Belle Fourche River Watershed Management and Project Implementation Plan Segment 9 Amendment

319 Watershed Project

October 1, 2020

Sponsored By:

Belle Fourche River Watershed Partnership

Submitted to:

South Dakota Department of
Environment and Natural Resources
Pierre, South Dakota 57501

PROJECT SUMMARY SHEET

PROJECT TITLE: Belle Fourche River Watershed Management and Project Implementation Plan Segment 9

PROJECT PERIOD: July 31, 2019–August 31, 2022

PROJECT SPONSOR:

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319 NONPOINT-SOURCE FUNDS:	**$1,099,000**	**+ $234,000**	**=**	**$1,333,000**
MATCH:	**$731,500**	**+ $175,500**	**=**	**$907,000**
OTHER FEDERAL FUNDS:	**$750,000**	**+ $1,247,000**	**=**	**$1,997,000**
TOTAL PROJECT COST:	**$2,580,500**	**+ $1,656,500**	**=**	**$4,237,000**

319 FUNDED FULL-TIME PERSONNEL: 1.5

PROJECT TYPES: [ ] PLANNING [X] WATERSHED [ ] I&E [ ] GROUNDWATER

PROJECT LOCATION

WATERSHED: Belle Fourche River Watershed

303(d) LISTED STREAM: Yes. The following streams are 303(d) listed:

Belle Fourche 1: Wyoming to Redwater River, SD-BF-R-BELLE_FOURCHE_01 (TSS, *E. coli*)
Belle Fourche 2: Redwater River To Whitewood Cr., SD-BF-R-BELLE_FOURCHE_02 (TSS, *E. coli*)
Belle Fourche 3: Whitewood Cr. To Willow Cr., SD-BF-R-BELLE_FOURCHE_03 (TSS, *E. coli*)
Belle Fourche 4: Willow Cr. To Alkali Cr., SD-BF-R-BELLE_FOURCHE_04 (TSS, *E. coli*)
Belle Fourche 5: Alkali Cr. To Mouth, SD-BF-R-BELLE_FOURCHE_05 (*E. coli,* TSS)
Horse Creek, Indian Creek to mouth, SD-BF-R-HORSE_01_USGS (TSS, *E. coli*)
Deadwood Creek, Rutabaga Gulch to Whitewood Creek, SD-BF-R-DEADWOOD_01 (*E. coli*)
Whitewood Creek: Gold Run Creek to Deadwood Creek, SD-BF-R-WHITEWOOD_02 (*E. coli*)
Whitewood Creek: Spruce Gulch to Sandy Creek, SD-BF-R-WHITEWOOD_04 (*E. coli*)
Whitewood Creek: Sandy Creek to I-90, SD-BF-R-WHITEWOOD_05 (pH)
Whitewood Creek: I-90 to Crow Creek, SD-BF-R-WHITEWOOD_06 (*E. coli*, pH)
Whitewood Creek: Crow Creek to mouth, SD-BF-R-WHITEWOOD_07 (*E. coli*, TSS)

HYDROLOGIC UNIT CODE: 10120201, 10120202, 10120203

Counties: Butte, Lawrence, Meade
Latitude: 45 N **Longitude:** –101 W

NPS CATEGORY

[X] AGRICULTURE: 100%	[ ] CONSTRUCTION
[ ] AFOs	[ ] HYDRAULIC MODIFICATION
[ ] URBAN RUNOFF	[ ] SILVICULTURE
[ ]RESOURCE EXTRACTION	[ ] OTHER

NPS FUNCTIONAL CATEGORY

[X] BMP IMPLEMENTATION (78%)	[ ] TECHNICAL ASSISTANCE
[X] INFORMATION AND EDUCATION (11%)	[ ] PLANNING
[ ] WATERSHED ASSESSMENT	[ ] GROUNDWATER
[X] WATER QUALITY MONITORING (11%)	[ ] OTHER

NPS POLLUTANTS TO BE ADDRESSED

[ ] EXCESS NITROGEN	[ ] PESTICIDES
[ ] EXCESS PHOSPHORUS	[ ] OIL AND GREASE
[X] SEDIMENTATION	[ ] TEMPERATURE
[X] PATHOGENS/BACTERIA	[ ] pH
[ ] METALS	[ ] OTHER
[ ] LOW DISSOLVED OXYGEN	[ ] OTHER

SUMMARY STATEMENT: The original project goal was to bring the Belle Fourche River into compliance for total suspended solids (TSS) and *Escherichia coli* (*E. coli*) by implementing the recommended best management practices (BMPs) by 2014 and implementing additional BMP recommendations from other Total Maximum Daily Load (TMDL) studies for waterbodies within the watershed as they became available.

This project exceeded the 2014 timeline, and a new 10-year plan would be developed to evaluate the effectiveness of installed BMPs and focus future projects to achieve full support of assigned beneficial uses on the Belle Fourche River and its tributaries. Progress has been made on affected waterbodies; however, the Belle Fourche River and certain tributaries continue to remain in nonsupport of TSS and *E. coli* which supports additional implementation work. Future work would be prioritized on targeted areas, such as Horse Creek, in the watershed where measurable water-quality improvements could be attained.

PROJECT GOALS:

The goals of Segment 9, as set forth in the Belle Fourche River Watershed TMDL study, include:

- Continue implementing BMPs in the watershed to reduce TSS and working toward the goal of 158 milligrams per liter (mg/L) in impaired reaches, which currently include all Segments 1–5 of the Belle Fourche River and the priority impaired Horse Creek Watershed.
- Continue implementing BMPs to reduce *E. coli* in the Belle Fourche River and the priority Horse Creek Watershed to not exceed a daily sample maximum of 1,178 colony-forming units per 100

milliliter (cfu/100 mL). Currently, Belle Fourche River Reaches 1 (Wyoming to Redwater River), 2 (Redwater River to Whitewood Creek), 3 (Whitewood to Willow Creek), 4 (Willow Creek to Alkali Creek) and 5 (Alkali Creek to Mouth) along Horse Creek Reach 1 (Indian Creek to mouth) are impaired for *E. coli* bacteria and TSS.

- Continue public outreach programs to stakeholders within the Belle Fourche River Watershed.
- Continue tracking the progress made toward reaching the goals of the TMDL to ensure that the BMPs are effective and that the proper BMPs are implemented.

PROJECT DESCRIPTION: The Belle Fourche River Watershed Partnership is the project sponsor for this 2-year project. This is the ninth segment that addresses seven TMDLs. Activities planned for this segment would continue implementing BMPs that reduce *E. coli* and TSS pollutants. These BMPs include: (1) installing irrigation sprinkler systems, (2) implementing grazing management systems, (3) installing riparian/bank stability improvements, (4) implementing improved cropping systems, (5) improving and/or relocating livestock feeding areas. The Segment 9 Amendment proposes additional funds to increase BMP installment in the watershed.

2.0 STATEMENT OF NEED

2.1 The Belle Fourche River Watershed Partnership (BFRWP) developed and implemented an assessment project to determine the Total Maximum Daily Load (TMDL) for the Belle Fourche River. The project started in April 2001. The purpose of the assessment was to (1) assess the current physical, chemical, and biological integrity of the Belle Fourche River and its tributaries; (2) determine the sources of total suspended solids (TSS) in the Belle Fourche River Watershed; and (3) define management prescriptions for identified nonpoint-source critical areas in the watershed. The TMDL was completed in 2003 and approved by the U.S. Environmental Protection Agency (EPA) in 2005. The TMDL report includes the Belle Fourche River and Horse Creek. The TMDL approved by the EPA addresses a cluster of TMDLs.

The Belle Fourche River was identified in the 1998 and 2002 *South Dakota 303(d) Waterbody Lists* and the 2004 and 2006 *Integrated Report for Surface Water Quality Assessment* (IR) as impaired because of elevated TSS concentrations. According to the 2006 IR, the Belle Fourche River from the Wyoming border to the Cheyenne River, South Dakota, failed to support its assigned uses because of high TSS concentrations. In the report, agricultural activities were listed as a probable source of occasional impairment. This report also states that a natural source of TSS may be the erosion of exposed shale beds that lie along the river and its tributaries. The 2008 IR shows that all segments of the Belle Fourche River, with the exception of the segment from the Wyoming border to Fruitdale, were delisted after water-quality standards for TSS were met. The 2010 IR reports that four out of the five stream segments are listed as nonsupporting for TSS warm-water permanent fish life assigned beneficial use. The 2012 IR reports that all of the segments are listed for TSS and two segments are listed for fecal coliform and *E. coli*. The 2014 IR reports that all of the segments are listed for TSS and two segments are listed for fecal coliform and *E. coli*. The 2016 IR has all of the Belle Fourche River segments listed for TSS and Segments 1, 3, and 5 as impaired for *E. coli*. The 2018 IR also has all of the Belle Fourche River segments listed for TSS and Segments 1, 3, and 5 as impaired for *E. coli*. Table 2-1 is a summary of the 2018 IR's TMDL segments within the Watershed that are listed as impaired for TSS, fecal coliform, *E. coli*, temperature, and pH. The table also lists the impaired beneficial use, impairment parameter, water-quality data, and possible source.

Horse Creek was listed in the 1998 impaired waterbody list for TSS; this listing was later determined to be an error. The Horse Creek listing was corrected to conductivity during 2002. During this assessment, approximately 10 percent of the samples collected from Horse Creek exceeded the water-quality standard for TSS. The 2012 IR lists Horse Creek as nonsupporting for conductivity alone. The 2014 IR does not list Horse Creek as impaired because of the lack of data reporting rather than clean water. In the 2016 IR and recently in the 2018 IR, Horse Creek is nonsupporting for *E. coli* and TSS.

The Belle Fourche River from the Wyoming border to the Redwater River was first listed for pathogens in the 2002 South Dakota Report to Congress 305 (b) Water Quality Assessment and continued to be listed for fecal coliform in successive integrated reports (2004, 2006, 2008, and 2010) as failing to support its immersion recreation beneficial use because of elevated levels of *E. coli*. The South Dakota Department of Environment and Natural Resources (SD DENR) developed a TMDL in 2017 that identified livestock on grass as the overwhelming source of E. *coli* impairments in the watershed (~97%). The Belle Fourche River from Alkali Creek to the mouth was listed as nonsupporting for fecal coliform (2010) and for *E. coli* (2012, 2014, 2016, 2018) with 97 percent of the bacterial load attributed to livestock according to the TMDL.

Table 2-1. Summary of the Non-Support Waterbodies within Belle Fourche River Watershed From 2020 Integrated Report

Waterbody / AU-ID	Location	Use	Support	EPA Category	Nonsupporting Parameters
SD-BF-R-BELLE_FOURCHE_01 Belle Fourche River	Wyoming border to Redwater River	Warmwater Permanent Fish Life Immersion Recreation	NON NON	4A	TSS ECOLI
SD-BF-R-BELLE_FOURCHE_02 Belle Fourche River	Redwater River to Whitewood Creek	Warmwater Permanent Fish Life Immersion Recreation	NON NON	5	TSS ECOLI
SD-BF-R-BELLE_FOURCHE_03 Belle Fourche River	Whitewood Creek to Willow Creek	Warmwater Permanent Fish Life Immersion Recreation	NON NON	5	TSS ECOLI
SD-BF-R-BELLE_FOURCHE_04 Belle Fourche River	Willow Creek to Alkali Creek	Warmwater Permanent Fish Life Immersion Recreation	NON NON	5	TSS ECOLI
SD-BF-R-BELLE_FOURCHE_05 Belle Fourche River	Alkali Creek to mouth	Warmwater Permanent Fish Life Immersion Recreation	NON NON	4A	TSS ECOLI
SD-BF-R-DEADWOOD_01 Deadwood Creek	Rutabaga Gulch to Whitewood Creek	Immersion Recreation	NON		ECOLI
SD-BF-R-HORSE_01_USGS Horse Creek	Indian Creek to mouth	Warmwater Semipermanent Fish Life Limited Contact Recreation	NON	5	TSS ECOLI
SD-BF-R-WHITEWOOD_03 Whitewood Creek	Gold Run Creek to Deadwood Creek	Immersion Recreation Limited	NON		ECOLI
SD-BF-R-WHITEWOOD_03 Whitewood Creek	Deadwood Creek to Spruce Gulch	Immersion Recreation	NON		ECOLI
SD-BF-R-WHITEWOOD_04 Whitewood Creek	Spruce Gulch to Sandy Creek	Immersion Recreation Limited	NON	5	ECOLI
SD-BF-R-WHITEWOOD_05 Whitewood Creek	Sandy Creek to I-90	Coldwater Marginal Fish Life	NON	5	pH
SD-BF-R-WHITEWOOD_06 Whitewood Creek	I-90 to Crow Creek	Warmwater Permanent Fish Life	NON	5	pH
SD-BF-R-WHITEWOOD_07 Whitewood Creek	Crow Creek to mouth	Limited Contact Recreation	NON	5	ECOLI

TSS BMP implementation recommended in the Belle Fourche River TMDL began during 2004. The first year of implementation included funding from local ranchers and farmers, BFRWP, Lawrence County, Belle Fourche Irrigation District (BFID), Wyoming Department of Environmental Quality (WDEQ), National Resource Conservation Service (NRCS), US Army Corps of Engineers (USACE), Bureau of Reclamation (USBR), and the U.S. Geological Survey (USGS). Two products of the project were the *Ten-Year Belle Fourche River Watershed Strategic Implementation Plan* (10-Year Plan) and the *Belle Fourche Irrigation District Water Conservation Plan* (5-Year Plan). These two plans outline the work that has been completed to date. A new 10-year plan for the project is included in this proposal to guide the project in future years. Table 2-2 list the BMPs installed above and below the reservoir to date. The total planned number of each BMP to be installed in this segment is also shown. Segments 1–7 were completed on schedule and within budget. Segment 8 was completed in July 2019 and within the project budget.

Table 2-2. Best Management Practices Installed and Scheduled Above and Below the Belle Fourche Reservoir

Best Management Practice	Planned for Segment 9	Segment 9 Amended	Amount Implemented To Date
Flow-Automation Units (number)	0		41
Upgraded Water Card and Water Order System	Complete		Phase III
Portable Stage/Flow-Measuring Devices (number)	0		15
Real-Time Stage Flow-Measuring Devices (number)	0		15
Line Open Canals and Laterals (feet)	0		16,000
Replace Open Canals/Laterals With Pipelines (feet)	4,000		25,000
Nonused Water Storage Pond (number)	0		3
Inlet Canal Lining (feet)	0		10,560
Pipeline Projects Delivering Water to Fields (feet)	6,000	1,000	65,471
Irrigation Sprinkler Systems (number)	17	2	122
Managed Riparian Grazing (acres)	6,000		35,188
Seasonal Riparian Area Management SRAM (acres)	0	40	0
Public Meetings (number)	6		49
Project Tours and Events (number)	6		22
Irrigation Scheduling (acres)	300		720
Cover Crops (acres)	200		300

While the 10-year plan has not been updated, the SD DENR has evaluated sediment load reductions within the watershed. The most direct measure of success is a summary of the BMPs implemented throughout the watershed and associated load reductions (nitrogen, phosphorus and sediment), which are reported annually to the EPA. Grazing and riparian reductions are calculated by using the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) model. Irrigation reductions are not able to be calculated in STEPL, and so reductions are based on literature values [USEPA, 2003]. While BMPs reduced sediment and other pollutants before 2009, the reductions in Tables 2-3 and 2-4 were reported in the same manner, are stored in the TRACKER database and so are easily comparable.

Table 2-3. Reported 319 Nonpoint-Source Reductions 2009–2018

Stream Reach	Nitrogen (lbs/year)	Phosphorous (lbs/year)	Sediment (tons/year)	*E. coli*/Fecal Coliform (mpn)
Belle Fourche 1	710	612	1600	32
Belle Fourche 2	2,561	2,397	10,426	129
Belle Fourche 3	2,048	1,405	3,700	11
Belle Fourche 4	2,271	1,493	5,778	163
Belle Fourche 5	846	321	1,660	94
Horse Creek	1304	871	1,857	14
Spearfish 6	210	180	400	0
Willow Creek	114	101	1,304	49
Crow Creek	0	0	1,118	0
Redwater	0	0	138	0
Other	703	676	1,759	29
Total	10,767	8,056	29,740	521

MPN: most probable number

Table 2-4. Reported 319 Nonpoint-Source Reductions 2009–2018

Project Implementation Segment	Best Management Practice	Nitrogen (lbs/year)	Phosphorous (lbs/year)	Sediment (tons/year)	Number of Projects
4	Grazing/Riparian	586	793	616	5
5	Grazing/Riparian	528	495	2,140	6
6	Grazing/Riparian	586	793	2,730	19
7	Grazing/Riparian	2,255	683	1,139	22
8	Grazing/Riparian	345	55	39	2
Subtotal	**Grazing/Riparian**	**4,300**	**2,819**	**6,664**	**54**
4	Irrigation			7,107	22
5	Irrigation	2,118	1,800	5,327	21
6	Irrigation	3,045	2,610	7,180	29
7	Irrigation	1,890	1,620	3,600	17
Subtotal	**Irrigation**	7,053	6,030	23,214	89
Grand Total		**11,353**	**8,849**	**29,878**	**143**

In addition to BMPs reported in TRACKER, recent evaluations of the sediment rating transport equations show that, given a flow, less sediment is being transported in post-bmp years (2005–2015) relative to pre-bmp years (1995–2004) both at Horse Creek and SDDENR_WQX-460880 (WQM 21) which is on the Belle Fourche River, east of Sturgis near Volunteer, downstream of implementation. High flows in recent years still result in exceedances because of the load-flow relationship where higher TSS concentrations are proportional to flows.

2.2 The Belle Fourche River Watershed is shown in Figure 2-1. The ecoregions in the watershed include the Black Hills Foothills, Black Hills Plateau, Black Hills Core Highlands, River Breaks, Semiarid Pierre Shale Plains, Dense Clay Prairie, and Missouri Plateau. The Belle Fourche River is a tributary to the Cheyenne River. There are 14 stream segments in the Belle Fourche River Watershed are listed in the South Dakota 2018 IR as impaired waters and not in full support of assigned beneficial uses. These segments include the Belle Fourche River (five listings), Deadwood Creek (one listing), Horse Creek (one listing), Strawberry Creek (one listing), and Whitewood Creek (six listings).

The surface area of the South Dakota portion of the Belle Fourche River encompasses approximately 2,089,000 acres and includes Hydraulic Units 10120201, 10120202, and 10120203. The city of Spearfish (2017 population 11,609) is the largest municipality located in the Belle Fourche River Watershed. Other small communities in the watershed include Belle Fourche (population 5,553), Sturgis (population 6,908), Lead (population 2,978), Deadwood (population 1,304), Newell (population 580), Nisland (population 224), and Fruitdale (population 65).

Land use in the watershed is primarily livestock grazing with cropland and a few urban and suburban areas. Wheat, alfalfa, native and tame grasses, and hay are the main crops. Corn, wheat, and barley are also grown within the BFID. Some winter feeding areas are located in the watershed. Gold mining, while reduced in scope from the past, occurs in some headwaters of the watershed, and some of the land is used for silviculture. Approximately 11 percent of the watershed is U.S. Forest Service (USFS) land (primarily the Black Hills National Forest), and 4 percent is Bureau of Land Management land.

Major soil associations found in the watershed include Winler-Lismas, Pierre-Kyle, Grummit-Shale, Epsie, Midway-Penrose, Cabbart-Absher, Butche-Colby, Arvada-Stetter, Lohmiller-Glenberg-Haverson, Caputa-Satanta, Delphill-Assinniboine, Nunn-Satanta-Zigweid, Blackpipe-Savo-Manvel, Blackpipe-Assinniboine-Savo, Canyon-Lakoa-Maitland, Tilford-Nevee, St. Onge-Keith, Lohmiller-Glenberg, Winler-Lismas-Swanboy, Kyle-Pierre-Hisle, Samsil-Lismas-Pierre, Nevee-Vale-Tilford, Butche-Satanta-Boneek, Nunn-Kyle-Pierre, Barnum-Swint-St. Onge, Grummit-Snomo-Rock, Paunsaugunt-Rock, Lakoa-Maitland, and Citadel-Vanocker-Grizzly.

The average annual precipitation in the Belle Fourche River Watershed ranges from 15 to 29 inches, 70 percent of which is usually received from April through September. Tornadoes and severe thunderstorms strike occasionally. These storms are local, of short duration, and occasionally produce heavy rainfall events. The average seasonal snowfall ranges from 155 inches in the higher elevations of the western part of the watershed to 23 inches per year in the eastern portion of the watershed. The average water allocation to the BFID is approximately 15 inches. The water added to the fields from irrigation nearly doubles the amount of water available for crop production.

The landscape in the watershed is characterized by prairies with mountains in the south and west. Land elevation ranges from approximately 2,500 feet above mean sea level (msl) to approximately 7,071 msl. The Black Hills are steep, and the hills near the Cheyenne River are not as steep.

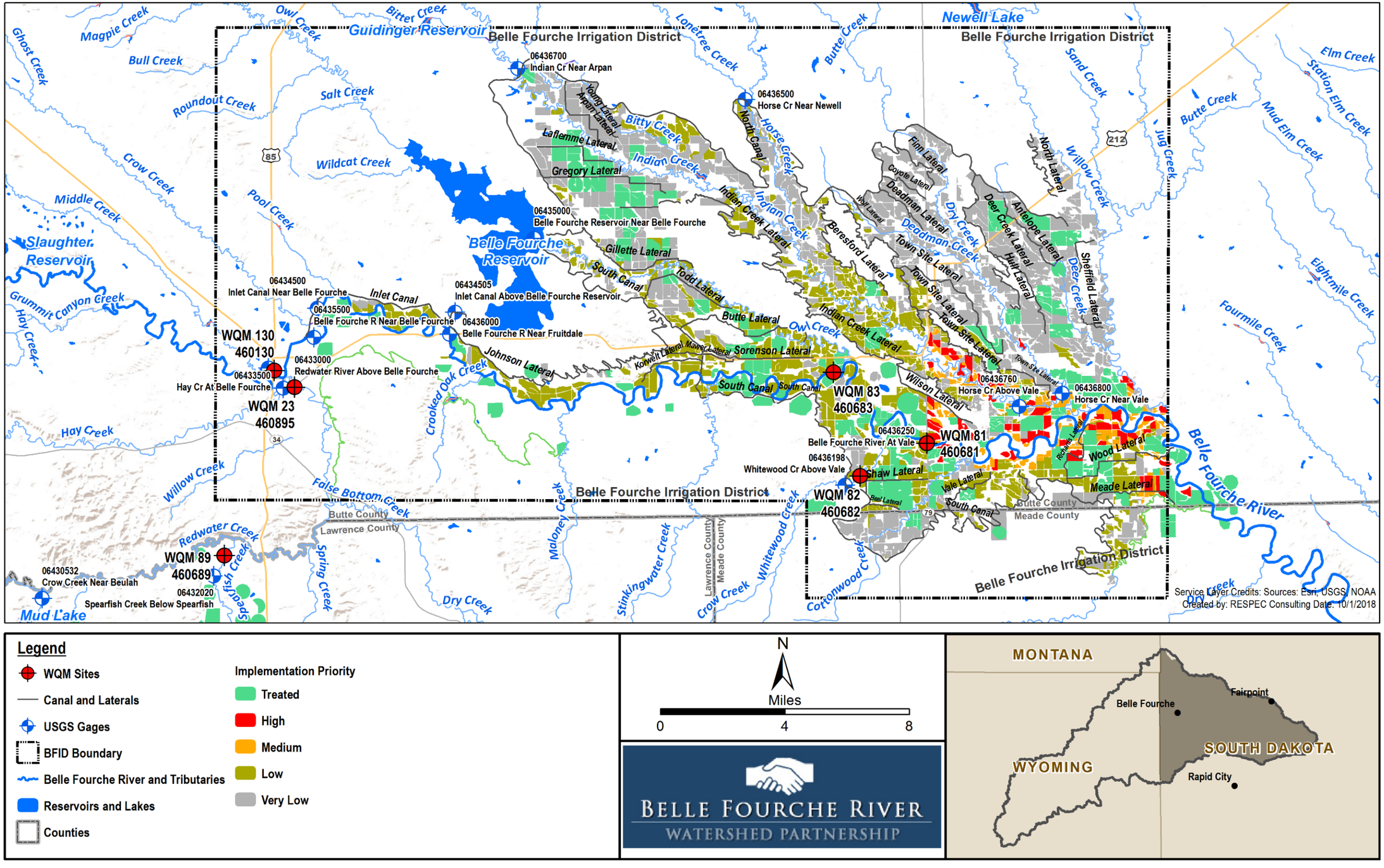

Figure 2-1. Location of the Belle Fourche River Watershed and Implementation Priority of Irrigated Lands

2.3 The Belle Fourche River Watershed within South Dakota encompasses over 2 million acres. TSS are contributed from natural, urban, agriculture, forest, and mining sources. The TMDL study identified that the primary contributor of TSS to the Belle Fourche River and Horse Creek are the natural bank sloughing, quantity of nonused irrigation water discharged to the natural waterways, and riparian habitat impairment. Stream entrenchment and bank failure are responsible for approximately 75 percent of the TSS in the Belle Fourche River system (2004 TSS TMDL). Stream energy causes natural bank failure (particularly in the eastern portion of the watershed). These areas are dominated by high banks composed primarily of clay soils that supply suspended solids to the channel. Riparian areas and improper grazing in the uplands facilitate natural bank failure and add to TSS in the watershed. Increased quantities of water resulting from the nonused irrigation flows are the major cause of the channel incision and result in additional bank failures and resultant suspended solids.

According to the TMDL, irrigation and return-flow, nonused irrigation water are responsible for approximately 20 percent of the TSS in the Belle Fourche River. The majority of the irrigated lands within the watershed are flood-irrigated. This type of irrigation results in sediments that are mobilized by three processes: (1) tail water/runoff crossing fields, (2) water in the canals and laterals, and (3) water in the intermittent streams carrying tail water/runoff to the perennial streams. Since the watershed project began, there have been approximately 20,000 to 22,000 acres converted to sprinkler irrigation. Rangeland erosion contributes the remaining 5 percent of the TSS load.

The *E. coli* TMDL study identified livestock as the main contributor to excess loading in the lower reach of the Belle Fourche River, with wildlife contributing approximately 3 percent of the load. To meet the standard for immersion recreation, *E. coli* loads need to be reduced 99, 56, 21, 29, and 80 percent during high, moist, midrange, dry, and low flow, respectively.

3.0 PROJECT DESCRIPTION

3.1 GOALS

The project goal is to bring the Belle Fourche River into compliance for its warm-water permanent fish life and immersion recreation beneficial uses by implementing the BMPs included in the 10-year implementation plan and by implementing additional BMP recommendations from the *E. coli* TMDL in the bacteria-impaired reaches of the Belle Fourche River. The goals of this project segment, as set forth in the Belle Fourche River TSS and *E. coli* TMDL studies, include the following:

- Continue implementing BMPs in the watershed to reduce TSS and working toward the goal of 158 milligrams per liter (mg/L) in impaired reaches, which currently include all Segments 1–5 of the Belle Fourche River and the priority impaired Horse Creek Watershed.
- Continue implementing BMPs to reduce *E. coli* in the Belle Fourche River and the priority Horse Creek Watershed to not exceed 1,178 colony-forming units per 100 milliliter (cfu/100 mL). Currently, Belle Fourche River Reaches 1 (Wyoming to Fruitdale), 3 (Whitewood to Willow Creek) and 5 (Alkali Creek to Mouth) are impaired for bacteria.
- Continue public outreach programs to stakeholders within the Belle Fourche River Watershed.
- Continue tracking the progress made toward reaching the goals of the TMDL to ensure that the BMPs are effective and that the proper BMPs are implemented.

3.2 OBJECTIVES AND TASKS

The strategy outlined in the Belle Fourche River Watershed Implementation Plan is to progressively implement BMPs, such as water management and grazing management systems in the riparian areas, within the Belle Fourche River Watershed to reduce TSS in Horse Creek and the Belle Fourche River and continue implementing BMPs to reduce *E. coli*. This project segment focuses on BMPs that reduce the amount of sediment-laden nonused irrigation water that is discharged to the local waterways by the delivery and application of irrigation water as well as riparian vegetation improvement. Baseline and seasonal monitoring would be performed to measure improvement. The project strategy would be reviewed annually to measure overall success to determine adjustments and to obtain funding for the following project segment. Federal, state, local, and private funding would be used to fund BMPs. A final report is produced for each 319 project segment that is completed.

Specifically, this project segment would fund the 12th and 13th years of BMP installation in the watershed to continue TSS reduction as well as targeting *E. coli* reductions as well.

OBJECTIVE 1: Implement BMPs Recommended in the Belle Fourche River Watershed TMDL to Reduce TSS and *E. coli*

The Belle Fourche River TSS TMDL recommends BMPs that focus on reducing the amount of nonused irrigation water discharged to the waterway from irrigation as well as implementing riparian vegetation improvements. Nonused water reduction activities include water delivery and water application improvement. Nonused water picks up sediment from the irrigation ditches themselves along with sediment from crop fields. The nonused water then returns to the Belle Fourche River and Horse Creek, and hence, increases the sediment loads. Horse Creek has been identified by the SD DENR and the BFRWP as a special focus area. Horse Creek itself is impaired; focusing efforts within a smaller geographic area may allow water-quality effects to be more readily observed than in the much larger Belle Fourche Watershed. Suitable irrigation and riparian/range improvement projects within Horse Creek would be designated as high priority and any 319 implementation dollars would be utilized to target those high priority flood irrigated fields. Additionally, the next priority would be flood-irrigated fields served by the BFID's Deer Creek, Indian Creek, Meade, Perry, Richard, Richards, Sheffield, Town Site, Vale, Wilson, and Wood laterals within the lower portions of the Middle Belle Fourche, Willow Creek, and Ninemile Creek watersheds.

Task 1 **Reduce Nonused Water Discharged to the Local Waterways From the Delivery and Application Systems**

The BFID maintains and operates irrigation facilities for the USBR. The BFID has an active water-conservation program. Historically, the program included lining the canals, piping, and operational and maintenance procedures to conserve water. Irrigation significantly impacts the Belle Fourche River, Horse Creek, and other streams within the BFID's 57,000 (+) acres (irrigable land). The impact is primarily from the additional water added to the system during the irrigation season (June–September), and the average TSS concentrations at USGS Gaging Station Sites 06430500 (at the South Dakota-Wyoming border) and USGS 06438000 (upstream of the Cheyenne River).

Approximately 64 percent of the water released from the reservoir was delivered to the field. Approximately 32 percent of the water was used by crops, and the rest was lost

through evaporation and nonused water was discharged to adjacent waterways. This nonused water also carried TSS from the flood-irrigation water in fields. This task would increase the overall irrigation delivery and application efficiency through sprinkler systems, pipelines, and water control and monitoring structures and equipment. Also, while conservation effects on irrigation within the Belle Fourche Watershed have not been directly measured at the field level, the Conservation Effects Assessment Project in the Upper Snake River/Rock Creek Watershed in Idaho measured 52–97 percent TSS reductions in nonused water by installing BMPs, including switching irrigation systems from furrow to sprinkler, using polyacrylamide, and installing sediment ponds.

Additionally, current river and reservoir conditions would be examined to identify any potential alternatives for increasing the assimilative capacity of the Belle Fourche River and its tributaries by adjusting facility operations to improve riparian and riverine habitats downstream of the Belle Fourche Reservoir. An example was the reservoir dredging project that was recently completed by the BFID, which removed approximately 33,000 cubic yards or 44,900 tons of sandy clay sediments near the intake of the South Canal. Any alternative would also have to address the complex nature of water management within watershed, which involves agricultural; recreational; water rights; interstate river compacts; and dam and reservoir operation and maintenance. A preliminary appraisal of potential effects and potential projects that may be eligible for private, state, and federal funding assistance would be developed.

Products:

1. Improved Irrigation Water Delivery and Application.

   The goal for this project segment is to reduce the amount of sediment-laden tail water that returns to the Belle Fourche River from inefficient water use in the BFID. This goal would be accomplished by reducing nonused irrigation water from the BFID's delivery system and the producers' application systems. In December 2019, the BFRWP submitted their "BFRWP Irrigation Efficiency and Soil Health Project" to the NRCS for RCPP funding and in April 2020, the NRCS awarded the BFRWP $1,203,000 of financial assistance and $468,429 in technical assistance in RCPP funding over the next 3 years to install on-the-ground conservation practices that address degraded plant condition and field sediment, nutrient and pathogen loss resource concerns and result in conservation benefits to the watershed's plant productivity and soil health. The project area includes the irrigated lands and conveyances within the BFID. The following is an outline of anticipated activities that would be completed to reach these milestones:

   a) Replace open laterals and sublaterals with pipeline within the delivery system. The BFID will improve delivery efficiency on the Moore, Sipalla, Town Site, Sorenson, Anderson, and Meade Laterals. These projects would reduce the seepage, evaporation, and sediment transport during irrigation water delivery.

      – Activity Cost: $200,000 + $330,000 = $530,000 319 Cost: $0
      – Lead Group: BFID, Watershed Staff, NRCS, USBR
      – Milestone: August 2022, RCPP and partner contributions from the BFID and USBR will be used to convert more than 15,000 feet of earthen laterals to more efficient delivery systems. (see the timeline on page 18).

b) Convert 17 (+2 = 19) flood-irrigation systems to sprinkler-irrigation systems. The total irrigation acres treated would be approximately 1,360 (+140 = 1,500) acres. Convert an additional 2 flood-irrigated systems to sprinkler-irrigation systems on approximately 140 acres totaling 19 pivots and 1,500 acres.

Sprinkler-irrigation systems are more efficient at applying water for irrigation (i.e., they use less water and reduce nonused water). In addition to improved water efficiency, converting flood-irrigation systems to sprinklers decreases the amount of sediment detached from the soil surface and transported from the field through runoff into the tributary drains back to the river. A total of 319 funds, along with Environmental Quality Incentives Program (EQIP) funds, would be used to attain this goal. Approximately 19 sprinkler-irrigation systems would be installed during this segment. Conversion projects include installing center-pivot sprinkler-irrigation systems and an underground pipeline that services the system on acres that have been using flood irrigation. Cost share is based on a docket price per linear foot of sprinkler system and pipeline that services the sprinkler-irrigation system and typically provides approximately 40 percent of the total cost of the project. The BFRWP designates the docket price annually for consistency with the EQIP payment schedule unit costs. The cost-share amount has been designated to not exceed 50 percent of the total cost of the project. Funds requested in this segment would be used to improve water use efficiency and decrease the amount of sediment transported through runoff on approximately 1,500 acres. Suitable irrigation projects within Horse Creek would be designated as high priority and any 319 implementation dollars would be utilized to target those high priority flood-irrigated fields.

The BFRWP's next priority are the flood-irrigated fields served by the BFID's Deer Creek, Indian Creek, Meade, Perry, Richard, Richards, Sheffield, Town Site, Vale, Wilson, and Wood laterals within the lower portions of the Middle Belle Fourche, Willow Creek, and Ninemile Creek watersheds. The BFRWP and NRCS will offer RCPP contracts to eligible producers for sprinkler systems, irrigation pipelines, irrigation water management, pumping plants, structures for water control, and cover crop conservation practices.

- Activity Cost: $1,143,000 + $1,195,000 = $2,338,000
- 319 Cost: $446,500 + $120,500 = $567,000
- Lead Group: NRCS, Consultants, Producers
- 319 Milestone: August 2022, conversion of flood-irrigation to sprinkler-irrigation systems (17 + 2 = 19 sprinklers) on approximately 1,360 +140 = 1,500 acres (see the timeline on page 18)
- RCPP Milestone: August 2020, RCPP and partner contributions from the SD DENR will be used to convert over 5,000 flood-irrigated acres to more efficient sprinkler systems.

c) Convert approximately 7,000 feet of open on-farm ditches to buried pipe. Total treated acres would be approximately 120 acres.

The Butte, Lawrence, and Elk Creek Conservation Districts submitted a grant request to the South Dakota Department of Agriculture (SDDA) through their

Coordinated Natural Resources Conservation Grants to provide cost share for converting on-farm open ditches to buried underground pipe. Replacing open ditches with buried pipe reduces water loss via seepage and evaporation, which would in turn increase efficiencies and reduce sediment-laden return flows.

– Activity Cost: $68,000 319 Cost: $9,000
– Lead Group: Producers, Watershed Staff, Butte, Lawrence, Elk Creek CDs
– Milestone: August 2022, 7,000 feet of open ditch converted to buried pipe treating approximately 120 acres (see timeline on page 16)

Task 2 **Riparian and Range Areas BMP Implementation**

In the Belle Fourche River Watershed, the 2004 TSS TMDL predicted that riparian vegetation improvement would reduce TSS concentrations by 18 percent. Functioning riparian areas intercept runoff and store sediment and associated pollutants. Grazing exclusion and streambank protection would be the main BMPs. The *E. coli* TMDL study identified that reducing livestock access to streams, protecting unstable stream banks, creating filter strips, and waste management should be implemented to reduce *E. coli* in the impaired reaches of the Belle Fourche River and Horse Creek. Suitable riparian and range improvement projects within Horse Creek would be designated as high priority and any 319 implementation dollars would be utilized to target those areas. Also, the next priority would be riparian and range projects within the lower portions of the Middle Belle Fourche, Willow Creek, and Ninemile Creek watersheds. The U.S. Department of Agriculture (USDA) cost-share funds would be used to install similar BMPs throughout the watershed. Installing BMPs in both the riparian and upland sites allows for overall improved riparian grazing management and rangeland health condition that would ultimately reduce TSS and *E. coli* concentrations.

Products:

2. Implement Riparian and Rangeland Improvements.

The focus of this product would be to work with producers who have livestock operations directly impacting riparian areas along unstable reaches on the Belle Fourche River, Horse Creek, and Willow Creek within the lower portions of the Horse Creek, Middle Belle Fourche, Willow Creek, and Ninemile Creek watersheds. BMPs used to achieve this goal include livestock deferment, improved grazing systems, livestock watering facilities, fencing, livestock water pipeline, streambank protection, riparian buffers, seasonal riparian area management (SRAM), and other facilitating practices. The BFRWP has been successful in working with the NRCS, Game Fish and Parks (SDGFP), and U.S. Fish and Wildlife Service (USFWS) and would continue to work with these agencies to maximize funding opportunities. In addition, BFRWP consultants would continue to provide technical assistance to producers who work on riparian improvement projects. The 319 implementation dollars would be utilized to target high priority unstable reaches on Horse Creek and the Belle Fourche River identified during the SD DENR's Rapid Geomorphic Assessment (RGA) that was completed in 2017.

a) Implement riparian improvements on approximately 4,000 acres and rangeland improvements on 2,000 acres.

– Activity Cost: $585,000 + $34,000 = $619,000

– 319 Cost: $275,000 + $25,000 = $300,000
– Lead Group: NRCS, Consultants, Producers
– Other Groups: NRCS, USFWS, SDGFP,
– Milestone: August 2022, implement improvements on approximately 4,000 acres of riparian and 2,000 acres of rangelands (see the timeline on page 21)

b) Implement seasonal riparian area management (SRAM) on approximately 40 acres.

– Activity Cost: $0 + $25,000 = $25,000
– 319 Cost: $0 + $25,000 = $25,000
– Lead Group: Producers, Watershed Staff
– Other Groups: SD DENR, NRCS
– Milestone: August 2022, implement seasonal riparian area management (SRAM) on approximately 40 acres of riparian (see the timeline on page 21)

Task 3 **Cover Crops and Soil Health**

Implementing cover crops on cropland can reduce soil erosion, increase soil moisture, and improve soil health. Cover crops produce more vegetation biomass than volunteer plants; these crops do transpire water, increase water infiltration, and decrease surface runoff and runoff velocity. Cover-crop species selection and its management determine the benefits and returns. The BFRWP has demonstrated cover-crop practices on approximately 200 acres in the watershed as part of Segment 7 and 8. The BFRWP would promote successful cover-crop practices throughout the watershed.

Products:

3. Implement cover crops on 200 acres in the watershed. The NRCS would be the funding partner for the cost share, and BFRWP staff would be responsible for coordinating with the producers (i.e., planning, contracting, and budgeting the projects). Cost-share rate would be $25 per acre or approximately 50 percent of the total cost with the producer providing 50 percent of the cost in the form of cash or in-kind match. The projects would be completed by August 2022.

   – Activity Cost: $25,000 319 Cost: $0
   – Lead Group: Producers, Watershed Staff, NRCS
   – Milestone: August 2022, 200 acres of cover crops planted (see timeline page 16)

OBJECTIVE 2: Conduct Public Outreach and Education, Implementation Record Keeping, Cultural Resources, Project Design, Report Writing, Writing Future Grants, and Annual Audit

Public outreach and education are an essential part of this project. Public meetings and workshops keep the community informed, encourage involvement with the BFRWP, and promote water-quality through personal responsibility. Producer implementation, project planning, and record keeping are important for efficient report writing. Grant writing for future projects that involve water-quality issues in the watershed would further assist the BFRWP efforts. Beginning in 2006, an additional $5,100,000 was funded for the watershed through these grant-writing efforts.

Task 4 **Project Management and Administration**

Products:

4. Public Outreach and Education, Implementation Record Keeping, Cultural Resources, Engineering, Irrigation Scheduling, Coordinating Improved Cropping Practices, Audits, Report Writing, and Future Grant Writing.

   Six public meetings would be held during the project segment. The meetings would update the status of the project and educate and encourage the producers, landowners, and stakeholders to become involved with implementing BMPs. These meetings would provide an opportunity for input from residents in the area. Meeting notifications would be provided through local agencies, mailings, and newspapers. Additionally, a public website (*www.bellefourchewatershed.com*) would be maintained to provide an overview of the project and status of work activities.

   Public awareness would be further enhanced by tours of the watershed, informational booths at local county fairs, and agriculture-related shows that demonstrate the BFRWP accomplishments. Educational workshops would be sponsored during the project and demonstrate innovative approaches to addressing resource concerns in the watershed. The BFRWP's Soil-Quality Demonstration Trailer would be used to demonstrate the effects of soil erosion to agriculture producers, students, and the general public. Watershed staff would be responsible for organizing and planning all of the public outreach and education activities.

   Riparian, irrigation, and cover-crop implementation projects require collaborating with the producer to complete applications, plan projects, comply with State Historic Preservation Office regulations, conduct engineering, check practices once they are complete, and organize and file applications and producer bills. Consultants would work with the NRCS and the Butte Conservation District to carry out this task.

   Grant Reporting and Track System (GRTS) reports would be completed as required by the SD DENR. A final report would be submitted to the EPA at the conclusion of the project. This report would cover all of the work completed during this segment of implementation and the estimated effects that the BMPs would have on the water quality in the Belle Fourche River. Additional grants to assist in resolving water-quality issues and support the cost of implementation projects would be written. The BFRWP has been successful in partnering with the NRCS, SDDA, South Dakota Weed and Pest, Meade County, Butte County, City of Spearfish, and City of Belle Fourche in securing grant funding to further efforts in water-quality improvement.

   – Activity Cost: $312,500 + $46,500 = $359,000
   – 319 Cost: $312,500 + $46,500 = $359,000
   – Lead Group: BFRWP
   – Other Groups: NRCS, Consultants, Butte Conservation District
   – Milestone: August 2022, two GRTS reports, one final report, two required federal audits, six public meetings, one website, two watershed tours, two workshops, five public information booths, and four soil-quality demonstrations (see timeline on page 16)

OBJECTIVE 3: **Complete Essential Water Quality Monitoring**

Water quality monitoring would continue to use a targeted approach. Water quality data would be collected at sites used during the watershed TMDL assessment.

Task 5 **Water Quality Monitoring to Assess BMPs**

Products:

5. Monitor Water Quality Improvement.

Monitoring is necessary to measure water quality within the Belle Fourche Watershed to determine if water-quality standards are being met and to ascertain whether implementation activities have had a measurable impact on water quality. Ambient monitoring at fixed locations can be used to evaluate the general state of water quality and assess long-term trends. Water quality monitoring on a smaller scale can detect local changes caused by implementation or other changes within the watershed. Water quality monitoring has expanded in Segment 9 to include both approaches.

The project would continue monitoring at these water-quality monitoring (WQM) stations: BELLEIMPWQM130 (WQM 130) and BELLEIMPWQM83 (WQM 83), and BELLEIMPWQM81 (WQM 81) on the Belle Fourche River. The lower Horse Creek site BELLEIMPHCR02 (HCR02) and the upper Indian Creek site BELLEIMPICR03 (ICR03) would continue to be monitored to measure any changes from installed BMPs and estimate any natural variation in water quality caused by changes in flow. The BELLEIMPBF8 (BF8/BF6) and BELLEIMPHCR04 (HCR04) sites were sampled in 2019 but were discontinued in 2020. Two new sites, BELLEIMPHCR10 on Winkler Road and BELLEIMPHCR11 on Stonelake Road, were added for sampling in 2020 between the HCR02 and HCR04 sites in closer proximity to implementation projects.

Flow impact on the watershed is analyzed by using the following USGS gage stations, which are long-term flow-measurement sites operated and maintained by the USGS:

- USGS 06428500 (Belle Fourche River at the South Dakota/Wyoming state line)
- USGS 06436000 (Belle Fourche River near Fruitdale, South Dakota)
- USGS 06437000 (Belle Fourche River near Sturgis, South Dakota)
- USGS 06438000 (Belle Fourche River near Elm Springs, South Dakota)
- USGS 06433000 (Redwater River above Belle Fourche, South Dakota)

Flow impacts are also analyzed using these BFRWP watershed project managed sites with installed Solinst Leveloggers to monitor temperature and water pressure to estimate discharges using flow rating curves developed with field flow measurements:

- BELLEIMPHCR02 (HCR02) (Inactive USGS 06436760 Horse Creek above Vale)
- BELLEIMPICR03 (ICR03) (Indian Creek upper site downstream of Arpan Road)
- BELLEIMPHCR10 (HCR10) (Horse Creek site on Winkler Road)
- BELLEIMPHCR11 (HCR11) (Horse Creek site on Stonelake Road)

The practices installed to reduce the amount of nonused water within the BFID may be detectable at the flow monitoring sites on the Belle Fourche River sites near Sturgis and Elm Springs as well as at the Horse Creek site above Vale. Additional water use data would also be compiled as part of the BFRWP's RCPP project to document expected conservation outcomes within the watershed.

The SD DENR Surface WQM Program has several active monitoring stations within the watershed. In addition, the watershed project would complete *E. coli* and TSS grab sampling at three recently discontinued WQM locations (BELLEIMPWQM130 at Belle Fourche, BELLEIMPWQM83 near Nisland, and BELLEIMPWQM81 (WQM 81) on the Belle Fourche River). The USGS discontinued their collection of water-quality samples at their gage stations within the watershed in 2015.

The BFRWP collects biweekly *E. coli* and TSS samples as well as continuous flow data from May through September at BELLEIMPHCR02, BELLEIMPICR03, BELLEIMPHCR10, and BELLEIMPHCR11. These samples provide information about impacts resulting from the BFID and on-farm delivery improvements over time. A majority of the wastewater from the delivery system and on-farm practices flow directly into Horse Creek. These monitoring sites are necessary to understand the impact that implementation projects have on flow and water quality in Horse Creek.

- Activity Cost: $265,000 + $8,000 = $273,000
- 319 Cost: $65,000 + $8,000 = $73,000
- Lead Group: USGS, Consultants, SD DENR
- Milestone: report water-quality results (see the timeline on page 18)

4.0 SCHEDULE

The project schedule is shown in Figure 4-1 and would be completed by August 2022.

4.1 PERMITS

Before any new construction can begin, required permits would be obtained. An example of a permit that may need to be obtained is the National Environmental Policy Act (NEPA) permit required to perform work on USBR lands. Other required permits may be needed for stormwater or construction work. Additionally, the need for 401 and 404 stream permits would be verified for the riparian work.

4.2 LEAD PROJECT SPONSOR

The BFRWP is the local sponsor for this implementation project and is a 501C(3) nonprofit group. The leaders of the BFRWP include the conservation districts within the watershed and the BFID. The BFRWP was the recipient of past 319 implementation grants for the Belle Fourche River TMDLs.

4.3 OPERATION AND MAINTENANCE QUALITY ASSURANCE

Responsibilities for operation and maintenance of 319 funded BMPs would be provided through conservation district/landowner contracts. Contracts developed for BMP installation would specify operation and maintenance needs, procedures for BMP failure or abandonment, and the life span of the BMPs terms agreed upon in the contract. The NRCS and consultants would be responsible for completing operation and maintenance scheduling, on-site evaluations, and follow-up with landowners when actions are necessary to ensure BMP operation for its designated life span.

The NRCS; Farm Service Agency; the Butte, Lawrence, and Elk Creek Conservation Districts; USBR; and consultants would be responsible for ensuring BMPs cost-shared with the EPA 319 funds are properly installed and maintained. Compliance with BMPs implemented with 319 funds would follow the same rules and regulations found in the EQIP Program Manual. Landowners and operators who do not maintain practices funded by this project for the length of the agreed contract would be required to repay all cost-share funds and any liquidated damages incurred. Conservation district personnel who are supported by the agent who acts on behalf of the BFRWP would be responsible for landowner contacts, developing a landowner/producer mailing list, maintaining records, submitting vouchers and reports, and recording cash and in-kind matches. Where USBR funds are used, the USBR would be responsible to ensure that the BMPs are operated and maintained properly for the life of the contract.

Project Timeline		2019					2020				2021				2022		
		Aug	Sept	Oct	Nov	Dec	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Aug
OBJECTIVE 1	*Implement BMPs Recommended in the Belle Fourche River TMDL to Reduce TSS and E. coli*																
Task 1.	Reduce Nonused Water Discharged to the Local Waterways From the Delivery and Application Systems																
Product 1	Improve Irrigation Water Delivery and Application																
Product 1a	Replace Open Laterals with Pipe																
Product 1b	Convert Flood Irrigation to Sprinklers																
Product 1c	Replace Open Ditches to Pipe																
Task 2.	Range and Riparian Area BMP Implementation																
Product 2a	Implement Riparian/Range Improvements																
Product 2b	Seasonal Riparian Area Management (SRAM)																
Task 3	Cover Crops and Soil Health																
Product 3	Implement Cover Crops																
OBJECTIVE 2	*Project Management and Administration*																
Task 4	Project Management and Administration																
Product 4	Public Outreach, Project Management and Administration																
OBJECTIVE 3	*Complete Essential Water-Quality Monitoring*																
Task 5	Water Quality Monitoring to Assess BMPs																
Product 4.	Water-Quality Monitoring																

Figure 4-1. Timeline of the Project.

5.0 COORDINATION PLAN

5.1 PARTICIPATING GROUPS AND AGENCIES

The BFRWP has been working together for over 17 years, has completed monitoring and evaluation work, and submitted a TMDL study for approval. Some of the BMPs recommended in the TMDL have been implemented (one flow-automation unit and partial completion of replacing open ditches with pipeline, pipeline projects from BFID to fields, sprinkler systems installation, and riparian vegetation improvement projects). The following groups/agencies have been participating and continue to participate in the Belle Fourche River Watershed implementation project:

- **Butte Conservation District** – Voting member of the BFRWP, provides financial support and EQIP and SDDA funding.
- **Belle Fourche Irrigation District (BFID) –** Voting member of the BFRWP, implements many BMPs, provides financial support and match funding.
- **Belle Fourche River Watershed Partnership (BFRWP) –** Local project sponsor.
- **Elk Creek Conservation District –** Voting member of the BFRWP, provides financial support and EQIP and SDDA funding.
- **Lawrence County** – Local support, provides funding.
- **Lawrence Conservation District –** Voting member of the BFRWP, provides financial support and EQIP and SDDA funding.
- **South Dakota Association of Conservation Districts** – Active participation of the BFRWP, provides support from the *303 (d) Watershed Planning and Assistance Project*.
- **South Dakota Conservation Commission** – Provides financial support.
- **South Dakota Department of Environment and Natural Resources (SD DENR)** – Active participation in the BFRWP, provides technical support and financial support.
- **South Dakota Game, Fish and Parks (SDGFP)** – Participant in the BFRWP, provides technical and financial support.
- **South Dakota Grassland Coalition** – Grassland management project financial support.
- **South Dakota School of Mines and Technology (SDSM&T)** – Active participant in the BFRWP, provides technical support (SDSM&T performed the initial TMDL study).
- **South Dakota State University (SDSU) –** Provides technical support, West River Ag Center personnel.
- **U.S. Bureau of Reclamation (USBR)** – Active participation in the BFRWP, provides technical support through drawings and designs as requested by the BFID, provides financial support.
- **U.S. Environmental Protection Agency (EPA)** – Provides 319 and 106 funding and technical guidance.
- **U.S. Geological Survey (USGS)** – Active participant in the BFRWP, fieldwork, and provides technical and financial support.
- **U.S. Fish and Wildlife Service (USFWS) –** Participant in the BFRWP, provides technical and financial support.
- **U.S. Natural Resources Conservation Service (NRCS)** – Participant in the BFRWP, provides technical and financial support.
- **Wyoming Department of Environmental Quality (WDEQ)** – Provides local and financial support for flow measurements at the South Dakota-Wyoming state line.

5.2 COORDINATION WITH OTHER PROGRAMS

The BFRWP would continue to coordinate activities with state, federal, and local government agencies through frequent personal communication and quarterly partnership meetings. The SDGFP, USFWS, NRCS, SD DENR, local organizations, and local government agencies would provide input and involvement in this implementation project. Coordination with these agencies would include work related to other grassland improvement projects and other 303(d) assessment work. Extra coordination with NRCS personnel would be necessary for the riparian and irrigation projects.

5.3 SIMILAR ACTIVITIES IN THE WATERSHED

All practices within the Belle Fourche River Watershed are included in the funding table.

6.0 EVALUATION AND MONITORING PLAN

6.1 QUALITY CONTROL AND ASSURANCE

Field data would be collected in accordance with the SD DENR's *Standard Operating Procedures for Field Samplers, Tributary and In-Lake Sampling Techniques*. A minimum of 10 percent (one sample) of all samples collected would be quality assurance/quality control (QA/QC) samples. QA/QC samples would consist of field duplicates or field replicate samples.

6.2 DATA

The data would be provided to the SD DENR. The data and analysis for this project would be documented in a final report that the BFRWP would provide for the SD DENR.

Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) and Hydrological Simulation Program – FORTRAN (HSPF) were used to model the Belle Fourche River Watershed when the TMDL was developed. To develop the TMDL and determine the necessary load reductions, several BMPs were modeled in these programs to reduce TSS concentrations in the streams within the Belle Fourche River Watershed. The sources of TSS identified were range erosion, irrigation and on-farm waste, free cattle access to streams, riparian degradation, natural geologic processes, hydraulic alteration by irrigation, and reduced stream miles. To understand the progress made in achieving the goals of the TMDL plan, the BFRWP monitors present progress against planned progress in midyear and annual reports (load reductions are reported annually).

Evaluating the project's success in reaching the objectives and goals would be accomplished by (1) comparing the scheduled versus the actual milestone completion dates; (2) comparing the flow rates and chemistry for irrigation-water application, delivery, and riparian BMPs; (3) measuring the reduction in nonused water from BFID discharged into streams; and (4) developing a sustainable watershed implementation project measured in part by the participation and approval of additional grant money for BMP implementation. Project monitoring would be reviewed by the BFRWP in quarterly meetings to report progress toward the goals and objectives.

6.3 LONG-TERM OPERATION AND MAINTENANCE FUNDING

The long-term Operation and Maintenance (O&M) funding for irrigation delivery improvements would be funded and maintained by the BFID. Stream riparian habitat and on-farm irrigation improvements would be managed and supported financially in part by the NRCS EQIP and RCPP funding.

7.0 BUDGET

Table 7-1 identifies the funding sources and cash flow during the project. Tables 7-2, 7-3a, 7-3b, and 7-4 present the budget for the 319 funds as well as the matching funds for the project. EPA 319 funds represent 40 percent of the total project budget. Table 7-5 shows the total budget, and Table 7-6 summarizes the other funds being spent on the project that cannot be used as matching funds.

Table 7-1. Cash Flow (Amendment in Red)

Budget	July 2019–June 2020 ($)	July 2020–June 2021 ($)	July 2021–August 2022 ($)	Total ($)	Amendment ($)	Amended Total ($)
319 Funds	366,333	483,333	483,334	1,099,000	234,000	1,333,000
Subtotal	**366,333**	**483,333**	**483,334**	**1,099,000**	**234,000**	**1,333,000**
NRCS EQIP	150,000	150,000	150,000	450,000	0	450,000
NRCS RCPP	0	623,500	623,500	0	1,247,000	1,247,000
USGS	66,667	66,667	66,667	200,000	0	200,000
USBR	33,333	33,333	33,333	100,000	0	100,000
Subtotal	**250,000**	**873,500**	**873,500**	**750,000**	**1,247,000**	**1,997,000**
Producer	202,166	289,917	289,917	606,500	175,500	782,000
Butte CD	8,333	8,333	8,333	25,000	0	25,000
BFID	33,333	33,334	33,334	100,000	0	100,000
Subtotal	**243,833**	**331,584**	**331,584**	**731,500**	**175,500**	**907,000**
319 Funds+Match	**610,166**	**814,917**	**814,917**	**1,830,500**	**409,500**	**2,240,000**
Total Budget	**860,166**	**1,688,417**	**1,688,417**	**2,580,500**	**1,656,500**	**4,237,000**

Table 7-2. Budget of 319 Funds (Amended in Red)

Project Description	Consultants ($)	Producer ($)	BFRWP ($)	Butte CD ($)	Totals ($)
Objective 1. Implement BMPs Recommended in the Belle Fourche River TMDL to Reduce TSS and *E. coli*					
Task 1. Reduce Nonused Water Discharged to the Waterways From the Delivery and Application Systems					
Product 1. Improved Irrigation Water Delivery and Application					
1a. Replace Open Laterals with Pipe					
1b. Convert Flood Irrigation to Sprinklers		446,500 120,500			446,500 120,500
1c. Replace Open Ditches to Pipe		9,000			9,000
Task 2. Range and Riparian Area BMP Implementation					
Product 2a. Implement Riparian Improvements		275,000 25,000			275,000 25,000
Product 2b. Seasonal Riparian Area Management (SRAM)		25,000			25,000
Task 3. Cover Crops and Soil Health					
Product 3. Cover Crops and Soil Health					
Objective 2.Conduct Public Outreach, Project Management and Administration					
Task 4. Project Management and Administration					
Product 4. Public Outreach, Project Management, and Administration	242,500 30,000		51,000 10,000	19,000 6,500	312,500 46,500
Objective 3. Complete Essential Water Quality Monitoring					
Task 5. Water Quality Monitoring to Assess BMPs					
Product 5. Water Quality Monitoring	65,000 8,000				65,000 8,000
Totals	**307,500** **38,000**	**721,500** **179,500**	**51,000** **10,000**	**19,000** **6,500**	**1,099,000** **234,000**
Amended Totals	**345,500**	**901,000**	**61,000**	**25,500**	**1,333,000**

Table 7-3a. Task 4 Project Management and Administration Explanation of 319 Fund Distribution (Amended in Red)

Supplemental Breakdown of 319 Project Management Budget	Hours/ Mileage	Rate	Cost	Amended Cost	Amended Total Cost
Financial Audit (Contracted)	NA	Actual Cost	15,000 5,000	5,000	20,000
Information and Education Events (BFRWP)	NA	Actual Cost	4,000 1,500	1,500	5,500
Administrative Support (BFRWP-Butte CD employee agreement)	800 1,640	$25/Hour	51,000 10,000	10,000	61,000
Project Travel Mileage (Consultant)	17,857 2,856	0.42/Mile	7,500 1,200	1,200	8,700
Travel Expense (Consultant)	NA	Actual Cost	2,000	0	2,000
BMP Project Planning and Certification (Consultant)	1,325 200	$111.70/Hour $120.00/Hour	148,000 24,000	24,000	172,000
Grant Tracking, Documentation, Proposal Writing (Consultant)	430 40	$111.70/Hour $120.00/Hour	44,000 4,800	4,800	48,800
Meetings, Technology Transfer, Information and Education Events (Consultant)	240	$111.70/Hour	25,500	0	25,500
Archeologist Contracted for State Historic Preservation Office Requirements (Consultant)	NA	Actual Cost (two surveys estimated)	2,100	0	2,100
Miscellaneous (Engineer Design, GIS, Geologist, Proposal Writing)	100	$111.70/Hour	13,400	0	13,400
Total			**312,500**	**46,500**	**359,000**

Table 7-3b. Task 5 Water-Quality Monitoring Explanation of 319 Fund Costs (Amended in Red)

Supplemental Breakdown of 319 Water-Quality Monitoring Budget	Quantity	Rate/Unit	Cost	Amended Cost	Amended Total Cost
Mileage (Consultant)	8,000+1,072	0.42/Mile	3,360	450	3,810
Laboratory Analyses (Consultant)	520+160	$17.50/Sample	9,100	2,800	11,900
Supplies (ice, distilled H20, hardware, Consultant)	36+10	$15/Trip	540	150	690
Sample Planning and Site Permission (Consultant)	70+3	$100-120/Hour	7,000	300	7,300
Sample and Flow Field Collection (Consultant)	304+31	$100-120/Hour	30,400	3,100	33,500
Staff Gages and Loggers Install (Consultant)	56+6	$100-120/Hour	5,600	600	6,200
Data Analysis, QAQC, and Reporting (Consultant)	75+5	$120/Hour	9,000	600	9,600
Total			**65,000**	**8,000**	**73,000**

Table 7-4. Budget of 319 and Matching Funds Budget (Amended in Red)

EPA 319 and Matching Funds Budget	EPA 319	EPA 319 Amended ($)	EPA 319 Total Amended ($)	Matching Funds ($)						Sum of Matching Funds ($)	Sum of Matching Funds Amended ($)
				Producer (Cash and In-kind) ($)	Producer Amended (Cash and In-kind) ($)	Butte Conservation District (Cash) ($)	Lawrence County (Cash) ($)	BFID (Cash and In-kind) ($)	WDEQ (Cash)		
Objective 1. Implement BMPs Recommended in the Belle Fourche River TMDL to Reduce TSS and *E. coli*											
Task 1. Reduce Nonused Water Discharged to the Local Waterways From the Delivery and Application Systems											
Product 1. Improved Irrigation Water Delivery and Application											
1a. Replace Open Laterals with Pipe								100,000		100,000	100,000
1b. Convert Flood Irrigation to Sprinklers	446,500	120,500	567,000	446,500	157,500					317,500	604,000
1c. Replace Open Ditches to Pipe		9,000	9,000	25,000	9,000	25,000				50,000	59,000
1b. Irrigation Scheduling											
Task 2. Range and Riparian Area BMP Implementation											
Product 2a. Implement Riparian Improvements	275,000	25,000	300,000	110,000	9,000					110,000	119,000
Product 2b. Seasonal Riparian Area Management (SRAM)		25,000	25,000								25,000
Task 3. Improved Cropping Practices											
Product 3. Implement Cover Crops				25,000						25,000	25,000
Objective 2. Conduct Public Outreach, Project Management and Administration											
Task 4. Project Management and Administration											
Product 4. Public Outreach, Project Management and Administration	312,500	46,500	359,000								
Objective 3. Complete Essential Water Quality Monitoring											
Task 5. Water Quality Monitoring to Assess BMPs											
Product 5. Water Quality Monitoring	65,000	8,000	73,000								
Total	**1,099,000**	**234,000**	**1,333,000**	**606,500**	**175,500**	**25,000**		**100,000**		**731,500**	**907,000**

Table 7-5. Total Budget (Amended in Red)

Total Budget	EPA 319 ($)	EPA 319 Amended ($)	Matching Funds ($)	Matching Funds Amended ($)	Nonmatching Funds ($)	Nonmatching Funds Amended ($)	Line Item Total ($)	Line Item Total Amended ($)
Objective 1. Implement BMPs Recommended in the Belle Fourche River TMDL to Reduce TSS and *E. coli*								
Task 1. Reduce Nonused Water Discharged to the Local Waterways From the Delivery and Application Systems								
Product 1. Improved Irrigation Water Delivery and Application								
1a. Replace Open Laterals with Pipe			100,000		100,000	330,000	200,000	530,000
1b. Convert Flood Irrigation to Sprinklers	446,500	120,500	446,500	157,500	250,000	917,000	1,143,000	2,338,000
1c. Replace Open Ditches to Pipe		9,000	50,000	9,000			50,000	68,000
1b. Irrigation Scheduling								
Task 2. Range and Riparian Area BMP Implementation								
Product 2a. Implement Riparian Improvements	275,000	25,000	110,000	9,000	200,000		585,000	619,000
Product 2b. Seasonal Riparian Area Management (SRAM)		25,000						25,000
Task 3. Improved Cropping Practices								
Product 3. Implement Cover Crops			25,000				25,000	25,000
Objective 2. Conduct Public Outreach, Project Management and Administration								
Task 4. Project Management and Administration								
Product 4. Public Outreach, Project Management and Administration	312,500	46,500					312,500	359,000
Objective 3. Complete Essential Water Quality Monitoring								
Task 5. Water Quality Monitoring to Assess BMPs								
Product 5. Water Quality Monitoring	65,000	8,000			200,000		265,000	273,000
Total	**1,099,000**	**234,000**	**731,500**	**175,500**	**750,000**	**1,247,000**	**2,580,500**	**4,237,000**

Table 7-6. Nonmatching Funds Budget

EPA 319 and Nonmatching Funds Budget	Nonmatching Funds						Sum of Nonmatching Funds ($)
	NRCS RCPP (Federal) ($)	NRCS EQIP (Federal) ($)	USACE (Federal) ($)	USBR (Federal) ($)	USGS (Federal) ($)	Other Grants (Conservation Commission, and others)	
Objective 1. Implement BMPs Recommended in the Belle Fourche River TMDL to Reduce TSS and *E. coli*							
Task 1. Reduce Nonused Water Discharged to the Local Waterways From the Delivery and Application Systems							
Product 1. Improved Irrigation Water Delivery and Application							
1a. Replace Open Laterals with Pipe	230,000			100,000			330,000
1b. Convert Flood Irrigation to Sprinklers	997,000	250,000					1,247,000
1c. Replace Open Ditches to Pipe							
Task 2. Range and Riparian Area BMP Implementation							
Product 2. Implement Riparian/Range Improvements		200,000					200,000
Product 2b. Seasonal Riparian Area Management (SRAM)							
Task 3. Cover Crops and Soil Health							
Product 3. Implement Cover Crops							
Objective 2. Conduct Public Outreach, Project Management and Administration							
Task 4. Project Management and Administration							
Product 4. Public Outreach, Project Management and Administration							
Objective 3. Complete Essential Water Quality Monitoring							
Task 5. Water Quality Monitoring to Assess BMPs							
Product 5. Water Quality Monitoring					200,000		200,000
Total	**1,277,000**	**450,000**		**100,000**	**200,000**		**1,977,000**

8.0 PUBLIC INVOLVEMENT

Communicating with the major stakeholders in this project is critical to its success. Public involvement in the project would continue through public meetings with stakeholders, tours sponsored by the BFRWP, newsletters sent out by conservation districts, radio advertisements, word of mouth, and the website developed by the partnership (*www.bellefourchewatershed.com*).

9.0 THREATENED AND ENDANGERED SPECIES

The following endangered species are identified by the SDGFP as located within and/or migrating through the Lawrence, Butte, and Meade Counties: bald eagle, whooping crane, least tern, and the black-footed ferret. Project implementation is not expected to impact any of these species. An Endangered Species Act Compliance Assessment letter dated May 18, 2004, from Mr. Doug Lofstedt (South Dakota Section 319 Project Officer) documents the "no affect" determination for the endangered species in the project area.

The procedure to ensure that threatened and endangered species are not adversely affected by project activities is based on the following three main premises, which are those used for Segments 1–8:

- The managed grazing systems, both planned and implemented, would promote restoring or preserving critical grassland habitat.
- Anticipating many of the grazing systems are anticipated to be planned and implemented within areas that have compliance plans in place.
- The involvement of the NRCS and the USFWS in planning and construction grazing systems ensures that personnel trained for mitigating threatened and endangered species would be involved with designing and implementing project BMPs.

The species that are most likely to be encountered during the project, as well as the procedure to follow should the species be encountered, are included below.

9.1 Bald Eagle

The bald eagle is a threatened species with a known certainty of occurrence in all three counties. According to the USFWS, bald eagles are known to nest in the floodplain forest along the Missouri River in Yankton, Bon Homme, Union, and Gregory Counties; along the James River in Brown, Spink, Sanborn, and Hutchinson Counties; and in forested areas in Meade, Charles Mix, and Brown Counties of South Dakota.

The 319-funded activities would be very low intensity and widely dispersed over the landscape. The activities would not significantly increase or expand the level of human activity. Activities that disturb possible nesting sites or reduce food sources are not anticipated. Therefore, EPA-funded activities are expected to have no effect on the bald eagle so consultation with the USFWS is planned.

9.2 Whooping Crane

The whooping crane is an endangered species with a known certainty of occurrence in all three counties. This species is often found in South Dakota during spring and fall migrations. Migration through the state occurs from mid- to late-April and mid- to late-October. Although a variety of habitats are used during migration, a wetland is always used for night roosting and frequently for foraging. While migrating, whooping cranes roost in wide, shallow, open water areas, including marshes, flooded crop fields, ponds, reservoirs, and rivers. Roosting sites must also be isolated from human disturbances.

The EPA-funded monitoring activities would be of low intensity, would be widely dispersed over the landscape, and would not significantly increase or expand the level of human activity. Additionally, if

any cranes are observed at any project work site, “all mechanical activities at the site would be suspended until the bird(s) leave the site under their own volition”. Thus, the EPA-funded activities are expected to have no effect on whooping cranes, and no consultation with the USFWS is planned.

9.3 Least Tern

The least tern is listed as an endangered species with a known certainty of occurrence in Meade County. This species historically breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems. The least tern is a local summer resident of the Missouri and Cheyenne Rivers in South Dakota and can be found migrating through virtually all of South Dakota with the exception of the Black Hills. Least terns usually nest on open expanses of sand or small pebble beaches along shorelines, riverbanks, sandbars, and islands. Least terns typically select nesting sites that are well-drained and away from the water line (usually near a small ridge or piece of driftwood). Their food source consists almost entirely of small fish, and feeding requires shallow water areas with an abundance of fish near the nesting area.

Major losses and alterations of habitat occur from shoreline, bank, and channel modification from the construction of locks, dams, dikes, levees, and reservoirs. Flooding can prevent or destroy nesting and can be a byproduct of habitat alteration. Habitat losses can also result from increased development, recreational uses, natural erosion, human and domestic pet disturbances or harassment, and trampling by cattle. Pollution that affects fish populations can also impact least terns.

The 319-funded monitoring activities would be of low intensity, would be widely dispersed over the landscape, confined to a few isolated stream channel areas, and would not significantly increase or expand the level of human activity. Activities that disturb possible nesting sites or reduce food sources are not anticipated. If any least terns are observed near any project work site, “all mechanical activities at the site would be suspended until the bird(s) leave the site under their own volition” (PIP Section 8.2). Therefore, EPA-funded activities are expected to have no effect on the least tern, and no consultation with the USFWS is planned.

9.4 Black-Footed Ferret

The black-footed ferret is an endangered species with a possible certainty of occurrence in all three counties. This species is a member of the weasel family, and feeds primarily on prairie dogs and uses their burrows for denning and shelter. Their historic range included Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wyoming, Alberta, and Saskatchewan. The South Dakota population that disappeared in the wild in 1974 was thought to be the last remaining population. However, a captive propagation program was started from a Meeteetse, Wyoming, population that was discovered in 1981. Reintroductions have since occurred in Arizona, Colorado, Kansas, Montana, South Dakota, Utah, and Wyoming. There are six sites within South Dakota in the Conata Basin, Badlands National Park, and Cheyenne River Sioux tribal land in Dewey and Ziebach Counties.

Primary threats to the black-footed ferret include predation, disease, and loss of habitat. The ferrets can be affected by predators such as coyotes, golden eagles, great-horned owls, prairie falcons, badgers, bobcats, and foxes. Canine distemper would kill ferrets, and sylvatic plague can eliminate entire prairie dog towns. In South Dakota, sylvatic plague is the biggest threat to ferret populations. However, poisoning prairie dogs and converting prairie to cropland are threats to ferret habitats.

The existence of black-footed ferrets is directly linked to the presence of prairie dogs. The sponsor would address the black-footed ferrets by complying with the South Dakota Prairie Dog Management Plan. If any actions are planned that may adversely affect the survival of a native or introduced population of black-footed ferrets, the sponsor would consult with the USFWS.