Total Suspended Solids Total Maximum Daily Load Evaluation for the James River Segment 11 Yankton County, South Dakota

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SOUTH DAKOTA DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES

2022

SD-JA-R-JAMES_11 Total Suspended Solids Total Maximum Daily Load Summary

Entity ID:	SD-JA-R-JAMES_11
Location:	HUC Code: 101600112001, 101600112002, 101600112003, 101600112004,101600111806, 101600111807, 101600111901, 101600111902, 101600111903, 101600111904, a portion of 101600111805
Size of Watershed:	249,051 acres
Water body Type:	River/Stream
303(d) Listing Parameter:	Total Suspended Solids
Initial Listing Date:	2004 IR
TMDL Priority Ranking:	High
Listed Stream Miles:	53.5 miles
Designated Use of Concern:	Warmwater Semipermanent Fish Life Propagation
Analytical Approach:	Load Duration Curve Framework
Target:	Meet applicable water quality standards 74:51:01:48
Indicators:	Total Suspended Solids
Threshold Value:	< 90 mg/L mean concentration of a minimum of 3 samples within a 30 day period or maximum single sample concentrations of < 158 mg/L
High Flow Zone LA:	4736.4 T/day
High Flow Zone WLA:	0 T/day
High Flow Zone MOS:	526.3 T/day
High Flow Zone TMDL:	5262.6 T/day

Contents

1.0 Introduction

The intent of this document is to clearly identify the components of the TMDL, support adequate public participation, and facilitate the US Environmental Protection Agency (US EPA) review. The TMDL was developed in accordance with Section 303(d) of the federal Clean Water Act and guidance developed by US EPA. This TMDL document addresses the Total Suspended Solids (TSS) impairment for segment **SD-JA-R-JAMES_11** of the James River. This segment has been listed as non-supporting for the Warmwater Semipermanent Fish Life use and has been included on the 2022 303(d) list.

1.1 Watershed Characteristics

1.1.1 General

The portion of the James River addressed in this TMDL covers 53.5 miles of the approximately 700 mile long river. The river is unique in that it has the flattest gradient of any similar length river in North America, dropping a mere 135 feet over its 474 mile course through South Dakota. The entire James River drains over 12.8 million acres (20,000 square miles) of North and South Dakota.

The area drained only by segment SD-JA-R-JAMES_11, which spans from the northern boundary of Yankton County to the confluence with the Missouri River, covers 249,051 acres (Figure 1). The SD-JA-R-JAMES_11 watershed covers the entirety of ten HUC 12 units (101600112001, 101600112002, 101600112003, 101600112004,101600111806, 101600111807, 101600111901, 101600111902, 101600111903, 101600111904) and a portion of another (101600111805). The municipalities of Tabor and Utica lie completely within the SD-JA-R-JAMES_11 watershed. The city of Yankton lies at the southern edge of the watershed boundary with two small portions of the Yankton city limits falling inside the SD-JA-R-JAMES_11 watershed boundary.

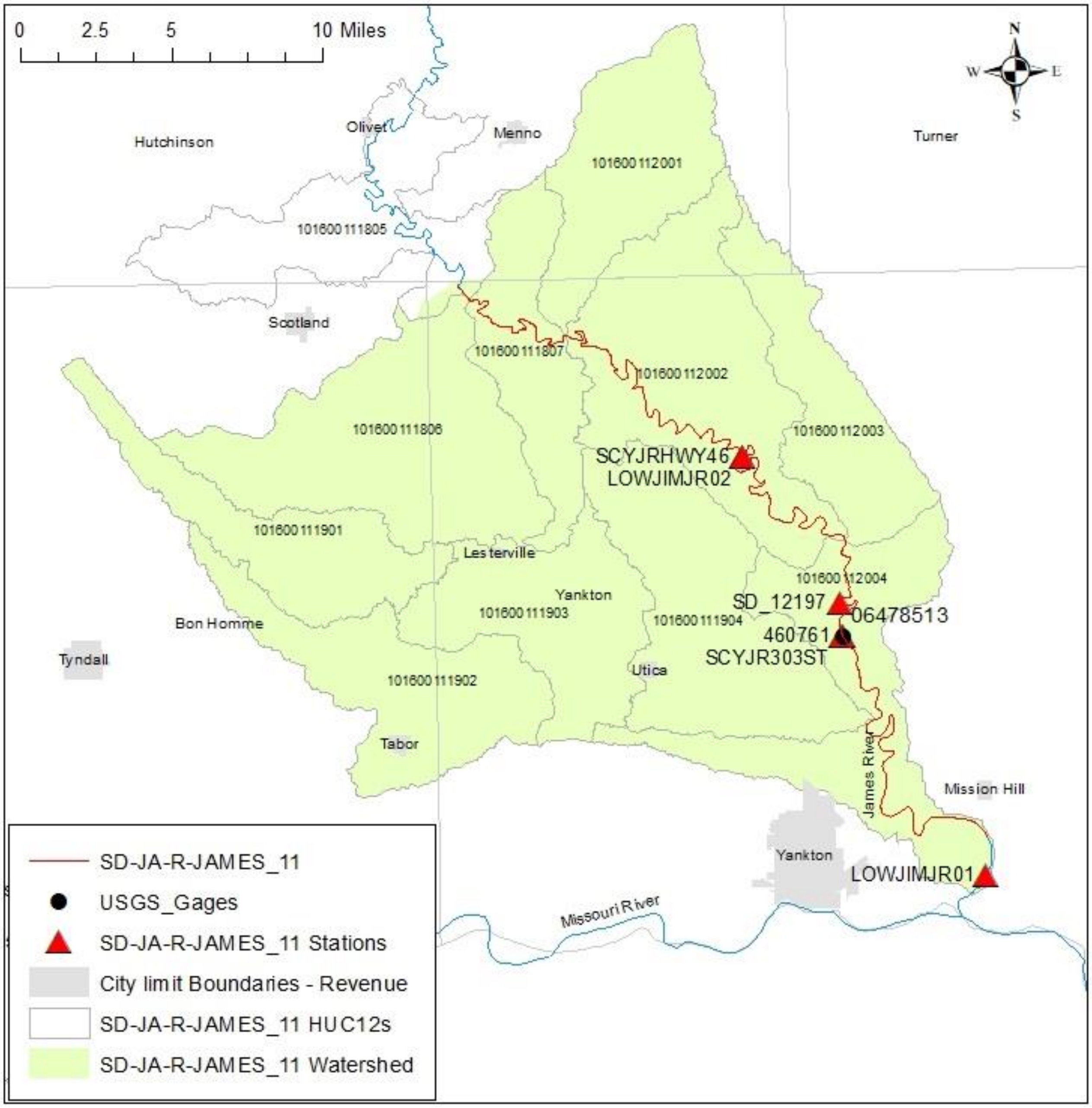

Figure 1. SD-JA-R-JAMES_11 watershed map showing monitoring station and stream gage locations.

1.1.2 Land Use

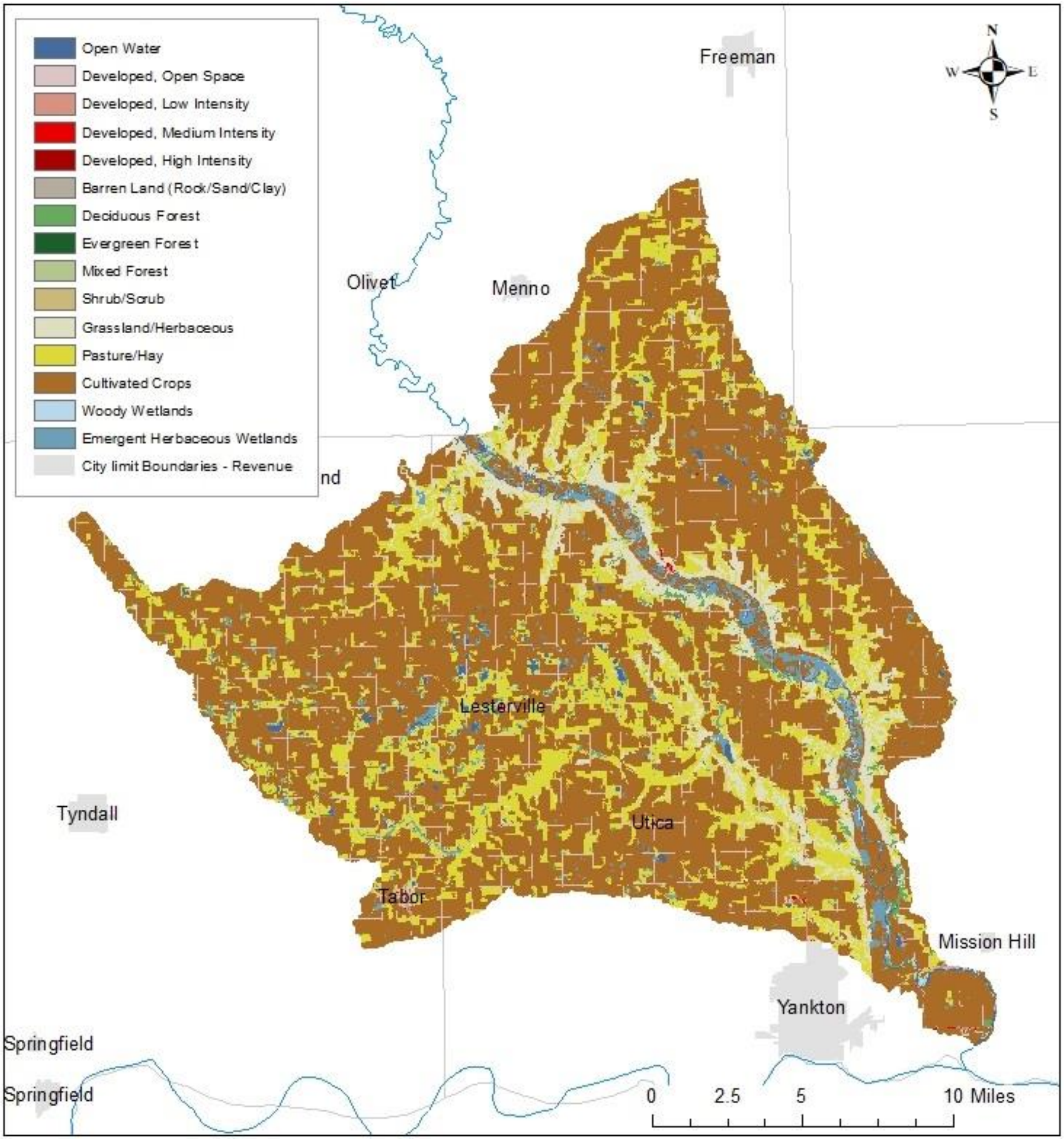

Figure 2. Map depicting land use in the SD-JA-R-JAMES_11 watershed (USDA National Agricultural Statistics Service, 2017).

The map in Figure 2 presents land use types in the SD-JA-R-JAMES_11 watershed. The percentage of the watershed area occupied by each use type is presented in Table 1. Land use is mostly agricultural in nature. Row crops such as corn and soybeans are the predominant land use type, occupying about 64% of the basin. These crops are typically grown on the more level terrain in the watershed. Pasture/hay and grassland/herbaceous areas are the second and third most common land use types in the basin (19.5% and 6.6%, respectively) and are typically used as pasture and hay production for livestock. These land use types are typically found on steeper terrain in the watershed, usually along tributaries to the James River. Developed land is mostly made up of roads and road ditches. Many roads in the watershed are gravel surfaced, and road ditches are typically planted in grass.

Table 1. Land use statistics for the SD-JA-R-JAMES_11 watershed (USDA National Agricultural Statistics Service, 2017).

Land Cover Type	Percent
Open Water	1.2%
Developed, Open Space	3.3%
Developed, Low Intensity	0.4%
Developed, Medium Intensity	0.1%
Developed, High Intensity	0.0%
Barren Land (Rock/Sand/Clay)	0.2%
Deciduous Forest	1.0%
Evergreen Forest	0.0%
Mixed Forest	0.1%
Shrub/Scrub	0.0%
Grassland/Herbaceous	6.6%
Pasture/Hay	19.5%
Cultivated Crops	64.3%
Woody Wetlands	0.2%
Emergent Herbaceous Wetlands	3.0%

1.1.3 Physiography

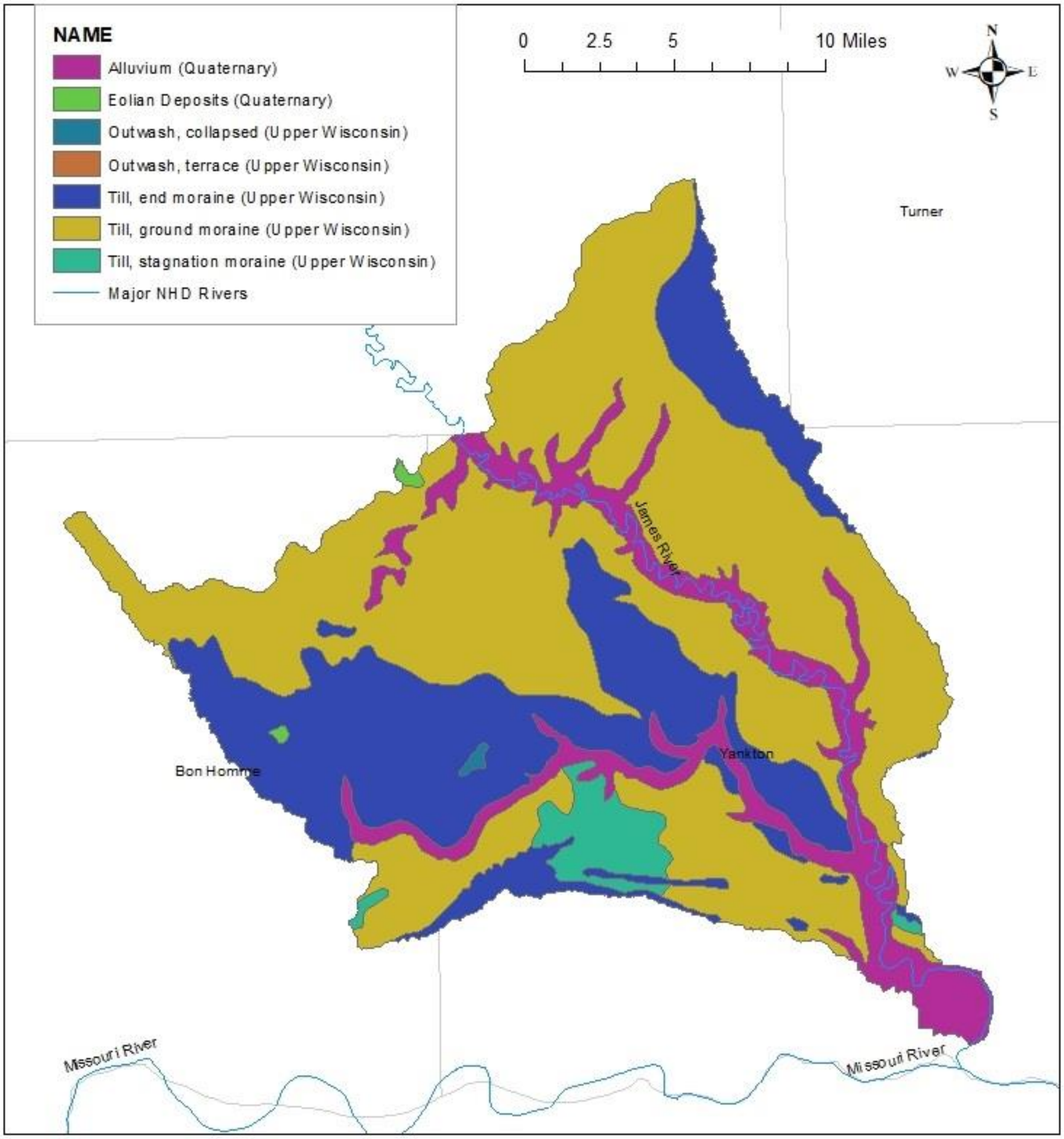

Figure 3. Geology map of the SD-JA-R-JAMES_11 watershed (Stoeser, et al., 2005).

The topography of South Dakota east of the Missouri River was shaped by successive periods of glaciation during the Pleistocene Epoch (10,000 – 2.5 million years ago). The most recent period of glaciation was the Late Wisconsin stage, which started about 35,000 years ago and ended 10,000 years ago.

Like much of eastern South Dakota, till is the most common glacial sediment in the SD-JA-R-JAMES_11 watershed. Glacial till consists of non-stratified, unsorted debris that has been transported and deposited directly by glacial ice. It is primarily composed of the rocks or sediments over which the ice traveled. In the SD-JA-R-JAMES_11 basin, till is composed primarily of a silty clay matrix, a variable proportion of sand and pebbles, and few boulders. The small grain size of glacial till in the watershed is a result of the predominance of shale in the bedrock of eastern South Dakota, from which the till originated (Johnson & McCormick, 2005).

Ground moraines are one form of glacial till. They have a flat to gently rolling surface formed of mostly till debris released by a glacier. In the SD-JA-R-JAMES_11 watershed, ground moraine is located in most of the area between Turkey Ridge and the James River as well as large areas north of the end moraines to the west of the James River (Johnson & McCormick, 2005). Ground moraines are the most common topographical feature in the SD-JA-R-JAMES_11 watershed (Figure 3).

Outwash deposits also occur in the SD-JA-R-JAMES_11 basin but are much less common than till. Outwash consists of sand and gravel with minor amounts of silt and clay that has been deposited by meltwater streams. Most outwash was deposited by meltwater in front of the glacier during advance and retreat, although outwash can also be originally deposited in or on a glacier, then lowered onto the till surface when the glacial ice melted (Johnson & McCormick, 2005).

Dune sand, classified as an eolian deposit, is present in the western portion of the watershed. The largest area of dune sand is located in northeastern Bon Homme County. This patch of dune sand is made up of fine to medium sand that is probably derived from the James River trench. It seldom reaches a thickness greater than 10 feet, and dune topography is only found on the thickest part of the deposit (Christensen, 1974).

Alluvium was formed when Holocene streams down-cut the late Wisconsin surface sediments and deposit clays, fine silts, and minor sand and gravel. Alluvium is found in the floodplains of the James River and its tributaries such as Beaver Creek, including the lowermost portion of the James River, which follows a meander channel abandoned by the Missouri River. Alluvium in tributaries of the James River is usually relatively thin, limited to a few feet thick. However, in the James River floodplain the alluvial thickness is about 20 feet thick (Johnson & McCormick, 2005).

1.1.4 Level 4 Ecoregions

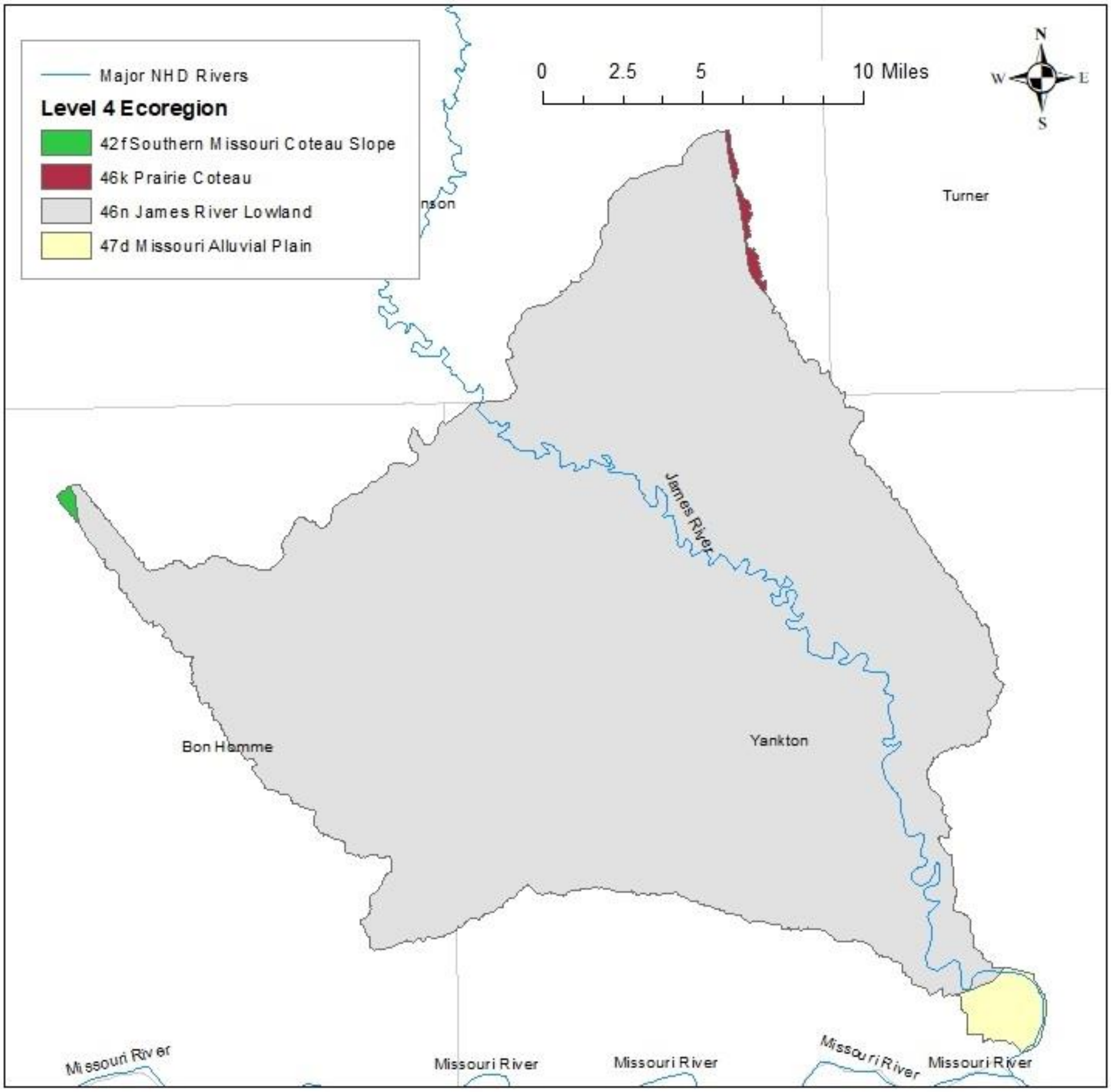

Figure 4. Map of Level 4 Ecoregions in the SD-JA-R-JAMES_11 watershed.

There are four Level 4 Ecoregions in the SD-JA-R-JAMES_11 watershed (Figure 4). The James River Lowlands (46n) occupies most of the watershed. The area at the downstream end of the watershed where the James River flows into the Missouri River is classified as Missouri Alluvial Plain (47d). A relatively small parcel of the Missouri Coteau Slope (42f) is found in the northwest corner of the watershed and a band of Prairie Coteau (46k) is located in the northeast corner.

2.0 Description of Applicable Water Quality Standards

Water quality standards are comprised of three main parts as defined in the Federal Clean Water Act (33 U.S.C. §1251 et seq.) and Administrative Rules of South Dakota (ARSD) Chapter 74:51:01:

- Beneficial Uses – Functions or activities that reflect waterbody management goals
- Criteria – Numeric concentrations or narrative statements that represent the level of water quality required to support beneficial uses
- Antidegradation – Additional policies that protect high quality waters

2.1 Beneficial Uses

Each individual waterbody within South Dakota is designated one or more of the following beneficial uses:

(1) Domestic water supply
(2) Coldwater permanent fish life propagation
(3) Coldwater marginal fish life propagation
(4) Warmwater permanent fish life propagation
(5) Warmwater semipermanent fish life propagation
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Fish and wildlife propagation, recreation, and stock watering
(10) Irrigation
(11) Commerce and industry

All waters (both lakes and streams) within South Dakota are designated the use of fish and wildlife propagation, recreation, and stock watering (9). All streams are designated the uses of (9), and (10) irrigation. Additional uses are designated by the state based on a beneficial use analysis of each waterbody.

SD-JA-R-JAMES_11 has been assigned the beneficial uses of: (5) warmwater semipermanent fish life, (8) limited contact recreation, (10) irrigation waters, and (9) fish and wildlife propagation, recreation, and stock watering. Upstream segments of the James River have been assigned the additional beneficial uses of (1) domestic water supply, and (4) warmwater permanent fish life.

Beaver Creek and Mud Creek, tributaries to SD-JA-R-JAMES_11, have been assigned the beneficial uses of (6) warmwater marginal fish life, (10) irrigation waters, and (9) fish and wildlife propagation, recreation, and stock watering.

The Missouri River is the downstream water that receives flow from SD-JA-R-JAMES_11 and has been assigned the beneficial uses of (1) domestic water supply, (4) warmwater permanent fish life, (7) immersion recreation, (8) limited contact recreation, (11) commerce and industry, (10) irrigation waters, and (9) fish and wildlife propagation, recreation, and stock watering

2.2 Water Quality Criteria

Table 2 lists the criteria that must be met for SD-JA-R-JAMES_11 to support the specified beneficial uses. When multiple criteria exist for a particular parameter, the most stringent criterion is used.

Table 2. South Dakota water quality criteria for SD-JA-R-JAMES_11.

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 74:51:01	mg/L 30 average March 1 to October 31	Warmwater Semipermanent Fish Life Propagation
	Equal to or less than the result from Equation 2 in Appendix A of Surface Water Quality Standards 74:51:01	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 74:51:01	mg/L Daily Maximum	
Dissolved Oxygen	≥5.0	mg/L	Warmwater Semipermanent Fish Life Propagation
Total Suspended Solids	≤90 (30-day mean) ≤158 (single sample)	mg/L	Warmwater Semipermanent Fish Life Propagation
Temperature	≤90	°F	Warmwater Semipermanent Fish Life Propagation
Escherichia coli Bacteria (May 1- Sept 30)	≤630 (30-day geometric mean) ≤1,178 (single sample)	count/100 mL	Limited Contact Recreation
Alkalinity ($CaCO_3$)	≤750 (30-day mean) ≤1,313 (single sample)	mg/L	Fish and Wildlife Propagation, Recreation, and Stock Watering
Conductivity	≤2,500 (30-day mean) ≤4,375 (single sample)	µmhos/cm @ 25° C	Irrigation Waters
Nitrogen, nitrate as N	≤50 (30-day mean) ≤88 (single sample)	mg/L	Fish and Wildlife Propagation, Recreation, and Stock Watering
pH (standard units)	≥6.5 to ≤9.0	units	Warmwater Semipermanent Fish Life Propagation
Solids, total dissolved	≤2,500 (mean) ≤4,375 (single sample)	mg/L	Fish and Wildlife Propagation, Recreation, and Stock Watering
Total Petroleum Hydrocarbon	≤10	mg/L	Fish and Wildlife Propagation, Recreation, and Stock Watering
Oil and Grease	≤10	mg/L	Fish and Wildlife Propagation, Recreation, and Stock Watering
Sodium Adsorption Ratio	≤10	ratio	Irrigation Waters
Undissociated hydrogen sulfide	≤0.002	mg/L	Warmwater Semipermanent Fish Life Propagation

Additional "narrative" criteria that may apply can be found in ARSD 74:51:01:05; 06; 08; and 09. These rules contain language that generally prohibits the introduction of materials into waterbodies causing pollutants to form, visible pollutants, undesirable odors and nuisance aquatic life which can all interfere with the biological integrity of a waterbody.

2.2.1 Total Suspended Solids Water Quality Criteria

South Dakota has adopted numeric TSS criteria for the protection of the coldwater permanent fish life propagation (2), coldwater marginal fish life propagation (3), warmwater permanent fish life propagation (4), warmwater semipermanent fish life propagation (5), and warmwater marginal fish life propagation (6) uses. Waters designated fish life propagation uses are to be maintained suitable for the propagation of fish life in order to protect aquatic life and the productivity of fisheries.

The South Dakota TSS criteria for the warmwater semipermanent fish life propagation beneficial use requires that 1) no single sample exceed 158 mg/L and 2) during a 30-day period, the mean of a minimum of 3 samples collected during separate weeks must not exceed 90 mg/L (ARSD 74:51:01:48). The numeric TSS criteria applicable to Segment 11 of the James River (SD-JA-R-JAMES_11) are the warmwater semipermanent fish life propagation values listed in Table 2.

TMDLs must also consider downstream water quality standards. In this case, SD-JA-R-JAMES_11 flows into the Missouri River, which has different beneficial uses than the James River and thus is subject to different criteria. The TSS criteria associated with the warmwater permanent fish life propagation (4) use of the Missouri River are identical to the warmwater semipermanent fish life propagation values listed in Table 2; therefore, this TMDL will also be protective of downstream water quality standards.

2.3 Antidegradation

This TMDL document is consistent with South Dakota antidegradation policies (ARSD 74:51:01:34) because it provides recommendations and establishes pollutant limits at water quality levels necessary to meet criteria and fully support existing beneficial uses.

3.0 Numeric TMDL Target

TMDLs are required to identify a numeric target to measure whether the applicable water quality standard is attained. A maximum allowable load, or TMDL, is ultimately calculated by multiplying this target with a flow value and a unit conversion factor. Generally, the pollutant causing the impairment and the parameter expressed as a numeric water quality criteria are the same. In these cases, selecting a TMDL target is as simple as applying the numeric criteria. Occasionally, an impairment is caused by narrative water quality criteria violations or by parameters that cannot be easily expressed as a load. When this occurs, the narrative criteria must be translated into a numeric TMDL target (e.g., nuisance aquatic life translated into a total phosphorus target) or a surrogate target established (e.g., a pH cause addressed through a total nitrogen target) and a demonstration should show how the chosen target is protective of water quality standards.

As seen from Table 2, there are two numeric TSS criteria for TMDL target consideration. When multiple numeric criteria exist for a single parameter, the most stringent criterion is selected as the TMDL target. The numeric TMDL target for TSS for SD-JA-R-JAMES_11 is 90 mg/L, which is based on the 30-day mean threshold for TSS. This criterion is more stringent than the single sample maximum for TSS of 158 mg/L.

4.0 303(d) Assessment

Waters are assessed on a biennial basis to determine whether water quality standards are being met. South Dakota Department of Agriculture and Natural Resources (SDDANR) evaluates monitoring data using procedures (Table 3) outlined in the Integrated Report to determine if: 1) one or more beneficial use is not supported, 2) the waterbody is impaired, and 3) it should be placed on the next 303(d) list. Waterbodies impaired by pollutants require TMDLs. Table 3 presents South Dakota's assessment method for TSS and describes what constitutes a minimum sample size and how an impairment decision is made.

Table 3. Assessment Methods for Determining Support Status for Section 303(d) (SD DANR, 2022).

IR Assessment Methods		
Description	**Minimum Sample Size**	**Impairment Determination Approach**
FOR CONVENTIONAL PARAMETERS (such as dissolved oxygen, TSS, *E. coli* bacteria, pH, water temperature, etc.)	STREAMS: a minimum of 20 samples (collected on separate days) for any one parameter are required within a waterbody reach. A minimum of 10 chronic (calculated) results are required for chronic criteria (30-day averages and geomeans). LAKES: Reference the lake listing methodology starting on page 31 of the 2022 IR.	STREAMS: >10% exceedance for daily maximum criteria (acute) or >10% exceedance for 30-day average criteria OR when overwhelming evidence suggests nonsupport/support LAKES: Reference the lake listing methodology starting on page 31 of the 2022 IR..

The assessment method mentions chronic criteria. Although this term does not directly relate to TSS, the assessment method is organized together with other conventional parameters in the Integrated Report to show that a consistent approach is applied to many pollutants. In this limited definition, chronic refers to the 30-day mean. Different assessment methods have been established for toxic parameters and mercury in fish tissue.

James River segment 11 was included on the 2004 303(d) list of impaired waters because of multiple instances where the mean of 3 or more samples collected in a 30-day period exceeded the chronic threshold of 90 mg/L, and because greater than 10% of the TSS samples exceeded the single sample maximum threshold of 158 mg/L.

5.0 Potential Sources

5.1 Point Sources

There are several documented point source discharges within the watershed of impaired segment (SD-JA-R-JAMES_11). This includes three permitted National Pollutant Discharge Elimination Systems (NPDES) that may directly contribute TSS. These potential sources of TSS are documented here to provide a watershed scale account of the system's operational characteristics (discharge permits, etc.), potential impact and Waste Load Allocation consideration.

The Town of Lesterville (permit number: SDG922373) is authorized to discharge to an unnamed tributary of Beaver Creek, which ultimately flows into SD-JA-R-JAMES_11. The Waste Water Treatment Facility (WWTF) consists of a gravity flow pond collection system. Annual discharges from the facility are infrequent and occur intermittently. Given the location of this facility, any discharge with suspended sediment that reaches Beaver Creek is expected to be impounded by Beaver Lake before having an impact on SD-JA-R-JAMES_11. Refer to the current permit and statement of basis for more information regarding the facilities operation characteristics:
https://danr.sd.gov/npdespdf/SDG922373/Lesterville%20Permit%202021.pdf

https://danr.sd.gov/npdespdf/SDG922373/Lesterville%20SOB.pdf

The Town of Tabor (permit number: SD0022209) is authorized to discharge to an unnamed tributary of Beaver Creek, which ultimately flows into SD-JA-R-JAMES_11. The WWTF consists of two stabilization ponds operated in series and two artificial wetlands operated in parallel. Annual discharges from the facility are infrequent and occur intermittently. Given the location of this facility, any discharge with suspended sediment that reaches Beaver Creek is expected to be impounded by Beaver Lake before having an impact on SD-JA-R-JAMES_11. Refer to the current permit and statement of basis for information regarding the facilities operation characteristics:
https://danr.sd.gov/npdespdf/SD0022209/Tabor%20Permit.pdf

https://danr.sd.gov/npdespdf/SD0022209/Tabor%20SOB.pdf

The Town of Utica (permit number: SDG825844) is not authorized to discharge to an unnamed tributary of Beaver Creek, which ultimately flows into SD-JA-R-JAMES_11. The WWTF consists of a gravity flow pond collection system. Given the location of this facility, any discharge with suspended sediment that reaches Beaver Creek is expected to be impounded by Beaver Lake before having an impact on SD-JA-R-JAMES_11. Refer to the current permit and statement of basis for information concerning the facilities operation characteristics:
https://danr.sd.gov/npdespdf/SDG825844/Utica%20Permit%202021.pdf

https://danr.sd.gov/npdespdf/SDG825844/Utica%20SOB.pdf

Infrequent and intermittent discharges from the three permitted facilities occur greater than 10 stream miles from SD-JA-R-JAMES_11. The indirect TSS load contribution from these permitted facilities is expected to have little or no impact on the TMDL. As a result, a waste load allocation of zero was assigned to the TMDL.

There are permits within the James River segment 10 drainage that are located on tributaries that flow to James River segment 10. There permits include Menno WTP (permit number: SDG860015), City of Menno (permit number: SD0020087), City of Scotland (permit number: SD0022853), and City of Tripp (permit number: SD0022403). These permits are not expected to impact SD-JA-R-JAMES_11 and will not be discussed further in this report.

There are six active stormwater construction permits within the SD-JA-R-JAMES_11 watershed (Table 13 in Appendix B). Several of the permits (5 of the 6) have project end dates that precede the publication of this report. The status of these construction projects is currently unknown, however, they are identified here because permits are considered active by SD DANR until the permitted party opts to close the permit. All of these permits authorize discharge of stormwater, but do not authorize discharge of non-stormwater. The permits also stipulate that they do not authorize discharge if the discharge will cause or have the reasonable potential to cause or contribute to violations of surface water quality criteria. As long as these stormwater construction projects comply with general permit requirements ensuring discharges are minimal and temporary loading events, the TMDL assumes their TSS contribution will be minimal, and unless found otherwise, no additional permit conditions are required by this TMDL. The assumption that discharges are minimal and temporary applies to future permits, as well, give that these permits represent temporary facilities and others are likely to be permitted in the future. A wasteload allocation of zero was assigned to these point sources.

Two small portions of the Yankton city limits extend into the SD-JA-R-JAMES_11 (Figure 1). All storm sewer outfalls located in these areas flow to the Missouri River drainage and not into the James River drainage. Because these outfalls do not flow to the James River segment 11, a wasteload allocation of zero was assigned to them.

5.2 Non-point Sources

Typical non-point sources of TSS in agricultural watersheds such as the James River are the bed and banks of streams and surface runoff from croplands, particularly row crops that are widely spaced such as corn and soybeans. Erosion of the stream bed and banks occurs naturally, but may be exacerbated by anthropogenic activities. Bridges, culverts, and other road crossings may also contribute sediment to streams by directing flow into stream banks where a meander occurs immediately downstream from the bridge or culvert. Areas where flow is directed into a stream bank are more likely to have failing banks, and therefore elevated sediment contributions to the stream.

Hydrologic changes due to changing climatic conditions or streamflow alterations may cause stream channels to adjust via widening and/or degradation. In neighboring Minnesota, the installation of subsurface drainage, "drain tile", and the removal of upland depressions and wetlands has resulted in increased streamflow and therefore increased erosive force on river banks and beds (Schottler, et al., 2013). The extent and location of subsurface drainage in the James River watershed is not currently known but drain tile outlet pipes running to the James River and its tributaries have been observed at several locations and it is presumed that drain tile is used extensively in the watershed.

The management of croplands can also impact TSS concentrations in streams. Extensive tillage and farming of areas near waterways results in higher sediment contributions to streams and can undermine the structural integrity of stream banks. Sediment contributions from the uplands may result in stream bank aggradation, where the elevation of the stream bed rises due to sediment deposition. Agricultural practices that reduce tillage, leave crop residue in place throughout the winter months, and utilize buffer strips of native vegetation along waterways can reduce sediment contribution to streams.

5.3 Natural Sources

Natural sources of TSS in the SD-JA-R-JAMES_11 watershed account for a proportion of TSS in the stream. Natural sources include the uplands and the bed and banks of the stream absent human influence. Two approaches to determining the natural TSS contribution to SD-JA-R-JAMES_11 are presented below. The results from these analyses are provided as a reference to understand natural TSS conditions in SD-JA-R-JAMES_11. According to the estimates described below, natural sources contribute approximately 4.4% to 22.5% of the existing TSS observed in SD-JA-R-JAMES_11. Natural sources are not assigned a separate allocation in the TMDL but rather the allowable natural loading is combined with human-caused nonpoint sources and represented in the LA. Because natural loading generally cannot be reduced through the implementation of Best Management Practices (BMPs), any reductions assigned to the LA are expected to be realized through restoration activities associated with human-caused nonpoint sources.

Table 7 presents information regarding the suspended sediment load at the Q1.5 discharge, or the 1.5 recurrence interval discharge value, for SD-JA-R-JAMES_11 in comparison to values developed by researchers that represent sediment loads for stable stream channels at the Q1.5 discharge. The suspended sediment load from 2009-2020 for SD-JA-R-JAMES_11 at the Q1.5 discharge at station 460761 is 0.0175 T/d/km^2 while the median value of stable channels in Ecoregion 46 is 0.00393 T/d/km^2 (Klimetz, Simon, & Schwartz, 2009). Dividing the median sediment load at the Q1.5 discharge from a stable stream in Ecoregion 46 by the TSS load at the Q1.5 discharge at 460761 provides a proportional estimate of the sediment load in SD-JA-R-JAMES_11 that results from a stable, healthy stream channel in Ecoregion 46. The result of this calculation is 22.5%, indicating that less than one quarter of the mean annual sediment load in SD-JA-R-JAMES_11 is accounted for by natural processes that would be present in a stable channel.

Table 8 presents information regarding the mean annual suspended sediment load for SD-JA-R-JAMES_11 in comparison to reference mean annual suspended sediment load values developed by researchers that represent stable stream channels. The mean annual load for 2010-2020 for SD-JA-R-JAMES_11 at station 460761 is 8.06 T/Y/km^2 while the median value of stable channels in Ecoregion 46 is 0.351 T/Y/km^2 (Klimetz, Simon, & Schwartz, 2009). Dividing the mean annual sediment load from a stable stream in Ecoregion 46 by the mean annual TSS load at 460761 provides a proportional estimate of the sediment load in SD-JA-R-JAMES_11 that results from a stable, healthy stream channel in Ecoregion 46. The result of this calculation is 4.4%, indicating a very small proportion of the mean annual sediment load in SD-JA-R-JAMES_11 is accounted for by natural processes that would be present in a stable channel.

6.0 Data Collection and Results

6.1 Water Quality Data and Discharge Information

Data relevant to SD-JA-R-JAMES_11 TSS conditions were compiled to produce this TMDL report. TSS data sources are summarized in Table 4 and are described further below. Figure 1 shows the location of the monitoring stations.

Table 4. Summary table of total suspended solids samples collected from SD-JA-R-JAMES_11 ordered from upstream to downstream.

Station	Project	Samples (n)	Date Range	TSS max (mg/L)	TSS min (mg/L)	TSS mean (mg/L)	TSS median (mg/L)	Single Sample Max % Exceedance @ 158 mg/L
LOWJIMJR02	Lower James River Watershed Assessment	26	2006-2007	292	8	143	144	46%
SCYJRHWY46	Volunteer Monitoring	2	2019-2020	240	92	166	166	50%
SD_12197	DENR-SD RIVER AND STREAMS 2018/2019	1	2019	264	264	264	264	100%
SCYJR303ST	Volunteer Monitoring	2	2019-2020	202	178	190	190	100%
460761	Ambient Surface Water Quality Monitoring	559	1974-2020	1050	1	106	78	24%
LOWJIMJR01	Lower James River Watershed Assessment/Central South Dakota Water Quality Monitoring	48	2006-2020	820	4	205	168	56%

The state of South Dakota operates a network of stream water quality monitoring sites throughout the state with the Ambient Surface Water Quality Monitoring (WQM) network. This network has one site along SD-JA-R-JAMES_11, station 460761. A total of 559 samples were collected at station 460761 between 1974 and 2020.

Stations LOWJIMJR01 and LOWJIMJR02 were sampled for the Lower James River Watershed Assessment Project from 2006-2007. LOWJIMJR01 was also sampled by the Central South Dakota Water Quality Monitoring project from 2016-2020. A total of 48 and 26 TSS samples have been collected at LOWJIMJR01 and LOWJIMJR02, respectively.

Stations SCYJR303ST and SCYJRHWY46 were sampled by volunteer water quality monitors with SD DANR technical support. SCYJR303ST is co-located with station 460761. Volunteers collecting samples at these locations are provided technical assistance and oversight from SD DANR to ensure data quality. Each of these stations were sampled for TSS twice, once in 2019 and once in 2020.

Station SD_12197 was sampled one time in 2019 as part of the SD DANR River and Streams project, which was designed to provide data for statewide 305(b) assessments.

A total of 10 sample sets composed of at least three samples collected within 30-day periods corresponding to a calendar month across a minimum of three weeks were collected at these sites between 1974 and the end of 2020. A total of 9 of those sample sets exceeded the 30-day mean criterion of 90 mg/L for an exceedance rate of 90%.

All sample data presented in Table 4 was collected using with methods in accordance with the South Dakota Standard Operating Procedures for Field Samplers developed by the SD DANR Watershed Protection Program and approved by USEPA Region VIII. TSS samples were sent to the State Health Laboratory in Pierre, SD for analysis. All sample data can be found in Appendix A.

The United States Geological Survey (USGS) operates a stream gage (06478513) that is the sole source of stream flow data for this TMDL. This gage is co-located with water sampling stations 460761 and SCYJR303ST.

6.2 Data Analysis

6.2.1 Water Quality Data

Figure 5 shows TSS sample concentrations from stations on SD-JA-R-JAMES_11. Sample concentrations in SD-JA-R-JAMES_11 range from < 3 mg/L to 1,050 mg/L.

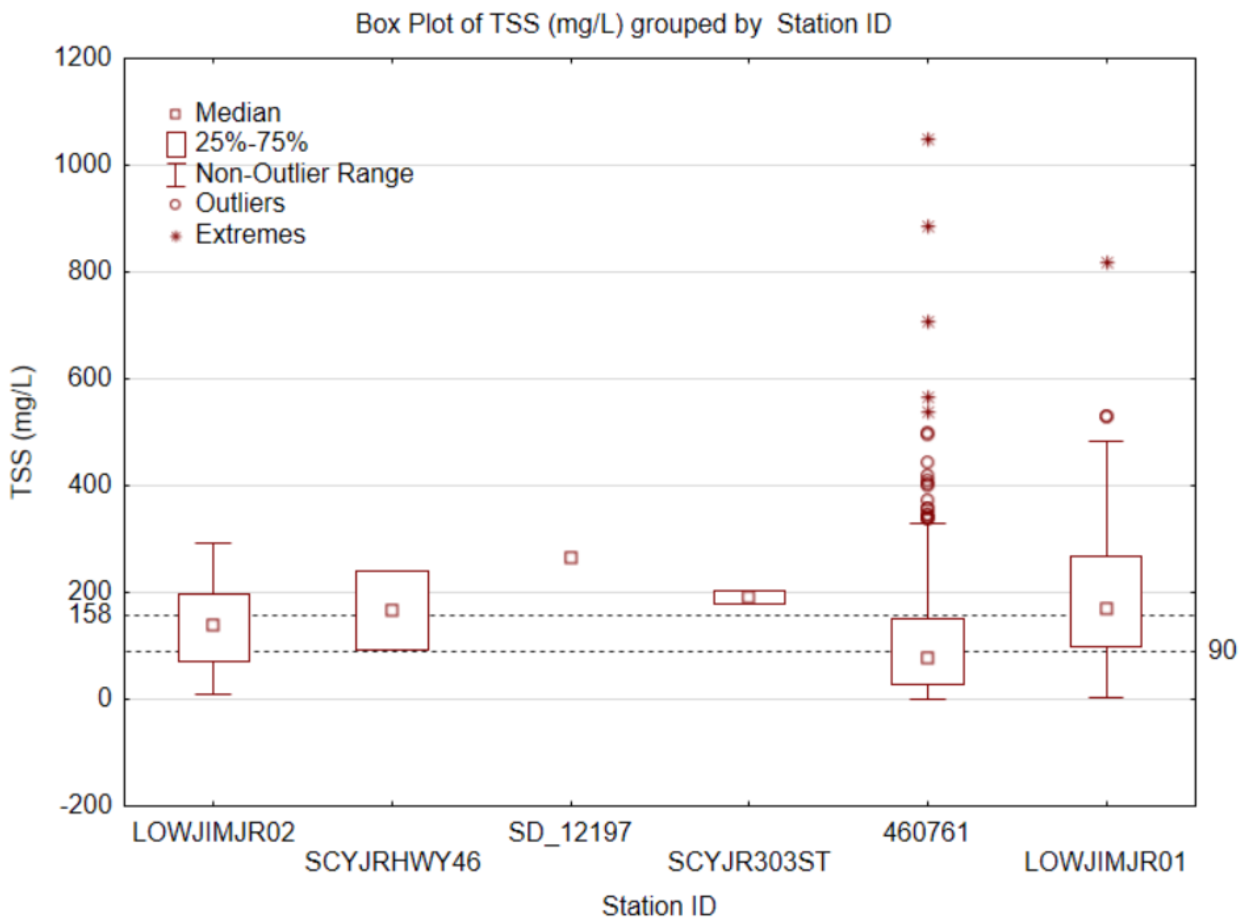

Figure 5. Box plot of SD-JA-R-JAMES_11 TSS concentration grouped by station in order from upstream to downstream (left to right).

Station 460761 had the lowest mean and median TSS concentrations of all stations, but also had the most extreme concentrations. The extreme TSS concentrations are likely explained by the greater number of samples and longer period of record relative to other stations. Sampling at this station began in 1974, while the stations from the Lower James River Watershed Assessment project were not sampled until 2006. Sampling at station 460761 has had many more opportunities to catch extreme concentrations than sampling efforts at other stations.

The relatively lower mean and median values may be explained by an increase in TSS concentration at this station over time. Table 5 shows TSS concentration statistics for station 460761 grouped by decade. Despite median TSS values remaining stable in the 1990s and 2000s, a general pattern of increasing TSS concentration over time can be observed.

Table 5. TSS statistics for station 460761 grouped by decade.

Decade	Mean	Median	n
1970s	86.3	58	71
1980s	82.4	72	96
1990s	111.6	76	118
2000s	93.4	76	117
2010s	126.4	97	140
2020	202.2	204	17

Lower TSS concentrations at 460761 may also be explained by the location of the station within SD-JA-R-JAMES_11. Stations located further upstream appear to exhibit lesser TSS concentrations than downstream stations. Station LOWJIMJR01, the most downstream station in the segment, had the highest mean and median TSS concentration of any station with more than 2 samples.

Table 6. TSS statistics for samples collected in 2006-2007 at stations LOWJIMJR01 and LOWJIMJR02.

2006-2007	Mean	Median
LOWJIMJR01	196	186
LOWJIMJR02	139	140

The discrepancy between TSS concentration at upstream and downstream stations is evident when comparing samples collected at LOWJIMJR01 and LOWJIMJR02 during the Lower James River Watershed Assessment project that was conducted in 2006-2007 (Table 6). Comparing sample data collected during the same period of record accounts for changing TSS dynamics over time. Even when accounting for the trend of increasing TSS concentration in the segment, TSS concentration at a downstream station (LOWJIMJR01) was notably higher than TSS concentration at an upstream station (LOWJIMJR02).

6.2.2 Rating Measurements

A rating curve plotting gage height on the y-axis and discharge on the x-axis may be used to further investigate the history of channel stability of the James River at Yankton, SD (Figure 6). Gage height and discharge data were collected simultaneously at USGS gage 06478513 at Yankton by the USGS for the purpose of developing rating curves to estimate stream flow. Shifts in the relationship between gage height and discharge indicate a shifting river channel. For example, if the gage height increases but discharge stays constant, the river channel has aggraded (filled in with sediment). Conversely, if the gage height decreases but discharge remains constant, the river channel has degraded due to channel scouring and is now lower in elevation. This method is effective for assessing channel stability over time (Klimetz, Simon, & Schwartz, 2009).

Figure 6 shows a general trend of channel bed degradation in the James River at Yankton. Beginning in the 1980s and continuing to the 2010s, channel bed elevation dropped consistently. Measurements from the 2020's include a single baseflow measurement indicating aggradation, but measurements at higher flow show a pattern similar to previous decades. The consistency of channel degradation over the last 40 years indicates a potentially unstable channel bed which has eroded several feet over the period of record. The sediment mobilized during downcutting of the channel is a likely source of TSS.

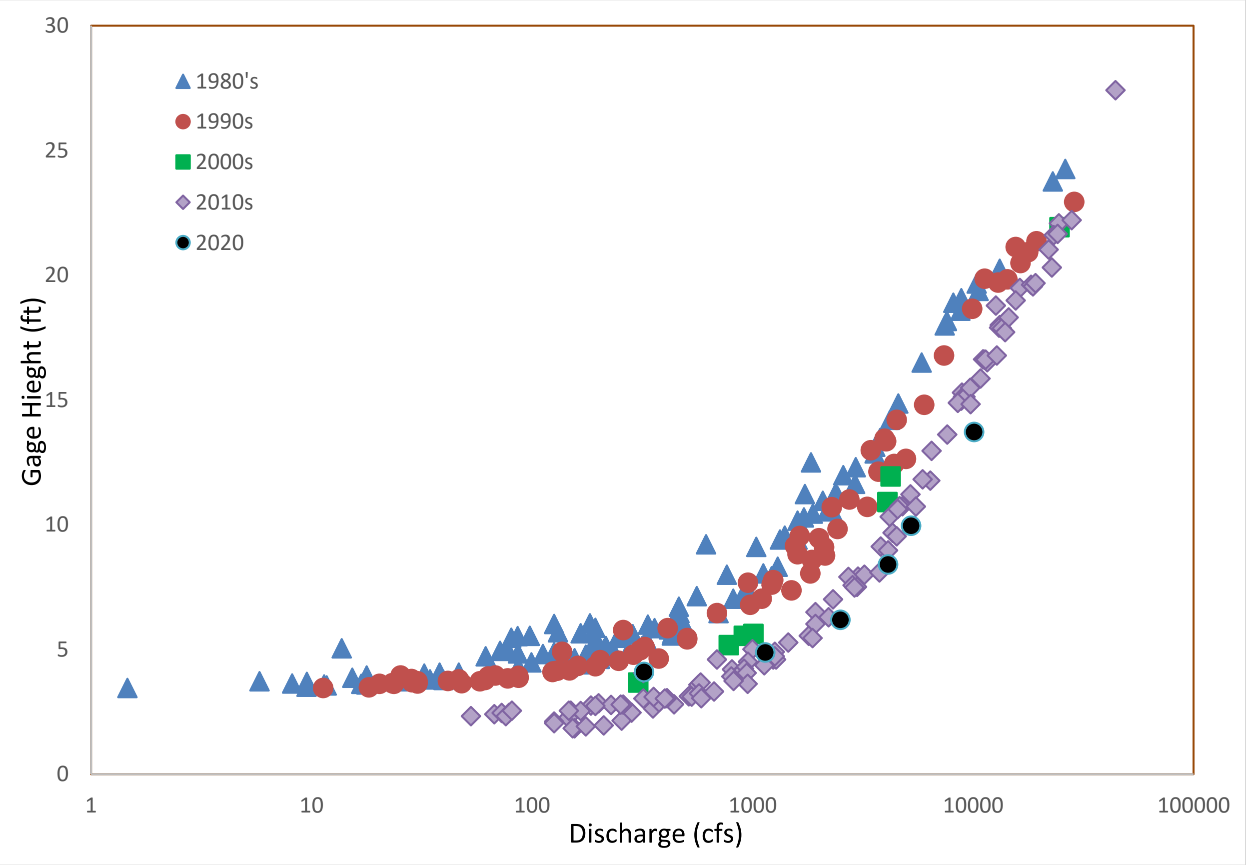

Figure 6. Stage/discharge relationship from USGS stream gage 06478513 at Yankton.

6.2.3 TSS Rating Curve

To investigate the relationship between TSS and flow in SD-JA-R-JAMES_11, a suspended sediment rating curve was developed for station 460761, where suspended sediment load is plotted against flow. Flow is plotted on the x-axis in cubic meters per second, and TSS load (TSS concentration times flow) is plotted on the y-axis in metric tonnes. A best fit line is applied, and the resulting rating equation is used to examine channel stability and sediment loading dynamics.

Suspended sediment concentration (SSC) data, rather than TSS, is typically used to develop a suspended sediment rating curve. The laboratory protocol for analyzing TSS is known to bias against sand sized particles (>63 µm) during sub-sampling (Gray, Glysson, Turcois, & Schwarz, 2000), resulting in underestimates of the sediment load. A general equation is available to convert TSS data to SSC, but it is not recommended for data from individual stations if paired TSS and SSC are not available (Glysson, Gray, & Conge, 2000). No SSC data is available for SD-JA-R-JAMES_11, so it was not possible to develop an equation representing the relationship between the two methods. TSS data was used in place of SSC data for the following analysis to aid in characterization of the sediment dynamics of SD-JA-R-JAMES_11. Because caution should be used when using TSS in place of SSC with these methods, they will not be used for calculating the TMDL but rather to provide supporting information regarding sediment conditions in SD-JA-R-JAMES_11.

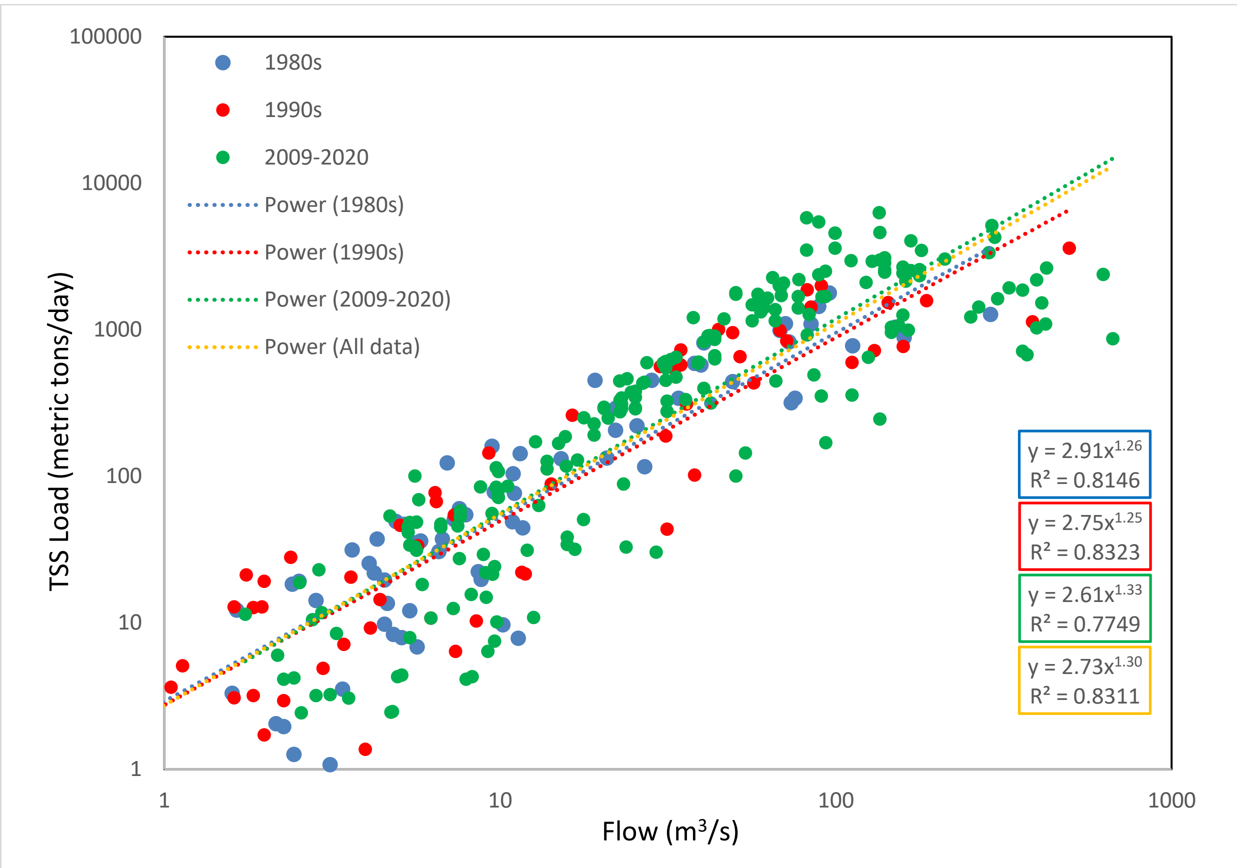

Figure 7. TSS rating curve for station 460761.

The coefficient and exponent of the rating equation can be used to determine how the stream is transporting sediment at various flow conditions. Klimetz et al. (2009) developed SSC rating relationships for streams in Level III Ecoregion 46 and reported median values for rating equation coefficients and exponents. They then separated stream segments into stable and unstable groups based on Rapid Geomorphic Assessment (RGA) scores and calculated median coefficient and exponent values for the two groups. The difference between the median of the two groups was shown to be statistically significant at $p = 0.01$ for coefficient values and at $p < 0.05$ for exponent values. The median values of the coefficient and exponent for stable streams may be considered "reference" conditions for streams in Ecoregion 46.

The coefficient of the rating equation reflects how the river transports sediment at low flows, where lower coefficient values mean lower sediment transport rates at low flows. Streams of the Great Plains ecoregions, where the channel boundary is typically composed of fine sediments that are easily entrained and transported at low flows, typically have higher coefficient values than mountain streams, where the channel boundary is composed of coarser materials that are not easily mobilized. For comparison, the median coefficient value for all streams in Ecoregion 46 was 3.51, while the median coefficient for Ecoregion 17 – Rocky Mountains was 0.17 (Klimetz, Simon, & Schwartz, 2009). The coefficient value for all TSS data at station 460761 is 2.73. This value is similar to the median value for stable Ecoregion 46 streams of 2.71. According to this analysis, the James River at station 460761 transports sediment during low flow conditions similarly to a reference quality stream in Ecoregion 46. The coefficient value has remained relatively stable with a slight decreasing trend since 1980. Coefficient values range from 2.91 in the 1980s to 2.61 in the period from 2009 to 2020. When directly comparing these results, it should be noted that the result for station 470761 was developed using TSS sample data, while Klimetz's results for Ecoregion 46 were developed using SSC sample data.

The exponent of the rating equation provides insight into the response of channels during periods of high flow. Higher exponents tend to be found in streams of mountainous regions (2.07 for Ecoregion 17 – Rocky Mountains), where large suspended sediment loads are common at high flows due to high channel slopes and flow velocities. Lower exponent values are associated with regions of less physical relief, for example 1.07 for all Ecoregion 46 streams. The exponent value for all data at station 460761 is 1.30. This value exceeds both the median value for stable streams in Ecoregion 46 of 1.02 and the median value for unstable Ecoregion 46 streams of 1.16. The exponent value for station 460761 is similar to the 75th percentile value for unstable streams of 1.34. This figure indicates an unstable stream channel that transports large sediment loads during high flow conditions compared to reference quality Ecoregion 46 streams. Exponent values were similar in the 1980s and 1990s at 1.26 and 1.25, respectively. In the period ranging from 2009-2020 the exponent value increased to 1.33, indicating a trend of transporting more sediment at high flow over time.

6.2.4 Total Suspended Solids Yield at Q1.5 Discharge Interval

Historically, stream researchers had assumed "bankfull discharge," the maximum discharge that can be contained within the channel without overtopping the banks, represented a "channel forming discharge." The discharge at the 1.5 recurrence interval, or a flow that occurs every 1.5 years, may be used as a surrogate for the bankfull discharge or channel forming discharge (Leopold, Wolman, & Miller, 1964).

The sediment load at the $Q_{1.5}$ flow may be calculated by substituting the $Q_{1.5}$ flow value (78.27 m/s^3) into the rating equations developed in Figure 7 and solving for the Y variable. The resulting value may then be divided by the watershed area in kilometers (48,963 km^2) to find the total suspended sediment yield in $T/d/km^2$. The watershed area value used in this analysis was obtained using the USGS Streamstats watershed delineation tool. This watershed area value is significantly greater than the watershed area of SD-JA-R-JAMES_11 because the entire watershed area upstream of 460761 is required for the analysis rather than the watershed area for James River segment 11 alone.

The sediment yield at the Q1.5 flow interval may be used to compare to values for stable (reference) and unstable streams in Ecoregion 46 reported by Klimetz et al. (Characterization of Suspended-Sediment Transport Conditions for Stable, "Reference" Streams in Selected Ecoregions of EPA Region 8, 2009).

Suspended sediment concentration (SSC) data, rather than TSS, is typically used to calculate the sediment load at the Q1.5 discharge interval. The laboratory protocol for analyzing TSS is known to bias against sand sized particles (>63 µm) during sub-sampling (Gray, Glysson, Turcois, & Schwarz, 2000), resulting in underestimates of the sediment load. A general equation is available to convert TSS data to SSC, but it is not recommended for data from individual stations if paired TSS and SSC are not available (Glysson, Gray, & Conge, 2000). No SSC data is available for SD-JA-R-JAMES_11, so it was not possible to develop an equation representing the relationship between the two methods. TSS data was used in place of SSC data for the following analysis to aid in characterization of the sediment dynamics of SD-JA-R-JAMES_11.

Table 7. Total suspended solids yield at the Q1.5 flow interval in comparison to reference values for stable and unstable streams in Ecoregion 46.

Rating Equation (from Figure 7)	**$Q_{1.5}$ (m/s^3)**	**TSS load @ $Q_{1.5}$ (T/d)**	**Sediment Yield @ $Q_{1.5}$ (T/km^2)**
1980s	78.27	700.50	0.0143
1990s		650.58	0.0133
2009-2020		855.14	0.0175
All years		801.53	0.0164
Median Yield Stable Ecoregion 46 Streams ($T/d/km^2$)			0.00393*
Median Yield Unstable Ecoregion 46 Streams ($T/d/km^2$)			0.0768*
Median Yield All Ecoregion 46 Streams ($T/d/km^2$)			0.00831*

* From Klimetz et al. (2009)

Table 7 presents TSS yields calculated using the rating equations from Figure 6, as well as the median values for stable, unstable, and all streams in Ecoregion 46 reported by Klimetz et al. The TSS yield at the Q1.5 flow interval for the SD-JA-R-JAMES_11 for all data (0.0164) is between the median values for stable and unstable streams in Ecoregion 46, but greater than the median value for all streams in the ecoregion. Of the results reported by Klimetz for Ecoregion 46, the closest result for all data from SD-JA-R-JAMES_11 is the 25^{th} percentile of all unstable sites in the ecoregion (0.0142). If looking solely at stable streams in Ecoregion 46, the result for SD-JA-R-JAMES_11 falls between the 75^{th} and 90^{th} percentile.

6.2.5 Mean Annual Suspended Sediment Load

The mean annual suspended sediment yield is another value that can be compared to reference values to characterize stream sediment transport. First, the daily sediment loads are calculated by multiplying the suspended sediment rating equation by the flow value for that day. Next, each day for each year is summed to calculate the annual load. That value is then divided by the watershed area to calculate the annual yield. As with the previous analysis, the watershed area value used in this analysis was obtained using the USGS Streamstats watershed delineation tool. This watershed area value is significantly less than the watershed area of SD-JA-R-JAMES_11 because the entire watershed area upstream of 460761 is required for the analysis rather than the watershed area for James segment 11 alone. The annual yields are averaged to get the mean annual suspended sediment yield.

Suspended sediment concentration (SSC) data, rather than TSS, is typically used to calculate the mean annual suspended sediment load. The laboratory protocol for analyzing TSS is known to bias against sand sized particles (>63 μm) during sub-sampling (Gray, Glysson, Turcois, & Schwarz, 2000), resulting in underestimates of the sediment load. A general equation is available to convert TSS data to SSC, but it is not recommended for data from individual stations if paired TSS and SSC are not available (Glysson, Gray, & Conge, 2000). No SSC data is available for SD-JA-R-JAMES_11, so it was not possible to develop an equation representing the relationship between the two methods. TSS data was used in place of SSC data for the following analysis to aid in characterization of the sediment dynamics of SD-JA-R-JAMES_11.

Because sediment transport dynamics in the SD-JA-R-JAMES_11 have changed over time, the rating equations from Figure 7 were used to calculate the load for specific periods of time. The rating equation from TSS data collected 1981-1989 was used to estimate annual suspended sediment yield for the years spanning 1982-1989. The rating equation from TSS data collected 1990-1995 was used to estimate annual suspended sediment yield for the years spanning 1990 to 1994. The rating equation for TSS data collected 2009-2020 was used to estimate annual suspended sediment yield for the years spanning 2010-2020. The resulting values were averaged for each time period to get the mean annual suspended sediment yield in $T/y/km^2$ for that time period.

Table 8. Mean annual total suspended sediment load for the James River at station 460761 in comparison to literature values for Ecoregion 46 streams.

Mean Annual Suspended Sediment Yield ($T/y/km^2$)	
James River at 460761 1982-1989	1.71
James River at 460761 1990-1994	1.46
James River at 460761 2010-2020	8.06
10th Percentile Stable Sites*	0.0708
25th Percentile Stable Sites*	0.158
Median Stable Sites*	0.351
75th Percentile Stable Sites*	0.579
90th Percentile Stable Sites*	4.33
10th Percentile Unstable Sites*	0.226
25th Percentile Unstable Sites*	0.788
Median Unstable Sites*	5.19
75th Percentile Unstable Sites*	7.87
90th Percentile Unstable Sites*	10.2

* Reported by Klimetz et al. (2009)

Mean annual suspended sediment loads in 1982-1989 and 1990-1994 (1.71 and 1.46 T/y/km^2, respectively) were similar and are between the 25th percentile and median for unstable streams in Ecoregion 46 reported by Klimetz et al. This indicates a moderate degree of instability in the stream channel for SD-JA-R-JAMES_11 from 1982 to 1994.

Flow data was not available to calculate mean annual suspended sediment loads from the years 1995 to 2009. The result for 2010-2020 (8.06 T/y/km^2) is markedly different and is greater than the 75th percentile value for unstable streams in Ecoregion 46 reported by Klimetz et al. This result indicates a large degree of instability from 2010-2020. Though the coefficient and exponent of the suspended sediment rating curve (Figure 7) are generally similar through the three time periods analyzed for mean annual sediment load and sediment transport dynamics have not significantly shifted, mean annual sediment loads are greater due to more frequent high flow events. The greatest streamflows on record for this segment were exceeded several times in the period from 2010 to 2020.

6.2.6 Rapid Geomorphic Assessments

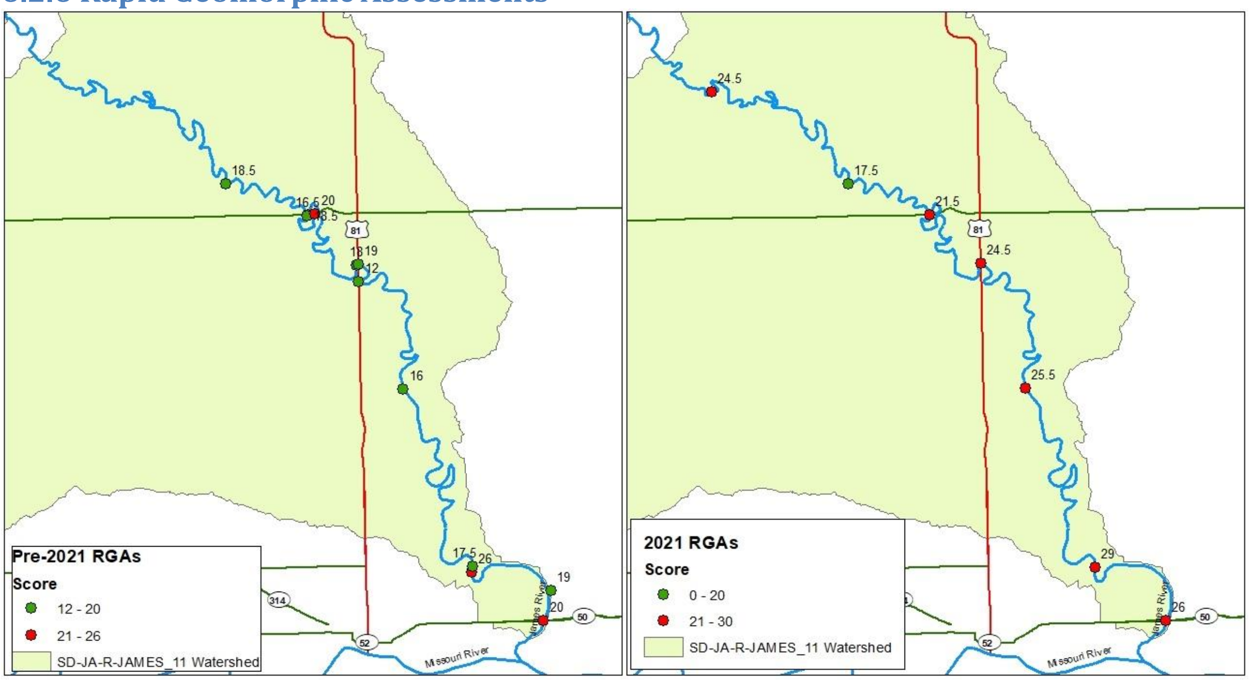

Figure 8. 2004-2006 RGA scores vs. 2021 RGA scores from SD-JA-R-JAMES_11.

A total of 19 Rapid Geomorphic Assessments (RGAs) were performed on SD-JA-R-JAMES_11 (Appendix A). RGAs were conducted in 2004, 2006 and 2021. An RGA is an assessment of the stability of stream bed and banks that considers stream bed composition, bank vegetation, existence of failing stream banks, presence of erosional and depositional areas, and stage of channel evolution. The RGA results in an overall score between zero and 30. A score below 10 represents a stable site while a score greater than 20 indicates an extremely unstable site. Scores between 10 and 20 indicate some degree of instability (Klimetz, Simon, & Schwartz, 2009).

Table 9. Rapid geomorphic assessment results for SD-JA-R-JAMES_11 comparing 2021 results to assessments completed at the same locations in previous years.

Location/Station ID	12/21/2004	06/14/2006	09/30/2021
431 Ave			24.5
Jamesville Colony		18.5	17.5
LOWJIMJR02, SCYJRHWY46	18.5	16.5	21.5
HWY81	18	19	24.5
460761, SCYJR303ST		16	25.5
oldhwy50	26	17.5	29
LOWJIMJR01		20	26
Mean	20.8	17.9	24.1
Median	19	18	24.5
n	3	6	7

Table 9 presents paired RGA data from sites that were assessed in both 2021 and a previous year. Sites that were not assessed multiple times were not included to make for a more appropriate comparison. Assessments from 2021 had a higher mean and median score than previous years. This indicates that streambank instability has increased from what can be characterized as somewhat unstable to extremely unstable. Greater streambank instability results in greater sediment contributions from the bed and banks of the river. Extreme flow events in 2010, 2011, 2019 and 2020 likely caused the increase in streambank instability that was observed in 2021.

7.0 TMDL Loading Analysis

The TMDL is the total allowable loading of the pollutant over the course of one day. A portion of the TMDL was allocated to point sources as a waste-load allocation (WLA) and nonpoint sources as a load allocation (LA). A fraction of the TMDL was also reserved as a margin of safety (MOS) to account for uncertainty in the calculations of these load allocations. Thus, the TMDL is the sum of WLA, LA, and MOS. The methods used to calculate the WLA, LA, and MOS are discussed further in Section 7. The equation that represents the TMDL calculations is presented below.

$$TMDL = \Sigma WLA + \Sigma LA + MOS$$

7.1 TMDL Load Duration Curve

For the purpose of TMDL development, a load duration curve framework was developed to display TSS concentrations within different flow regimes. Flows were divided into 5 zones based on the flow frequency percentile, where daily mean flow values are assigned a percentile based on their frequency of occurrence. For example, 1^{st} percentile flows are of such great magnitude that they are only exceeded 1% of the time, while flows at the 99^{th} percentile are so common that they are exceeded 99% of the time.

Data from 2010-2020 from all stations in SD-JA-R-JAMES_11 will be used for calculating TMDL loading and reductions. Flow variations between stations are not likely to have significant impact on loading values.

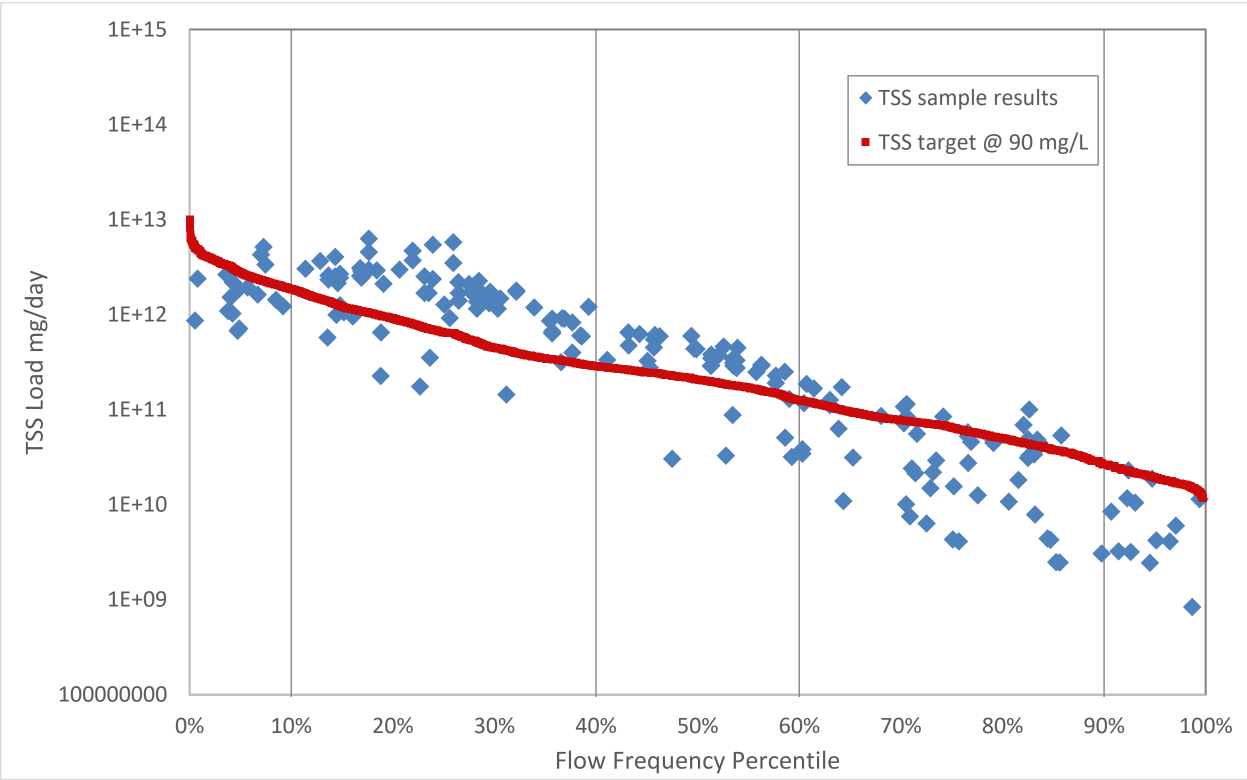

Figure 9. Total suspended solids load duration curve for SD-JA-R-JAMES_11.

For the load duration curve for SD-JA-R-JAMES_11 in Figure 9, TSS samples were paired with mean daily flow measurements from USGS gage 06478513.

Samples that exceeded the TSS target of 90 mg/L were most common at flows ranging from the 10^{th} to 60^{th} percentile of all flows. Samples in excess of the standard were less common in the other flow zones, particularly flows ranging from the 90^{th} to 100^{th} percentile.

Of the 17 samples in the highest flow zone (0-10%), a total of 3 exceeded the standard. A total of 77 samples were collected in the 2^{nd} flow zone (10-40%), of which 66 exceeded the TMDL target. A total of 38 samples were collected in the 3^{rd} flow zone (40-60%) and 32 of those samples exceeded the TMDL target. A total of 57 samples were collected in the 4^{th} flow zone (60-90%), and 17 samples exceeded the TMDL target. A total of 17 samples were collected in the low flow zone (90-100%) with one of those samples exceeding the TMDL target.

7.2 TMDL Allocations

The LDC in Figure 9 represents the dynamic expression of the TSS TMDL for SD-JA-R-JAMES_11. The LDC results in a unique maximum daily load that corresponds to a measured average daily flow. To aid in the implementation of the TMDL and estimation of needed TSS load reductions, Table 10 presents a combination of allocations for each of five flow zones. Methods used to calculate the TMDL components are discussed below.

It was decided to use the monthly chronic criterion of 90 mg/L to develop the loading capacity for each zone in order to ensure that the most stringent water quality standards are met. For each of the five flow zones, the 95th percentile of the range of TMDLs within a zone was set as the flow zone goal. TSS loads experienced during the largest stream flows (e.g. top 5 percent) cannot be feasibly controlled by practical management practices. Setting the flow zone goal at the 95th percentile of the range of TMDLs will protect the beneficial use and allow for the natural variability of the system.

Table 10. TMDL and allocations for SD-JA-R-JAMES_11 in units of T/day.

TMDL Component	Flow Zone				
	0-10	**10-40**	**40-60**	**60-90**	**90-100**
LA (T/d)	4736.4	1472.4	251.7	104.4	23.4
WLA (T/d)	0	0	0	0	0
MOS (T/d)	526.3	163.6	28.0	11.6	2.6
TMDL @ 90 mg/L (T/d)	5262.6	1636.0	279.6	116.0	26.0
Current Load* (T/d)	9706.6	9634.4	702.2	177.9	24.8
Load Reduction	46%	83%	60%	35%	0%
Flow Range (CFS)	>8430	1300-8430	570-1300	120-570	<120
95th Percentile Flow (CFS)	23900	7430	1270	527	118
95th Percentile TSS (mg/L)	166	530	226	138	86
*** Current load is the 95th percentile single sample concentration times the 95th percentile flow in each flow zone** *** The TMDL was calculated by multiplying the 95th percentile flow in each flow zone times the monthly criterion of 90 mg/L**					

7.2.1 Load Allocation

The LA represents the allowable loading from the sources described in sections 5.2 and 5.3. The LA was determined by subtracting the WLA and MOS from the TMDL.

7.2.2 Wasteload Allocation

A zero wasteload allocation was assigned to the SD-JA-R-JAMES_11 TMDL based on a review of the NPDES permitted point sources in the watershed (Section 5.1).

7.2.3 Margin of Safety

In accordance with the regulations, a margin of safety (MOS) was established to account for uncertainty in the data analyses. A margin of safety may be provided (1) by using conservative assumptions in the calculation of the loading capacity of the waterbody and (2) by establishing allocations that in total are lower than the defined loading capacity. In the case of SD-JA-R-JAMES_11 the latter approach was used to establish a safety margin.

A 10% explicit MOS was calculated within the duration curve framework to account for uncertainty (e.g., loads from tributary streams, effectiveness of controls, etc.). This 10% explicit MOS was calculated from the TMDL within each flow zone. The MOS addresses uncertainty in the analyses and is not considered a reserve capacity. The remaining assimilative capacity was attributed to nonpoint sources (LA).

8.0 Seasonal Variation

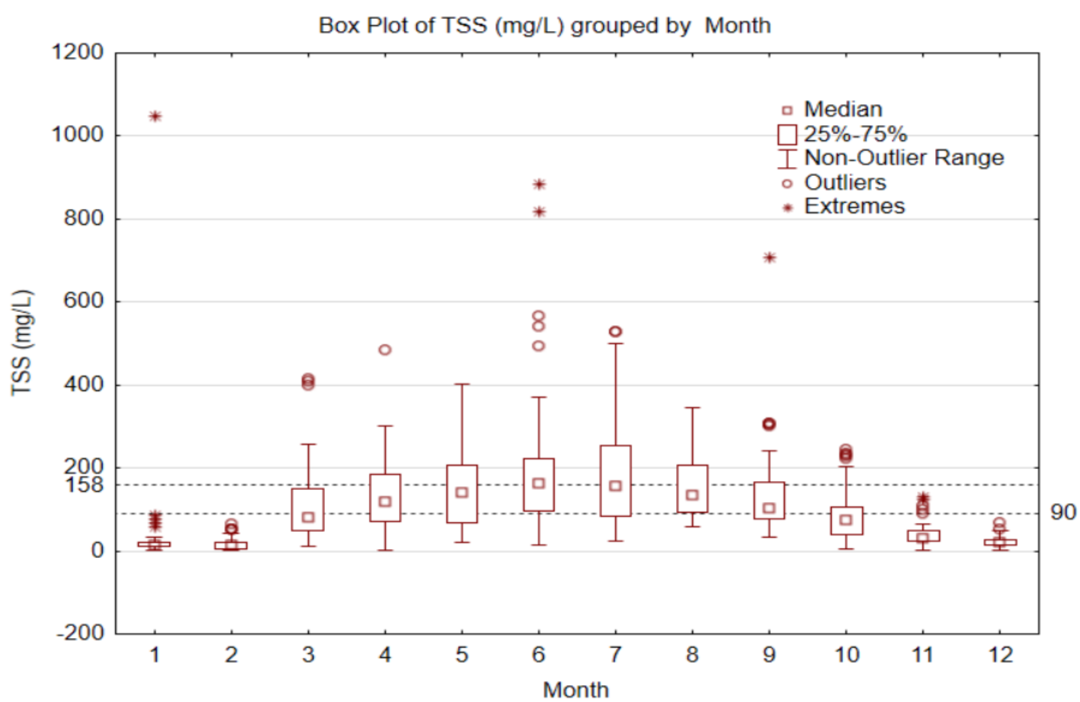

Figure 10. Box plot of SD-JA-R-JAMES_11 TSS samples from all stations grouped by month of sample collection.

Seasonality has a strong impact on TSS concentration in SD-JA-R-JAMES_11. TSS samples collected in June had a higher median value (164 mg/L) than all other months. July was a close second with a median TSS concentration of 156 mg/L. The maximum concentration was observed in January, though this was an outlier and not typical of TSS concentrations in January in SD-JA-R-JAMES_11. South Dakota streams typically experience their highest rate of flow in spring and early summer months, but high concentrations into July are not surprising considering that streamflow values commensurate with flood conditions persist into late summer in the James River due to its low channel gradient. Analysis of the suspended sediment rating curve in Figure 7 shows that large sediment loads relative to other Ecoregion 46 streams are transported at high flows in SD-JA-R-JAMES_11.

9.0 Critical Conditions

Critical conditions for TSS in SD-JA-R-JAMES_11 are associated with high flow events. Snow melt runoff and rain events in the James River basin produce high flow events that mobilize sediment and increase TSS concentration in the river through sheet and rill erosion and bank failure.

The James River has a distinctly flat channel gradient. Because of this, critical high flow conditions that would be observed in other rivers in the region in spring and early summer sometimes persist into late summer and fall in the James River. This occurs during wet cycles due to the time it takes for large volumes of water from further north in the basin to reach SD-JA-R-JAMES_11.

10.0 Public Participation

STATE AGENCIES

South Dakota Department of Agriculture and Natural Resources was the primary state agency involved in the completion of this assessment. SD DANR provided technical support and equipment throughout the course of the project. A 30-day public comment period was issued for the draft TMDL. A public notice letter was published in the following local newspapers: Yankton Daily Press and Dakotan, The Yankton County Observer and Scotland Journal. The draft TMDL document and ability to comment was made available on DANRs One-Stop Public Notice Page at: https://danr.sd.gov/public/default.aspx. The public comment period began June 1, 2022 and ended July 1, 2022. No public comments were received during the 30-day comment period.

FEDERAL AGENCIES

Environmental Protection Agency (EPA) provided the primary source of funds for the completion of the Lower James River Watershed Assessment and the South Central Watershed Improvement Project. EPA provided technical support and review during TMDL Development. EPA's approval letter and decision document are provided in Appendix B.

LOCAL GOVERNMENT, INDUSTRY, ENVIRONMENTAL, AND OTHER GROUPS AND PUBLIC AT LARGE

The primary local sponsor for this project was the South Dakota Association of Conservation Districts. 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 and important medium for obtaining local landowner views and opinions.

11.0 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 follow EPA guidance for revising or withdrawing TMDLs in accordance with considerations documented in EPA's 2012 draft memo before taking action (http://www.epa.gov/sites/production/files/2015-10/documents/drafttmdl_32212.pdf).

Long-term monitoring will continue in the SD-JA-R-JAMES_11 watershed. WQM site 460761 will be monitored monthly as part of the ambient water monitoring program and will be monitored by the Central South Dakota Water Quality Monitoring project on a bimonthly basis from June to September of each year. Volunteer water quality monitoring will also take place at station SCYJR303ST, which is co-located with 460761, on a monthly basis during the field season. Data collected as part of these monitoring efforts will be used to determine beneficial use support in accordance with 303(d) listing methods, evaluate TMDL effectiveness following BMP implementation and to make potential future adjustments to the TMDLs, if necessary.

12.0 Restoration Strategy

The TMDL for James River segment 11 (SD-JA-R-JAMES_11) corresponds exclusively to the 303(d) listed segment identified in South Dakota's 2022 Integrated Report for Surface Water Quality.

The South Central Watershed Implementation Project is currently underway in the lower James River watershed, including segment SD-JA-R-JAMES_11. This effort is a partnership with the James River Water Development District.

The most effective implementation plan for SD-JA-R-JAMES_11 may be characterized as an "all of the above" approach, encompassing BMPs (Best Management Practices) such as stream bank restoration at points of bank failure, conversion to conservation tillage agricultural practices, and the planting of riparian buffer strips. Stream bank stabilization and restoration efforts as well the installation of riparian buffer strips should focus on areas with the worst RGA scores, particularly the lower reaches of SD-JA-R-JAMES_11. Conversion to conservation tillage will be beneficial in any area of the SD-JA-R-JAMES_11 watershed, but resources would be most efficiently allocated to areas near the James River mainsteam and its tributaries.

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Appendix A. Data

Table 11. Total suspended solids sample data collected from SD-JA-R-JAMES_11.

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
07/31/1974	14:30	460761	Grab	49	
08/25/1974	08:00	460761	Grab	66	
09/17/1974	08:00	460761	Grab	75	
09/24/1974	12:45	460761	Grab	56	
10/21/1974	08:00	460761	Grab	28	
11/12/1974	12:30	460761	Grab	28	
12/11/1974	13:45	460761	Grab	11	
01/28/1975	10:00	460761	Grab	15	
01/29/1975	08:00	460761	Grab	1	
01/30/1975	09:00	460761	Grab	78	
02/19/1975	16:00	460761	Grab	38	
03/20/1975	10:25	460761	Grab	58	
04/28/1975	14:00	460761	Grab	126	
04/29/1975	14:20	460761	Grab	120	
04/30/1975	08:20	460761	Grab	64	
05/20/1975	16:00	460761	Grab	58	
06/11/1975	10:15	460761	Grab	886	
07/14/1975	08:00	460761	Grab	152	
08/13/1975	14:45	460761	Grab	122	
09/23/1975	10:45	460761	Grab	126	
10/21/1975	12:30	460761	Grab	69	
11/18/1975	13:30	460761	Grab	100	
12/15/1975	09:30	460761	Grab	49	
01/12/1976	11:00	460761	Grab	20	
02/19/1976	12:15	460761	Grab	37	
03/15/1976	11:30	460761	Grab	32	
04/20/1976	08:00	460761	Grab	249	
05/17/1976	12:45	460761	Grab	168	
06/21/1976	13:30	460761	Grab	139	
07/19/1976	13:00	460761	Grab	57	
08/16/1976	12:30	460761	Grab	198	
09/20/1976	12:45	460761	Grab	44	
10/18/1976	13:00	460761	Grab	4	
11/15/1976	13:30	460761	Grab	27	
12/20/1976	12:30	460761	Grab	52	
01/18/1977	13:00	460761	Grab	60	
02/21/1977	13:00	460761	Grab	22	
03/09/1977	12:30	460761	Grab	91	
04/19/1977	12:30	460761	Grab	79	
05/24/1977	13:30	460761	Grab	151	
06/21/1977	13:00	460761	Grab	99	
07/19/1977	12:30	460761	Grab	117	
08/16/1977	09:30	460761	Grab	58	
09/20/1977	10:00	460761	Grab	125	
10/26/1977	13:40	460761	Grab	34	
12/01/1977	14:30	460761	Grab	1	
12/28/1977	11:00	460761	Grab	22	
01/25/1978	08:00	460761	Grab	11	
02/23/1978	08:00	460761	Grab	13	
03/29/1978	08:00	460761	Grab	40	
04/24/1978	08:00	460761	Grab	50	
05/22/1978	08:00	460761	Grab	74	
06/26/1978	08:00	460761	Grab	120	
07/24/1978	08:00	460761	Grab	195	
08/22/1978	08:00	460761	Grab	88	
09/25/1978	08:00	460761	Grab	78	
10/24/1978	08:00	460761	Grab	36	
11/21/1978	08:00	460761	Grab	22	

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
12/19/1978	08:00	460761	Grab	15	
01/24/1979	08:30	460761	Grab	17	
02/28/1979	11:45	460761	Grab	6.5	
03/28/1979	11:35	460761	Grab	96	
04/23/1979	13:35	460761	Grab	128	
05/29/1979	14:00	460761	Grab	54	
06/25/1979	11:30	460761	Grab	220	
07/26/1979	11:15	460761	Grab	150	
08/29/1979	12:26	460761	Grab	175	
09/24/1979	08:00	460761	Grab	163	
10/29/1979	14:45	460761	Grab	66	
11/19/1979	15:15	460761	Grab	29	
12/03/1979	08:00	460761	Grab	19	
01/08/1980	14:35	460761	Grab	15	
02/27/1980	09:17	460761	Grab	20	
03/26/1980	10:45	460761	Grab	48	
04/30/1980	09:01	460761	Grab	2	
06/24/1980	12:25	460761	Grab	92	
09/30/1980	12:15	460761	Grab	60	
10/28/1980	10:45	460761	Grab	19	
12/29/1980	11:00	460761	Grab	14	
01/27/1981	08:00	460761	Grab	19	
02/24/1981	12:20	460761	Grab	17	
03/24/1981	12:35	460761	Grab	53	
04/28/1981	13:30	460761	Grab	80	
05/27/1981	13:50	460761	Grab	68	
06/23/1981	13:30	460761	Grab	565	
11/30/1981	13:45	460761	Grab	15	9.6
04/28/1982	08:40	460761	Grab	74	735
05/26/1982	08:10	460761	Grab	116	1200
06/30/1982	08:30	460761	Grab	144	405
07/27/1982	13:05	460761	Grab	100	152
08/24/1982	12:30	460761	Grab	94	29
09/28/1982	12:30	460761	Grab	88	89
10/26/1982	13:40	460761	Grab	205	246
11/30/1982	13:40	460761	Grab	26	310
01/25/1983	13:35	460761	Grab	12	120
03/01/1983	13:25	460761	Grab	104	1740
03/30/1983	10:00	460761	Grab	50	951
04/20/1983	13:55	460761	Grab	52	2670
05/24/1983	14:00	460761	Grab	152	782
06/28/1983	13:45	460761	Grab	50	2600
07/26/1983	14:00	460761	Grab	44	413
08/23/1983	13:45	460761	Grab	196	334
09/27/1983	12:45	460761	Grab	105	183
10/25/1983	13:30	460761	Grab	50	160
01/25/1984	13:00	460761	Grab	10	80
02/28/1984	14:00	460761	Grab	11	360
03/27/1984	13:45	460761	Grab	180	2500
04/24/1984	13:40	460761	Grab	80	5310
05/22/1984	13:50	460761	Grab	232	1430
07/24/1984	14:10	460761	Grab	168	1400
08/28/1984	14:40	460761	Grab	80	279
09/25/1984	13:20	460761	Grab	60	149
10/23/1984	14:40	460761	Grab	30	304
12/18/1984	14:30	460761	Grab	26	190
01/24/1985	13:00	460761	Grab	88	85
02/27/1985	08:00	460761	Grab	14	200
03/26/1985	14:00	460761	Grab	150	2980
04/29/1985	14:15	460761	Grab	184	1000
05/28/1985	14:05	460761	Grab	80	258
06/23/1985	13:40	460761	Grab	100	128
07/30/1985	13:40	460761	Grab	24	56.2
08/27/1985	10:05	460761	Grab	86	58

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
09/24/1985	13:20	460761	Grab	34	163
10/28/1985	13:30	460761	Grab	58	100
12/17/1985	14:20	460761	Grab	6	86
01/28/1986	10:00	460761	Grab	11	76
02/25/1986	13:40	460761	Grab	6	60
03/25/1986	13:30	460761	Grab	188	3140
04/29/1986	12:20	460761	Grab	51	10200
05/27/1986	10:10	460761	Grab	64	5640
06/24/1986	13:30	460761	Grab	80	3960
07/29/1986	14:20	460761	Grab	110	386
08/26/1986	13:45	460761	Grab	94	339
09/24/1986	09:30	460761	Grab	132	2560
10/28/1986	14:55	460761	Grab	100	537
11/18/1986	14:30	460761	Grab	8	400
12/30/1986	14:00	460761	Grab	20	170
01/28/1987	13:35	460761	Grab	18	180
02/24/1987	14:30	460761	Grab	54	232
03/24/1987	14:10	460761	Grab	215	3380
04/28/1987	12:05	460761	Grab	168	2410
05/19/1987	14:00	460761	Grab	180	1340
06/23/1987	13:20	460761	Grab	272	678
08/26/1987	14:20	460761	Grab	92	267
09/30/1987	14:42	460761	Grab	72	144
10/27/1987	14:30	460761	Grab	72	205
11/17/1987	13:30	460761	Grab	64	238
12/29/1987	13:20	460761	Grab	25	160
02/23/1988	14:30	460761	Grab	4	110
03/29/1988	13:40	460761	Grab	80	390
04/27/1988	13:50	460761	Grab	72	200
05/25/1988	13:15	460761	Grab	52	385
06/30/1988	08:00	460761	Grab	96	31
07/27/1988	13:15	460761	Grab	116	16
08/16/1988	13:10	460761	Grab	136	13
09/28/1988	13:05	460761	Grab	96	25
11/22/1988	13:00	460761	Grab	14	30
02/28/1989	14:00	460761	Grab	6	40
03/28/1989	13:10	460761	Grab	108	780
05/23/1989	13:45	460761	Grab	100	904
06/27/1989	14:15	460761	Grab	116	173
07/25/1989	15:30	460761	Grab	76	35
08/22/1989	15:00	460761	Grab	100	16
09/26/1989	14:20	460761	Grab	72	12
10/24/1989	13:45	460761	Grab	112	14
11/21/1989	14:00	460761	Grab	2	26
12/18/1989	12:30	460761	Grab	6	20
01/23/1990	14:10	460761	Grab	20	28
02/21/1990	14:20	460761	Grab	14	26
03/27/1990	13:45	460761	Grab	14	33
04/30/1990	12:30	460761	Grab	28	25
05/22/1990	14:15	460761	Grab	80	65
06/25/1990	14:00	460761	Grab	86	258
07/23/1990	14:30	460761	Grab	112	70
08/20/1990	14:15	460761	Grab	136	84
09/25/1990	11:15	460761	Grab	76	11
10/23/1990	14:45	460761	Grab	58	24
11/26/1990	14:10	460761	Grab	12	20
12/18/1990	14:50	460761	Grab	12	18
01/28/1991	14:30	460761	Grab	1050	8
02/19/1991	10:45	460761	Grab	2	29
03/12/1991	15:00	460761	Grab	40	37
04/22/1991	11:00	460761	Grab	52	40
05/21/1991	14:30	460761	Grab	68	201
06/18/1991	15:30	460761	Grab	88	2010
07/23/1991	13:30	460761	Grab	120	228

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
08/19/1991	14:30	460761	Grab	66	127
09/23/1991	11:30	460761	Grab	68	19
10/21/1991	14:00	460761	Grab	38	18
11/18/1991	13:00	460761	Grab	22	57
12/16/1991	13:30	460761	Grab	2	28
01/28/1992	13:35	460761	Grab	12	25
02/25/1992	14:05	460761	Grab	26	145
03/24/1992	13:45	460761	Grab	38	155
04/21/1992	13:35	460761	Grab	20	65
05/19/1992	13:45	460761	Grab	140	62
06/23/1992	14:41	460761	Grab	92	57
07/28/1992	14:40	460761	Grab	180	327
08/25/1992	14:15	460761	Grab	140	226
09/22/1992	14:00	460761	Grab	106	178
10/26/1992	14:15	460761	Grab	76	69
11/17/1992	14:30	460761	Grab	24	121
12/16/1992	14:00	460761	Grab	19	105
01/26/1993	11:00	460761	Grab	10	70
02/23/1993	14:45	460761	Grab	15	80
03/24/1993	14:00	460761	Grab	70	1100
04/27/1993	13:45	460761	Grab	192	1220
05/18/1993	14:15	460761	Grab	62	3950
06/22/1993	14:30	460761	Grab	168	2410
07/27/1993	13:45	460761	Grab	56	5610
08/24/1993	14:30	460761	Grab	64	4600
09/28/1993	14:40	460761	Grab	146	1830
10/26/1993	14:35	460761	Grab	100	1270
11/16/1993	14:55	460761	Grab	31	1340
12/15/1993	14:35	460761	Grab	16	1110
01/26/1994	14:55	460761	Grab	10	260
02/16/1994	14:40	460761	Grab	20	220
03/29/1994	14:25	460761	Grab	98	6580
04/26/1994	14:10	460761	Grab	196	2980
05/17/1994	14:30	460761	Grab	136	2520
06/21/1994	14:05	460761	Grab	244	1220
07/27/1994	14:30	460761	Grab	224	1740
08/23/1994	14:55	460761	Grab	216	1060
09/27/1994	14:15	460761	Grab	184	580
10/25/1994	13:40	460761	Grab	72	502
11/29/1994	14:50	460761	Grab	21	420
12/12/1994	14:45	460761	Grab	22	410
01/31/1995	13:10	460761	Grab	4	140
02/28/1995	14:55	460761	Grab	14	300
03/28/1995	14:40	460761	Grab	256	3200
04/25/1995	14:50	460761	Grab	84	17500
05/23/1995	14:25	460761	Grab	34	13600
06/27/1995	14:45	460761	Grab	124	5060
07/19/1995	14:55	460761	Grab	264	2900
08/22/1995	15:05	460761	Grab	260	1580
09/26/1995	14:50	460761	Grab	188	1170
11/01/1995	16:30	460761	Grab	84	
11/29/1995	15:00	460761	Grab	26	
12/13/1995	14:55	460761	Grab	21	
01/30/1996	13:45	460761	Grab	10	
02/27/1996	15:15	460761	Grab	51	
03/19/1996	15:05	460761	Grab	258	
04/23/1996	14:30	460761	Grab	134	
05/29/1996	14:50	460761	Grab	128	
06/25/1996	14:45	460761	Grab	252	
07/24/1996	16:25	460761	Grab	356	
08/22/1996	09:55	460761	Grab	208	
09/18/1996	10:00	460761	Grab	90	
10/30/1996	10:50	460761	Grab	106	
11/27/1996	13:20	460761	Grab	17	

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
12/30/1996	13:40	460761	Grab	6	
01/23/1997	08:00	460761	Grab	4	
02/19/1997	08:00	460761	Grab	9	
03/19/1997	08:00	460761	Grab	140	
04/28/1997	08:00	460761	Grab	56	
05/28/1997	08:00	460761	Grab	48	
06/24/1997	08:00	460761	Grab	194	
07/28/1997	08:00	460761	Grab	338	
08/27/1997	08:00	460761	Grab	276	
09/24/1997	08:00	460761	Grab	300	
10/22/1997	08:00	460761	Grab	124	
11/05/1997	08:00	460761	Grab	90	
12/17/1997	08:00	460761	Grab	30	
01/30/1998	08:00	460761	Grab	8	
02/26/1998	08:00	460761	Grab	66	
03/19/1998	08:00	460761	Grab	35	
04/29/1998	08:00	460761	Grab	260	
05/27/1998	08:00	460761	Grab	144	
06/10/1998	08:00	460761	Grab	80	
07/15/1998	08:00	460761	Grab	356	
08/20/1998	08:00	460761	Grab	220	
09/24/1998	08:00	460761	Grab	94	
10/26/1998	08:00	460761	Grab	232	
11/18/1998	08:00	460761	Grab	124	
12/14/1998	08:00	460761	Grab	68	
01/26/1999	08:00	460761	Grab	15	
02/23/1999	08:00	460761	Grab	39	
05/19/1999	08:00	460761	Grab	67	
06/14/1999	08:00	460761	Grab	166	
07/28/1999	08:00	460761	Grab	444	
08/25/1999	08:00	460761	Grab	248	
09/23/1999	08:00	460761	Grab	240	
10/26/1999	08:00	460761	Grab	94	
11/16/1999	08:00	460761	Grab	46	
12/13/1999	08:00	460761	Grab	33	
01/27/2000	08:00	460761	Grab	17	
02/28/2000	08:00	460761	Grab	52	
03/29/2000	08:00	460761	Grab	104	
04/24/2000	08:00	460761	Grab	162	
05/25/2000	08:00	460761	Grab	192	
06/28/2000	08:00	460761	Grab	66	
07/26/2000	08:00	460761	Grab	80	
08/15/2000	08:00	460761	Grab	180	
09/12/2000	08:00	460761	Grab	160	
10/24/2000	08:00	460761	Grab	64	
11/27/2000	08:00	460761	Grab	26	
12/04/2000	08:00	460761	Grab	22	
01/08/2001	08:00	460761	Grab	9	
02/26/2001	08:00	460761	Grab	5	
03/26/2001	08:00	460761	Grab	194	
04/05/2001	08:00	460761	Grab	168	
05/09/2001	08:00	460761	Grab	27	
06/11/2001	08:00	460761	Grab	208	
07/16/2001	08:00	460761	Grab	500	
08/13/2001	08:00	460761	Grab	236	
09/10/2001	08:00	460761	Grab	172	
10/15/2001	08:00	460761	Grab	108	
11/19/2001	08:00	460761	Grab	29	
12/18/2001	08:00	460761	Grab	28	
01/15/2002	08:00	460761	Grab	20	
03/25/2002	08:00	460761	Grab	51	
04/08/2002	08:00	460761	Grab	156	
05/07/2002	08:00	460761	Grab	61	
06/18/2002	08:00	460761	Grab	84	

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
07/10/2002	08:00	460761	Grab	100	
08/12/2002	08:00	460761	Grab	196	
09/10/2002	08:00	460761	Grab	114	
10/15/2002	08:00	460761	Grab	36	
11/06/2002	08:00	460761	Grab	26	
12/10/2002	08:00	460761	Grab	12	
01/07/2003	09:15	460761	Grab	68	
02/12/2003	10:40	460761	Grab	14	
03/18/2003	09:20	460761	Grab	68	
04/15/2003	09:40	460761	Grab	152	
05/12/2003	11:15	460761	Grab	80	
06/10/2003	09:50	460761	Grab	80	
07/08/2003	13:00	460761	Grab	216	
08/19/2003	09:50	460761	Grab	100	
09/15/2003	13:10	460761	Grab	102	
10/06/2003	11:35	460761	Grab	68	
11/18/2003	10:20	460761	Grab	39	
12/02/2003	09:55	460761	Grab	14	
01/06/2004	10:20	460761	Grab	34	
02/10/2004	10:10	460761	Grab	14	
03/30/2004	13:15	460761	Grab	57	
04/13/2004	09:50	460761	Grab	38	
05/19/2004	09:50	460761	Grab	162	
06/14/2004	10:35	460761	Grab	244	
07/13/2004	10:05	460761	Grab	156	
08/10/2004	09:55	460761	Grab	114	
09/07/2004	10:50	460761	Grab	58	
10/12/2004	11:20	460761	GRAB	39	
11/08/2004	14:50	460761	GRAB	60	
12/08/2004	11:20	460761	GRAB	19	
01/12/2005	10:20	460761	GRAB	25	
02/15/2005	08:45	460761	GRAB	28	
03/22/2005	09:25	460761	GRAB	30	
04/12/2005	09:20	460761	GRAB	118	
05/17/2005	08:35	460761	GRAB	164	
06/14/2005	08:30	460761	GRAB	284	
07/26/2005	17:30	460761	GRAB	236	
08/30/2005	09:15	460761	GRAB	176	
09/20/2005	09:25	460761	GRAB	148	
10/12/2005	09:30	460761	REPLICATE GRAB	88	
11/22/2005	10:30	460761	GRAB	42	
01/10/2006	10:25	460761	GRAB	23	
02/14/2006	11:00	LOWJIMJR02	GRAB	8	
02/14/2006	09:40	460761	GRAB	43	
02/14/2006	10:00	LOWJIMJR01	GRAB	4	
03/29/2006	10:30	460761	GRAB	100	
04/11/2006	14:00	LOWJIMJR02	GRAB	200	
04/11/2006	09:45	460761	GRAB	280	
04/11/2006	17:15	LOWJIMJR01	GRAB	280	
04/17/2006	13:00	LOWJIMJR02	GRAB	292	
04/17/2006	15:00	LOWJIMJR01	GRAB	484	
04/26/2006	16:45	LOWJIMJR02	GRAB	192	
04/26/2006	18:30	LOWJIMJR01	GRAB	300	
05/02/2006	15:30	LOWJIMJR02	GRAB	228	
05/02/2006	17:00	LOWJIMJR01	GRAB	228	
05/09/2006	14:30	LOWJIMJR02	GRAB	172	
05/09/2006	09:25	460761	GRAB	210	
05/10/2006	16:15	LOWJIMJR01	GRAB	220	
05/16/2006	17:15	LOWJIMJR02	GRAB	142	
05/16/2006	19:00	LOWJIMJR01	GRAB	156	
05/23/2006	13:30	LOWJIMJR02	GRAB	196	
05/23/2006	15:00	LOWJIMJR01	GRAB	200	
05/31/2006	15:30	LOWJIMJR02	GRAB	224	
05/31/2006	16:30	LOWJIMJR01	GRAB	248	

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
06/08/2006	10:45	LOWJIMJR02	GRAB	224	
06/08/2006	11:30	LOWJIMJR01	GRAB	224	
06/13/2006	10:10	460761	GRAB	148	
07/18/2006	11:45	460761	GRAB	82	
07/26/2006	17:30	LOWJIMJR02	GRAB	70	
07/26/2006	18:30	LOWJIMJR01	GRAB	78	
08/15/2006	11:50	460761	GRAB	104	
08/30/2006	16:30	LOWJIMJR02	GRAB	90	
08/30/2006	17:30	LOWJIMJR01	GRAB	77	
09/26/2006	11:35	460761	GRAB	88	
09/28/2006	11:45	LOWJIMJR02	GRAB	78	
09/28/2006	10:45	LOWJIMJR01	GRAB	94	
10/11/2006	10:35	460761	GRAB	76	
10/26/2006	14:30	LOWJIMJR02	GRAB	30	
10/26/2006	15:30	LOWJIMJR01	GRAB	30	
12/14/2006	11:00	460761	GRAB	14	
01/09/2007	12:30	460761	GRAB	12	
02/21/2007	11:15	460761	GRAB	14	
03/15/2007	10:00	LOWJIMJR02	GRAB	194	
03/15/2007	10:00	LOWJIMJR02	GRAB	140	
03/15/2007	08:00	LOWJIMJR01	GRAB	416	
03/20/2007	11:40	460761	GRAB	71	
03/20/2007	17:30	LOWJIMJR01	GRAB	172	
03/21/2007	08:45	LOWJIMJR02	GRAB	72	
03/21/2007	08:45	LOWJIMJR02	REPLICATE GRAB	68	
03/21/2007	18:45	LOWJIMJR01	GRAB	162	
03/21/2007	18:45	LOWJIMJR01	REPLICATE GRAB	156	
04/03/2007	12:00	LOWJIMJR02	GRAB	94	
04/12/2007	11:08	460761	GRAB	106	
04/18/2007	16:00	LOWJIMJR02	GRAB	118	
04/18/2007		LOWJIMJR02	REPLICATE GRAB	120	
04/23/2007	11:30	LOWJIMJR02	GRAB	146	
04/30/2007	12:15	LOWJIMJR02	GRAB	118	
05/07/2007	12:30	LOWJIMJR02	GRAB	268	
05/14/2007	11:30	LOWJIMJR02	GRAB	32	
05/15/2007	10:20	460761	GRAB	25	
05/21/2007	1899-12-31T11:15:00.000	LOWJIMJR02	GRAB	32	
06/05/2007	10:30	460761	GRAB	62	
06/25/2007	15:30	LOWJIMJR02	GRAB	59	
07/10/2007	10:50	460761	GRAB	184	
07/25/2007	09:45	LOWJIMJR02	GRAB	176	
08/14/2007	14:00	LOWJIMJR02	GRAB	248	
08/21/2007	11:50	460761	GRAB	192	
09/18/2007	11:10	460761	GRAB	166	
10/10/2007	10:50	460761	GRAB	156	
11/07/2007	10:25	460761	GRAB	48	
12/04/2007	11:15	460761	GRAB	18	
01/08/2008	11:10	460761	GRAB	7	
02/20/2008	14:40	460761	GRAB	7	
02/20/2008	14:40	460761	REPLICATE GRAB	5	
03/25/2008	10:45	460761	GRAB	42	
04/15/2008	11:30	460761	GRAB	107	
05/20/2008	10:20	460761	GRAB	120	
06/17/2008	10:10	460761	GRAB	112	
07/16/2008	10:50	460761	GRAB	84	
07/16/2008	08:00	460761	REPLICATE GRAB	84	
08/12/2008	11:20	460761	GRAB	61	
09/23/2008	11:50	460761	GRAB	74	
10/15/2008	10:40	460761	GRAB	86	
11/18/2008	10:40	460761	GRAB	50	
12/18/2008	10:30	460761	GRAB	25	
01/22/2009	11:15	460761	GRAB	7	
02/11/2009	10:30	460761	GRAB	14	

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
03/17/2009	11:15	460761	GRAB	38	
04/14/2009	11:10	460761	GRAB	80	
05/05/2009	11:10	460761	GRAB	28	
06/23/2009	10:30	460761	GRAB	78	
07/21/2009	11:10	460761	GRAB	76	
08/11/2009	09:40	460761	GRAB	200	
09/14/2009	11:30	460761	GRAB	242	
10/20/2009	11:30	460761	GRAB	78	2340
11/17/2009	12:10	460761	GRAB	66	3040
12/16/2009	10:50	460761	GRAB	23	1780
01/13/2010	11:50	460761	GRAB	12	1030
02/17/2010	11:30	460761	GRAB	10	445
03/25/2010	10:30	460761	GRAB	44	22100
04/13/2010	10:45	460761	GRAB	30	14000
05/19/2010	12:10	460761	GRAB	70	5810
06/15/2010	12:15	460761	GRAB	15	23600
07/13/2010	11:45	460761	GRAB	136	10100
08/10/2010	12:50	460761	GRAB	68	11600
09/08/2010	10:35	460761	GRAB	214	3210
10/13/2010	10:00	460761	GRAB	236	1990
11/10/2010	09:45	460761	GRAB	108	1260
12/07/2010	11:30	460761	GRAB	25	560
12/07/2010	08:00	460761	REPLICATE GRAB	28	560
01/19/2011	11:40	460761	GRAB	9	340
02/08/2011	11:40	460761	GRAB	6	280
03/15/2011	11:20	460761	GRAB	88	600
04/13/2011	11:15	460761	GRAB	64	14000
05/10/2011	10:40	460761	GRAB	30	14900
06/14/2011	11:00	460761	GRAB	166	7460
07/12/2011	11:05	460761	GRAB	204	10300
08/02/2011	11:45	460761	GRAB	166	10500
09/13/2011	11:20	460761	GRAB	308	3920
10/18/2011	11:15	460761	GRAB	177	2940
11/08/2011	11:10	460761	GRAB	130	2900
12/13/2011	11:10	460761	GRAB	45	3200
01/05/2012	11:30	460761	GRAB	31	1900
02/14/2012	11:50	460761	GRAB	22	590
03/20/2012	11:10	460761	GRAB	410	1780
03/20/2012	08:00	460761	REPLICATE GRAB	400	1780
04/03/2012	11:05	460761	GRAB	224	1180
05/08/2012	11:40	460761	GRAB	288	2430
06/04/2012	11:00	460761	GRAB	164	1180
07/03/2012	09:50	460761	GRAB	156	450
08/07/2012	11:40	460761	GRAB	92	102
09/11/2012	11:30	460761	GRAB	86	89.3
10/17/2012	11:30	460761	GRAB	76	61.5
11/06/2012	11:05	460761	GRAB	32	76.8
12/04/2012	10:30	460761	GRAB	21	80.1
01/08/2013	11:50	460761	GRAB	20	86
02/05/2013	11:55	460761	GRAB	5	68.4
03/12/2013	11:30	460761	GRAB	73	190
04/09/2013	12:30	460761	GRAB	250	1490
05/14/2013	11:15	460761	GRAB	252	966
06/11/2013	10:00	460761	GRAB	344	2070
07/09/2013	11:40	460761	GRAB	328	2740
08/06/2013	11:50	460761	GRAB	228	1540
09/10/2013	11:45	460761	GRAB	120	1110
10/08/2013	10:40	460761	GRAB	224	844
11/13/2013	10:45	460761	GRAB	33	626
12/10/2013	11:10	460761	GRAB	22	290
01/14/2014	11:20	460761	GRAB	17	190
02/11/2014	12:40	460761	GRAB	13	100
03/18/2014	11:40	460761	GRAB	68	334
04/08/2014	10:50	460761	GRAB	176	868

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
05/06/2014	11:20	460761	GRAB	224	1080
06/03/2014	11:05	460761	GRAB	252	1470
07/15/2014	11:50	460761	GRAB	296	1640
08/12/2014	11:30	460761	GRAB	224	1140
09/09/2014	12:05	460761	GRAB	188	939
10/07/2014	12:10	460761	GRAB	228	802
11/05/2014	10:10	460761	GRAB	36	207
12/09/2014	11:05	460761	GRAB	30	115
01/21/2015	11:00	460761	GRAB	12	110
02/10/2015	11:20	460761	GRAB	10	125
03/10/2015	11:15	460761	GRAB	10	175
04/14/2015	13:20	460761	GRAB	112	309
05/13/2015	11:40	460761	GRAB	140	202
06/02/2015	09:15	460761	GRAB	372	1330
07/08/2015	14:50	460761	GRAB	345	2470
08/11/2015	11:40	460761	GRAB	130	527
09/09/2015	12:10	460761	GRAB	138	552
10/14/2015	11:40	460761	GRAB	44	97.5
11/03/2015	09:30	460761	GRAB	46	104
12/08/2015	11:00	460761	GRAB	29	340
01/06/2016	11:05	460761	GRAB	20	220
02/09/2016	12:05	460761	GRAB	10	180
03/08/2016	11:30	460761	GRAB	132	893
04/05/2016	11:15	460761	GRAB	172	813
05/10/2016	11:30	460761	GRAB	268	2160
05/18/2016	08:00	460761	GRAB	204	1100
05/18/2016	07:00	LOWJIMJR01	GRAB	168	1100
06/03/2016	09:00	460761	GRAB	209	3290
06/03/2016	08:15	LOWJIMJR01	GRAB	312	3290
06/15/2016	11:00	460761	GRAB	163	627
06/22/2016	12:00	460761	GRAB	168	721
06/22/2016	11:00	LOWJIMJR01	GRAB	164	721
07/12/2016	10:45	460761	GRAB	100	199
07/12/2016	10:20	460761	GRAB	64	199
07/12/2016	09:45	LOWJIMJR01	GRAB	100	199
08/04/2016	10:40	460761	GRAB	208	197
08/04/2016	10:00	LOWJIMJR01	GRAB	68	197
08/10/2016	09:45	460761	GRAB	132	166
09/12/2016	11:05	460761	GRAB	137	742
09/16/2016	09:15	460761	GRAB	708	3140
09/16/2016	08:30	LOWJIMJR01	GRAB	308	3140
10/18/2016	10:20	460761	GRAB	38	315
11/14/2016	12:15	460761	GRAB	42	267
12/06/2016	09:30	460761	GRAB	26	336
01/10/2017	09:40	460761	GRAB	28	320
02/09/2017	11:25	460761	GRAB	6	292
03/09/2017	10:30	460761	GRAB	102	1110
04/04/2017	08:50	460761	GRAB	176	1370
05/03/2017	11:20	460761	GRAB	404	2290
05/17/2017	10:45	460761	GRAB	146	813
05/17/2017	09:30	LOWJIMJR01	GRAB	156	813
06/07/2017	09:20	460761	GRAB	168	804
06/07/2017	10:00	460761	GRAB	140	804
06/07/2017	08:50	LOWJIMJR01	GRAB	140	804
06/28/2017	09:25	460761	GRAB	134	893
06/28/2017	08:15	LOWJIMJR01	GRAB	174	893
06/28/2017	08:15	LOWJIMJR01	GRAB	158	893
07/12/2017	09:30	460761	GRAB	94	372
07/19/2017	10:00	460761	GRAB	80	269
07/19/2017	09:00	LOWJIMJR01	GRAB	88	269
08/08/2017	11:40	460761	GRAB	104	190
08/09/2017	10:00	460761	GRAB	90	188
08/09/2017	08:30	LOWJIMJR01	GRAB	98	188
08/30/2017	10:00	460761	GRAB	136	344

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
08/30/2017	09:00	LOWJIMJR01	GRAB	100	344
09/12/2017	09:50	460761	GRAB	90	348
09/19/2017	10:20	460761	GRAB	84	349
09/19/2017	09:30	LOWJIMJR01	GRAB	126	349
10/17/2017	10:50	460761	GRAB	86	556
11/20/2017	10:25	460761	GRAB	12	345
12/07/2017	09:50	460761	GRAB	20	256
01/10/2018	10:30	460761	GRAB	6	169
02/07/2018	10:50	460761	GRAB	11	90.4
03/13/2018	10:20	460761	GRAB	16	838
04/24/2018	11:10	460761	GRAB	198	4350
05/10/2018	15:00	460761	GRAB	210	2730
05/10/2018	14:30	LOWJIMJR01	GRAB	252	2730
05/15/2018	12:20	460761	GRAB	304	2210
05/31/2018	15:05	460761	GRAB	236	1430
05/31/2018	14:35	LOWJIMJR01	GRAB	114	1430
06/12/2018	10:05	460761	GRAB	178	1380
06/21/2018	14:40	460761	GRAB	495	2890
06/21/2018	14:10	LOWJIMJR01	GRAB	820	2890
07/12/2018	15:25	460761	GRAB	240	1540
07/12/2018	14:50	LOWJIMJR01	GRAB	176	1540
07/12/2018	14:52	LOWJIMJR01	GRAB/REPLICATE	168	1540
07/23/2018	10:30	460761	GRAB	226	1100
08/02/2018	13:45	460761	GRAB	138	673
08/02/2018	13:25	LOWJIMJR01	GRAB	116	673
08/07/2018	12:20	460761	GRAB	188	950
08/23/2018	14:35	460761	GRAB	106	487
08/23/2018	14:20	LOWJIMJR01	GRAB	94	487
09/11/2018	09:30	460761	GRAB	71	264
09/13/2018	14:40	460761	GRAB	78	235
09/13/2018	14:43	460761	GRAB/REPLICATE	78	235
09/13/2018	14:10	LOWJIMJR01	GRAB	82	235
10/03/2018	10:15	460761	GRAB	56	460
11/08/2018	12:35	460761	GRAB	30	425
12/06/2018	09:40	460761	GRAB	19	321
01/09/2019	10:20	460761	GRAB	8	325
02/19/2019	09:50	460761	GRAB	6	167
03/20/2019	10:20	460761	GRAB	72	15000
04/08/2019	11:15	460761	GRAB	43	14500
05/09/2019	12:35	460761	GRAB	21	13100
06/05/2019	15:05	460761	GRAB	23	12700
06/05/2019	14:35	LOWJIMJR01	GRAB	60	12700
06/19/2019	14:00	LOWJIMJR01	GRAB	154	5700
07/09/2019	10:15	SD_12197	GRAB	264	4530
07/10/2019	14:15	460761	GRAB	212	4940
07/10/2019	13:50	LOWJIMJR01	GRAB	256	4940
07/24/2019	10:05	460761	GRAB	56	8910
08/01/2019	14:15	460761	GRAB	152	6270
08/01/2019	13:55	LOWJIMJR01	GRAB	168	6270
08/13/2019	11:35	460761	GRAB	62	10700
09/10/2019	13:51	SCYJRHWY46	GRAB	92	5590
09/10/2019	14:43	SCYJR303ST	GRAB	178	5590
09/10/2019	09:50	460761	GRAB	196	5590
10/22/2019	10:55	460761	GRAB	244	4910
11/07/2019	11:20	460761	GRAB	60	4410
12/12/2019	10:45	460761	GRAB	37	3950
01/08/2020	10:15	460761	GRAB	21	4780
02/10/2020	12:20	460761	GRAB	21	3300
04/08/2020	10:40	460761	GRAB	62	9420
05/11/2020	12:15	460761	GRAB	80	5440
05/14/2020	14:57	460761	GRAB	76	5170
05/14/2020	14:32	LOWJIMJR01	GRAB	82	5170
06/04/2020	14:20	460761	GRAB	204	4940
06/04/2020	14:00	LOWJIMJR01	GRAB	236	4940

Date	Time	StationID	Sample Type	TSS (mg/L)	Flow (cfs)
06/10/2020	10:00	460761	GRAB	540	4760
06/18/2020	14:35	460761	GRAB	175	5910
06/18/2020	14:15	LOWJIMJR01	GRAB	280	5910
07/01/2020	14:14	460761	GRAB	255	4780
07/01/2020	13:53	LOWJIMJR01	GRAB	393	4780
07/07/2020	10:00	460761	GRAB	224	6350
07/16/2020	14:35	460761	GRAB	420	3510
07/16/2020	14:10	LOWJIMJR01	GRAB	530	3510
07/16/2020	14:12	LOWJIMJR01	GRAB/REPLICATE	530	3510
08/06/2020	14:28	460761	GRAB	340	2400
08/06/2020	14:30	460761	GRAB/REPLICATE	340	2400
08/06/2020	14:07	LOWJIMJR01	GRAB	345	2400
08/11/2020	12:50	460761	GRAB	330	2420
08/13/2020	11:34	SCYJRHWY46	GRAB	240	2330
08/13/2020	12:04	SCYJR303ST	GRAB	202	2330
08/20/2020	14:15	460761	GRAB	256	2110
08/20/2020	13:53	LOWJIMJR01	GRAB	288	2110
09/02/2020	12:00	460761	GRAB	304	1990
10/06/2020	10:30	460761	GRAB	86	1500
11/19/2020	11:40	460761	GRAB	44	823

Table 12. Rapid geomorphic assessment (RGA) results from SD-JA-R-JAMES_11.

Date	Length Assessed	Width	Structure	Reach Assessed	Stream Pattern	Latitude	Longitude	Bed Material	Bed/Bank	Incision	Constriction	Erosion	Instability	Vegetation	Accretion	Channel Stage	Score
12/21/2004			Bridge	Both	Meandering	43.0822	-97.4323	4.0	3.0	1.0	0.0	1.0	0.5	4.0	2.0	3.0	18.5
12/21/2004	500	70	None	Both	Meandering	43.0570	-97.4002	2.0	1.0	2.0	0.0	2.0	2.0	4.0	2.0	3.0	18.0
12/21/2004	500	100	Bridge		Meandering	42.9050	-97.3266	2.0	3.0	3.0	1.0	4.0	3.0	3.0	4.0	3.0	26.0
06/14/2006			Bridge	Above	Straight	42.8801	-97.2795	4.0	1.0	0.0	0.0	4.0	4.0	0.0	4.0	3.0	20.0
06/14/2006			Bridge	Below		42.8950	-97.2742	4.0	2.0	0.0	0.0	4.0	3.0	0.0	3.0	3.0	19.0
06/14/2006			Bridge	Both	Straight	42.9075	-97.3262	4.0	1.0	0.0	0.0	4.0	3.0	0.0	2.5	3.0	17.5
06/14/2006	800	167	Bridge	Both	Straight	42.9957	-97.3703	4.0	1.0	0.0	0.0	4.0	1.5	0.5	2.0	3.0	16.0
06/14/2006			Bridge	Both	Meandering	43.0576	-97.3989	4.0	2.0	0.0	0.0	2.0	2.0	4.0	2.0	3.0	19.0
06/14/2006	150		None		Straight	43.0488	-97.3989	4.0	1.0	0.0	0.0	2.0	0.0	2.0	0.0	3.0	12.0
06/14/2006	300		Bridge	Both	Meandering	43.0821	-97.4326	4.0	1.0	0.0	0.0	2.0	1.0	3.5	2.0	3.0	16.5
06/14/2006			None		Meandering	43.0829	-97.4271	4.0	1.0	0.0	0.0	3.0	2.0	3.5	3.5	3.0	20.0
06/14/2006	300	203	Bridge		Meandering	43.0984	-97.4866	4.0	1.0	0.0	0.0	3.0	1.5	3.0	3.0	3.0	18.5
09/30/2021	0.5 miles		Bridge	Both	meandering	43.1449	-97.5775	4.0	3.0	2.0	0.0	3.0	2.0	4.0	2.5	4.0	24.5
09/30/2021	0.75 miles			Both	meandering	43.0983	-97.4867	4.0	1.0	2.0	0.0	1.0	0.0	3.5	3.0	3.0	17.5
09/30/2021			bridge	both	meandering	43.0821	-97.4327	4.0	2.0	2.0	0.0	2.0	1.5	4.0	3.0	3.0	21.5
09/30/2021	1 mile		bridge	both	meandering	43.0579	-97.3987	4.0	3.0	2.0	0.0	3.0	1.5	3.0	4.0	4.0	24.5
09/30/2021			bridge	both	straight	42.9960	-97.3703	4.0	3.0	2.0	0.0	4.0	2.5	2.0	4.0	4.0	25.5
09/30/2021			bridge	both	straight	42.9074	-97.3263	4.0	3.0	2.0	4.0	4.0	3.0	1.0	4.0	4.0	29.0
09/30/2021			bridge	both	straight	42.8804	-97.2797	4.0	4.0	2.0	0.0	4.0	2.0	2.0	4.0	4.0	26.0

Appendix B. Construction Stormwater Permits

Table 13. Active construction stormwater permits in the SD-JA-R-JAMES_11 watershed.

Permit Number	Company Name	Project Name	Project Address	Project Start Date	Project End Date	Acres Disturbed	Discharge Nature	Latitude	Longitude
SDR10J164	Ralph & Lucille Marquardt	Lesterville Hog Barn	2 miles S & 1/2 mile E of Lesterville Lesterville, SD 57040	09/01/2018	06/01/2019	1	Construction of hog barn	43.01028	-97.5881
SDR10K099	Rykens RV Park	Rykens RV Park (Lake Alexis)	435th Ave & 305th Street Yankton, SD 57078	12/08/2020	12/07/2021	22	grading area for future development	42.9633	-97.4926
SDR10K371	B-Y Water District	B-Y Water Contract 2019-02	SD Hwy 46 and US Hwy 81 Tabor, SD 57063	11/05/2021	12/15/2022	42	Relocation of water main and appurtenances	43.08257	-97.3989
SDR10K465	NuStar Pipeline Operating Partnership	James River Pipeline Replacement	1.38 miles SE of town Jamesville, SD 57045	10/30/2021	12/31/2021	4.9	pipeline replacement using horizontal directional drilling & access roads	43.09204	-97.4597
SDR10K628	Marquardt Companies	Utica Governors Housing Development	435th Ave & 304th St Utica, SD 57067	12/01/2021	06/30/2022	1.5	utility work, road reconstruction, grading	42.98028	-97.4961
SDR10P104	SD Department of Transportation	BRO 8068(13)	7 miles N & 1 mile E (Stone Church Road) Lesterville, SD 57040	05/21/2021	12/05/2021	1.1	This project will consist of a structure replacement and approach grading.	43.14583	-97.5496

Appendix C. EPA Approval Letter and Decision Document