Belle Fourche River Watershed Management and Project Implementation Plan Segment 10

319 Watershed Project
October 1, 2021

Sponsored By:

Belle Fourche River Watershed Partnership

Submitted to:

South Dakota Department of Agriculture and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3182

1.0 PROJECT PROPOSAL SUMMARY SHEET

PROJECT TITLE: Belle Fourche River Watershed Management and Project Implementation Plan Segment 10

PROJECT PERIOD: September 1, 2022–August 31, 2025

PROJECT SPONSOR:

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319 NONPOINT-SOURCE FUNDS: $1,364,000
MATCH: $910,000
OTHER FEDERAL FUNDS: $980,000
TOTAL PROJECT COST: $3,254,000
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 Creek, SD-BF-R-BELLE_FOURCHE_02 (TSS, *E. coli*)
Belle Fourche 3: Whitewood Creek to Willow Creek, SD-BF-R-BELLE_FOURCHE_03 (TSS, *E. coli*)
Belle Fourche 4: Willow Creek to Alkali Creek, SD-BF-R-BELLE_FOURCHE_04 (TSS, *E. coli*)
Belle Fourche 5: Alkali Creek 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: Deadwood Creek to Spruce Gulch, SD-BF-R-WHITEWOOD_03 (*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 (81%) [ ] TECHNICAL ASSISTANCE
[X] INFORMATION AND EDUCATION (9%) [ ] PLANNING
[ ] WATERSHED ASSESSMENT [ ] GROUNDWATER
[X] WATER QUALITY MONITORING (6%) [ ] 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 new project implementation plans were 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 10, as initiated 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 to not exceed the Immersion Recreation Single Sample Maximum (SSM) of 235 cfu/100mL.
- Continue implementing BMPs to reduce *E. coli* in the priority Horse Creek Watershed to not exceed the Immersion Recreation SSM of 1,178 cfu/100mL.
- 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 3-year project. This is the tenth 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 riparian and range grazing management systems, (3) installing riparian/bank stability improvements, (4) implementing improved cropping systems, (5) improving and/or relocating livestock feeding areas.

2.0 STATEMENT OF NEED

2.1 DEMONSTRATED WATER QUALITY NEED

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 reported that

all of the segments are listed for TSS and two segments are listed for fecal coliform and *E. coli*. The 2014 IR reported that all of the segments are listed for TSS and two segments are listed for fecal coliform and *E. coli*. The 2016 IR had 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 had 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 2020 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 rather than clean water. In the 2016 IR, 2018 IR, and recently in the 2020 IR, Horse Creek is impaired for TSS and *E. coli.*

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 Agriculture and Natural Resources (SD DANR) 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.

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), U.S. Army Corps of Engineers (USACE), U.S. 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. This project implementation plan (PIP) will guide the project until August 31, 2025. Table 2-2 list the BMPs implemented within the watershed by the BFRWP, NRCS, and BFID. The total number of each BMP to be installed in this segment is also shown. Segments 1–8 were completed on schedule and within budget. Segment 9 is scheduled to be completed in August 2022 and within budget.

While the 10-year plan has not been updated, the SD DANR 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

Table 2-1. Summary of the Non-Support Rivers and Creeks 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	5	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_02 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

in the TRACKER database and so are easily comparable. 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 SDDANR_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.

Table 2-2. Best Management Practices within the Belle Fourche River Watershed

Best Management Practice	Planned for Segment 10	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)	5,000	25,000
Nonused Water Storage Pond (number)	0	3
Inlet Canal Lining (feet)	0	10,560
Pipeline Projects Delivering Water to Fields (feet)	15,000	91,460
Irrigation Sprinkler Systems (number)	15	134
Managed Riparian/Rangeland Grazing (acres)	6,000	120,180
Seasonal Riparian Area Management SRAM (acres)	90	0
Public Meetings (number)	10	61
Project Tours and Events (number)	12	50
Irrigation Scheduling (acres)	600	720
Cover Crops (acres)	2,000	8,300

2.2 WATERBODY INFORMATION

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 watershed listed in the South Dakota 2020 IR as impaired 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 drainage area of the watershed in South Dakota encompasses 2,089,000 acres and includes Hydraulic Units 10120201, 10120202, and 10120203. The city of Spearfish (2019 population 11,756) is the largest municipality located in the Belle Fourche River Watershed. Other communities in the watershed include Belle Fourche (population 5,702), Sturgis (population 6,922), Lead(population 2,943), Deadwood (population 1,293), Whitewood (population 979), Newell (population 597), Nisland (population 225), Central City (population 131), and Fruitdale (population 68).

Table 2-3. Current Segment 9 319 Nonpoint-Source Reductions (2019–2021)

Stream Reach	Nitrogen (lbs/year)	Phosphorous (lbs/year)	Sediment (tons/year)	*E. coli* (mpn/year)
Sprinkler Irrigation	208	176	395	0
Riparian Protection	356	137	261	4.02E+12
Irrigation Scheduling	87	77	210	0
Managed Grazing	2,601	315	171	1.51E+13
Improved Cropping	406	150	110	0
Total	3,658	855	1,147	1.91E+13

MPN: most probable number

Table 2-4. Reported 319 Nonpoint-Source Reductions by Project Segment (2009–2021)

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	3,642	2,225	5,086	20
9	Grazing/Riparian	3,658	855	432	4*
Subtotal	**Grazing/Riparian**	**11,255**	**5,844**	**12,143**	**76**
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
8	Irrigation	3,119	2,257	4,646	11
9	Irrigation	701	403	715	2*
Subtotal	**Irrigation**	10,873	8,690	28,575	102
Grand Total		**22,128**	**14,534**	**40,718**	**178**

*Segment 9 Projects completed to date with 8 riparian/range and 9 irrigation projects to be completed by August 2022

Land use in the watershed is primarily livestock grazing with cropland and a few urban and suburban areas. Native and tame grassland, forestland, hayland, and irrigated croplands are the main agricultural land uses. Irrigated crops include alfalfa, corn, wheat, and barley are grown within the watershed and primarily in 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 managed by the U.S. Forest Service in the Black Hills National Forest and 4 percent is managed by the Bureau of Land Management in individual allotments.

Annual precipitation in the watershed ranges from 15 to 29 inches, 70 percent of which is 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. The major land resource areas (MLRA) within the watershed include the Pierre Shale Plains (MLRA 60A) and the Black Hills (MLRA 62). Land elevation ranges from 2,500 feet above mean sea level (msl) to approximately 7,071 msl. The shale plains have long, smooth slopes and are gently sloping to strongly sloping. Slopes are moderately steep or steep along drainages and streams. Extensive terraces occur along many of the major streams draining the Black Hills, which are steep, and the hills near the Cheyenne River are not as steep.

2.3 PROJECT MAP

The project map is shown Figure 2-1 and displays the Lower Belle Fourche Watershed in the inset along with the potential and completed pivot projects, flood irrigated lands, and water quality monitoring sites.

2.4 GENERAL WATERSHED INFORMATION

The Belle Fourche River Watershed within South Dakota encompasses over 2 million acres. Sediment is 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. 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 sediment 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 23,000 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.

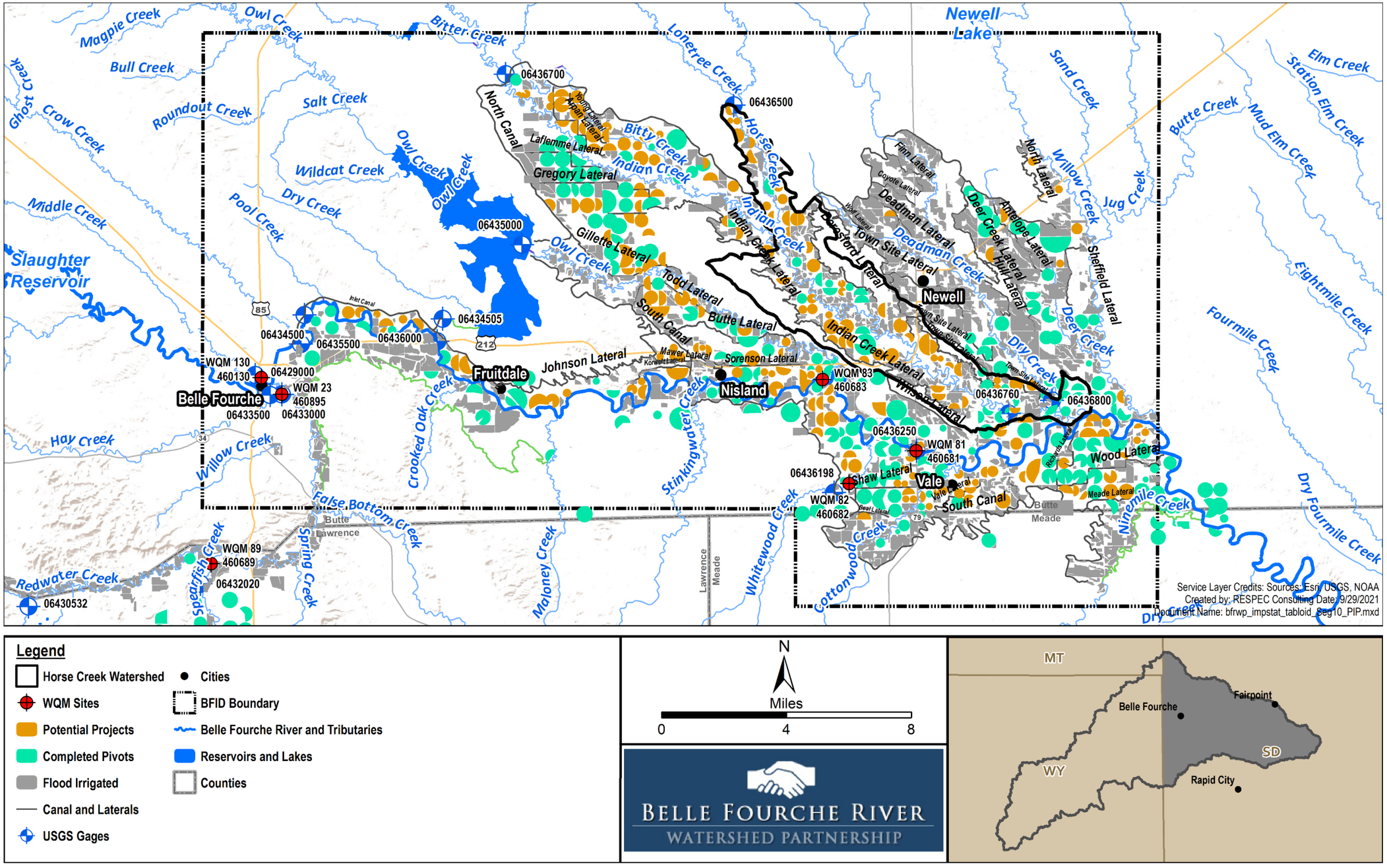

Figure 2-1. Location of the Belle Fourche River Watershed and Potential and Completed Pivot Projects and Flood Irrigated Lands

3.0 PROJECT DESCRIPTION

3.1 PROJECT OUTCOMES

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 to not exceed the Immersion Recreation Single Sample Maximum (SSM) of 235 cfu/100mL.
- Continue implementing BMPs to reduce *E. coli* in the priority Horse Creek Watershed to not exceed the Immersion Recreation SSM of 1,178 cfu/100mL.
- 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 OUTCOMES, TARGETS, AND TASKS

The strategy outlined in this Belle Fourche River Watershed Project Implementation Plan (PIP) is to implement irrigation application/conveyances and riparian/range grazing management BMPs and conservation practices within the Belle Fourche River Watershed to reduce TSS and *E. coli* in Horse Creek and the Belle Fourche River. This project segment focuses on BMPs that reduce the amount of sediment-laden nonused irrigation water that is discharged to the river and its tributaries by the delivery and application of irrigation water as well as riparian vegetation improvement. Water-quality monitoring would be performed to measure improvements. Annually, the BFRWP reviews project implementation progress and water-quality results in order to adjust available financial and technical assistance to producers within the watershed. Federal, state, local, and private funding would continue to be used to fund BMP and conservation practice installations. A final report will be completed for this project segment. This project segment would fund BMP installations from September 2022 through August 2025 and continue more than 14 years of TSS and *E. coli* reductions within the watershed.

Outcome 1: Reduce TSS and *E. coli* by Implementing BMPs Recommended in the TMDL

The Belle Fourche River TSS TMDL recommends BMPs that focus on reducing the amount of nonused irrigation water returned to the river and its tributaries and implement riparian vegetation improvements. Nonused irrigation water reduction activities include water delivery and water application improvements by converting open laterals and ditches to pipelines and converting flood irrigated fields to sprinkler irrigation. Nonused water picks up sediment from the earthen laterals and ditches along with sediment

runoff from flood irrigated fields. This nonused water then returns to the Belle Fourche River and Horse Creek thus increasing sediment loading. Horse Creek has been identified by the SD DANR and the BFRWP as a priority area for BMPs. Horse Creek itself is impaired; focusing efforts within a smaller geographic area allows water-quality improvements to be observed quicker than in the entire Belle Fourche Watershed. Suitable irrigation and riparian/range improvement projects within Horse Creek would continue to be a high priority and the 319 funding would be used to improve these high priority flood irrigated fields and riparian areas. Also, the next priority would be flood-irrigated fields and riparian areas along the BFID laterals in the lower areas of the Middle Belle Fourche, Willow Creek, and Ninemile Creek watersheds.

Task 1 – Reduce Nonused Water Returns to Waterways from 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 approximately 57,000 irrigated acres. 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).

Historically, an estimated 64 percent of the water released from the reservoir was delivered to the field and 32 percent of the water was used by crops, while 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. In 2021, the BFID reported that they were able to maintain approximately 75 to 80 percent for delivering irrigation water to irrigators during the growing season. While conservation effects on irrigation within the Belle Fourche Watershed have not been directly measured at the crop 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.

Also, 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.

Task Output 1: Improve Irrigation Water Delivery and Application

The goal for this project segment is to reduce the amount of sediment-laden water that returns to the river and its tributaries from nonused 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. The BFRWP and the SD DANR, BFID, and NRCS obtained Regional Conservation Partnership Program (RCPP) funding for the BFRWP Irrigation Efficiency and Soil Health Project that will provide financial and technical assistance funding to install irrigation application and conveyance and soil health conservation practices through August 2023. The BFRWP and the Butte Conservation District (Butte CD) and NRCS developed a Conservation Implementation Strategy (CIS) using Environmental Quality Incentives Program (EQIP) funding for irrigation practices to improve irrigation efficiencies and reduce soil erosion near the Belle Fourche River and Horse Creek confluence through September 2023.

<u>The following describes Tasks 1a, 1b, and 1c costs and milestones that would be completed this segment:</u>

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

Task Cost: $200,000 = **319 Cost: $0** + Non-Federal Match: $75,000 + Other Federal Funds: $125,000
Lead Group: BFID, Watershed Staff, NRCS, USBR
Milestone: August 2023 Conversion of approximately 5,000 feet of earthen laterals to pipelines

b) Convert 15 flood-irrigation systems to sprinkler-irrigation systems on approximately 900 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. The BFRWP would use available SD DANR Section 319 grant funds, NRCS EQIP and RCPP funds, and producer funds to attain this goal.

Approximately 15 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 price per linear foot of sprinkler system and pipe that services the system and typically provides approximately 40 to 50 percent of the total cost of the project. The BFRWP designates the docket price annually for consistency with the EQIP and RCPP payment schedule unit costs. The cost-share amount has been designated to not exceed 50 percent of the total cost of the producers' projects. Funds requested in this segment would be used to improve water use efficiency and decrease sediment transported through runoff on approximately 900 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 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.

Task Cost: $1,485,000 = **319 Cost: $580,000** +Non-Federal Match: $580,000 +Other Federal Funds: $325,000
Lead Group: NRCS, Consultants, Producers
Milestone: August 2025, conversion of flood irrigated acres to 15 sprinkler systems on 900 acres

c) Convert approximately 12,000 feet of open on-farm ditches to buried pipe on approximately 150 acres.

The Butte, Lawrence, and Elk Creek Conservation Districts intend to submit applications to the SD DANR and Conservation Commission from 2022 through 2025 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 TSS and water loss via seepage and evaporation, which in turn increase efficiencies and reduce sediment-laden return flows. Please note that this task funding depends on approval by the Conservation Commission and the SD DANR.

Task Cost: $150,000 = **319 Cost: $0** + Non-Federal Match: $150,000 + Other Federal Funds: $0
Lead Group: Producers, Watershed Staff, Butte, Lawrence, Elk Creek CDs
Milestone: August 2025, 15,000 feet of open ditch converted to buried pipe treating approximately 150 acres

Task 2 – Improve Riparian and Rangeland Conditions

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.

Task Output 2: Implement Riparian and Rangeland BMPs

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 the U.S. Fish and Wildlife Service (USFWS) and would continue to work with these agencies. In addition, BFRWP's consultants would continue to provide technical assistance to producers who work on implementation projects.

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

The BFRWP would use 319 and NRCS EQIP funds to target high priority unstable reaches on Horse Creek and the Belle Fourche River identified during the SD DANR's Rapid Geomorphic Assessment (RGA) that was completed in 2017. Also, the BFRWP has obtained NRCS Cooperative Conservation Grants (CCG) to enhance the success of prescribed grazing plans. The BFRWP range consultant conducts interviews with producers participating in 319 projects and Farmbill programs to address issues or concerns brought about from implementing prescribed grazing practices within the watershed. This feedback enhances the success of these projects to improve water quality and soil health.

Task Cost: $620,000 = **319 Cost: $290,000** +Non-Federal Match: $105,000 +Other Federal Funds: $225,000
Lead Group: NRCS, Consultants, Producers
Milestone: August 2025, implement improvements on approximately 6,000 acres of riparian and rangelands

b) Implement seasonal riparian area management (SRAM) on approximately 90 acres.

The BFRWP would use 319 funds to implement SRAM along Horse Creek and the Belle Fourche River by working with producers to defer grazing along the river and creek during the recreation season (May through September) for a payment per acre for the contract term. Grazing could occur from October through April and haying could occur from June through September.

Task Cost: $45,000 = **319 Cost: $45,000** +Non-Federal Match: $0 +Other Federal Funds: $0
Lead Group: Watershed Staff, Consultants, Producers
Milestone: August 2025, implement seasonal riparian area management (SRAM) on approximately 90 acres

Task 3 – Promote Cover Crops and Soil Health

Implementing cover crops 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. The BFRWP has demonstrated cover crops as part of Segment 7 and 8. The BFRWP would continue to promote cover crops in coordination with the South Dakota Soil Health Coalition (SD SHC) and NRCS throughout the watershed.

Task Output 3: Implement Cover Crops

Implement cover crops on 2,000 acres in the watershed. The SD SHC and NRCS would be the funding partners for the cost share. BFRWP staff would assist SD SHC and NRCS staff to develop producer

contracts for implementing cover crops within the watershed. These projects would be accounted for in the South Dakota Soil Health Coalition (SD SHC) Soil Health Planning and Improvement Project.

Task Cost: $0 = **319 Cost: $0** +Non-Federal Match: $0 +Other Federal Funds: $0
Lead Group: SD SHC and Watershed Staff, NRCS, Consultants, Producers
Milestone: August 2025, plant covers crops on approximately 2,000 acres

Outcome 2: Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews

Public outreach and education are an essential part of this project. Public meetings, workshops, and soil quality rainfall simulator demonstrations 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 further assist the BFRWP. Beginning in 2006, an estimated $8,000,000 were funded for watershed activities through grant-writing efforts.

Task 4 – Project Management and Administration

Task Output 4: Complete Outreach Activities, Administrative Responsibilities, Clearance Requirements, Participant Contracts, Progress Reporting, and Grant Writing

Nine 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, event booths at county fairs, and agriculture trade shows that highlight BFRWP accomplishments. Educational workshops would be sponsored during the project and demonstrate approaches to addressing resource concerns in the watershed. The BFRWP's Soil-Quality/Rainfall Simulator Demonstration Trailer https://www.rainfallsimulator.com/ would be used to demonstrate the effects of soil erosion to agriculture producers, students, and the general public. This trailer was used at 17 public outreach events within the watershed since 2019 reaching over 300 people. Watershed staff would be responsible for organizing and planning public outreach and education activities.

Riparian, range, and irrigation implementation projects require collaborating with the producer to complete applications, plan projects, comply with State Historic Preservation Office (SHPO) regulations, conduct engineering, check practices once they are complete, and organize and file applications and producer bills. Consultants would work with the SD DANR, NRCS and Watershed staff to carry out this task.

Grant Reporting and Track System (GRTS) reports would be completed as required by the SD DANR. 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 improving water-quality and support the cost of implementation projects would be written. The BFRWP has been successful in partnering with the NRCS, SD DANR, South Dakota Weed and Pest, Meade County, Butte County, City of Spearfish, and City of Belle Fourche in securing funding to further efforts in water-quality improvement.

Task Cost: $374,000 = **319 Cost: $374,000** +Non-Federal Match: $0 +Other Federal Funds: $0
Lead Group: BFRWP, Watershed Staff, Consultants, NRCS, Butte Conservation District
Milestone: August 2025, three GRTS reports, one final report, three federal audits, ten public meetings, one website, two watershed tours, two workshops, six public event booths, and two soil-quality demonstrations

Outcome 3: Essential Water Quality Monitoring

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

Task 5 – Water Quality Monitoring to Assess BMPs

Task Output 5: Complete Water Quality Monitoring and Report Findings Annually

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 was expanded in Segment 9 to include both approaches and will continue in during this segment.

The project would continue biweekly 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 monitor 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, between the HCR02 and HCR04 sites were added in 2020 and would continue through 2024 to monitor potential water-quality improvements from nearby BMP implementation projects.

The USGS operates 16 gage stations on the Belle Fourche River, Bear Butte Creek, Redwater River, Spearfish Creek, and Whitewood Creek in the watershed. Flows are analyzed using these gage stations:

- 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)
- In 2015, the USGS discontinued collection of water-quality samples at these five USGS gage stations listed above.
- The BFRWP consultants install Solinst Leveloggers to monitor water pressure and temperature from May through September every 15-minutes to estimate discharge using flow rating curves at the sites on Horse Creek and Indian Creek listed below:
- 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 BFRWP consultants would continue to collect *E. coli* and TSS biweekly samples from May through September at three discontinued WQM locations (BELLEIMPWQM130 at Belle Fourche, BELLEIMPWQM83 near Nisland, and BELLEIMPWQM81 (WQM 81) on the Belle Fourche River). The BFRWP consultants would also continue to collect biweekly *E. coli*, TSS, and flows from May through September at BELLEIMPHCR02, BELLEIMPICR03, BELLEIMPHCR10, and BELLEIMPHCR11 sites. At all monitoring sites, the Consultants first takes photos of the site then collects *E. coli* and TSS samples (including duplicates and blanks). A sonde (YSI Professional Plus with Quatro Cable) is then used to record temperature, dissolved oxygen, pH, and conductivity in the stream after sample bottles are filled. Then a Marsh-McBirney Flo-Mate Model 2000 meter is used to measure stream velocity on channel transects at the Horse and Indian Creek sites. After velocities are measured, the water level pressure data is downloaded from the Solinst Leveloggers then redeployed. All sample bottles are submitted using a Chain of Custody (COC) form to Midcontinent Testing Laboratories in Rapid City, SD for *E. coli* and TSS analyses.

The BFRWP consultants reviews the field sonde and flow data then enters this data into Excel® spreadsheets. Stream velocity measurements are used to develop flow rating curves and plotted with water level pressure 15-minute interval data for the Horse and Indian Creek sites to estimate discharge at each site. The YSI sonde and Marsh-McBirney meter are calibrated at the beginning of each sampling day. The probes for the YSI sonde are replaced annually and the Marsh-McBirney meter is sent to Hach Services in Loveland, CO for service, maintenance, and calibration annually.

This data provides information about the BFID and on-farm delivery improvements over time. A majority of the nonused water from the delivery system and on-farm practices flow directly into Horse Creek. These monitoring sites are necessary to understand the impact that BMP projects have on flow and water quality.

Task Cost: $330,000 = **319 Cost: $75,000** +Non-Federal Match: $0 +Other Federal Funds: $255,000
Lead Group: Consultants, SD DANR, USGS
Milestone: October 2024, monitor seven water quality sites and complete annual water-quality reports

3.3 MILESTONE TABLE

The project milestones and schedule are shown in Figure 3-1 and this project segment would be completed by August 2025.

3.4 PROJECT MANAGEMENT AND TRACKING

The BFRWP is the local sponsor for this implementation project and is a 501C(3) nonprofit group. The leaders of the BFRWP include the chairs of the Butte, Lawrence, and Elk Creek Conservation Districts and the BFID. The BFRWP employs consultants for the project management of the project segments and contracts with the Butte CD for support from their District Manager for grant administration. The BFRWP was the recipient of past 319 grants for the Belle Fourche River projects and is currently implementing their Segment 9 PIP within the watershed.

3.5 PERMITS AND CLEARANCES

Before any new construction can begin, required permits and clearances would be obtained. An example of a permit that may need to be obtained is the USACE's 404 permit, which would be considered for any riparian, stream, and/or wetland project activities. Another example of a clearance that would need to be obtained is from the SD State Historical Society (SD SHS) State Historical Preservation Officer (SHPO), which is based on a review to determine any historical and cultural effects of a proposed project. The BFRWP will coordinate with the SD DANR and submit necessary information to ensure that there are no historic properties present or the undertaking for a proposed project will not affect any properties eligible for or listed in the National Register of Historic Preservation (NRHP).

Also, the BFRWP will follow minimum Technical Assistance activities associated with RCPP-funded actions—compliance checks required for program eligibility under 7 CFR part 12 and part 1400, subpart F; National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), and Endangered Species Act (ESA) compliance activities.

Furthermore, in accordance with the USBR's requirements for their Belle Fourche Project, any proposed irrigation project within the BFID requires submission, review, and approval of a producer's Preliminary Project Description (PPD) by the BFID and USBR. As part of the USBR and BFID requirements for these PPD approvals, the USBR ensures compliance with the NHPA for the activities on USBR lands and facilities to fulfill their Section 106 responsibilities within the BFID in accordance with the 2018 Programmatic Agreement with the SD SHS and SHPO. The BFRWP will require any participant or producer to submit a PPD for their proposed irrigation project(s) to the BFID and USBR for approval as part of their contract with the BFRWP.

Figure 3-1. Milestone Table and Timeline of the Project.

Milestone Table and Project Timeline		2022					2023				2024				2025		
		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-Sep
OUTCOME 1	*Reduce TSS and E. coli by Implementing BMPs Recommended in the TMDL*																
Task 1 -	Reduce Nonused Water Returns to Waterways from Delivery and Application Systems																
Output 1 -	Improve Irrigation Water Delivery and Application	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Output 1a -	Replace Open Laterals with Pipe	■	■	■	■	■	■	■	■	■							
Output 1b -	Convert Flood Irrigation to Sprinklers	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Output 1c -	Replace Open Ditches to Pipe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 2 -	Improve Riparian and Rangeland Conditions																
Output 2a -	Implement Riparian/Rangelands BMPs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Output 2b -	Seasonal Riparian Area Management (SRAM)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 3 -	Promote Cover Crops and Soil Health																
Output 3 -	Implement Cover Crops	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
OUTCOME 2	*Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews*																
Task 4 -	Project Management and Administration																
Output 4 -	Complete Outreach Activities, Administrative Responsibilities, Clearance Requirements, Participant Contracts, Progress Reporting, and Grant Writing	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
OUTCOME 3	*Essential Water-Quality Monitoring*																
Task 5 -	Water Quality Monitoring to Assess BMPs																
Output 5 -	Complete Water Quality Monitoring and Report Findings Annually	■	■	■	■	■	■	■	■	■	■	■	■	■			

4.0 COORDINATION PLAN

4.1 PARTICIPATING GROUPS AND AGENCIES

The BFRWP has been working together for over 20 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 (flow-automation units, open ditches to pipelines, sprinkler system installations, and riparian/range improvement projects). The following groups/agencies have been participating and continue to participate in the BFRWP's implementation projects:

- **Butte Conservation District** – Voting member of the BFRWP, provides financial support and EQIP and SDDANR 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 SDDANR funding.
- **Lawrence County** – Local support, provides funding.
- **Lawrence Conservation District** – Voting member of the BFRWP, provides financial support and EQIP and SD DANR funding.
- **South Dakota Association of Conservation Districts** – Participation in the BFRWP, provides support from the *303 (d) Watershed Planning and Assistance Project*.
- **South Dakota Conservation Commission** – Provides financial support.
- **South Dakota Department of Agriculture and Natural Resources (SD DANR)** – 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)** – 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)** – Participant in the BFRWP, gage station 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)** – Active 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.

4.2 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 SD DANR, NRCS, SDGFP, USFWS, USGS, 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 and implementation work. Extra coordination with NRCS personnel would be necessary for the riparian and irrigation projects.

4.3 Similar and/or Duplicate Activities in the Watershed

All practices within the watershed are included in Section 3.0 and Section 7.0 funding tables. The BFRWP coordinates with partner agencies to ensure that activities within the watershed are coordinated appropriately and complementary of other project and/or program to increase efficiency of these efforts.

4.4 Assumption of the Responsibilities of Other Entities

The BFRWP encourages voluntary implementation of BMPs and conservation practices within the watershed. The BFRWP coordinates with other agencies on project implementation but does not assume any private, local, state, or federal agency or entity regulatory, mandated, statutory duties or responsibilities.

5.0 EVALUATION AND MONITORING PLAN

5.1 Quality Control and Assurance

Field data would be collected in accordance with the SD DANR'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.

5.1 Sample Collection, Data Management, and Models

The BFRWP's sample collection and monitoring plan is described in the Section 3.2 Task Output 5: Complete Water Quality Monitoring. The monitoring data would be provided to the SD DANR. The data and analysis for this project would be documented in an annual water quality findings memo and also in the project segment final report that the BFRWP would provide to the SD DANR.

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). Additionally, load reductions for nitrogen, phosphorus and sediment are reported annually to the SDD ANR using the STEPL model for riparian, rangeland, and cropland BMPs. Reductions for irrigation projects are not able to be calculated in STEPL, and estimated using direct measurements and literature values.

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.

5.2 Operation and Maintenance

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 SD DANR Section 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 and/or RCPP Program Manuals. Landowners and operators who do not maintain practices funded by this project for the length of the agreed contract lifespans 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 BFID and USBR would be responsible to ensure that the BMPs are operated and maintained properly.

Responsibilities for operation and maintenance of partner-contribution funded conservation practices will be provided through BFRWP producer contracts, which specify design, installation, and operation and maintenance requirements for the life span of the conservation practices terms in accordance with NRCS RCPP policy and procedures. The BFRWP in conjunction with NRCS will be responsible for completing operation and maintenance scheduling, on-site evaluations, and follow-up with producers when actions are necessary to ensure practice operation for its designated life span.

The BFRWP and NRCS will be responsible for ensuring conservation practices installed through RCPP producer contracts are properly installed, certified, and maintained. The BFRWP will also ensure compliance with NRCS RCPP rules and regulations for the Section 319 partner funded and RCPP project activities along with ensuring both RCPP and partner funded land management contracts comply with applicable NRCS policies and procedures, NEPA requirements, SDSHS SHPO rules and regulations, and the SD DANR program contract requirements. The long-term O&M funding for irrigation delivery improvements would be funded and maintained by the BFID. On-farm riparian, rangeland, and irrigation improvements would be managed and supported financially in part by the NRCS EQIP and RCPP funding.

6.0 INFORMATION AND EDUCATION

The BFRWP has in past implementation projects and will continue in this segment and would include tours, producer workshops, website operation, radio advertisements, soil quality/rainfall simulator trailer demonstrations, trade events displays and county fair booths, webinars, newspaper articles, and newsletters.

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. Section 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

Budget	Sep 2022–Aug 2023 ($)	Sep 2023–Aug 2024 ($)	Sep 2024–Aug 2025 ($)	Total ($)
SD DANR 319 Funds	384,000	490,000	490,000	1,364,000
Subtotal	**384,000**	**490,000**	**490,000**	**1,364,000**
NRCS EQIP	75,000	75,000	75,000	225,000
NRCS RCPP	425,000	0	0	425,000
USGS	85,000	85,000	85,000	255,000
USBR	25,000	25,000	25,000	75,000
Subtotal	**610,000**	**185,000**	**185,000**	**980,000**
Producer	200,000	280,000	280,000	760,000
Butte CD	25,000	25,000	25,000	75,000
BFID	25,000	25,000	25,000	75,000
Subtotal	**250,000**	**330,000**	**330,000**	**910,000**
319 Funds+Match	**634,000**	**820,000**	**820,000**	**2,274,000**
Total Budget	**1,244,000**	**1,005,000**	**1,005,000**	**3,254,000**

Table 7-2. Budget of 319 Funds

Project Description	Consultants ($)	Producer ($)	BFRWP ($)	Butte CD ($)	Totals ($)
Outcome 1. Reduce TSS and E. coli by Implementing BMPs Recommended in the TMDL					
Task 1. Reduce Nonused Water Discharged to Waterways from Delivery and Application Systems					
Output 1. Improved Irrigation Water Delivery and Application					
1a. Replace Open Laterals with Pipe					
1b. Convert Flood Irrigation to Sprinklers		580,000			580,000
1c. Replace Open Ditches to Pipe					
Task 2. Improve Riparian and Rangeland Conditions					
Output 2a. Implement Riparian/Rangeland BMPs		290,000			290,000
Output 2b. Seasonal Riparian Area Management (SRAM)		45,000			45,000
Task 3. Promote Cover Crops and Soil Health					
Output 3. Implement Cover Crops					
Outcome 2. Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews					
Task 4. Project Management and Administration					
Output 4. Public Outreach, Project Management, and Administration	275,000		66,000	33,000	374,000
Outcome 3. Essential Water Quality Monitoring					
Task 5. Water Quality Monitoring to Assess BMPs					
Output 5. Complete Water Quality Monitoring and Report Findings Annually	75,000				75,000
Totals	**350,000**	**915,000**	**66,000**	**33,000**	**1,364,000**

Table 7-3a. Task 4 Project Management and Administration Explanation of 319 Fund Distribution

Supplemental Breakdown of 319 Project Management Budget	Hours/ Mileage	Rate	Total Cost
Financial Audits (Contracted)	NA	$9,000/year Estimated Cost	27,000
Information and Education Events (BFRWP)	NA	Actual Cost	6,000
Administrative Support (BFRWP-Butte CD employee agreement)	2,640	$25/Hour	66,000
Project Travel Mileage (Consultant)	11,904	0.42/Mile	5,000
Travel Expense (Consultant)	NA	Actual Cost	1,000
BMP Project Planning and Certification (Consultant)	1,250	$140/Hour	175,000
Grant Tracking, Documentation, Proposal Writing (Consultant)	350	$140/Hour	49,000
Meetings, Technology Transfer, Information and Education Events (Consultant)	250	$140/Hour	35,000
Archeologist Contracted for State Historic Preservation Office Requirements (Consultant)	NA	Actual Cost (two surveys estimated)	2,200
Miscellaneous (Engineer Design, GIS, Geologist, Proposal Writing)	60	$130/Hour	7,800
Total			**374,000**

Table 7-3b. Task 5 Water-Quality Monitoring Explanation of 319 Fund Costs

319 Water-Quality Monitoring Budget	Quantity	Rate/Unit	Total Cost
Mileage (Consultant)	6,000	0.42/Mile	2,520
Laboratory Analyses (Consultant)	600	$21.00/Sample	12,600
Supplies (ice, distilled H20, hardware, Consultant)	32	$15/Trip	480
Sample Planning and Site Permission (Consultant)	70	$110/Hour	7,700
Sample and Flow Field Collection (Consultant)	330	$110/Hour	36,300
Staff Gages and Loggers Install (Consultant)	60	$110/Hour	6,600
Data Analysis, QAQC, and Reporting (Consultant)	80	$110/Hour	8,800
Total			**75,000**

Table 7-4. Budget of 319 and Matching Funds Budget

SD DANR EPA 319 and Matching Funds Budget	SD DANR Section 319 ($)	Matching Funds ($)					Sum of Matching Funds ($)
		Producer (Cash and In-kind) ($)	Butte CD (Cash) ($)	Lawrence County (Cash) ($)	BFID (Cash and In-kind) ($)	WDEQ (Cash)	
Outcome 1. Reduce TSS and *E. coli* by Implementing BMPs Recommended in the TMDL							
Task 1. Reduce Nonused Water Discharged to Waterways from Delivery and Application Systems							
Output 1. Improved Irrigation Water Delivery and Application							
1a. Replace Open Laterals with Pipe					75,000		75,000
1b. Convert Flood Irrigation to Sprinklers	580,000	580,000					580,000
1c. Replace Open Ditches to Pipe		75,000	75,000				150,000
Task 2. Improve Riparian and Rangeland Conditions							
Output 2. Implement Riparian/Rangeland BMPs	290,000	105,000					105,000
Output 2b. Seasonal Riparian Area Management (SRAM)	45,000						
Task 3. Promote Cover Crops and Soil Health							
Output 3. Implement Cover Crops							
Outcome 2. Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews							
Task 4. Project Management and Administration							
Output 4. Public Outreach, Project Management and Administration	374,000						
Outcome 3. Essential Water Quality Monitoring							
Task 5. Water Quality Monitoring to Assess BMPs							
Output 5. Complete Water Quality Monitoring and Report Findings Annually	75,000						
Total	**1,364,000**	**760,000**	**75,000**		**75,000**		**910,000**

Table 7-5. Total Budget

Total Budget	SD DANR EPA 319 ($)	Matching Funds ($)	Nonmatching Funds ($)	Line Item Total ($)
Outcome 1. Reduce TSS and *E. coli* by Implementing BMPs Recommended in the TMDL				
Task 1. Reduce Nonused Water Discharged to Waterways from Delivery and Application Systems				
Output 1. Improved Irrigation Water Delivery and Application				
1a. Replace Open Laterals with Pipe		75,000	125,000	200,000
1b. Convert Flood Irrigation to Sprinklers	580,000	580,000	325,000	1,485,000
1c. Replace Open Ditches to Pipe		150,000	50,000	200,000
Task 2. Improve Riparian and Rangeland Conditions				
Output 2a. Implement Riparian/Rangeland BMPs	290,000	105,000	225,000	620,000
Output 2b. Seasonal Riparian Area Management (SRAM)	45,000			
Task 3. Promote Cover Crops and Soil Health				
Output 3. Implement Cover Crops				
Outcome 2. Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews				
Task 4. Project Management and Administration				
Output 4. Public Outreach, Project Management and Administration	374,000			374,000
Outcome 3. Essential Water Quality Monitoring				
Task 5. Water Quality Monitoring to Assess BMPs				
Output 5. Complete Water Quality Monitoring and Report Findings Annually	75,000		255,000	330,000
Total	**1,364,000**	**910,000**	**980,000**	**3,254,000**

Table 7-6. Nonmatching Funds Budget

SD DANR Section 319 and Nonmatching Funds Budget	Nonmatching Funds						Sum of Nonmatching Funds ($)
	NRCS RCPP (Federal) ($)	NRCS EQIP (Federal) ($)	USACE (Federal) ($)	USBR (Federal) ($)	USGS (Federal) ($)	Other (Federal) ($)	
Outcome 1. Reduce TSS and *E. coli* by Implementing BMPs Recommended in the TMDL							
Task 1. Reduce Nonused Water Discharged to Waterways from Delivery and Application Systems							
Output 1. Improved Irrigation Water Delivery and Application							
1a. Replace Open Laterals with Pipe	50,000			75,000			125,000
1b. Convert Flood Irrigation to Sprinklers	325,000	250,000					425,000
1c. Replace Open Ditches to Pipe	50,000						
Task 2. Improve Riparian and Rangeland Conditions							
Output 2. Implement Riparian/Rangeland BMPs		225,000					225,000
Output 2b. Seasonal Riparian Area Management (SRAM)							
Task 3. Promote Cover Crops and Soil Health							
Output 3. Implement Cover Crops							
Outcome 2. Effective Public Outreach, Project Management, Record Keeping, Clearances, Report and Grant Writing, and Annual Audits/Reviews							
Task 4. Project Management and Administration							
Output 4. Public Outreach, Project Management and Administration							
Outcome 3. Essential Water Quality Monitoring							
Task 5. Water Quality Monitoring to Assess BMPs							
Output 5. Complete Water Quality Monitoring and Report Findings Annually					255,000		255,000
Total	**425,000**	**425,000**		**75,000**	**255,000**		**980,000**

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 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 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 site, "all mechanical activities at the site would be suspended until the bird(s) leave the site under their own volition". 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.