FECAL COLIFORM TOTAL MAXIMUM DAILY LOAD EVALUATION OF JAMES RIVER, YANKTON COUNTY, SOUTH DAKOTA

South Dakota Department of
Environment and Natural Resources

Protecting South Dakota's Tomorrow ... Today

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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Contents

List of Figures

List of Tables

Total Maximum Daily Load Summary Table

Total Maximum Daily Load Summary

Entity ID:	SD-JA-R-JAMES-11
Location:	HUC Code: 10160010
Size of Watershed:	250,000 acres
Water body Type:	River/Stream
303(d) Listing Parameter:	Fecal Coliform
Initial Listing date:	2006 IR
TMDL Priority Ranking:	1
Listed Stream Miles:	55 miles
Designated Use of Concern:	Limited Contact Recreation
Analytical Approach:	Load Duration Curve Framework
Target:	Meet applicable water quality standards 74:51:01:55
Indicators:	Fecal Coliform Counts
Threshold Value:	< 1000 colonies/100 ml geometric mean concentration with maximum single sample concentrations of <2000 colonies/100 ml for Fecal Coliform
High Flow Zone LA:	3.78E+14
High Flow Zone WLA:	0
High Flow Zone MOS:	4.55E+13
High Flow Zone TMDL:	4.23E+14

1.0 Introduction

The intent of this document is to clearly identify the components of the TMDL submittal to support adequate public participation and facilitate the United States Environmental Protection Agency (EPA) review and approval. The TMDL was developed in accordance with Section 303(d) of the federal Clean Water Act and guidance developed by EPA. This TMDL document addresses the fecal coliform bacteria impairment of the James River from the Yankton County Line to the Missouri River, SD-JA-R-James-11.

The James River has numerous segments that are listed for various impairments ranging from dissolved oxygen to suspended sediment. Segment 11 is also listed for suspended solids, which will be addressed in a separate document. The final segment of sampling to address that listing is scheduled to be completed in the summer of 2011.

1.1 Watershed Characteristics

The segment of the James River addressed in this TMDL covers the last 55 miles of the approximately 700 mile long river. The entire James River drains over 20,000 square miles of North and South Dakota (Figure 1). The immediate drainage area around the segment covers about 250,000 acres. The segment immediately upstream of this one is not impaired due to bacterial contamination, indicating evaluation of the immediate watershed would provide the reductions necessary to reach full support of the beneficial uses.

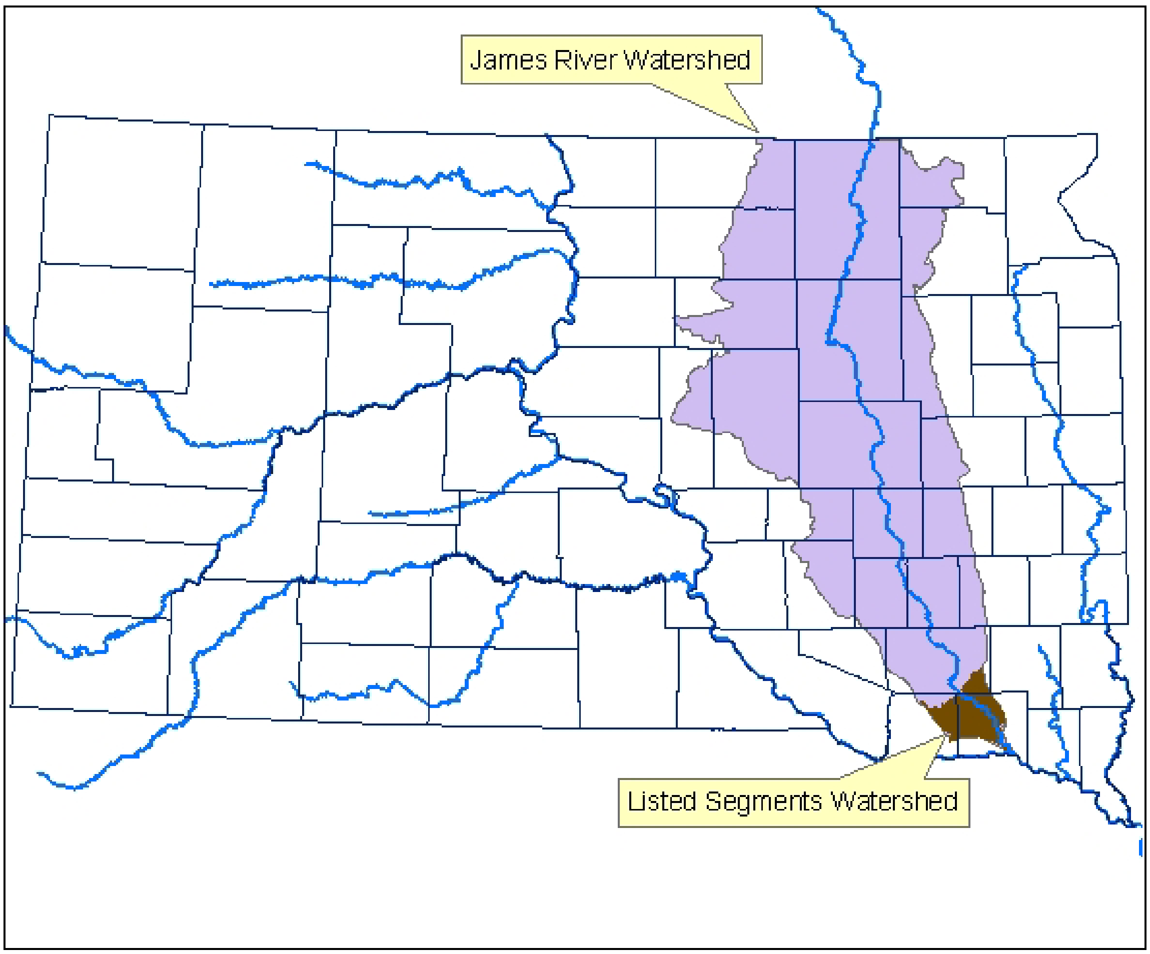

Figure 1. **James River Watershed location in South Dakot**a

Table 1 lists the land uses present in the watershed and their approximate percentages. Cropland is the primary land use and is found on most of the level soils across the landscape. The slopes typically found closer to the stream channels and along the James Valley trench are often too steep for tillage and are typically used for livestock grazing. Urban areas within the watershed consist primarily of small rural towns, farmsteads, and roadways.

Table 1. Land uses in the James River Watershed

Land use	Percentage
Crop	53%
Grass	32%
Urban	8%
Hay	4%
Water/Wetlands	2%
Forest	2%

The majority of the watershed is comprised of 2 primary soil associations. The first is the Ethan-Clamo-Davis association. It is located along the James River floodplain and adjacent breaks. The Clamo soils are located on the level ground along the river and are prone to flooding. They have good potential for crop growth, particularly if drained. The Ethan and Davis soils are found on the slopes and are typically used for rangeland. (USDA, 1979)

The second association is the Clarno-Bonilla-Tetonka. The Clarno soils are well drained and are located on the higher parts of the landscape. The Tetonka and Bonilla soils are located on lower portions of the landscape and are more prone to flooding. The majority of these units are used for cropland with some limitations due to flooding. (USDA, 1979)

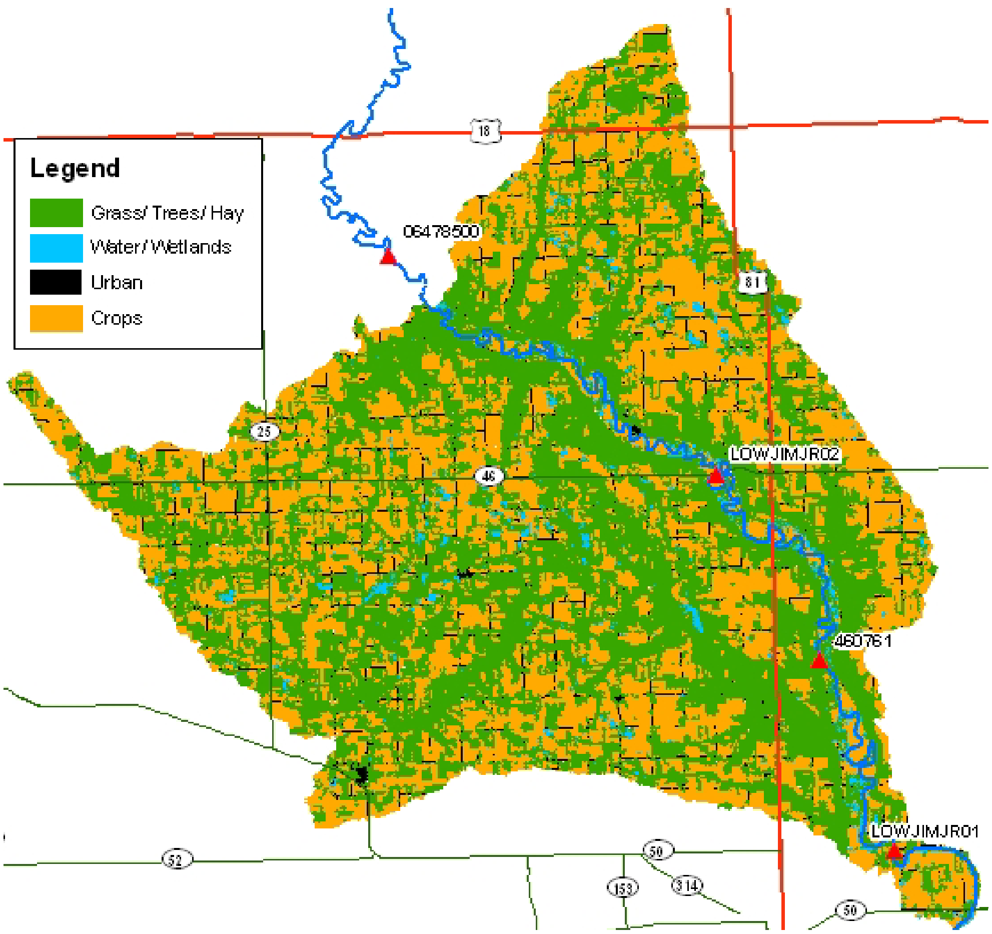

Figure 2. James River Watershed

2.0 Water Quality Standards

Each waterbody within South Dakota is assigned beneficial uses. All waters (both lakes and streams) are designated the use of fish and wildlife propagation, recreation and stock watering. All streams are assigned the use of irrigation. Additional uses may be assigned by the state based on a beneficial use analysis of each waterbody. Water quality standards have been defined in South Dakota state statutes in support of these uses. These standards consist of suites of numeric criteria that provide physical and chemical benchmarks from which management decisions can be developed.

Chronic standards, including geometric means and 30-day averages, are applied to a calendar month. While not explicitly described within the states water quality standards, this is the method used in the states Integrated Water Quality Report (IR) as well as in permit development.

Additional "narrative" standards that may apply can be found in the "Administrative rules of South Dakota: Articles 74:51:01:05; 06; 08; and 09". These contain language that generally prohibits the presence of materials causing pollutants to form, visible pollutants, and nuisance aquatic life.

The James River from the Yankton County line downstream to its confluence with the Missouri River has been assigned the beneficial uses of: warmwater semi-permanent fish life propagation, irrigation waters, limited contact recreation, and fish and wildlife propagation, recreation, and stock watering. Table 2 lists the criteria that must be met to support the specified beneficial uses. When multiple criteria exist for a particular parameter, the most stringent criterion is used.

The numeric TMDL target established for the James River is 1000 cfu/100 ml, which is based on the chronic standard for fecal coliform. The fecal coliform criteria for the limited contact recreation beneficial use requires that 1) no sample exceeds 2000 cfu/100 ml and 2) during a 30-day period, the geometric mean of a minimum of 5 samples collected during separate 24-hour periods must not exceed 1000 cfu/100 ml. These criteria are applicable from May 1 through September 30.

Table 2. State Water Quality Standards for the James River.

Parameters	Criteria	Unit of Measure	Beneficial Use Requiring this Standard
Total ammonia nitrogen as N	Equal to or less than the result from Equation 3 in Appendix A of Surface Water Quality Standards	mg/L 30 average March 1 to October 31	Warmwater Semipermanent Fish Propagation
	Equal to or less than the result from Equation 4 in Appendix A of Surface Water Quality Standards	mg/L 30 average November 1 to February 29	
	Equal to or less than the result from Equation c in Appendix A of Surface Water Quality Standards	mg/L Daily Maximum	
Dissolved Oxygen	≥4.0	mg/L	Warmwater Semipermanent Fish Propagation
Total Suspended Solids	≤90 (mean) ≤158 (single sample)	mg/L	Warmwater Semipermanent Fish Propagation
Temperature	≤32	°C	Warmwater Semipermanent Fish Propagation
Fecal Coliform Bacteria (May 1- Sept 30)	≤1000 (geometric mean) ≤2000 (single sample)	count/100 mL	Limited Contact Recreation
Escherichia coli Bacteria (May 1- Sept 30)	≤630 (geometric mean) ≤1178 (single sample)	count/100 mL	Limited Contact Recreation
Alkalinity ($CaCO_3$)	≤750 (mean) ≤1,313 (single sample)	mg/L	Wildlife Propagation and Stock Watering
Conductivity	≤2,500 (mean) ≤4,375 (single sample)	µmhos/cm @ 25° C	Irrigation Waters
Nitrogen, nitrate as N	≤50 (mean) ≤88 (single sample)	mg/L	Wildlife Propagation and Stock Watering
pH (standard units)	≥6.5 to ≤9.0	units	Warmwater Semipermanent Fish Propagation
Solids, total dissolved	≤2,500 (mean) ≤4,375 (single sample)	mg/L	Wildlife Propagation and Stock Watering
Total Petroleum Hydrocarbon	≤10	mg/L	
Oil and Grease	≤10		Wildlife Propagation and Stock Watering
Sodium Adsorption Ratio	<10	ratio	Irrigation Waters

3.0 Significant Sources

3.1 Point Sources

Regionally, there are four point source discharges that were evaluated for potential impacts to the listed segment of the James River.

The city of Scotland in Bon Homme County discharges to a tributary of Dawson Creek. Dawson Creek discharges to the James River upstream of the impaired segment and both Dawson Creek and the James River have a limited contact recreational use. Water quality standards that relate to bacterial contamination are the same for both waterbodies, but Dawson Creek is smaller with lower flows which created more restrictive conditions for both point and nonpoint source loads. Portions of Dawson Creek were listed for bacterial impairment and the city's contributions were addressed within the waste load allocations of that TMDL.

The City of Tabor's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 40 kilometers upstream of the listed segment. The city's facility is designed so that discharges would typically occur twice annually for approximately one week at a time. However, from 2005 through 2010, the city has only discharged twice. During the development of the NPDES/Surface Water Discharge permit for the facility, the potential impacts on the downstream segment were considered. SD DENR determined that Tabor's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. Therefore, the effluent limits could be set based strictly on the standards in the segment the facility discharges to. The City of Tabor's discharge to Beaver Creek is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

The City of Utica is located approximately 20 kilometers upstream of the listed segment of the James River. SD DENR has issued the community of Utica a zero discharge permit for its wastewater. All of the waste load allocations for Utica will be included as zero in the TMDL.

The City of Lesterville's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 35 kilometers upstream of the listed segment. The city's facility is managed so that discharges typically occur once per year for approximately one week at a time. During the development of the NPDES/Surface Water Discharge permit for the facility, the potential impacts on the downstream segment were considered. SD DENR determined that Lesterville 's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. Therefore, the effluent limits could be set based strictly on the standards in the segment the facility discharges to. The City of Lesterville 's discharge to Beaver Creek is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

3.2 Nonpoint Sources

Nonpoint sources of fecal coliform bacteria in the lower James River come primarily from agricultural sources. Data from the 2010 National Agricultural Statistic Survey (NASS) and from the 2002 South Dakota Game Fish and Parks county wildlife assessment were utilized for livestock and wildlife densities, respectively. Animal density information was used to estimate relative source contributions of bacteria loads and are summarized in Table 3. Total daily production for the lower basin (based on an estimate of 400 square miles) is $1.4E^{15}$ CFU.

Table 3. James River Segment 11 Nonpoint Sources of Bacteria

Species	#/mile	#/acre	FC/Animal/Day	FC/Acre	Percent
Dairy cow	0.00	0.0E+00	4.46E+10	0	0.0%
Beef	73.00	1.1E-01	3.90E+10	4448437500	83.8%
Hog	34.00	5.3E-02	1.08E+10	573750000	10.8%
Sheep	4.00	6.3E-03	1.96E+10	122500000	2.3%
Horse	0.25	3.9E-04	5.15E+10	20109375	0.4%
Poultry	100.00	1.6E-01	1.36E+08	21250000	0.4%
Humans1	5.85	9.1E-03	1.95E+09	17824219	0.3%
All Wildlife	Sum of all Wildlife			104363272	2.0%
Turkey (Wild)2	1.72	2.7E-03	1.10E+08	295625	
Goose3	0.10	1.6E-04	7.99E+08	124844	
Deer2	4.02	6.3E-03	3.47E+08	2179594	
Beaver2	1.34	2.1E-03	2.00E+05	419	
Raccoon2	3.82	6.0E-03	5.00E+09	29843750	
Coyote/Fox3	2.40	3.8E-03	1.75E+09	6562500	
Muskrat1	1.72	2.7E-03	2.50E+07	67188	
Opossom4	1.91	3.0E-03	1.15E+09	3424016	
Mink4	1.63	2.5E-03	1.15E+09	2922066	
Skunk4	2.29	3.6E-03	1.15E+09	4105234	
Badger4	0.86	1.3E-03	1.15E+09	1541704	
Jackrabbit4	1.53	2.4E-03	1.15E+09	2742798	
Cottontail4	21.03	3.3E-02	1.15E+09	37700030	
Squirrel4	7.17	1.1E-02	1.15E+09	12853505	
1 Yaggow et. al. 2001					
2 USEPA 2001					
3 Bacteria Indicator Tool Worksheet					
4 Best Professional Judgment based off of Dogs					
5 FC/Animal/Day averaged based on other species of Wildlife					

3.2.1 Natural background/wildlife

Wildlife within the watershed is a natural background source of fecal coliform bacteria. Wildlife population density estimates were obtained from the South Dakota Department of Game, Fish, and Parks. Best estimates suggest wildlife account for approximately 2% of the bacteria produced in the watershed.

3.2.2 Human

Three potential point sources are located in the James River segment 11 watershed, Lesterville, Tabor, and Utica. None of these systems are contributing to the loadings in the impaired segment. The entire watershed, including these communities, has a combined population of 3000 people within the 250,000 acre drainage area.

These systems account for about 660 of the approximately 3000 people in the watershed. Septic systems are assumed to be the primary human source for the rest of the population in the watershed. Table 3 includes all human produced fecals that are not delivered to a community waste system. When included as a total load in the table, the remaining population produced fecals accounting for approximately 0.3% of all fecal coliforms produced in the watershed. These bacteria should all be delivered to a septic system, which if functioning correctly would result in no fecal coliforms entering the river.

3.2.3 Agriculture

Manure from livestock is a potential source of fecal coliform to the stream. Livestock in the basin are predominantly beef cattle and hogs. Livestock can contribute fecal coliform bacteria directly to the stream by defecating while wading in the stream. They may also contribute by defecating while grazing on rangelands, which then get washed off during precipitation events. Table 4 allocates the sources for bacteria production in the watershed into three primary categories. The summary is based on several assumptions. Feedlot numbers were calculated as the sum of all dairy, hog, and the NASS estimate of beef in feeding areas. All remaining livestock were assumed to be on grass.

Table 4. Fecal Source Allocation for James River

Source	Percentage
Feedlots	43.1%
Livestock on Grass	54.7%
Wildlife	2.0%

There were approximately 1500 feeding operations screened within the Lower James River Assessment Project area. Fecal decay rates suggest that sources within 10 kilometers of the listed segment were most likely to contribute the largest portions of the load. Limiting the data set to lots located within this distance, (excluding areas evaluated for the Dawson Creek TMDL) produced a list of 242 feeding operations. These were evaluated based on their size and proximity to a waterway.

The 242 lots were grouped into tiers for implementation assessment, with 37 of the feeding areas falling within the top tier. SDDENR maintains a priority list of feeding areas to evaluate that is available to the implementation coordinators. Figure 3 depicts the locations of each of the feeding areas evaluated as well as the watershed boundary for segment 11. Twenty six of the feeding areas were located within the upstream segments watershed, however they were close enough to the listed segment that they may provide reductions that will aid in attainment of the water quality standard.

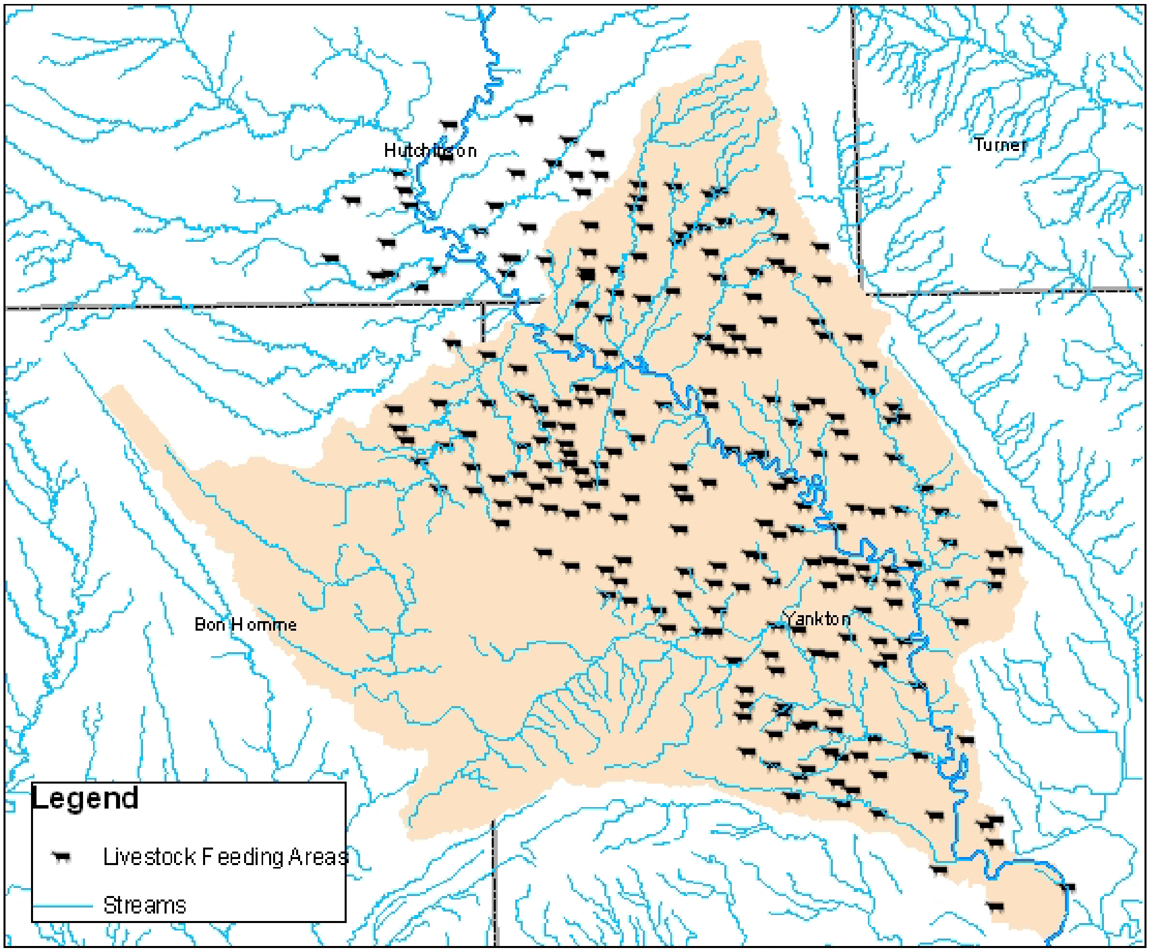

Figure 3. Priority Livestock Feeding Areas for Segment 11 of the James River

In addition to livestock feeding areas, livestock grazing may be a significant source. Approximately one third of the watershed is grassland; however the majority of this is located in close proximity to the stream corridors, increasing the chances that fecal material may be washed off into the streams.

Figure 4 depicts the estimated 80,000 acres of grass/pasture areas as well as the stream segments in the watershed. Fecal decay rates apply similarly to pastures as they do to feeding areas, suggesting that lots within the 10 kilometer distance of the river should be given a higher priority than those located further away. Applying the 10km buffer to the river and a 50 meter buffer to stream corridors to those areas upstream of site JR02, approximately 15,000 acres emerged as priority implementation sites.

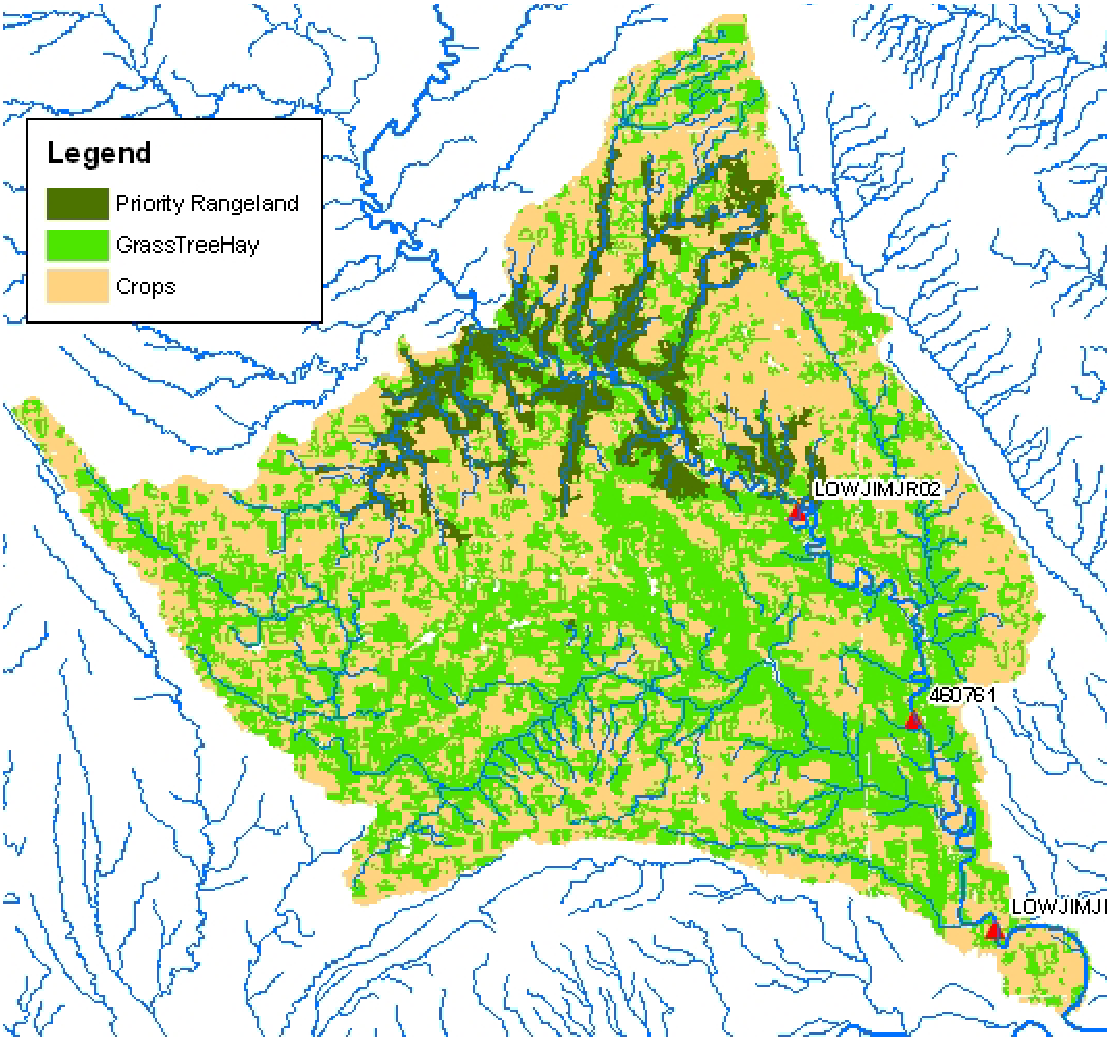

Figure 4. Location of Grasslands and Priority Grasslands in Segment 11 of the James River

4.0 Technical Analysis

4.1 Data Collection Method

Data on the James River were collected during the Lower James Watershed Assessment from two sampling points identified as site JOWJIMJR1 and LOWJIMJR2. The data collected during the assessment was used to supplement existing data from SD DENR ambient water quality monitoring site 460761 (WQM 8). Flow data for the James River was retrieved from the United States Geological Survey (USGS) at one station. The gauge data from Scotland (06478500) was used for the period of record for which sample data was available. Site locations are displayed in Figure 2.

South Dakota adopted *Escherichia coli* criteria during 2009 for the protection of the limited contact and immersion recreation uses. Segment 11 of the James River does not require an *E. coli* TMDL because the parameter is not currently listed as a cause of impairment to this stream. Because the two indicators are closely related, the fecal coliform bacteria TMDL and associated implementation strategy described in this document are expected to address both the fecal coliform bacteria and possible future *E. coli* impairments. If a TMDL must be established for *E. coli* in the future, a separate TMDL document will be developed for this parameter.

Unless otherwise noted, analysis was completed with modeling programs according to the most recent version of the Water Quality Modeling in South Dakota document (SDDENR, 2009).

4.2 Flow Analysis

The USGS gauge at Scotland (06478500) is located immediately upstream of the impaired segment. The contributing drainage area to the river downstream of this gauge is small when compared with the basin as a whole. Flows at this site may be considered representative of the segment and were used without modification. The period of record was limited to 1974 through the end of 2010 to match the same timeframe from which sample data were collected. The hydrograph for the period of record may be found in figure 5.

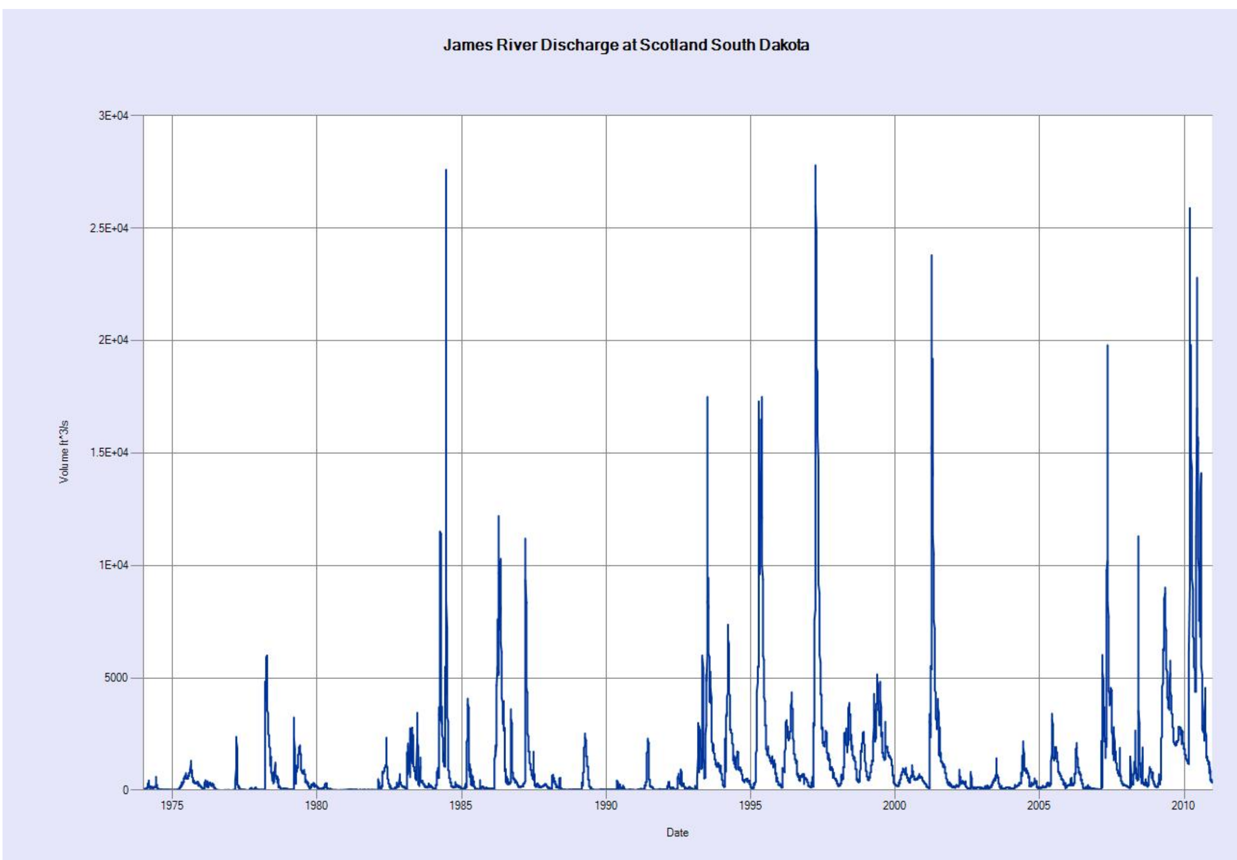

Figure 5. James River Daily Streamflow

4.3 Sample Data

Sample data from the existing WQM site as well as the assessment project were utilized to evaluate the river. A total of 341 samples were available for analysis from the TMDL segment. The TMDL is based on seasonal data collected from May through September in each year, limiting the data set to 200 samples.

Table 5. James River Fecal Coliform Bacteria Sample Data (Highlighted samples are in excess of the chronic standard.)

Date	Col/ 100 mL	Date	Col/ 100 mL	Date	Col/ 100 mL	Date	Col/ 100 mL
07/31/1974	100	09/24/1985	150	06/25/1996	40	05/09/2006	40
09/17/1974	160	05/27/1986	10	07/24/1996	70	05/10/2006	20
09/24/1974	33	06/24/1986	700	08/22/1996	60	05/16/2006	5
05/20/1975	110	07/29/1986	500	09/18/1996	60	05/16/2006	20
06/11/1975	100	08/26/1986	150	05/28/1997	2700	05/23/2006	10
07/14/1975	73	09/24/1986	800	06/24/1997	20	05/23/2006	5
08/13/1975	100	05/19/1987	60	07/28/1997	600	05/23/2006	5
09/23/1975	430	06/23/1987	1400	08/27/1997	90	05/31/2006	70
05/17/1976	40	09/30/1987	70	09/24/1997	600	05/31/2006	20
06/21/1976	30	05/25/1988	300	06/10/1998	100	06/08/2006	5
07/19/1976	63	06/30/1988	600	07/15/1998	200	06/08/2006	60
08/16/1976	2400	07/27/1988	130	08/20/1998	200	06/08/2006	100
09/20/1976	420	08/16/1988	5	09/24/1998	80	06/13/2006	30
05/24/1977	160	09/28/1988	150	05/19/1999	50	07/18/2006	10
06/21/1977	520	05/23/1989	20	06/14/1999	250	07/26/2006	5
07/19/1977	390	06/27/1989	250	07/28/1999	220	07/26/2006	70
08/16/1977	90	07/25/1989	110	08/25/1999	70	07/26/2006	30
09/20/1977	230	08/22/1989	22	09/23/1999	150	07/26/2006	5
05/22/1978	13	09/26/1989	10	05/25/2000	80	08/15/2006	5
06/26/1978	300	05/22/1990	380	06/28/2000	130	08/30/2006	30
07/24/1978	10000	06/25/1990	130	07/26/2000	800	08/30/2006	60
08/22/1978	10	07/23/1990	10	08/15/2000	8300	09/26/2006	1400
09/25/1978	80	08/20/1990	130	09/12/2000	50	09/28/2006	600
05/29/1979	100	09/25/1990	90	05/09/2001	320	09/28/2006	1500
06/25/1979	67	05/21/1991	130	06/11/2001	5	05/07/2007	4700
07/26/1979	200	06/18/1991	60	07/16/2001	30	05/14/2007	490
08/29/1979	67	07/23/1991	1300	08/13/2001	140	05/15/2007	280
09/24/1979	370	08/19/1991	420	05/07/2002	230	05/21/2007	150
06/24/1980	160	09/23/1991	50	06/18/2002	30	06/05/2007	80
09/30/1980	270	05/19/1992	160	07/10/2002	270	06/25/2007	10
05/27/1981	330	06/23/1992	170	08/12/2002	60	07/10/2007	10
06/23/1981	750	07/28/1992	440	09/10/2002	170	07/25/2007	20
05/26/1982	1900	08/25/1992	650	05/12/2003	10	08/21/2007	5900
06/30/1982	90	09/22/1992	120	06/10/2003	70	09/18/2007	10
07/27/1982	5	05/18/1993	350	07/08/2003	7600	05/20/2008	10
08/24/1982	900	06/22/1993	280	08/19/2003	80	06/17/2008	170
09/28/1982	250	07/27/1993	170	09/15/2003	3900	07/16/2008	5
05/24/1983	40	08/24/1993	20	05/19/2004	60	07/16/2008	10
06/28/1983	1700	09/28/1993	50	06/14/2004	180	08/12/2008	10
07/26/1983	370	05/17/1994	30	07/13/2004	50	09/23/2008	5
08/23/1983	80	06/21/1994	50	08/10/2004	10	05/05/2009	5
09/27/1983	310	07/27/1994	90	09/07/2004	30	06/23/2009	50
05/22/1984	50	08/23/1994	40	05/17/2005	240	07/21/2009	90
07/24/1984	40	09/27/1994	90	06/14/2005	450	08/11/2009	10
08/28/1984	20	05/23/1995	20	07/26/2005	140	09/14/2009	20
09/25/1984	40	06/27/1995	5	08/30/2005	90	05/19/2010	5
05/28/1985	50	07/19/1995	50	09/20/2005	10	06/15/2010	50
06/23/1985	110	08/22/1995	200	05/02/2006	60	07/13/2010	90
07/30/1985	60	09/26/1995	30	05/02/2006	70	08/10/2010	260
08/27/1985	130	05/29/1996	200	05/09/2006	10	09/08/2010	5

Bacteria concentrations for each of the three segments downstream of Huron are plotted in Figure 6. Segment 9 is defined as the James River from its confluence with Sand Creek to Interstate 90. Segment 10 is the portion of the river from Interstate 90 to the Yankton County line. The remaining segment is from the Yankton County line to the confluence with the Missouri River.

Increased frequency and magnitude of bacterial counts were observed in the lowest segment of the river. Reducing sources of bacteria contributing to the most downstream portions of segment 10 may help contribute to attaining the TMDL goal in segment 11 by reducing the initial concentrations within the river at the start of the segment.

Fifteen samples collected at the USGS gauge in Scotland were compared to samples collected on the same dates from site JR02 at South Dakota Highway 46. The average concentration at the Scotland gauge was 271 cfu/ 100 mL while the average at JR02 was 477 cfu/ 100 mL. At nearly two times the average concentration, additional emphasis should be placed on contributing portions of the drainage between these two points.

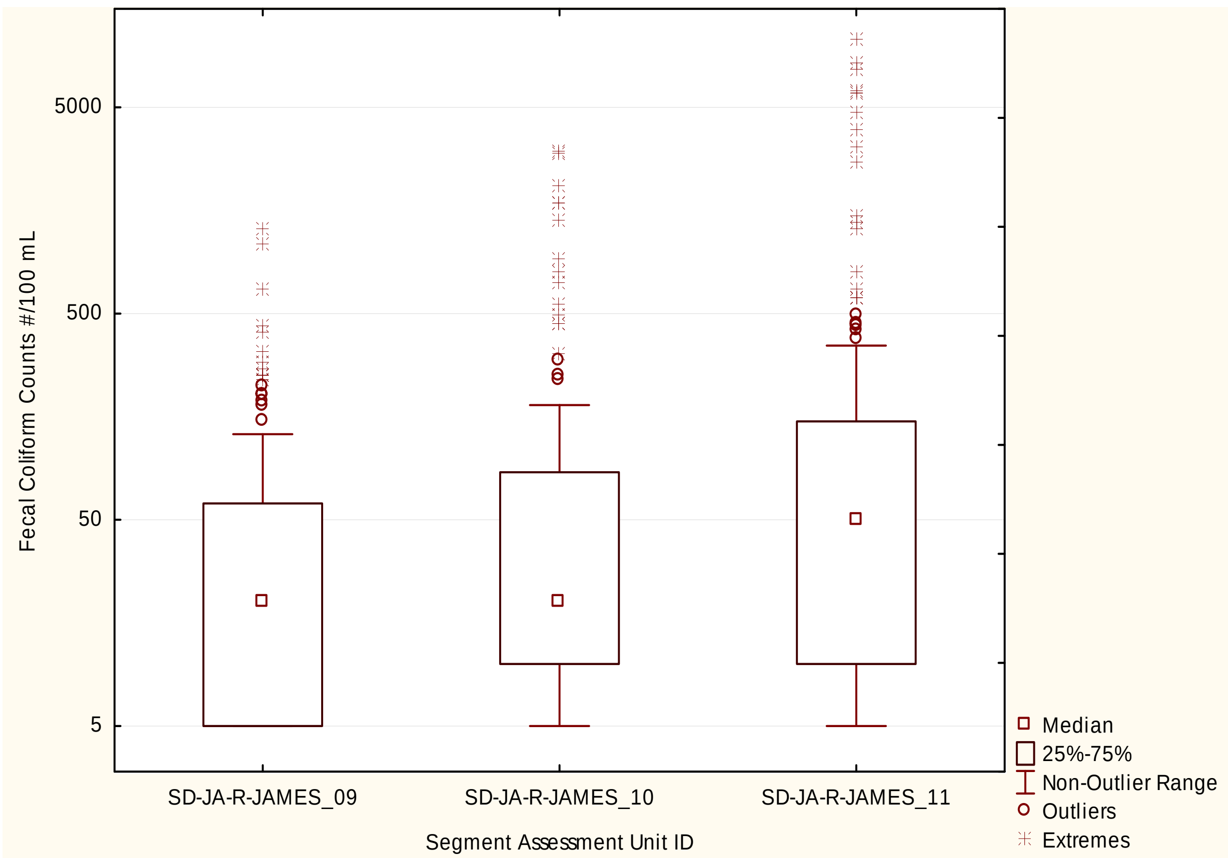

Figure 6. Comparison of Bacteria Concentrations for the Three Segments of the James River Downstream of Huron

Samples were separated into the portion of the hydrograph they were collected from in Figure 7. Samples collected from the rising limb of the hydrograph had a mean concentration of 470 colonies/ 100 mL while those collected form the falling limb had a mean concentration of 360 colonies/ 100 mL. The rising limb samples had higher mean tendencies, but the median values for each data set were nearly identical at 70 and 60 for rising and falling limbs respectively. The slightly higher counts for the rising limb in combination with a frequent occurrence of elevated numbers in the falling limb suggest that the sources of bacteria are well dispersed throughout the watershed.

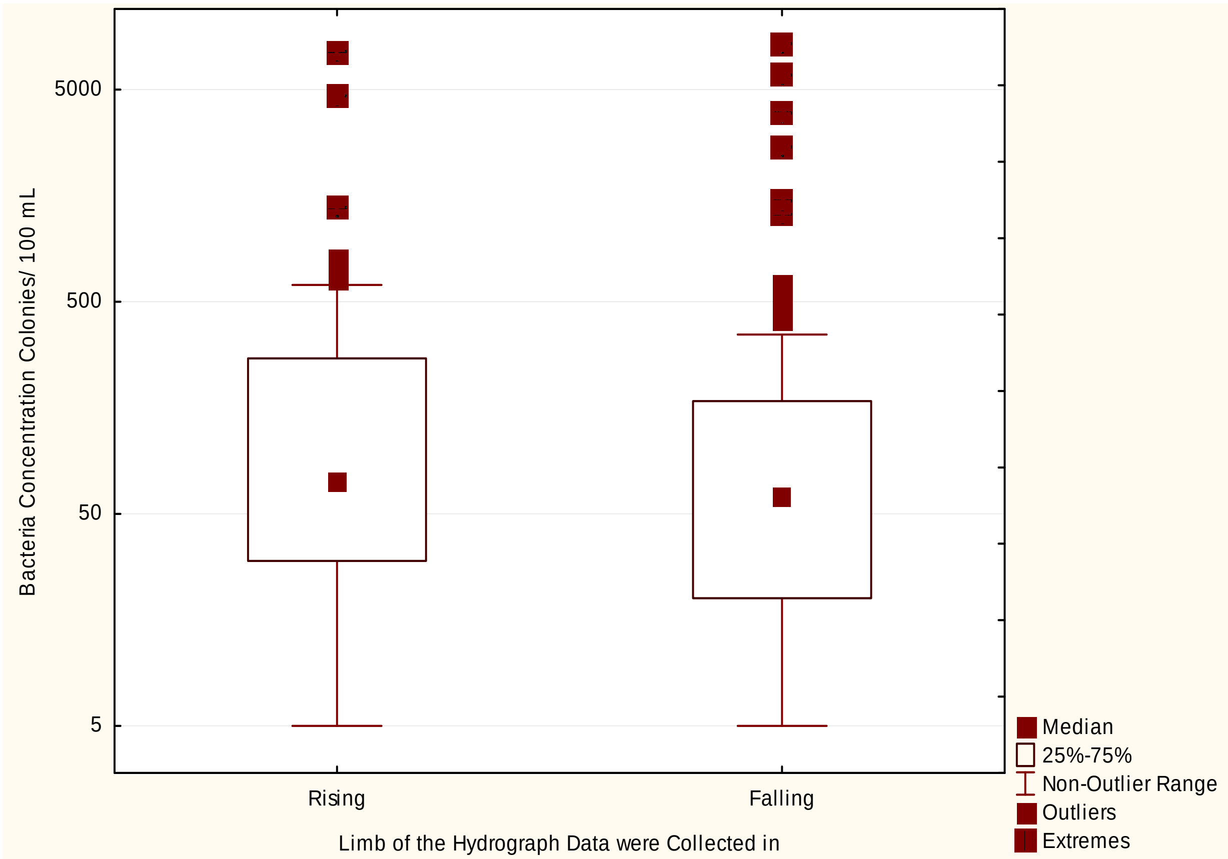

Figure 7. Bacteria Concentrations Grouped by Hydrograph Limb

The load duration curve in Figure 8 represents the 200 samples collected during the growing season (May 1 through September 30). The line represents the chronic standard for limited contact recreation which is 1000 colonies/ 100 mL. TMDL reductions will be based on the chronic standard to insure the TMDL meets all applicable water quality standards.

Samples exceeded state standards in 4 of the 5 flow zones. The only zone that did not have a measured exceedence was the mid flow zone (zone 3). Flow zone 2 had the highest concentrations and the greatest number of samples that exceeded the standard. Priority should be given to focusing restoration efforts on sources that have the greatest impact on this portion of the curve.

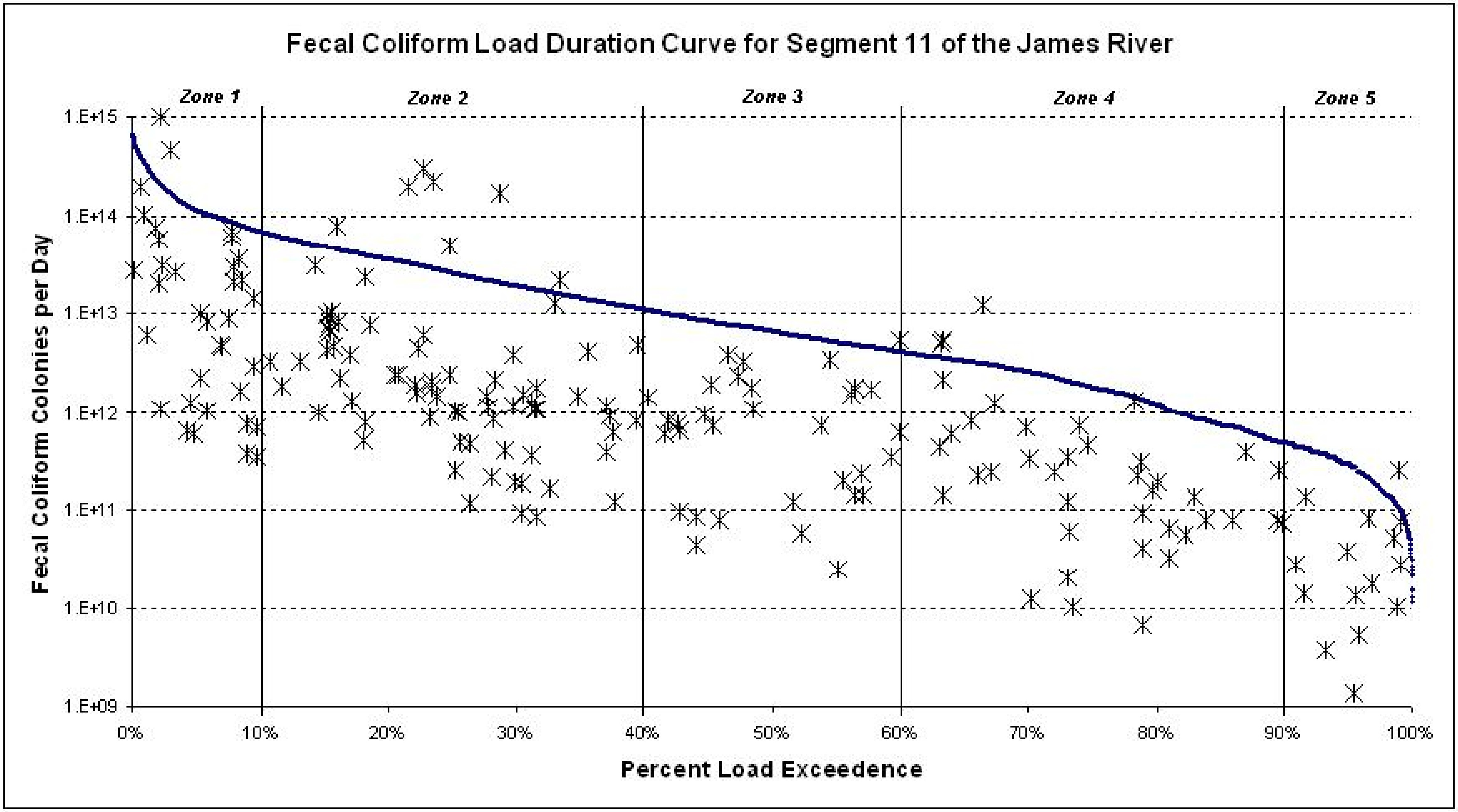

Figure 8. Fecal Coliform Load Duration Curve

5.0 TMDL and Allocations

5.0.1 Flow Zone 1 (<10% flow frequency exceedence)

Flow zone 1 represents the high flows in the James River. The lower limit of this zone is the 10th percentile which corresponds to a flow rate of 2,790 CFS. Flows in this zone are typically short in duration, only lasting for a few days. Flows in this zone were most commonly the product of spring snowmelt events but may be generated by large rain events.

Table 6 depicts the components of the TMDL for this flow zone. Data in this zone will be used as the overall TMDL load for the segment. The current load is based on the 95th percentile sample of 1,370 colonies/ 100 mL and the 95th percentile flow 17,300 cfs. The current load calculation suggests a 27% reduction in loadings is necessary to attain the standards.

The high flow zone is the most difficult zone to attain reductions for. Elevated concentrations may be the result of upstream influences as well as contributions from numerous sources dispersed throughout the watershed. Animal feeding areas are a probable source of contamination within this flow zone, but manure spread on fields and livestock in pastures may also contribute as well. As a result of using the chronic standard to establish the TMDL target, reductions of less than 27% may fully attain the water quality standard. Reductions from sources contributing to other flow zones (particularly zone 2) should help reduce concentrations within this flow zone.

Table 6. Flow Zone 1 Total Maximum Daily Load

TMDL Component	High Flows (expressed as CFU/ Day)
	>2,790 CFS
LA	3.78E+14
WLA Utica*	0
MOS	4.55E+13
TMDL @ 1000 CFU / 100 mL	4.23E+14
Current Load**	5.80E+14
Load Reduction	27%
The WLA for the community of Utica has a zero discharge permit.	
***Current Load is the 95th percentile concentration * 95th percentile flow in each regime*	

5.0.2 Flow Zone 2 (10% to 40% flow frequency exceedence)

Flow zone 2 consists of flows that occur under moist conditions. For the James River segment 11, those flows range from 450 cfs to 2,790 cfs. These flows are associated with runoff events. Water velocities during these conditions are significantly slower than during high flows, reducing the distance coliform bacteria may travel before dying off.

Table 7 depicts the components of the TMDL for this flow zone. The current load is based on the 95th percentile sample of 3,100 colonies/ 100 mL and the 95th percentile flow 2,500 cfs. The current load calculation suggests a 68% reduction in loadings is necessary to attain the standards.

Data collected from this flow zone was more likely to exceed the water quality standard than in any of the other flow zones. Sources of impairment may include feeding areas, pastures, and crop ground with manure spread on it. Due to the reduced transport velocities, impairments within this zone are less likely to be the result of loadings from upstream segments.

Targeting impairments to this flow zone may also help provide reductions for the high flow zone. Addressing the feeding areas should be an implementation priority to attain full support of the water quality standards for this flow zone.

Table 7. Flow Zone 2 Total Maximum Daily Load

TMDL Component	Moist Conditions (expressed as CFU/ Day)
	450 to 2,790 CFS
LA	4.65E+13
WLA Utica*	0
MOS	1.47E+13
TMDL @ 1000 CFU / 100 mL	6.11E+13
Current Load**	1.89E+14
Load Reduction	68%
The WLA for the community of Utica has a zero discharge permit.	
***Current Load is the 95th percentile concentration * 95th percentile flow in each regime*	

5.0.3 Flow Zone 3 (40% to 60% flow frequency exceedence)

Flow zone 3 are mid range flows. For the James River segment 11, those flows range from 167 cfs to 450 cfs. These flows may be associated with small runoff events or occur at the trailing end of a large events hydrograph. Table 8 depicts the components of the TMDL for this flow zone. The current load is based on the 95th percentile sample of 470colonies/ 100 mL and the 95th percentile flow 427 cfs. No reductions were necessary within this flow zone, the highest concentration measured was 650 colonies/ 100 mL.

Table 8. Flow Zone 3 Total Maximum Daily Load

TMDL Component	Midrange Flows (expressed as CFU/ Day)
	167 to 450 CFS
LA	7.92E+12
WLA Utica*	0
MOS	2.52E+12
TMDL @ 1000 CFU / 100 mL	1.04E+13
Current Load**	4.91E+12
Load Reduction	0%
The WLA for the community of Utica has a zero discharge permit.	
***Current Load is the 95th percentile concentration * 95th percentile flow in each regime*	

5.0.4 Flow Zone 4 (60% to 90% flow frequency exceedence)

Flow zone 4 consists of flows that occur during dry conditions. For the James River segment 11, those flows range from 20 cfs to 167 cfs. These flows are indicative of drought conditions. Table 9 depicts the components of the TMDL for this flow zone. The current load is based on the 95th percentile sample of 1,395 colonies/ 100 mL and the 95th percentile flow 155 cfs. Sources of impairment within this zone directly deliver bacteria to the stream. If a point source were present it may be a contributor, however grazing livestock or feeding areas with direct access to the river or a perennial stream are the most likely sources of impairment.

Table 9. Flow Zone 4 Total Maximum Daily Load

TMDL Component	Dry Conditions (expressed as CFU/ Day)
	20 to 167 CFS
LA	2.49E+12
WLA Utica*	0
MOS	1.30E+12
TMDL @ 1000 CFU / 100 mL	3.79E+12
Current Load**	5.29E+12
Load Reduction	28%
The WLA for the community of Utica has a zero discharge permit.	
***Current Load is the 95th percentile concentration * 95th percentile flow in each regime*	

5.0.5 Flow Zone 5 (90% to 100% flow frequency exceedence)

Flow zone 5 consists of the lowest flows recorded on the river. They are representative of severe drought conditions both locally and regionally. Flows in this zone range from the lowest measured of less than 1 cfs to 20 cfs.

Table 10 depicts the components of the TMDL for this flow zone. The current load is based on the 95th percentile sample of 1080 colonies/ 100 mL and the 95th percentile flow 19 cfs. The current load calculation suggests a 7% reduction in loadings is necessary to attain the standards.

Impairments in this flow zone are in direct contact with the waterway and are located in close proximity. Low flows also have low velocities, which allows for die off rates to take effect without the load traveling a significant distance. Out of the 17 samples collected within this flow zone, only 1 exceeded the standard. That sample remains the only exceedence out of the 48 samples collected from flows of less than 125 cfs. The lack of violations at low flows indicates that livestock access to the mainstem of the river is an unlikely source of impairment. Implementation efforts should focus on the higher flow zones because of the low frequency of impairment.

Table 10.Flow Zone 5 Total Maximum Daily Load

TMDL Component	Low Flows (expressed as CFU/ Day)
	0.5 to 20 CFS
LA	1.83E+11
WLA Utica*	0
MOS	2.82E+11
TMDL @ 1000 CFU / 100 mL	4.65E+11
Current Load**	5.02E+11
Load Reduction	7%
The WLA for the community of Utica has a zero discharge permit.	
***Current Load is the 95th percentile concentration * 95th percentile flow in each regime*	

5.1 Load Allocations (LAs)

Approximately 90% of the land use in the watershed is agricultural. All of the TMDL load has been allocated to these nonpoint source loads in the following load allocations. A 27% reduction in fecal coliform bacteria from anthropogenic sources (livestock) is required in the high flow zone to fully attain the current water quality standards. This concentration is the same as the chronic standard, however this reduction was based on reducing a single sample. A 68% reduction in fecal coliform bacteria is required in the moist conditions flow zone to fully attain current water quality standards. A 28% and 7% reduction in fecal coliform bacteria are required in the dry conditions and low flow zones respectively. The midrange flow zone does not require reductions to maintain support of the standards. Reducing the highest samples below the chronic standard provides assurance that both acute and chronic standards will be met.

5.2 Waste load Allocations (WLAs)

The only waste load allocation for this segment is from the city of Utica, which has a zero discharge permit from DENR, resulting in a waste load allocation of zero for this stream segment.

6.0 Margin of Safety (MOS) and Seasonality

6.1 Margin of Safety

An explicit MOS identified using a duration curve framework is basically unallocated assimilative capacity intended to account for uncertainty (e.g., loads from tributary streams, effectiveness of controls, etc). An explicit MOS was calculated as the difference between the loading capacity at the mid-point of each of the flow zones and the loading capacity at the minimum flow in each zone. A substantial MOS is provided using this method, because the loading capacity is typically much less at the minimum flow of a zone as compared to the mid-point. Because the allocations are a direct function of flow, accounting for potential flow variability is an appropriate way to address the MOS.

6.2 Seasonality

Seasonality is important when considering bacteria contamination. Sample data was limited to the recreation season which begins in May and continues through September. Peak use is typically later in the season after temperatures warm up. Monthly evaluations of the data showed no trend of a particular month generating higher or lower concentrations. The lack of a pattern further suggests numerous sources dispersed throughout the basin

7.0 Public Participation

STATE AGENCIES

South Dakota Department of Environment and Natural Resources (SD DENR) was the primary state agency involved in completion of this assessment. SD DENR provided technical support and equipment throughout the course of the project.

FEDERAL AGENCIES
Environmental Protection Agency (EPA) provided the primary source of funds for the completion of the assessment on the Lower James River.

LOCAL GOVERNMENT, INDUSTRY, ENVIRONMENTAL, AND OTHER GROUPS, AND PUBLIC AT LARGE
The primary local sponsor for this project was the James River Water Development District. Board meetings for the district are held bi-monthly, with short updates on the assessment presented followed by a question and answer session for board members and public attendees. TMDL activities in the district have been presented and discussed at nearly every meeting since project planning began in 2005.

During the summer sampling seasons, project personnel frequently met with landowners in the field. These meetings were most often facilitated through the landowners stopping to ask questions while data collection was occurring. Although informal in nature, these meetings provide an important medium for obtaining local landowner views and opinions.

This TMDL was placed on public notice during February 2011 in both the Yankton Daily Press as well as the Scotland Journal. The document was made available on the DENR website and advertised on its home page during the same time period. The only comments received during the notice were from EPA.

8.0 Monitoring Strategy

The Department may adjust the load and/or waste load allocations in this TMDL to account for new information or circumstances that are developed or come to light during the implementation of the TMDL and a review of the new information or circumstances indicate that such adjustments are appropriate. Adjustment of the load and waste load allocation will only be made following an opportunity for public participation. New information generated during TMDL implementation may include, among other things, monitoring data, BMP effectiveness information and land use information. The Department will propose adjustments only in the event that any adjusted LA or WLA will not result in a change to the loading capacity; the adjusted TMDL, including its WLAs and LAs, will be set at a level necessary to implement the applicable water quality standards; and any adjusted WLA will be supported by a demonstration that load allocations are practicable. The Department will notify EPA of any adjustments to this TMDL within 30 days of their adoption.

9.0 Restoration Strategy

An implementation project began in 2008 for the lower James River Basin. The initial goals of the project were to begin addressing bacterial contamination in two of the tributaries to the James River (Dawson Creek and Pierre Creek). This TMDL will provide the basis for expanding the efforts of the Lower James Implementation Project to include the impairments addressed.

10.0 Literature Cited

Huxoll, Cory. 2002. South Dakota Game Fish and Parks; South Dakota Game Report No. 2003-11; 2002 Annual Report County Wildlife Assessments with a summary of the 1991-2002 Assessments.

SDDENR (South Dakota Department of Environment and Natural Resources). 2006. The 2006 South Dakota Integrated Report for Surface Water Quality Assessment Pierre, SD.

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USEPA. 2001. Protocol for Developing Pathogen TMDLs. EPA 841-R-00-002. Office of Water (4503F0, United States Environmental Protection Agency, Washington D.C. 132 pp.

Yagow, G., Dillaha, T., Mostaghimi, S., Brannan, K., Heatwole, C., and Wolfe, M.L. 2001. *TMDL modeling of fecal coliform bacteria with* HSPF. ASAE meeting paper No.01-2006. St. Joseph, Mich.

Appendix A. Public Comments

EPA REGION VIII TMDL REVIEW

TMDL Document Info:

Document Name:	**Fecal Coliform Bacteria Total Maximum Daily Load Evaluation of James River, Yankton County, South Dakota**
Submitted by:	**Cheryl Saunders, SD DENR**
Date Received:	**January 25, 2011**
Review Date:	**February 15, 2011**
Reviewer:	**Vern Berry, EPA**
Rough Draft / Public Notice / Final?	**Public Notice Draft**
Notes:	

Reviewers Final Recommendation(s) to EPA Administrator (used for final review only):

☐ Approve
☐ Partial Approval
☐ Disapprove
☐ Insufficient Information

Approval Notes to Administrator:

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the minimum submission requirements and TMDL elements identified in the following 8 sections:

1. Problem Description
   1.1.. TMDL Document Submittal Letter
   1.2. Identification of the Waterbody, Impairments, and Study Boundaries
   1.3. Water Quality Standards
2. Water Quality Target
3. Pollutant Source Analysis
4. TMDL Technical Analysis
   4.1. Data Set Description
   4.2. Waste Load Allocations (WLA)
   4.3. Load Allocations (LA)
   4.4. Margin of Safety (MOS)
   4.5. Seasonality and variations in assimilative capacity
5. Public Participation
6. Monitoring Strategy
7. Restoration Strategy
8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered "impaired." When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate. A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody is able to assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant**.** A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describes the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA's minimum submission requirements relative to that section, a brief summary of the EPA reviewer's findings, and the reviewer's comments and/or suggestions. Use of the verb "must" in the minimum submission requirements denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review template is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 TMDL Document Submittal Letter

When a TMDL document is submitted to EPA requesting formal comments or a final review and approval, the submittal package should include a letter identifying the document being submitted and the purpose of the submission.

Minimum Submission Requirements.

- ☒ A TMDL submittal letter should be included with each TMDL document submitted to EPA requesting a formal review.
- ☒ The submittal letter should specify whether the TMDL document is being submitted for initial review and comments, public review and comments, or final review and approval.

☐ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute**.** The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment 11 fecal coliform TMDL was submitted to EPA for review via an email from Cheryl Saunders, SD DENR on January 25, 2011. The email included the draft TMDL document and a request to review and comment on the TMDL.

Comments: None

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Minimum Submission Requirements:

☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state’s current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).

☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map.

☐ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:
☐ Approve ☒ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: Segment 11 of the James River is a stream located in Yankton County, South Dakota and is part of the larger James River watershed in the Lower James sub-basin (HUC 10160011). The listed river segment has a total drainage area of approximately 250,000 acres in eastern South Dakota, and includes approximately 55 miles of the River from the Yankton County line to its mouth (i.e., to the confluence with Missouri River; SD-JA-R-JAMES_11). It is listed as a high priority for TMDL development.

The designated uses for James River include warmwater semi-permanent fish life propagation waters, limited-contract recreation waters, irrigation, fish and wildlife propagation, recreation, and stock watering. The segment was listed on the 2010 303(d) list for fecal coliform and total suspended solids which are impairing the recreational use.
COMMENTS: James River segment 11, as well as the three segments immediately upstream, are all also listed as impaired by total suspended solids. The Introduction section of the TMDL document should be revised to include mention of the TSS impairment in this segment and also include a brief explanation of SD DENR's plans to address the TSS impairment in the future.

DENR Response to Comment: Language was added to the introduction briefly describing the existence of additional impairments throughout the basin. Beginning in 2006, DENR began collecting a significant amount of data in preparation for the development of a TSS TMDL for the listed segments. The final steps in this collection are scheduled to be carried out during the summer of 2011 with TMDL development to begin afterwards.

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g., insufficient data were available to determine if this water quality criterion is being attained).

Minimum Submission Requirements:

☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).

☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the significant sources. Therefore, all TMDL documents must be written to meet the existing water quality standards for that waterbody (CWA §303(d)(1)(C)).

Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.

☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment addressed by this TMDL is impaired based on fecal coliform concentrations for limited contact recreation. South Dakota has applicable numeric standards for fecal coliform that may be applied to this River segment. The fecal coliform numeric standards being implemented in this TMDL are: a single sample maximum value of ≤ 2000 cfu/100 mL, and a 30-day geometric mean of ≤ 1000 cfu/ 100 mL. Discussion of additional applicable water quality standards for James River can be found on pages 7 and 8 of the TMDL.

South Dakota has adopted Escherichia coli criteria for the protection of the limited contact and immersion recreation uses. However, segment 11 of the James River does not require an E. coli TMDL because the parameter is not currently listed as a cause of impairment to this stream segment. Because the two indicators are closely related, the fecal coliform bacteria TMDL and associated implementation strategy described in the TMDL document are expected to address both the fecal coliform bacteria and possible future E. coli impairments. If a TMDL must be established for E. coli in the future, a separate TMDL document will be developed for this parameter.

Comments: None.

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddeness, stream morphology, up-slope conditions and a measure of biota).

Minimum Submission Requirements:

☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained.

Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.

☐ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The water quality target for this TMDL is based on the numeric water quality standards for fecal coliform to achieve the limited contact recreation beneficial use for James River. The target for the James River segment included in the TMDL document is the fecal coliform standard expressed as the 30-day geometric mean of 1000 CFU/100 mL during the recreation season from May 1 to September 30. While the standard is intended to be expressed as the 30-day geometric mean, the target was used to compare to values from single grab samples. This ensures that the reductions necessary to achieve the target will be protective of both the acute (single sample value) and chronic (geometric mean of 5 samples) standards.

Comments: None.

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each significant source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each significant source (or source category) should be identified and quantified to the maximum practical extent. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Minimum Submission Requirements:

☒ The TMDL should include an identification of all potentially significant point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.

☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.

☒ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified, characterized, and properly quantified.

☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The TMDL document identifies the land use in the watershed as predominately agricultural consisting of cropland (53%), grassland / rangeland (32%), developed (8%), hay (4%) and water/wetlands or forest land (3%).

Four point source discharges were evaluated for potential impacts to the listed segment of the James River. The city of Scotland in Bon Homme County discharges to a tributary of Dawson Creek. Dawson Creek discharges to the James River upstream of the impaired segment. Portions of Dawson Creek were listed for bacterial impairment and the City's contributions were addressed within the waste load allocations of the Dawson Creek TMDL.

The City of Tabor's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 40 kilometers upstream of the listed segment. From 2005 through 2010, the City only discharged twice. SD DENR determined that Tabor's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. The City of Tabor's discharge to Beaver Creek is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

The City of Utica is located approximately 20 kilometers upstream of the listed segment of the James River. SD DENR has issued the community of Utica a zero discharge permit for its wastewater. All of the waste load allocations for Utica will be included as zero in the TMDL.

The City of Lesterville's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 35 kilometers upstream of the listed segment. SD DENR determined that Lesterville's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. The discharge from the City of Lesterville is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

Nonpoint sources of fecal coliform bacteria in the lower James River come primarily from agricultural sources. Data from the 2010 National Agricultural Statistic Survey (NASS) and from the 2002 South Dakota Game Fish and Parks county wildlife assessment were utilized for livestock and wildlife densities, respectively. Animal density information was used to estimate relative source contributions of bacteria loads as summarized in Table 3 of the TMDL document.

Livestock in the basin are predominantly beef cattle and hogs. Livestock can contribute fecal coliform bacteria directly to the stream by defecating while wading in the stream. They may also contribute by defecating while grazing on rangelands, which then get washed off during precipitation events. Table 4, excerpted from the TMDL document below, allocates the sources for bacteria production in the watershed into three primary categories. Feedlot numbers were calculated as the sum of all dairy, hog, and the NASS estimate of beef in feeding areas. All remaining livestock were assumed to be on grass.

Table 4. Fecal Source Allocation for James River

Source	Percentage
Feedlots	43.1%
Livestock on Grass	54.7%
Wildlife	2.0%

There were approximately 1500 feeding operations screened within the Lower James River Assessment Project area. Fecal decay rates suggest that sources within 10 kilometers of the listed segment were most likely to contribute the largest portions of the load. Limiting the data set to lots located within this distance, (excluding areas evaluated for the Dawson Creek TMDL) produced a list of 242 feeding operations. These were evaluated based on their size and proximity to a waterway. The 242 lots were grouped into tiers for implementation assessment, with 37 of the feeding areas falling within the top tier. Twenty six of the feeding areas were located within the upstream segments watershed, however they were close enough to the listed segment that they may provide reductions that will aid in attainment of the water quality standard.

In addition to livestock feeding areas, livestock grazing may be a significant source. Approximately one third of the watershed is grassland; however the majority of this is located in close proximity to the stream corridors, increasing the chances that fecal material may be washed off into the streams. Fecal decay rates apply similarly to pastures as they do to feeding areas, suggesting that lots within the 10 kilometer distance of the river should be given a higher priority than those located further away. Applying the 10km buffer to the river and a 50 meter buffer to stream corridors to those areas upstream of site JR02, approximately 15,000 acres emerged as priority implementation sites.

Comments: None.

4. TMDL Technical Analysis

TMDL determinations should be supported by a robust data set and an appropriate level of technical analysis**.** This applies to **all** of the components of a TMDL document. It is vitally important that the technical basis for **all** conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum LAs + \sum WLAs + MOS$$

Where:

TMDL = Total Pollutant Loading Capacity of the waterbody

LAs = Pollutant Load Allocations

WLAs = Pollutant Wasteload Allocations

MOS = The portion of the Load Capacity allocated to the Margin of safety.

Minimum Submission Requirements:

☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

☒ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation. In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.

☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

(1) the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
(2) the distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc…;
(4) present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
(5) an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.

☒ TMDLs must take critical conditions (e.g., steam flow, loading, and water quality parameters, seasonality, etc…) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

☐ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The technical analysis should describe the cause and effect relationship between the identified pollutant sources, the numeric targets, and achievement of water quality standards. It should also include a description of the analytical processes used, results from water quality modeling, assumptions and other pertinent information. The technical analysis for segment 11 of the James River TMDL describes how the fecal coliform loads were derived in order to meet the applicable water quality standards for the 303(d) impaired stream segment.

Data for James River segment 11 was collected during the Lower James watershed assessment from two sampling points. This data was used to supplement existing data from SD DENR ambient water quality monitoring site 460761. Sample data from the existing WQM site as well as the assessment project were utilized to evaluate the river. Flow data for the James River was retrieved from the United States Geological Survey (USGS) at one station near Scotland, SD. This USGS gauge is located immediately upstream of the impaired segment.

The TMDL loads and loading capacities were derived using the load duration curve (LDC) approach. The LDC was divided into 5 distinct flow regimes – high flow (≥ 2,790 cfs), moist flow (between 2,790 cfs and 450 cfs), midrange flow (between 450 cfs and 167 cfs), dry flow (between 167 cfs and 20 cfs), and low flow (< 20 cfs). The result is a flow-variable TMDL target across the flow regime shown in Figure 8 of the TMDL document. The LDC is a dynamic expression of the allowable load for any given daily flow. Loading capacities were derived from this approach at the 95th percentile of the observed fecal coliform bacteria load for each flow regime: high flow = 4.23E+14 CFU/day; moist flow = 6.11E+13 CFU/day; midrange flow = 1.04E+13 CFU/day; dry flow = 3.79E+12 CFU/day; and low flow = 4.65E+11 CFU/day.

Comments: None.

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc…).

Minimum Submission Requirements:

- ☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.
- ☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment 11 TMDL data description and summary are included mostly in the Technical Analysis section of the document. Data for James River segment 11 was collected during the Lower James watershed assessment from two sampling points identified as site JOWJIMJR1 and LOWJIMJR2. This data was used to supplement existing data from SD DENR ambient water quality monitoring site 460761. Sample data from the existing WQM site as well as the assessment project were utilized to evaluate the river. A total of 341 samples were available for analysis from the TMDL segment. The TMDL is based on seasonal data collected from May through September in each year, limiting the data set to 200 samples.

Flow data was retrieved from the United States Geological Survey (USGS) at one station. The gauge data from Scotland (06478500) was used for the period of record for which sample data was available. This USGS gauge is located immediately upstream of the impaired segment. The contributing drainage area to the river downstream of this gauge is small when compared with the basin as a whole. Flows at this site may be considered representative of the segment and were used without modification. The period of record was limited to 1974 through the end of 2010 to match the same timeframe from which sample data was collected.

Comments: None.

4.2 Waste Load Allocations (WLA):

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Minimum Submission Requirements:

☒ EPA regulations require that a TMDL include WLAs for all significant and/or NPDES permitted point sources of the pollutant. TMDLs must identify the portion of the loading capacity allocated to individual existing and/or future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.

☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: Four point source wastewater treatment facility discharges were evaluated for potential impacts to the listed segment of the James River: 1) the city of Scotland; 2) the City of Tabor; 3) the City of Utica; and 4) the City of Lesterville. SD DENR determined that the discharge from all four point sources would not impact the designated beneficial uses of segment 11 of the James River. Therefore, the WLA for these facilities are zero.

Comments: None.

4.3 Load Allocations (LA):

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Minimum Submission Requirements:

☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.

☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The Watershed Characteristics section of the TMDL explains that the landuse in the watershed is predominately agricultural consisting of cropland (53%), grassland / rangeland (32%), developed (8%), hay (4%) and water/wetlands or forest land (3%). Nonpoint sources of fecal coliform bacteria in James River come primarily from agricultural sources. Livestock in the basin are predominantly beef cattle and hogs. Therefore the majority of the loading capacity has been allocated to the nonpoint sources in the form of load allocations. Tables 6 - 10 include the load allocations at each of the flow regimes – 3.78E+14 CFU/day at high flows; 4.65E+13 CFU/day during moist flows; 7.92E+12 CFU/day at midrange flows; 2.49E+12 CFU/day during dry conditions; and 1.83E+11 CFU/day at low flows.

Comments: None.

4.4 Margin of Safety (MOS):

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of a explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Minimum Submission Requirements:

☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

☐ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.

☒ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.

☐ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River TMDL includes an explicit MOS derived by calculating the difference between the loading capacity at the mid-point of each of the five flow zones and the loading capacity at the minimum flow in each zone. The explicit MOS values are included in Tables 6 - 10 of the TMDL.

Comments: None.

4.5 Seasonality and variations in assimilative capacity:

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Minimum Submission Requirements:

☒ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: By using the load duration curve approach to develop the TMDL allocations, seasonal variability in fecal coliform loads are taken into account. Highest steam flows typically occur during late spring, and the lowest stream flows occur during the winter months.

Comments: None.

5. Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Minimum Submission Requirements:

☐ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).

☐ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:

☐ Approve ☒ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The State's submittal includes a general summary agencies involved in development of the TMDL.

COMMENTS: The Public Participation section mentions the parties involved in data collection and TMDL development, but little mention is made of opportunities the general public has had to provide input to the TMDL. Regular public board meetings is mentioned, however more detail regarding the number of meetings, as well as reference to newspaper publication of the public notice, posting on the State's website and 30-day public comment period should be included in the Public Notice section of the TMDL document.

DENR Response to Comment: Additional language was added to this section regarding the notice period. It was difficult to determine an exact number of meetings that this particular information may have been presented at. There have been approximately 30 board meetings held throughout the basin. Nearly every meeting includes an update on the TMDL activities in the basin, however some updates did not include information specific to the bacteria TMDL for segment 11. Perhaps the most important, although nearly impossible to quantify, is the public interaction that occurs in the field during data collection. Project coordinators visit with local landowners about varying aspects of the project on a daily basis, with many of their concerns and accounts taken into consideration during development of the TMDL.

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Minimum Submission Requirements:

☐ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.

☐ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL. http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.pdf

Recommendation:
☐ Approve ☒ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The Monitoring Strategy section makes no mention of future monitoring efforts.

Post-implementation monitoring will be necessary to assure the TMDL has been reached and maintenance of the beneficial use occurs.

COMMENTS: With a SD DENR ambient monitoring station (WQM 8) located within the impaired segment of the James River, we assume that monitoring will continue in this drainage. We recommend adding a brief description of future monitoring efforts in the TMDL document.

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct "what if" scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Minimum Submission Requirements:

☒ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, "reasonable assurance" is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of "reasonable assurance".

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The Restoration Strategy section of the TMDL document says that an implementation project was initiated in the James River basin in 2008. Since there are no significant point sources in the James River watershed there is no need to include a discussion of reasonable assurance in this TMDL document.

Comments: None.

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a "daily" loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.

Minimum Submission Requirements:

☒ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional "non-daily" terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River fecal coliform TMDL includes daily loads expressed as cfu/day. The daily TMDL loads are included in TMDL and Allocations section of the TMDL document.

COMMENTS: None.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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MAR 29 2011

DEPT. OF ENVIRONMENT AND
NATURAL RESOURCES,
SECRETARY'S OFFICE

Ref: 8EPR-EP

Steven M. Pirner
Secretary
South Dakota Department of Environment & Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

Re: TMDL Approvals
James River, Segment 11; Fecal Coliform; SD-JA-R-JAMES_11

Dear ~~Mr. Pirner~~ Steve:

We have completed our review of the total maximum daily loads (TMDLs) as submitted by your office for the waterbodies listed in the enclosure to this letter. In accordance with the Clean Water Act (33 U.S.C. 1251 *et. seq.*), we approve all aspects of the TMDLs as developed for the water quality limited waterbodies as described in Section 303(d)(1). Based on our review, we feel the separate elements of the TMDLs listed in the enclosed table adequately address the pollutants of concern as given in the table, taking into consideration seasonal variation and a margin of safety.

Thank you for submitting these TMDLs for our review and approval. If you have any questions, the most knowledgeable person on my staff is Vern Berry and he may be reached at 303-312-6234.

Sincerely,

Carol L. Campbell

Carol L. Campbell
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Enclosures

ENCLOSURE 1: APPROVED TMDLs

Fecal Coliform Total Maximum Daily Load Evaluation of James River, Yankton County, South Dakota (SD DENR, January 2011)

Submitted: 3/4/2011

1	Pollutant TMDLs completed.
1	Causes addressed from the 2010 303(d) list.
0	Determinations that no pollutant TMDL needed.

Segment: James River from Yankton County Line to mouth

303(d) ID: SD-JA-R-JAMES_11

Parameter/Pollutant (303(d) list cause): FECAL COLIFORM - 259

Water Quality Targets: <= 1000 cfu/100 mL geometric mean concentration; <= 2000 cfu/100 mL single sample maximum

Allocation*	Value	Units	Permits
WLA	0	CFU/DAY	
MOS	1.47E+13	CFU/DAY	
LA	4.65E+13	CFU/DAY	
TMDL	6.11E+13	CFU/DAY	

Notes: The loads shown represent the loads during the moist flow regime as defined by the load duration curve for the James River, segment 11 (see Figure 8 of the TMDL). The moist range flows are when significant differences occur between the existing loads and the target loads, and represent the flow regime that is most likely to be targeted for BMP implementation.

* LA = Load Allocation, WLA = Wasteload Allocation, MOS = Margin of Safety, TMDL = sum(WLAs) + sum(LAs) + MOS

ENCLOSURE 2

EPA REGION VIII TMDL REVIEW

TMDL Document Info:

Document Name:	**Fecal Coliform Bacteria Total Maximum Daily Load Evaluation of James River, Yankton County, South Dakota**
Submitted by:	**Cheryl Saunders, SD DENR**
Date Received:	**March 4, 2011**
Review Date:	**March 17, 2011**
Reviewer:	**Vern Berry, EPA**
Rough Draft / Public Notice / Final?	**Final**
Notes:	

Reviewers Final Recommendation(s) to EPA Administrator (used for final review only):

- ☒ Approve
- ☐ Partial Approval
- ☐ Disapprove
- ☐ Insufficient Information

Approval Notes to Administrator:

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the minimum submission requirements and TMDL elements identified in the following 8 sections:

1. Problem Description
   1.1.. TMDL Document Submittal Letter
   1.2. Identification of the Waterbody, Impairments, and Study Boundaries
   1.3. Water Quality Standards
2. Water Quality Target
3. Pollutant Source Analysis
4. TMDL Technical Analysis
   4.1. Data Set Description
   4.2. Waste Load Allocations (WLA)
   4.3. Load Allocations (LA)
   4.4. Margin of Safety (MOS)
   4.5. Seasonality and variations in assimilative capacity
5. Public Participation
6. Monitoring Strategy
7. Restoration Strategy
8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered "impaired." When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate.

A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody is able to assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant. A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describes the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA's minimum submission requirements relative to that section, a brief summary of the EPA reviewer's findings, and the reviewer's comments and/or suggestions. Use of the verb "must" in the minimum submission requirements denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review template is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 TMDL Document Submittal Letter

When a TMDL document is submitted to EPA requesting formal comments or a final review and approval, the submittal package should include a letter identifying the document being submitted and the purpose of the submission.

Minimum Submission Requirements.

☒ A TMDL submittal letter should be included with each TMDL document submitted to EPA requesting a formal review.

☒ The submittal letter should specify whether the TMDL document is being submitted for initial review and comments, public review and comments, or final review and approval.

☒ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment 11 fecal coliform TMDL was submitted to EPA for review and approval via an email from Cheryl Saunders, SD DENR on March 17, 2011. The email included the final TMDL document and a letter requesting approval of the TMDL.

COMMENTS: None

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Minimum Submission Requirements:

☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state's current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).

☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map.

☐ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: Segment 11 of the James River is a portion of the stream located in Yankton County, South Dakota and is part of the larger James River watershed in the Lower James sub-basin (HUC 10160011). The listed river segment has a total drainage area of approximately 250,000 acres in eastern South Dakota, and includes approximately 55 miles of the River from the Yankton County line to its mouth (i.e., to the confluence with Missouri River; SD-JA-R-JAMES_11). It is listed as a high priority for TMDL development.

The designated uses for the James River include warmwater semi-permanent fish life propagation waters, limited-contract recreation waters, irrigation, fish and wildlife propagation, recreation, and stock watering. The segment was listed on the 2010 303(d) list for fecal coliform and total suspended solids which are impairing the recreational use. The total suspended solids impairment will be addressed in a separate document.

COMMENTS: None.

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g., insufficient data were available to determine if this water quality criterion is being attained).

Minimum Submission Requirements:

☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).

☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the significant sources. Therefore, <u>all TMDL documents must be written to meet the existing water quality standards</u> for that waterbody (CWA §303(d)(1)(C)).

Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.

☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment addressed by this TMDL is impaired based on fecal coliform concentrations for limited contact recreation. South Dakota has applicable numeric standards for fecal coliform that may be applied to this River segment. The fecal coliform numeric standards being implemented in this TMDL are: a single sample maximum value of ≤ 2000 cfu/100 mL, and a 30-day geometric mean of ≤ 1000 cfu/ 100 mL. Discussion of additional applicable water quality standards for James River can be found on pages 7 and 8 of the TMDL.

South Dakota has adopted Escherichia coli criteria for the protection of the limited contact and immersion recreation uses. However, segment 11 of the James River does not require an E. coli TMDL because the parameter is not currently listed as a cause of impairment to this stream segment. Because the two indicators are closely related, the fecal coliform bacteria TMDL and associated implementation strategy described in the TMDL document are expected to address both the fecal coliform bacteria and possible future E. coli impairments. If a TMDL must be established for E. coli in the future, a separate TMDL document will be developed for this parameter.

COMMENTS: None.

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddeness, stream morphology, up-slope conditions and a measure of biota).

Minimum Submission Requirements:

☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained.

Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.

☐ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The water quality target for this TMDL is based on the numeric water quality standards for fecal coliform to achieve the limited contact recreation beneficial use for James River. The target for the James River segment included in the TMDL document is the fecal coliform standard expressed as the 30-day geometric mean of 1000 CFU/100 mL during the recreation season from May 1 to September 30. While the standard is intended to be expressed as the 30-day geometric mean, the target was used to compare to values from single grab samples. This ensures that the reductions necessary to achieve the target will be protective of both the acute (single sample value) and chronic (geometric mean of 5 samples) standards.

COMMENTS: None.

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each significant source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each significant source (or source category) should be identified and quantified to the maximum practical extent. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Minimum Submission Requirements:

☒ The TMDL should include an identification of all potentially significant point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.

☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.

☒ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified, characterized, and properly quantified.

☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The TMDL document identifies the land use in the watershed as predominately agricultural consisting of cropland (53%), grassland / rangeland (32%), developed (8%), hay (4%) and water/wetlands or forest land (3%).

Four point source discharges were evaluated for potential impacts to the listed segment of the James River. The city of Scotland in Bon Homme County discharges to a tributary of Dawson Creek. Dawson Creek discharges to the James River upstream of the impaired segment. Portions of Dawson Creek were listed for bacterial impairment and the City's contributions were addressed within the waste load allocations of the Dawson Creek TMDL.

The City of Tabor's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 40 kilometers upstream of the listed segment. From 2005 through 2010, the City only discharged twice. SD DENR determined that Tabor's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. The City of Tabor's discharge to Beaver Creek is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

The City of Utica is located approximately 20 kilometers upstream of the listed segment of the James River. SD DENR has issued the community of Utica a zero discharge permit for its wastewater. Therefore, the discharge from the City of Utica will not be given a WLA for this TMDL.

The City of Lesterville's wastewater treatment facility discharges to the upper portions of the Beaver Creek stream system approximately 35 kilometers upstream of the listed segment. SD DENR determined that Lesterville's discharge to an unnamed tributary of Beaver Creek was a sufficient distance upstream of this segment of the James River and would not impact the designated beneficial uses. The discharge from the City of Lesterville is not causing water quality impacts in the downstream segment of the James River and will not be given a WLA for this TMDL.

Nonpoint sources of fecal coliform bacteria in the lower James River come primarily from agricultural sources. Data from the 2010 National Agricultural Statistic Survey (NASS) and from the 2002 South Dakota Game Fish and Parks county wildlife assessment were utilized for livestock and wildlife densities, respectively. Animal density information was used to estimate relative source contributions of bacteria loads as summarized in Table 3 of the TMDL document.

Livestock in the basin are predominantly beef cattle and hogs. Livestock can contribute fecal coliform bacteria directly to the stream by defecating while wading in the stream. They may also contribute by defecating while grazing on rangelands, which then get washed off during precipitation events. Table 4, excerpted from the TMDL document below, allocates the sources for bacteria production in the watershed into three primary categories. Feedlot numbers were calculated as the sum of all dairy, hog, and the NASS estimate of beef in feeding areas. All remaining livestock were assumed to be on grass.

Table 4. Fecal Source Allocation for James River

Source	Percentage
Feedlots	43.1%
Livestock on Grass	54.7%
Wildlife	2.0%

There were approximately 1500 feeding operations screened within the Lower James River Assessment Project area. Fecal decay rates suggest that sources within 10 kilometers of the listed segment were most likely to contribute the largest portions of the load. Limiting the data set to lots located within this distance, (excluding areas evaluated for the Dawson Creek TMDL) produced a list of 242 feeding operations. These were evaluated based on their size and proximity to a waterway. The 242 lots were grouped into tiers for implementation assessment, with 37 of the feeding areas falling within the top tier. Twenty six of the feeding areas were located within the upstream segments watershed, however they were close enough to the listed segment that they may provide reductions that will aid in attainment of the water quality standard.

In addition to livestock feeding areas, livestock grazing may be a significant source. Approximately one third of the watershed is grassland; however the majority of this is located in close proximity to the stream corridors, increasing the chances that fecal material may be washed off into the streams. Fecal decay rates apply similarly to pastures as they do to feeding areas, suggesting that lots within the 10 kilometer distance of the river should be given a higher priority than those located further away. Applying the 10km buffer to the river and a 50 meter buffer to stream corridors to those areas upstream of site JR02, approximately 15,000 acres emerged as priority implementation sites.

COMMENTS: None.

4. TMDL Technical Analysis

TMDL determinations should be supported by a robust data set and an appropriate level of technical analysis. This applies to **all** of the components of a TMDL document. It is vitally important that the technical basis for **all** conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum LAs + \sum WLAs + MOS$$

Where:

TMDL = Total Pollutant Loading Capacity of the waterbody

LAs = Pollutant Load Allocations

WLAs = Pollutant Wasteload Allocations

MOS = The portion of the Load Capacity allocated to the Margin of safety.

Minimum Submission Requirements:

☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

☒ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation. In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.

☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

(1) the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
(2) the distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc…;
(4) present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
(5) an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.

☒ TMDLs must take critical conditions (e.g., steam flow, loading, and water quality parameters, seasonality, etc…) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

☐ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The technical analysis should describe the cause and effect relationship between the identified pollutant sources, the numeric targets, and achievement of water quality standards. It should also include a description of the analytical processes used, results from water quality modeling, assumptions and other pertinent information. The technical analysis for segment 11 of the James River TMDL describes how the fecal coliform loads were derived in order to meet the applicable water quality standards for the 303(d) impaired stream segment.

Data for James River segment 11 was collected during the Lower James watershed assessment from two sampling points. This data was used to supplement existing data from SD DENR ambient water quality monitoring site 460761. Sample data from the existing WQM site as well as the assessment project were utilized to evaluate the river. Flow data for the James River was retrieved from the United States Geological Survey (USGS) at one station near Scotland, SD. This USGS gauge is located immediately upstream of the impaired segment.

The TMDL loads and loading capacities were derived using the load duration curve (LDC) approach. The LDC was divided into 5 distinct flow regimes – high flow (≥ 2,790 cfs), moist flow (between 2,790 cfs and 450 cfs), midrange flow (between 450 cfs and 167 cfs), dry flow (between 167 cfs and 20 cfs), and low flow (< 20 cfs). The result is a flow-variable TMDL target across the flow regime shown in Figure 8 of the TMDL document. The LDC is a dynamic expression of the allowable load for any given daily flow. Loading capacities were derived from this approach at the 95th percentile of the observed fecal coliform bacteria load for each flow regime: high flow = 4.23E+14 CFU/day; moist flow = 6.11E+13 CFU/day; midrange flow = 1.04E+13 CFU/day; dry flow = 3.79E+12 CFU/day; and low flow = 4.65E+11 CFU/day.

COMMENTS: None.

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc…).

Minimum Submission Requirements:

☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.

☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River segment 11 TMDL data description and summary are included mostly in the Technical Analysis section of the document. Data for James River segment 11 was collected during the Lower James watershed assessment from two sampling points identified as site JOWJIMJR1 and LOWJIMJR2. This data was used to supplement existing data from SD DENR ambient water quality monitoring site 460761. Sample data from the existing WQM site as well as the assessment project were utilized to evaluate the river. A total of 341 samples were available for analysis from the TMDL segment. The TMDL is based on seasonal data collected from May through September in each year, limiting the data set to 200 samples.

Flow data was retrieved from the United States Geological Survey (USGS) at one station. The gauge data from Scotland (06478500) was used for the period of record for which sample data was available. This USGS gauge is located immediately upstream of the impaired segment. The contributing drainage area to the river downstream of this gauge is small when compared with the basin as a whole. Flows at this site may be considered representative of the segment and were used without modification. The period of record was limited to 1974 through the end of 2010 to match the same timeframe from which sample data was collected.

COMMENTS: None.

4.2 Waste Load Allocations (WLA):

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Minimum Submission Requirements:

☒ EPA regulations require that a TMDL include WLAs for all significant and/or NPDES permitted point sources of the pollutant. TMDLs must identify the portion of the loading capacity allocated to individual existing and/or future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.

☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: Four point source wastewater treatment facility discharges were evaluated for potential impacts to the listed segment of the James River: 1) the City of Scotland; 2) the City of Tabor; 3) the City of Utica; and 4) the City of Lesterville. SD DENR determined that the discharge from all four point sources would not impact the designated beneficial uses of segment 11 of the James River. Therefore, the WLAs for these facilities are zero.

COMMENTS: None.

4.3 Load Allocations (LA):

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Minimum Submission Requirements:

☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.

☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The Watershed Characteristics section of the TMDL explains that the landuse in the watershed is predominately agricultural consisting of cropland (53%), grassland / rangeland (32%), developed (8%), hay (4%) and water/wetlands or forest land (3%). Nonpoint sources of fecal coliform bacteria in James River come primarily from agricultural sources. Livestock in the basin are predominantly beef cattle and hogs. Therefore the majority of the loading capacity has been allocated to the nonpoint sources in the form of load allocations. Tables 6 - 10 include the load allocations at each of the flow regimes – 3.78E+14 CFU/day at high flows; 4.65E+13 CFU/day during moist flows; 7.92E+12 CFU/day at midrange flows; 2.49E+12 CFU/day during dry conditions; and 1.83E+11 CFU/day at low flows.

COMMENTS: None.

4.4 Margin of Safety (MOS):

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of a explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Minimum Submission Requirements:

☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

- ☐ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.
- ☒ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.
- ☐ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River TMDL includes an explicit MOS derived by calculating the difference between the loading capacity at the mid-point of each of the five flow zones and the loading capacity at the minimum flow in each zone. The explicit MOS values are included in Tables 6 - 10 of the TMDL.

COMMENTS: None.

4.5 Seasonality and variations in assimilative capacity:

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Minimum Submission Requirements:

☒ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: By using the load duration curve approach to develop the TMDL allocations, seasonal variability in fecal coliform loads are taken into account. Highest steam flows typically occur during late spring, and the lowest stream flows occur during the winter months.

COMMENTS: None.

5. Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Minimum Submission Requirements:
☒ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).

☒ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The State's submittal includes a summary of the public participation process that has occurred which describes the ways the public has been given an opportunity to be involved in the TMDL development process. The State has encouraged participation through public meetings in the watershed, and a website was developed and maintained throughout the project. The TMDL was available for a 30-day public notice period, which was published in two local newspapers, prior to finalization.

COMMENTS: None.

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Minimum Submission Requirements:

☒ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.

☒ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL. http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.pdf

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The Monitoring Strategy section makes no mention of future monitoring efforts.

Post-implementation monitoring will be necessary to assure the TMDL has been reached and maintenance of the beneficial use occurs.

COMMENTS: With a SD DENR ambient monitoring station (WQM 8) located within the impaired segment of the James River, we assume that monitoring will continue in this drainage.

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct "what if" scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Minimum Submission Requirements:

☒ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, "reasonable assurance" is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of "reasonable assurance".

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The Restoration Strategy section of the TMDL document says that an implementation project was initiated in the James River basin in 2008. Since there are no significant point sources in the James River watershed there is no need to include a discussion of reasonable assurance in this TMDL document.

COMMENTS: None.

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a "daily" loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.

Minimum Submission Requirements:

☒ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional "non-daily" terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

SUMMARY: The James River fecal coliform TMDL includes daily loads expressed as cfu/day. The daily TMDL loads are included in TMDL and Allocations section of the TMDL document.

COMMENTS: None.