THAT DID NOT WORK WELL

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 by some systems with severe impacts to water quality. SCCD is currently working with other funding entities to attempt 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 is also working toward finding alternative funding sources for sewer connections to replace septic systems. When these connections are used to replace septic systems that meet the WDEQ eligibility requirements, the funds will be applied as match to future 319 grants.

There is also some difficulty in completing some of the projects according to local regulations. Some septic system projects were not able to be completed according to the current rules. Small lot sizes, shallow groundwater, and poor percolation rates made it impossible for the SCCD-NRCS program to provide assistance. There is also a need to improve access to and understanding of alternative technologies and other possibilities for on-site wastewater treatment.

FUTURE ACTIVITY 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 updated all of their program policies, applications, and ranking sheets to improve project prioritization and consistency.

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 #4 319 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.

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ATTACHMENT A

**WATERSHED PROGRESS REGISTERS
AND
LOAD REDUCTION PRIORITY MAPS**

**TONGUE RIVER WATERSHED PROGRESS REGISTER
TONGUE RIVER WATERSHED LOAD REDUCTION PRIORITY MAP
GOOSE CREEK WATERSHED PROGRESS REGISTER
GOOSE CREEK WATERSHED LOAD REDUCTION PRIORITY MAP
PRAIRIE DOG CREEK WATERSHED PROGRESS REGISTER
PRAIRIE DOG CREEK WATERSHED LOAD REDUCTION PRIORITY MAP**

ATTACHMENT B

INFORMATION AND EDUCATION PRODUCTS

GOOSE CREEK WATERSHED ANNUAL NEWSLETTERS (2012, 2013/2014)

TONGUE RIVER WATERSHED ANNUAL NEWSLETTERS (2012, 2013/2014)

PRAIRIE DOG CREEK ANNUAL NEWSLETTERS (2012, 2013/14)

RUN-OFF DEMONSTRATION PROJECT SIGN PROOFS

TONGUE RIVER LANDOWNER RESOURCE GUIDE

LIVING WITH LIVESTOCK POSTCARD AND RACK CARD

ATTACHMENT A

**WATERSHED PROGRESS REGISTERS
AND
LOAD REDUCTION PRIORITY MAPS**

**TONGUE RIVER WATERSHED PROGRESS REGISTER
TONGUE RIVER WATERSHED LOAD REDUCTION PRIORITY MAP
GOOSE CREEK WATERSHED PROGRESS REGISTER
GOOSE CREEK WATERSHED LOAD REDUCTION PRIORITY MAP
PRAIRIE DOG CREEK WATERSHED PROGRESS REGISTER
PRAIRIE DOG CREEK WATERSHED LOAD REDUCTION PRIORITY MAP**

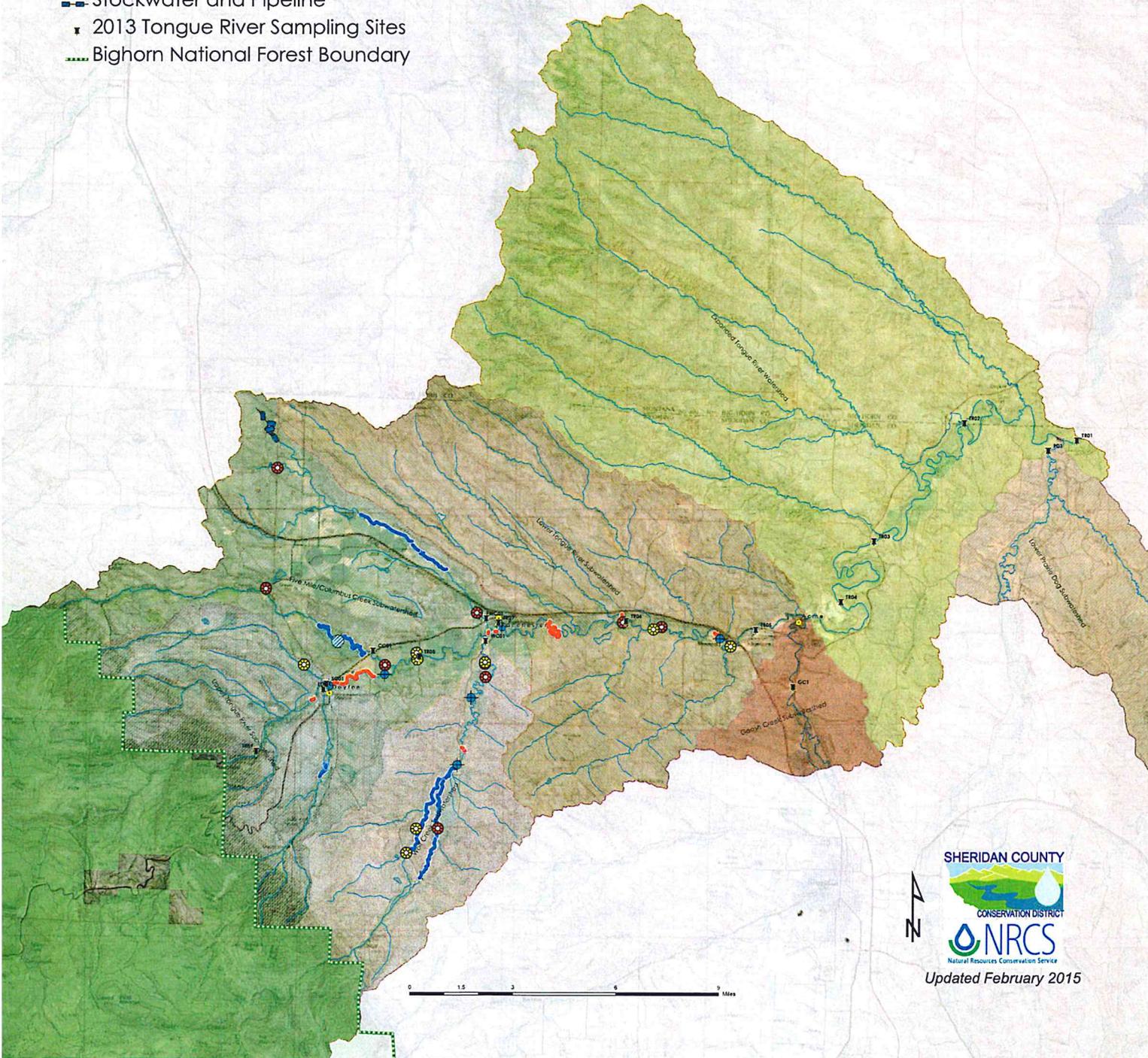
TONGUE RIVER WATERSHED PROGRESS REGISTER

Legend

-  Septic Systems
-  Livestock Facility Improvement
-  Diversion with Stabilization
-  Stream Restoration
-  Riparian buffer
-  Willow Plantings
-  Reservoir
-  Channel stabilization
-  Stockwater and Pipeline
-  2013 Tongue River Sampling Sites
-  Bighorn National Forest Boundary

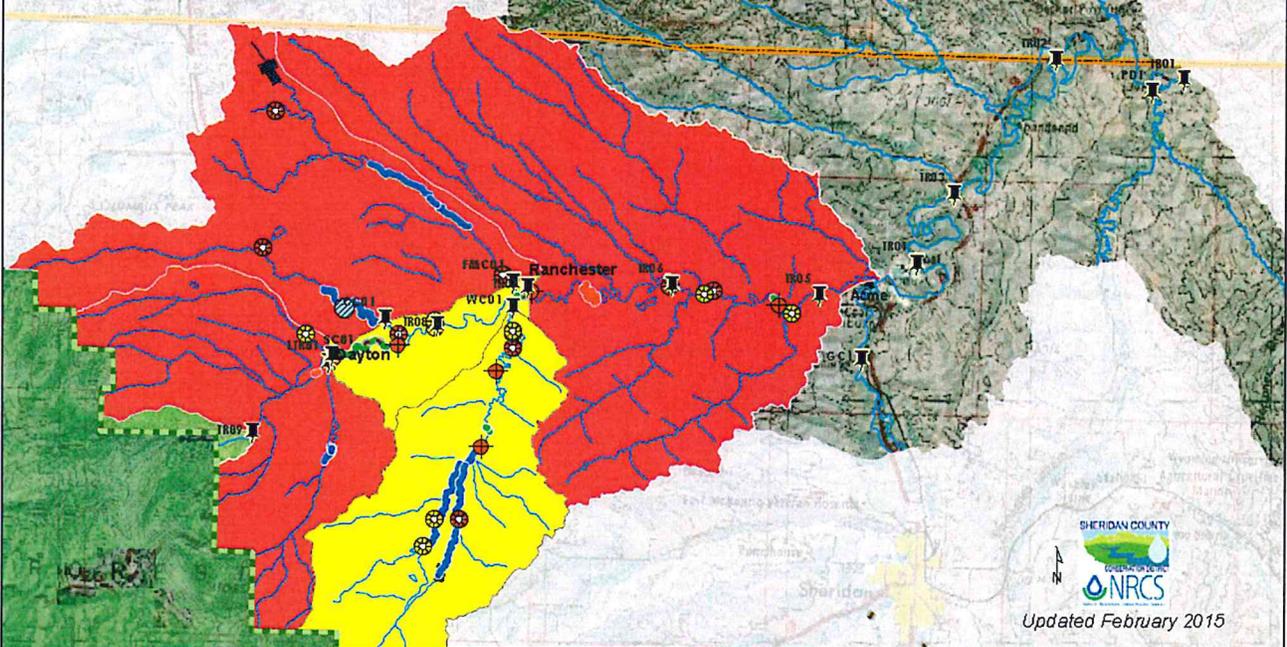
Subwatersheds

-  Expanded Tongue River Watershed
-  Lower Prairie Dog Subwatershed
-  Goose Creek Subwatershed
-  Lower Tongue River Subwatershed
-  Upper Tongue River Subwatershed
-  Wolf Creek Subwatershed
-  Fivemile/Columbus Creek Subwatershed



Legend

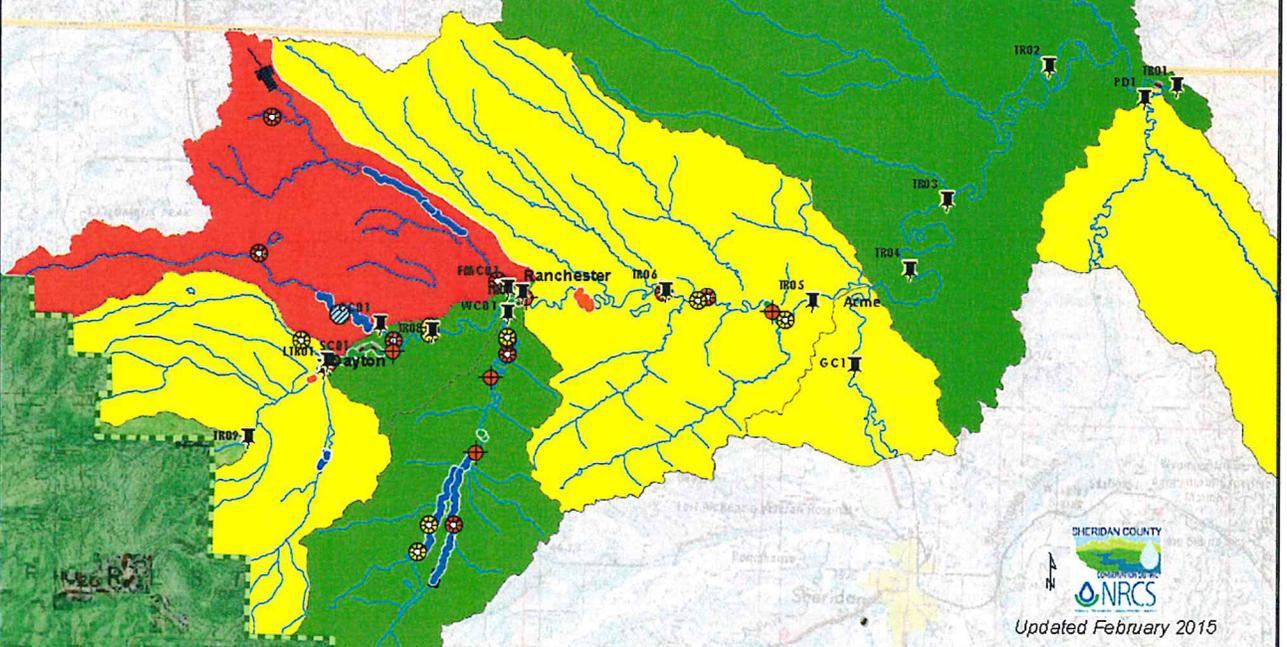
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|--------------------------------|-----------------------|----------------------------------|---|
| 2013 TR Monitoring Sites | Reservoir | Stockwater and Pipeline | 2012 Priority Ranking for Load Reduction |
| Diversion with Stabilization | Willow Plantings | Stream Restoration | Medium |
| Septic Systems | Channel stabilization | Bighorn National Forest Boundary | Very High |
| Livestock Facility Improvement | Riparian buffer | Wyoming Border | |



2012 Percent Load Reduction Needed

Legend

- | | | | |
|--------------------------------|-----------------------|----------------------------------|---|
| 2013 TR Monitoring Sites | Reservoir | Stockwater and Pipeline | 2013 Priority Ranking for Load Reduction |
| Diversion with Stabilization | Willow Plantings | Stream Restoration | Low |
| Septic Systems | Channel stabilization | Bighorn National Forest Boundary | Medium |
| Livestock Facility Improvement | Riparian buffer | Wyoming Border | Very High |



2013 Percent Load Reduction Needed

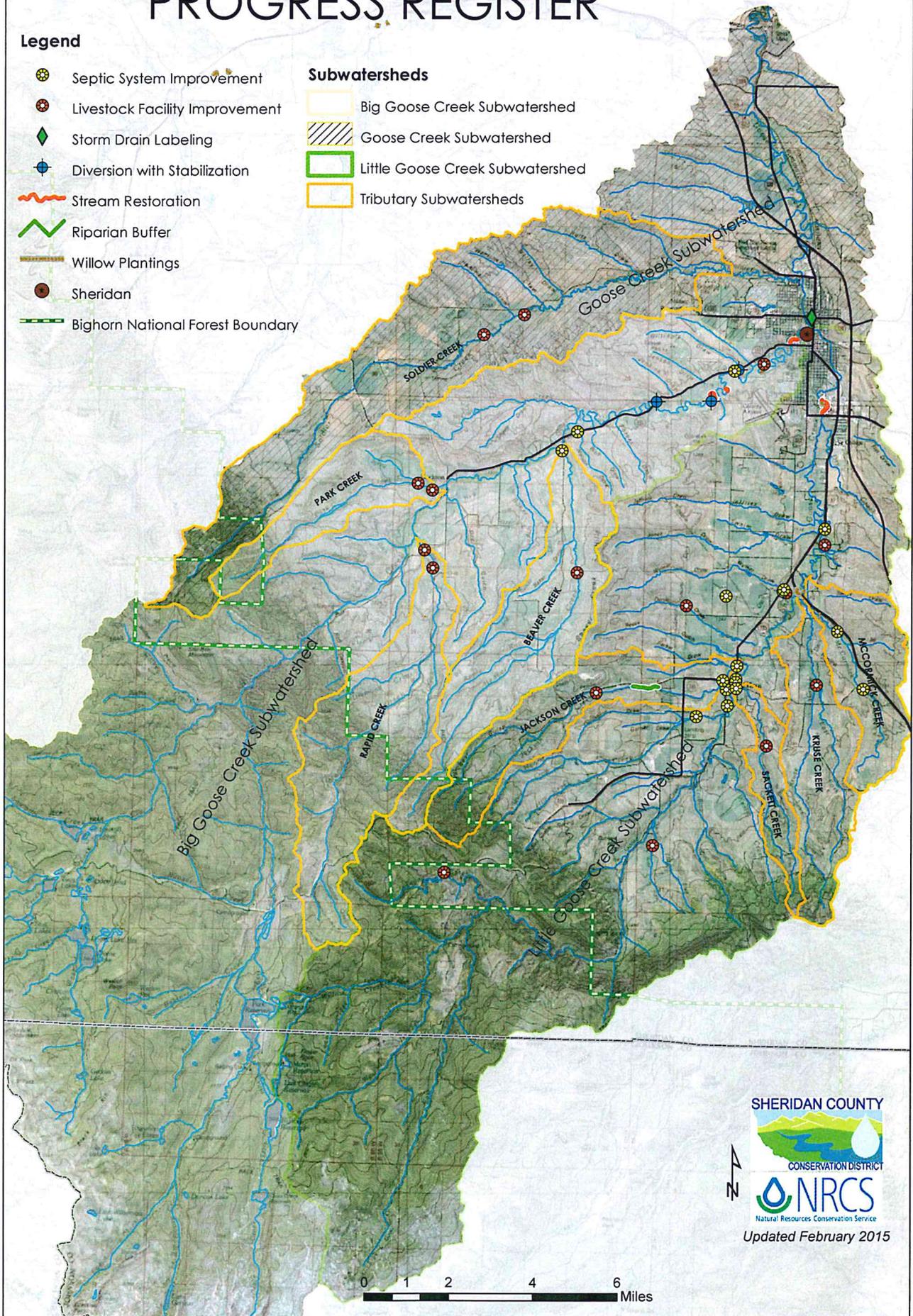
GOOSE CREEK WATERSHED PROGRESS REGISTER

Legend

-  Septic System Improvement
-  Livestock Facility Improvement
-  Storm Drain Labeling
-  Diversion with Stabilization
-  Stream Restoration
-  Riparian Buffer
-  Willow Plantings
-  Sheridan
-  Bighorn National Forest Boundary

Subwatersheds

-  Big Goose Creek Subwatershed
-  Goose Creek Subwatershed
-  Little Goose Creek Subwatershed
-  Tributary Subwatersheds



SHERIDAN COUNTY



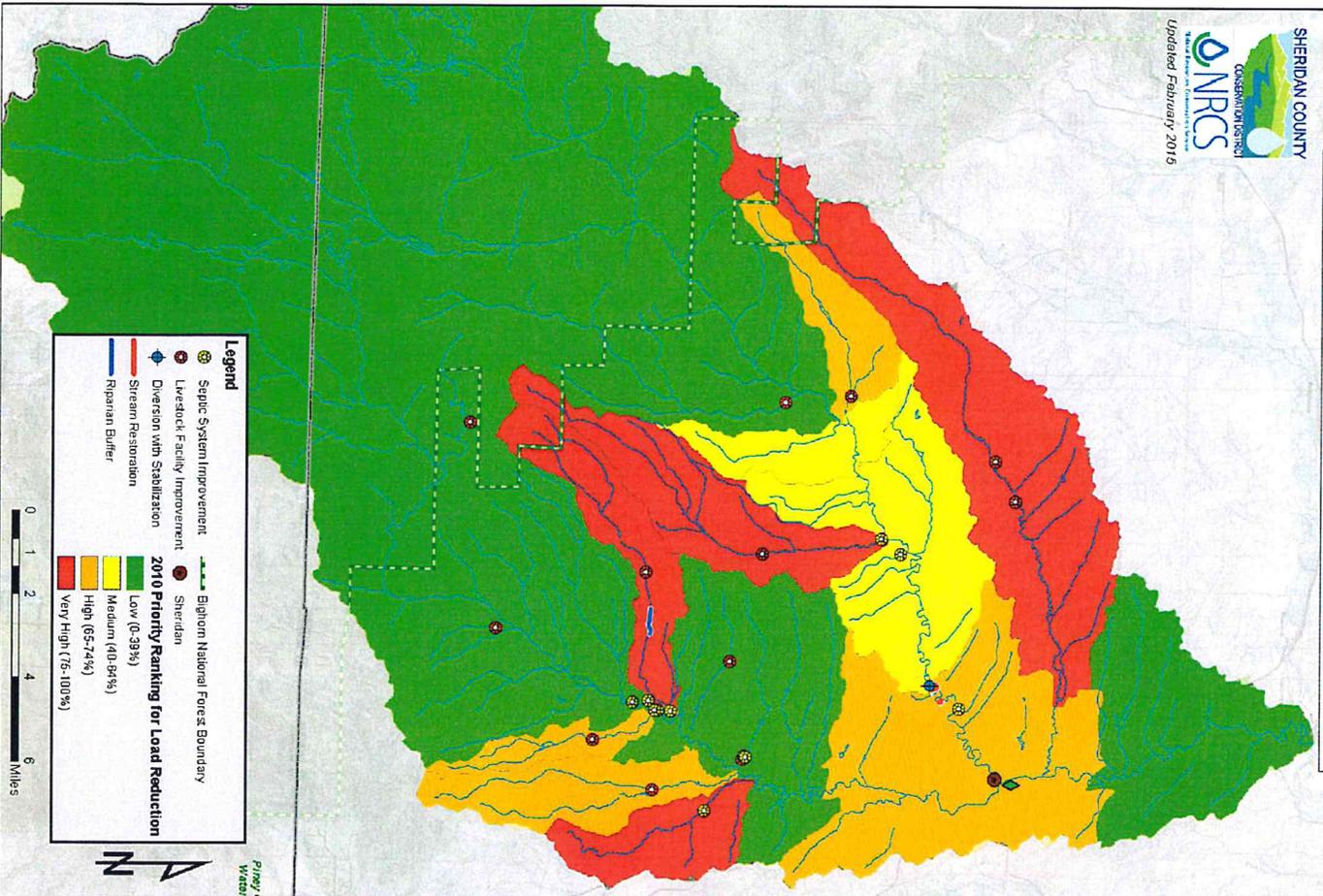
CONSERVATION DISTRICT



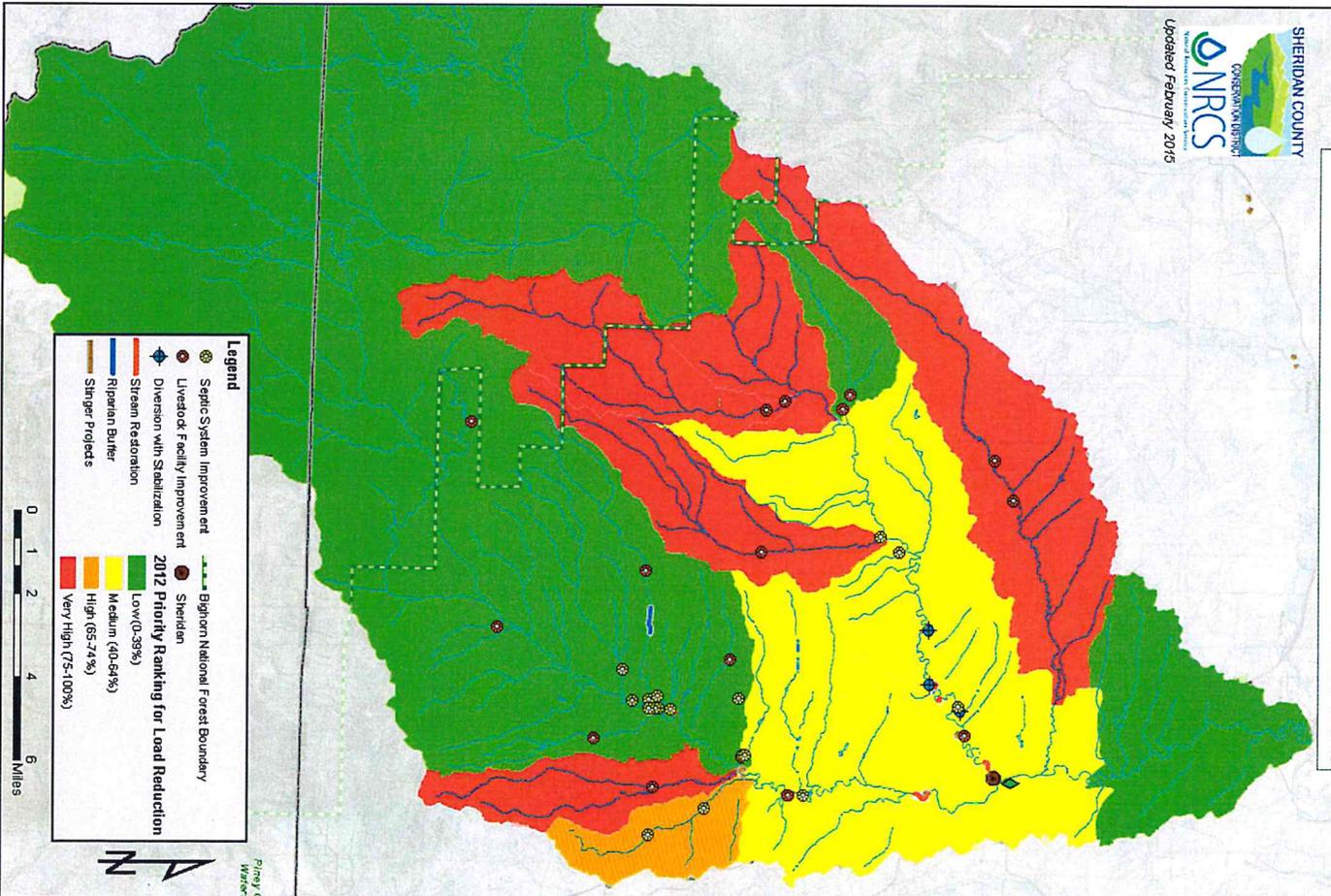
Natural Resources Conservation Service

Updated February 2015

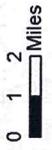
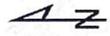
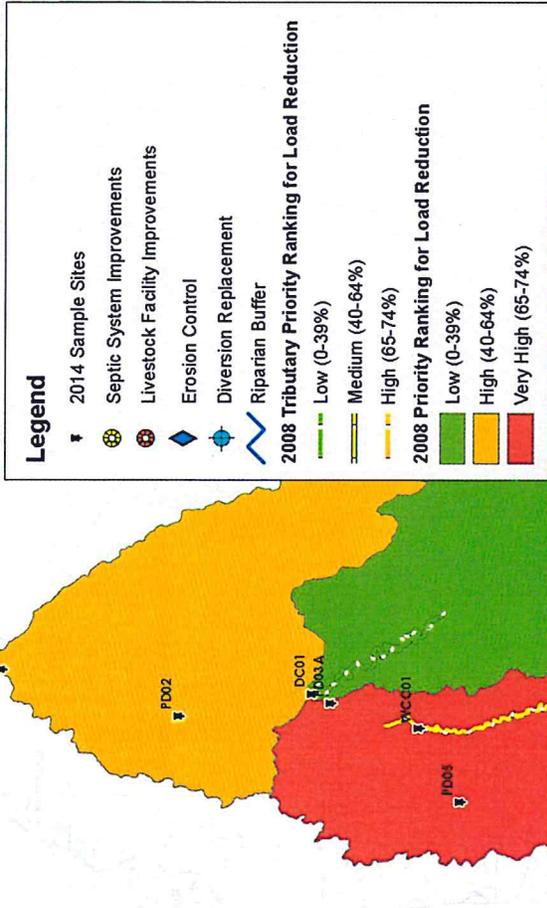
2010 Percent Load Reduction Needed



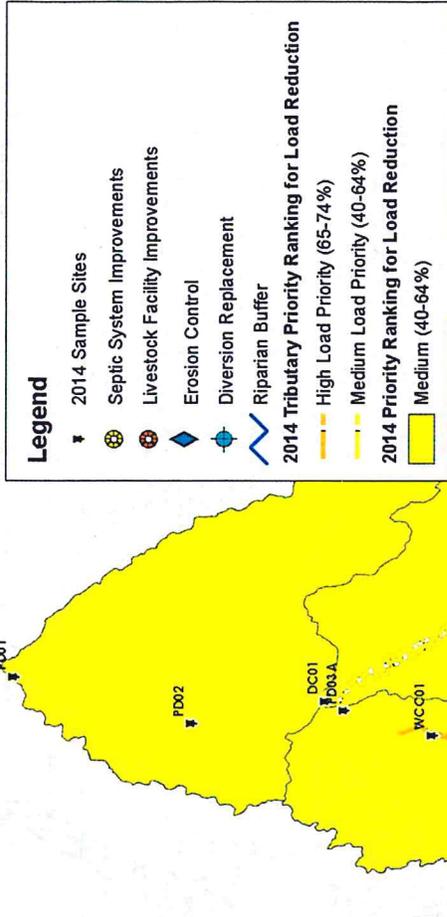
2012 Percent Load Reduction Needed



2008 Percent Load Reduction Needed



2014 Percent Load Reduction Needed



ATTACHMENT B

INFORMATION AND EDUCATION PRODUCTS

GOOSE CREEK WATERSHED ANNUAL NEWSLETTERS (2012, 2013/2014)

TONGUE RIVER WATERSHED ANNUAL NEWSLETTERS (2012, 2013/2014)

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Goose Creek Watershed Annual Newsletter

Goose Creek Watershed Group
Sheridan County Conservation District
Natural Resources Conservation Service
The City of Sheridan
Sheridan County

SUMMER 2012

2012 Goose Creek Watershed Water Quality Monitoring

In May, Sheridan County Conservation District (SCCD) started its fourth round of water quality monitoring within the Goose Creek Watershed since 2001. The watershed area that is in the process of being sampled starts from Little Goose Canyon and Big Goose Canyon and ends on Goose Creek, slightly upstream of the confluence of the Tongue River near Acme. This year there are 24 sampling sites within this watershed area: 10 sites are within the Little Goose Creek subwatershed; 9 sites are within the Big Goose Creek subwatershed; and the remaining 5 sites are on Soldier Creek and the mainstem of Goose Creek. This year's water quality sampling will be used to evaluate trends in bacteria and sediment, along with benthic macroinvertebrates and habitat assessments at a limited number of stations.



Maria Burke, SCCD Natural Resources Technician, gathers information from water sampled from the Goose Creek Watershed in May of 2012.

Bacteria impairment is when the amount of bacteria sampled in a surface waterbody is above the State of Wyoming water quality standard.

SCCD starting water quality monitoring in the Goose Creek watershed after the Wyoming Department of Environmental Quality listed Little Goose Creek and Big Goose Creek for bacteria impairments in 1996. Goose Creek and 7 tributaries off of Big Goose, Little Goose, and Goose Creek were later listed in 2000 for bacteria impairments.

Provisional sampling in May has shown that in sections of the three major streams – Big Goose, Little Goose, and Goose Creek – levels of the bacteria, *E. coli* (*Escherichia coli*), are higher than the State of Wyoming standard. Preliminary results so far show Big Goose Creek having the highest levels of *E.coli*. Bacteria and turbidity sampling will continue again in August, which could adjust the overall summer levels.

“Where does *E. coli* come from?” you may ask. *E.coli* bacteria are most commonly found in the lower intestine of warm-blooded organisms like humans, dogs, cats, deer, cows, and horses. These and other warm-blooded organisms that use and live in the watershed could be contributing to these higher than standard numbers. That is why it is important that that we look at ourselves to see what we can do better. The choices we all make every day impact the Goose Creek Watershed...your watershed.



Spring Willow Plantings

This spring, the SCCD used their Waterjet Stinger to plant willows along the stream-restoration project at South Park.

These willows are already thriving and will help to re-vegetate exposed areas. Willow plantings are an economical and relatively easy tool to use to help stabilize streambanks by holding the soil into place once the roots become established. Willows also produce new growth that will fill in exposed areas creating a dense vegetative buffer against further erosive actions.

Please contact the SCCD if you have a willow planting project and would like some assistance.

Cost-Share Assistance Available

Landowners who live in the Goose Creek Watershed may be eligible for cost-share assistance from the Sheridan County Conservation District. Assistance is available for a variety of projects including: septic system replacement, corral relocation (for horses, cattle and other animals) and stream restoration. To qualify for assistance there must be an obvious impact to water quality. Landowners are required to contribute a certain percentage of match. Septic system replacements have a few additional requirements.

SCCD Pairs Up with Sheridan County Public Works Office To Host Landowner Meetings

Do you think your septic system is more than 30 years old? Is the septic tank made of something other than concrete and/or is the leachfield missing? Is it an unpermitted septic system? Is any part of the system within 100 meters of a surface water body? If you answered "YES" to any of these questions, you are encouraged to attend one of these three landowner meetings hosted by Sheridan County Public Works and the Sheridan County Conservation District:

Date: **July 31st, 2012**
Time: **5:00pm – 7:00pm**
Location: **Big Horn Women's Club**
Johnson Street, Big Horn

Date: **August 1st, 2012**
Time: **7:00pm – 8:45pm**
Location: **Sheridan Fulmer Library**
W Alger Street, Sheridan

Date: **August 2nd, 2012**
Time: **5:00pm – 7:00pm**
Location: **Beckton School**
Big Goose Rd, Sheridan

The purpose of these meetings is to:

- Educate landowners around Goose Creek about water quality concerns and impairments in the watershed relating to bacteria
- Emphasize the benefits of septic permitting and proper septic system maintenance
- Gain information about the existing septic systems in Goose Creek Watershed
- Inform about possible funding opportunities to repair or replace existing systems

As a landowner and an avid user of indoor plumbing, we hope by attending this meeting there will be multiple benefits



SCCD provided cost-share assistance to help a homeowner install this new leachfield and septic system in the Goose Creek Watershed in 2011.

including: How to identify where your septic system is located, how it operates, how to properly maintain your system, and how to obtain a record of your septic system. We hope this will not only increase the value of your property, but will ensure the health and wellbeing of your family, neighbors, and downstream community. Perhaps most importantly, these meetings will also address funding opportunities for landowners who need to repair or replace existing septic systems.

By working together, we can reduce bacteria to ensure a cleaner, healthier watershed for current and future generations. We hope you can join us at one of these three meetings. If you cannot make any of these meetings, please call either the Sheridan County Public Works office at 674-2920 or Sheridan County Conservation District at 672-5820, extension 3.

For Your Benefit—Know Before You Buy!

Many rural residents may not be aware of certain regulations regarding septic systems when they purchase their home or are planning on building a new home. In Sheridan County all residents are required to have a permit to replace or install a new septic system. This includes any portion of the system—even if it is only the leachfield that is being replaced. It is a good idea to have the septic system inspected prior to purchasing a home. Septic systems that are currently located within the flood plain or high ground water table will likely undergo extensive design changes when they need to be replaced. In addition, current County and Wyoming Department of Environmental Quality regulations have set-back requirements concerning distances between septic system components (i.e. septic tanks and leachfields) and water located on your property (for example your property may have a well or stream located next to the current system). For residents living on small acreages, replacing or installing a new system can be challenging and very costly for the landowner. Often, the landowner faces the difficult decision of having to put an unattractive mounded septic system in their yard and/or has to request variances from local and state agencies to be able to replace a failing system on a lot too small to meet set-back requirements.

SCCD Updates Goose Creek Watershed Plan

In January, the SCCD filed the Goose Creek Watershed Improvement Effort Implementation Strategy, 2012-2015, with the Wyoming Department of Environmental Quality. This Implementation Strategy is an update to the Goose Creek Watershed Plan and provides an outline of objectives and action items to be implemented over the next three years. The update of the plan was a collaborative effort from a variety of stakeholders, including the SCCD, local watershed residents, Sheridan County and the City of Sheridan. If you would like more information about the details of the plan, please contact the SCCD at 672-5820 ext. 3.



Goose Creek Watershed Annual Newsletter

Goose Creek Watershed Group
Sheridan County
Conservation District
Natural Resources
Conservation Service
The City of Sheridan
Sheridan County

January 2014

WORK WITHIN THE WATERSHED

Understanding Water Quality Standards and the Watershed Planning Process

The Goose Creek Watershed Steering Committee provides input and recommendations to the SCCD to address water quality concerns in the Goose Creek watershed. In the Goose Creek Watershed Plan, one of the recommended action items is to provide basic information on water quality standards.

Protection of waters under the Clean Water Act (enacted in 1972) includes designating uses and establishing water quality criteria to protect those uses. The Wyoming Surface Water Classification List, developed by WDEQ in 2001, assigns a classification to waterbodies of the State. Depending on its classification, a waterbody is expected to have sufficient quality to support certain activities or uses. Wyoming's designated uses include drinking water, Game Fish, Non-Game Fish, Fish Consumption, Other Aquatic Life, Recreation, Wildlife, Agriculture, Industry, and Scenic Value. Class 2AB waterbodies are expected to support all of the uses, while other classifications may not be expected to support drinking water, fisheries, or aquatic life uses. All waterbodies are expected to support recreation, wildlife, agriculture, industry, and scenic value.

Continued on page 2

Does Big Goose or Little Goose Creek mean something to you, your children, or your grandchildren?

Have concerns about surface waters in the Goose Creek Watershed?

COME TO OUR MEETING ON FEBRUARY 5TH!

The Goose Creek Watershed Steering Committee, which is comprised of landowners and interested parties, was formed in 2003 with the main purpose of developing a Goose Creek Watershed Plan. It has transformed into a steering committee that provides input and recommendations to the SCCD for implementing resource programs within the Goose Creek Watershed. This year our annual meeting will be held on **February 5th at 6pm in Downtown Sheridan Association's Community Room** (corner of Main and Coffeen Street).

The agenda will include the following topics:

- **Activities/Projects/Progress Updates from:**
 - **Sheridan County**
 - **City of Sheridan – Update on Storm Drain Sampling and Placements, and the Watershed Control Plan Aimed at Addressing Cryptosporidium in the Upper Big Goose Creek Drainage**
 - **SCCD – Livestock and Septic System Replacement Projects, and DSA's Improved Rain Garden to Filter Runoff Pollution**
- **Ideas for Improving Outreach and Getting the Word out for Improvement Projects**
- **Goose Creek Watershed concerns from attending members**

Rivers and creeks in Wyoming are precious to all of us. We depend on them for our drinking source, livestock drinking source, irrigation for crops, watering lawns, and for their recreational opportunities. The town of Sheridan was built around Big and Little Goose Creek, which greatly attributes to our positive sense of place. If you feel connected to these creeks and want to have an input on improving these surface waters for future generations, please join us at our steering committee meeting. We hope to see you there!

Update on the Goose Creek Watershed Monitoring Report

Goose Creek watershed water quality monitoring was conducted at 24 sampling sites in the recreational summer season of 2012. Water quality monitoring during May and August of 2012 included the following parameters: water temperature, pH, conductivity, dissolved oxygen, discharge, turbidity, and *Escherichia coli* (*E. coli*). Continuous water temperature data loggers were used to monitor instream temperatures from May 1, 2012 to October 31, 2012 at nine of the 24 stations. Macroinvertebrate sampling and habitat assessments were performed at eight stations in September. The Goose Creek Report, which summarizes the analytical water quality data of 2012, is in the process of being finalized. Here are a few of the key findings:



- An increase in *E. coli* bacteria concentrations from 2001 to 2012 was observed at every comparable site and sampling period, except for Park Creek and Kruse Creek during the month of May. In August of 2012, out of the 21 comparable stations from 2001, only 14 stations increased in bacteria concentrations.
- Every continuous temperature logger reported water temperatures above the maximum instream temperature standard (20°C/68°F) for cold water fisheries, often for multiple days, except for the furthest upstream Big Goose station.
- Biological conditions on six of the eight macroinvertebrate stations sampled in 2012 were partial/non supporting, and one station was indeterminate supporting based on the evaluation of the stream benthic macroinvertebrate communities. Big Goose Creek's most upstream station was the only site fully supporting its biological condition. The partial/non-support and indeterminate support classifications indicates the aquatic communities are stressed.

Please continue to check back to SCCD's website in the following month, www.sccdwy.org, for the finalized Goose Creek Watershed Monitoring Report.



(continued from page 1)

Water quality standards for individual pollutants and conditions are established for each designated use. These standards consist of either a numeric limit or a narrative description of a desired condition. When levels of a pollutant, such as bacteria, exceed the water quality standard, the stream is considered to be "impaired". The bacteria standard relates to recreational use and requires calculation of a geometric mean of five separate samples spread within a 30 day period. To meet the primary contact recreation standard (which is currently applied to all of the waterbodies within the Goose Creek Watershed), the geometric mean must not exceed 126 colonies/100 mL. If this standard is exceeded at a sample site, the associated stream segment is considered impaired.

The SCCD conducts an interim water quality monitoring program on three of the watersheds within Sheridan County. Goose Creek is among the watersheds monitored in this rotation. Bacteria geometric means are calculated for samples collected in May/June (for run-off conditions) and in August. Some sites may exceed the standard in one time period and not in the other. Understanding when bacteria samples for a particular site are below, at, or above the primary contact recreation standard, helps the SCCD evaluate how runoff and other weather related events impact bacteria and sediment contributions. Knowing this information helps the SCCD determine which types of water quality improvement projects are best suited to help reduce *E. coli* bacteria and sediment contributions to the water body. The overall goal is to reduce *E. coli* bacteria and sediment contributions so that our waterbodies can support all of the uses for which they are intended.



Tongue River Watershed Annual Newsletter

Sheridan County
Conservation District
Tongue River
Watershed
Steering Committee

2012

This is the fifth annual Tongue River Watershed newsletter, which is being sent to all residents within the watershed. The newsletter is one of several information and education action items to inform watershed residents of water quality work being done to improve water quality in Tongue River and its tributaries (Wolf Creek, Five Mile Creek, Columbus Creek, Little Tongue River and Smith Creek).

SCCD RECEIVES GRANT FOR TONGUE RIVER WATERSHED SURVEY

The Sheridan County Conservation District, in partnership with Sheridan County, has been awarded a \$40,000 grant from the Wyoming Department of Environmental Quality and US Environmental Protection Agency under section 205j of the Clean Water Act. The funding from the grant will be used to conduct a stream channel survey and assessment of the Tongue River through Tongue River Canyon. In the summer of 2011, the District was approached by the Sheridan County Public Works Department about requests the County had received to address eroding and unstable streambanks in the Tongue River, specifically as it flows through the Tongue River Canyon. A subsequent landowner meeting indicated that there was interest in pursuing a watershed survey that would focus on physical characteristics of the channel and the floodplain and result in recommendations on the types and locations of potential improvement projects. The channel survey and assessment will be initiated in the Spring of 2013 and is expected to be completed by the end of 2014.

HELP SCCD IMPLEMENT THE TONGUE RIVER WATERSHED PLAN Funding is Available for Water Quality Improvement Projects

In October of 2012, the SCCD submitted a revised Tongue River Watershed plan to the Wyoming Department of Environmental Quality for final approval. This plan enables the SCCD to provide cost-share assistance to landowners for projects to address potential bacteria contributions, especially from domestic animals and septic systems. However, we cannot provide assistance unless it is requested. To encourage residents to participate in programs, this year's newsletter highlights some frequently asked questions—if you have other questions, please contact the SCCD/NRCS office.

Current Goals for Livestock and Septic System Improvements

While developing the Tongue River Watershed Plan, steering committee members came up with goals to try and reduce bacteria contributions. These goals are intended to be met each year, to come up with an overall bacteria reduction of 18% by the year 2017. We need your help to meet these goals for both livestock and septic systems.

Action Item	2013**		2017	
	Goal	Actual Number Addressed*	Goal	Actual Number Addressed*
Action: Replace/repair septic systems	6	0	4	1
Action: Relocate/improve livestock facilities	437	0	436	0

*Goals for septic systems are in replacements per year. Goals for livestock are in animal units addressed per year. The animal units presented are based on the combined individual numbers for cattle, horse, and sheep where a cow/calf pair is equivalent to 1.0 AU, a horse is equivalent to 1.25 AU, and a sheep is equivalent to 0.2 AU.

**The goals for 2014-2016 are the same as the goals for 2013

WHAT DO WE NEED TO DO TO HELP YOU GET STARTED? Frequently Asked Questions

How Much Funding is Available Overall?

The current grant has approximately \$200,000.00 to be used in the Tongue River, Goose Creek and Prairie Dog Creek watersheds. The majority of this grant is intended to fund livestock and septic system improvements. We have, in the past, needed to have a sign-up to prioritize water quality work based on available funding. Since we are in a financial position to fund all projects that meet the water quality objective, we strongly encourage landowners to participate now. In the future, if the demand exceeds our funding resources, we may have to re-instate a sign-up.



How Much Will it Cost?

One of the greatest concerns that landowners have before deciding to participate is how much is this going to cost? The SCCD provides cost-share assistance for livestock (relocating corrals, stockwater, grazing management) and septic system improvements along impaired streams in Sheridan County. Typical cost-share assistance for livestock improvements is between 50% and 80%, depending upon available funding. The SCCD offers 50% cost-share assistance for septic system replacements. "In-kind" contributions, including materials and/or labor, can be used as a landowner portion.

SHERIDAN COUNTY



Sheridan County Conservation District

1949 Sugarland Drive, Suite 102
Sheridan, Wyoming 82801

Phone: 307-672-5820

Website: www.sccdofwyo.org

How does "In-Kind" apply to the landowner portion of the project expense?

Program participants are required to pay a certain percentage of their project costs. However, this does not have to be cash. Participants who have time and equipment to do the work could have very little out-of-pocket expense. Regardless of a participant's ability to do all the work by themselves, any "in-kind" work that they can do on their own project will help reduce their overall cost.

What happens if I visit with the SCCD about a project and decide not to do it?

Landowners are under no obligation to complete a project until a contract is signed. Even then, it is possible to cancel or modify a project or portion of the project. People are encouraged to come into the SCCD/NRCS office to discuss any concerns they may have. We understand there are many factors to be considered and hope to make this process as easy and enjoyable as possible.

What Are Past Participants Saying About the Programs?



Since 2002, the SCCD/NRCS has helped 25 landowners make livestock improvements and 22 landowners make septic system improvements throughout Sheridan County. Here are what some past participants have said about working with the SCCD/NRCS:

"I was very happy with this project. Everything about the process was flexible enough to accommodate my needs. The project not only met the objective of addressing the water quality concerns, but also improved the overall working operation of the corrals. It was definitely a 'win/win' situation" —Leroy Taylor;

"This project involved fencing off Denio Draw from existing corrals, pastures and an animal feeding facility, thus creating a rather extensive riparian area and enhanced wildlife habitat. . . SCCD and NRCS staff were diligent in their efforts [to] maintain a professional and accommodating working relationship throughout the duration of the project. Their expertise in planning and directing the project was invaluable." —Mike Winterholler;

"I strongly believe that these are very good projects for Sheridan County, [because] they help improve the watershed and environment. With the help, information, and funding made available, we were able to design the best septic system for us. NRCS and District people helped with the surveying and all of the other required information and were very helpful with the funding of the project" —Jack Fiedor; (* Note: Jack also completed a livestock project.)*



"Because of this program we have been able to relocate our corrals away from the creek, develop new water sources for livestock and create a filter type buffer zone where runoff water is cleaned up before entering Big Goose creek. It was a total win/win situation. . . We would urge SMALL property owners to look into this program. The SCCD/NRCS are eager to work with you, and you would be doing yourself a favor as well as improving the water quality in our area." —Rick & Kathy Woods.



Tongue River Watershed Annual Newsletter

Sheridan County
Conservation District
Tongue River Watershed
Steering Committee

January 2014

This is the sixth annual Tongue River Watershed newsletter, which is being sent to all residents within the watershed. The newsletter is one of several information and education action items to inform watershed residents of water quality work being done to improve water quality in Tongue River and its tributaries (Wolf Creek, Five Mile Creek, Columbus Creek, Little Tongue River and Smith Creek).

WORK WITHIN THE WATERSHED

Understanding Water Quality Standards and the Watershed Planning Process

The Tongue River Watershed Steering Committee provides input and recommendations to the SCCD to address water quality concerns in the Tongue River watershed. In the Tongue River Watershed Plan, one of the recommended action items is to provide basic information on water quality standards.

Protection of waters under the Clean Water Act (enacted in 1972) includes designating uses and establishing water quality criteria to protect those uses. The Wyoming Surface Water Classification List, developed by WDEQ in 2001, assigns a classification to waterbodies of the State. Depending on its classification, a waterbody is expected to have sufficient quality to support certain activities or uses. Wyoming's designated uses include drinking water, Game Fish, Non-Game Fish, Fish Consumption, Other Aquatic Life, Recreation, Wildlife, Agriculture, Industry, and Scenic Value. Class 2AB waterbodies are expected to support all of the uses, while other classifications may not be expected to support drinking water, fisheries, or aquatic life uses. All waterbodies are expected to support recreation, wildlife, agriculture, industry, and scenic value.

Water quality standards for individual pollutants and conditions are established for each designated use. These standards consist of either a numeric limit or a narrative description of a desired condition. When levels of a pollutant, such as bacteria, exceed the water quality standard, the stream is considered to be "impaired". The bacteria standard relates to recreational use and requires calculation of a geometric mean of five separate samples spread within a 30 day period. To meet the primary contact recreation standard (which is currently applied to all of the waterbodies within the Tongue River Watershed), the geometric mean

Continued on page 2

**Is the Tongue River important to you, your children, or your grandchildren?
Have concerns about surface waters in the Tongue River Watershed?**

COME TO OUR MEETING ON FEBRUARY 6TH!

The Tongue River Steering Committee, which is comprised of landowners and interested parties, was formed in 1997 with the main purpose of identifying water quality sampling areas in the Tongue River Watershed. It has transformed into a steering committee that provides input and recommendations to the SCCD for implementing resource programs within the Tongue River Watershed. This year our annual meeting will be held on **February 6th at 6pm in Ranchester's Town Hall.**

The agenda will include the following topics:

- **Tongue River Water Quality Sampling in 2013**
- **Livestock and Septic System Replacement Projects within Priority Areas**
- **Update on the Tongue River Canyon Road Assessment**
- **Update on the Tongue River Initiative**
- **Ideas for Improving Outreach and Getting the Word out for Improvement Projects**
- **Tongue Watershed Ideas or Concerns from Attending Members**

Rivers and creeks in Wyoming are precious to all of us. We depend on them for our drinking source, livestock drinking source, irrigation for crops, watering lawns, and for their recreational opportunities. The towns of Ranchester and Dayton were built around Tongue River and its tributaries which greatly attribute to the positive sense of place. If you feel connected to these surface waters and want to have an input on improving them for future generations, please join us at our meeting. We hope to see you there!

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Residential Customer

Dayton, WY 82836



(continued from page 1) must not exceed 126 colonies/100 mL. If this standard is exceeded at a sample site, the associated stream segment is considered impaired.

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contributions to the water body. The overall goal is to reduce *E. coli* bacteria and sediment contributions so that our waterbodies can support all of the uses for which they are intended.

Update on Tongue River Watershed Monitoring Report:

Tongue River watershed water quality monitoring was conducted at 16 sampling sites in the recreational summer season of 2013. Water quality monitoring during May and August of 2013 included the following parameters: water temperature, pH, conductivity, dissolved oxygen, discharge, turbidity, and *Escherichia coli* (*E. coli*). Continuous water temperature data loggers were used to monitor instream temperatures from May 1, 2013 to October 31, 2013 at nine of the 16 stations. Macroinvertebrate sampling and habitat assessments were performed at five stations in September.

Here are a few of the key findings analyzed from the water quality data of 2013:

- May bacteria levels for 15 out of the 16 sites sampled were above the State of Wyoming standard. In August, all mainstem sites on the Tongue River were below standard levels of bacteria except for the site between Dayton and Ranchester, but all tributary sites were still above the standard, except for Goose Creek.
- Every continuous temperature logger reported water temperatures above the maximum instream temperature standard (20°C/68°F) for cold water fisheries, often for multiple days, except for the Tongue River Canyon station.
- Turbidity for Tongue River sites increased from upstream to downstream. The highest turbidity in tributary sites occurred in Columbus and Fivemile Creek for both May and August.

Please continue to check back to SCCD's website in the following months, www.sccdwy.org, for the finalized Tongue River Watershed Monitoring Report.



Prairie Dog Creek Watershed Annual Newsletter

Sheridan County
Conservation District
Prairie Dog Creek
Watershed
Steering Committee

2012

This is the third annual Prairie Dog Creek Watershed newsletter, which is being sent to all residents within the watershed. The newsletter is one of several information and education action items to inform watershed residents of water quality work being done to improve water quality in Prairie Dog Creek and its tributaries.

**PRAIRIE DOG CREEK
WATERSHED
INTERIM WATER
QUALITY
MONITORING
RESULTS FOR 2012**

Results from Prairie Dog Creek watershed monitoring in 2011 were similar to those in 2007. The primary regulatory concern in the Prairie Dog Creek watershed is *E. coli* bacteria concentrations in excess of Wyoming water quality standards for primary contact recreation. Although bacteria concentrations were typically higher in the lower portion of the watershed, all sampled sites had at least one 30-day geometric mean that exceeded the Wyoming water quality standard. With few exceptions, all sites on Prairie Dog Creek showed a decrease in bacteria concentrations from 2007 to 2008, which was followed by an increase in 2011. Bacteria concentrations decreased an average of 5% for May/June sample periods and 7% for July/August sample periods from 2007 to 2011. Water temperatures were recorded in excess of 20° C in portions of the watershed. Although there are no numeric standards for Sediment and Turbidity, Prairie Dog Creek contains high levels of sediment, which may contribute to bacteria concerns.

HELP SCCD IMPLEMENT THE PRAIRIE DOG CREEK WATERSHED PLAN Funding is Available for Water Quality Improvement Projects

In February of 2011, the Prairie Dog Creek Watershed Plan (PDWP) was approved by the Wyoming Department of Environmental Quality. This plan enables the SCCD to provide cost-share assistance to landowners for projects to address potential bacteria contributions, especially from domestic animals and septic systems. However, we cannot provide assistance unless it is requested. To encourage residents to participate in programs, this year's newsletter highlights some frequently asked questions—if you have other questions, please contact the SCCD/NRCS office.

Current Goals for Livestock and Septic System Improvements

While developing the Prairie Dog Creek Watershed Plan, steering committee members came up with goals to try and reduce bacteria contributions. These goals are intended to be met each year, to come up with an overall bacteria reduction of 10% by the year 2015. So far, these goals are not being met for either livestock or septic systems.

Action Item	2011		2012**	
	Goal	Actual Number Addressed*	Goal	Actual Number Addressed*
Action: Replace/repair septic systems	1	0	3	1
Action: Relocate/improve livestock facilities	298	0	298	0

**Goals for septic systems are in replacements per year. Goals for livestock are in animal units addressed per year. The animal units presented are based on the combined individual numbers for cattle, horse, and sheep where a cow/calf pair is equivalent to 1.0 AU, a horse is equivalent to 1.25 AU, and a sheep is equivalent to 0.2 AU.*

***The goals for 2013-2015 are the same as the goals for 2012*

WHAT DO WE NEED TO DO TO HELP YOU GET STARTED? Frequently Asked Questions

How Much Funding is Available Overall?

The current grant has approximately \$200,000.00 to be used in the Prairie Dog Creek, Goose Creek and Tongue River watersheds. The majority of this grant is intended to fund livestock and septic system improvements. We have, in the past, needed to have a sign-up to prioritize water quality work based on available funding. Since we are in a financial position to fund all projects that meet the water quality objective, we strongly encourage landowners to participate now. In the future, if the demand exceeds our funding resources, we may have to re-instate a sign-up.



How Much Will it Cost?

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What Are Past Participants Saying About the Programs?



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"I was very happy with this project. Everything about the process was flexible enough to accommodate my needs. The project not only met the objective of addressing the water quality concerns, but also improved the overall working operation of the corrals. It was definitely a 'win/win' situation" —Leroy Taylor;

"This project involved fencing off Denio Draw from existing corrals, pastures and an animal feeding facility, thus creating a rather extensive riparian area and enhanced wildlife habitat. . . SCCD and NRCS staff were diligent in their efforts [to] maintain a professional and accommodating working relationship throughout the duration of the project. Their expertise in planning and directing the project was invaluable." —Mike Winterholler;

"I strongly believe that these are very good projects for Sheridan County, [because] they help improve the watershed and environment. With the help, information, and funding made available, we were able to design the best septic system for us. NRCS and District people helped with the surveying and all of the other required information and were very helpful with the funding of the project" —Jack Fiedor; (* Note: Jack also completed a livestock project.)*



"Because of this program we have been able to relocate our corrals away from the creek, develop new water sources for livestock and create a filter type buffer zone where runoff water is cleaned up before entering Big Goose creek. It was a total win/win situation. . . We would urge SMALL property owners to look into this program. The SCCD/NRCS are eager to work with you, and you would be doing yourself a favor as well as improving the water quality in our area." —Rick & Kathy Woods.



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WORK WITHIN THE WATERSHED

Understanding Water Quality Standards and the Watershed Planning Process

The Prairie Dog Creek Watershed Steering Committee provides input and recommendations to the SCCD to address water quality concerns in the Prairie Dog Creek watershed. In the Prairie Dog Creek Watershed Plan, one of the recommended action items is to provide basic information on water quality standards.

Protection of waters under the Clean Water Act (enacted in 1972) includes designating uses and establishing water quality criteria to protect those uses. The Wyoming Surface Water Classification List, developed by WDEQ in 2001, assigns a classification to waterbodies of the State. Depending on its classification, a waterbody is expected to have sufficient quality to support certain activities or uses. Wyoming's designated uses include drinking water, Game Fish, Non-Game Fish, Fish Consumption, Other Aquatic Life, Recreation, Wildlife, Agriculture, Industry, and Scenic Value. Class 2AB waterbodies are expected to support all of the uses, while other classifications may not be expected to support drinking water, fisheries, or aquatic life uses. All waterbodies are expected to support recreation, wildlife, agriculture, industry, and scenic value.

Continued on page 2

***Is Prairie Dog Creek important to you, your children, or your grandchildren?
Have concerns about surface waters in the Prairie Dog Creek Watershed?***

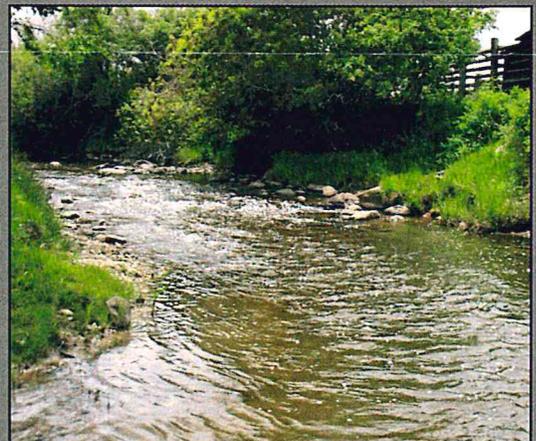
COME TO OUR MEETING ON FEBRUARY 18TH!

The Prairie Dog Creek Steering Committee, which is comprised of landowners and interested parties, was formed in 2007 with the main purposes of developing a Prairie Dog Creek Watershed Plan and guiding water quality sampling efforts. It has transformed into a steering committee that provides input and recommendations to the SCCD for implementing resource programs within the Prairie Dog Creek Watershed. This year our annual meeting will be held on:

February 18th at 6pm in Prairie Dog Community Center.

The agenda will include the following topics:

- **Prairie Dog Creek Watershed Water Quality Sampling in 2014**
- **Funding for Septic System Replacements and Livestock Projects within Priority Areas**
- **Ideas for Improving Outreach and Getting the Word out for Improvement Projects**
- **Prairie Dog Creek Watershed Ideas or Concerns from Attending Members**



Rivers and creeks in Wyoming are precious to all of us. We depend on them for our drinking source, livestock drinking source, irrigation for crops, watering lawns, and for their recreational opportunities. If you feel connected to these surface waters and want to have an input on improving them for future generations, please join us at the steering committee meeting. We hope to see you there!

SHERIDAN COUNTY



Sheridan County Conservation District

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Prairie Dog Creek Watershed Interim Water Quality Monitoring

2014 will be the fourth year of water quality sampling for the Prairie Dog Creek Watershed. Site set up, including installation of staff gauges and deployment of continuous temperature loggers will begin in April. The first of two rounds of sampling will be in May/June and the second will be in August. In between those months, we will be out in the watershed collecting discharge measurements and downloading temperature data. Thank you to all of the landowners who have given us permission in the past. If you see us driving around this summer, please do not hesitate to give us a wave or stop to chat!



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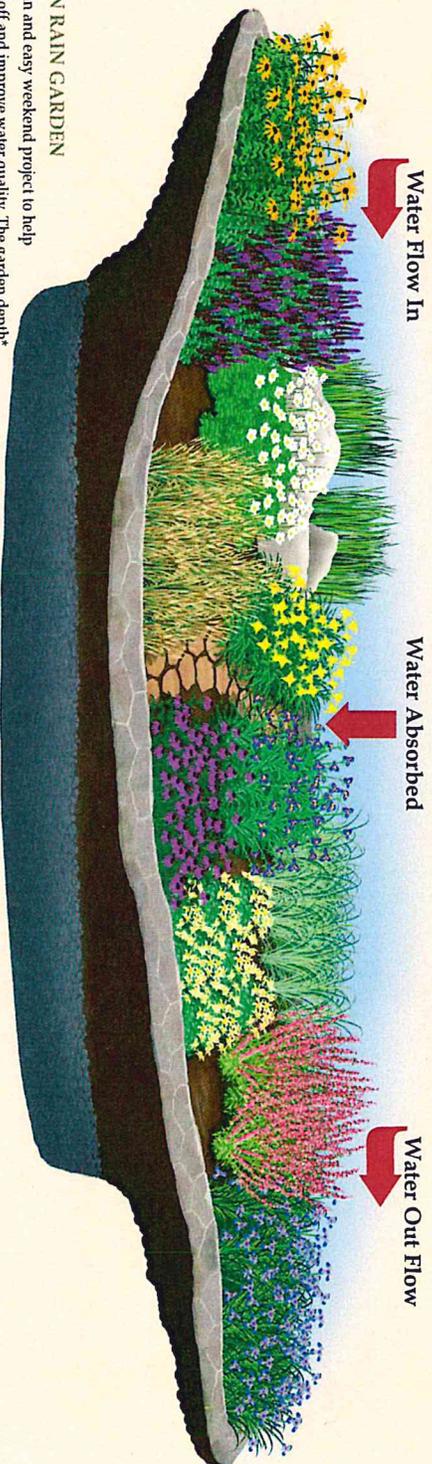
Water quality standards for individual pollutants and conditions are established for each designated use. These standards consist of either a numeric limit or a narrative description of a desired condition. When levels of a pollutant, such as bacteria, exceed the water quality standard, the stream is considered to be "impaired". The bacteria standard relates to recreational use and requires calculation of a geometric mean of five separate samples spread within a 30 day period. To meet the primary contact recreation standard (which is currently applied to all of the waterbodies within the Prairie Dog Creek Watershed), the geometric mean must not exceed 126 colonies/100 mL. If this standard is exceeded at a sample site, the associated stream segment is considered impaired.

The SCCD conducts an interim water quality monitoring program on three of the watersheds within Sheridan County. Prairie Dog Creek is among the watersheds monitored in this rotation. Bacteria geometric means are calculated for samples collected in May/June (for run-off conditions) and in August. Some sites may exceed the standard in one time period and not in the other. Understanding when bacteria samples for a particular site are below, at, or above the primary contact recreation standard, helps the SCCD evaluate how runoff and other weather related events impact bacteria and sediment contributions. Knowing this information helps the SCCD determine which types of water quality improvement projects are best suited to help reduce *E. coli* bacteria and sediment contributions to the water body. The overall goal is to reduce *E. coli* bacteria and sediment contributions so that our waterbodies can support all of the uses for which they are intended.

RAIN GARDENS AT WORK

... HELPING TO KEEP YOUR WATER CLEAN

Rain gardens help improve water quality by capturing and filtering runoff from roofs, driveways, sidewalks or other impervious surfaces. This keeps runoff from travelling overhead and picking up pollutants before entering nearby storm drains and streams. Run-off collects in the basin of the rain garden and slowly infiltrates back into the ground. The soil acts as a natural filter to clean the water before it replenishes ground water supplies.



BUILD YOUR OWN RAIN GARDEN

Rain gardens can be a fun and easy weekend project to help homeowners reduce runoff and improve water quality. The garden depth depends on the size, soil and the desired amount of runoff to be collected. Depending on soil type, the soil beneath the planting surface may need to be replaced with a sand/loam/compost mixture. An outlet needs to be constructed to prevent erosion during unusually large runoff events. The garden should be planted with a variety of vegetation adapted to Wyoming's environment. These gardens are easy to build and maintain and can fit into small yards or large areas. *Depth refers to the distance from top edge of the garden to the planting surface.

FUNCTIONAL AND AESTHETIC

Homeowners who install rain gardens will see that they are both functional and aesthetic. In addition to improving water quality by filtering runoff, rain gardens provide habitat for birds, butterflies and other wildlife and can be an attractive addition to any landscape.

For more information, please contact the Sheridan County Conservation District - 307-672-5820.

PLANT SELECTION

Depending on soil and light conditions, a variety of plants may be used. Actual plant selection will vary based on personal preference and availability from local nurseries. Try to include a mixture of grasses and sedges to increase root mass for improved infiltration. Plants in this rain garden are listed by common name and genus/species.

	BLUE FLAG IRIS <i>Iris versicolor</i> (Height: 2', Spread: 5')		SNOW DROP ANEMONE <i>Anemone hepatica</i> (Height: 5", Spread: 12")		PURPLE CONEFLOWER <i>Echinacea purpurea</i> (Height: 3-4', Spread: 2')
	SAGE <i>Salvia</i> (Height: 12', Spread: 15')		DINER'S GOLD COLUMBINE <i>Aquilegia scopulorum</i> (Height: 3-5', Spread: 15')		SPIDERWORT <i>Tradescantia</i> (Height: 1-2', Spread: 15')
	ECHINACEA <i>Echinacea purpurea</i> (Height: 1-2', Spread: 15')		LITTLE BLUE STAR <i>Scutellaria</i> (Height: 5", Spread: 15')		BLAZING STAR <i>Liatris spicata</i> (Height: 2', Spread: 15')
	FEATHER REED GRASS <i>Calamagrostis canadensis</i> (Height: 3', Spread: 15')		SEDIMENT <i>Sedimentum</i> (Height: 3', Spread: 15')		

PROUDLY SPONSORED AS AN EDUCATIONAL OPPORTUNITY BY:
Sheridan County Conservation District, Downtown Sheridan Association,
City of Sheridan, and University of Wyoming Extension

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STORM WATER TO STREAMS

IMPROVING WATER QUALITY IN SHERIDAN COUNTY PROJECT HISTORY AND OVERVIEW

Managing runoff, especially in an urban or residential setting can be a difficult task. The Sheridan County Conservation District (SCCD) began addressing the issue by encouraging residents to install rain barrels on their home downspouts.

With such a positive response to rain barrels, the SCCD, in partnership with Downtown Sheridan Association (DSA) and the City of Sheridan, decided to demonstrate alternatives for capturing/dispersing runoff before it reaches local waterways. The project needed to incorporate practices that would be practical and easy for homeowners to install and would also provide a significant water quality benefit.

RAIN GARDEN

Rain gardens capture storm water from roofs, allowing the water to be evaporated by plants and/or to infiltrate back into the ground before traveling overland. Rain gardens can be very effective tools for promoting water quality through storm water management. Rain gardens can also be very attractive additions to any landscape and can provide wonderful habitats for many pollinator and bird species.

RAIN BARRELS

Rain barrels help home owners take a simple step in preventing storm water from traveling overland and collecting pollutants—which often end up in local streams and rivers! Place rain barrels under downspouts to collect water to be used in other areas of the property. A surprising amount of water can be collected in a very short amount of time. Make sure rain barrels are emptied after every rain event or attach a hose to the spigot to provide an outlet for water to travel to rain gardens, swales or other vegetated areas of the property.

PERMEABLE WALKWAYS AND DRIVEWAYS

Anytime you add a sidewalk or other impervious surface, you add a conduit for runoff. Permeable surfaces help provide a solution by allowing some of the water to go through the surface instead of running over the surface. Depending upon the location and use of the walkway, a variety of materials can be used. As long as there are voids in the surface, either through holes/spaces built into the material or gaps between the material, runoff will be able to infiltrate into the soil beneath the walkway.

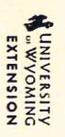
As part of the project, SCCD decided to build a rain garden to capture runoff from the roof, install rain barrels to catch runoff from an additional downspout on the east side of the DSA building, and install a permeable walkway to provide access to and through the site.

All three runoff management practices are practical solutions for controlling storm water. They can also be valuable additions to any home or business by increasing aesthetic appearance and providing accessibility, all the while helping to improve the water quality in Sheridan County rivers and streams.



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