ESCHERICHIA COLI (*E. coli*) ADDENDUM TO THE FECAL COLIFORM BACTERIA TOTAL MAXIMUM DAILY LOAD (TMDL) FOR SPRING CREEK SEGMENT 1, BROOKINGS AND MOODY COUNTIES, SOUTH DAKOTA

Watershed Protection Program

Division of Resource Conservation and Forestry

South Dakota Department of Agriculture and Natural Resources

April 2024

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INTRODUCTION

The South Dakota Department of Agriculture and Natural Resources (SDDANR) adopted a conversion process to translate existing fecal coliform TMDLs and allocations to *E. coli* to satisfy Clean Water Act section 303(d) requirements. The 2020 bacteria TMDL translation included *E. coli* TMDLs for four impaired waterbodies. The conversion process and resulting *E. coli* TMDLs were formally approved by the United States Environmental Protection Agency (EPA) November 8, 2020, reissued following the correction of a minor clerical error on June 6, 2022 (SD DANR,2022).

Spring Creek Segment 01 (Big Sioux River to MN Border) or **SD-BS-R-SPRING_01** is considered impaired for the designated limited contact recreation use due to *E. coli* in South Dakota's most recent 303(d) list documented in the 2024 Integrated Report (IR) and is considered a high priority for TMDL development (SD DANR, 2024).

Several factors must be met to determine whether an existing fecal coliform TMDL can be converted to *E. coli* for a given waterbody in accordance with the methods and assumptions established in the 2020 bacteria TMDL translation:

- Waterbody must fall entirely within state jurisdiction,
- If jurisdiction is shared, TMDL only applies to portion of the water under South Dakota's jurisdiction,
- The TMDL will meet applicable water quality standards,
- Wastewater discharges to the stream are expected to meet effluent limits in accordance with an authorized NPDES permit, and
- The 2004 Central Big Sioux TMDL assumptions (e.g., source contributions, loading capacity, etc.) are still valid.

This addendum demonstrates the factors are met and it is appropriate to apply the process and rationale described in the 2020 bacteria translation TMDL (SD DANR,2022). Appendix B of the 2004 Central Big Sioux River TMDL document contains the bacteria sample data used for analysis. Appendix B of this addendum also contains *E.coli* data that has been sampled for Spring Creek segment 01 since, 2019, confirming the waterbody is still consistently demonstrating impairment for *E.coli*. Spring Creek segment 01 was listed as impaired for *E. coli* in 2022. The intent of this document is to convert the existing fecal coliform TMDL and allocations for Spring Creek segment 01 to *E. coli* using the conversion process and rationale described in the 2020 bacteria TMDL translation. Hereby, this document serves as an addendum to the Spring Creek fecal coliform TMDL (TMDL ID# 34505; approved by EPA in May 2008) by incorporating an *E. coli* TMDL and allocations for Spring Creek segment 01 (SD DANR, 2004).

JURISDICTION

Spring Creek segment 01 originates in Minnesota, extending 25.64 miles into South Dakota to its confluence with Big Sioux River segment 07. A majority of the Spring Creek Watershed is within South Dakota. SD-BS-R-SPRING-01 falls entirely within state jurisdiction (Figure 1 pg. 654 Central Big Sioux TMDL; SD DANR, 2004).

WATER QUALITY STANDARDS AND TMDL TARGETS

South Dakota *E. coli* criteria for immersion (ARSD 74:51:01:50) and limited contact recreation (ARSD 74:51:01:51) consist of a single sample maximum (SSM) and a monthly geometric mean (GM) both of which include distinct numeric limits. The SSM requires that no single daily sample exceed the

associated numeric limit. The monthly GM also must not be exceeded and is calculated based on a minimum of 5 samples collected during separate 24-hr periods over a 30-day period. Former fecal coliform SSM and GM criteria were similar for *E. coli*, however, numeric limits deviate between the bacteria indicators (Table 1).

Impaired waters require TMDL development based on the most protective criteria. Selecting the most protective numeric target for TMDL development ensures attainment with the water quality criteria. The fecal coliform TMDL for Spring Creek used the SSM as the TMDL target for Limited Contact Recreation (Table 1). Appendix A of the 2020 bacteria TMDL translation outlines that the GM and SSM *E. coli* criteria are equally protective. As a result, the *E. coli* TMDL and allocations can be translated based on the SSM *E. coli* criterion consistent with the 2004 Spring Creek TMDL. In addition to the daily load, the geometric mean criteria must be attained on a longer (i.e., monthly) basis.

Table 1. Designated recreation uses and associated bacteria criteria designated to Spring Creek

Impaired Stream Segment AUID	Designated Recreation Use	Fecal Coliform Geomean CFU/100mL	Fecal Coliform SSM CFU/100mL	E. *coli* Geomean CFU/100 mL	*E. coli* SSM CFU/ 100mL
SD-BS-R-SPRING_01	Limited Contact Recreation	≤1,000	*≤2,000	≤630	*≤1,178

*Refers to numeric criteria used for TMDL development

SOURCE ASSESSMENT

Point Sources

Several National Pollutant Discharge Elimination System (NPDES) permits were identified in the watershed of Spring Creek Segment 01. These potential point sources of *E. coli* bacteria are documented here to provide a watershed scale account of the system's operational characteristics (discharge permits etc.), potential impact, and Waste Load Allocation (WLA) consideration.

The City of Elkton Wastewater Treatment Facility (WWTF)

The city of Elkton is authorized to discharge directly into Spring Creek under NPDES permit SD0020788 (https://danr.sd.gov/npdespdf/SD0020788/Elkton%20Permit.pdf). This wastewater treatment facility is located southwest of the city in Brookings County. The WWTF consists of gravity flow collections system with three area lift stations that convey wastewater to a three-cell stabilization pond system followed by two artificial wetlands. The facility was upgraded in 2011, the facility removed a berm between cell 1 and 3 to create the artificial wetlands. This facility serves the community of 736 people (2010 census). Discharge from the facility must comply with effluent limits established for various pollutants including *E. coli*. *E*. *coli* concentrations must not exceed the SSM and GM criteria for limited contact recreation waters, which is consistent with the TMDL target. The *E. coli* TMDL would not add new requirements or implementation expectations to the permit. Per the SD DANR Integrated Compliance Information System (ICIS) the last time the city of Elkton WWTF discharged was in April of 2021. This was due to having a few wet years causing the facility to discharge the excess water.

A Waste Load Allocation (WLA) from the City of Elkton Wastewater Treatment Facility was provided for Spring Creek. A WLA of 8.10E+10 CFU/day was assigned in the fecal coliform TMDL. The WLA was based on the premise that the Elkton WWTF would discharge their maximum design capacity. This amount is unlikely since most dischargers operate well within their permit limits. The assumptions in the fecal coliform TMDL are still accurate today.

Construction Stormwater Permits

There are two active stormwater construction permits within the Spring Creek 01 segment. Paul Barthel (SD10J673) and the City of Elkton's Utility Improvement Phase II (SDR10K772). These permits are considered active by SD DANR until the permitted party opts to close the permit. All of these permits authorize discharge but do not authorize discharge of non-stormwater. The permits also stipulate that they do not contribute to violations of surface water quality criteria. A Stormwater Pollution Protection Plan (SWPPP) is required for all permitted construction and Industrial stormwater sites. The SWPPP is a written document that outlines how contractors will ensure stormwater runoff leaving the site will not become contaminated with pollutants. A WLA is not assigned since these permits are not expected to be a source of bacteria pollution.

Concentrated Animal Feeding Operations (CAFOs)

A recent search found that there are three facilities located within the Spring Creek segment 01. Each of the CAFOs facility name, type of operation, and permit number can be found in Table 2. All CAFO's are required to maintain compliance with provisions of the Water Pollution Control Act (SDCL 34A-2). SDCL 34A-2-36.2 requires each concentrated animals feeding operations, as defined by Title 40 Codified Federal Regulations Part 122.23 Dated January 1, 2007, to operate under a general or individual water pollution control permit issued pursuant to 34A-2-36. The general permit ensures that all CAFO's in SD have permit coverage regardless of if they meet conditions for coverage a NPDES permit.

All facilities with a general permit number that starts with SDG-01* are covered under the 2003 General Water Pollution Control Permit for Concentrated Animal Feeding Operations, which requires housed lots to have no discharge of solid or liquid manure to waters of the state, and allows open lots to only have a discharge of manure or process wastewaters from properly designed, constructed, operated and maintained manure management systems in the event of 25- years, 24-hour or 100-year, 24-hour storm event if they meet the permit conditions. The general permit was reissued and became effective on April 15, 2017. All CAFO's with coverage under the 2003 general permit have a deadline to apply for coverage under the 2017 general permit.

Table 2. CAFOs in Spring Creek Watershed

Name of Facility	Type of Operations	SD General Permit #
Dakota Layers, LLC	layers (housed lot)	SDG-0100041
Golden Dakota Farms, LLC	dairy cattle (housed lot)	SDG-100211

Thornhills Feed Lot, LLC	beef cattle (open lot)	SDG-0100051

All facilities with a general permit number that starts with SDG-1* are covered under the 2017 General Water Pollution Control Permit for Concentrated Animal Feeding Operations. The 2017 general permit allows no discharge of manure or process wastewater from operations with state permit coverage or NPDES permit coverage for new source swine, poultry, and veal operations, and other housed lots with covered manure containment systems. Operations also have the option to apply for a state issued NPDES permit. Operations covered by the 2017 general permit or NPDES permit for open or housed lots with uncovered manure containment systems can only discharge manure or process wastewater from properly designed, constructed, operated and maintained manure management systems in the event of 25-year, 24-hour storm event if they meet the permit conditions. Both the 2003 and 2017 general permits have nutrient management planning requirements based on EPA's regulations and the South Dakota Natural Resources Conservation Services 590 Nutrient Management Technical Standard to ensure the nutrients are applied at agronomic rates with management practices to minimize the runoff of nutrients. Additionally, the general permits include design standards, operation, maintenance, inspection, record keeping, and reporting requirements. (https://danr.sd.gov/Agriculture/Livestock/FeedlotPermit/default.aspx)

As long as CAFOs comply with the general permit requirements ensuring their discharges are unlikely and indirect loading events, the TMDL assumes their *E. coli* contribution is minimal, and unless found otherwise, no additional permit conditions are required by this TMDL.

Nonpoint Sources

The nonpoint source assessment for Spring Creek segment 01 is document in the 2004 Spring Creek fecal coliform TMDL and the conclusions of that 2004 assessment are still accurate today. Fecal coliform source contributions are considered synonymous with *E.coli* based on the close statewide paired bacteria data relationship documented in the 2020 bacteria TMDL translation.

The 2004 TMDL breaks down Spring Creek's Watershed as follows, with 64% (20,360 acres) of the land being used for cropland, 34% (10,758 acres) being used for grasses, and finally, the last 2% of land falling under trees and artificial (i.e., urban or developed) uses. The exact land use percentages from the original fecal coliform TMDL were not able to be replicated, so land use from the 2004 fecal coliform TMDL was compared to land use derived from the Earth Resources Observation and Science's (EROS) National Land Cover Database (NLCD) for the years 2004 and 2021 (EROS Center, 2023). Looking at the 2004 NLCD GIS layer it shows the watershed as follows, 73.51% of land being used for cropland, 20.55% for grasses, and 5.94% falling under trees and artificial uses. The 2021 NLCD GIS layer showed similar percentages with 73.86% for cropland, 20.03% for grasses and 5.75% of land falling under trees and artificial uses. It is uncertain what data was used to show land use in the original fecal coliform TMDL. However, the NLCD layers show insignificant changes between the years 2004 and 2021. Land use and bacteria production characteristics in the impaired watersheds are expected to be similar to that documented during the respective Fecal Coliform TMDL assessment.

TMDL AND ALLOCATIONS

A Load Duration Curve method was used to develop the fecal coliform bacteria loading, (concentration) x (flow), using zones based on hydrologic conditions to develop the fecal coliform TMDL for the 2004 Spring Creek segment. The criteria ratio approach was used to convert the existing fecal coliform TMDL and allocations to *E. coli* for each flow zone. The *E. coli* TMDL, WLA, load allocation (LA), and margin of safety (MOS) were calculated by multiplying the existing fecal coliform values by the ratio (EC:FC) for the SSM (Table 3).The *E. coli* TMDL allocations (TMDL=WLA+LA+MOS) were based on the same percent contribution as established for the fecal coliform TMDL allocations in each flow zone.

The fecal coliform current load from the Spring Creek 01 fecal coliform TMDL was converted to *E. coli* using the ratio (EC:FC) for the SSM. The percent reduction was then calculated as the converted *E. coli* current load minus the *E. coli* converted TMDL divided by the converted *E. coli* current load (Table 5). This calculation results in percent reductions identical to the Spring Creek 01 fecal coliform TMDL (Table 4).

Table 3. Applicable bacteria criteria and ratio for the immersion recreation use.

Fecal coliform criteria	*E. coli* criteria	EC:FC ratio
GM 1000	GM 630	0.63
SSM 2000	SSM 1178	0.589

The *E. coli* TMDL is protective of applicable criteria assigned to the limited contact recreation designated use for Spring Creek segment 01. The Spring Creek fecal coliform TMDL contains supporting information necessary to implement the *E. coli* TMDLs. The original fecal coliform and converted *E. coli* TMDL allocations and reductions are provided for Spring Creek segment 01 in tables 4 and 5, respectively. In addition to the daily load, the geometric mean criteria must be attained on a longer (i.e., monthly) basis.

Due to low number of samples per zone, all zones were combined to assess the overall fecal coliform bacteria in the Spring Creek fecal coliform TMDL. This addendum followed the same assumptions of the previous EPA approved TMDL document.

Table 4. Existing fecal coliform TMDL and allocations for Spring Creek segment 01 based on the applicable bacteria criteria for limited contact recreation from the 2004 fecal coliform TMDL

Flow Zone	Fecal TMDL (CFU/day)	WLA (CFU/day)	LA (CFU/day)	MOS (CFU/day)	Current Load (CFU/day)	% Reduction
All	3.02E+11	8.10E+10	1.91E+11	3.02E+10	5.03E+11	40%

Table 5. E. coli TMDL and Load allocations for Spring Creek segment 01 based on the applicable bacteria criteria for immersion recreation.

Flow Zone	*E. coli* TMDL (CFU/day)	WLA (CFU/day)	LA (CFU/day)	MOS (CFU/day)	Current Load (CFU/day)	% Reduction
All	1.78E+11	4.77E+10	1.12E+11	1.78E+10	2.96E+11	40%

The TMDL analysis was performed using the best data available to specify the fecal coliform reductions necessary to achieve water quality criteria. Using the individual flow zones results in two flow zones with no samples and no reductions. A more conservative approach using the overall conditions was taken to support implementation efforts after the entire land use data and size of the watershed was considered. Tables 6 and 7 show what the data would look like if the document had used multiple flow zones for

	Median	Overall (0-100)	High/ Moist (0-40)	Mid-Range (40-60)	Dry/Low (60-100)
X	Median Concentration (counts/day)	8.15E+10	4.33E+10	2.45E+10	0.00E+00
	Flow Median (cfs)	6.17	15.46	6.17	2.60
=	Existing	5.03E+11	6.69E+11	1.51E+11	00.0E+00
	Target Load (at 2,000 cfu/100mL)	3.02E+11	7.57E+11	3.02E+11	1.27E+11
	% Reduction w/MOS	45	-2.79	-81.87	0.00
Note: units are counts/day					
	Median Flow Percentile	50	20	50	80
	Number of Samples per Zone	11	8	3	0

each fecal coliform and for *E. coli*, respectively.

Table 6. Flowzone Reduction Comparison for fecal coliform

	Median	Overall (0-100)	High/ Moist (0-40)	Mid-Range (40-60)	Dry/Low (60-100)
X	Median Concentration (counts/day)	4.80E+10	2.55E+10	1.44E+10	0.00E+00
	Flow Median (cfs)	6.17	15.46	6.17	2.60
=	Existing	2.96E+11	3.94E+11	8.90E+10	00.0E+00
	Target Load (at 1,178 cfu/100mL)	1.78E+11	4.46E+11	1.78E+11	7.48E+10
	% Reduction w/MOS	45	0	0	0
Note: units are counts/day					
	Median Flow Percentile	50	20	50	80
	Number of Samples per Zone	11	8	3	0

Table 7.. Flowzone Reduction Comparison E. Coli Translation

SUMMARY

The 2020 bacteria TMDL translation provided a framework to convert fecal coliform TMDLs and allocations to *E. coli* to address impaired streams with recreation uses in South Dakota. This framework was used to convert the existing fecal coliform TMDLs and allocations set forth in the 2008 fecal coliform TMDL Spring Creek segment 01 (**SD-BS-R-SPRING_01**) to *E. coli*. Therefore, this document serves as an *E. coli* TMDL addendum to the 2004 fecal coliform Spring Creek segment 01 (TMDL # 34505). The addended *E. coli* TMDL and allocations follow the assumptions of the 2004 fecal coliform TMDL. The fecal coliform and *E. coli* TMDLs for Spring Creek segment 01 were developed in accordance with Section 303(d) of the federal Clean Water Act and guidance provided by the US EPA.

The South Dakota DANR partners with East Dakota Water Development District, helping implement the Big Sioux River Project (BSRP) with section 319 funds to help landowners with Best Management Practices (BMP) within the Big Sioux River Watershed. Spring Creek Segment 01 is located in this watershed, and the project is working to reduce *E. coli* numbers within the watershed.

PUBLIC COMMENT

This TMDL addendum was made available for public comment in accordance with section 303(d) requirements. A public notice letter was published in the Brookings Register, Moody County Enterprise, and the Sioux Falls Argus Leader to announce the availability of the addendum for public comment. The TMDL addendum document and comment process was made available on the South Dakota Department of Agriculture and Natural Resources webpage at https://danr.sd.gov/public/default.aspx. The public comment period began May 8th and ended June 11th . No comments were received during the public comment period.

LITERATURE CITED

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APPENDIX A: EPA APPROVAL LETTER AND DECISION DOCUMENT

REGION 8
DENVER, CO 80202

SENT VIA EMAIL

Hunter Roberts, Secretary
South Dakota Department of Agriculture & Natural Resources
Hunter.Roberts@state.sd.us

Re: Approval of *Escherichia coli* (*E. coli*) Addendum to the Fecal Coliform Bacteria Total Maximum Daily Load (TMDL) for Spring Creek Segment 01, Brookings and Moody Counties, South Dakota

Dear Secretary Roberts:

The U.S. Environmental Protection Agency (EPA) has completed review of the *E. coli* addendum to the fecal coliform bacteria total maximum daily load (TMDL) submitted by your office on June 27, 2024. In accordance with the Clean Water Act (33 U.S.C. §1251 *et. seq.*) and the EPA's implementing regulations at 40 C.F.R. Part 130, the EPA hereby approves South Dakota's TMDL for segment 01 of Spring Creek in the Big Sioux basin. The EPA has determined that the separate elements of the TMDL listed in the enclosure adequately address the pollutant of concern, are designed to attain and maintain applicable water quality standards, consider seasonal variation and includes a margin of safety. The EPA's rationale for this action is contained in the enclosure.

The EPA's approval of South Dakota's submitted TMDL extends to waterbodies in South Dakota with the exception of those waters that are within Indian country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove the State's TMDL with respect to those waters at this time. The EPA, or eligible Indian tribes, as appropriate, will retain responsibilities under Clean Water Act Section 303(d) for those waters.

We appreciate the South Dakota Department of Agriculture & Natural Resources efforts to complete this TMDL. If you have any questions, please contact Amy King on my staff at (303) 312-6708.

Sincerely,

STEPHANIE DEJONG

Digitally signed by STEPHANIE DEJONG
Date: 2024.07.24 10:12:45 -06'00'

Stephanie DeJong, Manager
Clean Water Branch

Enclosure

cc: Paul Lorenzen, Watershed Protection Program Administrator, South Dakota DANR
Alan Wittmuss, TMDL Team Leader, South Dakota DANR

EPA's TOTAL MAXIMUM DAILY LOAD (TMDL) DECISION RATIONALE

TMDL: *Escherichia coli* (*E. coli*) Addendum to the Fecal Coliform Bacteria Total Maximum Daily Load (TMDL) for Spring Creek Segment 01, Brookings and Moody Counties, South Dakota

ATTAINS TMDL ID: R8-SD-2024-03

LOCATION: Brookings and Moody counties, South Dakota

IMPAIRMENTS/POLLUTANTS: The TMDL submittal addresses one river segment with a recreation use that is impaired due to high concentrations of *Escherichia coli (E. coli)* bacteria.

WATERBODY/POLLUTANTS ADDRESSED IN THIS TMDL ACTION

Assessment Unit ID	Waterbody Description	Pollutants Addressed
SD-BS-R-SPRING_01	Spring Creek (Big Sioux River to MN Border)	*E. coli*

BACKGROUND: The South Dakota Department of Agriculture and Natural Resources (DANR) submitted to the EPA the final *E. coli* TMDL for segment 01 of Spring Creek, with a letter requesting review and approval dated June 27, 2024.

The TMDL submittal included:

- Letter requesting the EPA's review and approval of the TMDL
- Final TMDL report

This river segment is subject to an existing fecal coliform TMDL approved by the EPA on May 28, 2008 (SD DANR, 2004; ATTAINS Action ID #34505). Appendix XX contains the fecal coliform TMDL for Spring Creek. Since that time, South Dakota adopted and began implementing the EPA's 2012 Recreational Water Quality Criteria. These revised criteria recommend states establish *E. coli* criteria after scientific advancements demonstrated *E. coli* was a better indicator of fecal contamination and recreational harm than fecal coliform (USEPA, 2012). South Dakota has since adopted new criteria for *E. coli*, maintaining dual criteria for several years to facilitate the transition and allow for the collection of additional *E. coli* data, and eventually dropped the fecal coliform criteria altogether. They also adopted a conversion process to translate existing fecal coliform TMDLs and allocations to *E. coli* to satisfy Clean Water Act (CWA) Section 303(d) requirements. The initial set of converted *E. coli* TMDLs were formally approved by the EPA on November 8, 2020 (SD DANR, 2020; ATTAINS Action ID #R8-SD-2021-01).

The intent of this TMDL submittal is to revisit the existing fecal coliform TMDL for Spring Creek segment 01, demonstrate that the TMDL is protective of newer *E. coli* criteria, and convert the fecal coliform TMDL to address the current *E. coli* impairment. This serves as an addendum to the fecal coliform TMDL which remains effective and is not withdrawn. Most of the data, maps, figures, assumptions, and analyses discussed in this TMDL submittal are contained in Appendix XX of the original fecal coliform TMDL (SD DANR, 2004; ATTAINS Action ID #34505) and are not repeated in the

E. coli report. Page number and section references to the original fecal coliform TMDL are associated with Appendix XX specifically.

ACTION: Based on the EPA's review of South Dakota's TMDL submittal and other relevant information in the administrative record, the EPA approves the final *E. coli* TMDL for Spring Creek segment 01 consistent with Section 303(d) of the Clean Water Act (CWA) and 40 C.F.R. Part 130.

TMDL Approval Summary	
Number of TMDLs Approved:	1
Number of Causes Addressed by TMDLs:	1

The following explains how the TMDL submission meets the statutory and regulatory requirements of TMDLs in accordance with CWA Section 303(d), and the EPA's implementing regulations in 40 C.F.R. Part 130.

This TMDL decision rationale sets forth the EPA's reasoning for approving South Dakota's *E. coli* Addendum to the Fecal Coliform Bacteria TMDL for Spring Creek Segment 01, Brookings and Moody Counties, South Dakota. The EPA conducted a complete review of the state's TMDL and supporting documentation and information. This document tracks the EPA's guidelines (EPA, 2002a) that summarize the effective statutory and regulatory requirements relating to TMDLs (CWA Section 303(d) and 40 C.F.R. Part 130).

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

Spring Creek is a tributary to the Big Sioux River and its drainage area falls in Brookings and Moody counties in eastern South Dakota. This segment begins in Minnesota and ends at the confluence with segment 07 of the Big Sioux River, just north of the city of Flandreau. The entire creek drains over 30,000 acres in South Dakota and an additional 10 percent of the drainage area are the headwaters originating in Minnesota. Spring Creek segment 01 in South Dakota is a 25.64 mile segment from the Big Sioux River to MN border (SD-BS-R-SPRING_01) (see *Jurisdiction* as well as Figures 1 and 2 and the *Introduction* and *Problem Identification* sections in SD DANR, 2004). When the original fecal coliform was developed, the Administrative Rules of South Dakota erroneously listed the segment as running from the Big Sioux River to Section 22, Township 116N, and Range 51W. This assessment unit has since been corrected. The watershed area in the fecal coliform TMDL is still correct (see *Jurisdiction* section).

Spring Creek segment 01 was first listed as impaired for *E. coli* and placed on South Dakota's 303(d) list in 2022. It was assigned a high priority (i.e., 1) for TMDL development on the 2024 EPA-approved 303(d) list (SD DANR, 2024). This priority ranking information is contained on page 3. In addition to the earlier fecal coliform impairment, Spring Creek segment 01 is also listed as impaired for total suspended solids (scheduled for TMDL development in 2030; SD DANR, 2024).

In 2020 DANR adopted a conversion process to translate existing fecal coliform TMDLs and allocations to *E. coli* values to address *E. coli* impairments in an efficient manner (SD DANR, 2020). The bacteria translation document included assumptions to identify whether a fecal coliform TMDL can be converted to *E. coli*. The *Introduction* section (p. 3) of this Spring Creek *E. coli* addendum lists specific factors to determine the applicability of the bacteria translation process. These factors are used to confirm that the assumptions of original TMDL are still valid (i.e., source contributions, loading capacity, etc.), demonstrate that the assessment unit is within South Dakota's jurisdiction, document that wastewater discharges are managed through effluent limits in National Pollutant Discharge Elimination System (NPDES) permits, and confirm the waterbody will meet water quality standards when numeric targets are met. The addendum demonstrates that all conditions are met for Spring Creek segment 01; therefore, the conversion process can be applied to calculate *E. coli* TMDLs and allocations.

The *Nonpoint Sources* section (p. 6) of the *E. coli* addendum confirms that the nonpoint source assessment presented in the fecal coliform TMDL remains applicable. Watershed runoff is the primary source of bacteria in the Spring Creek segment 01 watershed. The land use distribution is cropland (nearly 74 percent) and grass/grazing (20 percent), followed by smaller areas of trees and artificial (i.e., developed) uses. Two percent of the nonpoint source load was attributed to natural background

sources associated with wildlife. The remainder of the nonpoint source loading is from cropland, pastureland, and residential areas including septic systems. The city of Elkton is the only municipality in the drainage. The fecal coliform TMDL included an analysis using the Agricultural Non-Point Source Pollution (AGNPS) model to estimate nonpoint source loadings from feedlots (note: this tool was also used to estimate land use areas in the fecal coliform TMDL). This analysis showed that the Spring Creek monitoring station is downstream of most of the feedlots that had the greatest potential to cause water quality problems, so any loading associated with these sources should be reflected in the monitoring data. In addition, storm event samples had higher concentrations, suggesting that runoff from storm events was the primary cause of bacteria loading (*Linkage Analysis* section of SD DANR, 2004).

The *Point Sources* section (p. 4-6) of the *E. coli* addendum identifies several NPDES facilities in the Spring Creek segment 01 watershed. This comprehensive discussion provides a watershed-scale accounting of potential point sources. DANR identified each permittee by facility name, permit number, and permit type and also described a rationale for wasteload allocations (WLA) (p. 4-6). Only the city of Elkton Wastewater Treatment Facility (WWTF) permit (SD0020788) was identified as a permitted facility contributing *E. coli* to the creek. The WLA in the fecal coliform was calculated based on the design capacity flow, the water quality criterion, and a unit conversion factor. The *E. coli* TMDL includes the same assumptions as the fecal coliform TMDL for the city of Elkton WWTF.

The magnitude of pollutant sources is quantified in the original fecal coliform TMDL using information and assumptions that vary depending on the source type. For example, the process and assumptions used to estimate septic system contribution was adequately explained and involved applying an assumed failure rate consistent with primary literature and technical EPA resources (EPA, 2002b). The point source load was calculated using Discharge Monitoring Report data and nonpoint source loads were calculated using the AGNPS model. The U.S. Department of Agriculture and National Resources Conservation Service jointly designed the AGNPS tool specifically "to assist with determining [best management practices (BMPs)], *the setting of TMDLs*, [emphasis added] and for risk & cost/benefit analyses" (USDA, 2023). Other data sources and information used are routinely cited and appropriate for the study.

Assessment: The EPA concludes that DANR adequately identified the impaired waterbody, the pollutant of concern, the priority ranking, the identification, location and magnitude of the pollutant sources, and the important assumptions and information used to develop the TMDL.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The *Water Quality Standards and TMDL Targets* section (p. 4) describes the water quality standards applicable to the impaired segment with citations to the relevant South Dakota regulations. SD-BS-R-SPRING_01 is designated the following beneficial uses:

- warmwater marginal fish life propagation,
- limited contact recreation,

- fish and wildlife propagation, recreation, and stock watering, and
- irrigation waters.

DANR determined that *E. coli* is preventing the creek's limited contact recreation use from being fully supported. Numeric criteria are provided for the most sensitive use, which is limited contact recreation, in Table 1. Numeric *E. coli* criteria established to protect this recreation use are comprised of a 30-day mean criterion (≤ 630 colony forming units per 100 milliliters [CFU/100mL]) and a single sample maximum criterion (≤ 1,178 CFU/100mL) (Table 1). These criteria are seasonally applicable from May 1 to September 30.

The numeric *E. coli* criteria for limited contact recreation waters are applied directly as water quality targets for this TMDL. DANR reasonably expects that meeting the numeric *E. coli* criteria will lead to conditions necessary to support any relevant narrative criteria. The TMDL numeric target applicable to the impaired segment is based on the limited contact recreation single sample maximum criterion (1,178 CFU/100mL) as monitoring is not of sufficient frequency to assess compliance with the geometric mean criterion. DANR demonstrates in the 2020 bacteria translation TMDL that attaining the single sample maximum target will also achieve the geometric mean criterion (SD DANR, 2020).

The TMDL is consistent with South Dakota antidegradation policies because it provides recommendations and establishes pollutant limits at water quality levels necessary to meet criteria and fully support existing beneficial uses, including downstream uses.

Assessment: The EPA concludes that DANR adequately described the applicable water quality standards and set the numeric water quality target for this TMDL.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

The original fecal coliform TMDL relied on the load duration curve approach to define the fecal coliform loading capacity of Spring Creek segment 01. Consequently, this *E. coli* TMDL, which is based on the fecal coliform TMDL analysis, used the same approach to establish the *E. coli* loading capacity. A load duration curve is a graphical representation of pollutant loads across various flows. The approach helps correlate water quality conditions to stream flow and provides insight into the variability of source contributions. The EPA has published guidance on the use of duration curves for TMDL development (USEPA, 2007) and the practice is well established.

Using this approach, DANR set the TMDL equivalent to the loading capacity, which is the sum of the load allocations (LA), WLA, and margin of safety (MOS), and expressed the TMDL in CFUs per day. Data analyses illustrate the loading capacity and existing loads in different flow zones (i.e., high-moist, mid-range, and dry-low; see Figure 4 of the fecal coliform TMDL); however, all flow zones were combined for the overall TMDL due to the low sample count when separated into different zones. The TMDL is not expressed as a load or mass, but instead as a number of organisms per day due to the nature of the pollutant. This approach is consistent with EPA guidance and the flexibility offered in 40 CFR §130.3(i) to express TMDLs in other appropriate, non-mass-based measures (USEPA, 2001).

DANR calculated the *E. coli* TMDL by multiplying the existing fecal coliform TMDL by the ratio associated with the applicable bacteria standards (Table 3). The fecal coliform TMDL was established using a target of 2,000 CFU/100mL. The applicable *E. coli* criterion is 1,178 CFU/100mL. Thus, the *E. coli* TMDL for Spring Creek segment 01 was established by multiplying the original fecal coliform TMDL by 0.589, which is the ratio associated with the single sample maximum criterion (Table 3). This approach is equivalent to establishing the *E. coli* TMDL using the *E. coli* criterion as the TMDL target and a stream flow value consistent with the fecal coliform TMDL. The WLA for the city of Elkton WWTF permit, LA, and MOS were all calculated with the same approach and ratio. In this TMDL submittal, DANR verified that the bacterial source assessment and linkage analysis was still accurate. Since conditions had not changed from the previous TMDL submittal, it was acceptable to rely on the fecal coliform loading capacity and allocation schemes for the new *E. coli* TMDL. The *E. coli* loading capacity and allocations for Spring Creek segment 01 are provided in Table 5.

The full water quality dataset is included in Appendix B of the original fecal coliform TMDL (SD DANR, 2004). In addition, Appendix B of this TMDL submittal includes recent *E. coli* data collected for Spring Creek segment 01, which demonstrated continued impairment. Existing fecal coliform loads based on these data were converted to *E. coli* loads using a ratio of 0.589 (Table 3) and percent reductions for each flow regime were calculated as the converted *E. coli* current load minus the *E. coli* converted TMDL divided by the converted *E. coli* current load (Table 5). The TMDL requires an overall 40 percent reduction (Table 5). Figure 4 of the fecal coliform TMDL demonstrates exceedances in the high-moist flow zone, suggesting that runoff from the land surface is the primary source (i.e., cropland and pastureland). Based on limited data, it appears the TMDL is currently met and no reductions are required during the mid-range flow zone and there are no data to assess current conditions in the dry-low flow zone. Table 7 presents a summary of data analyses by flow zone based on the limited sample size, highlighting the more conservative approach taken by the state in bundling the data into one overall zone and establishing a universal 40% reduction goal.

DANR adequately took critical conditions into account by reviewing the variability of water quality across various stream flows, rainfall events, and point source discharge characteristics, and then establishing the TMDL and directing future implementation activities consistent with those identified critical conditions. The fecal coliform TMDL identified critical conditions as runoff conditions during the recreation season. This is the time of high-intensity rainstorm events that can wash off pollutants from the watershed.

Assessment: The EPA concludes that the loading capacity was calculated using an acceptable approach, used observed concentration data and a water quality target consistent with water quality criteria, and has been appropriately set at a level necessary to attain and maintain the applicable water quality standards. The pollutant loads have been expressed as daily limits. The critical conditions were described and factored into the calculations and were based on a reasonable approach to establish the relationship between the target and pollutant sources.

4. Load Allocation

The *E. coli* LA was based on the conversion from the fecal coliform LA using the ratio in Table 3 (see *TMDL and Allocations* section, p. 7-8). Table 5 presents the LA summarized into a single flow zone. This composite LA represents all nonpoint source contributions, both human and natural, as one allocation. Natural background was estimated at two percent of the loading and the remainder of the LA is associated with bacteria contribution from land uses, including cropland, pastureland, and residential areas (p. 11 in SD DANR, 2004).

Assessment: The EPA concludes that the LAs provided in the TMDL are reasonable and will result in attainment of the water quality standards.

5. Wasteload Allocations

The Spring Creek segment 01 fecal coliform TMDL established a WLA for the city of Elkton WWTF (Permit #SD0020788). Total contributions from the WWTF to the fecal coliform loading were estimated at 0.00016 percent and characterized as insignificant (*Point Sources* section of SD DANR, 2004). A WLA of 8.10E+10 CFU/day was assigned in the fecal coliform TMDL for the city of Elkton WWTF. As explained on page 7, the *E. coli* WLA was derived by multiplying the fecal coliform WLA by the single sample criterion ratio of 0.589 (Table 3), which is protective of the limited contact recreation use. The *E. coli* WLA is presented in Table 5 as a constant load applied across the full flow regime.

Other permits were discussed in the *Point Sources* section (p. 4-6). These include two general construction stormwater permits and three concentrated animal feeding operations (CAFOs; Table 2). The construction stormwater permits were not assigned WLAs since they are not expected to be sources of bacteria pollution. CAFOs were also not assigned WLAs as their permit requirements prohibit discharges except in the event of 25-year, 24-hour storm events (p. 5-6).

Assessment: The EPA concludes that the WLA provided in the TMDL is reasonable, will result in the attainment of the water quality standards and will not cause localized impairments as the WLA calculation applies the water quality criterion at the point of discharge. The TMDL accounts for all point sources contributing loads to impaired segments, upstream segments, and tributaries in the watershed.

6. Margin of Safety

This TMDL submittal incorporates an explicit MOS approach. The MOS was calculated by translating the MOS in the fecal coliform TMDL to an *E. coli* load using a ratio of 0.589 associated with the single sample maximum (Table 3). DANR describes this in the *TMDL and Allocations* section (p. 7). The MOS in the fecal coliform TMDL was calculated as 10 percent of the loading capacity (SD DANR, 2004), which is reasonable given the technical approach followed (e.g., no quantified modeled uncertainty) and accounts for uncertainties encountered throughout the development process like those associated

with a limited water quality dataset, among others. The explicit MOS for the *E. coli* TMDL is included in Table 5.

Assessment: The EPA concludes that the TMDL incorporates an adequate margin of safety.

7. Seasonal Variation

The load duration curve method used to evaluate water quality conditions incorporates variations in stream flow, which in turn, is influenced by other climatic and human factors that change throughout the year. To account for these variations, DANR evaluated the data at different flow zones as shown in Figure 4 and Table 6 of the fecal coliform TMDL (SD DANR, 2004). The TMDL was presented for a single comprehensive flow zone due to the limited observed data in separate zones; however, the data analyses demonstrate exceedances during the high-moist flow zone, associated with watershed-wide snowmelt or runoff events (SD DANR, 2004). Sixty percent of the fecal coliform exceedances were associated with a rainfall event. In addition to these flow and water quality patterns, the limited contact recreation water quality criteria have a seasonal component as they apply during the recreation season (May through September). Restoration efforts should account for seasonal patterns to achieve TMDL goals.

Assessment: The EPA concludes that seasonal variations were adequately described and considered to ensure the TMDL allocations will be protective of the applicable water quality standards throughout any given year.

8. Reasonable Assurances

The TMDL for Spring Creek segment 01 is developed for an assessment unit impaired by both point and nonpoint sources, thus reasonable assurances must be provided. Reasonable assurance justifications are provided for both point and nonpoint sources.

For point sources, the WLA established for the city of Elkton WWTF is based on the design capacity. The city operates well below the design capacity and within its permit limits. The last discharge from this facility was in April of 2021, so current practices are achieving the WLA. Available *E. coli* monitoring data collected in the past three years have been well below the TMDL target (ranging from non-detect to 65 CFU/100mL).

Nonregulatory, voluntary-based reasonable assurances are provided for the LA through collaboration with the East Dakota Water Development District (EDWDD). This group is helping to implement the Big Sioux River Project (BSRP) with section 319 funds to help landowners with best management practices (BMP) within the Big Sioux River Watershed. Spring Creek segment 01 is located in this watershed, and the project is working to reduce *E. coli* numbers within the watershed through BMP implementation and monitoring (p. 9).

Assessment: The EPA considered the reasonable assurances contained in the TMDL submittal and concludes that they are adequate to meet the load reductions. Nonpoint source load reductions are expected to occur through the implementation of best management practices ongoing and planned to begin in the future. Point sources with NPDES permits require that treatment is consistent with assumptions and requirements of WLAs for the discharges in the TMDL.

9. Monitoring Plan

DANR recognizes that during and after implementation of BMPs, monitoring will be necessary to measure attainment of water quality standards. This will generally be accomplished through DANR's ambient water quality monitoring program at the same stations where data were collected to develop the fecal coliform TMDL. The fecal coliform TMDL includes stream-specific monitoring recommendations in the *Follow-Up Monitoring* section, including post-implementation sampling at BMP sites and recurring ambient monitoring (SD DANR, 2004).

Assessment: The TMDL submittal includes a commitment to effectiveness monitoring. The EPA supports these future monitoring plans and recommends the state consider additional monitoring to track overall progress of TMDL implementation.

10. Implementation

In the *Implementation Plan* section of the fecal coliform TMDL, DANR describes implementation considerations for Spring Creek segment 01. DANR identified the need to identify and install agricultural BMPs to reduce loads during runoff events (SD DANR, 2004). The *E. coli* addendum discusses the BSRP and support of the EDWDD in helping landowners implement BMPs.

Assessment: DANR discussed how information derived from the TMDL analysis process can be used to support implementation of the TMDL. The EPA is taking no action on the implementation portion of the TMDL submittal because implementation plans are not a required element of a TMDL.

11. Public Participation

The TMDL submittal explains the public engagement process DANR followed during development of the *E. coli* TMDL on page 10. A draft TMDL report was released for public comment from May 9, 2024 to June 11, 2024. The opportunity for public review and comment was posted on DANR's website and announced in three local newspapers: the Brookings Register, Moody County Enterprise, and the Sioux Falls Argus Leader. No public comments were submitted.

Assessment: The EPA reviewed DANR's public participation process and concludes that DANR involved the public during the development of the TMDL and provided adequate opportunities for the public to comment on the draft report.

12. Submittal Letter

A transmittal letter with the appropriate information was included with the final TMDL report submission from DANR, dated June 27, 2024 and signed by Alan Wittmuss, Environmental Scientist Manager – TMDL Team Leader, Water Protection Program.

Assessment: The EPA concludes that the state's TMDL submittal package clearly and unambiguously requested EPA to act on the TMDL in accordance with the Clean Water Act and the TMDL submittal contained all necessary supporting information.

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APPENDIX B: *E.COLI* DATA

SampleDate	*E. coli (CFU/*100mL)
05/21/2019	428
06/03/2019	866
06/17/2019	2400
07/01/2019	4110
07/15/2019	2190
08/19/2019	687
09/16/2019	1120
09/23/2019	579
10/07/2019	727
06/08/2020	1990
06/22/2020	69.1
07/06/2020	6870
07/20/2020	6020
08/03/2020	1510
08/17/2020	2600
09/08/2020	8160
09/21/2020	5480
10/19/2020	3870
04/19/2021	3.1
05/03/2021	179
05/25/2021	63.8
06/07/2021	14100
06/23/2021	250
07/12/2021	2420
07/19/2021	1090
07/19/2021	1120
07/19/2021	<1
08/02/2021	52.8
08/16/2021	1120
08/16/2021	1300
09/14/2021	>24200
09/20/2021	2380
10/18/2021	2100