THE 2004 SOUTH DAKOTA INTEGRATED REPORT FOR SURFACE WATER QUALITY ASSESSMENT

Protecting South Dakota's Tomorrow…Today

Prepared By
SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

Steven M. Pirner, Secretary

SOUTH DAKOTA WATER QUALITY
WATER YEARS 1998-2003 (streams) and
WATER YEARS 1993-2003 (lakes)

The 2004 South Dakota Integrated Report
Surface Water Quality Assessment

by the State of South Dakota

pursuant to
Sections 305(b), 303(d), and 314 of the Federal Water Pollution Control Act

South Dakota Department of Environment and Natural Resources

Steven M. Pirner, Secretary

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
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March 30, 2004

Robbie Roberts, Administrator
US Environmental Protection Agency, Region 8
999 18th Street, Suite 300
Denver, CO 80202-2466

Re: Final 2004 South Dakota Integrated Report

Dear Mr. Roberts:

I am pleased to submit to you the 2004 South Dakota Integrated Report, with supporting documentation, as required under Sections 305(b) and 303(d) of the Clean Water Act.

This submittal represents a large effort by this department as well as interested members of the South Dakota public. The 2004 report is one of the most comprehensive reviews of water quality data completed in South Dakota to date.

We have provided your agency with an electronic copy of the list in addition to this submittal. It will also be available in the near future via our homepage at http://www.state.sd.us/denr/denr.html.

We look forward to your agency's approval of our 2004 Integrated Report. We also want to thank members of your staff for their assistance and insights during the development process.

Sincerely,

Steven M. Pirner
Secretary

Enclosure

Cc: Max Dodson, USEPA Region 8
Bruce Zander, USEPA Region 8
Carol Campbell, USEPA Region 8

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MAY - 3 2004

Ref: 8EPR-EP

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

Re: Clean Water Act Section 303(d)
Total Maximum Daily Load (TMDL) Waterbody
List

Dear Mr. Pirner:

Thank you for your submittal of South Dakota's 2004 Integrated Report for Surface Water Quality Assessment dated March 30, 2004. EPA has conducted a complete review of the Clean Water Act Section 303(d) waterbody list and supporting documentation and information. Based on this review, EPA has determined that South Dakota's 2004 list of water quality limited segments (WQLSs) still requiring TMDLs meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations. Therefore, by this order, EPA hereby APPROVES South Dakota's 2004 Section 303(d) list. Please see the enclosure for a description of the statutory and regulatory requirements and a summary of EPA's review of South Dakota's compliance with each requirement.

EPA's approval of South Dakota's 2004 Section 303(d) list extends to all waterbodies in categories 5 and 6a of the list with the exception of those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove the State's list with respect to those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.

The public participation process sponsored by South Dakota DENR included publishing display ads in newspapers across the state requesting public input in developing the draft list and requesting water quality data, official public notices on the list availability, use of the South Dakota DENR website, and a mailing to many entities asking for both comments and additional data or information on waters. We commend the State for its thorough public participation process.

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We wish to inform you that our office has received concurrence from the U.S. Fish and Wildlife Service regarding our biological evaluations of the approval of the State's year 2004 Section 303(d) waterbody list. Our biological evaluation that addressed our approval was submitted to the Service in accordance with Section 7 of the Endangered Species Act. In our evaluation, we assessed the effects of our approval on the threatened, endangered, proposed, and candidate species throughout the State. Our conclusion was that our approval of the State's list would not likely have an adverse effect on the species of concern. Any effect of the list approval was seen as either insignificant or beneficial to the species.

Under current regulations, the next Section 303(d) list is required to be submitted on April 1, 2006. We suggest you stay abreast of EPA TMDL guidance development in the months to come in the event of any changes to that date. Although current regulations require lists to be submitted every 2 years, in April of even years, states may submit Section 303(d) lists more frequently as they deem necessary. All additions, deletions and modifications to the list will require EPA approval.

Again, thank you for the efforts related to the good job of developing the Section 303(d) TMDL waterbody list for the 2004-2006 biennium. If you have questions on any of the above information, feel free to give me, or Vern Berry (303-312-6234) of my staff, a call.

Sincerely,

Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and
Remediation

Enclosure

Table of Contents

FIGURES ..... **II**

TABLES ..... **III**

I. INTRODUCTION **4**

II. EXECUTIVE SUMMARY **3**

III. SURFACE WATER QUALITY ASSESSMENT **6**

SURFACE WATER QUALITY MONITORING PROGRAM 6
METHODOLOGY 20
STATEWIDE SURFACE WATER QUALITY SUMMARY 25
LAKE WATER QUALITY ASSESSMENT 32
RIVER BASIN ASSESSMENTS 37
WETLANDS 163
PUBLIC HEALTH/AQUATIC LIFE CONCERNS 168

IV. POLLUTION CONTROL PROGRAMS **180**

POINT SOURCE POLLUTION CONTROL PROGRAM 180
NONPOINT SOURCE POLLUTION CONTROL PROGRAM 181

V. PUBLIC PARTICIPATION PROCESS **187**

VI. REFERENCES **188**

VII. KEY TO ABBREVIATIONS **190**

APPENDICES **191**

APPENDIX A – WATERBODIES FROM THE 2002 303(D) LIST TO BE DELISTED 192
APPENDIX B – SURFACE WATER QUALITY MONITORING SCHEDULE AND SAMPLING SITE DESCRIPTION 195
APPENDIX C – PUBLIC PARTICIPATION DISPLAYS AND RESPONSE TO PUBLIC COMMENTS 207

Figures

Figure 1: Status of TMDLs from the 2002 303(d) list 18
Figure 2: Location and Distribution of Lakes and Reservoirs in South Dakota Ecoregions: 23
Figure 3: Major River Basins in South Dakota 38
Figure 4: 2004 South Dakota Waterbody Support Status 39
Figure 5: 2004 South Dakota TMDL Waters 40
Figure 6: Bad River Basin Waterbody Support Status 47
Figure 7: Bad River Basin TMDL Waters 48
Figure 8: Belle Fourche River Basin Waterbody Support Status 59
Figure 9: Belle Fourche River Basin TMDL Waters 60
Figure 10: Upper Big Sioux River Basin Waterbody Support Status 72
Figure 11: Lower Big Sioux River Basin Waterbody Support Status 73
Figure 12: Upper Big Sioux River Basin TMDL Waters 74
Figure 13: Lower Big Sioux River Basin TMDL Waters 75
Figure 14: Upper Cheyenne River Basin Waterbody Support Status 89
Figure 15: Lower Cheyenne River Basin Waterbody Support Status 90
Figure 16: Upper Cheyenne River Basin TMDL Waters 91
Figure 17: Lower Cheyenne River Basin TMDL Waters 92
Figure 18: Grand River Basin Waterbody Support Status 97
Figure 19: Grand River Basin TMDL Waters 98
Figure 20: Upper James River Basin Waterbody Support Status 109
Figure 21: Lower James River Basin Waterbody Support Status 110
Figure 22: Upper James River Basin TMDL Waters 111
Figure 23: Lower James River Basin TMDL Waters 112
Figure 24: Little Missouri River Basin Waterbody Support Status 115
Figure 25: Little Missouri River Basin TMDL Waters 116
Figure 26: Minnesota River Basin Waterbody Support Status 122
Figure 27: Minnesota River Basin TMDL Waters 123
Figure 28: Upper Missouri River Basin Waterbody Support Status 134
Figure 29: Lower Missouri River Basin Waterbody Support Status 135
Figure 30: Upper Missouri River Basin TMDL Waters 136
Figure 31: Lower Missouri River Basin TMDL Waters 137
Figure 32: Moreau River Basin Waterbody Support Status 141
Figure 33: Moreau River Basin TMDL Waters 142
Figure 34: Niobrara River Basin Waterbody Support Status 145
Figure 35: Niobrara River Basin TMDL Waters 146
Figure 36: Red River Basin Waterbody Support Status 149
Figure 37: Red River Basin TMDL Waters 150
Figure 38: Vermillion River Basin Waterbody Support Status 156
Figure 39: Vermillion River Basin TMDL Waters 157
Figure 40: White River Basin Waterbody Support Status 161
Figure 41: White River Basin TMDL Waters 162
Figure 42: The Prairie Pothole Region in South Dakota and Wetland Losses in the Prairie Pothole Region in SD and Adjoining States (USGS Supply Paper 2425) 164
Figure 43: South Dakota DENR Water Quality Monitoring Sites 204
Figure 44: Water Quality Monitoring Stations on Whitewood Creek and tributaries in the Lead-Deadwood Area 205
Figure 45: Water Quality Monitoring Stations located on the Big Sioux River in the Sioux Falls Area 206

Tables

Table 1. Atlas 4
Table 2: Numeric Criteria Assigned to Beneficial Uses of Surface Waters of the State ARSD 74:51:01 9
Table 3: Surface Water Quality Standards for Toxic Pollutants ARSD 74:51:01 10
Table 4: Status of TMDLs from the 2002 303(d) list 18
Table 5: 2004 303(d) Summary of TMDLs by Basin 19
Table 6: Sample Criteria for Determining Support Status 21
Table 7: South Dakota Ecoregions Support Determination Range For Lakes 23
Table 8: Designated Overall Use Support Status for Rivers and Streams in South Dakota 26
Table 9: Designated Overall Use Support Status for Lakes and Reservoirs in South Dakota 27
Table 10: Individual Use Support Summary for Rivers and Streams 27
Table 11: Individual Use Support Summary for Lakes and Reservoirs 29
Table 12: Total Sizes of Water Impaired by Various Cause Categories in South Dakota 30
Table 13: Total Sizes of Waters Impaired by Various Source Categories in South Dakota 31
Table 14: Trophic Status of Significant Publicly Owned Lakes 33
Table 15: Acid Effects on Lakes 35
Table 16: Long-Term Trends in Public Lakes (1989-2003) 36
Table 17: Bad River Basin Information 45
Table 18: Belle Fourche River Basin Information 52
Table 19: Big Sioux River Basin Information 63
Table 20: Cheyenne River Basin Information 80
Table 21: Grand River Basin Information 95
Table 22: James River Basin Information 101
Table 23: Little Missouri River Basin Information 114
Table 24: Minnesota River Basin Information 119
Table 25: Missouri River Basin Information 127
Table 26: Moreau River Basin Information 139
Table 27: Niobrara River Basin Information 144
Table 28: Red River Basin Information 148
Table 29: Vermillion River Basin Information 153
Table 30: White River Basin Information 159
Table 31: Extent of Wetlands, by Type 165
Table 32: Total Size Affected by Toxics 168
Table 33: Summary of Fish Kill Investigations (October 1, 2001 - September 30, 2003) 169
Table 34: Waterbodies Affected by Swimming Beach Closures 176
Table 35: Waterbodies Affected by Fish and Shellfish Consumption Restrictions 178
Table 36: Waterbodies Affected by Surface Drinking Water Restrictions 178
Table 37: Summary of Waterbodies Not Fully Supporting Drinking Water Use 179
Table 38: State-Level Summary of Drinking Water Use Assessments for Rivers and Streams 179
Table 39: State-Level Summary of Drinking Water Use Assessment for Lakes and Reservoirs 179
Table 40: South Dakota Categories and Subcategories of NPS Pollution Sources 185

I. INTRODUCTION

This integrated 305(b) and 303(d) report (Integrated Report) was prepared by the South Dakota Department of Environment and Natural Resources (DENR) pursuant to Sections 305(b), 303(d), and 314 of the Federal Water Pollution Control Act (P.L. 95-217).

The 305(b) report in previous years provided an assessment of the quality of South Dakota's water resources and summarized state programs established to prevent and control water pollution. The 303(d) report identified impaired waterbodies within South Dakota that require the development of Total Maximum Daily Loads (TMDLs). The 305(b) report was routinely used to create the 303(d) impaired waterbody list.

The purpose of this document is to combine the 305(b) report and 303(d) lists into one Integrated Report, which will provide an assessment of the quality of South Dakota's surface water resources and identify the impaired waterbodies that need TMDLs. It is the intent of this report to inform the citizens of South Dakota and the US Environmental Protection Agency (EPA) of the condition of state surface water resources and to serve as the basis for management decisions by government and other entities for the protection of surface water quality.

EPA will use the information from the Integrated Report to document the states' progress in meeting and maintaining Clean Water Act goals for the ecological health of the nation's surface waters and their domestic, commercial, and recreational uses. DENR will use the information in this report along with population data, economic analyses, program capability assessments, and other appropriate information to plan and prioritize water pollution control activities.

DENR will also use the Integrated Report as a tool to continue to stimulate development of nonpoint source (NPS) projects and to produce a priority waterbody list for the program. The Integrated Report will be available to all state conservation districts and water development districts. Each district can review watershed information for its geographical area of interest. This helps the districts focus on the location, nature, and severity of surface water problems in their areas. This generally leads to public discussions, which start the long process towards nonpoint source pollution control implementation.

This report is also shared with the Nonpoint Source Task Force to help focus its efforts and provide information used in the priority waterbody ranking system. The Nonpoint Source program also uses this document to supplement news articles released through the DENR Information and Education (I&E) program.

The surface water quality assessments listed in this report rely heavily on the analyses of data generated by DENR, the United States Geological Survey (USGS), personal observations of field samplers, water quality data submitted by the cities of Watertown and Sioux Falls, and best professional judgement. While this assessment is as compre-

hensive as resources permit, undoubtedly some of the state's surface water quality problems, particularly localized ones, do not appear in this report.

South Dakota Law (SDCL 34A-2-4 and 34A-2-6) authorizes the Department's Secretary to provide this assessment of current state surface water quality to the people of the State of South Dakota and the Environmental Protection Agency (EPA).

II. EXECUTIVE SUMMARY

The purpose of this report is to assess the water quality of South Dakota's water resources and to identify the impaired waterbodies that require TMDLs. This report meets the requirements of Sections 305(b), 303(d), and 314 of the federal Clean Water Act which mandates a biennial report on state water quality to Congress. This report is also intended to inform the citizens of South Dakota on the status of the quality of their water resources and to serve as the basis for management decisions by government staff and local officials for the protection of water quality. DENR will use the information in this report along with population data, economic analyses, program capability assessments, and other appropriate sources to plan and prioritize water pollution control activities.

Surface Water Quality

South Dakota has a total of 10,298 miles of rivers and major streams (Table 1). About 7,360 miles have been assessed in the past five years (October 1998 to September 2003). During this 5-year interval, 56% of assessed stream miles were found to support all assigned beneficial uses and 44% were nonsupporting of their designated uses. Seventy-six percent of stream miles designated for immersion recreation supported swimmable uses, 20% did not meet the swimmable criteria, and 4% had insufficient data to determine support status. A total of 96 different streams or stream segments are either listed as impaired or require TMDL development to ensure water quality standards are maintained.

Similar to previous reporting periods, nonsupport for fishable/aquatic life uses was caused primarily by total suspended solids (TSS) from agricultural nonpoint sources (NPS) and natural origin.

In addition to rivers and streams, South Dakota has 573 lakes and reservoirs with Water Quality Standards classifications. The four Missouri River mainstem reservoirs were not included in the total lake acres, but were included in the monitored river mileage.

Excluding the four mainstem reservoirs, 34% (54 lakes) of the lake acreage assessed from 1993 to 2003 is considered to support all designated uses and 66% (68 lakes) does not support uses. A total of 68 lakes are listed as impaired and require TMDL development. Runoff, carrying sediment and nutrients, is the major nonpoint pollution source. Sediment from several major and many minor tributaries is also shortening the useful lives of the four large mainstem reservoirs. Much of the sedimentation is due to natural sources.

DENR continues to conduct special chemical/physical/biological stream surveys and routine ambient monitoring to assess the quality of receiving streams and to document water quality problem sources.

Table 1. Atlas

State population (2000 census)	754,844
State surface area (sq. mi.)	77,047
Number of water basins (according to state subdivisions)	14
Total number of river miles	10,298
Number of perennial river miles (subset)	2,293
Number of intermittent stream miles (subset)	8,005
Number of border river miles of shared rivers/streams (subset)	360*
Miles of ditches and canals (man-made waterways)	424*
Number of classified lakes/reservoirs/ponds	573
Acres of lakes/reservoirs/ponds	204,897
Square miles of estuaries/harbors/bays	0
Number of ocean coastal miles	0
Number of Great Lakes shore miles	0
Acres of freshwater wetlands	1,780,000
Acres of tidal wetlands	0

Name of border rivers: Missouri River, Big Sioux River, Bois de Sioux River.

* (EPA, 1991)

Wetlands

According to recent estimates issued by the US Fish and Wildlife Service (USFWS), South Dakota originally had approximately 2.7 million acres of wetlands. Today, there are roughly 1.8 million acres remaining, which represents a loss of one-third attributable to both natural and human causes. Highest losses were recorded for small temporary wetland basins less than two acres in area. The rate of wetland destruction within the state appears to have slowed considerably. All of the reasons are not known, but one major influence was probably the "Swampbuster" provisions of the 1985 Farm Bill. This Act effectively reduced or removed certain incentives for producers to drain and convert wetlands to agricultural use. Another factor may have been that many of the remaining wetlands are very difficult and/or economically unfeasible to drain and use for crop production.

South Dakota made substantial progress in the past several years toward developing appropriate wetland water quality standards. On December 3, 1992, South Dakota adopted, through the South Dakota Surface Water Quality Standards, a provision that wetlands be included as "waters of the state." Wetlands were also designated the beneficial use of fish and wildlife propagation, recreation and stock watering, which provides protection under existing narrative and numeric water quality standards.

Water Pollution Control Programs

The water quality goals of the state are to: identify water quality problems; set forth effective management programs for water pollution control; alleviate water quality problems; and achieve and preserve water quality for all intended uses.

Point Source Pollution Control (Surface Water Discharge System):
DENR continues to implement the National Pollutant Discharge Elimination System (NPDES) program in South Dakota, referred to as the Surface Water Discharge (SWD) program. The SWD program implements SWD permits and develops the point source TMDLs that are required to ensure water quality standards are maintained. A total of 26 stream segments (waterbodies) will require a point source TMDL that will coincide with a SWD permit renewal this report cycle. Sixteen percent of the total number of TMDLs that are required are from SWD permit renewals.

Nonpoint Source Pollution Control:
Nonpoint Source (NPS) pollution originates from diverse and diffuse sources. Nonpoint pollution controls must reflect this by wisely using resources available from various state, federal, and local organizations plus have landowner support and participation. South Dakota primarily uses voluntary measures for the implementation of Best Management Practices (BMPs) to control NPS pollution. During the past 20 years, the program has initiated many development and implementation projects throughout the state. The Clean Water Act section 319 program is the focal point for a majority of the existing NPS control programs. However, the technical and financial assistance currently available is not sufficient to solve all of the NPS pollution problems in the state. Other solutions must be explored. Landowners have the capability to accomplish much if they understand the problems and the methods to solve them. Many of the solutions involve land management changes that benefit the landowner by making their lands more productive and sustainable. Educating the public about NPS pollution issues has been effective in prompting many landowners to voluntarily implement activities to control NPS pollution. A total of 70 stream segments and 68 lakes require nonpoint source TMDLs to address impairments. Forty-three percent of the total number of required TMDLs are for streams and 41% are for lakes.

III. SURFACE WATER QUALITY ASSESSMENT

SURFACE WATER QUALITY MONITORING PROGRAM

General Discussion

South Dakota DENR monitors surface waters in the state through an established ambient water quality sampling program, water quality surveys, fish surveys, TMDLs, Surface Water Discharge (SWD) permits, and individual state and federal lakes and nonpoint source projects. Aside from DENR, the United States Geological Survey (USGS) also conducts routine monitoring throughout the state. All data resulting from USGS monitoring efforts are available from the USGS website. Much of the state's data has been entered into the United States Environmental Protection Agency STORET computer system.

Water samples are analyzed for physical, chemical, biological, and bacteriological parameters to provide baseline data for the determination of potential effects of point and nonpoint sources of pollution. Baseline data are also used as a management tool to determine the effectiveness of control programs on existing point and nonpoint sources and for directing future activities. Water samples can show whether or not a waterbody is meeting its assigned water quality beneficial uses. Water quality standards were first established for all surface waters by the state's Committee on Water Pollution in 1967. The Water Management Board completed the final steps of its most recent triennial review and revisions in December 1998 and the US EPA formally approved South Dakota's standards on March 29, 2000. These water quality standards consist of water quality criteria necessary to protect the assigned beneficial uses of state surface waters.

All surface waters in the state are classified for one or more of the following beneficial uses:

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

All streams in South Dakota are assigned the beneficial uses (9) and (10) unless otherwise stated in the Administrative Rules of South Dakota (ARSD) Chapter 74:51:03. Lakes listed in ARSD Chapter 74:51:02 are assigned the beneficial uses of (7) and (8)

unless otherwise specified. All lakes in South Dakota are also assigned the beneficial use of (9) unless otherwise stated in the same reference (74:51:02) http://legis.state.sd.us/rules/rules/7451.htm. Table 2 contains a summary of the established beneficial uses and a partial listing of assigned criteria to protect them. Current state toxic pollutant standards for human health and aquatic life are presented in Table 3.

Fixed Station Ambient Monitoring

The DENR water quality monitoring network was expanded from 94 stations to a total of 137 stations at the present time. Sampling stations are located within high quality beneficial use classifications, above and below municipal/industrial discharges, or within problem watersheds. Currently, the department collects these samples on a monthly, quarterly, or seasonal basis. This type of water sampling is invaluable for monitoring historical information, natural background conditions, possible runoff events, and acute or chronic water quality problems.

Typically, grab samples are collected mid-stream, either from a bridge or by wading. Some stations may have to be sampled from the bank depending on conditions. Every station is sampled in the same manner and location each time. When the sample has been collected, the sampler immediately obtains water and air temperatures, pH reading, and dissolved oxygen content. Time of sample, water depth, channel width, and other visual observations are also recorded. The samples are properly preserved and transported to the laboratory for analysis. Sample test results are entered into EPA's computer data storage and retrieval system (STORET).

The most commonly sampled parameters include fecal coliform, conductivity, hardness, BOD_5, alkalinity, residue (total solids, total suspended solids, total dissolved solids), pH, ammonia, nitrates, and phosphorous (total and dissolved). Several stations are sampled for sodium, calcium, and magnesium during the irrigation season. Stations located along streams that receive flows associated with hard rock mines are also analyzed for cyanide, cadmium, lead, copper, zinc, chromium, mercury, nickel, silver, and arsenic.

Ambient station locations, descriptions, and schedules are included in Appendix A. More detailed descriptions of individual stream sites are available from DENR on request.

Intensive Water Quality Monitoring (Point Sources)

Water quality monitoring surveys are performed by the Surface Water Quality Program to document stream improvement areas, stream degradation areas, develop point source TMDLs, or to provide data for developing or verifying SWD permit limits. The major intent of the water quality monitoring program is to monitor instream water quality at critical points to ensure protection of the assigned beneficial uses.

Major wastewater facilities needing greater than secondary treatment are evaluated by conducting an intensive water quality survey both above and below a wastewater

discharge. These wasteload allocations are the basis for future treatment needs and SWD permit limits.

With increased emphasis on water quality improvements to justify federal expenditures, the monitoring program will concentrate on showing water quality improvements from the upgrading of wastewater treatment facilities. After wastewater treatment facilities are upgraded, monitoring is used to verify SWD permit limits developed through computer modeling. Surveys provide an evaluation of whether or not the wastewater treatment is adequate to protect the beneficial use of receiving waters.

Intensive Water Quality Monitoring (Special Studies)

Intensive water quality monitoring is sometimes initiated to assess special problem areas, to obtain data for use in site-specific criteria modification studies, or to provide an updated database for a waterbody.

Intensive Fish Survey Monitoring

Fish surveys are occasionally conducted by GF&P and the Surface Water Quality Program to evaluate the impact of wastewater dischargers on the receiving stream and to evaluate the fishery classification. The fish survey results, although they are qualitative in nature, are used in conjunction with water quality surveys to evaluate the impact of pollutants on stream water quality.

Biological Sampling Program

Biological samples are often included as part of a watershed assessment study or a special study. The state Water Resources Assistance Program includes aquatic plant and algae surveys, either as chlorophyll *a* concentration and/or algae identification and counts.

Toxicity Testing Program

Priority toxic pollutants are relatively expensive to analyze and are not routinely monitored except for special situations. Whole effluent toxicity tests have been included as permit limits in many major municipal and industrial SWD permits.

Parameters (mg/L) except where noted	(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, wildlife propagation, recreation & stock watering	(10) Irrigation	(11) Commerce and Industry
Alkalinity ($CaCO_3$)									750[1]/1,313[2]		
Barium	1.0										
Chloride	250[1]/438[2]	100[1]/175[2]									
Chlorine, total residual		0.019 acute 0.011chronic	0.019 acute 0.011chronic	0.019 acute 0.011chronic	0.019 acute 0.011chronic	0.019 acute 0.011chronic					
Coliform, total (per 100 mL)	5,000 (mean); 20,000 (single sample)										
Coliform, fecal (per 100 mL)							200 (mean); 400 (single sample)	1,000 (mean); 2,000 (single sample)			
Conductivity (uohms/cm @ 25°C)									4,000[1]/7,000[2]	2,500[1]/ 4,375[2]	
Fluoride	4.0										
Hydrogen sulfide, undisassociated		0.002	0.002	0.002	0.002	0.002					
Nitrogen, unionized ammonia as N		0.02[1]/1.75 x the criterion	0.02[1]/1.75 x the criterion	0.04[1]/1.75 x the criterion	0.04[1]/1.75 x the criterion	0.05[1]/1.75 x the criterion					
Nitrogen, nitrates as N	10.0								50[1]/88[2]		
Oxygen, dissolved		≥ 6.0; ≥ 7.0 (during spawning season)	≥ 5.0	≥ 5.0; ≥ 6.0 (in Big Stone Lk & Lk Traverse during Apr & May)	≥ 5.0	≥ 4.0	≥ 5.0	≥ 5.0			
pH (standard units)	6.5 – 9.0	6.6 – 8.6	6.5 – 8.8	6.5 – 9.0	6.5 – 9.0	6.0 – 9.0			6.0 – 9.5		6.0 – 9.5
Sodium Adsorption Ratio										10	
Solids, suspended		30[1]/53[2]	90[1]/158[2]	90[1]/158[2]	90[1]/158[2]	150[1]/263[2]					
Solids, total dissolved	1,000[1]/1,750[2]								2,500[1]/4,375[2]		2,000[1]/3,500[2]
Sulfate	500[1]/875[2]										
Temperature (°F)		65	75	80	90	90					
Total Petroleum Hydrocarbons	≤ 1.0								≤ 10		
Oil and Grease									≤ 10		

Table 2: Numeric Criteria Assigned to Beneficial Uses of Surface Waters of the State ARSD 74:51:01

[1] 30-day average [2] daily maximum

Table 3: Surface Water Quality Standards for Toxic Pollutants ARSD 74:51:01

Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute (CMC)/ Chronic (CCC)	Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute(CMC)/ Chronic (CCC)
Acenaphthene	1,200/2,700		Cadmium	-/-	3.7[9]/1.0[9]
Acenaphthylene (PAH)[6]	-/-	-/-	Carbon Tetrachloride[5] (Tetrachloromethane)	0.25/4.4	-/-
Acrolein	320/780	-/-	Chlordane[5]	0.00057/0.00059	2.4/0.0043
Acrylonitrile[5]	0.059/0.66	-/-	Chlorine	-/-	19/11
Aldrin[5]	0.00013/0.00014	3.0/-	Chlorobenzene (monochlorobenzene)	680/21,000	-/-
Anthracene (PAH)[6]	9,600/110,000	-/-	Chlorodibromomethane (HM)[6]	0.41/34	-/-
Antimony	14/4,300	-/-	Chloroform (HM)[5] (Trichloromethane)	5.7/470	-/-
Arsenic[5]	0.018/0.14	360/190	2-Chloronaphthalene	1,700/4,300	
Asbestos[5]	7,000,000 fibers/L	-/-	2-Chlorophenol	120/400	
BHC (alpha)[5] (Hexachlorocyclohexane-alpha)	0.0039/0.013	-/-	Chromium(III)	-/-	550[9]/180[9]
BHC (beta)[5] (Hexachlorocyclohexane-beta)	0.014/0.046	-/-	Chromium(VI)	-/-	15/10
BHC (gamma) (Lindane)[5] (Hexachlorocyclohexane-gamma)	0.019/0.063	2.0/0.08	Chrysene (PAH)[5]	0.0028/0.031	-/-
Benzene[5]	1.2/71	-/-	Copper	1,300/-	17[9]/11[9]
Benzidine[5]	0.00012/0.00054	-/-	Cyanide (weak acid dissociable)	700/220,000	22/5.2
Benzo (a) Anthracene (PAH)[5] (1,2 Benzanthracene)	0.0028/0.031	-/-	4,4'-DDD[5]	0.00083/ 0.00084	-/-
Benzo (a) Pyrene (PAH)[5] (3,4 Benzopyrene)	0.0028/0.031	-/-	4,4'-DDE[5]	0.00059/ 0.00059	-/-
Benzo (b) Fluoroanthene (PAH)[5] (3,4 Benzofluoroanthene)	0.0028/0.031	-/-	4,4'-DDT[5][7]	0.00059/ 0.00059	1.1/0.001
Benzo (k) Fluoroanthene (PAH)[5] (11,12 – Benzofluoroanthene)	0.0028/0.031	-/-	Dibenzo (a,h) Anthracene (PAH)[C] (1,2,5,6-Dibenzanthracene)	0.0028/0.031	-/-
Benzo (g,h,i) Perylene (PAH)[6] (1,12 Benzoperylene)	-/-	-/-	1,2 Dichlorobenzene	2,700/17,000	-/-
Beryllium[5]	-/-	-/-	1,3 & 1,4-Dichlorobenzene	400/2,600	-/-
Bis (2-chloroethyl) Ether[5]	0.031/1.4	-/-	3,3'-Dichlorobenzidine[5]	0.04/0.077	-/-
Bis (2-chloroisopropyl) Ether	1,400/170,000	-/-	Dichlorobromomethane (HM)[6]	0.27/22	-/-
Bis (2-ethylhexyl) Phthalate[5]	1.8/5.9	-/-	1,2-Dichloroethane[5]	0.38/99	-/-
Bromoform (HM)(6)	4.3/360	-/-	1,1-Dichloroethylene(5)	0.057/3.2	-/-

Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute (CMC)/ Chronic (CCC)	Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute(CMC)/ Chronic (CCC)
(Tribromomethane)					
Butyl Benzene Phthalate	3,000/5,200		2,4-Dichlorophenol	93/790	-/-
1,2-Dichloropropane	0.52/39		Mercury	0.14/0.15	2.1/0.012(10)
1,3-Dichloropropylene, Cis & Trans (1,3-Dichloropropene)	10/1,700	-/-	Methyl Bromide (HM) (Bromomethane)	48/4,000	-/-
Dieldrin(5)	0.00014/0.00014	2.5/0.0019	Methyl Chloride (HM)(6) (Chloromethane)	-/-	-/-
Diethyl Phthalate	23,000/120,000	-/-	Methylene Chloride (HM)(5)(Dichloromethane)	4.7/1,600	-/-
2,4-Dimethylphenol	540/2,300		N-Nitrosodimethylamine(5)	0.00069/8.1	-/-
Dimethyl Phthalate	313,000/2,900,000	-/-	N-Nitrosodi-n-Propylamide	0.005/1.4	
Di-n-butyl Phthalate	2,700/12,000	-/-	N-Nitrosodiphenylamine(5)	5.0/16.0	-/-
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	13.4/765	-/-	Nickel	610/4,600	1,400(9)/160(9)
2,4-Dinitrophenol	70/14,000	-/-	Nitrobenzene	17/1,900	-/-
Dioxin (2,3,7,8-TCDD)(5)	0.000000013/ 0.000000014	-/-	PCB-1016, 1221, 1232, 1242, 1248, 1254, 1260 (Arochlor 1016, 1221, 1232, 1242, 1248, 1254, 1260)(2)(5)(7)	0.000044/ 0.000045	-/0.014
1,2-Diphenylhydrazine(5)	0.040/0.54	-/-	Pentachlorophenol	0.28/8.2	20 (8)/13(8)
2,4-Dinitrotoluene(5)	0.11/9.1	-/-	Phenanthrene (PAH)(6)	-/-	-/-
Endosulfan (alpha & beta)	0.93/2.0	0.22/0.056	Phenol	21,000/4,600,000	-/-
Endosulfan Sulfate	0.93/2.0	-/-	Pyrene (PAH)(6)	960/11,000	-/-
Endrin	0.76/0.81	0.18/0.0023	Selenium(7)	-/-	20/5
Endrin aldehyde	0.76/0.81	-/-	Silver	-/-	3.4(9)/-
Ethylbenzene	3,100/29,000	-/-	1,1,2,2-Tetrachloroethane(5)	0.17/11	-/-
Fluoranthene	300/370	-/-	Tetrachloroethylene(6)	0.8/8.85	-/-
Fluorene (PAH)(6)	1,300/14,000	-/-	Thallium	1.7/6.3	-/-
Heptachlor(5)	0.00021/0.00021	0.52/0.0038	Toluene	6,800/200,000	-/-
Heptachlor epoxide(5)	0.00010/0.00011	0.52/0.0038	Toxaphene(5)	0.00073/0.00075	0.73/0.0002
Hexachlorobenzene(5)	0.00075/0.00077	-/-	1,2-Trans-Dichloroethylene	700/-	
Hexachlorobutadiene(5)	0.44/50	-/-	1,1,1-Trichloroethane	-/-	-/-
Hexachlorocyclopentadiene	240/17,000	-/-	1,1,2-Trichloroethane(5)	0.60/42	-/-
Hexachloroethane(5)	1.9/8.9	-/-	Trichloroethylene(5)	2.7/81	-/-
Indeno (1,2,3-c,d) pyrene (PAH)(c)	0.0028/0.0311	-/-	2,4,6-Trichlorophenol(5)	2.1/6.5	-/-
Isophorone[5]	8.4/600	-/-	Vinyl chloride[5]	2.0/525	-/-

Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute (CMC)/ Chronic (CCC)	Pollutant	Human Health Value Concentrations in ug/L Use 1[3] / Uses 2-3-4-5-6[4]	Aquatic Life Value Concentrations in ug/L Uses 2-3-4-5-6 Acute(CMC)/ Chronic (CCC)
			(Chloroethylene)		
Lead	-/-	65[9]/2.5[9]	Zinc	-/-	110[9]/100[9]

SOUTH DAKOTA
Surface Water Quality Standards [1]
for Toxic Pollutants

(1) The aquatic life values for arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury (acute), nickel, selenium, silver and zinc given in this document refer to the dissolved amount of each substance unless otherwise noted. All surface water discharge permit effluent limits for metals shall be expressed and measured in accordance with ? 74:52:03:16.

(2) Apply to the beneficial uses as designated but do not supersede those standards for certain toxic pollutants as previously established in §§ 74:51:01:31, 74:51:01:32, 74:51:01:44 to 74:51:01:54, inclusive, and §§ 74:51:01:56 and 74:51:01:57.

(3) Based on two routes of exposure - ingestion of contaminated aquatic organisms and drinking water.

(4) Based on one route of exposure - ingestion of contaminated aquatic organisms only.

(5) Substance classified as a carcinogen with the value based on an incremental risk of one additional instance of cancer in one million persons (10^{-6}).

(6) Chemicals which are not individually classified as carcinogens but which are contained within a class of chemicals with carcinogenicity as the basis for the criteria derivation for that class of chemicals; an individual carcinogenicity assessment for these chemicals is pending.

(7) Also applies to all waters of the state.

(8) pH-dependent criteria. Value given is an example only and is based on a pH of 7.8. Criteria for each case must be calculated using the following equation taken from Quality Criteria for Water 1986 (Gold Book):

Pentachlorophenol (PCP), ug/L

Chronic = $e^{[1.005(pH) - 5.290]}$ Acute = $e^{[1.005(pH) - 4.830]}$

(9) Hardness-dependent criteria in ug/L. Value given is an example only and is based on a $CaCO_3$ hardness of 100 mg/L. Criteria for each case must be calculated using the following equations taken from Quality Criteria for Water 1986 (Gold Book):

Cadmium, ug/L

Chronic = $(*0.909)e^{(0.7852[\ln(hardness)]-3.490)}$ Acute = $(*0.944)e^{(1.128[\ln(hardness)]-3.828)}$

*Conversion factors are hardness-dependent. The values shown are with a hardness of 100 mg/L as calcium carbonate ($CaCO_3$). Conversion factors (CF) for any hardness can be calculated using the following equations:

Chronic: CF = 1.101672 - [(ln hardness)(0.041838)]
Acute: CF = 1.136672 - [(ln hardness)(0.041838)]

Chromium (III), ug/L

Chronic = $(0.860)e^{(0.8190[\ln(hardness)]+1.561)}$ Acute = $(0.316)e^{(0.8190[\ln(hardness)]+3.688)}$

Copper, ug/L

Chronic = $(0.960)e^{(0.8545[\ln(hardness)]-1.465)}$ Acute = $(0.960)e^{(0.9422[\ln(hardness)]-1.464)}$

Lead, ug/L

Chronic = $(*0.791)e^{(1.273[\ln(hardness)]-4.705)}$ Acute = $(*0.791)e^{(1.273[\ln(hardness)]-1.460)}$

*Conversion factors are hardness-dependent. The values shown are with a hardness of 100 mg/L as calcium carbonate ($CaCO_3$). Conversion factors (CF) for any hardness can be calculated using the following equations:

Acute and Chronic: CF = 1.46203 - [(ln hardness)(0.145712)]

Nickel, ug/L

Chronic = $(0.997)e^{(0.8460[\ln(hardness)]+1.1645)}$ Acute = $(0.998)e^{(0.8460[\ln(hardness)]+3.3612)}$

Silver, ug/L

Acute = $(0.85)e^{(1.72[\ln(hardness)]-6.52)}$

Zinc, ug/L

Chronic = $(0.986)e^{(0.8473[\ln(hardness)]+0.7614)}$ Acute = $(0.978)e^{(0.8473[\ln(hardness)]+0.8604)}$

(10) These criteria are based on the total-recoverable fraction of the metal.

Total Maximum Daily Loads (TMDLs) and Section 303(d)

Overview of TMDLs

TMDLs are an important tool for the management of state surface water quality. The goal of TMDLs is to ensure that waters of the state attain and maintain water quality standards. EPA defines a TMDL as "the sum of the individual waste load allocations for point sources and load allocations for both nonpoint sources and natural background sources established at a level necessary to achieve compliance with applicable surface water quality standards." In simple terms, a TMDL is the amount of pollution a waterbody can receive and still maintain water quality standards.

TMDLs must be developed for waters that do not meet water quality standards or for waters that may not meet water quality standards after technology-based requirements have been applied to point source dischargers. Each TMDL should address a specific waterbody or watershed, and specify quantifiable targets and associated actions that will enable a given waterbody to attain and maintain applicable water quality standards.

Section 303(d) of the federal Clean Water Act (CWA) requires states to develop and submit for approval a list of waters targeted for TMDL development every two years. This is referred to as the 303(d) list. Items that must accompany this list include targeted pollutants; and timeframes for TMDL development.

Once identification of TMDL waters are completed, states are to develop TMDLs at a pace necessary to complete all the TMDLs during a 13 year period. TMDLs must allow for seasonal variations and a margin of safety that accounts for any lack of knowledge concerning the relationship between pollutant loadings and water quality.

Types of Waters Listed

The following information and data sources were used to determine which waterbodies require TMDLs, based on the requirements of section 303(d) of the federal Clean Water Act:

- Waters included in the Integrated Report that are identified as "not supporting" or also known as "impaired" waters;
- Waters for which modeling indicates nonattainment of water quality standards;
- Waters for which documented water quality problems have been reported by local, state, or federal agencies; the general public; or academic institutions; and
- Waters that receive discharges from point sources where water quality-based effluent limits are required to maintain surface water quality standards.

Impaired Waters

Waters that are considered impaired for meeting beneficial uses or water quality standards require a TMDL. This includes waters that are identified under the "not supporting" beneficial use categories in this report unless the waterbody has a recent TMDL approved by EPA that addresses the impairments.

Waters with Surface Water Discharge-Related Wasteload Allocations

In December 1993, DENR was delegated authority to administer the National Pollutant Discharge Elimination System. At that time, EPA withheld program authorization within Indian Country. DENR's program is called the Surface Water Discharge (SWD) Program. SWD permits are used to control discharges of pollutants from point sources. Most SWD permits contain technology-based effluent limits, which are usually attained using the best available technology that is economically achievable. In cases where technology-based limits are not sufficient to protect water quality standards, water quality-based effluent limits are incorporated into permits via wasteload allocations. In many cases, the development and implementation of water quality-based limits includes the development of a TMDL for the receiving water. The portion of the TMDL allocated to the point source discharger is the "wasteload allocation." The portion of the TMDL allocated to upstream background sources is the "load allocation." Most SWD permits are issued with a duration of five years, after which the effluent limits and TMDL are re-evaluated.

Waters with SWD-related TMDLs fall into the category of waters *"for which dilution calculations or predictive modeling indicate nonattainment of water quality standards."* This does not mean that the waterbody segment to which any particular SWD permittee discharges is impaired. It simply means that without water quality-based limits, predictive modeling would indicate probable impairment. Most segments for which SWD-related TMDLs are being developed are in fact **not impaired,** because the majority of these TMDLs are already in place, and are merely being updated during this two year time-frame.

Waters Reported by Government Agencies; Members of the General Public; or Academic Institutions

DENR did not receive comments on specific waterbodies that should be included as impaired from organizations or citizens during the public participation period for this report cycle.

<u>Prioritization of TMDL Waters</u>

Regulatory Requirements

Section 303(d) of the federal CWA requires that *"each state shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters."* Little other guidance is offered for states to use in the prioritization process.

A system of prioritization has been developed by DENR based on several factors. Included in these factors are the required elements of *"the severity of the pollution and the uses to be made of such waters."* The highest priorities are given to waters meeting the following criteria (priority 1):

- Waters with expiring Surface Water Discharge permits;
- Imminent human health problems;
- Waters where TMDL development is expected over the next two years;
- Waters listed for four or more listing criteria; or
- Waters with documented widespread local support for water quality improvement.

The lower priorities are given to waters meeting the following criteria (priority 2):

- Waters with an increasing trend towards eutrophy or enrichment, with consideration given to the rapidity of the declining water quality;
- Waters listed for three or less listing criteria;
- Waters where local support for TMDL development is expected but not documented; or
- Waters listed for aquatic life impairment.
- Waters with no evident local support for water quality improvements; or
- Waters where impairments are believed to be due largely to natural causes.

These criteria are a guide. If a waterbody met any one criteria in a category that did not necessarily mean the waterbody was prioritized as such, since many waterbodies fit one or more criteria from the lists above.

Section 319-Related Waters

Section 319 TMDL assessments are developed based upon the prioritization criteria listed above. Implementation projects for TMDLs hinge upon whether adequate local support exists.

Surface Water Discharge-Related Waters

By federal law, SWD permits cannot be issued with a permit life greater than five years. One hundred eighty (180) days prior to permit expiration, a discharger must apply for a permit renewal. By rule, permit renewals are prepared and public noticed for 30 days by DENR. SWD-related TMDLs are considered a high priority in South Dakota.

The majority of parameters for which SWD-related TMDLs are developed include ammonia and dissolved oxygen. As can be seen from this report, very few streams have impairments for ammonia and dissolved oxygen. The priorities for SWD-related TMDLs are not based upon the severity of waterbody impairment but upon federal requirements to renew these discharge permits and the importance of maintaining the past water quality improvements made through the permits.

<u>Summary of the State TMDL Waterbodies</u>

Using the methodologies, data, information, and public input described for the surface water quality assessments, DENR included the waterbodies that require TMDLs (previously known as the 303(d) list) within Tables 17 - 30. The tables include waterbody names, pollutants of concern, basis for listing, and other information. A total of 164 different waterbodies require TMDLs (Table 5). Each waterbody may contain several different pollutants and thereby may constitute several TMDLs. In addition, some streams are listed more than once due to TMDLs identified for different segments of the same stream (even for the same pollutant).

If a specific waterbody required a TMDL for several different pollutants, all pollutants were grouped into one TMDL for that waterbody. In reality, it may not be possible to incorporate each pollutant into a single TMDL for each waterbody segment, but this assumption was made for planning purposes. There may be other cases where widespread support for water quality improvement, large single-entity landholders (federal lands, state lands, etc.), or other factors allow several waterbodies to be targeted for improvement under a single TMDL. Possible

scenarios such as these make TMDL numbers difficult to project. Notwithstanding this fact, the implications of the list are that a monumental work effort will be required to complete the number of TMDLs in the time frame suggested by the list.

Future List Development

Much federal and state effort has gone into establishing the future direction of the TMDL program. EPA drafted revisions to the regulations that resulted in a large volume of conflicting public comment. States were given a choice to submit a 2000 303(d) list or submit a list for 2002. South Dakota chose to develop a 2002 list. It was determined that resources would be better spent developing TMDLs to meet the 1998 303(d) schedule than re-develop a list that would not be much different than the 1998 list due to only two more years of data.

After several months of review and public input, EPA published final rules in the *Federal Register* on July 13, 2000. A Congressional rider placed in a FY 2000 military construction / supplemental appropriations bill prohibited EPA from implementing the rule during FY 2000 and 2001. Therefore, the TMDL program continued to operate under requirements specified in section 303(d) of the Clean Water Act and in the 1992 TMDL regulations.

EPA has also initiated the Consolidated Assessment and Listing Methodology (CALM) program to integrate the 305(b) and 303(d) reports for 2002. The Integrated Water Quality Monitoring and Assessment Report guidance was available November 19, 2001. Based on the timing of the guidance, EPA granted states the option of completing separate reports or one combined report. South Dakota chose to complete separate reports for 2002.

On July 21, 2003, EPA issued, "Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 305(b) and 303(d) of the Clean Water Act" and again gave states the choice of developing separate reports or an Integrated Report that combines the two. South Dakota has chosen to complete an Integrated Report for 2004.

Resource Implications

TMDL issues span a wide range of activities within DENR. Nonpoint source assessments, clean lakes assessments, discharge permitting, water quality monitoring, water quality standards, water rights, feedlot regulations, and other areas are involved in, or affect TMDL development and implementation. Because of this, the development and implementation of TMDLs will rely on existing programs, resources, and activities. Effective TMDL development requires good coordination within all DENR water programs. In addition, the development and implementation of effective TMDLs that will result in improving the quality of South Dakota's waters must have the support, input, and coordination of affected government agencies, local groups, and citizens. As such, the TMDL effort will involve the coordination of many diverse groups and diverse interests with the common goal of improving water quality.

It is not possible to develop TMDLs for every waterbody within two years. The time frame to develop TMDLs on each biennial list is 13 years in accordance with EPA guidelines.

Delisting of Certain 2002 TMDL Waters and Other Exclusions

Status of 2002 303(d) List

South Dakota's 2002 list contained 167 different waterbodies or waterbody segments for TMDL development. A total of 39 TMDLs have been completed or determined to be unnecessary by DENR since April 1, 2002. Table 4 and Figure 1 below show the status of waters included in the 2002 303(d) list.

Table 4: Status of TMDLs from the 2002 303(d) list

TMDL Status	Number and Percentage of TMDLs
Completed or determined to be unnecessary	**39 (23%)**
In progress	**84 (51%)**
Planned	**44 (26%)**
Total:	**167**

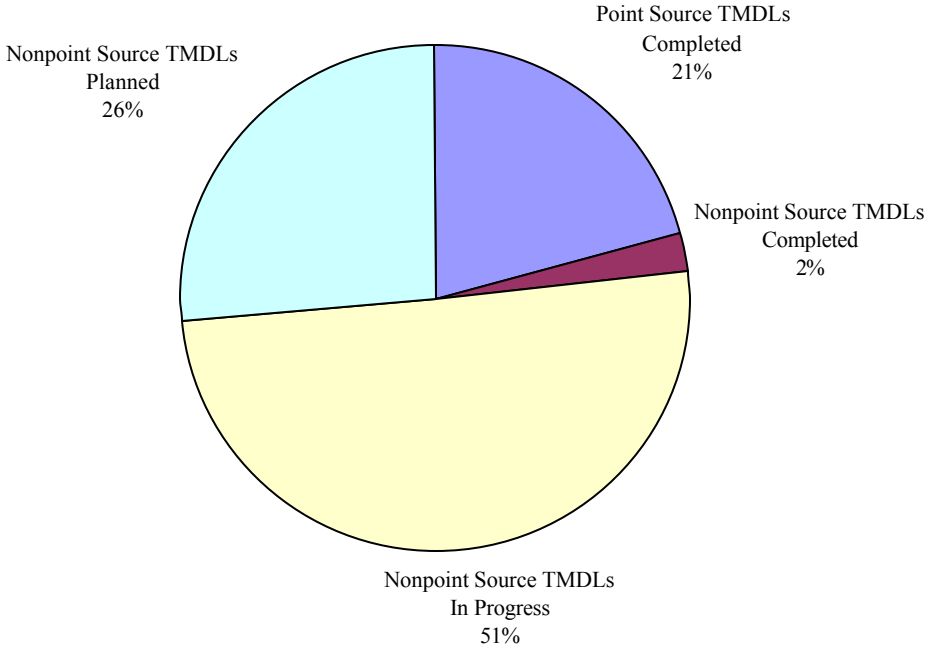

Figure 1: Status of TMDLs from the 2002 303(d) list

Delisting of Waterbodies

Waters were delisted using the following criteria:

- EPA-approved TMDL(s) in place for all pollutants of concern;
- Water quality standards now being met because:
  - New monitoring data show attainment; or
  - New-modeling results show no potential for exceedance of standards.
- Water was listed in error;
- Additional state effluent controls address water quality problems;

- Reservoir has been breached and is no longer a viable waterbody; or
- Data assessment methodologies have been modified.

Table 5: 2004 303(d) Summary of TMDLs by Basin

Basin	Projected Number of TMDLs required	Pollutants of Concern
Bad River Basin	4	Ammonia, dissolved oxygen, nutrients, accumulated sediment, total suspended solids
Belle Fourche River Basin	11	Ammonia, bacteria, metals, pH, accumulated sediment, temperature, total suspended solids
Big Sioux River Basin	37	Ammonia, bacteria, dissolved oxygen, nutrients, accumulated sediment, total suspended solids
Cheyenne River Basin	29	Ammonia, bacteria, nutrients, pH, accumulated sediment, sodium adsorption ratio, total suspended solids
Grand River Basin	10	Bacteria, dissolved oxygen, nutrients, accumulated sediment, sodium adsorption ratio, temperature, total suspended solids
James River Basin	21	Ammonia, bacteria, dissolved oxygen, nutrients, accumulated sediment, total suspended solids
Little Missouri River Basin	1	Sodium adsorption ratio, ammonia
Minnesota River Basin	2	Ammonia, bacteria, dissolved oxygen, nutrients, accumulated sediment
Missouri River Basin	23	Ammonia, bacteria, dissolved oxygen, nutrients, accumulated sediment
Moreau River Basin	6	Ammonia, bacteria, nutrients, accumulated sediment, total suspended solids
Niobrara River Basin	2	Dissolved oxygen, nutrients, accumulated sediment, total suspended solids
Red River Basin	2	Dissolved oxygen, nutrients
Vermillion River Basin	9	Ammonia, bacteria, dissolved oxygen, nutrients, accumulated sediment, total suspended solids
White River Basin	7	Ammonia, bacteria, accumulated sediment, total suspended solids
Totals	**164**	

METHODOLOGY

Two major types of assessments were used to determine use support status of waterbodies; one based on monitoring and the other based on qualitative evaluations. Monitoring data were primarily obtained from South Dakota DENR, United States Geological Survey (USGS), the city of Watertown, and the city of Sioux Falls. A source of quantitative and qualitative lake assessment data was the 1995 South Dakota Lakes Assessment Final Report (Stewart and Stueven, 1996).

The DENR maintains a Quality Assurance (QA) Program to ensure that all environmental water quality measurement data generated or processed meets standard accepted requirements for precision, accuracy, completeness, representativeness, and comparability. This entails the preparation and periodic review and revision of the DENR Quality Assurance Program and individual project plans. It also includes the preparation of periodic reports to DENR management and USEPA; the review of contracts, grants, agreements, etc., for consistency with QA requirements; and the administration of QA systems and performance audits. The latter activity requires the - establishment of schedules for the collection of the duplicate and blank samples, periodic testing of field sampling techniques, and liaison with contracted labs to ensure compliance with QA objectives. In 1998, the Water Resources Assistance Program created a QA document and protocol for its Clean Lakes and NPS programs. An updated Standard Operating Procedure manual was completed and published June 2003.

The ambient monitoring station assessment network provides useful information on overall stream water quality. Only a brief summary of water quality is included because of the large volume of data and reports. A more detailed description of the stream ambient monitoring program is found in the preceding Surface Water Quality Monitoring Program chapter of this document.

Fixed station monitoring data were assessed by dividing major streams into segments that contain the same or similar designated beneficial uses, water quality standards criteria, and environmental and physical influences. Data obtained during the current reporting period were analyzed by utilizing the USEPA STORET data storage/retrieval system. The data for each monitored segment were compared to state water quality standards applicable to the beneficial uses assigned to the segment in question (Tables 2 and 3).

For this report, monitored stream course mileages and lake acreages were measured using EPA Reach Indexing Tool software. All nonsupporting stream segments for which the data were available are also listed as requiring TMDLs.

Specific criteria were developed to define how data for streams would be evaluated to determine the status of each stream segment (waterbody). The following criteria were used:

Table 6: Sample Criteria for Determining Support Status

Description	Criteria Used
Number of observations (samples) required to consider data representative of actual conditions	STREAMS: 20 samples for any one parameter are usually required at any site. If greater than 25% of samples exceed water quality standards, this threshold was reduced to 10 samples, since impairment is more likely. In addition, the sample threshold was reduced to five samples if 100% of the samples indicated full or nonsupport for that parameter. LAKES: 2 separate years of samples for Trophic State Index, which must include at least one Secchi disk, phosphorus, and chlorophyll-a value. Sample dates must be between May 15 and September 15.
Required percentage of samples exceeding water quality standards in order to consider segment water quality-limited	STREAMS: >10% (>25% if less than 20 samples available). LAKES: Not Applicable
Data age	STREAMS: Data must be less than five years old for (1998 and newer) LAKES: Data must be less than 10 years old (1993 and newer) Unless there is justification that data is representative of current conditions. While a data age of two years matches the report cycle, it does not allow for enough samples to accurately portray variability.
Quality Assurance/Quality Control	STREAMS and LAKES: There must be a consensus that the data meets QA/QC requirements similar to those outlined in DENR protocols. QA/QC data was encouraged to be submitted.

Waterbodies were also considered nonsupporting if beach closures were attributable to pollution-related causes. Waterbodies were listed as nonsupporting through beach closures where there were more than two beach closures per season in a consecutive two-year sampling period based on fecal coliform concentrations. However, if subsequent DNA testing or other investigations determine that there was no pollution source in the watershed (i.e. the source was bathers, or pets) signs will be posted informing the public on the need to use sanitary practices and the waterbody will not be listed as nonsupporting.

Deviations from the above criteria were allowed in specific cases, and are generally discussed in the proceeding tables listing the surface water quality summaries. Use support assessment for all assigned uses was based solely on frequency of violation of water quality standards for any one worst-case of the following parameters: total suspended solids, total dissolved solids, pH, water temperature, dissolved oxygen, unionized ammonia, fecal coliform (May 1 - September 30), metals, and others. Violations of more than one parameter were not considered additive in determining overall use-support status for any given waterbody. A stream segment with only a slight exceedance (< 10% violations for one or more parameters) is considered fully supporting.

Complete listings of relevant parameters appear in Tables 2 and 3. South Dakota has established the following general criteria for determining use support of monitored streams:

Fully supporting	1 - 10% of values violate standards
Not supporting	>10% of values violate standards

In order to ensure a sufficient number of samples was available for each stream segment (usually 20) to arrive at an assessment that would be statistically acceptable, the period of record considered for this report was from October 1, 1998 to September 30, 2003 (5 years).

Much of the waterbody information is summarized in Tables 7 through 16. More detailed information on each river basin and the assessed lakes within each drainage is presented in Tables 17 through 30.

In addition to the use support assessment above, South Dakota has chosen to use the assessment categories that EPA recommends in its guidance that was issued on July 21, 2003. South Dakota's assessment categories are as follows:

- Category 1: All designated uses are met;
- Category 2: Some of the designated uses are met but there is insufficient data to determine if remaining designated uses are met;
- Category 3: Insufficient data to determine whether any designated uses are met;
- Category 4a: Water is impaired but has an EPA approved TMDL;
- Category 4b: Water is impaired but implementation project (best management practices) is in place;
- Category 4c: Water is impaired by a parameter that is not considered a "pollutant";
- Category 5: Water is impaired or threatened and a TMDL is needed;
- Category 6a: Water is required to have a new or revised point source TMDL in order to maintain water quality standards; and
- Category 6b: Water has an existing point source TMDL approval

Support assessment for fishable (fish and aquatic life propagation) use primarily involved monitoring the following major parameters: dissolved oxygen, unionized ammonia, water temperature, pH, and suspended solids.

Support assessment for swimmable use (immersion recreation and limited contact recreation) involved monitoring fecal coliform and dissolved oxygen from May 1 through September 30 of each year (Table 2).

Lakes assessed for water quality and trophic state were normally sampled once in spring and summer (June through September) at one to three established sites, dependent on lake size. Separate surface and bottom water samples were collected at each site for determination of 17 standard water quality parameters. Air and water temperature, dissolved oxygen, pH, and secchi disk visibility were measured on site. Chlorophyll *a* was extracted from 100-400 milliliters (ml) of lake water and analyzed as described by APHA (1995). The remaining parameters were determined at the State Health Laboratory, Pierre, South Dakota, from water samples properly preserved and shipped in ice coolers within 24 hours of collection.

Beginning in the year 2000, the support status of lakes and reservoirs has been evaluated according to the ecoregions (Level III) in which they are located (Figure 2 and Table 7). The methodology applied to arrive at the use-support determinations shown in Table 7 is found in a recently published DENR report entitled *Ecoregion Targeting for Impaired Lakes in South Dakota*, (Stueven et al., 2000) and can also be found on the DENR website at: http://www.state.sd.us/denr/DFTA/WatershedProtection/TSINEW.pdf.

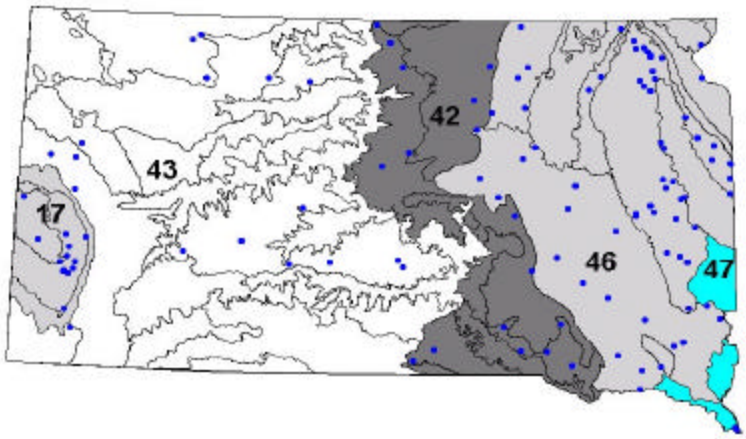

Figure 2: Location and Distribution of Lakes and Reservoirs in South Dakota Ecoregions

Trophic assessment of state lakes was based on trophic status as determined by combining Carlson's (1977) Trophic State Indices (TSI) for secchi depth, total phosphorus and chlorophyll a. Use support status of assessed lakes was determined by establishing the following ranges of TSI values to correspond to full and non support for each ecoregion:

Table 7: South Dakota Ecoregions Support Determination Range For Lakes

Ecoregion Support Determination		
TSI Range		
Ecoregion	Fully Supporting	Not Supporting
46N (east river natural lakes)	≤ 65.00	≥ 65.01
46R (east river reservoirs)	≤ 65.00	≥ 65.01
42 (Missouri River)	≤ 65.00	≥ 65.01
43 (west river)	≤ 55.00	≥ 55.01
17 (Black Hills)	≤ 45.00	≥ 45.01

Long-term trends in lake trophic status were estimated primarily by comparison of TSI values and data gathered during the 1989 through 2003 statewide lake assessments. Short-term cyclical trends for monitored lakes between assessment periods were discussed in the River Basins assessment chapter of this section. A difference of five units or more between respective TSI values was arbitrarily selected as signifying a legitimate change in lake water quality between monitoring periods. Long-term trends covering the period from 1989 through 2003 are summarized in the Lake Water Quality Assessment chapter of this section (Table 17).

For convenience, lake-specific information gathered during the present lake water quality assessment was included in the River Basin Assessments chapter of this section. The lake assessment was based primarily on a state-wide lake survey conducted by DENR from 1994 to 2003. Lakes were chosen on the basis of public ownership, public access, and inclusion in the 1979 South Dakota Clean Lakes Classification Report (Koth, 1981).

STATEWIDE SURFACE WATER QUALITY SUMMARY

South Dakota has a total of 10,298 miles of rivers and major streams (Table 1). Major or significant streams in this context are waters that have been assigned aquatic life use support in addition to the beneficial uses of fish and wildlife propagation, recreation, stock watering, and irrigation (9) and (10). This definition includes primary tributaries and, less frequently, subtributaries of most state rivers and larger perennial streams. In a few cases, lower order tributaries may be included, for example in the Black Hills area, which has a relatively large number of permanent streams. If all existing and mostly waterless stream channels and gullies were included, the great majority of which serve only to carry snowmelt or stormwater runoff for a week or two during an average year, total stream mileage within South Dakota would exceed the above quoted figure by at least ten times (EPA, 1991).

Approximately 7,360 miles have been assessed, and resulting data evaluated and reported, by DENR, to determine water quality status for an extended period covering the last five years (October 1998 through September 2003). Data needed to be evaluated over this longer time span to ensure enough data points were available for each stream segment (usually 20) to properly characterize existing stream conditions. Since for some stream segments only four (or fewer) samples were available per year, evaluation of a data set covering at least five years of sampling was required to adequately portray the natural variability in water quality that is typical of stream environments.

Currently, 56% of the assessed stream miles fully support their assigned beneficial uses and 44% do not presently support their uses. The high percentage of impairment can be attributed largely to high levels of total suspended solids (TSS).

During this reporting cycle, 6,993 designated miles were assessed for goal attainment of fishable (aquatic life) use which includes 2,256 miles also assessed for swimmable goal attainment. During this assessment period, 47% of assessed stream miles fully met fishable/aquatic life criteria, 34% did not meet fishable/aquatic life criteria, and 19% had insufficient information to determine the attainment status. Seventy-six percent of 2,251 stream miles fully supported swimmable uses, 20% did not meet swimmable criteria, and 4% had insufficient information to determine attainment status.

Nonsupport was caused primarily by TSS from agricultural nonpoint sources and natural origin. In terms of total stream miles affected, the second most frequent cause of impairment this reporting period was fecal coliform, the third cause of impairment was due to specific conductance, and the fourth cause of impairment was due to elevated sodium adsorption ratios. Recently revised figures indicate that nonsupport due to fecal coliform decreased from 31% of swim-rated stream miles for the 2002 305(b) report to 20% in the present assessment. Information within historical 305(b) reports show a continuing decrease in the percentage of stream miles impaired by fecal coliform.

Additional causes of impairment this reporting cycle included total dissolved solids (TDS), temperature, and low concentrations of dissolved oxygen in approximate order of frequency. Natural pollutant sources of dissolved and suspended solids are exemplified by erosive soils that

occur in western South Dakota badlands and within the Missouri River basin (including considerable exposed marine shale formations) and in extreme southeastern South Dakota (including large areas of highly erodible loess soils).

Higher than average annual precipitation can produce considerable suspended sediment problems over large areas of the state, particularly in the west and southeast. Fecal coliform concentrations also increase significantly in a number of state lakes during times of above normal rainfall. Appropriate best management practices should be applied to treat the sources of these and other impacts whose effects are likely to be masked during periods of low precipitation.

In addition to rivers and streams, South Dakota has 573 classified publicly owned lakes and reservoirs totaling nearly 205,000 acres. The above 573 waterbodies are listed in ARSD Chapter 74:51:02 and classified for aquatic life and recreation beneficial uses. GF&P presently manages 450 state lakes for fish. The total lake area has been estimated by the South Dakota Conservation Districts in a past survey at approximately 1.6 million acres.

Excluding the four mainstem reservoirs, 34% (54 lakes) of the lake acreage assessed is presently considered to support all designated uses and 66% (68 lakes) does not support one or more uses. Approximately 98% of use nonsupport for lakes can be attributed to nonpoint sources. Most lakes in the state are characterized as eutrophic to hypereutrophic. They tend to be shallow and turbid and are well-supplied with dissolved salts, nutrients, and organic matter from often sizeable watersheds of nutrient-rich glacial soils that are extensively developed for agriculture. Runoff, carrying sediment and nutrients from agricultural land, is the major nonpoint pollution source.

The mileage/acreage of use support for assessed surface waters in South Dakota during this reporting cycle is summarized in Tables 8 through 13.

Table 8: Designated Overall Use Support Status for Rivers and Streams in South Dakota

Type of Waterbody: Rivers and Streams (miles)			
Degree of Use Support	Assessment Basis		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	-	4,155	4,155
Size Fully Supporting but Threatened	-	-	-
Size Not Supporting	-	3,205	3,205
TOTAL	-	7,360	7,360

Table 9: Designated Overall Use Support Status for Lakes and Reservoirs in South Dakota

Type of Waterbody: Lakes and Reservoirs (acres)			
Degree of Use Support	Assessment Basis		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	-	47,372	47,372
Size Fully Supporting but Threatened	3,637	-	3,637
Size Not Supporting	-	88,602	88,602
TOTAL	3,637 [a]	135,974	139,611

[a] These lakes were only evaluated by fish flesh data, no water quality data was taken for this report cycle.

Table 10: Individual Use Support Summary for Rivers and Streams

Use (Miles)	Size Fully Supporting	Size Not Supporting	Size Threatened with Insuff. Info.	Size With Insuff. Info. Or Not Assessed	Size Assessed
Overall Use Support	4,155	3,205	-	-	7,360
Coldwater Permanent Fish Life	1,218	72	11	56	1,357
Coldwater Marginal Fish Life	187	47	-	15	249
Warmwater Permanent Fish Life	600	456	-	34	1,090
Warmwater Semipermanent Fish Life	877	1,654	-	377	2,908
Warmwater Marginal Fish Life	429	78	-	882	1,389
Immersion Recreation	1,713	460	-	83	2,256
Limited Contact Recreation	4,056	569	-	2,356	6,981
Fish/Wldlf. Prop., Rec., and Stock Watering	5,605	437	-	1,349	7,391
Irrigation	5,919	1,176	-	296	7,391
Commerce and Industry	1,414	-	-	-	1,414
Drinking Water Supply	1,826	59	-	-	1,884

Table 11: Individual Use Support Summary for Lakes and Reservoirs

Use (Acres)	Size Fully Supporting	Size Not Supporting	Size Threatened with Insuff. Info.	Size With Insuff. Info. Or Not Assessed	Size Assessed
Overall Use Support	47,372	88,602	3,637	-	139,611
Coldwa ter Permanent Fish Life	1,194	470	-	11	1,675
Coldwater Marginal Fish Life	11	152	-	-	163
Warmwater Permanent Fish Life	35,321	34,949	106	-	70,376
Warmwater Semipermanent Fish Life	14,600	21,826	-	-	36,426
Warmwater Marginal Fish Life	1,316	20,870	-	2,621	24,807
Immersion Recreation	43,963	5,011	-	84,367	133,341
Limited Contact Recreation	48,974	-	-	83,119	132,093
Fish/Wldlf. Prop., Rec., and Stock Watering	114,944	5,277	3,531	17,641	141,393
Irrigation	11,044	5,070	-	28,913	45,026
Drinking Water Supply	6,252	-	-	7,069	13,321

Table 12: Total Sizes of Water Impaired by Various Cause Categories in South Dakota

Rivers and Streams	
Cause/Stressor Category	**Miles**
Cadmium	2
Copper	2
Fecal Coliform	953
Nitrates	22
Dissolved Oxygen	109
pH	42
Salinity/SAR	577
Specific Conductivity	670
Temperature, Water	153
Total Dissolved Solids	473
Total Suspended Solids	2,139
Zinc	2
Lake/Reservoir	
Cause/Stressor Category	**Acres**
Fecal Coliform	6,632
Fish Consumption Advisories	3,750
Nitrates	55
Salinity/SAR	5,147
Sedimentation/Siltation	15,564
Selenium	55
Total Suspended Solids (TSS)	352
Trophic State Index (TSI)	91,857
Turbidity	296

Table 13: Total Sizes of Waters Impaired by Various Source Categories in South Dakota

River Streams	
Source Category	**Miles**
Acid Mine Drainage	2
Animal Feeding Operations (NPS)	274
Combined Sewer Overflow	1
Crop Production	1625
Drought-Related Impacts	27
Grazing in Riparian or Shoreline Zones	418
Flow Modification	187
Industrial Point Source Discharge	22
Irrigated Crop Production	302
Livestock (Grazing or Feeding Operations)	1518
Managed Pasture Grazing	35
Mine Tailings	2
Municipal (Urbanized High Density Area)	5
Municipal Point Source Discharge	29
Natural Sources	996
Non-irrigated Crop Production	604
Other Recreation Pollution Sources	50
Rangeland (Unmanaged Pasture) Grazing	400
Residential Districts	10
Source Unknown	897
Streambank Modifications/Destabilization	151
Wet Weather Discharges	23
Lakes and Reservoirs	
Source Category	**Acres**
Animal Feeding Operations (NPS)	5,108
Crop Production	213
Livestock (Grazing or Feeding Operations)	213
Natural Sources	5,125
Non-Point Sources	96,927

LAKE WATER QUALITY ASSESSMENT

Two major types of assessments were used to determine water quality and use support status of state lakes. One based on current and previous field monitoring; and the other was based on qualitative evaluations, for example, when monitoring data is incomplete or fragmentary from DENR or other agencies. A total of 573 lakes are currently listed for beneficial uses in South Dakota. Twelve lakes/reservoirs in South Dakota have a surface area greater than 4,000 acres and have a combined surface area of 91,134 acres. The combined surface acreage of all other lakes (561) less than 4,000 acres in area was 113,763 acres.

DENR has developed a strategy to evaluate lake water quality on an ecoregion basis. This ecoregion effort requires the determination of reference lakes for comparative purposes. The basis and strategy of the ecoregion evaluation is described in the document, *Ecoregion Targeting for Impaired Lakes in South Dakota* (Stueven et al. 2000). A total of 128 lakes have been sampled periodically from 1993 through 2003 to evaluate the use support of designated beneficial uses. Of those lakes, six did not meet the requirements for sufficient data to be listed in this report. Of the 122 waterbodies meeting the minimum criteria, 54 (34% of lake acreage) fully supported their designated uses and 68 (66% of lake acreage) failed to support one or more of their assigned uses (Table 11).

The remaining lakes in Table 14 (451) did not meet the criteria for assessment listed below. The lakes included in lake assessment sampling must meet the following criteria:

- Publicly owned,
- Public access,
- Are of regional significance,

Carlson's (1977) Trophic State Indices (TSI) were used to determine trophic status of the lakes that were assessed from 1993 through 2003. The parameters used included Secchi depth, total phosphorus and chlorophyll *a*. Carlson's Indices were selected because of ease of use and to ensure continuity with past 305(b) reports. Carlson's Indices were also used to determine short-term and long-term trends in lake water quality.

The trophic status of 128 lakes were determined during the last 10 years. One lake was rated as oligotrophic and 9 were rated as mesotrophic. Thirty-Six lakes in Table 14 were considered to be eutrophic and 80 were hyper-eutrophic.

Table 14: Trophic Status of Significant Publicly Owned Lakes

	Number of Lakes	Acreage of Lakes
Total	573	204,987
Total Assessed *	129	141,791
Dystrophic	0	0
Eutrophic	37	44,542
Hypereutrophic	80	84,840
Mesotrophic	9	11,868
Oligotrophic	1	11
Unknown	2	530

* May 15, 1993 to September 15, 2003

The major problems of South Dakota lakes continue to be excessive nutrients, algae, and siltation due to nonpoint source pollution (primarily agricultural). Over the years, internal loading from phosphorus has become more of a problem as watershed loadings have decreased due to better agricultural practices. Aging reservoirs have also become more eutrophic as many are now approaching their expected usable life spans. Adding to the problem is the fact that most reservoirs tend to have significantly larger watersheds relative to their water surface area than natural lakes. Water quality degradation due to acid precipitation, acid mine drainage, or toxic pollutants, is presently not a problem in South Dakota lakes. Lake-specific data is tabulated in the River Basin Assessments section.

Water Resource Assistance Program

The approach used by the South Dakota Water Resource Assistance Program for addressing nonpoint source pollution is to first, identify and target sources of pollution and determine alternative restoration methods; and second, to control the sources of pollution and restore the quality of impacted waterbodies. Most phases of the program are state and local efforts, with supplemental technical and financial assistance from EPA and other federal agencies used whenever possible.

The watershed assessment phase encompasses a series of procedures to assess the current condition of selected water bodies. Included in this phase are water quality, water quantity and watershed data collection. The state provides the local sponsor with technical assistance, training, and equipment to conduct the assessment portion of the project. Generally, the local project sponsor is responsible for collecting the data using 319 federal funding, state grant funding, and existing local resources. Following the collection of sufficient data, the state evaluates the data and prepares a report which details baseline information, identifies sources of pollution, describes alternative pollution control methodologies and outlines implementation costs. A TMDL is developed using this information. Prior to the implementation of specific pollution control and restoration alternatives, the project sponsor is responsible for the preparation of a watershed/lake restoration plan based on recommendations from the assessment.

Technical assistance for this process is provided by the state. If the plan is approved, the project sponsors are eligible to apply for appropriate state and federal funding.

The majority of the pollution sources that have affected the lakes in South Dakota are agricultural nonpoint sources. The methods used to control these sources are selected on a case-by-case basis. The selection of methods is based on the evaluation of individual watersheds using the Annualized Agricultural Nonpoint Source Model (USDA-ARS, 1998) or a manual inventory of land use, soil type and nonpoint sources. The AGNPS model delineates critical cells within the watershed and is then used to predict which control methods would be the most effective.

Following this evaluation, coordination with state and federal agricultural agencies is solicited to verify the critical nature of the identified cells and the selected control methods. For those areas targeted as critical, the owners/operators are contacted to request their voluntary participation in the control program. The state does have in effect the Sediment and Erosion Control Act of 1976 which is implemented by individual state conservation districts. However, any action under the Act is based strictly in response to complaints. There are no provisions for forcing compliance on identified problem areas. Specific practices currently recommended for nonpoint source pollution control include the full range of Best Management Practices (BMP) both mechanical and managerial, large and small sediment control structures, shoreline erosion control, and the installation of manure management systems. The DENR Surface Water Discharge program (SWD) generally prohibits discharge to lakes.

Lake management in South Dakota is dependent upon many resource management programs and agencies. The Department of Environment and Natural Resources, the Department of Agriculture, U.S. Natural Resources Conservation Service, Department of Game, Fish and Parks and many local agencies and special purpose districts are all crucial to the protection or restoration of lakes in the state. All of the above mentioned agencies have links to components of many different types of projects. Land use ordinances exist in South Dakota as local and county zoning ordinances and are considered local issues and responsibilities.

In conjunction with the development of recommended pollution control alternatives, the watershed assessment study data evaluation is also designed to provide recommendations for in-lake restoration alternatives. The primary recommendations provided for lake restoration include, but are not limited to, natural flushing, reducing or eliminating sources of pollution, in-lake alum treatments, and sediment removal by dredging. Restoration methods employed in the past also include aeration, sediment removal, weed harvesting, and chemical weed control.

A list of current assessment and implementation projects can be found on the Det website: http://www.state.sd.us/denr/DFTA/WatershedProtection/tmdlpage.htm.

Impaired Lakes

A description of impaired lakes is included in the section of this document titled *River Basin Assessments.* The lakes are listed by their location in each major river basin in the state.

All 573 state lakes presently listed in ARSD Chapter 74:51:02 have been assigned the beneficial use of fish and wildlife propagation, recreation, and stock watering (9). The lakes listed in the ARSD may also be assigned two or more of the following beneficial uses:

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

Acid Effects on Lakes

During the Lake Water Quality Assessment, each lake was measured for field pH. As a result of this monitoring, no lakes have been found to have pH levels less than 7.00 SU (standard units). The state is not aware of any lakes in South Dakota that are currently being impacted by acid deposition (Table 15). This is attributed to a lack of industrialization and a natural buffering capacity of the soils.

Table 15: Acid Effects on Lakes

	Number of Lakes	Acreage of Lakes
Assessed for Acidity	129	141,791
Impacted by High Acidity	-0-	-0-
Vulnerable to Acidity	-0-	-0-

Trends in Lake Water Quality

Trend in water quality can be useful in management decisions and to determine if lake water quality management issues need to be addressed. Long-term trends were determined for South Dakota lakes using all available information collected during the Lake Water Quality Assessments and the Statewide Lakes Monitoring Program. Chlorophyll *a*, total phosphorus, and Secchi disk depth were used to calculate trophic state using Carlson's Trophic State Index on each lake. A mean annual TSI was calculated for each year. Most of the trends were analyzed with information starting from the 1989 South Dakota Lakes Survey. The trophic state indices were plotted on a graph and a slope was calculated for the data points to determine trends. Table 16 is a summary of trends in the water quality of monitored South Dakota public lakes. The results of this recently revised long-term trend analysis indicate that no major changes have occurred in the monitored lakes since 1989. As lakes, and especially reservoirs, age and naturally become eutrophic, one would expect to see a slowly declining trend line. The stable water quality of the data South Dakota does have shows that water quality is being maintained and not getting noticeably worse.

A number of short-term, cyclical changes or fluctuations were observed between monitoring periods. With the extreme drought experienced in the past 3 years, water levels have been reduced and nutrients are being concentrated at higher levels. These lakes show short time flucuations of declining water quality. There have also been cases of improving water quality during the short term. Like the declining trends some of these have been due to seasonal variability and some have been due to water quality improvements. Lake Oliver is a case of better water quality due to inlake water quality management practices. An alum treatment in the fall of 2002 lowered the amount of phosphorus in Lake Oliver by 50% and has helped the lake's TSI value fall below the recommended target. The rapid improvements seen in Lake Oliver were a result of an inlake management technique. Implementation practices completed in a watershed upstream of a lake are very beneficial but the improvements to lake water quality may not be seen for quite some time.
The following table shows stable trends in all of the lakes monitored. The trend was expressed as the slope of the regression line through the TSI points. The maximum long-term rate of change for any lake was approximately one TSI point every 125 years. Many of the lakes and reservoirs had much smaller changes. With only 13 years or less of data, it is difficult to draw any definite conclusions on the water quality trend of a lake. To have better trend analysis, more data over time will be needed.

Table 16: Long-Term Trends in Public Lakes (1989-2003)

	Number of Lakes	Acreage of Lakes
Assessed for Trends	129	141,791
Improving	0	0
Stable	129	141,791
Degrading	0	0
Trend Unknown	0	0

RIVER BASIN ASSESSMENTS

South Dakota has fourteen major river basins, most of which drain into the Missouri River (Figure 3). The following sections contain brief narratives that discuss noteworthy waterbodies and pollution problems. A detailed state map showing assessed lakes and streams provides general use support information (Figure 4). More specific information is provided in the accompanying river basin tables for the monitored waterbodies in each river basin that is identified in Figure 3 and shown in Figure 4.

Much of the information necessary for River Basin Assessments is obtained from the state stream ambient monitoring program. This fixed ambient network presently consists of 137 active in-stream stations. The collected data is evaluated to define water quality in the state, identify pollution, and report changes in the state's water quality.

Sampling station locations are determined by assessing areas located within high quality beneficial use classifications, located above and below municipal/industrial discharges, or within problem watersheds. Currently, DENR collects samples at those locations on either a monthly, quarterly, or seasonal basis for nutrient, bacterial, and general physical and chemical parameters. Stations that are located near hard rock mines are also analyzed for cyanide and ten metals including arsenic. Several stations are sampled for sodium, calcium, and magnesium during the irrigation season. The samples are handled in accordance with DENR's QA/QC Plan. Sample test results are then entered into STORET. This type of water sampling is used to track historical sampling information, natural background conditions, runoff events, and can indicate possible acute or chronic water quality problems.

Lake monitoring within each river basin is conducted in conjunction with the Watershed Assessment Program's, watershed assessment studies. Many of the standard parameters measured in streams are also evaluated for state lakes with the addition of Secchi disk visibility, chlorophyll *a* level, oxygen/water temperature profiles, total phosphorus, and total volatile solids. Similarly, in the course of sampling lakes as well as streams, any pollution sources or environmental conditions that may affect water quality are noted by field personnel. Unlike stream evaluations, however, lake trophic state and trends in lake trophic condition are estimated with Carlson's (1977) Trophic State Indices (TSI).

Baseline data show whether or not a waterbody is meeting its assigned water quality beneficial uses. A description of the procedure involved is found in the methodology section of this document. Baseline data evaluations are used as a management tool to determine the effectiveness of control programs on existing point and nonpoint sources and for directing future control activities.

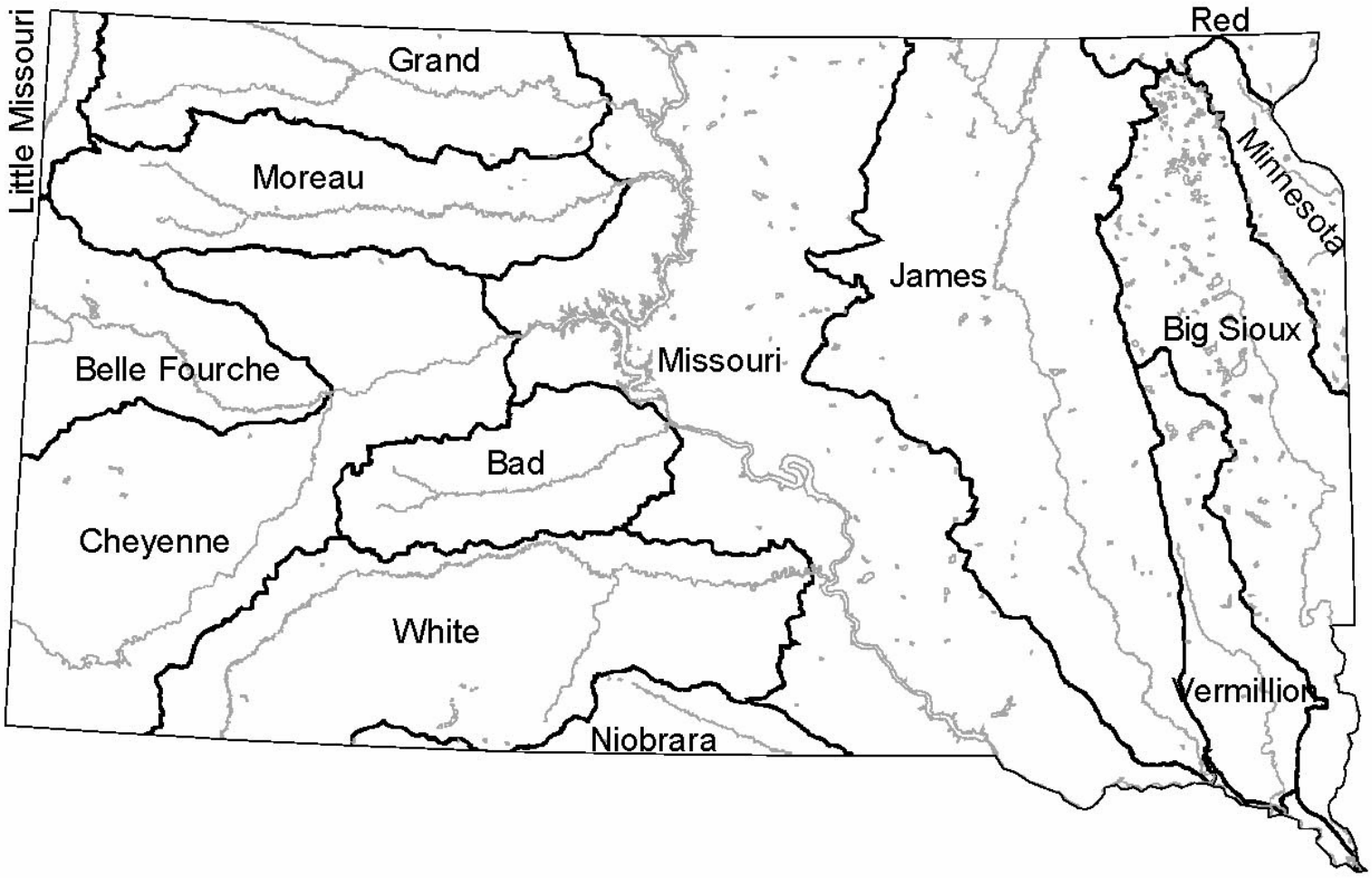

Figure 3: Major River Basins in South Dakota

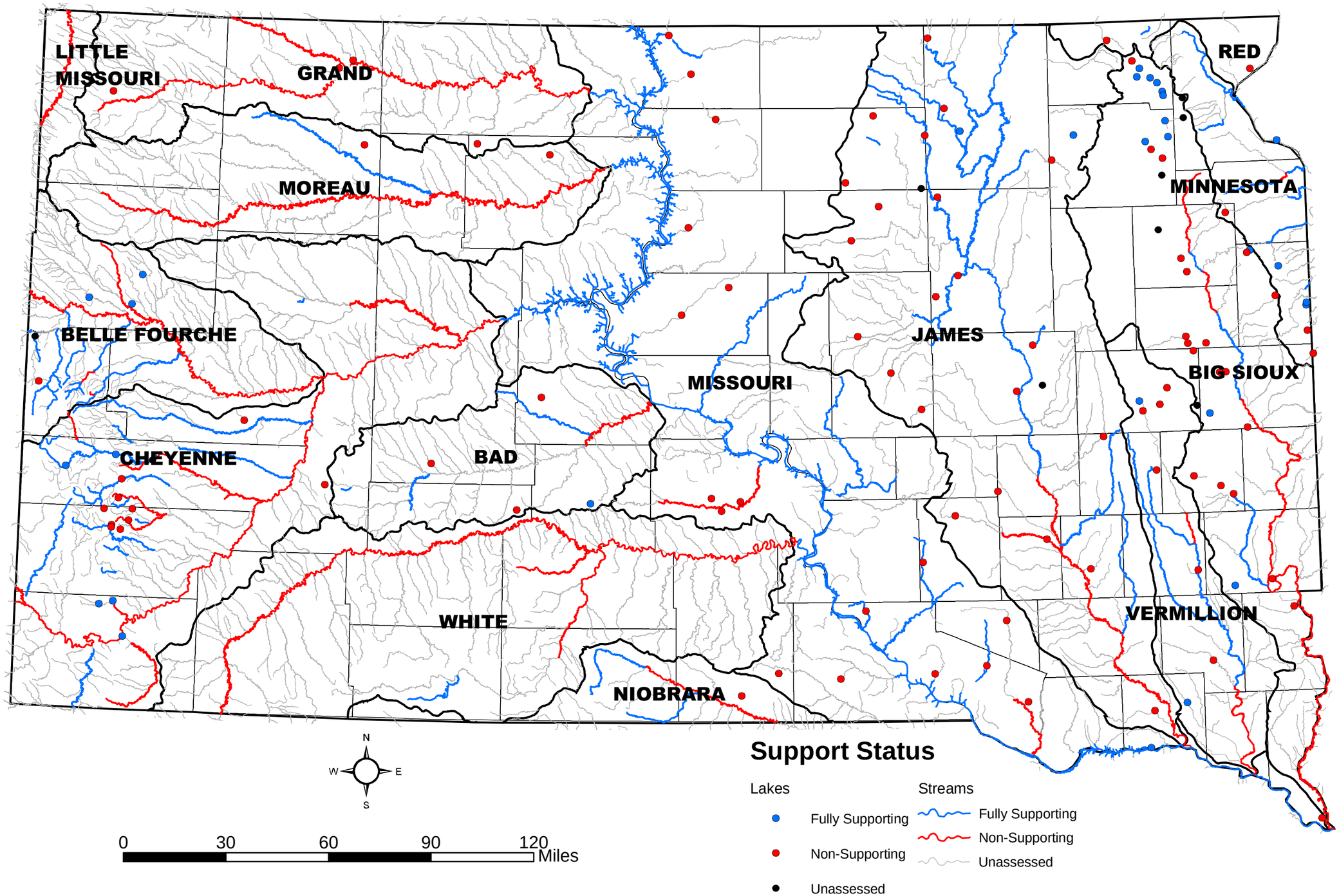

Figure 4: 2004 South Dakota Waterbody Support Status

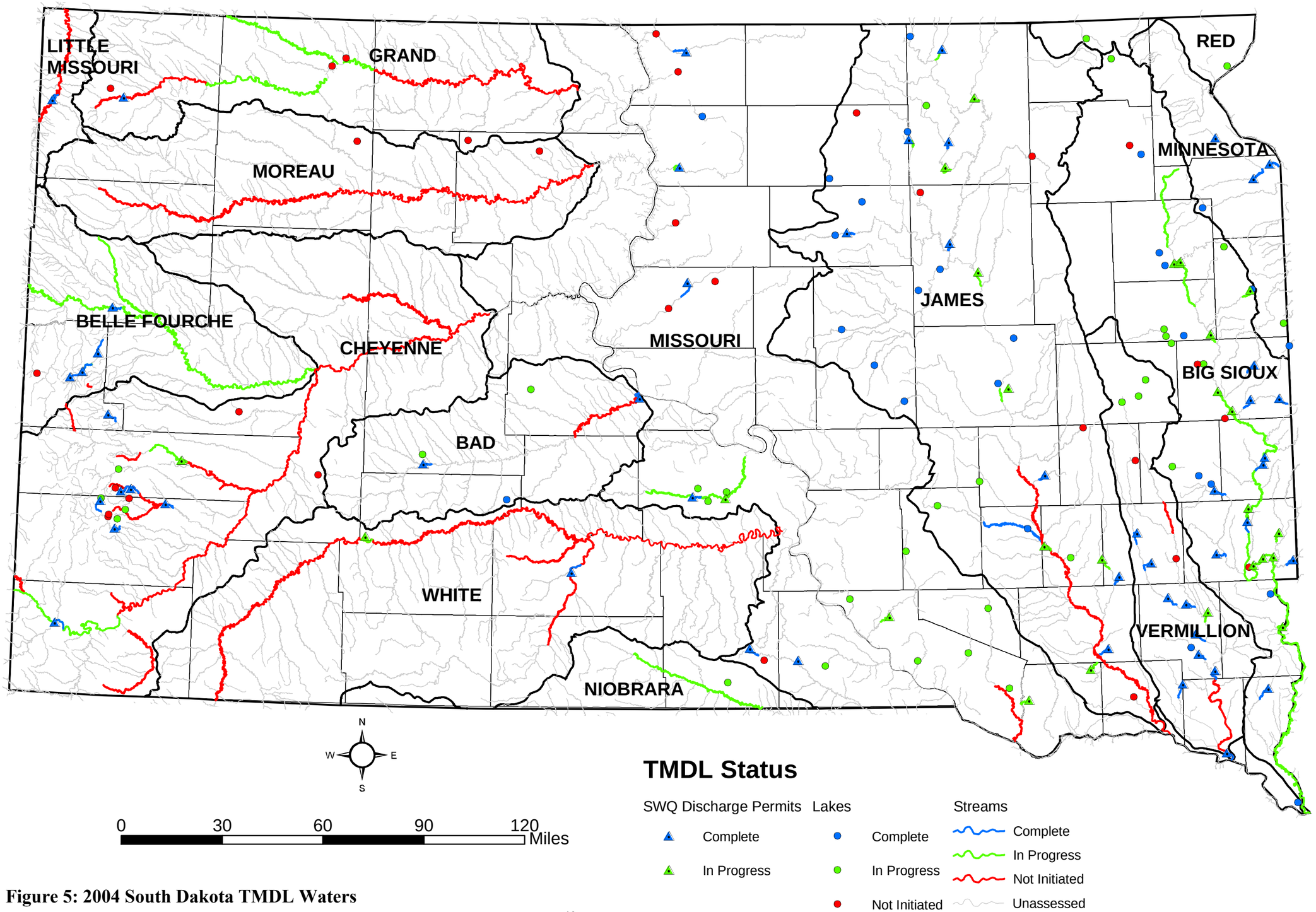

Figure 5: 2004 South Dakota TMDL Waters

KEY FOR RIVER BASIN INFORMATION TABLES

Name - Name of waterbody
Location - Best available description
Map ID - Map identification
Basis - Monitoring agency/program and sampling site identification/WQM number or Surface Water Discharge Permit Number.
Use - Beneficial use assigned to waterbody or TMDL status of Surface Water Discharge Permit
EPA Category - EPA Support Category

- Category 1: All designated uses are met;
- Category 2: Some of the designated uses are met but there is insufficient data to determine if remaining designated uses are met;
- Category 3: Insufficient data to determine whether any designated uses are met;
- Category 4a: Water is impaired but has an EPA approved TMDL;
- Category 4b: Water is impaired but implementation project (best management practices) is in place;
- Category 4c: Water is impaired by a parameter that is not considered a "pollutant";
- Category 5: Water is impaired or threatened and a TMDL is needed;
- Category 6a: Water is required to have a new or revised point source TMDL in order to maintain water quality standards; and
- Category 6b: Water has an existing point source TMDL approval

Source categories -

<u>Point Sources</u>

- Controlled by permit
- Industrial
- Municipal
- Combined sewer (end-of-pipe)
- Storm sewers (end-of-pipe)

<u>Nonpoint Sources</u> (unspecified)

- Residential districts

<u>Agriculture</u>

- Non-irrigated crop production
- Irrigated crop production
- Pasture land
- Range land
- Feedlots - all types
- Animal holding/management areas

<u>Hydromodification</u>

- Channelization
- Dredging
- Dam construction
- Flow regulation/modification
- Bridge construction
- Removal of riparian vegetation
- Streambank modification/destablization

<u>Support status (lakes and streams):</u>
Full = Full support, Non = Nonsupport, Insuff. Info. = Insufficient sampling information (had limited sample data and fewer than 25% water quality standard violations)
Unknown = No sample data for the given beneficial use

Bad River Basin (Figures 6 and 7, Table 17).

The Bad River basin lies in west-central South Dakota between the Cheyenne and White River basins. The basin drains an approximate 3,151 square mile area. Historically, a main feature of the basin has been a general lack of surface water flow. The upper portion of the Bad River receives water from several artesian wells in the Philip area so water is present most of the year. There are prolonged periods of low flow in the reach from Midland to the Missouri River.

In past reporting periods, the Bad River had not supported its beneficial uses due to elevated suspended solids concentration. Monitoring during the 1987-89 cycle failed to detect high-suspended solids concentrations but only indicated moderately elevated conductivity. These results were obtained because of very low river flows prior to and during sampling. Monitoring during the 1990s indicated high levels of TSS (4,000 – 21,860 mg/l) were entering Lake Sharpe with increased rainfall in the Bad River basin from 1995 through 1999. During the last assessment, the lower Bad River was again nonsupporting for conductivity and high TSS. During the present reporting period the Bad River was nonsupporting for both total dissolved and suspended solids.

During past monitoring periods, an apparent pattern of poor water quality was noted in the lower Bad River. Exceedances of the suspended solids (TSS) standard occurred during high river flows, while during minimal flows, elevated dissolved solids concentrations (>2,500 mg/l) and excessively high conductivity readings (>2,500 µmhos/cm) were recorded. The erodible marine shales that underlie much of the drainage supply large quantities of dissolved salts in addition to suspended solids to the river during major watershed runoff events.

Water conductivity in the Bad River has averaged 2,752 µmhos/cm for the period from 1968 to 1999. During the last reporting period (1996-2001) conductivity (specific conductance) averaged 3,682 µmhos/cm and during the present assessment (1998-2003) it averaged 3,928 µmhos/cm. The increases may have been a result of lower flows and increased evaporation during the late 1990s and early 2000s. Fecal coliform bacteria appeared to have declined from levels recorded before 1994, and no exceedances were recorded the past three assessments or during the present assessment.

During years of above normal runoff, Bad River sediment is deposited on the Missouri River bed below Lake Oahe, which can restrict the main river channel causing local water levels to fluctuate and present a potential flooding problem for riverside residences in the southeast area of Pierre. This often necessitates a reduction in the volume of water released from Oahe Dam, which serves to interrupt power generation producing a negative economic impact. Winter flooding in the developed flood plain has occurred on an irregular basis since 1979 caused by the formation of ice jams during periods of extreme cold weather. Dredging the accumulated river sediments has been proposed as a remedial measure. However, initial considerations indicate this to be a costly proposition requiring the initial removal and disposal of more than 3 million cubic yards of sediment. Periodic maintenance dredging may also be necessary in the long term unless some means are found to drastically reduce the amount of sedimentation from the Bad River. A limited dredging project to deepen boat channels near two river islands below Pierre was completed in 1998.

A 1996 COE project designed to flush sediments downstream has met with moderate success. Flushing remains a preferred alternative for sediment removal according to the COE and involves

lowering water levels in the Missouri River below the Bad River confluence and then sharply increasing Oahe Reservoir water releases for a period of time.

The deposited sediments are restricting boat navigation on the Missouri River in the vicinity of the growing Bad River delta. In addition, suspended sediment from the Bad River has perceptibly increased water turbidity in Lake Sharpe for more than 30 miles downstream of the confluence. Incoming sediments and resulting turbidity have a negative impact on sport fishing, recreation, and tourism in this area. Water quality data for the past 35 years have indicated that erosion in the Bad River basin and subsequent sediment yield to the Missouri River are on-going problems that first became evident shortly after the filling of the mainstem reservoirs in the early 1960s.

Rangeland in this area is on a relatively steep topography overlain by shallow, erosive Pierre Shale soils. The structure of these soils may deteriorate even under what is considered normal grazing pressure. Past field observations indicated that large acreages of range in the lower watershed were in poor condition. Increased snowmelt or rainfall, such as occurred for most of the 1990s, would very likely have produced even more severe erosion and sedimentation events than were noted in the previous decade. In fact, many small stockwater dams in the Bad River basin were reported to be rapidly filling with eroded sediment during the middle and late 1990s.

In 1989, a sediment monitoring program was established in the Bad River drainage to determine the sources of sedimentation, quantify the extent of sediment transport into Lake Sharpe on the Missouri River, and develop alternate remedial methods of watershed management to reduce sediment loads impacting the Bad River and Lake Sharpe. Previous studies have indicated that until 1980 approximately 3.2 million tons of sediment were deposited in the Missouri from the Bad River each year. Since the application of extensive conservation measures in the Bad River watershed (e.g. Conservation Reserve Program) sediment loads delivered to Lake Sharpe are reported to have dropped by 40% and data show a continuing drop in sediment delivery. This means that the 30% reduction called for in the assigned TMDL has been exceeded. While the reduction is appreciable, there remains a considerable volume of sediment estimated at nearly 2 million tons still entering upper Lake Sharpe on a yearly basis. The 1989 monitoring study determined that rangeland in the lower half of the drainage was the major contributor with 80 to 85% of the sediment coming from channel and gully erosion. The study also determined that two-thirds of the total sediment load to Lake Sharpe was being produced in the lower one-third of the Bad River watershed.

Based on information gained from this study, Phase II of the Bad River Water Quality Project was initiated on March 12, 1990. This stage of the project was designed to identify and assess cost effective, landowner-acceptable Best Management Practices (BMPs) that will reduce sediment loading and serve as a model for similar projects in the entire Missouri River Basin. Grazing management practices that reduce the dependence of livestock on riparian areas were targeted as the main thrust of the project.

BMPs presently being applied include rotational grazing systems, construction and rehabilitation of sediment dams, and restoration of wildlife and riparian areas among others. At the same time, vegetative responses to different implemented grazing systems and the effect of various grazing strategies on development of gully erosion (gully headcut advance) are being investigated. Other BMPs being promoted to reduce sediment loading of the Bad River include the use of conservation

tillage and no-till farming on cropland and the construction of wind protection fences in the uplands that will allow moving animal feeding areas out of riparian zones.

The Phase II Project ended in 1994 and a final report is available. This project has demonstrated that significant erosion and sediment reduction can be accomplished with the implementation of conservation practices. Over 90 percent of the landowners in selected project areas have applied some form of BMP and about 95 percent of the project area has been treated. Data indicate a 50 percent reduction in sediment delivery from the Plum Creek subwatershed. Although these results are promising, much remains to be done to significantly reduce the sediment loads to Lake Sharpe.

Other projects are currently being implemented in the Bad River Basin. A Phase III Project is continuing the efforts of the Phase II Project by promoting BMPs in additional areas of the watershed, especially in the lower third of the watershed where the erosion problems are most severe. A demonstration project in the upper portions of the watershed has also been implemented. This project is demonstrating to landowners the various BMPs that were successful during the Phase II Project. It is hoped that these projects convince landowners that it is worth the effort to implement certain BMPs, for environmental reasons and to improve their own farm/ranch operations.

One of the four small lakes monitored in this basin (Hayes Lake) was rated as hyper-eutrophic and three as eutrophic this reporting cycle. Freeman Dam and Hayes Lake appear to have undergone a moderate decline in water quality from the late 1980s to the early 1990s. The most recent data suggest Hayes Lake water quality has remained stable whereas that of Freeman Lake appeared to have undergone a moderate decline since the previous assessment, as measured by chlorophyll *a*, phosphorus, and Secchi disk depth. During the last three years, Freeman Lake has shown very high algae densities and chlorophyll *a* levels. Moreover, Freeman Lake water has historically been high in selenium and nitrate.

Of the four monitored lakes, only Murdo Dam met the ecoregion water quality criteria (TSI < 55) for this assessment. Causes for impairment in the other three lakes include algae, macrophytes, nutrient enrichment, and siltation. Problem sources may be livestock operations and farmland in the watershed.

Assessment and implementation projects presently underway in the Bad River basin include the Waggoner Lake and Hayes Lake assessments, and the Bad River Implementation Project.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 17: Bad River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Freeman Lake	Jackson County	L1	Lake Assessment	Limited Contact Recreation	Unknown		Nonpoint Sources	5	Yes – 2
				Immersion Recreation	Unknown		Natural Sources		
				Warmwater Permanent Fish Life	Non	TSI			
				Fish/Wildlife Prop, Rec, Stock Waters	Non				
Hayes Lake	Stanley County	L2	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full		Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI			
Murdo Dam	Jones County	L3	Lake Assessment	Warmwater Permanent Fish Life	Full			2	No
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
Waggoner Lake	Haakon County	L4	Lake Assessment	Immersion Recreation	Unknown		Nonpoint Sources	5	Yes – 1
				Warmwater Permanent Fish Life	Non	TSI			
				Domestic Water Supply	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Streams									
Bad River	Stanley County line to mouth	S1	DENR 460850	Limited Contact Recreation	Full		Natural Sources	5	Yes – 2
				Warmwater Marginal Fish Life	Non	Conductivity	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Non	TSS	Livestock		
				Irrigation Waters	Non	TDS			
Plum Creek	Near and below Hayes	S2	USGS 6441100 & 6441110	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
South Fork Bad River	Near Cottonwood	S3	USGS 6440200	Irrigation Waters	Full			2	No
				Warmwater Marginal Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Unnamed Tributary of Cottonwood Creek	Near Quinn	S4	USGS 6440300	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Surface Water Discharge Permits						**PARAMETER**			
Bad River	Near Ft. Pierre	P1	SD0023582	Approved TMDL		Ammonia		6b	No
Bad River	Near Midland		SD0020630	Went to No Discharge permit -delist					No
Bad River	Near Philip	P2	SD0020303	Approved TMDL		Ammonia		6b	No

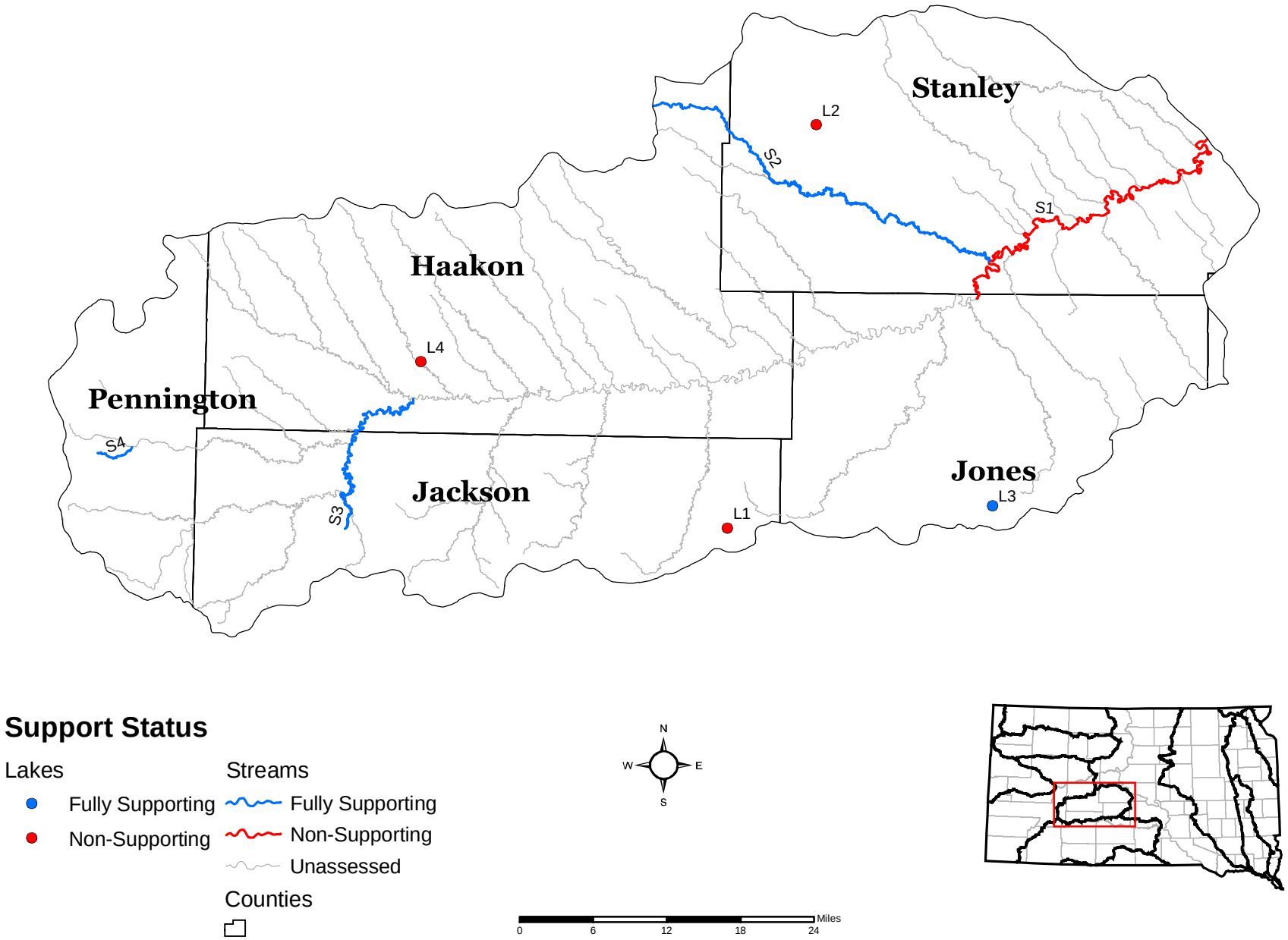

Figure 6: Bad River Basin Waterbody Support Status

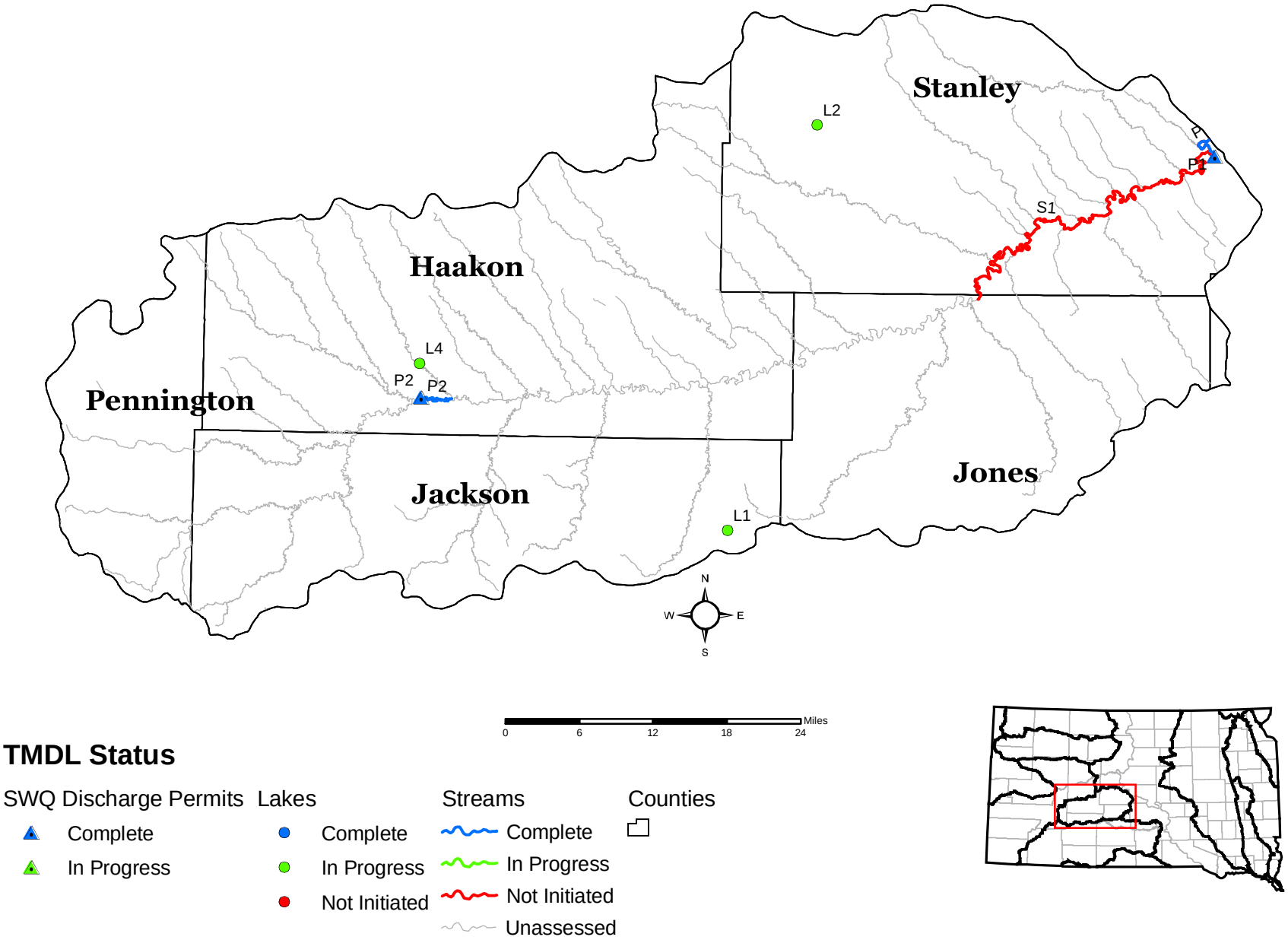

Figure 7: Bad River Basin TMDL Waters

Belle Fourche River Basin (Figures 8 and 9, Table 18).

Upper Belle Fourche River from the Wyoming border to the Willow Creek is nonsupporting due to excessive TSS and fecal coliform concentrations. Elevated TSS has been a periodic problem in this river for the past decade. A natural source of elevated TSS and TDS for the upper reach of the river may be from erosion of the extensive exposed shale beds that lie along the river's course upstream of the city of Belle Fourche. Agricultural activities are likely additional sources of occasional violations of the water quality standards. The lower Belle Fourche River is nonsupporting also due to excessive TSS during the present and previous assessments.

Historic and current USGS monitoring data indicate Horse Creek is not supporting its irrigation use due to conductivity in excess of 3,000 µmhos/cm. Irrigation return flows may be contributing to the high conductivity in this stream at the present time.

Redwater River fully supported its assigned uses during this assessment and most previous reporting periods.

Past and current assessments show Spearfish Creek generally supports its beneficial uses. However, a segment near Elmore and Spearfish, recorded violations of the water quality standards due to elevated pH. It is believed that the higher pH is due largely to the limestone formations located along the course of the stream (natural conditions).

Commercial streamside placer mining activities are no longer a significant source of water quality problems in Black Hills streams within the Belle Fourche and Cheyenne River Basins. During 1996 and 1997, Homestake Mining and Brightwater Inc., an affiliate of the Dunbar Resort, reclaimed the Red Placer that was previously mined by Dakota Placers under South Dakota Mining Permit No. 208. Homestake and Brightwater jointly own the Red Placer claim and developed an extensive reclamation and stream rehabilitation plan for the mine site. Approximately 16 acres of mine-affected lands along Whitewood Creek were reclaimed, and the stream channel was reconstructed and stabilized throughout the site.

Bear Butte Creek from the headwaters to the Lawrence County line was historically severely impaired by heavy metals and elevated TSS. The sources of excessive heavy metals were old streamside mine tailings along Strawberry Creek and in-place contaminants in the Bear Butte streambed. During the last assessment (water years 1996-2001) and during the current assessment, the entire monitored length of Bear Butte Creek fully supported all assigned beneficial uses.

Strawberry Creek, approximately five miles southeast of Deadwood, is a western tributary of upper Bear Butte Creek. In past years, upper Strawberry Creek was severely impacted by mine tailings and by Brohm Mining Corporation's Gilt Edge Mine; seepage and runoff from which produced conditions of low water pH (avg. 4.1) and excessive TSS in this stream during the period 1993 to 1995. In addition, there was impairment due to elevated TDS and specific conductivity. However, there was dramatic improvement in stream pH (avg. 7.2) and conductivity starting with the November 1994 samples and some improvement in TDS although not in TSS. The improvements were due to collection and treatment of acidic mine water at the Gilt Edge Mine. During 1996-1997, water quality in Strawberry Creek declined. Nonsupport was caused by TDS, conductivity, elevated TSS,

and low pH. Average water pH fell to 6.85 for this recent period. In the late 1990s, average pH improved slightly to 7.0 and TSS decreased to acceptable levels. However, the stream was nonsupporting due to high TDS and zinc concentrations. Last assessment, stream pH maintained acceptable levels (mean: 7.2 s.u.) but the creek again failed to support beneficial uses for TDS, and was impaired for elevated zinc, cadmium, copper, and cyanide concentrations. During this assessment, the average stream pH was recorded as 7.1. However, there appeared to have been a wide range of fluctuation for this parameter (4.3-9.3). The stream is currently nonsupporting for high levels of zinc, cadmium, copper, TDS, specific conductivity, and pH.

In July 1999 Brohm Mining Corporation's parent corporation, Dakota Mining, declared bankruptcy, and the State of South Dakota took over water treatment at the site. On July 31, 2000, EPA took over site operations including water treatment and on December 1, 2000 the site was listed on the National Priorities List as a Superfund Site. In an effort to improve water treatment and quality during 2002 and 2003, EPA converted the water treatment plant from a caustic-based plant to a lime based plant. The new plant became operational in September 2003 and the effluent must meet surface water quality standards except for TDS and selenium.

Last reporting cycle, upper Whitewood Creek fully supported beneficial uses from the headwaters to the Gold Run Creek confluence at Lead. Currently, the upper creek is also meeting all beneficial use criteria.

Downstream of the confluence with Gold Run Creek, the water quality of middle Whitewood Creek routinely declines. During the present and last two reporting periods, nonsupport of this reach was attributable solely to high fecal coliform levels. Cause for impairment during this assessment was elevated water temperature in the segment below Deadwood and high pH in a five mile segment above Whitewood. The lower half of Whitewood Creek fully supported its assigned uses this reporting period as during past assessments. Monitored heavy metals levels again showed no violations. The entire length of Whitewood Creek is currently meeting heavy metals criteria.

Sources of the high fecal coliform numbers to the stream's middle reach may be due to aging septic and sewer systems in the area. Sewage pipes in this area have deteriorated with age and are gradually being repaired or replaced. Another source of coliform to the creek is from the combined sewer overflow (CSO) in Lead. A SWD permit has been issued to the city of Lead for the CSO, requiring compliance with EPA's nine minimum controls.

During the 1994 assessment report (water years 1989-1993), West Strawberry Creek, a southeastern tributary of upper Whitewood Creek, was impaired by elevated water temperatures (>65 °F), TSS and high pH. Lack of adequate flows may have been a major contributing factor for the impairments at that time. West Strawberry Creek fully supported assigned beneficial uses during the present and previous three assessments.

Annie Creek, Cleopatra Creek, False Bottom Creek, Stewart Gulch Creek, Fantail Creek, Deadwood Creek, and Whitetail Creek are seven small tributaries investigated during this assessment. These are tributaries of Spearfish Creek, Redwater River, and Whitewood Creek, respectively. All of these tributaries supported the assigned uses and met the metals water quality standards.

During this assessment, four of the five monitored lakes in the Belle Fourche River basin showed stable water quality conditions and one, Orman Dam, registered a decline in water quality between assessments. Only one (Iron Creek Lake) of the five lakes failed to meet its water quality target criteria (TSI < 45).

Belle Fourche Reservoir (Orman Dam) continued to support its assigned uses for the last four reporting periods with TSI values in the mesotrophic range (combined TSIs: 42 to 46). However, inorganic turbidity has been a moderate water quality problem in Orman Dam particularly in the early 1990s (Secchi visibility TSIs: 57 - 58). Much of this turbidity may be attributed to the previously mentioned surface shale formations within this drainage. Crow Creek, Owl Creek, and water diversions from the Belle Fourche River transport large quantities of TSS into the reservoir during high-water periods. Agricultural activities may at times be a major source of nutrients and siltation to this large reservoir. A later Secchi TSI calculated for 1999 showed a marked improvement in reservoir water clarity (TSI: 44). However, recent combined TSIs indicated a decline in Orman Dam water quality compared with 1999 readings due to higher phosphorus and chlorophyll levels during 2003.

Newell Lake fully supported its beneficial uses during the last three reporting periods. Mesotrophic status has been maintained in the lake from 1989 to 1997, with the exception of 1993 and 1996. The current calculated combined TSI for Newell Lake is 48, which presently places the lake in the mesotrophic range.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 18: Belle Fourche River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Iron Creek Lake	Lawrence County	L5	Lake Assessment	Limited Contact Recreation	Unknown		Nonpoint Sources	5	Yes – 2
				Immersion Recreation	Unknown				
				Coldwater Permanent Fish Life	Non	TSI			
				Domestic Water Supply	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Mirror Lake	Lawrence County	L6	Lake Assessment	Immersion Recreation	Unknown			3	No
				Limited Contact Recreation	Unknown				
				Domestic Water Supply	Unknown				
				Coldwater Permanent Fish Life	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Newell Lake	Butte County	L7	Lake Assessment	Immersion Recreation	Unknown			2	No
				Warmwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Newell City Pond	Butte County	L8	Lake Assessment	Immersion Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Coldwater Marginal Fish Life	Full				
				Limited Contact Recreation	Unknown				
Orman Dam	Butte County	L9	Lake Assessment	Warmwater Permanent Fish Life	Full			2	No
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Streams									
Annie Creek	Headwaters to Spearfish Creek	S5	DENR 46MN31	Limited Contact Recreation	Full			1	No
				Coldwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Bear Butte Creek	Headwaters to Strawberry Creek	S6	DENR 460126	Coldwater Permanent Fish Life	Full			1	No [1]
				Fish/Wildlife Prop, Rec, Stock Waters	Full				(see page
				Limited Contact Recreation	Full				59 for foot-
				Irrigation Waters	Full				note)
Bear Butte Creek	Strawberry Creek to near Bear Den Mountain	S7	DENR 460125	Irrigation Waters	Full			1	No
				Limited Contact Recreation	Full				
				Coldwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Belle Fourche River	WY border to near Fruitdale	S8	DENR 460130	Fish/Wildlife Prop, Rec, Stock Waters	Full		Grazing in Riparian Zones	5	Yes – 1
				Limited Contact Recreation	Full		Livestock		
				Irrigation Waters	Full		Crop Production		
				Immersion Recreation	Non	Fecal Coliform			
				Warmwater Permanent Fish Life	Non	TSS			
Belle Fourche River	Near Fruitdale to Whitewood Creek	S9	DENR 460683	Irrigation Waters	Full		Managed Pasture Grazing	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production		
				Warmwater Permanent Fish Life	Non	TSS	Natural Sources		
				Immersion Recreation	Insuff Info		Rangeland Grazing		
				Limited Contact Recreation	Insuff Info				
Belle Fourche River	Whitewood Creek to Willow Creek	S10	DENR 460681	Irrigation Waters	Full		Crop Production	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Warmwater Permanent Fish Life	Non	TSS			
Belle Fourche River	Willow Creek to Alkali Creek	S11	DENR 460880	Immersion Recreation	Insuff Info		Irrigated Crop Prod.	5	Yes – 1
				Warmwater Permanent Fish Life	Non	TSS	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock		
				Limited Contact Recreation	Insuff Info		Non-irrigated Crop Prod.		
				Irrigation Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Belle Fourche River	Alkali Creek to mouth	S12	DENR 460676	Warmwater Permanent Fish Life	Non	TSS	Irrigated Crop Prod.	5	Yes – 1
				Irrigation Waters	Full		Crop Production Rangeland Grazing		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Grazing in Riparian Zones		
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
Crow Creek	Near Beulah, WY	S13	USGS 6430532	Coldwater Permanent Fish Life	Insuff Info			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Irrigation Waters	Full				
Deadwood Creek	Rutabaga Gulch to Whitewood Creek	S14	DENR 460127	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Coldwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
False Bottom Creek	Headwaters to St. Onge	S15	DENR 46MN38	Irrigation Waters	Full			1	No
				Limited Contact Recreation	Full				
				Coldwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Fantail Creek	Headwaters to Nevada Gulch	S16	DENR 460119	Coldwater Permanent Fish Life	Full			1	No
				Irrigation Waters	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
Horse Creek	Near Vale and Newell	S17	USGS 6436760	Limited Contact Recreation	Unknown			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Non	Conductivity	Source Unknown		
				Warmwater Semipermanent Fish Life	Insuff Info				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Little Spearfish Creek	Near Lead	S18	USGS 6430850	Limited Contact Recreation	Unknown			2	No
				Coldwater Permanent Fish Life	Insuff Info				
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Murray Ditch	At WY-SD state line	S19	USGS 6429997	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Redwater River	US Hwy 85 to mouth	S20	DENR 460895	Irrigation Waters	Full			1	No
				Coldwater Marginal Fish Life	Full				
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Spearfish Creek	Intake Gulch to Annie Creek	S21	DENR 46MN32	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Immersion Recreation	Full				
				Coldwater Permanent Fish Life	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
Spearfish Creek	Annie Creek to McKinley Gulch	S22	DENR 46MN33	Coldwater Permanent Fish Life	Full			1	No
				Limited Contact Recreation	Full				
				Domestic Water Supply	Full				
				Immersion Recreation	Full				
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Spearfish Creek	McKinley Gulch to Squaw Creek	S23	DENR 46MN34	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Immersion Recreation	Full				
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
				Limited Contact Recreation	Full				
				Coldwater Permanent Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Spearfish Creek	Cleopatra Creek to Fish Hatchery Gulch	S24	DENR 46MN 35	Irrigation Waters	Full			1	No
				Limited Contact Recreation	Full				
				Coldwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Spearfish Creek	Fish Hatchery Gulch to Higgens Gulch	S25	DENR 460900	Limited Contact Recreation	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Coldwater Permanent Fish Life	Full				
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
				Immersion Recreation	Full				
Spearfish Creek	Higgens Gulch to mouth	S26	DENR 460689	Limited Contact Recreation	Full			1	No
				Immersion Recreation	Full				
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
				Coldwater Permanent Fish Life	Full				
Cleopatra Creek (formerly known as Squaw Creek)	Confluence with East Branch to mouth	S27	DENR 46MN39	Coldwater Permanent Fish Life	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Immersion Recreation	Full				
Stewart Gulch	Headwaters to mouth	S28	DENR 460124	Limited Contact Recreation	Full			1	No
				Coldwater Permanent Fish Life	Full				
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Strawberry Creek	Headwaters to mouth	S29	DENR 460116	Irrigation Waters	Non	pH	Mine Tailings	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Non	Conductivity; TDS	Acid Mine Drainage		
				Coldwater Marginal Fish Life	Non	Zinc; Cadmium	Impacts from Abandoned Mines		
				Limited Contact Recreation	Full	Copper			
West Strawberry Creek	Headwaters to mouth	S30	DENR 460675	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Coldwater Permanent Fish Life	Full				
Whitetail Creek	Headwaters to mouth	S31	DENR 460118	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Coldwater Permanent Fish Life	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Whitewood Creek	Whitetail Summit to Gold Run Creek	S32	DENR 460686	Irrigation Waters	Full			1	No
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
				Coldwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Whitewood Creek	Gold Run Creek to Deadwood Creek	S33	DENR 460122	Immersion Recreation	Full			1	No [2]
				Fish/Wildlife Prop, Rec, Stock Waters	Full				(See
				Irrigation Waters	Full				footnote at end of table)
				Coldwater Marginal Fish Life	Full				
				Limited Contact Recreation	Full				
Whitewood Creek	Deadwood Creek to Spruce Gulch	S34	DENR 460123	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Limited Contact Recreation	Non	Fecal Coliform	Aging Septic Systems		
				Immersion Recreation	Non				
				Coldwater Marginal Fish Life	Full				
				Irrigation Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Whitewood Creek	Spruce Gulch to Sandy Creek	S35	DENR 460685	Coldwater Permanent Fish Life	Non	Water Temp	Combined Sewer Overflows	5	Yes[3] – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Immersion Recreation	Non	Fecal Coliform			
				Limited Contact Recreation	Full				
Whitewood Creek	Sandy Creek to I-90	S36	DENR 460684	Coldwater Marginal Fish Life	Full			1	No
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Immersion Recreation	Full				
Whitewood Creek	I-90 to Crow Creek	S37	DENR 460652	Warmwater Semipermanent Fish Life	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
Whitewood Creek	Crow Creek to mouth	S38	DENR 460682	Limited Contact Recreation	Full			1	No
				Warmwater Semipermanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
Surface Water Discharge Permits									
						PARAMETER			
Belle Fourche River	Near Nisland	P3	SD0020109	Approved TMDL		Ammonia		6b	No
Whitewood Creek	Near Lead-Deadwood	P4	SD0020796	Approved TMDL		Ammonia, dissolved oxygen		6b	No
Whitewood Creek	Near Lead	P5	SD0000043	Need to Renew TMDL		Ammonia, metals		6a	Yes – 1
Whitewood Creek	Near Whitewood	P6	SD0021466	Approved TMDL		Ammonia		6b	No

[1] Listed in error for Total Suspended Solids in 2002. Current data shows no impairment.

[2] Was previously listed in the 2002 303(d) list, however new water quality information indicates full support.

[3] Was previously listed in the 2002 303(d) list for suspended solids, however new water quality information indicates full support for this parameter.

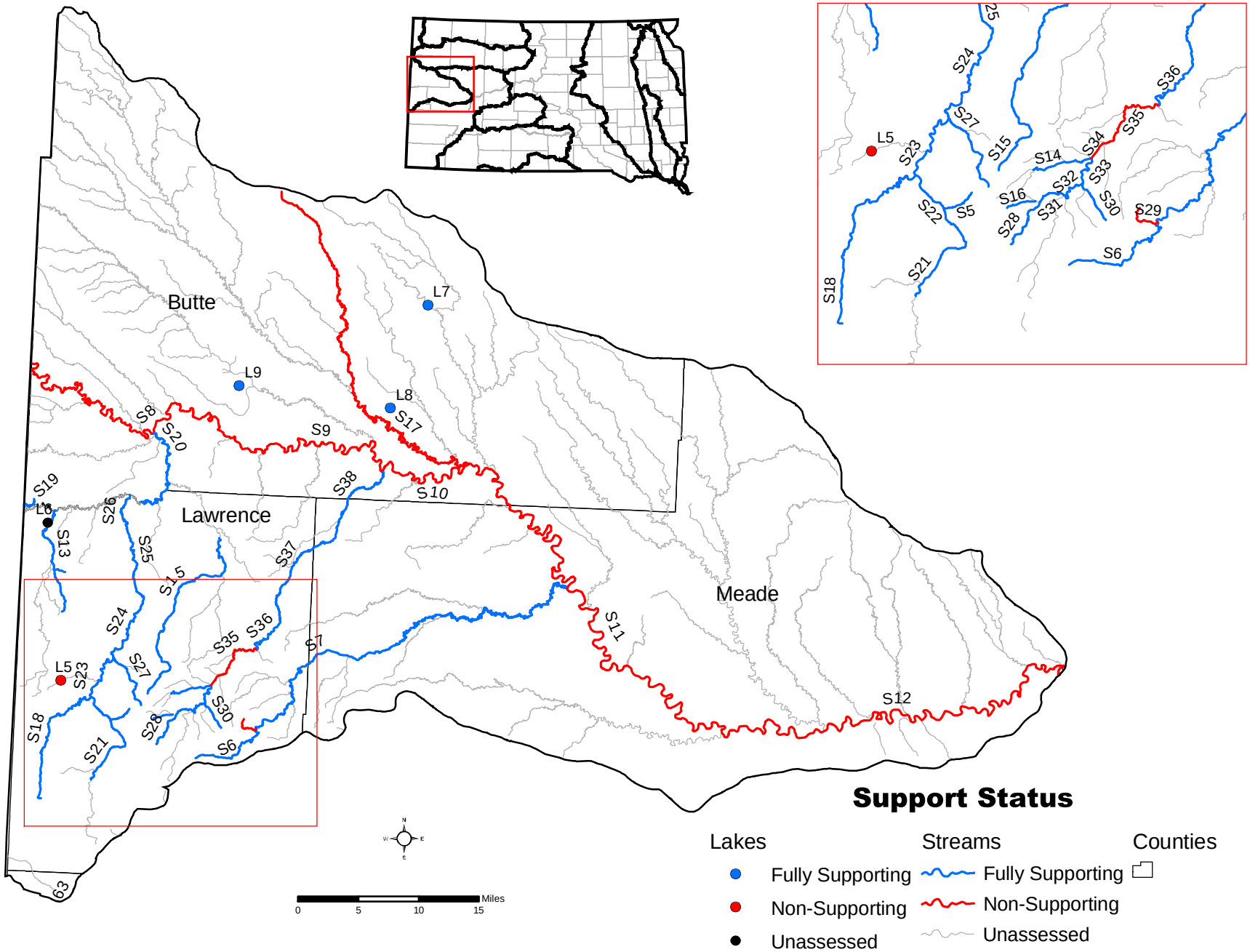

Figure 8: Belle Fourche River Basin Waterbody Support Status

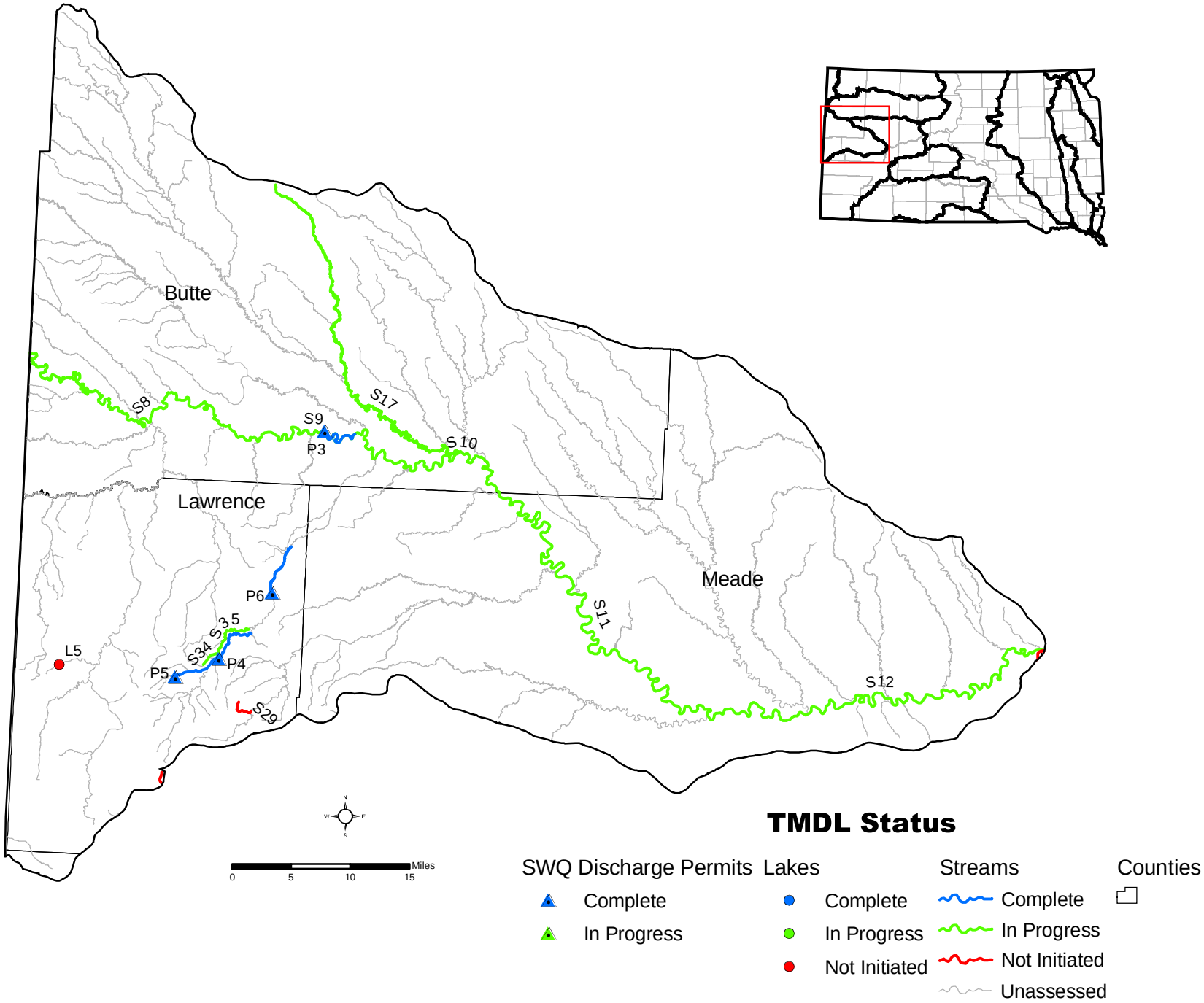

Figure 9: Belle Fourche River Basin TMDL Waters

Big Sioux River Basin (Figures 10 - 13, Table 19).

The Big Sioux River basin is located in eastern South Dakota. The lower portion of the river forms the Iowa-South Dakota border. The basin drains an approximate 4,280 square miles in South Dakota and an additional 3,000 square miles in Minnesota and Iowa. The basin's primary source of income is agriculture, but it also contains a majority of the state's light manufacturing, food processing, and wholesaler industries. Four state educational institutions, several vocational schools, and Sioux Falls, the state's largest city, are located within this basin making this the heaviest populated basin in the state.

DENR presently maintains 17 active water quality sampling sites on the Big Sioux River and one site on the lower Skunk Creek tributary in Sioux Falls. Most of the fixed stations are representative of the various segments of the 395-mile length of the monitored river and are located from the head waters above Watertown in Codington County south to Richland in Union County, the last downstream site.

The lower half of the Big Sioux River continues to be nonsupporting for its fishable and/or swimmable beneficial uses at the present time. Major impairments are TSS and fecal coliform bacteria.

The upper 105-mile reach of the Big Sioux River, from the headwater to the vicinity of Volga, fully supported its assigned beneficial uses for assessments conducted during the 1990s. Recently, however, during the last and current assessment period, the uppermost 31-mile river segment from the headwaters (vic. Ortley) to Lake Kampeska did not support beneficial uses due to low DO, probably the indirect result of low stream flow. The next reach downstream, a short segment from Lake Kampeska to above Watertown, fully supported uses during that time period. The next downstream segment (below Watertown) from Willow Creek to Stray Horse Creek was and still is nonsupporting for the "domestic water supply" use assigned to this stream segment as the result of high nitrite/nitrate levels (>10 mg/l), and high fecal coliform. The next segment, from Stray Horse Creek to the vicinity of Volga, fully supported uses during the previous and present reporting cycle. The remaining two segments of the upper Big Sioux River from near Volga, to the vicinity of Lake Campbell, continued to be nonsupporting due to elevated TSS.

The next three monitored stream segments of the lower Big Sioux, from Lake Campbell to the Skunk Creek confluence in Sioux Falls, generally had fair water quality last assessment with impairment due to elevated TSS and fecal coliform. This reporting period, high fecal coliform levels were a problem for immersion recreation use in the two downstream segments below Dell Rapids. In the Sioux Falls area below the Skunk Creek confluence, the river water quality deteriorates, primarily due to higher incidence of excessive fecal coliform levels. The Big Sioux was nonsupporting from the confluence to above Brandon, mainly due to elevated fecal coliform levels. The lower two segments in this reach were also impaired by elevated TSS.

The lowermost segments of the Big Sioux River from above Brandon, to the Missouri River confluence continue to be nonsupporting for fecal coliform bacteria and TSS.

Sources of fecal coliform in the Big Sioux may be discharges of wastewater, rural farmsteads/dwellings, and runoff from feedlots/animal holding sites. During periods of high precipitation discharges from storm sewers, emergency bypasses of municipal wastewater facilities, and industrial dischargers that have had fecal coliform violations in the past may be contributors of fecal coliform to the Big Sioux River.

Sediment sources are overland runoff from nearby croplands and feedlots, inflow from tributaries, and streambank erosion. Potential for soil erosion appears to be high in a 50-mile reach of the Big Sioux south of Canton, where the river channel borders an extensive hilly area of erosive soils. This situation promotes bank erosion and sediment runoff in the Big Sioux and tributaries in the area.

Skunk Creek near Sioux Falls is presently supporting its beneficial uses. During the last three reporting periods, Skunk Creek was also fully supporting.

With one or two possible exceptions, lakes in the Big Sioux River basin are eutrophic due to algae, nutrient enrichment, and siltation. Nearly 41% of the monitored lakes can be considered hypereutrophic (highly eutrophic) at the present time. Hypereutrophic conditions are also related to the moderate size of some of the waterbodies and the shallow depth of most of the basin lakes making them more susceptible to rapid changes produced by large nutrient and sediment loads from often sizeable agricultural watersheds comprised of nutrient-rich glacial soils.

Fifty-one percent of 35 recently-monitored lakes in the Big Sioux River basin presently meet the assigned water quality criteria (TSI <65) and 49% do not. Comparison of TSI values with those of the previous assessment (for 22 lakes where sufficient data was available to estimate short term trends) indicated that only 2 lakes, North Waubay and South Red Iron Lake, had improved in water quality since the last reporting period. Six lakes showed an apparent decline (higher TSI values). Water quality in 14 lakes (64%) remained comparatively stable over the last several years. Climatic changes are believed responsible for short-term fluctuations.

Watershed management programs are attempting to reduce sediment and nutrient loads from both manmade and natural sources within the basin.

Projects within the Big Sioux basin include watershed implementation projects for Clear Lake (Deuel Co), Blue Dog/Enemy Swim, Madison/Brant Lake, Bachelor Creek and the Upper Big Sioux River. Assessment projects currently underway are the Central, North Central and Lower Big Sioux River, Marshall Lake, Wall Lake, Lake Norden/Lake Albert, and School/Bullhead, Watershed Assessment Projects. A four-year sediment removal (dredging) project in Clear Lake (Deuel Co) was completed in 2003.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 19: Big Sioux River Basin Information

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lake Albert	Kingsbury County	L10	Lake Assessment	Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lake Alvin	Lincoln County	L11	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
Bitter Lake	Day County	L129	NA	Fish/Wildlife Prop, Rec, Stock Waters	Unknown	Fish Cons. Advisory	Unknown	5	Yes – 2
Blue Dog Lake	Day County	L12	Lake Assessment	Limited Contact Recreation	Full			4a	No
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
Brant Lake	Lake County	L13	Lake Assessment	Immersion Recreation	Unknown			4a	No
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Bullhead Lake	Deuel County	L14	Lake Assessment	Immersion Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Limited Contact Recreation	Unknown				
Lake Campbell	Brookings County	L15	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Immersion Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Clear Lake	Deuel County	L16	Lake Assessment	Limited Contact Recreation	Unknown			4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		

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WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Clear Lake	Marshall County	L17	Lake Assessment	Immersion Recreation	Unknown			2	No
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Full				
Cottonwood Lake	Marshall County	L18	Lake Assessment	Immersion Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Full				
Covell Lake	Minnehaha County	L19	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint source		
Dry Lake	Codington County	L20	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			3	No
				Warmwater Marginal Fish Life	Unknown				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Lake Drywood North	Roberts County	L21	Lake Assessment	Immersion Recreation	Unknown			3	No
				Warmwater Marginal Fish Life	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
East Oakwood Lake	Brookings County	L22	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Immersion Recreation	Full				
			Lake Assessment	Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Enemy Swim Lake	Day County	L23	Lake Assessment	Warmwater Permanent Fish Life	Full			1	No
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
Lake Herman	Lake County	L24	Lake Assessment	Immersion Recreation	Full			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Full				

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WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lake Kampeska	Codington County	L25	Lake Assessment	Domestic Water Supply	Full			4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Non	Fecal Coliform			
				Limited Contact Recreation	Full				
Lake Madison	Lake County	L26	Lake Assessment	Immersion Recreation	Unknown			4a	No
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Minnewasta Lake	Day County	L27	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
North Buffalo Lake	Marshall County	L28	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No
				Warmwater Semipermanent Fish Life	Full				
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Nine Mile Lake	Marshall County	L29	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Lake Norden	Hamlin County	L30	Lake Assessment	Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Oneroad Lake	Roberts County	L31	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			3	No
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Unknown				
				Immersion Recreation	Unknown				

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WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Pelican Lake	Codington County	L32	Lake Assessment	Limited Contact Recreation	Full			4a	No
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Pickerel Lake	Day County	L33	Lake Assessment	Warmwater Permanent Fish Life	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Lake Poinsett	Hamlin County	L34	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
Roy Lake	Marshall County	L35	Lake Assessment	Immersion Recreation	Full			1	No
				Warmwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
South Red Iron Lake	Marshall County	L36	Lake Assessment	Immersion Recreation	Unknown			2	No [1]
				Warmwater Permanent Fish Life	Full				(See
				Limited Contact Recreation	Unknown				note at end
				Fish/Wildlife Prop, Rec, Stock Waters	Full				of table)
School Lake	Deuel County	L37	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Lake Sinai	Brookings County	L38	Lake Assessment	Limited Contact Recreation	Unknown			2	No
				Warmwater Permanent Fish Life	Full				
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
South Buffalo Lake	Marshall County	L39	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No [1]
				Warmwater Semipermanent Fish Life	Full				(See
				Limited Contact Recreation	Unknown				note at end
				Immersion Recreation	Unknown				of table)

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WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lake St. John	Hamlin County	L40	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			5	Yes – 1
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Twin Lake/W. Hwy 81	Kingsbury County	L130	NA	Fish/Wildlife Prop, Rec, Stock Waters	Unknown	Fish Cons. Advisory	Unknown	5	Yes – 2
West Oakwood Lake	Brookings County	L41	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Wall Lake	Big Sioux Basin	L42	Lake Assessment	Warmwater Semipermanent Fish Life	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Waubay	Day County	L43	Lake Assessment	Warmwater Semipermanent Fish Life	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Big Sioux River	SE of Ortley to Lake Kampesk a	S39	DENR 46BSA1	Irrigation Waters	Full			5	Yes – 1
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Non	Diss. Oxygen			
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Big Sioux River	Lake Kampeska to Willow Creek	S40	DENR 460655	Warmwater Semipermanent Fish Life	Full			1	No
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

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WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Big Sioux River	Willow Creek to Stray Horse Creek	S41	DENR 460740	Warmwater Semipermanent Fish Life	Full		Livestock	5	Yes – 1
				Limited Contact Recreation	Non	Fecal Coliform	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Municipal PS Discharge		
				Irrigation Waters	Full		Industrial PS Discharge		
				Domestic Water Supply	Non	Nitrates			
Big Sioux River	Stray Horse Creek to near Volga	S42	DENR 46BS08	Warmwater Semipermanent Fish Life	Full			1	No
				Domestic Water Supply	Full				
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
Big Sioux River	Near Volga to Brookings	S43	DENR 460662	Warmwater Semipermanent Fish Life	Non	TSS	Crop Production	5	Yes – 1
				Irrigation Waters	Full		Grazing in Riparian Zones		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Animal Feeding Operations (NPS)		
				Domestic Water Supply	Full				
				Limited Contact Recreation	Full				
Big Sioux River	Brookings to I-29	S44	DENR 460702	Limited Contact Recreation	Full		Crop Production	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Non-Irrigated Crop Prod.		
				Domestic Water Supply	Full		Grazing in Riparian Zones		
				Irrigation Waters	Full		Managed Pasture Grazing		
				Warmwater Semipermanent Fish Life	Non	TSS	Livestock		
Big Sioux River	I-29 to near Dell Rapids	S45	DENR 46BS18	Irrigation Waters	Full			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Non	TSS	Crop Production		
				Limited Contact Recreation	Full		Livestock		
				Domestic Water Supply	Full				

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WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Big Sioux River	Near Dell Rapids to below Baltic	S46	DENR 460703	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Immersion Recreation	Non	Fecal Coliform	Livestock		
				Warmwater Semipermanent Fish Life	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
Big Sioux River	Below Baltic to Skunk Creek	S47	DENR 46BS23	Warmwater Semipermanent Fish Life	Full			5	Yes – 1
				Immersion Recreation	Non	Fecal Coliform	Livestock		
				Irrigation Waters	Full				
				Domestic Water Supply	Full				
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Big Sioux River	Skunk Creek to diversion return	S48	DENR 460664	Domestic Water Supply	Full			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Immersion Recreation	Non	Fecal Coliform	Residential Districts		
Big Sioux River	Diversion return to SF WWTF	S49	DENR 46BS29	Immersion Recreation	Non	Fecal Coliform	Municipal (Urbanized Area)	5	Yes – 1
				Limited Contact Recreation	Full		Streambank Modifications/destablization		
				Warmwater Semipermanent Fish Life	Non	TSS	Hydrostructure Flow Modification		
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Big Sioux River	SF WWTF to above Brandon	S50	DENR 460117	Irrigation Waters	Full		Streambank Modifications/destablization	5	Yes – 1
				Immersion Recreation	Non	Fecal Coliform	Wet Weather Discharges		
				Warmwater Semipermanent Fish Life	Non	TSS	Livestock		
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

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WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Big Sioux River	Above Brandon to Nine Mile Creek	S51	DENR 460831	Immersion Recreation	Non	Fecal Coliform	Animal Feeding Operations (NPS)	5	Yes – 1
				Warmwater Semipermanent Fish Life	Non	TSS	Livestock		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Non-Irrigated Crop Prod.		
				Irrigation Waters	Full		Grazing in Riparian Zones		
				Limited Contact Recreation	Non		Animal Feeding Operations (NPS)		
Big Sioux River	Nine Mile Creek to near Fairview	S52	DENR 460665	Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock	5	Yes – 1
				Irrigation Waters	Full		Hydrostructure Flow Modification		
				Warmwater Semipermanent Fish Life	Non	TSS	Rangeland Grazing		
				Immersion Recreation	Non	Fecal Coliform	Crop Production		
				Limited Contact Recreation	Full		Streambank Modifications/destablization		
Big Sioux River	Near Fairview to near Alcester	S53	DENR 460666	Immersion Recreation	Non	Fecal Coliform	Crop Production	5	Yes – 1
				Warmwater Semipermanent Fish Life	Non	TSS	Grazing in Riparian Zones		
				Limited Contact Recreation	Full		Non-Irrigated Crop Prod.		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Hydrostructure Flow Modification		
				Irrigation Waters	Full		Animal Feeding Operations (NPS)		
Big Sioux River	Near Alcester to Indian Creek	S54	DENR 460667	Limited Contact Recreation	Non		Animal Feeding Operations (NPS)	5	Yes – 1
				Irrigation Waters	Full		Grazing in Riparian Zones		
				Immersion Recreation	Non	Fecal Coliform	Hydrostructure Flow Modification		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Streambank Modifications/destablization		
				Warmwater Semipermanent Fish Life	Non	TSS	Non-Irrigated Crop Prod.		
Big Sioux River	Indian Creek to mouth	S55	DENR 460832	Warmwater Semipermanent Fish Life	Non	TSS	Animal Feeding Operations (NPS)	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Grazing in Riparian Zones		
				Irrigation Waters	Full		Crop Production		
				Limited Contact Recreation	Non		Hydrostructure Flow Modification		
				Immersion Recreation	Non	Fecal Coliform	Streambank Modifications/destablization		

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Skunk Creek	Brandt Lake to mouth	S56	DENR 460121	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Warmwater Marginal Fish Life	Insuff Info				
Surface Water Discharge Permits						PARAMETER			
Beaver Creek	Near Valley Springs	P7	SD0020923	Approved TMDL		Ammonia		6b	No
Big Sioux River	Near Baltic	P8	SD0022284	Approved TMDL		Ammonia		6b	No
Big Sioux River	Near Brookings	P9	SD0023388	Need to Renew TMDL		Ammonia; Diss. Oxygen		6a	Yes – 1
Big Sioux River	Near Canton	P10	SD0022489	Need to Renew TMDL		Ammonia		6a	Yes – 1
Big Sioux River	Near Dell Rapids	P11	SD0022101	Need to Renew TMDL		Ammonia		6a	Yes – 1
Big Sioux River	Near Egan	P12	SD0022462	Approved TMDL		Ammonia		6b	No
Big Sioux River	Near Estelline	P13	SD0022144	Need to Renew TMDL		Ammonia		6a	Yes – 1
Big Sioux River	Near Flandreau	P14	SD0021831	Approved TMDL		Ammonia		6b	No
Big Sioux River	Near Sioux Falls & Brandon	P15	SD0000078	Need to Renew TMDL		Ammonia; Diss. Oxygen		6a	Yes – 1
		P16	SD0022128						
			SD0022535						
Big Sioux River	Near Trent		SD0020265	Went to No Discharge Permit					No
Big Sioux River	Near Watertown	P17	SD0027324	Need to Renew TMDL		Ammonia; Diss. Oxygen		6a	Yes – 1
			SD0023370						
			SD0026786						
Big Sioux River	Near Volga	P18	SD0021920	Need to Renew TMDL		Ammonia		6a	Yes – 1
East Brule Creek	Near Alcester	P19	SD0021695	Approved TMDL		Ammonia		6b	No
Hidewood Creek	Near Clear Lake	P20	SD0020699	Need to Renew TMDL		Ammonia		6a	Yes – 1
Medary Creek	Near Aurora	P21	SD0021661	Approved TMDL		Ammonia		6b	No
Six Mile Creek	Near White	P22	SD0021636	Approved TMDL		Ammonia		6b	No
Skunk Creek	Near Chester	P23	SD0020338	Approved TMDL		Ammonia		6b	No
Skunk Creek	Near Hartford	P24	SD0021750	Approved TMDL		Ammonia		6b	No
Split Rock Creek	Near Corson	P25	SD0000299	Need to Renew TMDL		Metals; Cyanide		6a	Yes – 1
Spring Creek	Near Elkton	P26	SD0020788	Approved TMDL		Ammonia		6b	No

[1] Was previously listed on the 2002 303(d) list, however new water quality information indicates full support.

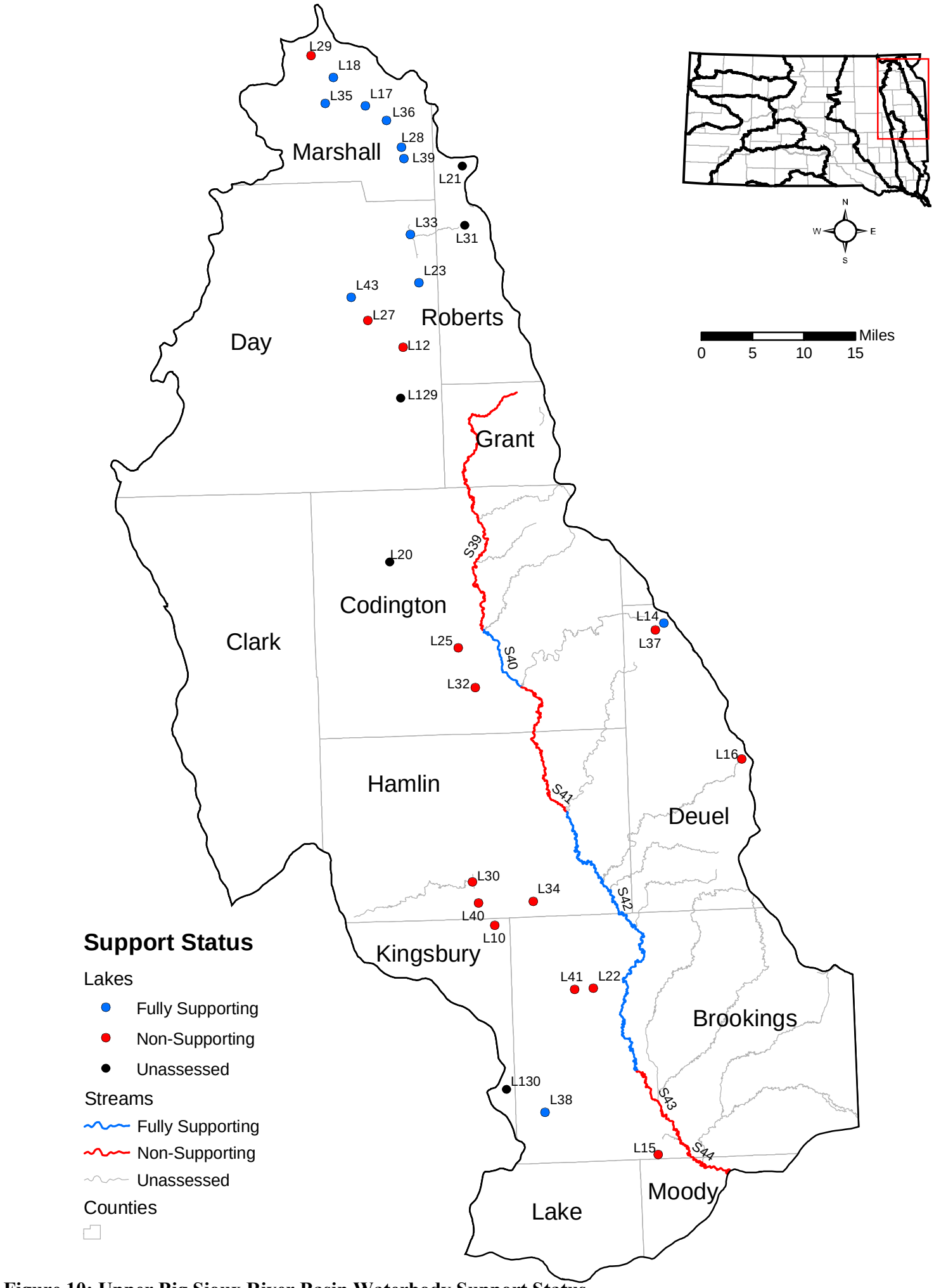


Figure 10: Upper Big Sioux River Basin Waterbody Support Status

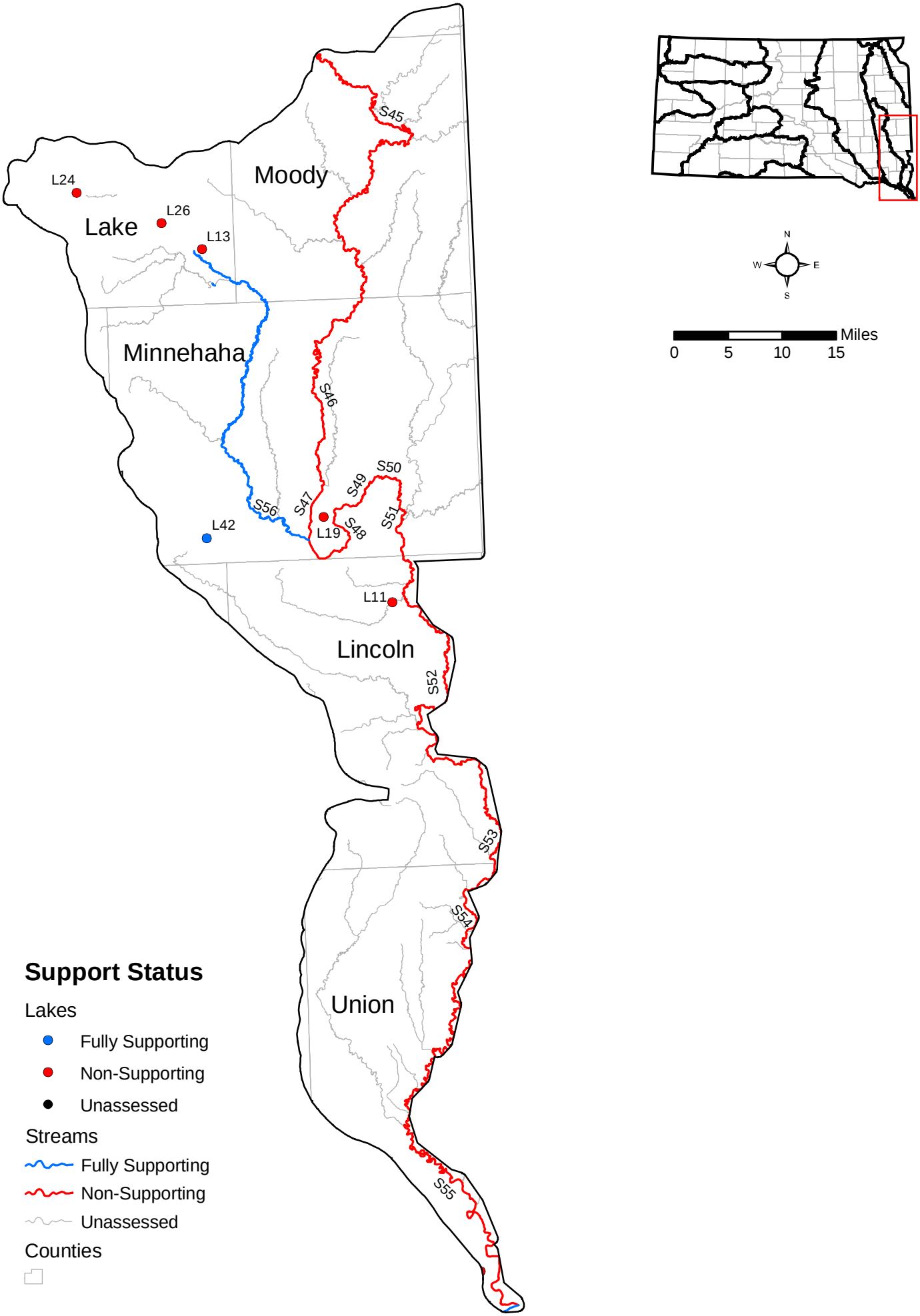


Figure 11: Lower Big Sioux River Basin Waterbody Support Status

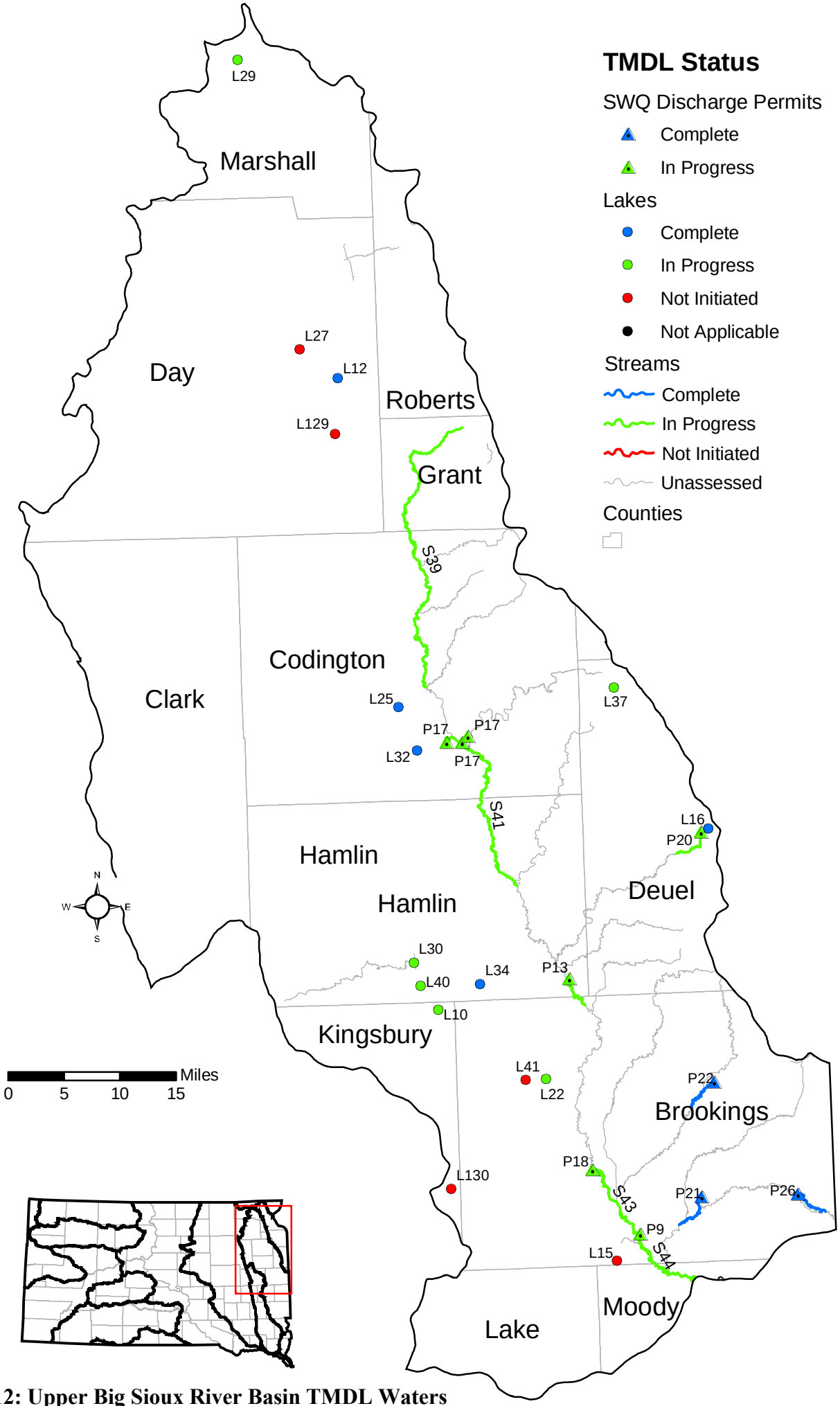


Figure 12: Upper Big Sioux River Basin TMDL Waters

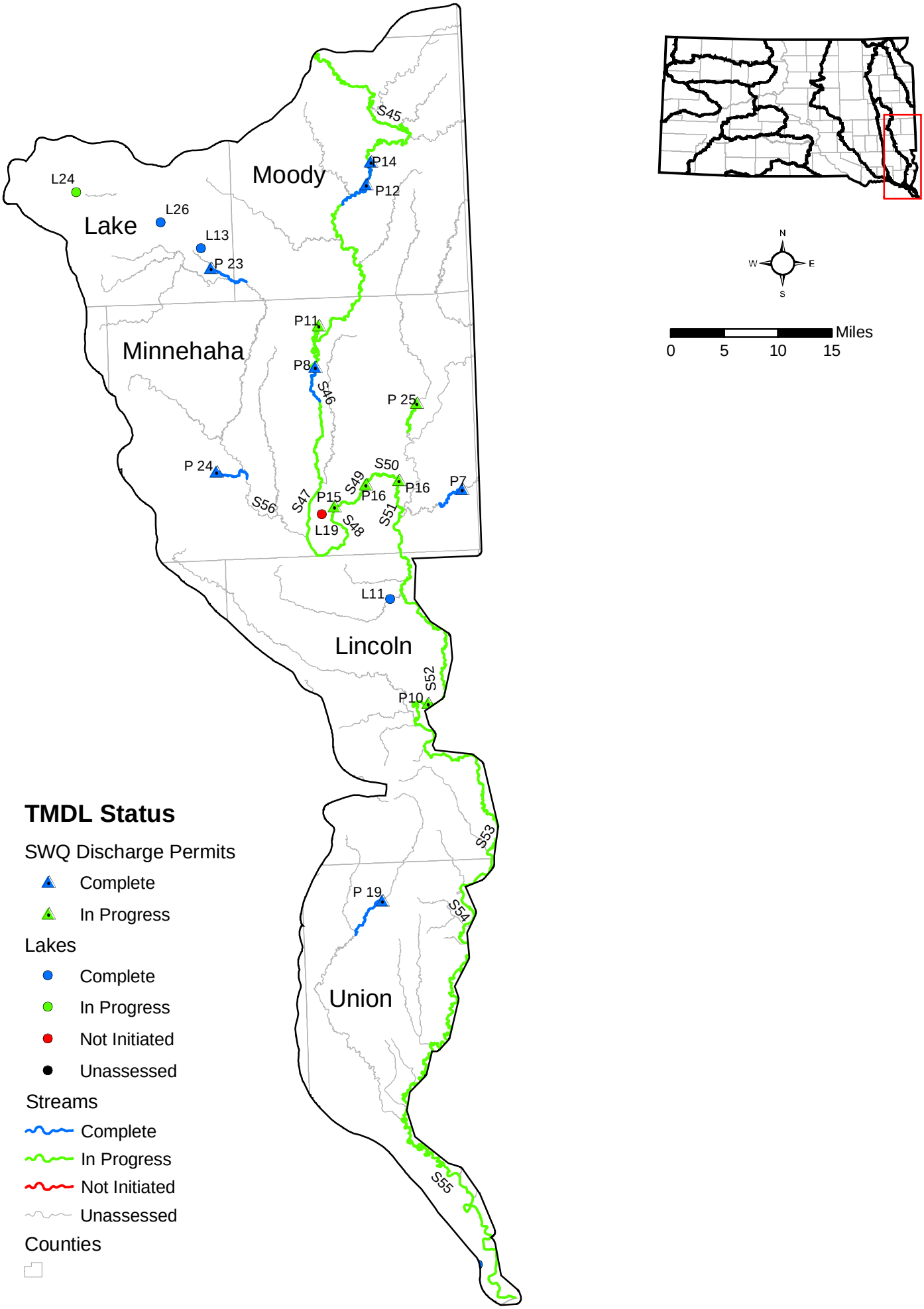


Figure 13: Lower Big Sioux River Basin TMDL Waters

Cheyenne River Basin (Figures 14 - 17 , Table 20).

The portion of the Cheyenne River Basin that lies in southwestern South Dakota drains 16,500 square miles within the boundaries of the state. The area in this basin is very diverse. It includes part of the Black Hills and Badlands, rangeland, irrigated cropland, and some mining areas. After traversing the western half of the state from southwest to northeast, the Cheyenne River flows into Lake Oahe, a reservoir on the Missouri River.

Cheyenne River water quality continues to be generally poor. The two downstream river segments did not support their designated fishable uses due to high TSS similar to past reporting periods. Also similar to the last four assessments was impairment of the immersion recreation use because of excessive fecal coliform levels. The two segments below Augustora Reservoir were similarly impaired due to high TSS and/or fecal coliform.

No TSS violations were noted for the upper Cheyenne River (Wyoming border to Angostura Reservoir) during 1994-1995 contrasted with 38% of samples exceeding the standard during 1996-1997. Below average rainfall in the upper drainage during the 1994 water year may have been largely responsible for the decrease in TSS. TDS remained high during both periods (25% and 43% exceedance) for this upper river segment. During the current and last two assessments the upper Cheyenne River was again impaired for high TDS. During the present evaluation, this reach was also impaired for irrigation use by high sodium adsorption ratio (SAR) and the lower river segment was additionally impaired for excessive TSS. The elevated concentrations of TDS and TSS are largely of natural geologic origin from runoff leaching and eroding the extensive shale formations in the upper Cheyenne River drainage. Changes in the other measured parameters were minor between the previous and present reporting cycle.

Large silt loads carried by the Cheyenne River impact Lake Oahe during seasonal periods of high flow. Monitoring records indicate that 11.6 million tons of sediment per year flow from the Cheyenne River into lower Lake Oahe. Severe soil erosion in the Badlands and along much of the river's lower course is the source of the suspended solids problem in the lower reaches. A major transporter of eroded soil is the Sage Creek tributary of the Cheyenne River, which drains a large portion of the northern Badlands.

The lower Cheyenne drainage, in general, contains a high percentage of erodible cropland and rangeland in west-central South Dakota. This cropland may contribute additional amounts of eroded sediment during periods of heavy rainfall.

High fecal coliform counts were recorded at all river sites nearly every reporting period. Likely sources of bacteria are livestock wastes. Irrigation return flows, cropland, and rangeland also contribute to water quality problems, the latter two sources particularly in the lower half of the river course.

A past problem was the presence of excessive levels of mercury in fish and sediments in the Cheyenne River arm of Lake Oahe. Previous studies in the 1970s and 1984 revealed mercury levels in game fish that exceeded recommended FDA levels for consumption. The mercury appeared to originate from gold mining operations in the northern Black Hills region and entered

the Cheyenne via the Belle Fourche River (a tributary of the Cheyenne River). Mining operations had used mercury in their gold recovery process but mercury use was discontinued in 1970. As a result, mercury concentrations seemed to have declined in fish and sediment of the Belle Fourche River, Cheyenne River, and the Cheyenne River arm (Foster Bay) of Lake Oahe between 1970-71 and 1984-88 (Ruelle et at., 1993).

Fairly recent fish flesh samples were collected by EPA (1998). The results of that data were reviewed by the Agency for Toxic Substance and Disease Registry. The conclusions stated mercury detected from fish in the Cheyenne River Basin were not significantly higher than mercury in fish from the Moreau River, and the fish did not pose a health hazard to sport fisherman.

Rapid Creek water quality typically ranges from good to satisfactory in its upper reaches with fair to poor quality downstream of Rapid City. During the current and previous assessments, the creek upstream of Pactola Reservoir supported its assigned uses. The next site downstream and adjacent to the Rapid City limits also fully supported its designated uses.

The segments on Rapid Creek immediately above the Rapid City wastewater treatment facility down to the confluence of the Cheyenne River were nonsupporting due to excessive fecal coliform during the present and last two assessments. A major recurring problem in this area of the creek is excessive fecal coliform bacteria levels.

Fall River in its upper half is often impaired during the warmer seasons of the year due to a natural source. Warmwater springs continually feed creeks and tributaries to the river and cause violations of the coldwater fishery standards for water temperature during late spring and summer. For this reason, the stream is managed as a warmwater fishery during the summer months and as a stocked coldwater (trout) fishery during the colder months. The lower half of Fall River below Hot Springs has not been monitored for water quality since 1990 but DENR reestablished a site (WQM 57) for quarterly sampling in 1999. Water quality data gathered since 1999 indicate the lower half of Fall River is impaired by elevated water temperature.

Black Hills streams other than those mentioned above usually have good to satisfactory water quality and fulfill their fishable/swimmable designated uses. They are, however, relatively small streams vulnerable to losses of flow exacerbated by periodic droughts in the Black Hills and high evapotranspiration rates characteristic of a dense and extensive ponderosa pine and spruce forest canopy. Grazing of streamside vegetation, which increases stream bank erosion, water temperature and nutrient loading, also continues to be a problem in a number of Black Hills streams.

The entire monitored length of French Creek fully supported designated beneficial uses during the present reporting cycle and the last several assessments. Overall water quality has remained in the good to satisfactory range for more than 15 years.

Flynn Creek, a small tributary of the south fork of Lame Johnny Creek, supported its fishable beneficial use during the last three assessments. This small stream has fully supported all its designated uses during earlier reporting cycles, indicating Flynn Creek has consistently good water quality.

Lower Battle Creek was impaired during this and previous assessments due to elevated water temperature and pH. Grace Coolidge Creek, a tributary of Battle Creek, is presently nonsupporting of its coldwater fishery use due to elevated water temperature. Upper Battle Creek is also nonsupporting due to temperature and pH during this evaluation. Generally, in past reporting periods, these streams were moderately impaired by either or both high pH (>8.6) and water temperature. The nonsupport may be caused largely by natural conditions such as low stream flow.

Upper Spring Creek was listed as moderately impaired in two reporting periods of the early 1990s due to excessive fecal coliform. During the current and the last two assessments, the stream rated as fully supporting. This is a reasonably good indication that water quality is now consistently acceptable over the entire length of Spring Creek.

Castle Creek below Deerfield Reservoir supported designated uses during the present as well as the last three assessments. In the past, slightly elevated pH was frequently recorded in the lower reach.

Beaver Creek was added to the WQM monitoring schedule in January 1999 and data shows the creek is nonsupporting for excessive TDS, fecal coliform, SAR, water temperature, TSS, and conductivity.

Cherry Creek, a prairie stream south of Faith, was also recently added to the WQM monitoring network. Limited data collected so far suggest the stream is nonsupporting for conductivity.

Few consistent long-term trends in water quality were evident for the monitored smaller creeks in the Black Hills. Probably for most of these small streams, moderate water quality fluctuations can be expected to occur between monitoring periods largely as a result of natural climatic and hydrologic factors.

The Black Hills region traditionally has some of the best surface water quality in the state. This is due in a large part to a cooler climate and higher rainfall than the surrounding plains as a result of greater elevation and forest cover. Also contributing to the water quality in this region is the nature of local bedrock formations which are much less erodible than the highly erosive and leachable marine shales and badlands on the surrounding plains.

Two reservoirs in this basin, Deerfield, and Pactola Reservoir, were rated as oligotrophic/mesotrophic during previous reporting periods with the former the more productive waterbody. However, the most recent average TSI value obtained for Pactola Reservoir and Deerfield Reservoir are 35 and 45 respectively. Data collected in 1997 suggested moderate nutrient enrichment had taken Deerfield to a higher mesotrophic status from a TSI of 40 in 1996 to 47 in 1997. The significantly higher TSI for Deerfield, relative to 1996, was due in large part to a larger chlorophyll *a* concentration in 1997. More data is needed to establish a trend for the two reservoirs. About a third of the monitored lakes appeared to have undergone a moderate decline in water quality during the mid 1990s, including Angostura Reservoir.

Of the 11 of 16 monitored lakes in the Cheyenne River basin for which sufficient data was available, six registered stable conditions between assessments, four lakes showed moderate improvement, and one, Coldbrook Reservoir, recorded a moderate decline in water quality due to increased chlorophyll levels this reporting period.

Five of the 16 monitored lakes met their ecoregion target water quality criteria (TSI < 45) this assessment. Those waterbodies were Angostura, Deerfield, Pactola, Cottonwood Springs, and Coldbrook Reservoir.

Angostura, Deerfield, and Pactola Reservoirs are sizeable high quality waterbodies vulnerable to nutrient enrichment and sedimentation from natural soil erosion, recreational activities, and various silvicultural activities. Eutrophication and sedimentation of Angostura Reservoir may be hastened by the inflow of often poor quality water from the upper Cheyenne River.

There are presently four ongoing assessment projects in the Cheyenne River basin: Custer State Park Lakes Assessment (Center, Legion, and Sylvan reservoirs), Upper Cheyenne River Assessment (including Angostura Reservoir), Spring Creek Assessment (including Sheridan Lake and Lake Mitchell), and Lower Rapid Creek and Upper Rapid/Castle Creek Assessment.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 20: Cheyenne River Basin Information

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Angostura Reservoir	Fall River County	L44	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No
				Immersion Recreation	Full				
				Warmwater Permanent Fish Life	Full				
				Limited Contact Recreation	Full				
				Domestic Water Supply	Unknown				
				Irrigation Waters	Full				
Bismark Lake	Custer County	L45	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Coldwater Marginal Fish Life	Non	TSI; pH	Nonpoint Sources		
				Immersion Recreation	Unknown				
Canyon Lake	Pennington County	L46	Lake Assessment	Immersion Recreation	Unknown			3	No [1]
				Domestic Water Supply	Unknown				(See
				Limited Contact Recreation	Unknown				footnote at end of table)
				Coldwater Permanent Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info				
Center Lake	Custer County	L47	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Coldwater Permanent Fish Life	Non	TSI; pH	Nonpoint Sources		
Cold Brook Reservoir	Fall River County	L48	Lake Assessment	Coldwater Permanent Fish Life	Full			2	No
				Domestic Water Supply	Unknown				
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Cottonwood Springs Lake	Fall River County	L49	Lake Assessment	Immersion Recreation	Unknown			2	No
				Warmwater Permanent Fish Life	Full				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Unknown				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Curlew Lake	Pennington County	L50	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			5	Yes – 2
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Deerfield Lake	Pennington County	L51	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No
				Coldwater Permanent Fish Life	Full				
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Horsethief Lake	Pennington County	L52	Lake Assessment	Coldwater Permanent Fish Life	Non	TSI; pH	Nonpoint Sources	5	Yes – 2
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lakota Lake	Custer County	L53	Lake Assessment	Limited Contact Recreation	Full			5	Yes – 2
				Coldwater Marginal Fish Life	Non	TSI; pH	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
Legion Lake	Custer County	L54	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Coldwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
New Wall Lake	Pennington County	L55	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 2
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
Pactola Reservoir	Pennington County	L56	Lake Assessment	Coldwater Permanent Fish Life	Full			2	No
				Domestic Water Supply	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Unknown				
				Immersion Recreation	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Sheridan Lake	Pennington County	L57	Lake Assessment	Coldwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Stockade Lake	Custer County	L58	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Coldwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Sylvan Lake	Custer County	L59	Lake Assessment	Coldwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Streams									
Battle Creek	Near Horsethief Lake to Teepee Gulch Creek	S57	DENR 460103	Coldwater Permanent Fish Life	Non	Water Temp	Natural Sources	5	Yes – 2 [2]
				Limited Contact Recreation	Full				(See
				Irrigation Waters	Full				footnote at end of table)
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Battle Creek	Teepee Gulch Creek to SD Hwy 79	S58	DENR 460905	Fish/Wildlife Prop, Rec, Stock Waters	Full		Natural Sources Source Unknown	5	Yes – 2
				Limited Contact Recreation	Full				
				Coldwater Permanent Fish Life	Non	pH			
				Irrigation Waters	Full	Water Temp			
Bear Gulch	Near Hayward	S59	USGS 6405800	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
				Limited Contact Recreation	Unknown				
				Coldwater Marginal Fish Life	Insuff Info				
Beaver Creek	WY border to mouth	S60	DENR 460128	Fish/Wildlife Prop, Rec, Stock Waters	Non	TSS		5	Yes – 2
				Limited Contact Recreation	Full	Water Temp			
				Irrigation Waters	Non	TDS			
				Coldwater Marginal Fish Life	Non	Conductivity			
Box Elder Creek	Headwaters to near Bogus Jim Creek	S61	DENR 460679	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Irrigation Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Box Elder Creek	Above Box Elder to Owanka	S62	DENR 460925	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Coldwater Permanent Fish Life	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
Castle Creek	Deerfield Reservoir to Rapid Creek	S63	DENR 460646	Limited Contact Recreation	Full			1	No
				Coldwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
Cherry Creek	Headwaters to mouth	S64	DENR 460131	Warmwater Marginal Fish Life	Insuff Info	Conductivity		5	Yes – 2
			USGS 6439000	Irrigation Waters	Non				
				Limited Contact Recreation	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info				
Cheyenne River	WY border to Beaver Creek	S65	DENR 460156	Irrigation Waters	Non	TDS		5	Yes – 2
				Warmwater Semipermanent Fish Life	Insuff Info	Conductivity			
				Fish/Wildlife Prop, Rec, Stock Waters	Non	SAR			
				Limited Contact Recreation	Insuff Info				
Cheyenne River	Beaver Creek to Angostura Reservoir	S66	DENR 460875	Limited Contact Recreation	Full		Crop Production	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Non	TDS	Livestock		
				Warmwater Semipermanent Fish Life	Non	Conductivity	Natural Sources		
				Irrigation Waters	Non	TSS			
Cheyenne River	Angostura Reservoir to Rapid Creek	S67	DENR 460132	Irrigation Waters	Full			5	Yes – 2
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
				Warmwater Semipermanent Fish Life	Non	TSS			

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Cheyenne River	Rapid Creek to Belle Fourche River	S68	DENR 460865	Irrigation Waters	Full		Crop Production	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Irrigated Crop Prod.		
				Immersion Recreation	Non	Fecal Coliform	Livestock		
				Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources		
				Limited Contact Recreation	Full		Rangeland Grazing		
Cheyenne River	Belle Fourche River to Bull Creek	S69	DENR 468860	Limited Contact Recreation	Full		Livestock	5	Yes – 2
				Immersion Recreation	Non	Fecal Coliform	Crop Production		
				Warmwater Permanent Fish Life	Non	TSS	Irrigated Crop Prod.		
				Irrigation Waters	Full		Natural Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Cheyenne River	Bull Creek to mouth	S70	DENR 460133	Limited Contact Recreation	Full		Livestock	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Natural Sources		
				Irrigation Waters	Full		Irrigated Crop Prod.		
				Warmwater Permanent Fish Life	Non	TSS	Non-Irrigated Crop Prod.		
				Immersion Recreation	Non	Fecal Coliform	Rangeland Grazing		
Cold Springs Creek	Near SD Hwy 385	S71	USGS	Coldwater Permanent Fish Life	Full			2	No
			433444103295200	Irrigation Waters	Full				
			433451103284000	Fish/Wildlife Prop, Rec, Stock Waters	Full				
			433459103280800	Limited Contact Recreation	Insuff Info				
Elk Creek	Near Roubaix, Rapid	S72	USGS 6424000	Limited Contact Recreation	Insuff Info			2	No
	City, and Elm Spr.		6425100	Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info				
			6425500	Irrigation Waters	Full				
				Warmwater Permanent Fish Life	Full				
Elm Creek	Near Fairpoint, Red	S73	USGS 6437650	Limited Contact Recreation	Unknown			2	No
	Owl		6438800	Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info				
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Insuff Info				
Fall River	Hot Springs to mouth	S74	DENR 460657	Coldwater Marginal Fish Life	Non	Water Temp	Natural Sources	5	Yes – 2
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Flynn Creek	Near SD Hwy 87 to mouth	S75	DENR 460111	Coldwater Marginal Fish Life	Full			1	No
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
French Creek	Headwaters to Custer	S76	DENR 460102	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Coldwater Marginal Fish Life	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
French Creek	Custer to Stockade Lake	S77	DENR 460653	Irrigation Waters	Full			1	No
				Coldwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
French Creek	Stockade Lake to SD Hwy 79	S78	DENR 460651	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
				Coldwater Marginal Fish Life	Full				
Grace Coolidge Creek	Headwaters to Battle Creek	S79	DENR 460650	Limited Contact Recreation	Full			5	Yes – 1
				Coldwater Permanent Fish Life	Non	Water Temp	Source Unknown		
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Grizzly Bear Gulch	Near Keystone	S80	USGS 6403850	Coldwater Permanent Fish Life	Insuff Info			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info				
				Irrigation Waters	Full				
				Limited Contact Recreation	Unknown				
Hat Creek	Near Edgemont	S81	USGS 6400000	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Warmwater Semipermanent Fish Life	Insuff Info				
				Limited Contact Recreation	Unknown				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Horsehead Creek	At Oelrichs	S82	USGS 6400875	Limited Contact Recreation	Unknown			5	Yes – 2
				Irrigation Waters	Non	Conductivity	Source Unknown		
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Warmwater Semipermanent Fish Life	Insuff Info				
Lime Creek	At Rapid City	S83	USGS 6413650	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Limited Contact Recreation	Unknown				
				Coldwater Permanent Fish Life	Insuff Info				
				Irrigation Waters	Full				
Lindsey Draw	Near Farmingdale	S84	USGS 6421800	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			5	No
				Irrigation Waters	Non	Conductivity	Source Unknown		
Pass Creek	Near Dewey	S85	USGS 6394450	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Rapid Creek	Headwaters to Pactola Reservoir	S86	DENR 460647	Immersion Recreation	Full			1	No
				Coldwater Permanent Fish Life	Full				
				Domestic Water Supply	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
Rapid Creek	Pactola Reservoir to Lower Rapid City	S87	DENR 460669	Domestic Water Supply	Full			1	No
				Coldwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				
Rapid Creek	Lower Rapid City to RC WWTF	S88	DENR 460110	Limited Contact Recreation	Full		Crop Production	5	Yes – 1
				Irrigation Waters	Full		Livestock		
				Immersion Recreation	Non	Fecal Coliform	Wet Weather Discharges		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwat er Semipermanent Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Rapid Creek	RC WWTF to above Farmingdale	S89	DENR 460692	Limited Contact Recreation	Full			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Irrigation Waters	Full				
				Immersion Recreation	Non	Fecal Coliform	Animal Feeding Operations (NPS)		
Rapid Creek	Above Farmingdale to mouth	S90	DENR 460910	Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock	5	Yes – 1
				Limited Contact Recreation	Full				
				Immersion Recreation	Non	Fecal Coliform			
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Non	TSS			
Rapid Creek, N Fork	Above mouth	S91	BH Natl Forest Data	Irrigation Waters	Unknown			5	Yes – 1
				Coldwater Permanent Fish Life	Non	Water Temp.	Source Unknown		
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Reno Gulch	Near Hill City	S92	USGS 6406760	Irrigation Waters	Full			2	No
				Coldwater Marginal Fish Life	Insuff Info				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Rhoads Fork	Near Rochford	S93	USGS 6408700	Coldwater Permanent Fish Life	Insuff Info			2	No
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Full				
Spring Creek	Headwaters to Sheridan Lake	S94	DENR 460654	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Coldwater Marginal Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Spring Creek	Sheridan Lake to SD Hwy 79	S95	DENR 460649	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Coldwater Marginal Fish Life	Full				
				Immersion Recreation	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
Sunday Gulch	Below Johnson	S96	USGS 6406740	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
	Canyon, near			Irrigation Waters	Full				
	Hill City			Coldwater Permanent Fish Life	Insuff Info				
				Limited Contact Recreation	Unknown				
Victoria Creek	Near Rapid City	S97	USGS 6412220	Irrigation Waters	Full			5	Yes – 2
			6412250	Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Coldwater Permanent Fish Life	Non	Water Temp	Source Unknown		
Surface Water Discharge Permits						**PARAMETER**			
Battle Creek	Near Hermosa	P27	SD0022349	Approved TMDL		Ammonia		6b	No
Battle Creek	Near Keystone	P28	SD0024007	Approved TMDL		Ammonia		6b	No
Box Elder Creek	USFS-Box Elder CCC	P29	SD0020834	Approved TMDL		Ammonia		6b	No
Cheyenne River	Near Edgemont	P30	SD0023701	Approved TMDL		Ammonia		6b	No
French Creek	Near Blue Bell Lodge	P31	SD0024228	Approved TMDL		Ammonia		6b	No
Lafferty Gulch	Near Keystone	P32	SD0021610	Approved TMDL		Ammonia		6b	No
Rapid Creek	Near Rapid City	P33	SD0023574	Need to Renew TMDL		Ammonia; Diss. Oxygen		6a	Yes – 1
Willow Creek	Near Sylvan Lake	P34	SD0024279	Approved TMDL		Ammonia		6b	No

[1] One sampling year indicates full support.

[2] This segment was previously listed in the 2002 303(d) list for pH, however new water quality data indicates full support.

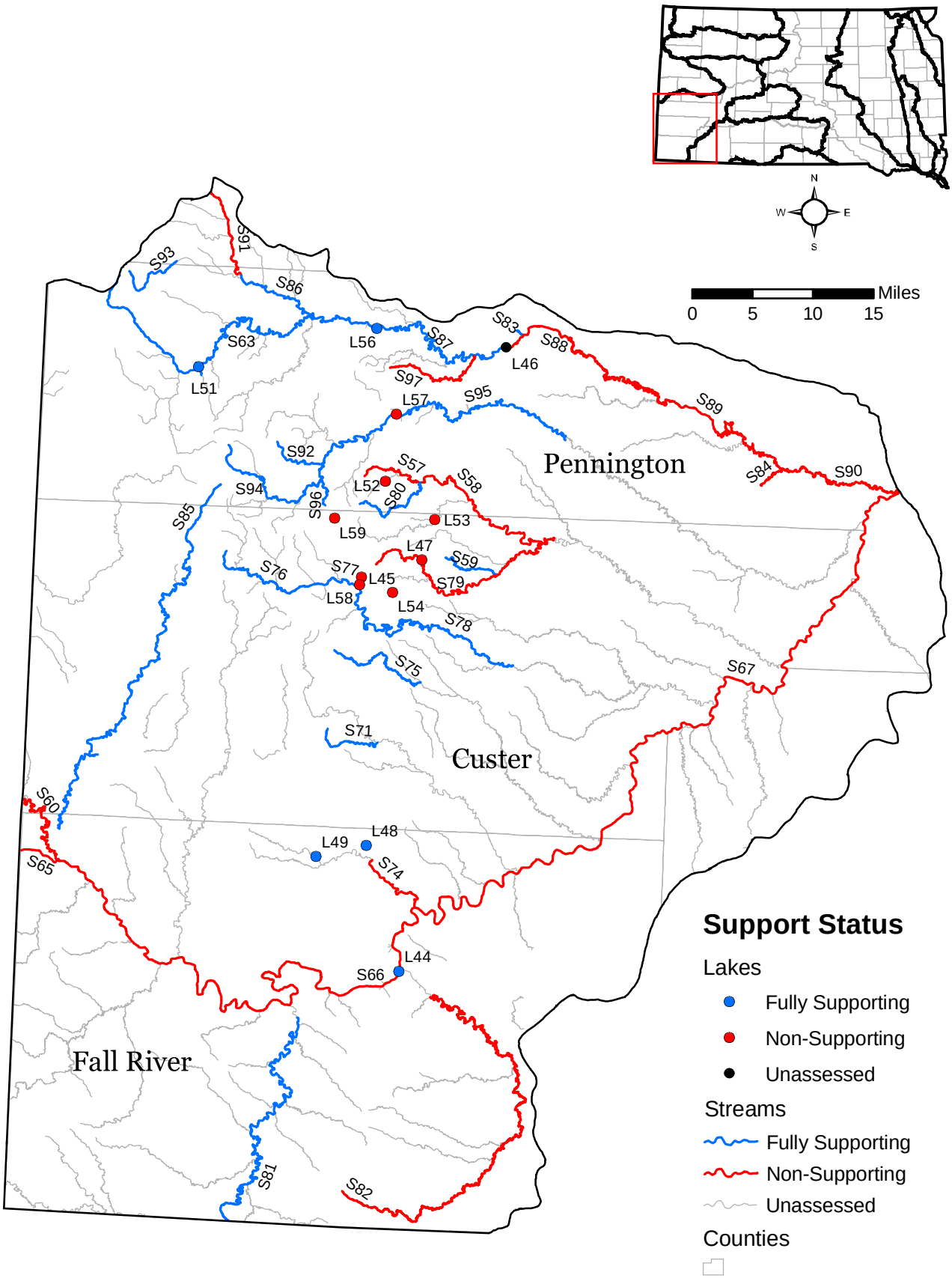


Figure 14: Upper Cheyenne River Basin Waterbody Support Status

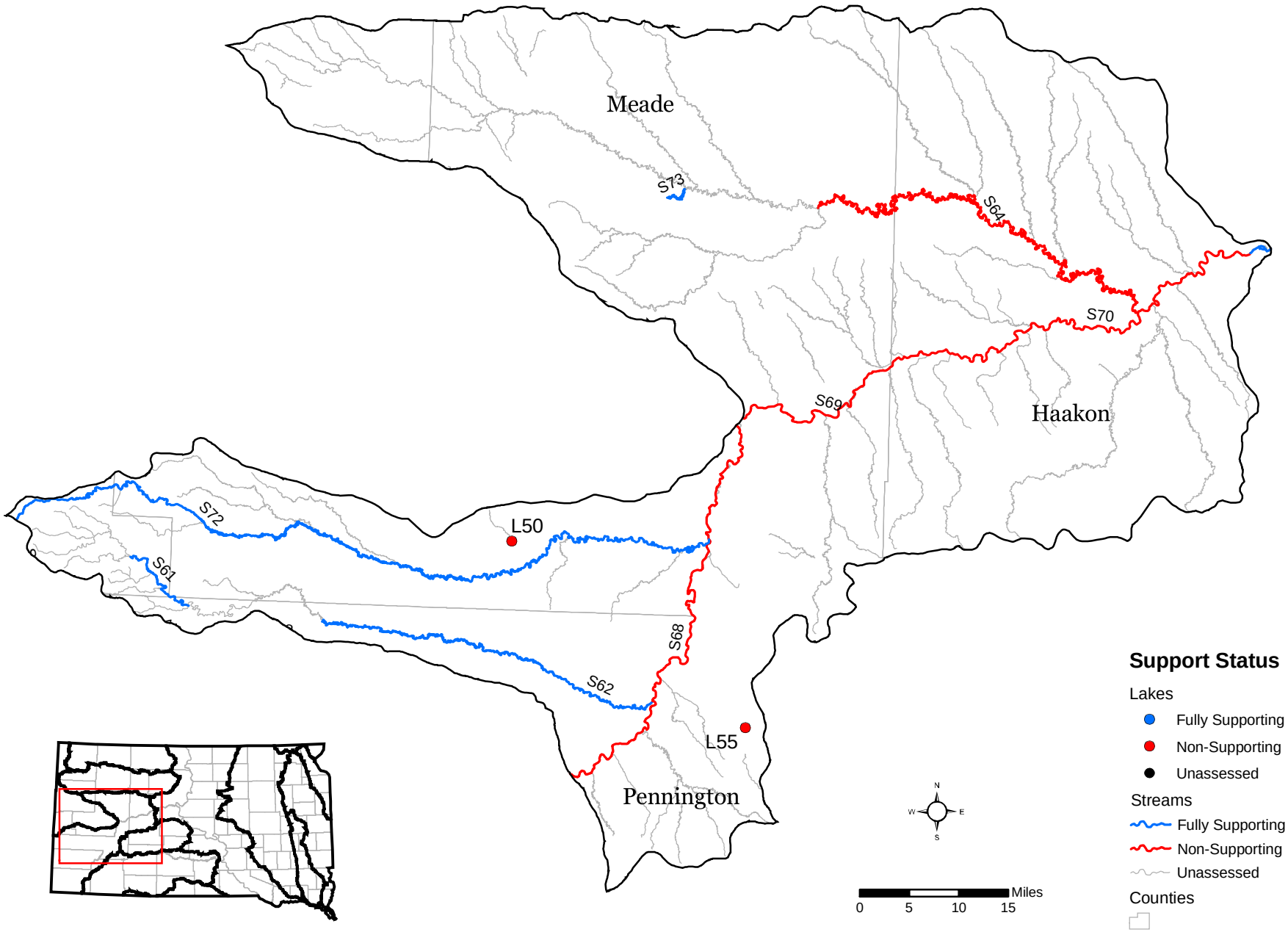


Figure 15: Lower Cheyenne River Basin Waterbody Support Status

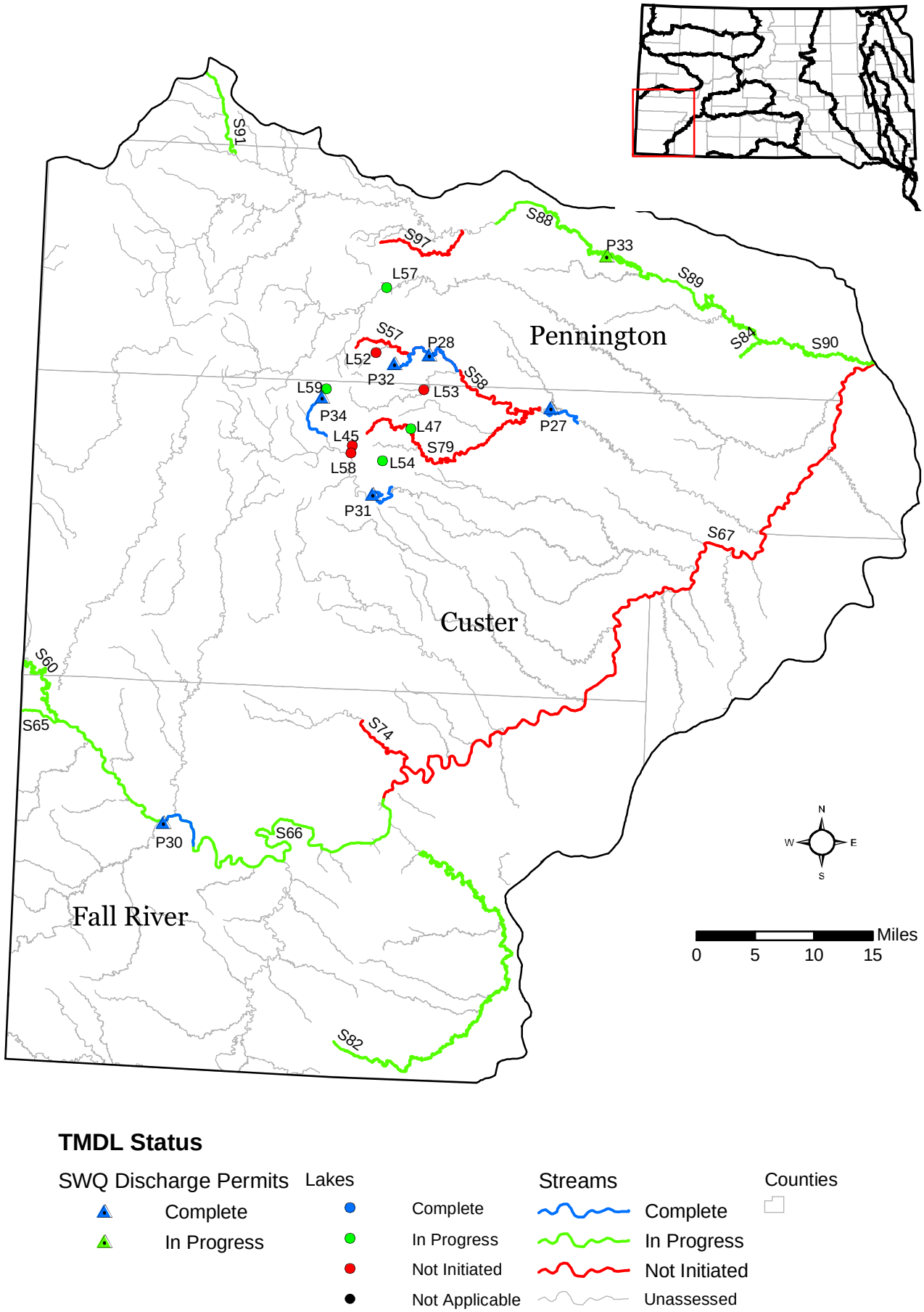


Figure 16: Upper Cheyenne River Basin TMDL Waters

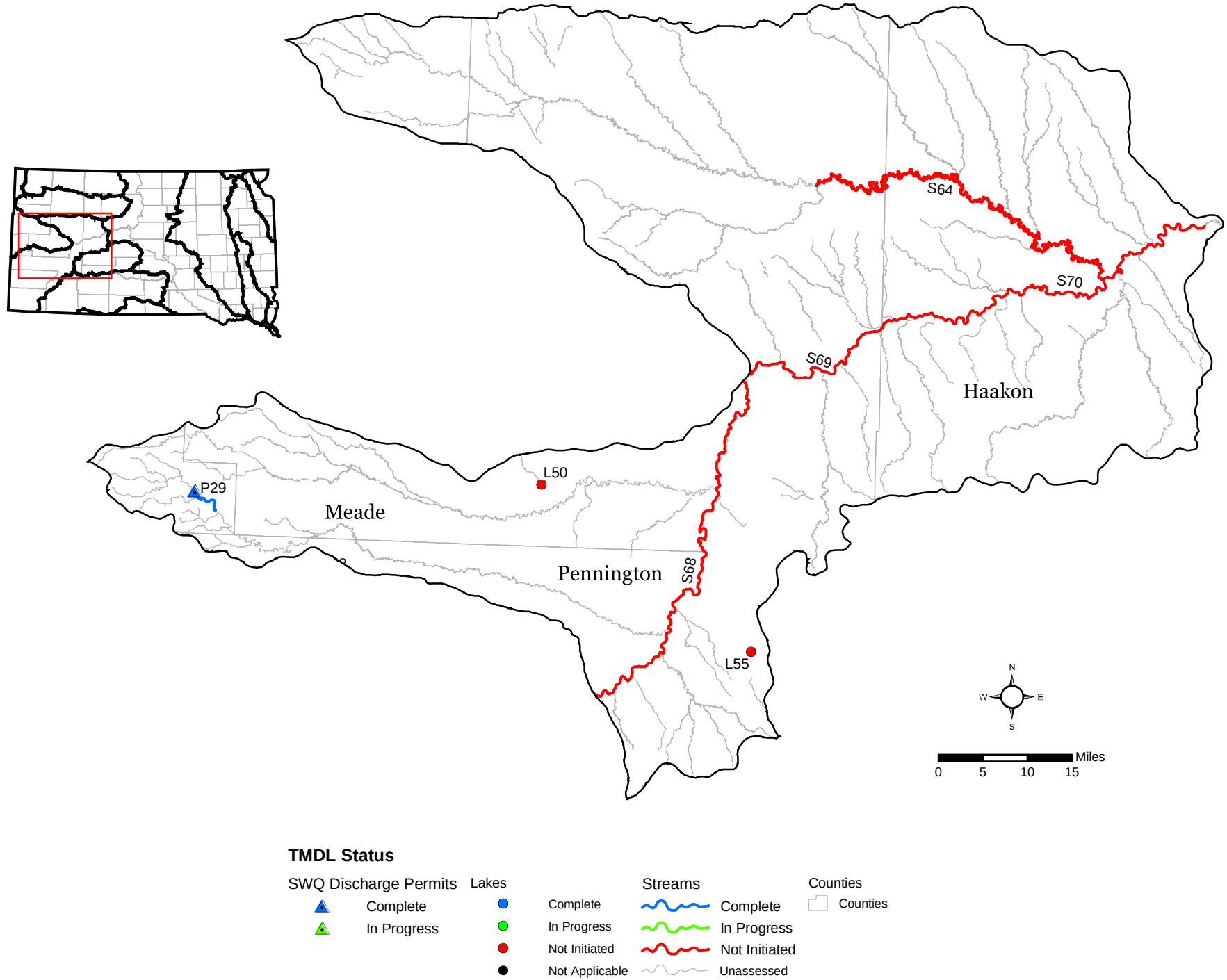


Figure 17: Lower Cheyenne River Basin TMDL Waters

Grand River Basin (Figures 18 and 19, Table 21).

The Grand River basin covers 5,680 square miles in northwest South Dakota and southwest North Dakota. This is a sparsely populated region with a population density of approximately one person per square mile. The major income is derived from agriculture (83%). However, this basin possesses energy resources in commercial quantities. As of June 1995 there were 121 producing oil wells and 54 gas wells concentrated primarily in north central and southwest Harding County. The combined daily output of these well fields averaged 3,445 barrels of oil and 23.3 million cubic feet of natural gas.

In past decades, water quality within the North Fork Grand River drainage fluctuated widely but was usually only moderately impaired for designated beneficial uses. The North Fork generally supported assigned beneficial uses for most of the 1990s for all measured parameters, with the exception of the SAR, which was added to the monitoring schedule in the late 1990s. During this assessment, the North Fork was nonsupporting for irrigation use due to a high SAR, TDS, and conductivity.

Apparently, high conductivity and TDS concentration are more or less typical of both North and South Fork drainages. The North Fork watershed drains the southern periphery of the North Dakota badlands which may be a major source of high levels of TDS and TSS. Much of the suspended sediment is normally deposited in Bowman Haley Reservoir upstream of Shadehill Reservoir, where dissolved salts may be concentrated by evaporation while the water is held in storage. The most common dissolved salts in the Shadehill Reservoir watershed are sodium sulfate and sodium bicarbonate.

The South Fork drainage contains erosive soils, which contribute sediment and suspended solids that often produce high TSS levels in the South Fork. These largely natural sources are aggravated by agricultural and grazing practices. Past observations indicated agricultural practices such as streamside grazing and cropping are continuing in the South Fork drainage. Similar to past reporting periods, the South Fork drainage did not support its beneficial uses in this current assessment due to excessive TSS and SAR. There were no other impairments noted.

The Grand River from the Shadehill Reservoir tailwaters to 18 miles downstream is presently nonsupporting of its beneficial use designations due elevated stream temperature, high pH, elevated TSS and SAR. Elevated water temperature and pH were typically the cause of nonsupport for this river segment in previous assessments. It should be noted again that the major tributaries to Shadehill Reservoir are typically high in TDS and/or TSS. The remaining length of the Grand River of nearly 84 miles was also rated as nonsupporting during this current assessment due to excessive TSS, SAR, and fecal coliform bacteria.

Four lakes within the basin that were monitored under the statewide lakes assessment include Shadehill Reservoir (4,693 acres) and Flat Creek Lake (203 acres). Shadehill Reservoir is presently supporting all but one of its assigned beneficial uses and is meeting the water quality target criteria (TSI: <55). It has maintained a mesotrophic status for most of the past decade (TSI <50). The reservoir is considered impaired for irrigation use due to natural limitations imposed by local soil-water incompatibility where high sodium concentration combined with the clayey

characteristics of most soils in this region significantly reduce the acreages suitable for continuous irrigation. This condition is measured by the sodium adsorption ratio (SAR). A SAR value of 10 or greater indicates that a build-up of sodium will break down soil structure and cause serious problems for plant growth.

Although the latest (2002) TSI for Shadehill Reservoir increased to 48, the above trend may be evidence of fairly stable conditions in this large reservoir for the past eight years. However, sedimentation, suspended solids and, to a lesser extent, nutrient concentration appear to be gradually increasing in the main body of this large reservoir. Sedimentation at the two major reservoir inlets, particularly at the South Fork inlet, is progressing at a more rapid rate and may affect the recreational potential of the upper reservoir in a few years.

Water quality in nearby Flat Creek Dam had shown improvement between the early and mid 1990s (TSI: 76 (1991) to 63 (1994)). However, the most recent data available (2001) suggest that the reservoir had reverted to its former nonsupporting status of 1991(2001 TSI: 71). Causes of pollution to this small reservoir include nutrient enrichment and siltation. Agricultural activities maybe the problem sources in this drainage.

Gardner Lake in Harding County is presently rated as eutrophic according to limited recent data (2002). Not enough water quality data has been collected to chart reliable trends in this waterbody.

Lake Isabel is presently rated as hyper-eutrophic and as not supporting its fishable/swimmable uses. The combined TSI for the lake increased from 68 during the last assessment to 73 for the present report, suggesting a moderate decline in water quality from the late 1990s to the early part of this decade (2001).

Shadehill Reservoir is the only monitored lake in this basin that is presently meeting its water quality target criteria (TSI < 55) for reservoirs in the Northwestern Great Plains ecoregion.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 21: Grand River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Flat Creek Dam	Perkins County	L60	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Lake Gardner	Harding County	L61	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
Lake Isabel	Dewey County	L62	Lake Assessment	Domestic Water Supply	Full			5	Yes – 2
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full	Fish Cons. Advisory			
Shadehill Reservoir	Perkins County	L63	Lake Assessment	Limited Contact Recreation	Full			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Full				
				Irrigation Waters	Non	TDS/Chlorides	Nonpoint Sources		
				Immersion Recreation	Full	SAR			
Streams									
Grand River	Shadehill Reservoir to Corson County line	S98	DENR 460640	Coldwater Marginal Fish Life	Non	Water Temp	Rangeland Grazing	5	Yes – 1
				Limited Contact Recreation	Insuff Info	pH	Natural Sources		
				Irrigation Waters	Non	TSS	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Full	SAR			
Grand River	Corson County line to Bullhead	S99	DENR 460138	Warmwater Permanent Fish Life	Non	TSS	Natural Sources	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Non	SAR			
				Limited Contact Recreation	Insuff Info				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Grand River	Bullhead to mouth	S100	DENR 460945	Warmwater Permanent Fish Life	Non	TSS	Livestock	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production		
				Irrigation Waters	Non	SAR	Natural Sources		
				Limited Contact Recreation	Non	Fecal Coliform			
North Fork Grand River	ND border to Shadehill Reservoir	S101	DENR 460677	Warmwater Marginal Fish Life	Full		Natural Sources	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Non	TDS			
				Limited Contact Recreation	Insuff Info	SAR			
				Irrigation Waters	Non	Conductivity			
South Fork Grand River	Jerry Creek to Skull Creek	S102	DENR 460139	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources		
				Limited Contact Recreation	Insuff Info				
				Irrigation Waters	Insuff Info				
South Fork Grand River	Skull Creek to Shadehill Reservoir	S103	DENR 460678	Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production	5	Yes – 1
				Irrigation Waters	Non	SAR	Rangeland Grazing		
				Limited Contact Recreation	Insuff Info		Grazing in Riparian Zones		
				Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources		
Surface Water Discharge Permits						**PARAMETER**			
South Fork Grand River	Near Buffalo	P35	SD0023400	Approved TMDL		Ammonia		6b	No

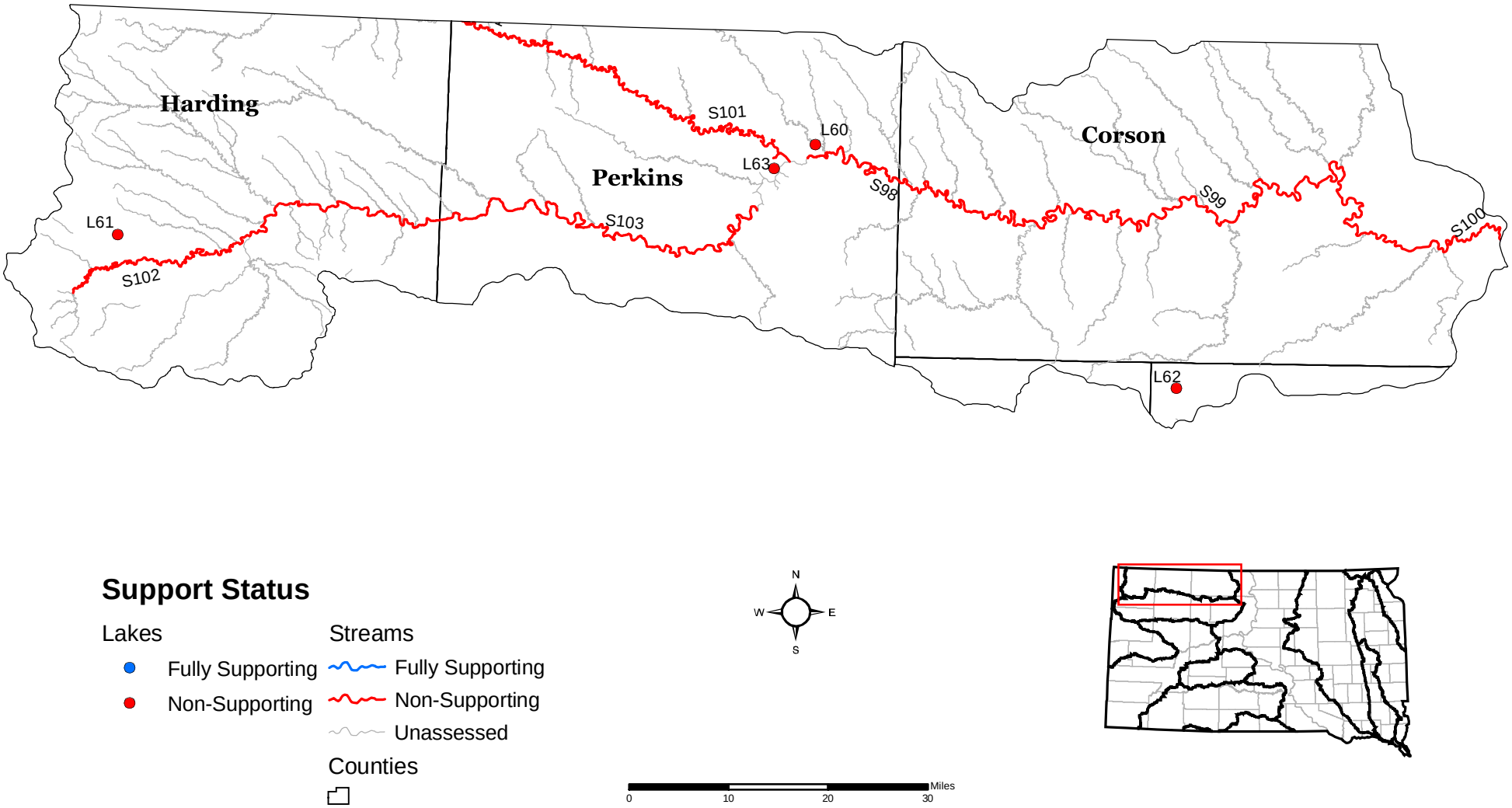


Figure 18: Grand River Basin Waterbody Support Status

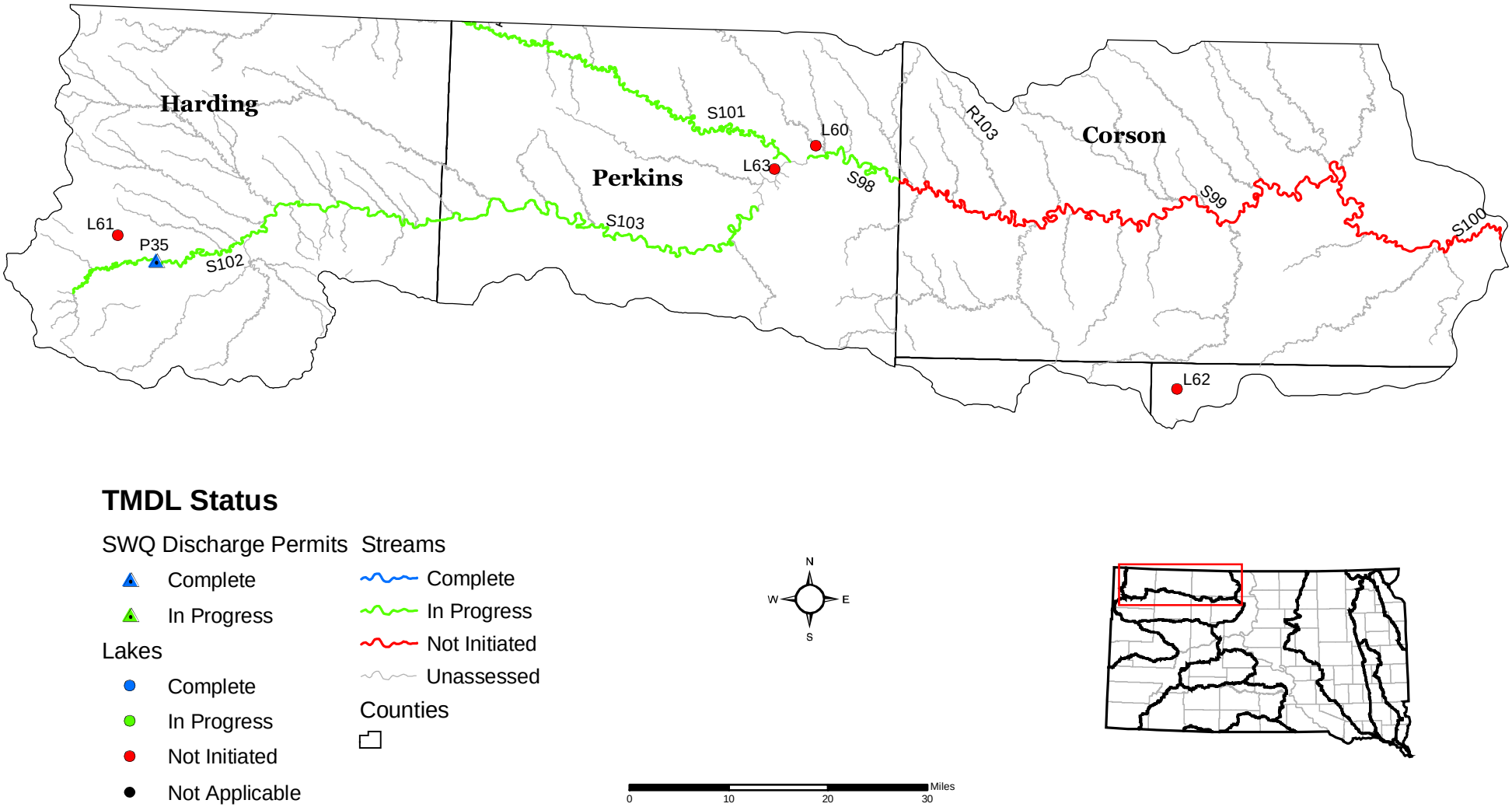


Figure 19: Grand River Basin TMDL Waters

James River Basin (Figures 20 - 23, Table 22).

The James River drainage is the second largest river basin in the state. It drains approximately 12,000 square miles stretching from the northern to the southern state borders. It is located in east-central South Dakota. Agriculture and related businesses are the predominant sources of income.

Water quality in the James River basin has shown steady improvement over the last ten years. Better water quality may have resulted in a large part due to completed and ongoing projects for the construction and rehabilitation of wastewater treatment facilities for municipalities in the basin. However, river turbidity (cloudy or muddy water) may remain a persistent problem in the James River due to the silt and sediment periodically brought in by its many small tributaries and the large amount of previously accumulated material on the river bottom.

During the previous assessment, the upper half of the James River from the North Dakota border to Huron, was rated as moderately impaired for beneficial uses. The same reach supported its assigned beneficial uses during the current assessment cycle. During a large part of the previous decade, this upper reach was moderately to severely impaired by low dissolved oxygen (DO). Decay of excessive organic matter accumulations in slough-like conditions during winter and under ice cover may have temporarily depleted river oxygen supplies. A source of this organic matter may be waste from concentrations of migrating waterfowl on the Sand Lake Refuge. Organic loading may also have occurred during periods of runoff in this part of the river. Winter and summer oxygen deficits have not been uncommon in the slow-flowing upper reach of the James River. During the current reporting cycle there were few low DO (< 5 ppm) readings recorded in the upper half of the James River.

During the present assessment, nonsupport was noted in the lower part of the James River from Sand Creek to the mouth. This took the form of mainly excessive TSS which was also a major impairment during the previous assessment in this reach. Also noted during the current reporting period was impairment due to fecal coliform in the segment from the Yankton County line to the mouth.

Site WQM 136 was established on the Elm River in 1999. Prior to this document not enough water quality data was collected to reliably determine use support of this river. Sufficient data is now available to rate this stream as presently supporting assigned beneficial uses.

Prior to this current assessment, Moccasin Creek's beneficial uses were fish and wildlife propagation, recreation, stockwatering waters (9), and irrigation waters (10). This creek was supporting designated beneficial uses during the previous assessment (water years 1996-2001) but the beneficial uses have been upgraded. Moccasin Creek from directly above the city of Aberdeen to its mouth has since been reclassified (effective February 2003) for the additional beneficial uses of a marginal warmwater fishery (6) and for limited-contact recreation (8). There is insufficient data collected since the upgrade to determine the support status for the beneficial uses that were added in 2003.

Firesteel Creek was not supporting its assigned beneficial uses during the previous and present assessments due to high TDS and water temperature.

Three other tributaries in the James River basin were added to the monitoring schedule since last assessment: Mud Creek, Snake Creek, and Wolf Creek. Insufficient data has been collected from these creeks to reliably determine use support.

Lakes in the basin are highly eutrophic because of nutrient enrichment and siltation. Agricultural activities, including livestock operations, are considered major pollution sources.

Twenty-one of 24 lakes monitored in this basin over the last and present decade are currently classified as hyper-eutrophic (TSIs: 66-81) and do not meet their water quality target criteria (TSI < 65). The remaining three lakes are rated as mesotrophic (Wylie Park Lake) to eutrophic (TSI: 44-64). Of the 15 lakes for which sufficient data were available, the majority (11) had relatively stable water quality over the past two to five years. As far as could be determined from TSI indices, there were no lakes in this basin that showed improved water quality during the present reporting cycle. Water quality in four lakes seemed to have declined over the past several years most likely due to climatic fluctuations.

During this reporting period, assessments have been completed for the Jones, Rosehill, Loyalton, Cresbard and Mina lakes. Current assessment projects include Wilmarth/Twin Lakes, Richmond Lake, Lake Hanson, and Moccasin Creek watersheds. Implementation projects undertaken since 2002 and presently active include Lake Hanson, Jones/Rosehill Lakes, Elm Lake, Lake Faulkton, and Lake Louise/Cottonwood Lake. The Lake Mitchell/ Firesteel Creek Implementation Project began in 1993 is continuing its restoration efforts.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 22: James River Basin Information

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Amsden Dam	Day County	L64	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 2
				Immersion Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Beaver Lake	Yankton County	L65	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Bierman Lake	Spink County	L66	Lake Assessment	Limited Contact Recreation	Unknown	TSI	Nonpoint Sources	5	Yes [1] – 2
				Warmwater Permanent Fish Life	Unknown				(See
				Immersion Recreation	Unknown				footnote at end of table)
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Lake Byron	Beadle County	L67	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Irrigation Waters	Unknown				
				Immersion Recreation	Unknown				
Lake Carthage	Miner County	L68	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lake Cavour	Beadle County	L69	Lake Assessment	Warmwater Marginal Fish Life	Unknown			3	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Cottonwood Lake	Spink County	L70	Lake Assessment	Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Cresbard Lake	Faulk County	L71	Lake Assessment	Immersion Recreation	Unknown	TSI	Nonpoint Sources	4a	No
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Non				
Elm Lake	Brown County	L72	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Immersion Recreation	Unknown				
				Domestic Water Supply	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Lake Faulkton	Faulk County	L73	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Lake Hanson	Hanson County	L74	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
				Limited Contact Recreation	Full				
Jones Lake	Hand County	L75	Lake Assessment	Limited Contact Recreation	Unknown			4a	No
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
Lake Louise	Hand County	L76	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Full				
Loyalton Dam	Edmunds County	L77	Lake Assessment	Immersion Recreation	Unknown			4a	No
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Mina Lake	Edmunds County	L78	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Limited Contact Recreation	Full				
				Domestic Water Supply	Unknown				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lake Mitchell	Davison County	L79	Lake Assessment	Domestic Water Supply	Full			4a	No
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Irrigation Waters	Full				
North Scatterwood Lake	Edmunds County	L80	Lake Assessment	Warmwater Marginal Fish Life	Unknown			3	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Pierpont Lake	Day County	L81	Lake Assessment	Immersion Recreation	Unknown			2	No
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Full				
Ravine Lake	Beadle County	L82	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lake Redfield	Spink County	L83	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Richmond Lake	Brown County	L84	Lake Assessment	Limited Contact Recreation	Full			5	Yes – 1
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Rose Hill Lake	Hand County	L85	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
Rosette Lake	Edmunds County	L86	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Twin Lakes	Sanborn County	L87	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Wilmarth Lake	Aurora County	L88	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Immersion Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Unknown				
Wylie Pond	Brown County	L89	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Immersion Recreation	Full				
				Warmwater Marginal Fish Life	Full				
				Limited Contact Recreation	Full				
Streams									
Elm River	Elm Lake to mouth	S104	DENR 460136	Limited Contact Recreation	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
				Warmwater Semipermanent Fish Life	Full				
				Irrigation Waters	Full				
Firesteel Creek	W Fork Firesteel Creek to mouth	S105	DENR 460137	Domestic Water Supply	Non	TDS		4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Non	Water Temp			
				Limited Contact Recreation	Full				
				Irrigation Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Foot Creek	Near Aberdeen	S106	USGS 6471800	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Foster Tributary	Near Carpenter	S107	USGS 6475850	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Howard Tributary	Near Leola	S108	USGS 6473020	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
James River	ND border to Mud Lake Reservoir	S109	DENR 460805	Limited Contact Recreation	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
James River	Mud Lake Reservoir	S110	DENR 460112	Warmwater Semipermanent Fish Life	Full			1	No
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
James River	Columbia Road Reservoir	S111	DENR 460113	Irrigation Waters	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Limited Contact Recreation	Full				
James River	Columbia Road Reservoir to near US Hwy 12	S112	DENR 460733	Irrigation Waters	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Full				
James River	US Hwy 12 to Mud Creek	S113	DENR 460734	Limited Contact Recreation	Full			1	No
				Warmwater Semipermanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
James River	Mud Creek to James River diversion dam	S114	DENR 460140	Irrigation Waters	Full			1	No
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
James River	James River diversion dam to Huron 3rd St. Dam	S115	DENR 460735	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
James River	Huron 3rd St. Dam to Sand Creek	S116	DENR 460736	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Full				
James River	Sand Creek to I-90	S117	DENR 460737	Limited Contact Recreation	Full			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Semipermanent Fish Life	Non	TSS	Crop Production		
				Irrigation Waters	Full		Livestock		
James River	I-90 to Yankton County line	S118	DENR 460707	Irrigation Waters	Full			5	Yes – 2
				Limited Contact Recreation	Insuff Info				
				Warmwater Semipermanent Fish Life	Non	TSS	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock		
James River	Yankton County line to mouth	S119	DENR 460761	Warmwater Semipermanent Fish Life	Non	TSS	Crop Production	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock Animal Feeding Operations (NPS)		
				Irrigation Waters	Full				
				Limited Contact Recreation	Non	Fecal Coliform			
Moccasin Creek	Headwaters to Aberdeen	S120	DENR 460694	Warmwater Marginal Fish Life	Insuff Info			2	No
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Insuff Info				

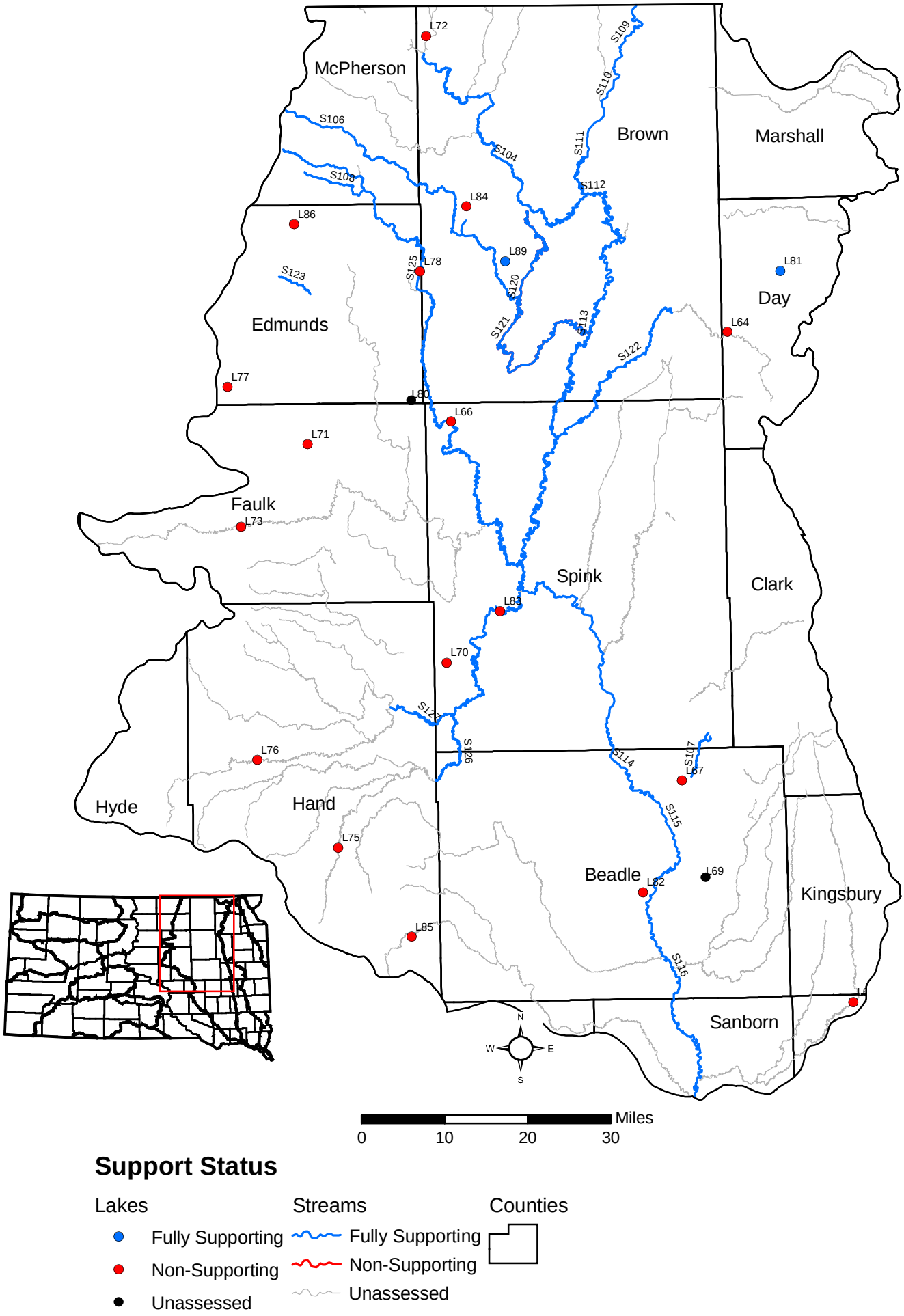
Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Moccasin Creek	Aberdeen to Warner	S121	DENR 460695	Limited Contact Recreation	Insuff Info			2	No
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Mud Creek	SD Hwy 73 to mouth	S122	DENR 460145	Irrigation Waters	Full			2	No
				Warmwater Marginal Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Insuff Info				
Preachers Run Tributary	At Ipswich	S123	USGS 6473300	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Rock Creek	Near Fulton	S124	USGS 6477150	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
				Limited Contact Recreatio n	Unknown				
				Warmwater Marginal Fish Life	Insuff Info				
Snake Creek	Headwaters to mouth	S125	DENR 460146	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Insuff Info				
				Limited Contact Recreation	Insuff Info				
Turtle Creek	Hand County line to mouth	S126	DENR 460148	Warmwater Marginal Fish Life	Full			2	No
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Insuff Info				
Wolf Creek	Above Wolf Creek Colony	S127	DENR 460157	Irrigation Waters	Full			2	No
				Warmwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Insuff Info				
Wolf Creek	Just above Wolf Creek Colony to mouth	S128	DENR 460158	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No
				Limited Contact Recreation	Insuff Info				
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Wolf Creek	Spink County near Burdette to mouth	S129	DENR 460151	Fish/Wildlife Prop, Rec, Stock Waters	Insuff Info			3	No
				Irrigation Waters	Insuff Info				
				Warmwater Marginal Fish Life	Insuff Info				
				Limited Contact Recreation	Insuff Info				
Surface Water Discharge Permits						**PARAMETER**			
Dawson Creek	Near Scotland	P36	SD0022853	Need to Renew TMDL		Ammonia		6a	Yes – 1
James River	Near Ashton	P37	SD0022276	Approved TMDL		Ammonia		6b	No
James River	Near Columbia	P38	SD0022926	Need to Renew TMDL		Ammonia		6a	Yes – 1
James River	Near Frankfort	P39	SD0020869	Need to Renew TMDL		Ammonia		6a	Yes – 1
James River	Near Huron	P40	SD0023434	Need to Renew TMDL		Ammonia		6a	Yes – 1
James River	Near Mitchell	P41	SD0023361	Need to Renew TMDL		Ammonia		6a	Yes – 1
James River	Near Menno	P42	SD0020087	Approved TMDL		Ammonia		6b	No
Jim Creek	Near Artesian	P43	SD0021733	Approved TMDL		Ammonia		6b	No
Maple River	Near Frederick	P44	SD0022152	Need to Renew TMDL		Ammonia		6a	Yes – 1
Moccasin Creek	Near Aberdeen	P45	SD0020702	Approved TMDL		Ammonia		6b	No
Moccasin Creek	Near Warner	P46	SD0020389	Need to Renew TMDL		Ammonia		6a	Yes – 1
Snake Creek	Near Mina Lake	P47	SD0026344	Need to Renew TMDL		Ammonia		6a	Yes – 1
South Fork Snake Creek	Near Faulkton	P48	SD0021971	Approved TMDL		Ammonia		6b	No
Wolf Creek	Near Bridgewater	P49	SD0021512	Approved TMDL		Ammonia		6b	No
Wolf Creek	Near Emery	P50	SD0021741	Need to Renew TMDL		Ammonia		6a	Yes – 1

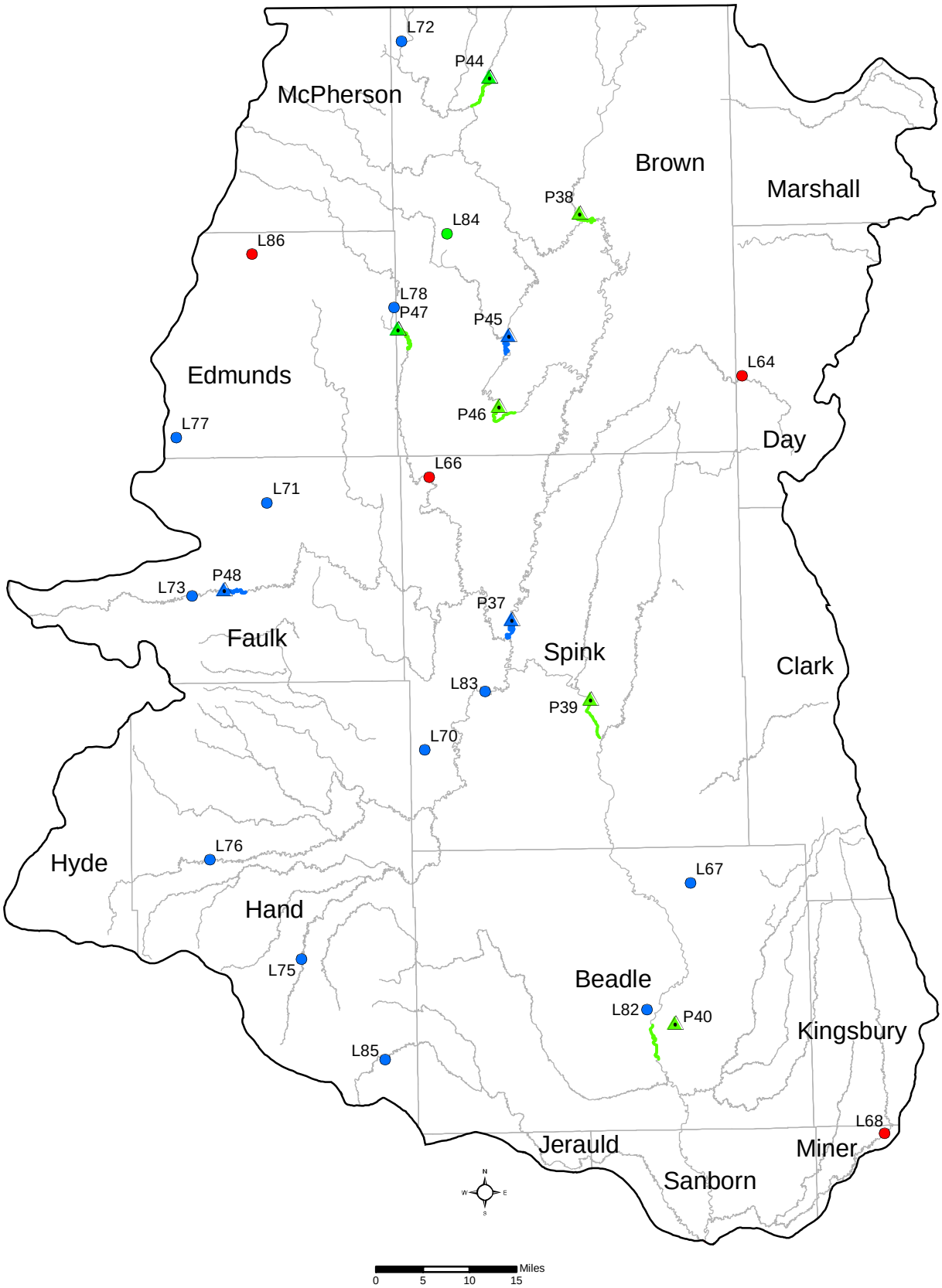
[1] There was insufficient data to determine support status for the current cycle. The water body has been reported as impaired in previous 303(d) lists. A TMDL has not been completed at this time.



Support Status

Lakes	Streams	Counties
Fully Supporting	Fully Supporting	
Non-Supporting	Non-Supporting	
Unassessed	Unassessed	

Figure 20: Upper James River Basin Waterbody Support Status



TMDL Status

SWQ Discharge Permits
- Complete
- In Progress

Lakes
- Complete
- In Progress
- Not Initiated
- Not Applicable

Streams
- Complete
- In Progress
- Not Initiated
- Unassessed

Counties

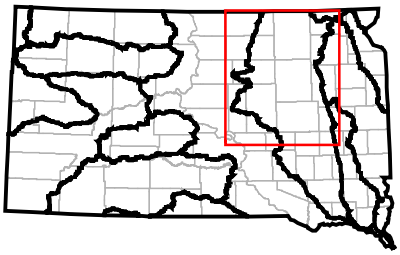


Figure 22: Upper James River Basin TMDL Waters

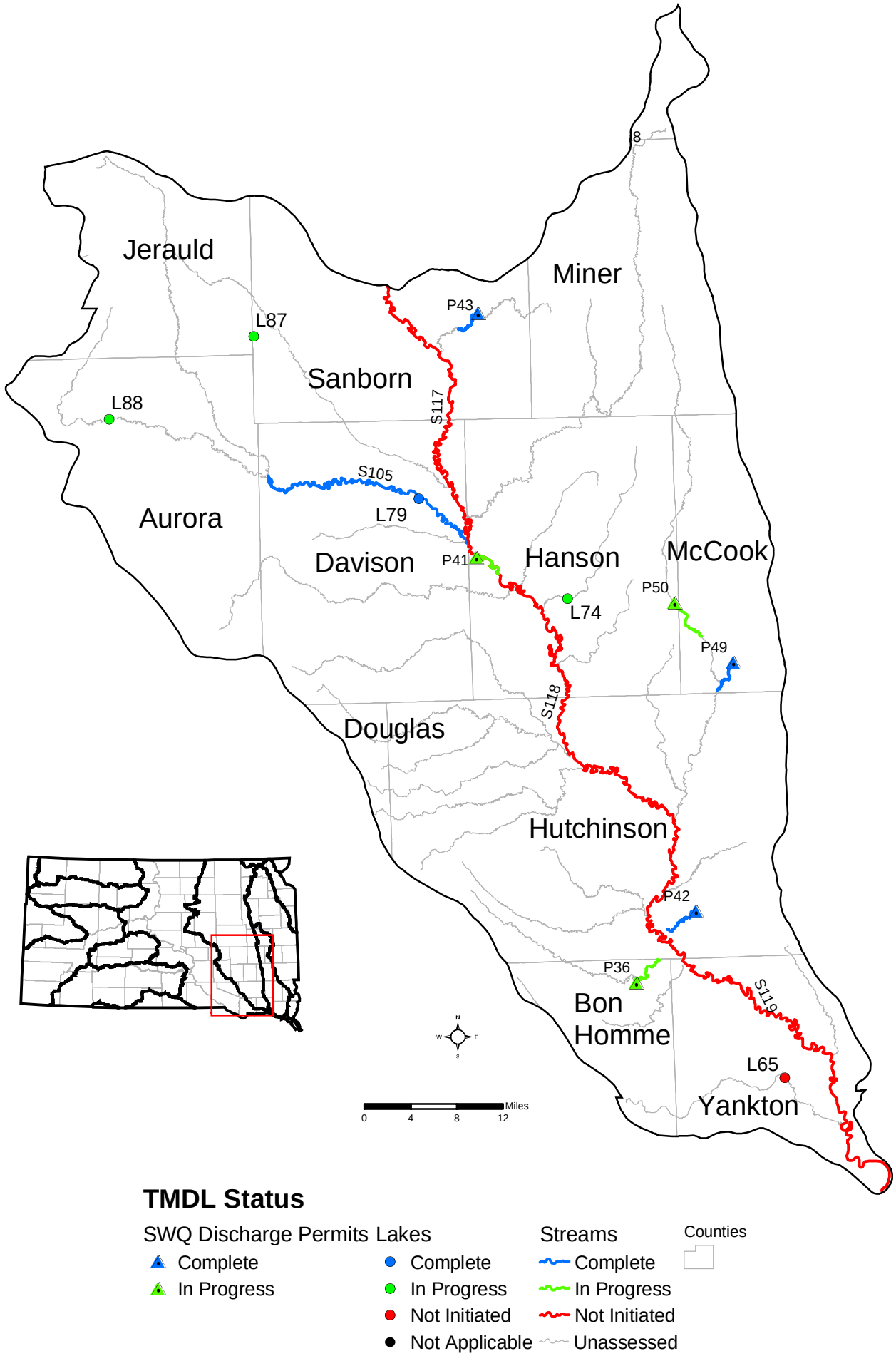


Figure 23: Lower James River Basin TMDL Waters

Little Missouri River Basin (Figures 24 and 25, Table 23).

The Little Missouri River Basin is a small basin located in the northwestern corner of the state. The river enters the state from southeastern Montana and drains some 605 square miles before exiting into North Dakota. The basin's economy is dominated by agriculture with approximately 90 percent of the land being used for agricultural production. The majority of this land is used for rangeland, due to limited rainfall. The basin mineral industry is limited to the extraction of sand and gravel. However, thin beds of lignite coal do exist and test holes for oil have been drilled. At the present time, neither the coal nor the oil is commercially produced.

DENR discontinued monitoring water quality of the Little Missouri River in 1979. Data from previous samples showed that the water quality was generally suitable for the designated beneficial uses although minor violations of the Water Quality Standards criteria for TDS, TSS, and conductivity were occasionally noted. Conductivity violations occurred primarily during winter when formation of ice cover tends to concentrate salts in the remaining flow. The violations were generally attributed to agricultural nonpoint sources in Montana and South Dakota and naturally occurring erosion and soluble minerals. There is only one point source discharge in the South Dakota portion of the basin. In 1999, DENR resumed quarterly monitoring of the Little Missouri River at site WQM 26 at Camp Crook.

Limited monitoring by USGS during the 1990s suggested that the Little Missouri River continues to support its designated beneficial uses. No major impairments were noted during the previous assessment. However, insufficient data were available to rate the stream for irrigation use due to lack of SAR data. During this current assessment, the Little Missouri River is impaired for irrigation use due to high SAR.

There are no monitored lakes within this basin.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 23: Little Missouri River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Little Missouri River	MT border to ND border	S130	DENR 460955	Warmwater Semipermanent Fish Life	Full			5	Yes – 2
				Limited Contact Recreation	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Non	SAR			
Surface Water Discharge Permits						**PARAMETER**			
Little Missouri River	Near Camp Crook	P51	SD0024759	Approved TMDL		Ammonia		6b	No

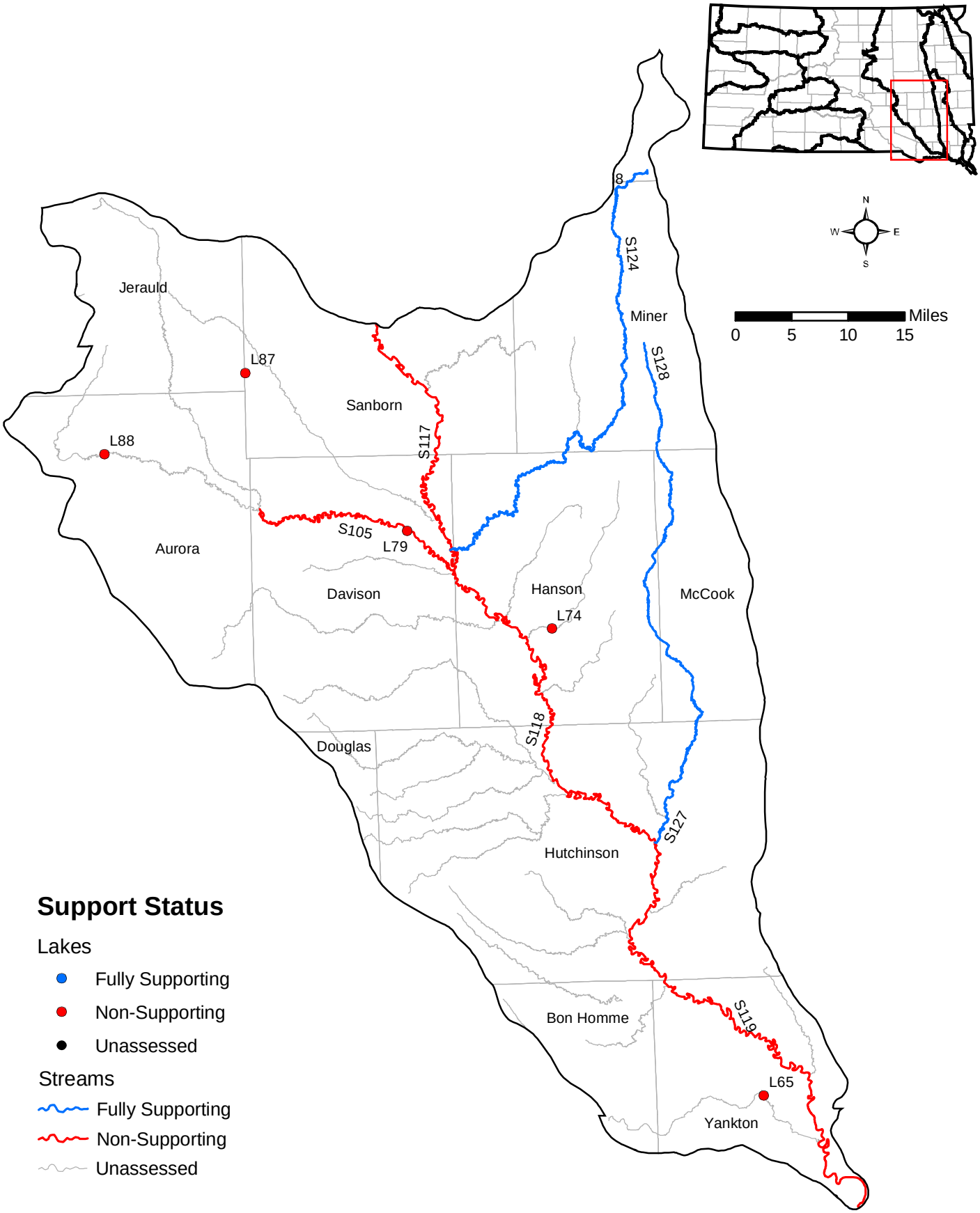


Figure 21: Lower James River Basin Waterbody Support Status

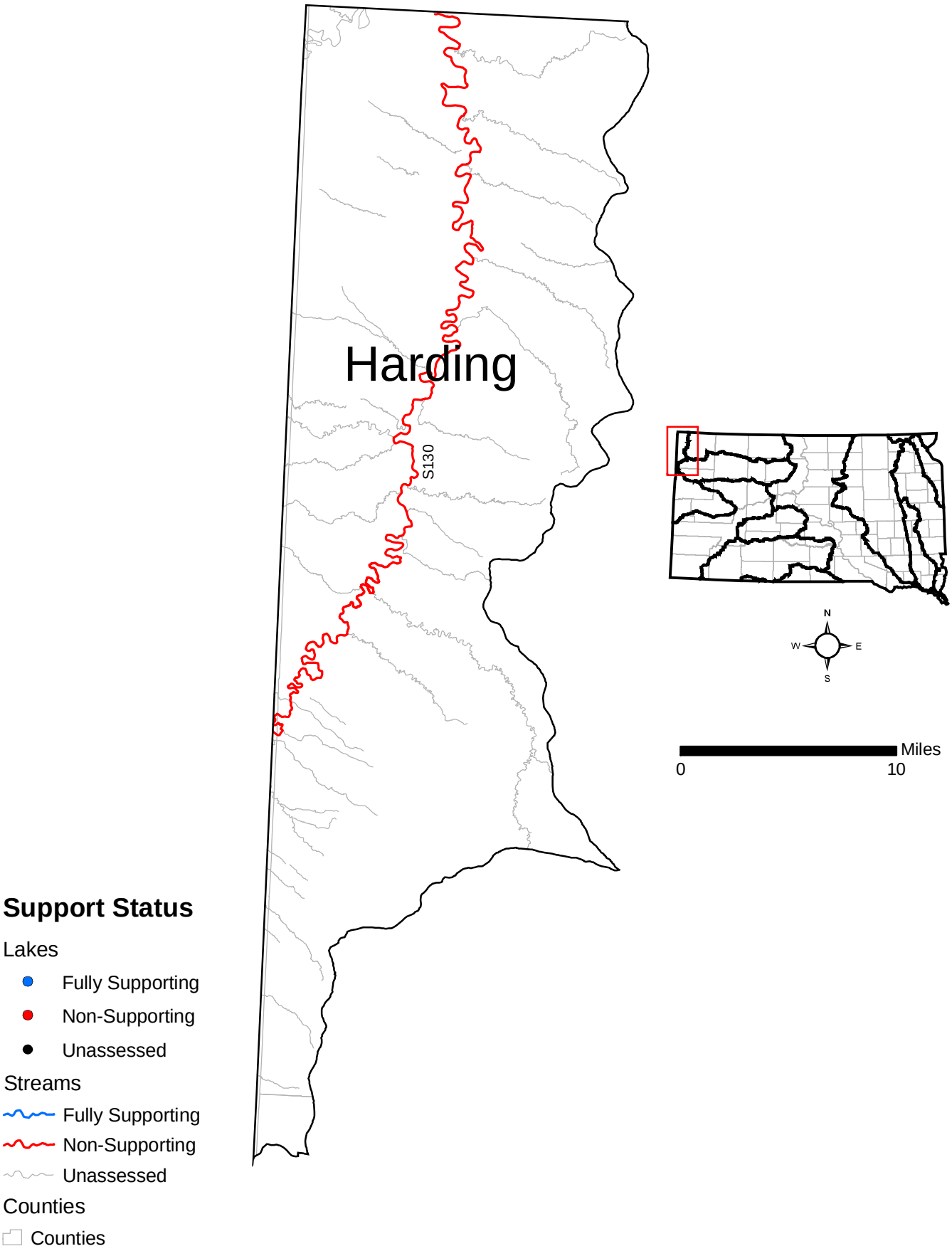


Figure 24: Little Missouri River Basin Waterbody Support Status

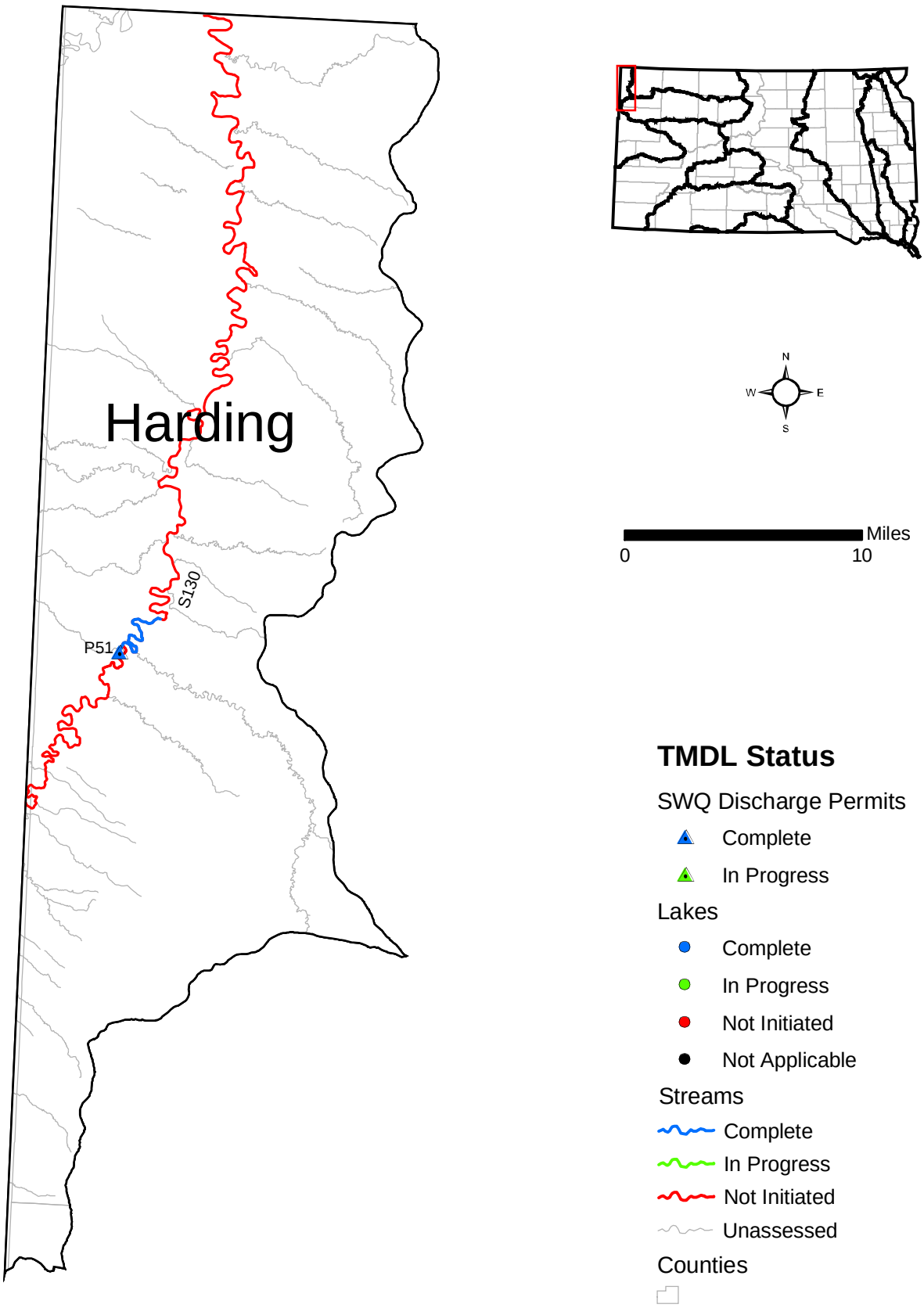


Figure 25: Little Missouri River Basin TMDL Waters

Minnesota River Basin (Figures 26 and 27, Table 24).

The Minnesota River Basin is found in the northeastern corner of the state. It is bordered on the north by the Red River tributaries, on the west by the Prairie Coteau Pothole region, on the south by the Big Sioux River, and on the east by the South Dakota/Minnesota border. The basin drains an area of 1,572 square miles within South Dakota. Agriculture remains the one economic mainstay, while manufacturing and quarrying also contribute significantly.

Water quality within the basin continues to be good to satisfactory. Occasional TSS violations were noted for some rivers for the current assessment. They were for the most part sporadic and isolated events probably caused alternately by brief periods of heavy localized runoff and periods of dryer weather.

The upper half of the South Fork Whetstone River generally supported its assigned beneficial uses during the past as well as the present assessments. In the downstream half, water quality degradation occurred during low river flow due to low DO. During dry periods Milbank wastewater treatment facility discharge makes up most or all of the flow volume of the lower South Fork. The city of Milbank had several SWD permit violations of Five-Day Biochemical Oxygen Demand (BOD_5) during the current monitoring period, which is likely the reason for the impairment of this segment of the river. The city is now in the process of upgrading its wastewater treatment facilities and the stream should recover in the future.

The seven lakes in the basin that have been monitored range from moderately to highly eutrophic due to algae, nutrient enrichment, and siltation (TSI: 52-73). The latest reliable data suggests that presently Lake Cochrane and Punished Woman Lake have better water quality than the other five lakes with TSIs (2002) of 56 and 52, respectively. The worst water quality of the seven lakes was found in Fish Lake and Lake Hendricks with TSIs of 73 and 70. Lakes Oliver, Big Stone, and Alice occupied the middle with TSIs in a narrow range from 59 to 62. Recent TSIs suggested that water quality in six of the seven basin lakes remained stable or showed some improvement while that in remaining Fish Lake registered a moderate decline. With the exception of Fish Lake and Lake Hendricks the basin lakes met their assigned water quality criteria.

A major lake restoration measure at Punished Woman Lake begun in the late 1980s was for the removal of large amounts of accumulated bottom sediment by dredging. The dredging project has been completed. In Lake Cochrane, a sanitary district sewer project has been completed around the periphery of the lake which is substantially decreasing nutrient levels entering that waterbody. Recent data suggest there has been moderate improvement in the water quality in both lakes. A recent improvement in water quality was also noted in Lake Alice.

In the past, the Whetstone River had carried large loads of sediment into the south end of Big Stone Lake during high water years. The construction and subsequent modification of a diversion dam and sediment barrier immediately south of the lake outlet, has resulted in a substantial reduction in sedimentation to Big Stone Lake. This river flow management system, which includes a control structure, was designed to divert approximately 80% of peak river flows with attendant sediment from lower Big Stone Lake to the Minnesota River.

Potential pollutant sources of sediment, nutrients and bacteria to lakes in this basin continue to be crop land, pasture land, feedlots, and animal holding/management areas.

Two watershed improvement projects presently underway in this basin include the Big Stone Lake Implementation Project begun in 1987, and the Lake Cochrane/Lake Oliver Watershed Implementation Project. The Fish Lake/ Lake Alice Assessment Project undertaken last reporting period is nearing completion. An alum application project for phosphorus reduction in Lake Oliver was completed during 2002. The lake is presently meeting the water quality criteria (TSI < 65) established for the lakes in the Minnesota River basin.

A number of completed implementation projects in this basin are expected to continue to significantly reduce pollutant loads to Big Stone Lake and tributaries for the forseeable future. Lake Farley, near Milbank, has been renovated to restore its sediment trapping capacity, which should further reduce the amount of sediment as well as nutrients entering the lower Whetstone River. Thirty-four feedlot projects have been completed in the Big Stone Lake watershed and a number of lake shore stabilization and watershed improvement projects are currently underway or nearing completion. Funding to continue the Little Minnesota River subwatershed portion of the Big Stone Lake restoration effort has been shifted from Section 319 of the Clean Water Act to Public Law 566 (PL566) Watershed Project through the United States Department of Agriculture.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 24: Minnesota River Basin Information

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lake Alice	Deuel County	L90	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			2	No [1]
				Immersion Recreation	Unknown				(See
				Limited Contact Recreation	Unknown				footnote at end of table)
				Warmwater Semipermanent Fish Life	Full				
Big Stone Lake	Roberts County	L91	Lake Assessment	Limited Contact Recreation	Full			4a	No [2]
				Immersion Recreation	Full				(See
				Fish/Wildlife Prop, Rec, Stock Waters	Full				footnote at end of table)
				Irrigation Waters	Unknown				
				Warmwater Permanent Fish Life	Full				
Lake Cochrane	Deuel County	L92	Lake Assessment	Limited Contact Recreation	Full			1	No
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Full				
Fish Lake	Deuel County	L93	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Lake Hendricks	Brookings County	L94	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Lake Oliver	Deuel County	L95	Lake Assessment	Immersion Recreation	Unknown			4a	No [3]
				Warmwater Marginal Fish Life	Full				(See
				Fish/Wildlife Prop, Rec, Stock Waters	Full				footnote at end of table)
				Limited Contact Recreation	Unknown				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Punished Woman Lake	Codington County	L96	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			4a	No
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Streams									
Big Coulee Creek	Near Peever	S131	USGS 5289985	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Cobb Creek	Near Gary	S132	USGS 5299700	Limited Contact Recreation	Unknown			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Full				
				Coldwater Marginal Fish Life	Non	Water Temp	Source Unknown		
West Branch Lac Qui Parle River	Above Gary to MN border	S133	DENR 460645	Limited Contact Recreation	Insuff Info			2	No
				Fish/W ildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Coldwater Marginal Fish Life	Insuff Info				
Little Minnesota River	Near Claire City to MN border	S134	DENR 460710	Limited Contact Recreation	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
Whetstone River	Headwaters to MN border	S135	DENR 460700	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
				Warmwater Semipermanent Fish Life	Full				
South Fork Whetstone River	Headwaters to Lake Farley	S136	DENR 460690	Limited Contact Recreation	Insuff Info			2	No
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
South Fork Whetstone River	Lake Farley to mouth	S137	DENR 460691	Limited Contact Recreation	Insuff Info			4a	No [4]
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Non	Diss. Oxygen	Municipal PS Discharge		
North Fork Yellow Bank River	Grant County Hwy 35 to MN border	S138	DENR 460688	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Irrigation Waters	Full				
				Warmwater Permanent Fish Life	Full				
				Limited Contact Recreation	Full				
South Fork Yellow Bank River	Near Caine Creek to MN border	S139	DENR 460687	Coldwater Marginal Fish Life	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
Surface Water Discharge Permits						**PARAMETER**			
Whetstone River	Near Big Stone City	P52	SD0023663	Approved TMDL		Ammonia		6b	No
South Fork Whetstone River	Near Milbank	P53	SD0020371	Approved TMDL		Ammonia; Diss. Oxygen		6b	No
North Fork Whetstone River	Near Wilmot		SD0021024	Approved TMDL		Ammonia		6b	No

[1] New sampling information indicates full support and a TMDL was submitted to EPA for approval on January 29, 2004.

[2] One sampling year indicates full support.

[3] New sampling information indicates full support.

[4] This stream has never shown impairment until the point source discharger in the area had problems meeting the SWDpermit limits. The facility is now in the process of upgrading the facility in order to continue to maintain permit limits that were developed through a point source TMDL for ammonia and dissolved oxygen. The renewal point source TMDL was approved by EPA on 3/25/2004.

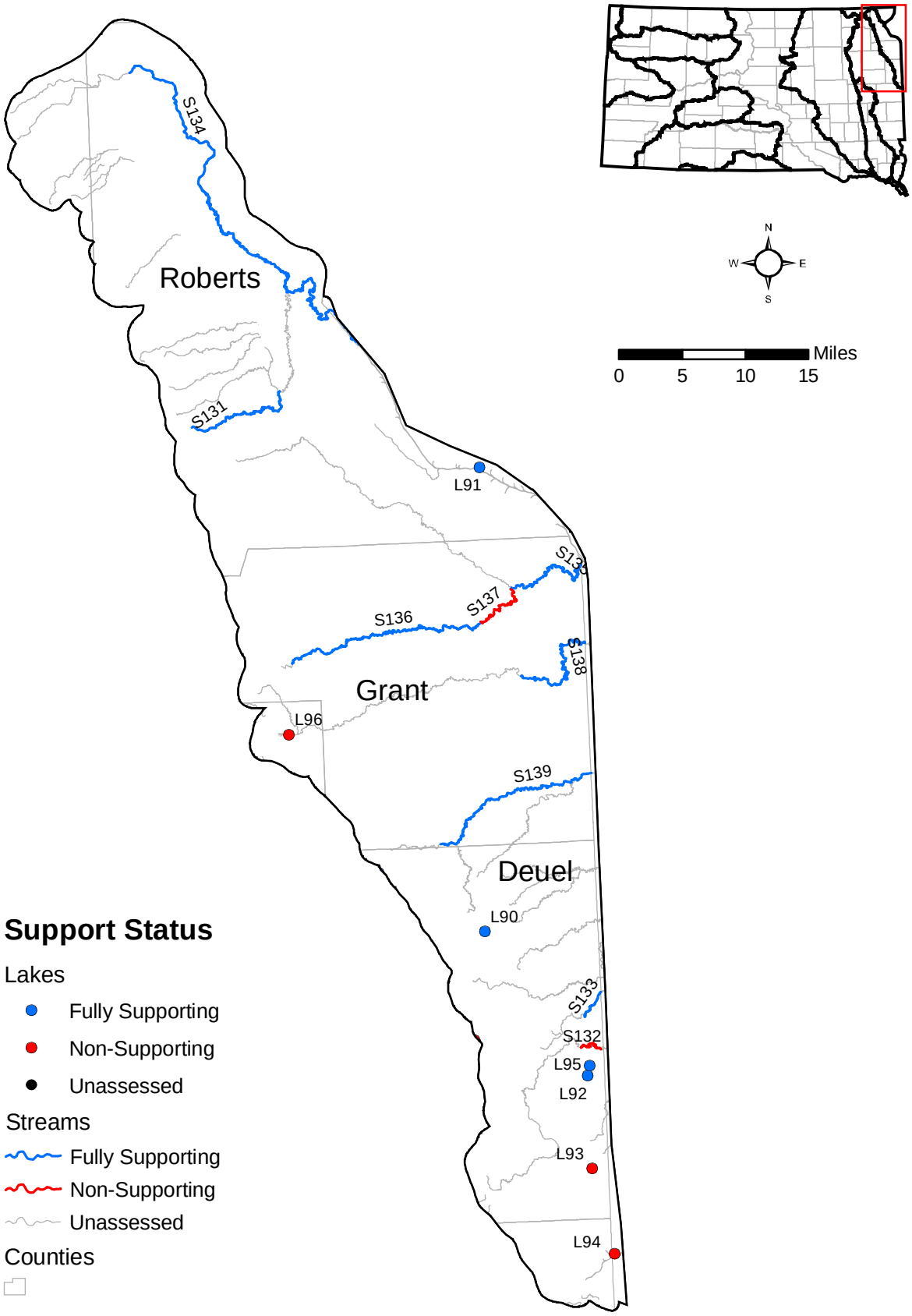


Figure 26: Minnesota River Basin Waterbody Support Status

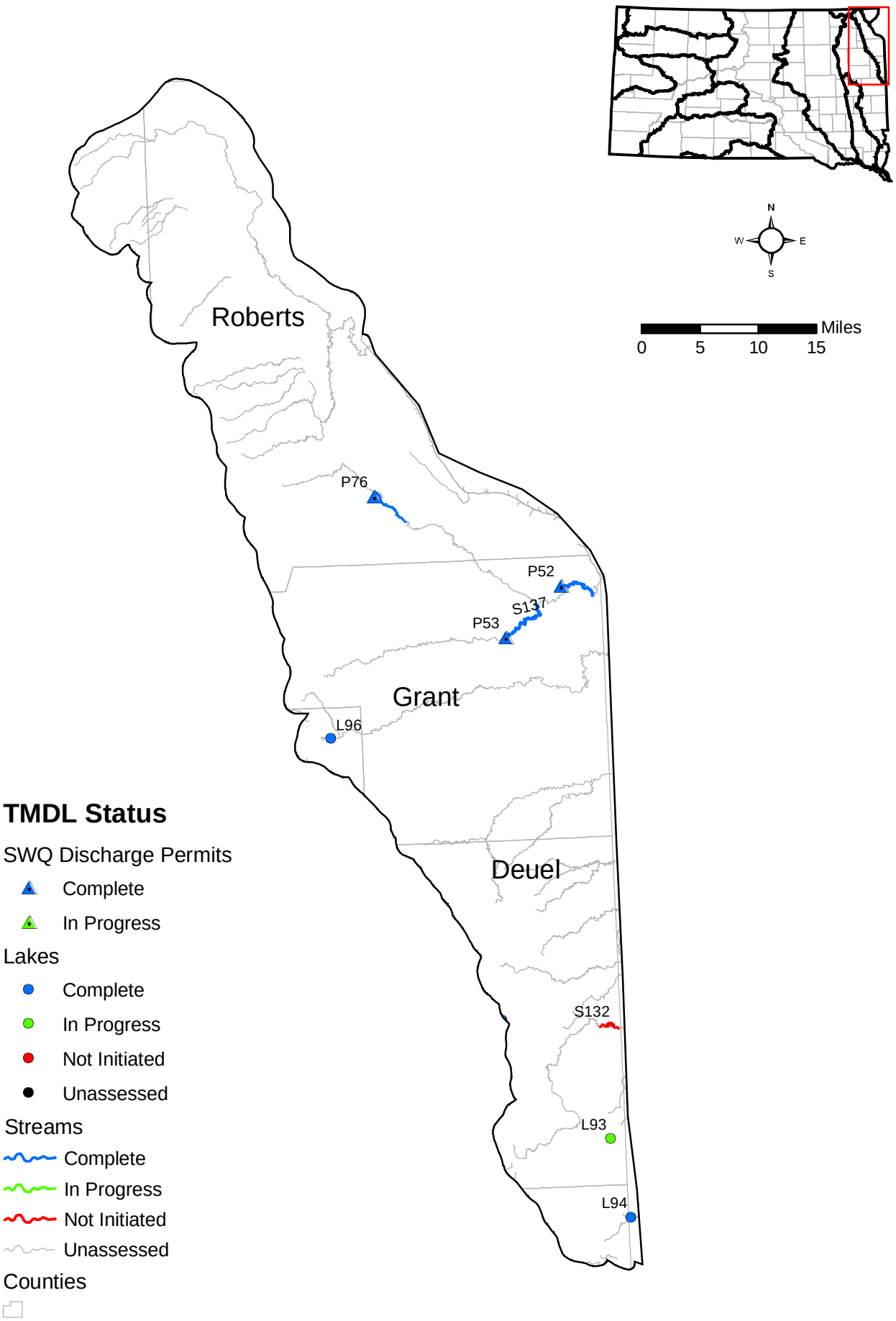


Figure 27: Minnesota River Basin TMDL Waters

Missouri River Basin (Mainstem) (Figures 28 - 31, Table 25).

The Missouri River is the largest body of water in South Dakota. It makes a definite cut down the middle of the state to form what is commonly referred to as either "east or west" river country. The river enters the state on the north from North Dakota and flows south until it reaches the vicinity of Pierre. Along this southern course it receives significant flows from the Grand, Moreau, and Cheyenne River basins. From Pierre onward the river flows generally east-southeast until it exits the state on the southeast tip after receiving contributing flows from the Bad, White, James, Vermillion, Niobrara, and Big Sioux River basins. During its course through the state, the Missouri River, excluding its major tributaries, drains an approximate 16,610 square miles; 2,580 square miles of this is located within the Missouri Coteau and is considered non-contributing.

The dominant feature of the Missouri River in South Dakota is the presence of four impoundments; Lake Oahe at Pierre (Oahe Dam), Lake Sharpe at Fort Thompson (Big Bend Dam), Lake Francis Case at Pickstown (Ft. Randall Dam), and Lewis and Clark Lake at Yankton (Gavins Point Dam). The largest of these is Lake Oahe with 22,240,000 acre-feet of storage capacity. The impoundments serve for flood control, hydroelectric generation, irrigation, municipal water use, water related recreation, and downstream navigation. The 70-mile reach from the Gavins Point Dam to Sioux City, Iowa is the last major free-flowing segment of the Missouri River in the state.

Water quality, for the most part, remains good, although violations of the surface water quality standards for temperature and elevated pH may occur from time to time. In 1999, DENR resumed quarterly sampling of the Missouri River at former DENR sites (power station releases). More extensive monitoring is required for these large reservoirs in order to properly characterize present water quality upon which reliable use-support determinations can be based.

Reservoir problems that deserve serious consideration are the erosion occurring along shorelines due to extreme fluctuations in water levels acting on high banks of erosive marine shales, and the large amount of sediment deposited in the reservoir basins mostly by the five major western tributaries (nearly 40 million tons per year by a 1987 Corp of Engineers estimate) especially the Bad, White, and Cheyenne Rivers.

Water turbidity, caused mainly by suspended clay and other sediment particles delivered by the Bad River has persisted for most of the open water season in the upper half of Lake Sharpe from 1991 to the present. It must be noted that the already accumulated sediment in shallower areas will be subject to resuspension by strong winds during the greater part of each year and erodible high banks composed of weathered marine shale will provide sediment water turbidity released by rainfall runoff, changing reservoir water levels, and wind/wave action. In addition, a number of small tributaries are a seasonal source of sediment to Lake Sharpe.

Lake Francis Case in the Lower Missouri basin is similarly impacted by sediment-laden inflows from the White River primarily derived from natural erosion in the western badlands. Additional sediments are provided to Lake Francis Case by a number of smaller tributaries that enter various embayments throughout the length of this mainstem reservoir from the east and west.

Water quality monitoring at the Fort Randall Dam power plant discharge did not indicate any problems this reporting cycle. There were no violations observed in water temperature or TSS this assessment.

In 1999, monitoring sites were established at selected small tributaries to the Missouri mainstem reservoirs. USGS data for Choteau Creek east of Wagner, show the creek to be impaired by low DO levels and high TSS. Medicine Creek at Kennebec, is impaired due to high TDS and conductivity. Crow Creek and Medicine Knoll Creek fully supported beneficial uses for the previous and the current reporting cycles.

During 1992-93, Charles Mix County Conservation District reported that sediments from the Cedar and Platte Creeks were severely impacting the embayments into which they emptied. Platte Creek Bay and Cedar Creek Bay are popular fishing and recreational areas with the latter bay also serving as the site of an intake for the Randall Community Rural Water system. The area affected by siltation was estimated to be 120 acres. Less severe sediment impacts were noted in three other bays on the eastern shore of Lake Francis Case with a total area in excess of 300 acres.

Water discharged from Lake Francis Case exerts a considerable erosive force on the banks of the Missouri River. Nearly two miles of high banks on the eastern shore of the unchannelized river between Lake Francis Case and Lewis and Clark Lake were reported to be severely affected. Riverside cropland has been continually lost to bank erosion for the past two decades at two separate stretches near Marty and Greenwood (Charles Mix County Conservation District, written communication). Shoreline erosion was severe for most of the past decade due to significant increases in water released from all of the large mainstem reservoirs upstream during summer, fall, and winter of 1995-97. The unusually large discharges were made necessary to free up sufficient reservoir storage space for the 1996-98 spring runoffs. Major erosion problems similar to those noted above developed during late 1997 in the Missouri shoreline downstream of Lewis and Clark Lake due to high reservoir discharges. Recent drier conditions in the middle of the state (1999-2002) and in upstream reservoirs will temporarily alleviate those erosion problems.

Most lakes in the Missouri River basin are highly eutrophic because of nutrient enrichment and siltation. Water quality of these lakes has generally declined in the past decade. Agricultural activities are the problem sources. A dredging project has been active in McCook Lake since 1991 to remove large accumulations of sediment. The project goal is to dredge the entire lake basin by the year 2003. Two other dredging projects have also been active in the basin at East Lake Eureka and Lake Hiddenwood.

Lake Yankton in the southeast Lower Missouri basin continues to have the best water quality of the assessed basin lakes with TSIs of 47.3 last assessment and 46.9 this reporting period. Burke Lake near the upper basin's southern border had been experiencing sedimentation, nuisance growths of blue-green algae and macrophytes, odor problems, and fish kills. Limited TSI data collected in 2001 and 2003 suggested some improvement (lower concentrations) in lake phosphorus and chlorophyll levels over those reported in 1994. Summer phosphorus TSI declined from 95.7 in 1994 to 85.0 in 2001 and chlorophyll TSI from 74.4 in 1994 to 68.6 in

2003. However, those more recent phosphorus and chlorophyll values are still considered high (hyper-eutrophic). There were insufficient data to calculate aggregated TSI trends for Burke Lake. The city of Burke is currently sponsoring an assessment of Burke Lake.

Twelve of 18 lakes monitored in this basin are presently classified as hyper-eutrophic (TSI: 66-86) and therefore are not meeting their water quality target criteria (TSI: <65). Five lakes are rated as eutrophic and one lake as mesotrophic (Yankton Lake TSI: 49). Sufficient short-term trend data (2-5 years) were available for only eight basin lakes this assessment. Four lakes had relatively stable water quality, two lakes showed some improvement, and the remaining two lakes had somewhat worse water quality since the previous assessment.

During this reporting period, assessments underway in the Missouri River basin include projects for Little White River, Lewis and Clark, Dante Lake, and Burke Lake watersheds. Nearing completion are assessments for the Medicine Creek watershed and the South Central watershed.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 25: Missouri River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Academy Lake	Charles Mix County	L97	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Lake Andes	Charles Mix County	L98	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Brakke Dam	Lyman County	L99	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
Burke Lake	Gregory County	L100	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Immersion Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Byre Lake	Lyman County	L101	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Domestic Water Supply	Full				
Lake Campbell	Campbell County	L102	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Corsica Lake	Douglas County	L103	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Cottonwood Lake	Sully County	L104	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Dante Lake	Charles Mix County	L105	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Immersion Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Fate Dam	Lyman County	L106	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
Geddes Lake	Charles Mix County	L107	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 1
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
Lake Hiddenwood	Walworth County	L108	Lake Assessment	Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources	4a	No
				Limited Contact Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Full				
Lake Hurley	Potter County	L131	NA	Warmwater Semipermanent Fish Life	Unknown	Fish Cons. Advisory	Unknown	5	Yes – 2
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Immersion Recreation	Unknown				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
McCook Lake	Union County	L109	Lake Assessment	Limited Contact Recreation	Unknown			4a	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
Platte Lake	Charles Mix County	L110	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Lake Pocasse	Campbell County	L111	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 2
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Roosevelt Lake	Tripp County	L112	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 2
				Immersion Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
Sully Lake	Sully County	L113	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI; pH	Nonpoint Sources		
Sully Dam	Tripp County	L114	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Semipermanent Fish Life	Non	TSI; pH	Nonpoint Sources		
Lake Yankton	Yankton County	L115	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Andes Creek	Near Armour	S140	USGS 6452380	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Campbell Creek	Near Lee's Corner	S141	USGS 6442718	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Choteau Creek	Wagner to mouth	S142	DENR 460134	Limited Contact Recreation	Full	TSS		5	Yes – 1
			USGS 6453200	Warmwater Semipermanent Fish Life	Non	Diss. Oxy.			
			USGS 6453300	Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
Crow Creek	Bedashosha Lake to Jerauld County line	S143	DENR 460135	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Warmwater Semipermanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
East Fork Platte Creek	Near Aurora Ctr	S144	USGS 6452290	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				
Elm Creek	Near Gann Valley	S145	USGS 6442900	Warmwater Marginal Fish Life	Insuff Info			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Full				
				Limited Contact Recreation	Unknown				
Missouri River	Big Bend Dam to	S146	DENR 460673	Irrigation Waters	Full			1	No
(Lake Francis Case)	Ft. Randall Dam			Limited Contact Recreation	Full				
				Warmwater Permanent Fish Life	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
				Commerce and Industry Waters	Full				
				Immersion Recreation	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Missouri River (Lewis and Clark Lake)	Ft. Randall Dam to Gavins Pt. Dam	S147	DENR 460674	Warmwater Permanent Fish Life	Full			1	No
				Commerce and Industry Waters	Full				
				Domestic Water Supply	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
Missouri River	Gavins Pt. Dam to North Sioux City	S148	DENR 460674	Warmwater Permanent Fish Life	Full			1	No
				Commerce and Industry Waters	Full				
				Domestic Water Supply	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
Medicine Creek	US Hwy 83 to mouth	S149	DENR 460141	Warmwater Marginal Fish Life	Full			5	Yes – 1
				Irrigation Waters	Non	Conductivity			
				Fish/Wildlife Prop, Rec, Stock Waters	Non	TDS			
				Limited Contact Recreation	Insuff Info				
Medicine Knoll Creek	Headwaters to mouth	S150	DENR 460142	Irrigation Waters	Full			1	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Marginal Fish Life	Full				
				Limited Contact Recreation	Full				
Missouri River (Lake Oahe)	ND Border to Oahe Dam	S151	DENR 460671	Limited Contact Recreation	Full			1	No
				Irrigation Waters	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
				Commerce and Industry Waters	Full				
				Coldwater Permanent Fish Life	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Platte Creek	Near P latte	S152	USGS 6452320	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Insuff Info				
Missouri River (Lake Sharpe)	Oahe Dam to Big Bend Dam	S153	DENR 460672	Commerce and Industry Waters	Full			1	No
				Irrigation Waters	Full				
				Limited Contact Recreation	Full				
				Coldwater Permanent Fish Life	Full				
				Domestic Water Supply	Full				
				Immersion Recreation	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
Snake Creek	Near Bijou Hills	S154	USGS 6452275	Limited Contact Recreation	Unknown			2	No
				Warmwater Marginal Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Full				
Spring Creek	US Hwy 83 to mouth	S155	DENR 460155	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No [1]
				Irrigation Waters	Full				(See
				Limited Contact Recreation	Full				footnote at
				Warmwater Semipermanent Fish Life	Full				end of table)

		MAP ID	BASIS		PARAMETER	EPA Category	On 303(d)? & Priority
Surface Water Discharge Permits							
Choteau Creek	Near Wagner		SD0020184	EPA Permit -Delist			No
Dry Choteau Creek	Near Avon	P54	SD0022730	Need to Renew TMDL	Ammonia	6a	Yes – 1
Medicine Creek	Near Kennebec	P55	SD0022861	Need to Renew TMDL	Ammonia	6a	Yes – 1
Medicine Creek	Near Presho	P56	SD0020117	Approved TMDL	Ammonia	6b	No
Okobojo Creek	Near Agar	P57	SD0022241	Approved TMDL	Ammonia	6b	No
Platte Creek	Near Platte	P58	SD0020354	Need to Renew TMDL	Ammonia	6a	Yes – 1
Ponca Creek	Near Colome	P59	SD0023230	Approved TMDL	Ammonia	6b	No

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Surface Water Discharge Permits		**MAP ID**	**BASIS**		**PARAMETER**	**EPACategory**	**On 303(d)? & Priority**
Ponca Creek	Near Gregory	P60	SD0022179	Approved TMDL	Ammonia	6b	No
Spring Creek	Near Herreid	P61	SD0022900	Approved TMDL	Ammonia	6b	No
Swan Creek	Near Akaska	P62	SD0022250	Need to Renew TMDL	Ammonia	6a	Yes – 1

[1] Was previously listed on the 2002 303(d) list for dissolved oxygen. However, new water quality data indicates full support.

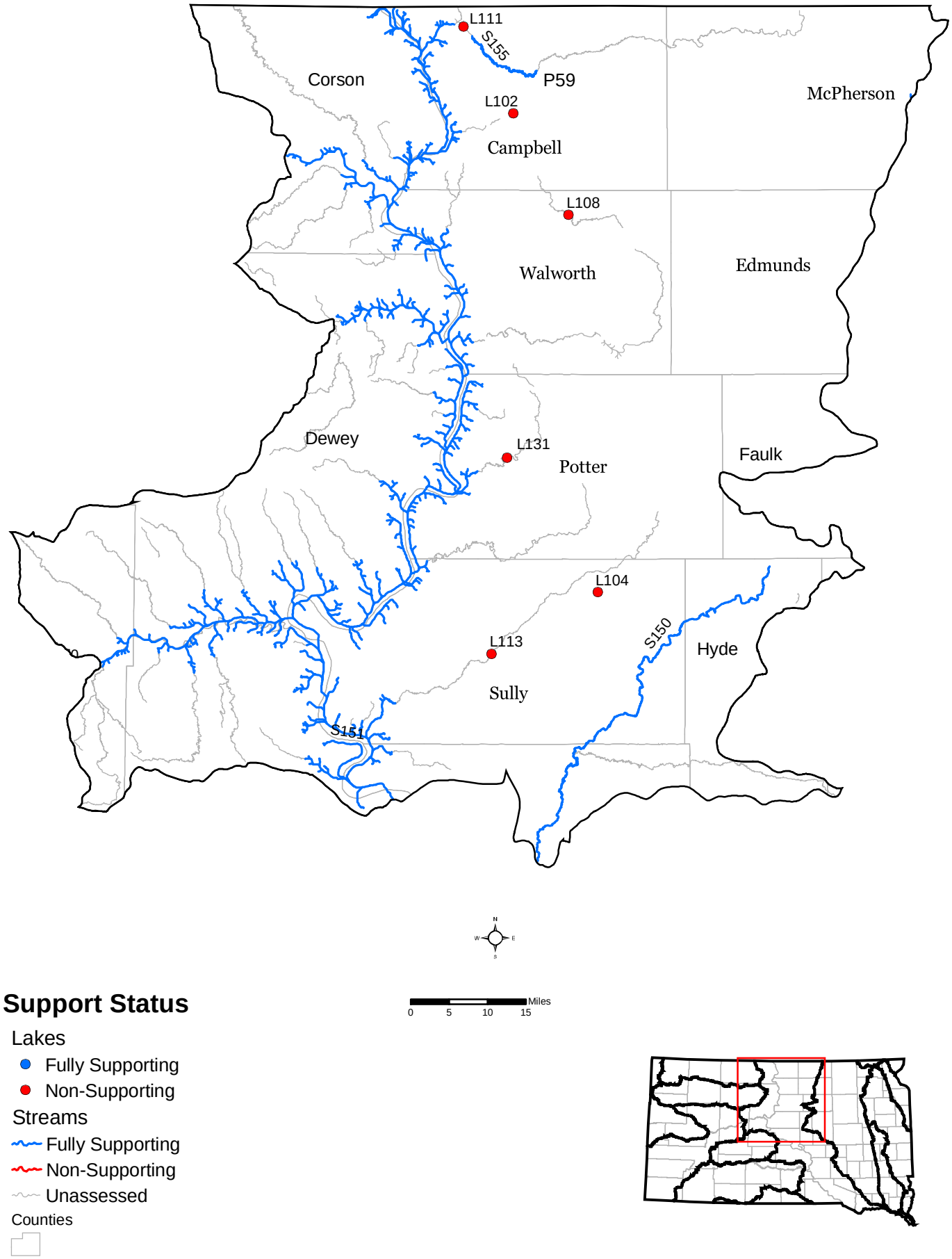


Figure 28: Upper Missouri River Basin Waterbody Support Status

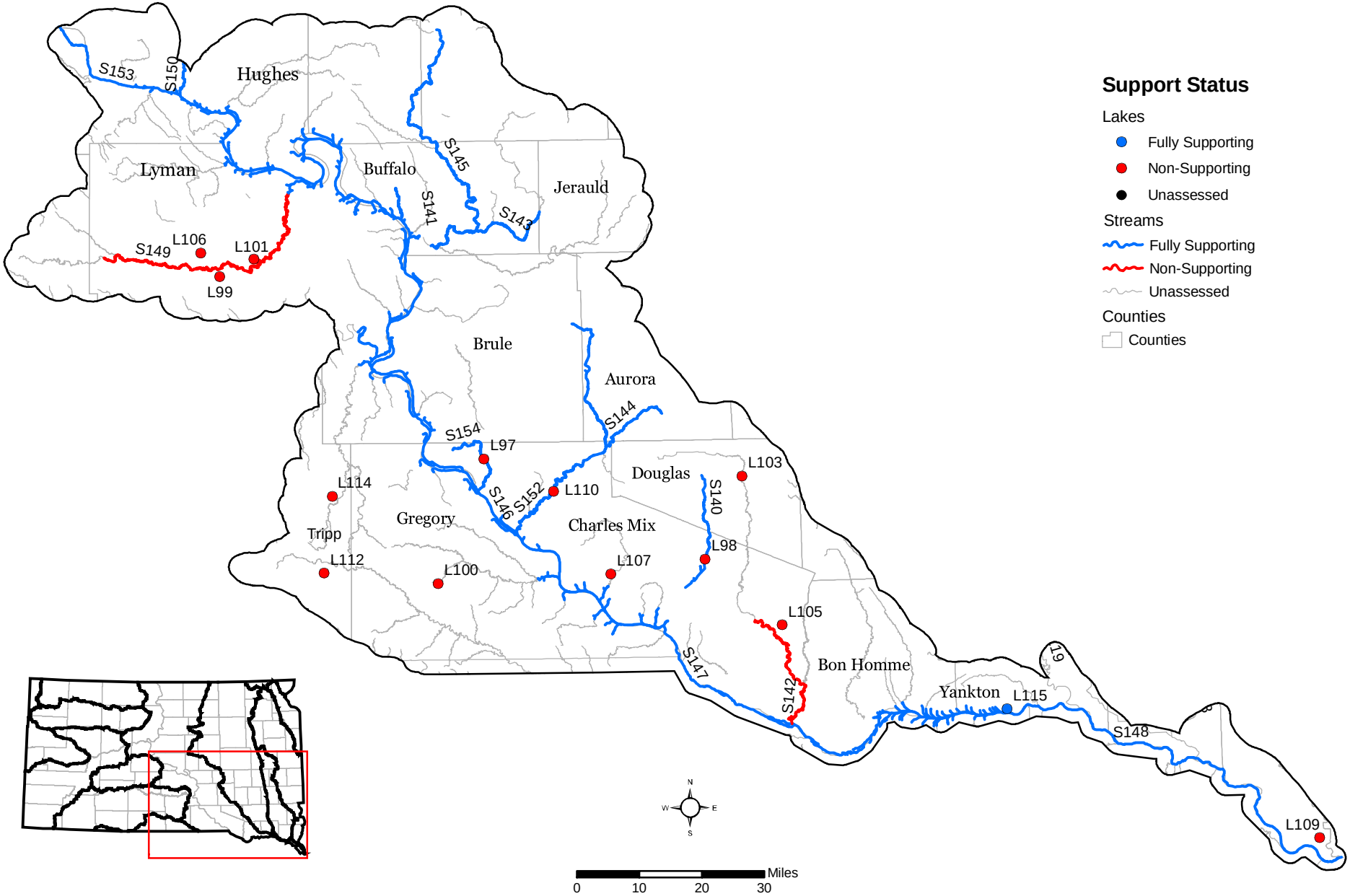


Figure 29: Lower Missouri River Basin Waterbody Support Status

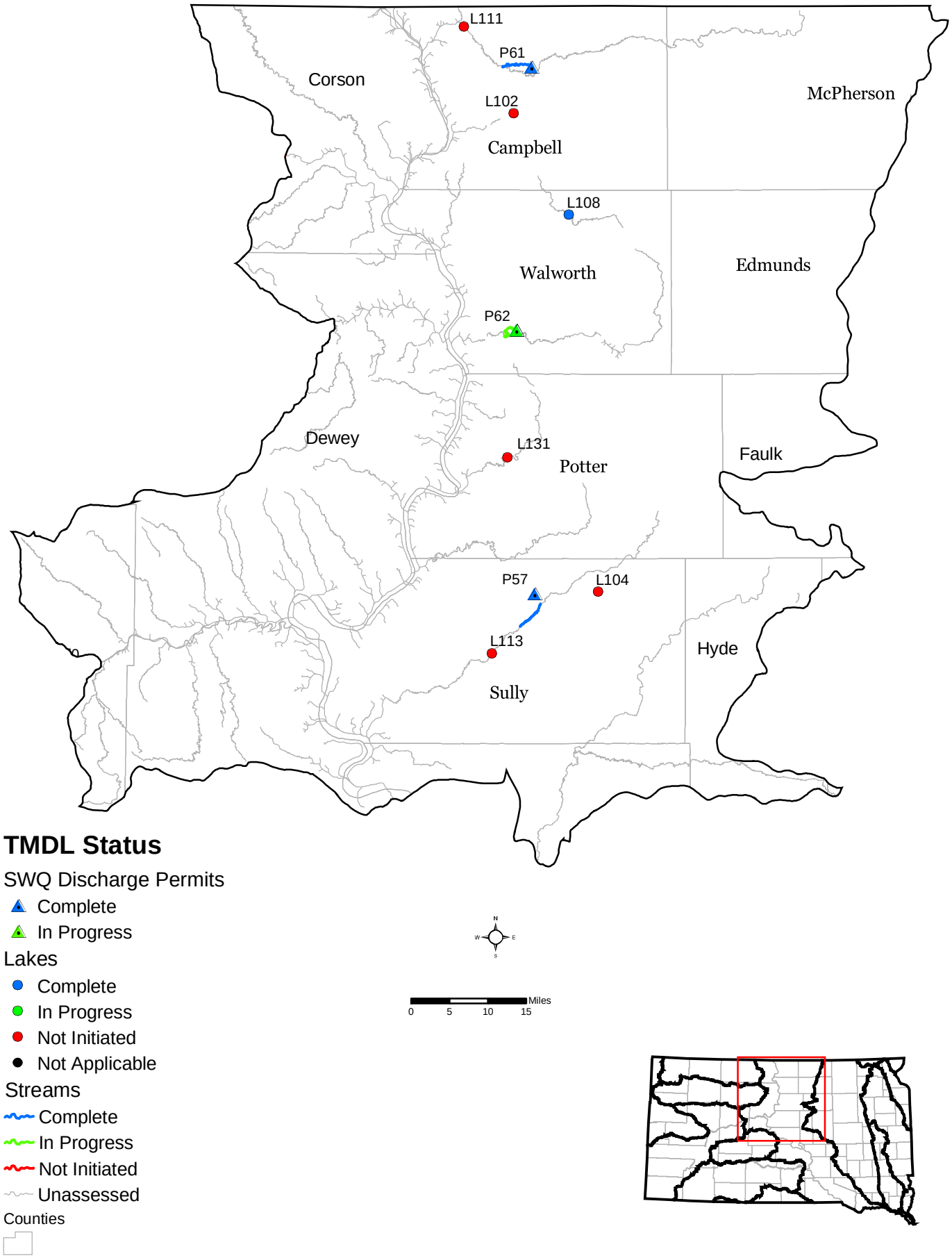


Figure 30: Upper Missouri River Basin TMDL Waters

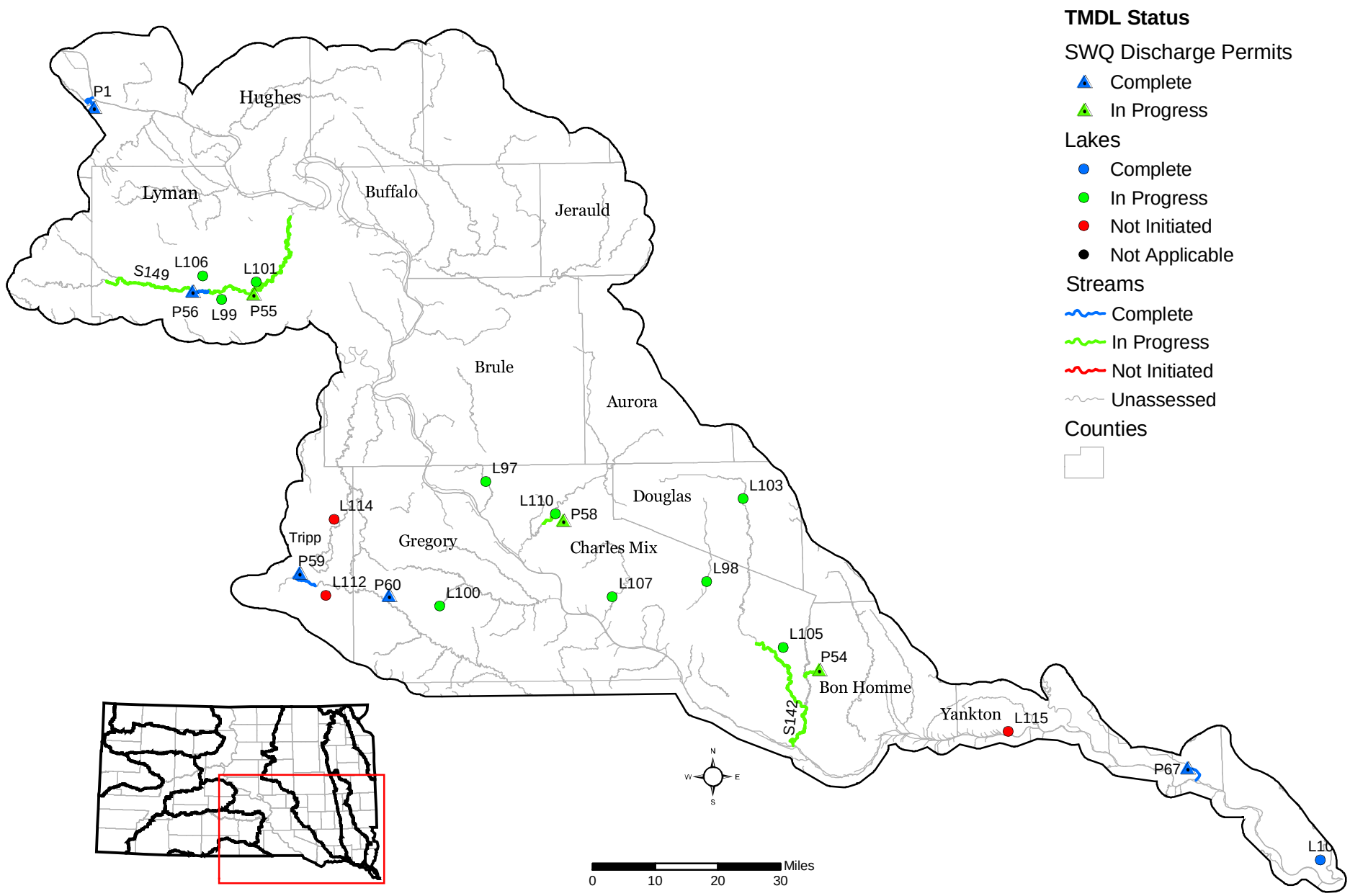


Figure 31: Lower Missouri River Basin TMDL Waters

Moreau River Basin (Figures 32 and 33, Table 26).

This basin is located in the northwest part of South Dakota and drains an area of 5,037 square miles. As with the Grand River basin to the north, agriculture is the mainstay of this sparsely populated basin. Population density is approximately two persons per square mile. Approximately two-thirds of the basin's land is devoted to pasture and ranching operations. There was in past years considerable gas, oil, and coal exploration conducted in this river basin but few energy resources were discovered. At present there is only one producing oil well in the basin located near the western boundary of Dewey County. Average production is 13 barrels a day.

Water quality within this basin is marginal. Much of the sediment in the drainage comes from erosive Cretaceous shales that also mineralize the water. As in the adjoining Grand River basin to the north, this leads to high levels of TDS in the water of local streams, primarily sulfate, iron, manganese, sodium, and other metals and minerals.

During the winter months the Moreau River often freezes to the bottom following seasonal periods of low or no flow during late summer and fall.

During the previous six reporting periods and the present assessment the lower Moreau River is nonsupporting of its beneficial uses due to TSS. Higher than average runoff from 1991 through 1999 was probably largely responsible for excessive TSS levels over the entire basin in the 1990s. A secondary problem in the upper and lower drainage of the Moreau River is the high SAR of watershed soils. This resulted in impairment for the irrigation use of Moreau River. This assessment the South Fork Moreau River is impaired by excessive TDS. Thunder Butte Creek, a tributary of the Moreau River, seemed to have fair to satisfactory water quality for assigned beneficial uses during the last two assessment periods but not enough samples have been collected for this current assessment cycle to clearly establish support status for this stream.

In 1991, two small reservoirs in the river basin, Coal Springs Dam and Dewberry Lake were found to be hypereutrophic with TSIs of 71 and 81, respectively. Recent water quality data (2003) indicated Dewberry Lake has remained hypereutrophic (TSI: 94.7) due to high phosphorus and chlorophyll *a* levels. Previous data collected in 1991 indicated similar high concentrations of phosphorus in this reservoir. Coal Springs Dam is presently rated as impaired for its assigned beneficial uses (1991-TSI: 60). There appears to have been a moderate decline in phosphorus levels from 1991 to 1999.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 26: Moreau River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Coal Springs Reservoir	Perkins County	L116	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Dewberry Dam	Dewey County	L117	Lake Assessment	Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Unknown				
				Immersion Recreation	Unknown				
Streams									
Moreau River	Headwaters to near Iron Lightning	S156	DENR 460039	Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production	5	Yes – 2 [1]
				Limited Contact Recreation	Full		Livestock		(See
				Warmwater Semipermanent Fish Life	Full		Natural Sources		footnote at end of table)
				Irrigation Waters	Non	SAR			
Moreau River	Iron Lightning to Green Grass	S157	DENR 460143	Limited Contact Recreation	Insuff Info			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production		
				Warmwater Semipermanent Fish Life	Non	TSS	Livestock		
				Irrigation Waters	Insuff Info		Natural Sources		
Moreau River	Green Grass to mouth	S158	DENR 460935	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Limited Contact Recreation	Full		Crop Production		
				Irrigation Waters	Non	SAR	Livestock		
				Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources		
South Fork Moreau River	Alkali Creek to mouth	S159	DENR 460144	Limited Contact Recreation	Insuff Info			5	Yes – 2
				Irrigation Waters	Non	Conductivity			
				Fish/Wildlife Prop, Rec, Stock Waters	Non	TDS			
				Warmwater Marginal Fish Life	Insuff Info				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
Thunder Butte Creek	Headwaters to mouth	S160	DENR 460147	Warmwater Marginal Fish Life	Insuff Info			2	No
				Limited Contact Recreation	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Insuff Info				
Surface Water Discharge Permits									
Thunder Butte Creek	Near Bison		SD0022411	Went to No Discharge Permit					No

[1] Was previously listed in the 2002 303(d) list for suspended solids. However, new water quality data indicate full support for suspended solids.

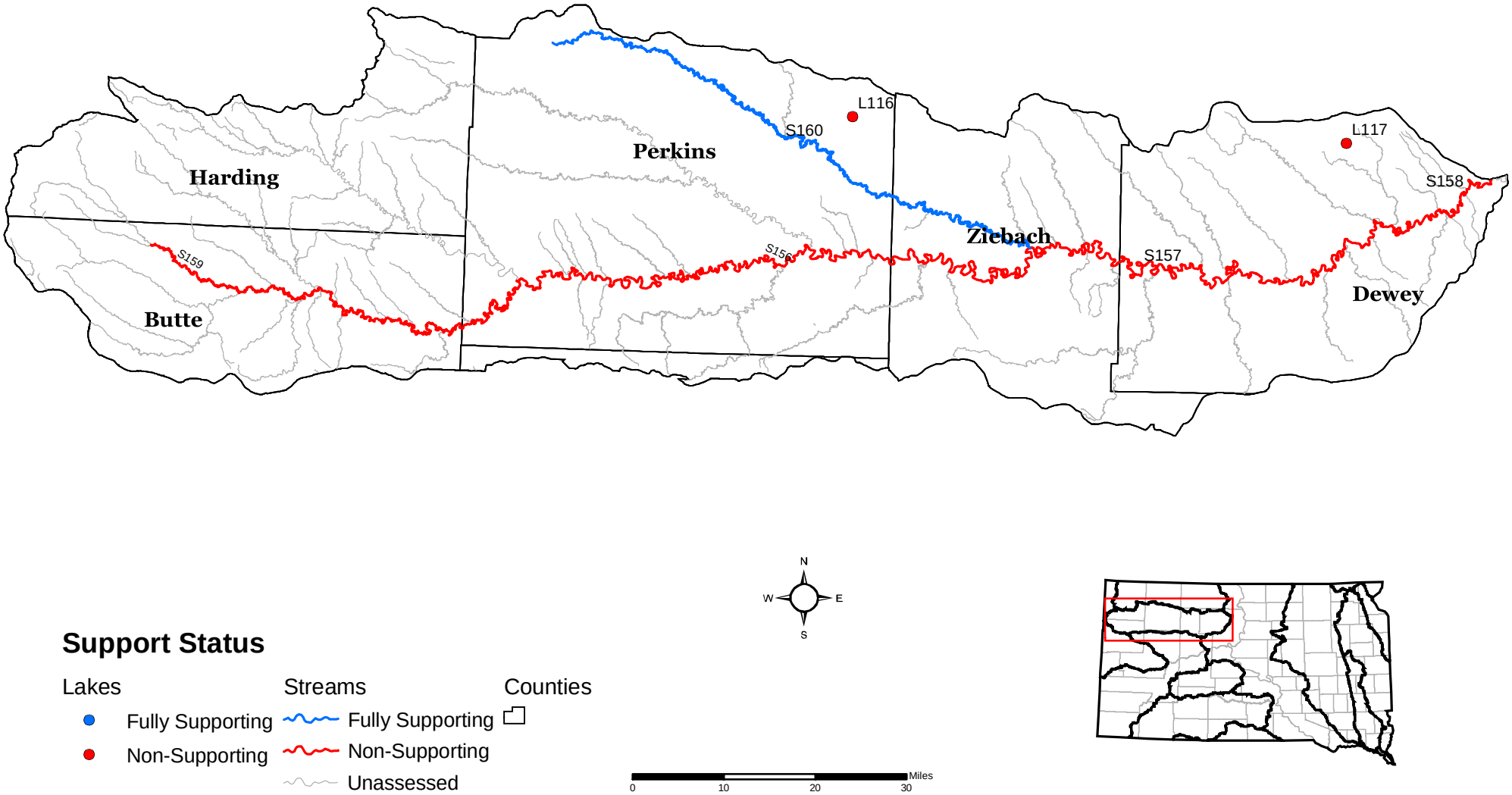


Figure 32: Moreau River Basin Waterbody Support Status

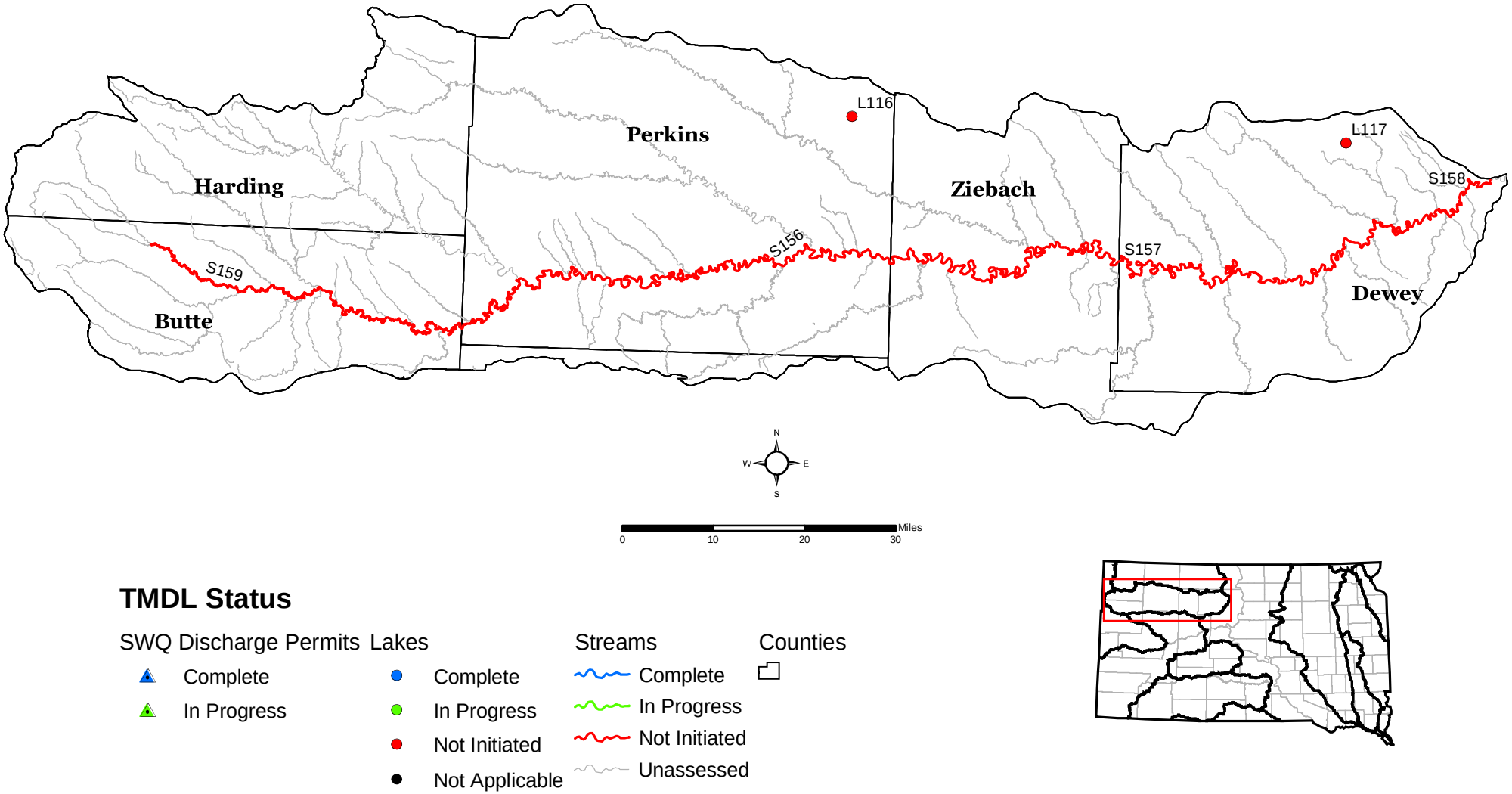


Figure 33: Moreau River Basin TMDL Waters

Niobrara River Basin (Figures 34 and 35, Table 27).

The tributaries of this basin that lie in South Dakota are located in the very south-central part of the state. These tributaries include the Keya Paha River and the Minnechadusa River. These streams drain approximately 2,000 square miles in South Dakota. Agriculture is the leading source of income to the basin.

Increased stream flows from 1990 to 1995 and after were instrumental in increasing suspended solids concentrations in the Keya Paha River. This resulted in downgrade of basin water quality to a moderately impaired status from 1992 to 1997 though TSS levels were not as high as those found in most other eastern South Dakota streams. This reach must be monitored more closely to better determine all the major pollution sources contributing to the overall degradation (e.g. sedimentation) of this high quality stream during periods of normal or increased stream flow. In recent years the support status of the Keya Paha River seems to have been inversely related to the amount of runoff and stream flow. During the last three reporting periods the Keya Paha River was rated as nonsupporting due to excessive TSS. The reason for the decline in water quality was probably increased rainfall in the basin, as was often the case in past assessments.

Rahn Lake, the only lake in the basin, was assessed in 2000 and found to be hypereutrophic due to nutrient enrichment and siltation. These problems were caused by agricultural activities.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 27: Niobrara River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Rahn Lake	Tripp County	L118	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Immersion Recreation	Unknown				
Streams									
Antelope Creek	Near Mission	S161	USGS 6463900	Limited Contact Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Warmwater Semipermanent Fish Life	Insuff Info				
				Irrigation Waters	Full				
Keya Paha River	Keyapaha to NE border	S162	DENR 460815	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 1
				Limited Contact Recreation	Full				
				Domestic Water Supply	Full		Crop Production		
				Irrigation Waters	Full		Livestock		
				Warmwater Semipermanent Fish Life	Non	TSS	Non-Irrigated Crop Prod.		
Sand Creek	Near Olsonville	S163	USGS 6464120	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				

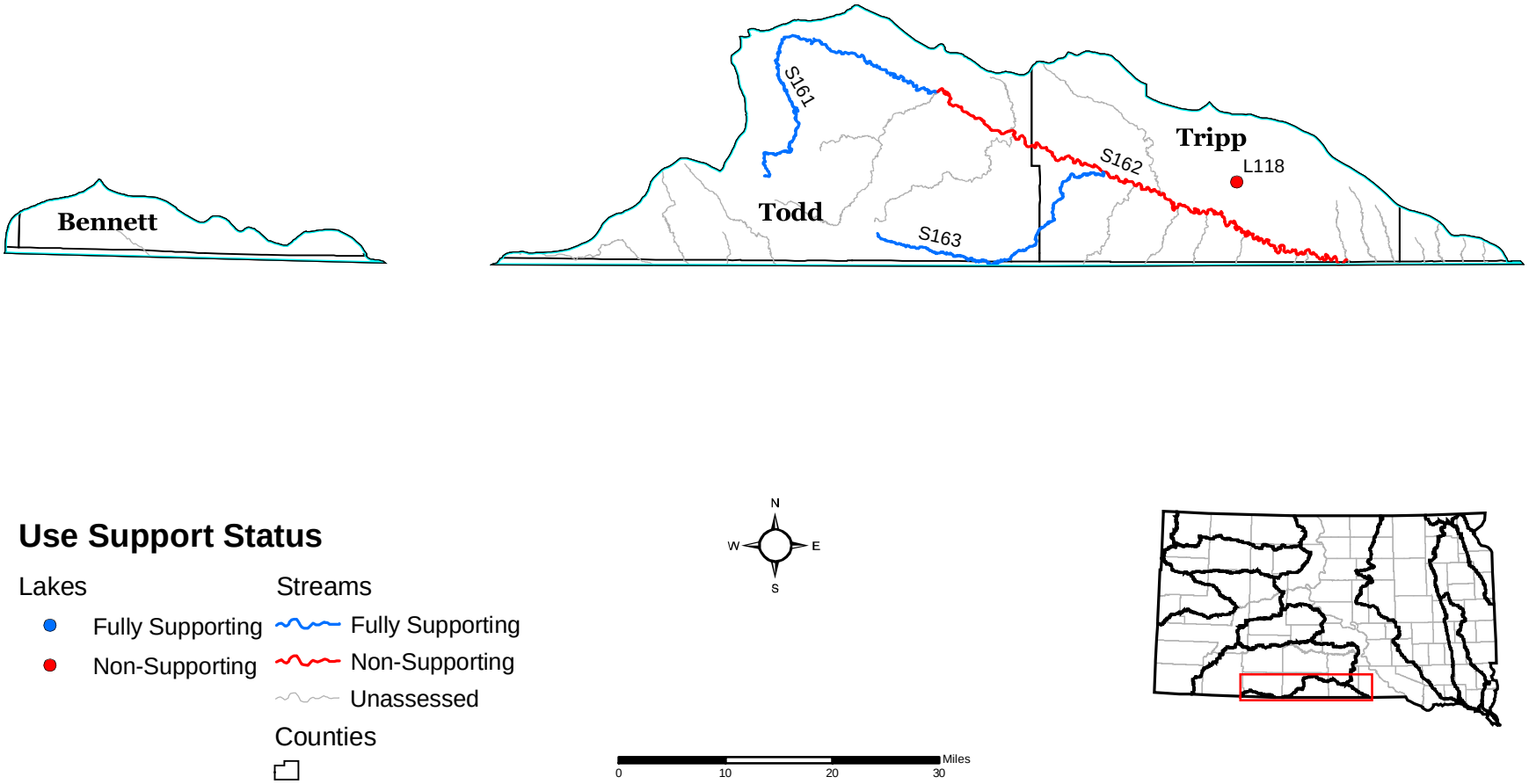


Figure 34: Niobrara River Basin Waterbody Support Status

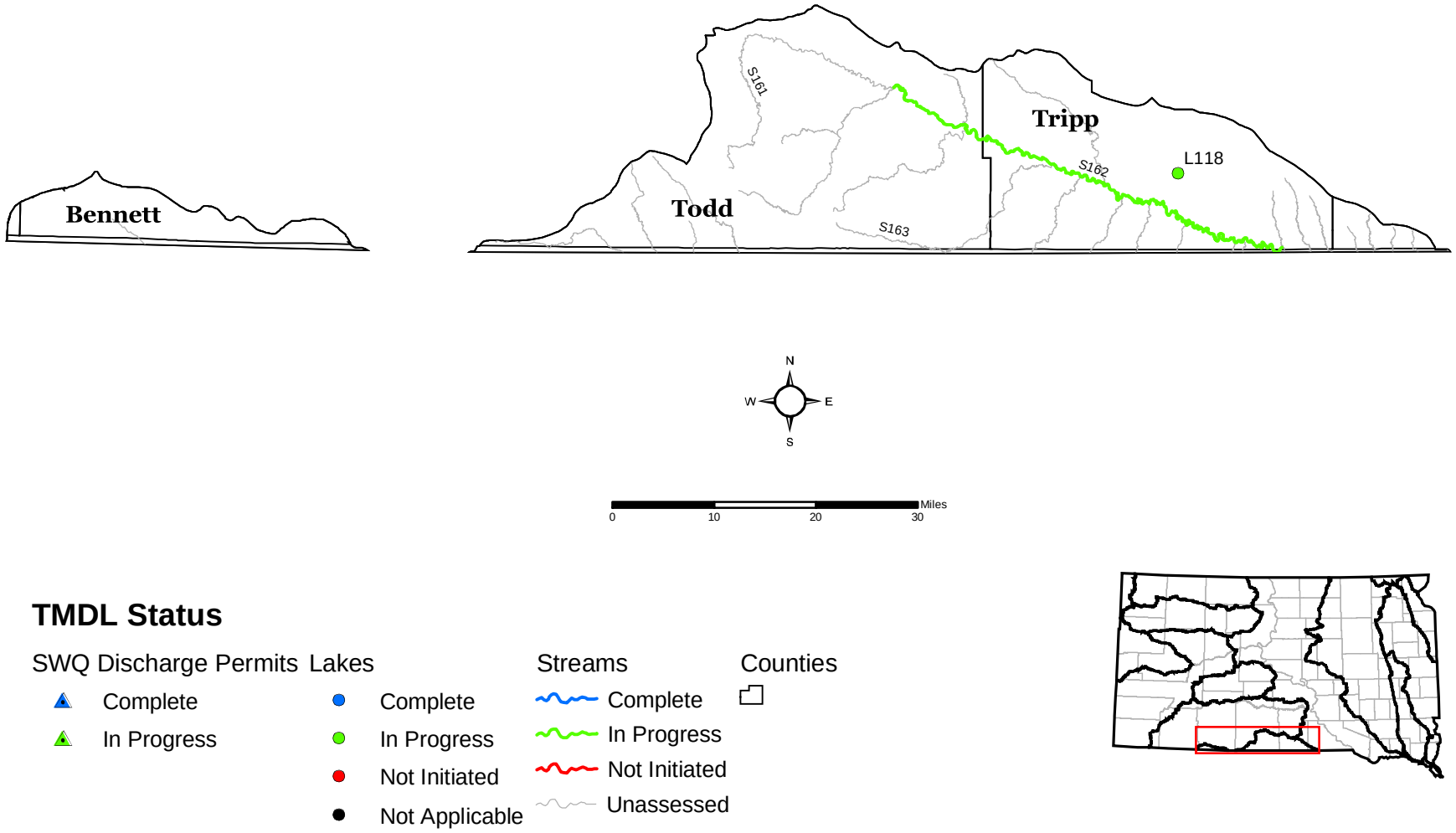


Figure 35: Niobrara River Basin TMDL Waters

Red River Basin (Figures 36 and 37, Table 28).

The Red River basin covers the extreme northeastern corner of the state. The tributaries of the Red River that are in South Dakota drain a total of 600 square miles. Once again, agriculture, with all its activities, is the main economic industry.

Water quality monitoring confirmed that Lake Traverse and White Lake Dam are highly eutrophic. Lake Traverse has a history of dense blue-green algal blooms and periodic attempts to treat the blooms in some of the lake embayments with copper sulfate. Observation and comparison with past monitoring data suggested that this large lake had attained relative stability at a high trophic level during the 1980s and early 1990s. Stable water quality conditions were also suggested by more recent water quality data collected in the late 1990s and 2003. The water quality of White Lake Dam may have degraded somewhat from 1980 to 1990 but annual TSIs for this lake show little further change from 1989 through 1993 (TSI: 69-72). A preliminary analysis of the most recent data suggests White Lake water quality has declined moderately between 2000 and 2001. Limited algae data for the last two decades indicated that the size and duration of summer blue-green blooms have increased considerably over that time span in this small lake. White Lake Dam, an alternate drinking water supply for the city of Britton, is impacted by agricultural fertilizers, livestock operations, and by siltation.

Lake Traverse and White Lake Dam presently have similar average TSIs, 69.8 and 68.7, respectively. A recent high TSI reading for chlorophyll *a* (79) suggests blue-green blooms continue to be a regular feature in summer for the two waterbodies.

A lake assessment has been completed for White Lake Dam and a TMDL is currently being written. An assessment of Lake Traverse and its watershed is scheduled for sampling in the 2004 season.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 28: Red River Basin Information

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Lake Traverse	Roberts County	L119	Lake Assessment	Limited Contact Recreation	Unknown			5	Yes – 2
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Irrigation Waters	Unknown				
				Immersion Recreation	Unknown				
White Lake	Marshall County	L120	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreation	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Domestic Water Supply	Full				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
Streams									
La Belle Creek	Near Veblen	S164	USGS 5051650	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Irrigation Waters	Full				

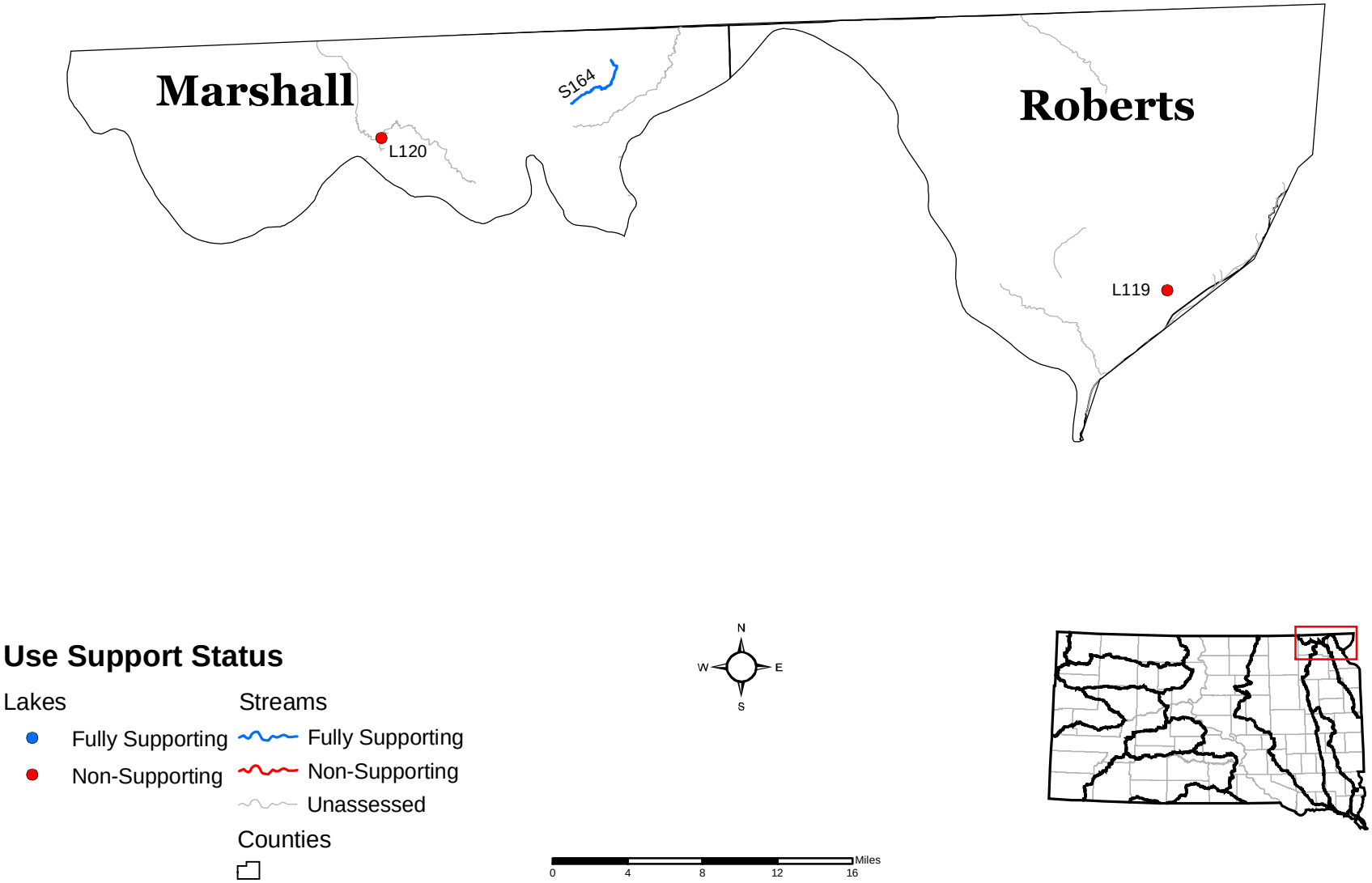


Figure 36: Red River Basin Waterbody Support Status

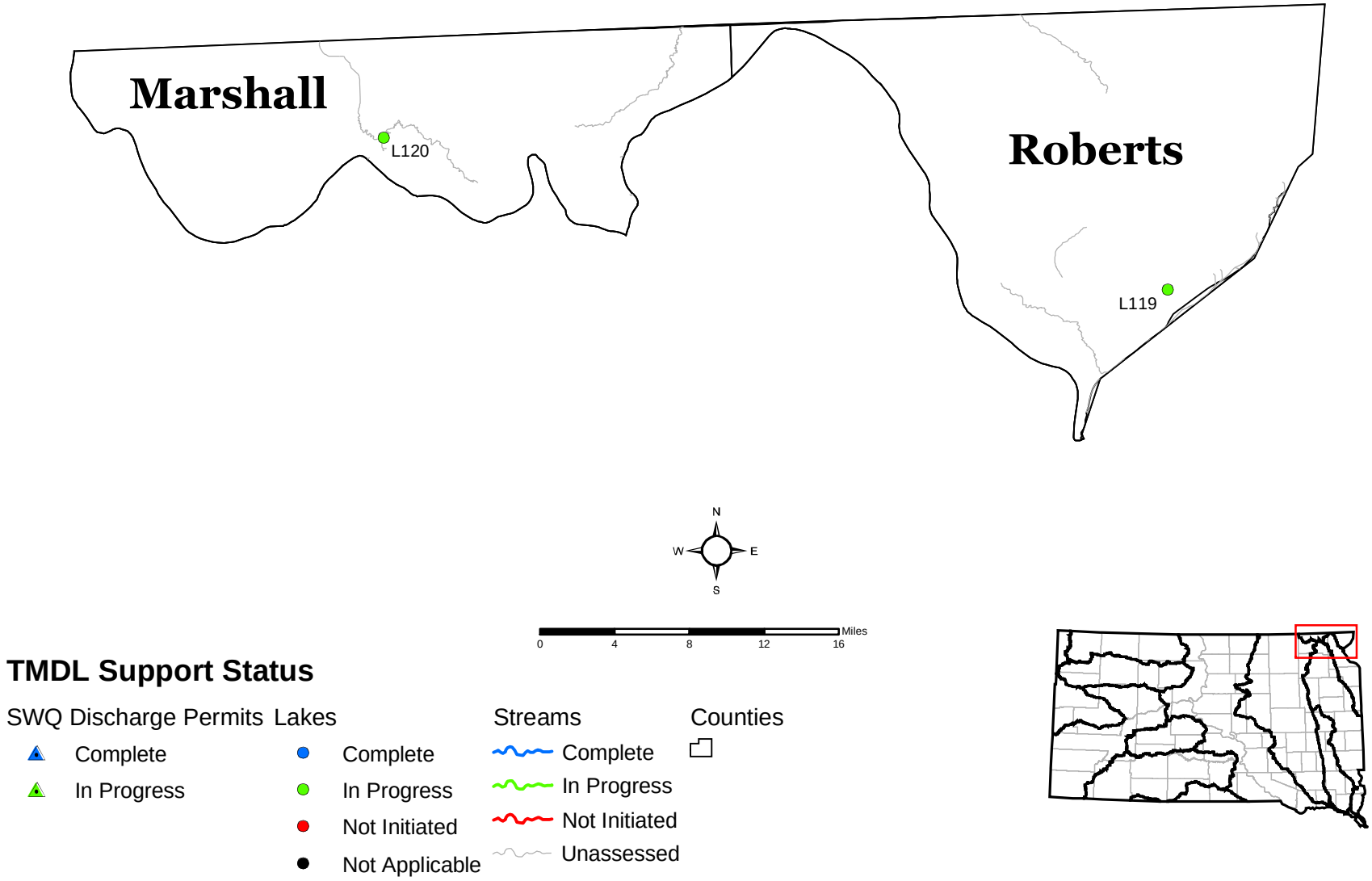


Figure 37: Red River Basin TMDL Waters

Vermillion River Basin (Figures 38 and 39, Table 29).

The Vermillion River basin covers an area of 2,652 square miles in southeastern South Dakota. The basin is about 150 miles in length and varies in width from 12 miles in the north to 36 miles in the south. Much of the lower 22 miles of the river is channelized. The major economic pursuit is agriculture. It is estimated that 96 percent of the total surface area is devoted to agriculture. That leaves the remaining areas for municipalities, sand and gravel operations, and other uses.

The Vermillion River basin experienced extended periods of above normal rainfall from 1992 through 1998 that resulted in flooding during spring and summer of 1993, 1995, and to some extent, in 1997, 1998, and 2001. These high water conditions produced increased siltation and sedimentation to local waterbodies.

The water quality of the lower basin below Lake Vermillion was usually marginal for designated beneficial uses, most often the result of elevated TSS. During the early 1990s (1991-1995) the warmwater fishery use continued to be impacted by excessive TSS which represented the sole cause of nonsupport for the entire drainage. Moderate increases in TSS were noted during 1995-1997 which was a similarly wet period in the watershed. TDS showed a moderate decline during the course of the last decade although there was little change in water pH between reporting cycles. A moderate impairment for secondary contact was noted in the upper and lower reach of the river due to elevated fecal coliform numbers in the second half of the 1990s. This rating resulted from an increase in bacteria numbers after September 1995. This reporting cycle (water years 1998-2003) the lower reach from below Centerville to the Big Sioux River confluence was impaired due to high TSS and excessive fecal coliform bacteria. The river segment immediately upstream, measured from the Lake Vermillion tailwaters to Centerville, fully supported beneficial uses.

Eight lakes in the basin have been assessed during the last ten years: Lake Preston, Whitewood Lake, Swan Lake, Silver Lake, Lake Thompson, Lake Vermillion (also called East Vermillion Lake), Lake Marindahl and Lake Henry. All but one lake are highly eutrophic (TSI: 73-86) with algae, nutrient enrichment and siltation being major causes of nonsupport. Lake Marindahl currently ranks as eutrophic (TSI: 58). Lake Henry was breached and a new dam was built downstream. Siltation and sedimentation problems are particularly severe at Lake Vermillion (TSI: 75) owing to its large watershed (>260,000 acres) comprised mostly of cropland. Although Lake Vermillion showed comparatively little change in annual TSI values in the 1990s and the last three years, fecal coliform bacteria levels at Lake Vermillion swimming areas exceeded 200 colonies/100ml twelve times in 1993 but only three times for 1994-1995 and six times from 1996 to 1997 (1996 and 1998 305(b)). Only three exceedances were recorded from 1998 through 2001, two in 2002 and none in 2003. According to the most recent TSI values, Lake Vermillion is impaired for designated beneficial uses.

Resident response within this basin indicated local lakes were not meeting their swimmable uses due to excessive algal/macrophyte growth and deterioration of beaches by siltation. Eutrophication in this river basin is accelerated by a large number of feedlots and/or animal holding/management areas, erosion runoff from fertilized cropland, and stream bank erosion.

An implementation Phase II project, which included hydraulic dredging of lake sediments and watershed management measures, has been completed at Swan Lake. The volume of sediment removed by the end of 1997 totaled 345,000 cubic yards with another 45,000 cubic yards estimated to have been removed in 1998.

Of the four lakes in this basin for which sufficient short-term trend data was available, three showed fairly stable water quality conditions between assessments, and one, Whitewood Lake, showed a decline in water quality. However, only Lake Marindahl met the water quality target criteria (TSI < 65) established for the lakes and reservoirs in the Vermillion River basin which is located in the Northern Glaciated Plains ecoregion.

Projects undertaken in this basin are nearing completion, include the Turkey Ridge Creek Watershed Assessment Project in Turner county, and the Kingsbury County Lakes Assessment Project. The Kingsbury County lakes consist of Henry, Preston, Thompson, and Whitewood Lake. The dredging of Swan Lake was completed. An assessment of the entire basin and the remaining impaired lakes is scheduled to take place in the fall of 2004.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 29: Vermillion River Basin Information

WATERBODY Lakes	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
East Vermillion Lake	McCook County	L121	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Limited Contact Recreation	Full				
				Immersion Recreation	Full				
				Warmwater Permanent Fish Life	Non	TSI; pH	Nonpoint Sources		
Lake Henry	Kingsbury County	L122	Lake Assessment	Immersion Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Marginal Fish Life	Full				
				Limited Contact Recreation	Unknown				
Marindahl Lake	Yankton County	L123	Lake Assessment	Warmwater Permanent Fish Life	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
Lake Preston	Kingsbury County	L124	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Non	TSI	Nonpoint Sources	5	Yes – 1
Silver Lake	Hutchinson County	L125	Lake Assessment	Fish/Wildlife Prop, Rec, Stock Waters	Full			5	Yes – 2
				Immersion Recreation	Unknown				
				Limited Contact Recreation	Unknown				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Swan Lake	Turner County	L126	Lake Assessment	Limited Contact Recreation	Unknown			4a	No
				Warmwater Semipermanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Immersion Recreation	Unknown				
Lake Thompson	Kingsbury County	L127	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Non	TSI	Nonpoint Sources		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Lakes									
Whitewood Lake	Kingsbury County	L128	Lake Assessment	Immersion Recreation	Unknown			5	Yes – 1
				Limited Contact Recreatio n	Unknown				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Warmwater Marginal Fish Life	Non	TSI	Nonpoint Sources		
Streams									
Little Vermillion River	Near Salem	S165	USGS 6478540	Irrigation Waters	Full			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
Vermillion River	Headwater to Turkey Ridge Creek	S166	DENR 460661	Fish/Wildlife Prop, Rec, Stock Waters	Full			1	No
				Irrigation Waters	Full				
				Warmwater Semiperman ent Fish Life	Full				
				Limited Contact Recreation	Full				
Vermillion River	Turkey Ridge Creek to Baptist Creek	S167	DENR 460755	Warmwater Semipermanent Fish Life	Non	TSS	Livestock	5	Yes – 1
				Limited Contact Recreation	Non	Fecal Coliform	Hydrostructure Flow Modification		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Streambank Modifications/destablization		
				Irrigation Waters	Full		Crop Production		
Vermillion River	Baptist Creek to mouth	S168	DENR 460745	Limited Contact Recreation	Non	TSS	Livestock	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full	Fecal Coliform	Hydrostructure Flow Modification		
				Warmwater Semipermanent Fish Life	Non		Streambank Modifications/destablization		
				Irrigation Waters	Full		Crop Production		
East Fork Vermillion River	McCook/Lake County line to Little Vermillion River	S169	DENR 460150	Warmwater Marginal Fish Life	Non	TSS		5	Yes – 2
				Limited Contact Recreation	Insuff Info				
				Irrigation Waters	Full				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
East Fork Vermillion River	Little Vermillion River to mouth	S170	DENR 460154	Irrigation Waters	Full			2	No
				Warmwater Marginal Fish Life	Insuff Info				
				Fish/Wildlife Prop, Rec, Stock Waters	Full				
				Limited Contact Recreation	Insuff Info				
West Fork Vermillion River	Near Parker	S171	USGS 6478690	Limited Contact Recreation	Unknown			2	No
				Fish/Wildlife Prop, Rec, Stock Waters	Unknown				
				Irrigation Waters	Full				
				Warmwater Marginal Fish Life	Insuff Info				
Surface Water Discharge Permits						**PARAMETER**			
Turkey Creek	Near Irene	P63	SD0022454	Approved TMDL		Ammonia		6b	No
Turkey Ridge Creek	Near Viborg	P64	SD0020541	Approved TMDL		Ammonia		6b	No
Vermillion River	Near Centerville	P65	SD0022527	Approved TMDL		Ammonia		6b	No
Vermillion River	Near Chancellor	P66	SD0023639	Need to Renew TMDL		Ammonia		6a	Yes – 1
Vermillion River	Near Hurley	P67	SD0021997	Approved TMDL		Ammonia		6b	No
Vermillion River	Near Vermillion	P68	SD0020061	Approved TMDL		Ammonia; Diss. Oxygen		6b	No
West Fork Vermillion River	Near Canistota	P69	SD0022497	Approved TMDL		Ammonia		6b	No
West Fork Vermillion River	Near Marion	P70	SD0020311	Approved TMDL		Ammonia		6b	No
West Fork Vermillion River	Near Parker	P71	SD0020940	Approved TMDL		Ammonia		6b	No
West Fork Vermillion River	Near Salem	P72	SD0020966	Approved TMDL		Ammonia		6b	No

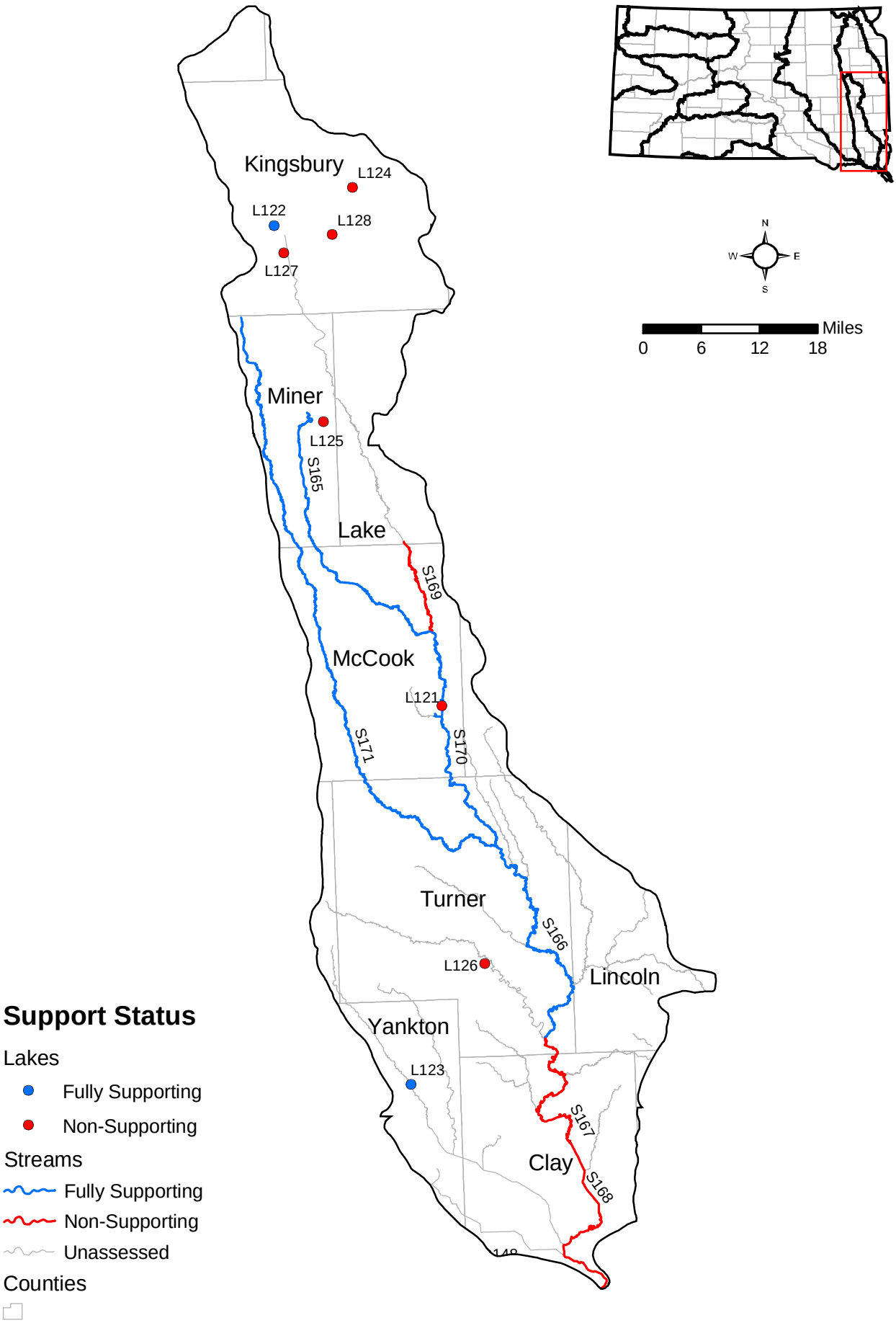


Figure 38: Vermillion River Basin Waterbody Support Status

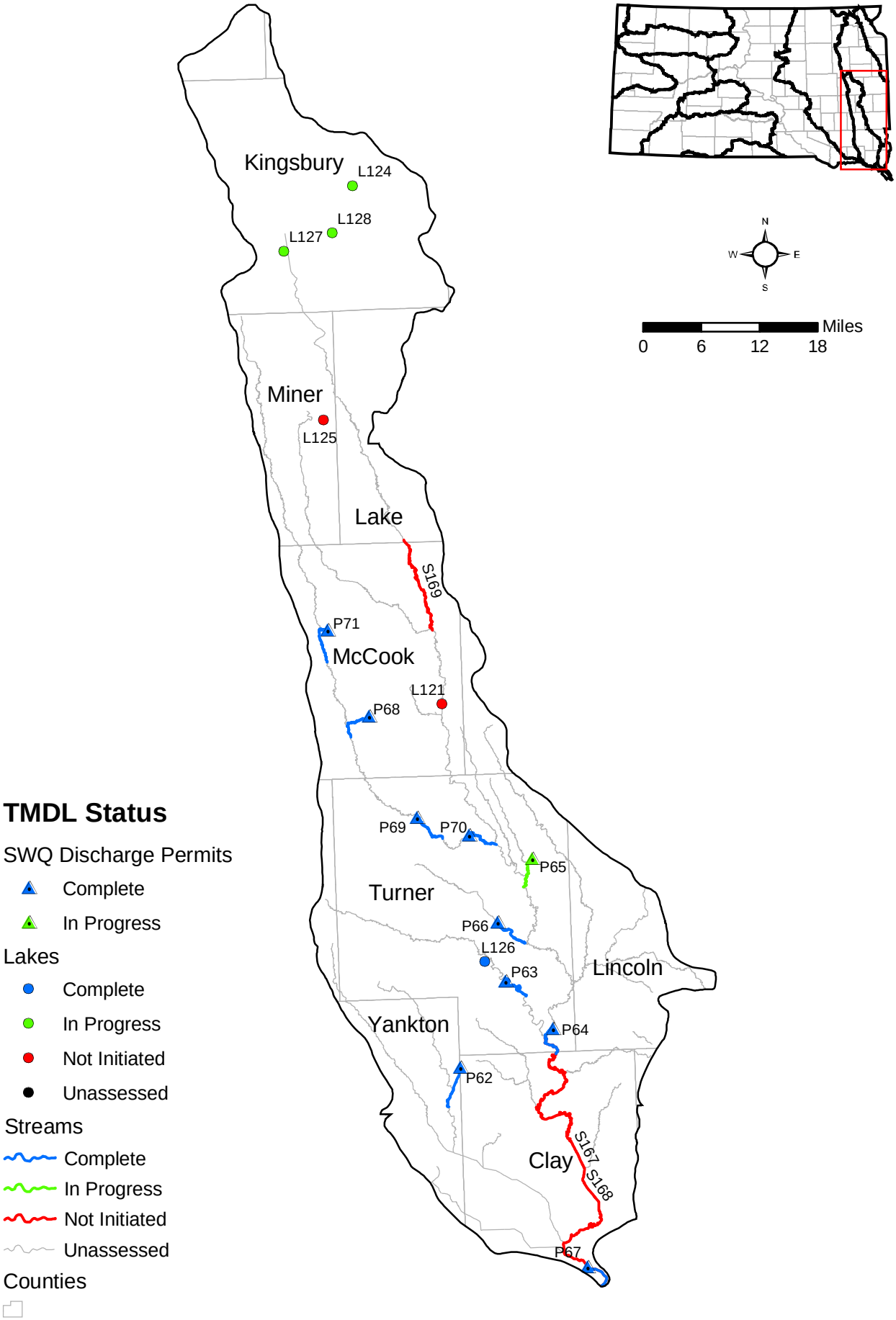


Figure 39: Vermillion River Basin TMDL Waters

White River Basin (Figures 40 and 41, Table 30).

The White River basin is the most southern of the five major drainages in South Dakota that enters the Missouri River from the west. The total drainage area of the basin in the state is 8,250 square miles. Agriculture dominates the basin's economy with the majority of the land used as rangeland or cropland.

Based on current water quality standards, water quality within this basin is extremely poor. It is the most severely impacted basin in the state. The single most important source of this poor quality is the highly erosive soil within the river drainage. This basin receives the majority of the runoff and drainage from the western badlands. The exposed badlands are a major natural source of both suspended and dissolved solids to the river. Severe erosion and leaching of soils occurs in the badlands and throughout the entire length of the basin.

Suspended sediment is deposited in Lake Francis Case at an average rate of 11,800,000 tons per year. Largely as a result of these appreciable sediment loads from the White River watershed, Lake Francis Case has lost an estimated >10% of reservoir water capacity to siltation since its creation in 1952. In the reservoir, sediment turbidity may be evident as far as 77 miles downstream of the White River/Missouri River confluence. Deposited sediment that forms a White River delta impedes boat navigation between the upper and lower reservoir.

Present water quality monitoring showed no improvement over conditions observed for the past decade in this basin. Extremely high exceedances of suspended solids were again noted in the entire White River drainage. In addition, fecal coliform was also the cause of impairment from the middle reach of the White River in the vicinity of Kadoka and downstream to Oacoma.

Owing to generally higher than normal runoff and river flows in this basin during most of the last decade and beyond, TSS concentrations were also excessive (nonsupport rating) in the upper White River and the Little White tributary for most of the 1990s and in this current assessment. Cottonwood Creek, another tributary of the White, is presently nonsupporting due to elevated TDS and conductivity. The listed segments of the Little White River and the White River are currently under assessment.

Category (1) All uses met (2) Some uses met but insufficient data to determine support of other uses (3) Insufficient data (4a) Water impaired but has an approved TMDL (5) Water impaired/requires a TMDL (6a) Water not impaired but requires a new or revised point source TMDL (6b) Water not impaired and has an existing point source TMDL approval

Table 30: White River Basin Information

WATERBODY Streams	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Cottonwood Creek	Headwaters to White River	S172	DENR 460153	Fish/Wildlife Prop, Rec, Stock Waters	Non	TDS		5	Yes – 2
				Irrigation Waters	Non	Conductivity			
Lake Creek	Above & below refuge near Tuthill	S173	USGS 6448000 6449000	Fish/Wildlife Prop, Rec, Stock Waters	Unknown			2	No
				Limited Contact Recreation	Unknown				
				Warmwater Permanent Fish Life	Insuff Info				
				Irrigation Waters	Full				
Little White River	Rosebud Creek to mouth	S174	DENR 460840	Warmwater Semipermanent Fish Life	Non	TSS	Crop Production	5	Yes – 1
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock		
				Irrigation Waters	Full		Natural Sources		
				Limited Contact Recreation	Full				
White River	NE border to Interior	S175	DENR 460842	Irrigation Waters	Full			5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Natural Sources		
				Limited Contact Recreation	Full		Crop Production		
				Warmwater Semipermanent Fish Life	Non	TSS	Livestock		
White River	Interior to Black Pipe Creek	S176	DENR 460835	Limited Contact Recreation	Non	Fecal Coliform	Natural Sources	5	Yes – 2
				Warmwater Semipermanent Fish Life	Non	TSS	Crop Production		
				Irrigation Waters	Full		Livestock		
				Fish/Wildlife Prop, Rec, Stock Waters	Full				

WATERBODY	LOCATION	MAP ID	BASIS	USE	SUPPORT	CAUSE	SOURCE	EPA Category	On 303(d)? & Priority
Streams									
White River	Black Pipe Creek to Oak Creek	S177	DENR 460152	Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources	5	Yes – 2
				Limited Contact Recreation	Non	Fecal Coliform	Crop Production		
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Livestock		
				Irrigation Waters	Full				
White River	Oak Creek to mouth	S178	DENR 460825	Warmwater Semipermanent Fish Life	Non	TSS	Natural Sources	5	Yes – 2
				Fish/Wildlife Prop, Rec, Stock Waters	Full		Crop Production		
				Limited Contact Recreation	Non	Fecal Coliform	Livestock		
				Irrigation Waters	Full				
Surface Water Discharge Permits						**PARAMETER**		**Category**	
Little White River	Near Interior	P73	SD0021857	Need to Renew TMDL		Ammonia		6a	Yes – 1
Little White River	Near White River	P74	SD0022063	Approved TMDL		Ammonia		6b	No

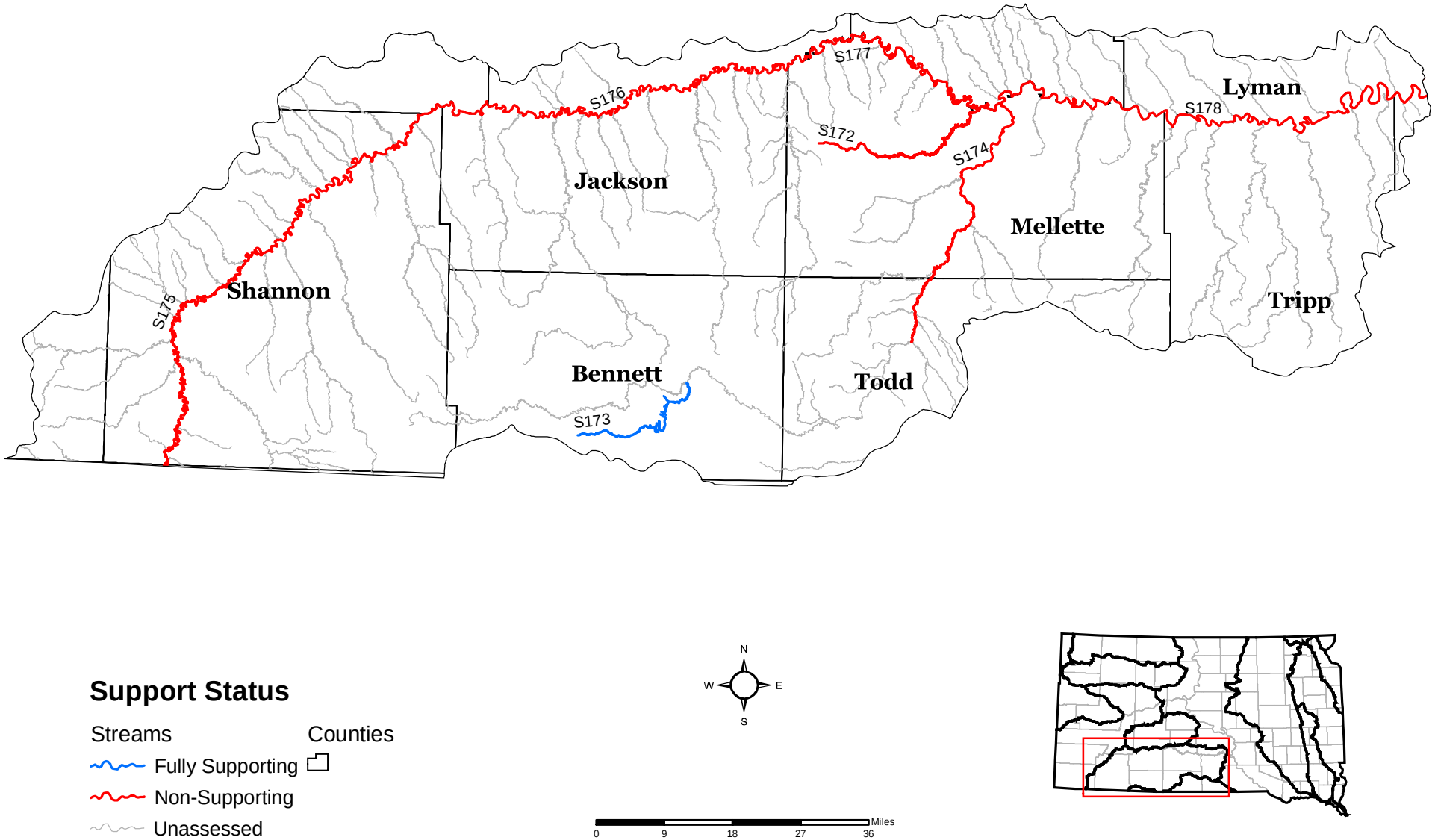


Figure 40: White River Basin Waterbody Support Status

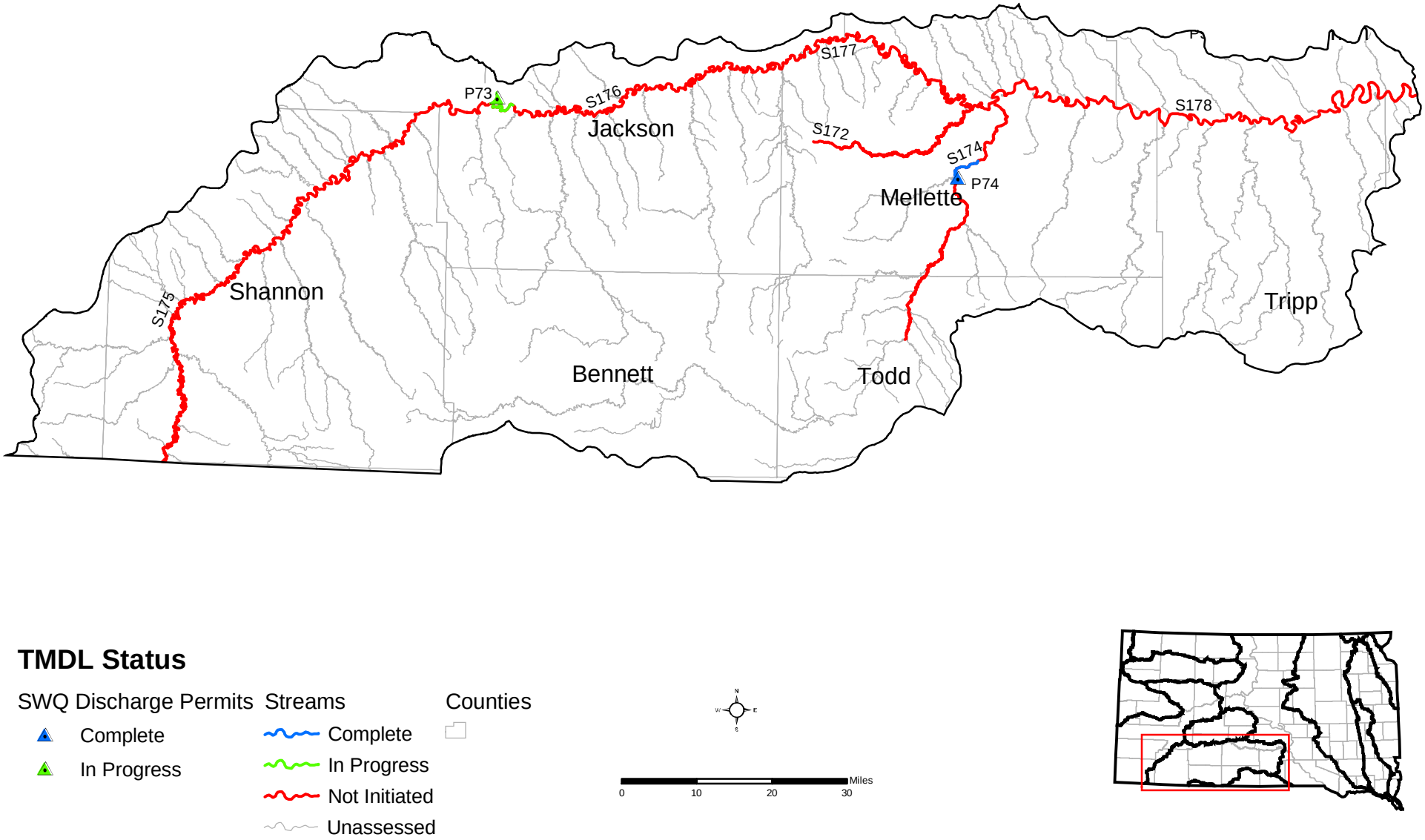


Figure 41: White River Basin TMDL Waters

WETLANDS

In South Dakota, wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (ARSD 74:51:01) For purposes of federal 404 identification and delineation, wetlands must have each of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly hydric soil, and (3) the substrate is saturated with water or covered by shallow water at some time during the growing season of each year.

There are many types of wetlands, but the most prevalent type in South Dakota is the Palustrine Emergent Wetland, commonly referred to as the prairie pothole (Figure 34). One of the functions of these prairie potholes is the production of waterfowl. Researchers have found an average of 140 ducks produced per square mile per year in eastern South Dakota (US Department of the Interior, 1984). Other functions of wetlands in the state are the improvement and maintenance of water quality and recreation.

Still another important function of the prairie pothole is water storage. A common agricultural practice has been to drain these pothole areas by open ditching and thus eliminate water storage areas. This drainage leads to the concentration of waterfowl breeding populations at the remaining wetlands as well as increased flooding in certain river basins. This has been documented in the James River Basin of North Dakota according to J.G. Sidle in the North Dakota Outdoors publication of August, 1983 (US Department of the Interior, 1984). In the Upper James River Basin of South Dakota a 1989 United States Fish & Wildlife Service (US FWS) survey found that at least 5.5% of total wetland acres had been impacted by drainage as well as 6% of the acreage in the Vermillion River drainage and as much as 40% of the acreage in the Upper Big Sioux River watershed (US Department of the Interior, 1991).

In 1989, 19% of total wetland acreage in the upper James River basin had been impacted by dugouts, whereas 36% and 33% of total wetland acres had been affected in the Vermillion and Big Sioux drainages, respectively (US Department of the Interior, 1991). By 1994, through the efforts of the landowners, the US FWS, the Natural Resources Conservation Service (NRCS), Ducks Unlimited, and Conservation Districts, South Dakota had increased the total area of wetlands by 4,500 acres. These wetlands were all newly created and served to add to the habitat of South Dakota's wildlife.

South Dakota has approximately 2.7 million acres of hydric soils. Small wetland areas were densely distributed over most of eastern (east-river) South Dakota where they were formed by retreating glaciers (Figure 34). Today, there are roughly 1.8 million acres of wetlands remaining (Dahl, 1990). This represents a one-third loss due to both natural and human causes. These figures are available in the 1990 US Fish and Wildlife Service Report to Congress entitled Wetlands Losses in the US 1780s to 1980s. Natural losses result from natural succession, sedimentation, erosion, the hydrologic cycle, and fire.

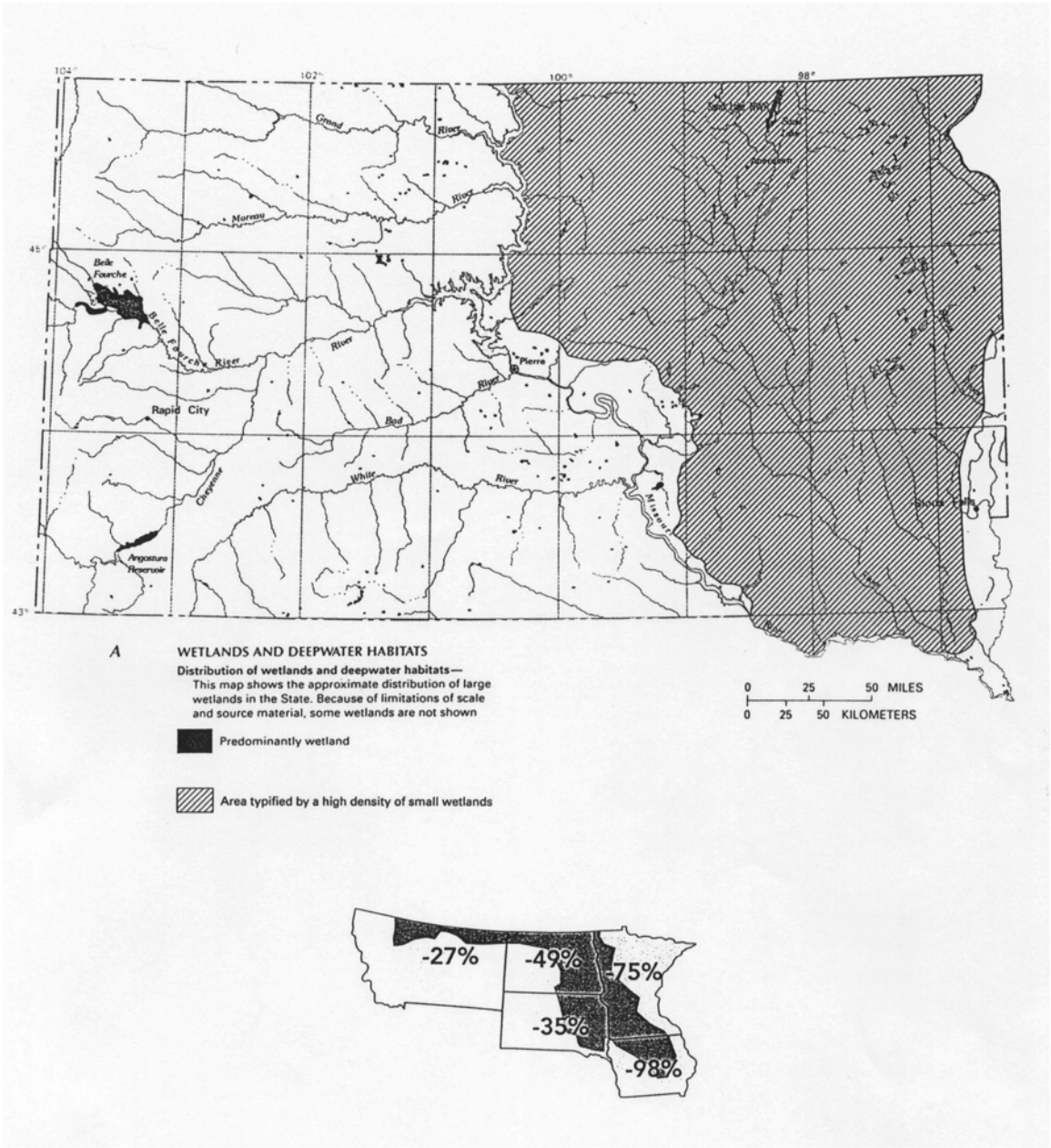


Figure 42: The Prairie Pothole Region in South Dakota and Wetland Losses in the Priarie Pothole Region in SD and Adjoining States (USGS Supply Paper 2425)

Table 31: Extent of Wetlands, by Type

Wetland Type Cowardin et al. (1979)	Historical Extent (acres) 1982 NRI	Most Recent Acreage 1992 NRI	% Change
Marine	0.0	0.0	0.0
Estuarine	0.0	0.0	0.0
Riverine	105,100	104,300	-0.8
Lacustrine	756,100	792,500	+4.8
Palustrine	2,108,700	2,107,600	-0.05
Total	2,969,900	3,004,400	+1.2

Human induced impacts may include agricultural drainage, flood control, channelization, filling, dredging, reservoir construction, oil and gas extraction, ground water extraction, and various waste disposal sources. The impact rate on individual wetland basins (all types) in eastern South Dakota was estimated at 4.5% between 1983/84 and 1989. Highest loss rates were recorded for small temporary wetland basins less than 2 acres in area (US Department of the Interior, 1991).

By contrast, the National Resources Inventory (NRI) in1982, located 2,969,900 acres of wetlands in South Dakota. Since heavy emphasis was placed on the hydric soils criterion, the number of wetlands found reflects the previously mentioned number of acres of hydric soils in South Dakota. The National Resources Inventory was again conducted in 1992 and 3,004,400 acres of wetlands were found in South Dakota, reflecting an increase in wetland acreage of 34,500 acres (Table 36).

Wetlands are protected by several agencies in South Dakota. Counties are responsible for control of wetland drainage. The US COE is responsible for the control of activities which place fill in wetlands. The Corps' authority stems from Section 404 of the Clean Water Act. Before exercising its authority on a particular action, the COE issues a public notice, taking into consideration the comments of the US EPA, US FWS, SD GF&P, SD DENR, and other resource agencies. Projects must receive certification from DENR under Section 401 of the Clean Water Act that the project will not violate South Dakota Surface Water Quality Standards. DENR regulates the discharge of pollutants to wetlands under the Surface Water Discharge permitting program.

Approximately 51,000 acres of wetlands are currently owned by the SD GF&P and managed as State Game Production Areas and Public Shooting Areas. The US FWS has 484,000 wetland acres and 518,000 grassland acres under perpetual easement, 17,348 acres under easement with FmHA, and another 67,000 wetland acres under fee titles.

"Swampbuster" Provisions

On December 23, 1985, President Reagan signed the Food Security Act of 1985. The Wetland Conservation or "Swampbuster" Provision of the Act was included because of an increased awareness of wetland values and public concern over diminishing wetland resources. Swampbuster's purpose was to remove the incentives for persons to produce agricultural commodities on converted wetlands and to thereby:

*Reduce soil loss due to wind and water erosion;

*Protect the nation's long-term capability to produce food and fiber;

*Reduce sedimentation and improve water quality;

*Assist in preserving the nation's wetlands;

*Curb production of surplus commodities.

Swampbuster provisions provide that anyone who, after December 23, 1985, produces an agricultural commodity on a converted wetland shall be determined to be ineligible for certain benefits provided by the US Department of Agriculture (USDA) and agencies of the Department. The 1990 Farm Bill tightened this provision to include the conversion of any wetland which had the potential to produce an agriculture commodity.

The benefits under this provision include:

*Any type of price-support or payment made available under the Agricultural Act;

*Farm storage facility loans under the CCC Chapter Act;

*Disaster payments under the Agricultural Act of 1949;

*Crop insurance under the Federal Crop Insurance Act;

*Farm loans made, insured, or guaranteed by FmHA; and

*Payment for storage of an agricultural commodity under the CCC Charter Act.

Swampbuster determinations and decisions are made by the Natural Resources Conservation Service (NRCS). The agency plays an integral role in determining ineligibility for benefits under swampbuster provisions.

In South Dakota, the NRCS established four wetland inventory teams to accelerate wetland identification on existing croplands as required by Swampbuster. These teams completed about 80% of the statewide inventory by the end of 1991. At that time, resumption of the survey was delayed until new federal guidelines could be incorporated into survey procedure. Maps of

designated wetlands found on agricultural lands in eastern South Dakota are available through the Farm Service Agency or NRCS. Similar maps covering the western half of the state are in the draft stage and nearing completion.

Since the advent of the Swampbuster program, annual losses of wetland acreages in the state due to drainage, excavation, or fill, have been estimated to have been reduced by more than 50 percent and in some instances has led to an increase in wetland acreage.

PUBLIC HEALTH/AQUATIC LIFE CONCERNS

Although toxic pollutants are of concern in South Dakota, the cost of routinely monitoring most toxic pollutants is prohibitive. At present, priority toxins (heavy metals) are routinely monitored at several WQM stream sites located near historic or current mining activities in the northern Black Hills. Ammonia, which is a 307(a) toxic pollutant, is frequently monitored throughout the DENR fixed station monitoring network (Table 32).

Table 32: Total Size Affected by Toxics

WATERBODY	SIZE MONITORED FOR TOXICS*	SIZE WITH ELEVATED LEVELS OF TOXICS**
Rivers (miles)	3,080	163
Lakes (acres)	139,611	0

* Ammonia, cyanide, chlorine, and metals including arsenic.

** Elevated levels are defined as exceedances of state water quality standards, 304(a) criteria, and/or FDA action levels, or levels of concern (where numeric criteria do not exist).

Aquatic Life (Fish Kills)

There were 28 separate aquatic life concern incidents investigated from October 1, 2001 to September 30, 2003, and each involved a fish kill. Of these incidents, only two were the result of a winter kill. The remaining fish kills occurred for a variety of other reasons but mostly due to natural conditions.

The US Fish and Wildlife Service Field Manual for the Investigation of Fish Kills, offers the following guide for reporting fish kills:

Minor Kill:	less than 100 fish
Moderate Kill:	100 to 1,000 fish in 1.6 km of stream or equivalent lentic area.
Major Kill:	more than 1,000 fish in 1.6 km of stream or equivalent lentic area.

By these standards, from October 1, 2001 to September 30, 2003, there were ten minor fish kills in South Dakota. During this same time period, there were nine moderate fish kills and nine major fish kills.

It is extremely important that the initial phases of a fish kill investigation be performed at the earliest indication of a die-off. The need for such urgency is due to the fact that fish degrade rapidly and the cause of death may become unidentifiable within minutes. Unfortunately, DENR is often notified days after an incident has occurred. For this reason, the department is occasionally unable to positively identify the event that caused the fish kill.

Table 33: Summary of Fish Kill Investigations (October 1, 2001 - September 30, 2003)

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
November 29, 2003	Freshwater drum observed by GF&P personnel. White bass and walleye reported by the public.	100's (8”-10")	Minor	Missouri River near Yankton in Yankton County	SDF GF&P received a report on Monday that a fish kill had been observed on the previous Saturday. The fish were scattered along the shoreline from Riverside Park, downstream one mile. The fish were not there Friday and most were gone by Sunday morning. Gulls were eating the fish. Due to the fact that the DENR and GF&P did not receive a report of the kill until after most evidence had disappeared, cause could not be determined. Some city storm sewers may discharge in the area. The city water treatment plant is upstream and the city sewage treatment plant is downstream.
November 12, 2003	Bluegill: Black Crappie: White Sucker: Common Carp:	50 or less (2"-4") 50 or less (4"-6") 100 or more (4"-12") 50 or more (6"-18")	Moderate	Firesteel Creek in Davison County	A Mitchell resident noted dead fish in Firesteel Creek. Local CO and city of Mitchell personnel investigated. Water samples were taken. Photos were taken. Fish kill was a result of an 18 million gallon discharge of treated drinking water from the city water plant.
September 24, 2003	Crappie:	No count	Moderate	Bear Butte Lake in Meade County	A report came in from a Sturgis resident who had noted a kill on the lake. He said he saw a dead crappie along every 1-3 feet of shoreline while fishing and that there were numerous lethargic fish in the water. Gene Galinat with GF&P investigated. He found dead crappies around the entire lake. No other fish species noted. It was Mr. Galinats opinion the crappie died due to low DO. Lake was measured at a maximum 6 feet earlier in the summer and is now 1-2 feet lower.

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
September 4, 2003	Not recorded	Not recorded	Major	Tisdale Dam in Meade County	SD GF&P had two reports of fish kills at Tisdale Dam. The water level in the dam is extremely low this year. GF&P personnel believe the kill was due to an oxygen/temperature problem.
September 2, 2003	Bluegill: Largemouth bass: White suckers:	90 7 40	Minor	Lake Alvin	SD GF&P investigated. The kill appeared to be confined to the bay west of the fishing dock at the south side of the dam. The DO in the bay was only 1 ppm. The DO in the middle of the lake was near 7 ppm. In spite of the low oxygen some live small fish were observed in the bay.
September 1, 2003	White Sucker: Walleye: Fathead minnow:	1 1 1000's	Minor	Lake Herman in Lake County	Shon Eide, Lake County CO investigated. Kill was localized to Pelican Point on the north end of the lake. Fish kill determined to be a result of natural summer conditions
August 25, 2003	Bluegill and black bullhead	Many	Moderate	Dawson Creek at Scotland	SD GF&P reported a fish kill in some pools in Dawson Creek on the Scotland Golf Course. There had been a small kill in one pool earlier during the year. GF&P believes the kill is a result of the heat and lack of water flow. Because Dawson dumps into newly-constructed Lake Henry, some of the locals were concerned about chemical or agricultural pollution. DENR personnel and Todd Crownover, the local CO investigated. Fish kill determined to be a result of natural summer conditions.
August 19, 2003	walleye, northern pike, yellow perch, and carp	100's	Major	Cottonwood Lake in Spink County	Wildlife Conservation Officer Mike Yost reported the kill occurred during the first week of August. The lake is 5-6 feet deep and was undergoing a severe algal bloom. Summerkills of fish are common on Cottonwood.

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
July 25, 2003	Yellow perch, crappies, and black bullheads	100's	Moderate	Hildes Marina on Lake Madison in Lake County	Hildes Marina is a man-made canal that serves a housing development on the southwest corner of the lake. There was a heavy algae bloom reported in the marina recently that may have been responsible for the kill. It was restricted to the marina, no dead fish were found in the main lake. The perch had a bright red discoloration on the top of their heads. GF&P personnel feel confident the fish kill was due to natural conditions.
July 25, 2003	sunfish, minnows, carp and bullheads	1,000's	Major	Lake Henry, on Dawson Creek near Scotland	GF&P personnel believe the kill was caused by low DO resulting from excessive BOD from the decaying vegetation. GF&P personnel feel confident the fish kill was due to natural conditions.
July 21, 2003	Green Sunfish, Common Carp, Black Bullhead, Northern Pike, Bluegill, Walleye, miscellaneous minnows and Crappie	100's	Major	Ravine Lake, Huron	Stressed fish visible in water near boat docks. One Huron resident reported seeing an oily sheen along the shore. The individual also reported experiencing some form of allergic reaction after swimming in the lake (swimmers itch has not been ruled out). GF&P personnel reported the kill to DENR personnel. Local Conservation Officer and DENR personnel investigated and found DO below 1 ppm. Chemical and physical analysis of water did not reveal any cause for the low DO.
July 8, 2003	Unidentified	5 to 6 (a handful)	Minor	Spring Creek	GF&P personnel (Jesse Lucks) from Cleghorn Fish Hatchery investigated. No dead fish were noted by GF&P personnel and live fish were observed in the stream. No conclusion has been reached as to a cause for the apparently minor (but unconfirmed by state personnel) fish kill.
June 25, 2003	Black Bullhead:	Some	Minor	Lake Poinsett	Based upon information provided by the public, it appears the kill was very minor in extent and was due to fishing and/or spawning stress.

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
June 25, 2003	Northern Pike: Bluegill: Crappie:	>50 several several	Moderate	Lake Wanalain	GF&P personnel were on-site and collected fish for visual observation. Low DO (1 ppm) was found in several locations on the lake. Dead aquatic vegetation observed. GF&P personnel believe poor water quality due to vegetation die-off and with warm/shallow water lead to the fish kill.
June 19, 2003	common carp: black bullhead: green and orange-spotted sunfish: fathead minnows: creek chubs:	10 + 40 + 50 + several several	Severe in 1 mile section of the creek – minor or no kill above & below this area.	Long Creek downstream of Lennox	GF&P personnel (Dave Lucchesi) and DENR personnel (Clark Christensen) inspected the site on 2 separate occasions. Poor water quality resulting from the presence of large algae bloom may be the cause of the fish kill.
May 20, 2003	Suckers	10	Minor	French Creek in Custer	GF&P Conservation Officer was on-site. Noted live fish in the creek. He felt death was due to spawning stress. DENR personnel obtained water and fish samples. Analysis of water and autopsy of fish confirms natural cause of death.
April 14, 2003	Black Crappie	100's to 1000s	Moderate	Mina Lake	GF&P personnel investigated. Dead fish collected. Jerry Broughton at the Blue Dog Lake Hatchery was consulted and believes cause of death is likely due to an environmental situation where the oxygen was depleted, stressing the fish. The stressed fish were attacked by bacteria (asymptomatic aeromonas) and this lead to death. Sick fish showing evidence of bacteria growth were also collected.
April 7, 2003	Black Bullheads, White Bass, Smallmouth Bass, Walleye, White Crappie, and other species:	100's perhaps more	Moderate, perhaps Major	Blue Dog Lake	GF&P personnel investigated. DO was 20 at time of testing. Dead fish sent to Jerry Broughton at the Blue Dog Lake Hatchery for evaluation. He diagnosed the death as being due to super saturation of water by gasses.

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
February 26, 2003	Not documented	Not documented	Major	Potts Dam	Appeared to be due to natural winter conditions (winter kill). GF&P personnel noted strong odor and found no DO in water samples.
August 20, 2002	Not documented	Reported as "a lot of fish"	Minor (possibly moderate)	Vermillion River	On August 20, 2002, GF&P and DENR were notified of a fish kill. The local conservation officer investigated. Locals indicated there had been a visible oil sheen with a chemical smell. By the time the conservation officer was notified, no evidence of dead fish, a sheen, or a smell remained. The cause of the kill, and in fact the fish kill itself, was not verified.
July 22, 2002	Black Bullheads: Northern Pike:	Large # A few	Major	Grass Lake	The fish kill appeared to be a result of factors related to the drought: algae bloom, low DO, shallow water, high water temperature, etc.
July 18, 2002	Not documented	Large number of fish	Major	Olson WPA	The pond is shallow and the area is experiencing severe drought conditions. It appears the fish kill is due to a number of factors related to the drought: low DO, shallow water, high water temperature, etc.
July 12, 2002	Flathead Catfish, Channel Catfish, Sturgeon (Shovelnose) Carp, Sauger, White Sucker, and Drum:	1,000's of dead fish	Major	Big Sioux River downstream of Westfield, Iowa	SD GF&P and Iowa NR investigated. Appears it may be due to some discharge from wastewater treatment facilities for City of Westfield, Iowa. However, this is just conjecture as the cause of the fish kill was not proven.
July 11, 2002	Black Bullheads	Several	Moderate	Scott Lake	GF&P investigated. Hemorrhages were found on fish & were caused by Aeromonas septicemia and Edwardsia tarda, both gram negative bacteria (typical bacterial infections associated with high density populations, poor water quality, and spawning stress).

Date Reported	Fish Species	Number Dead Fish Observed	Kill Classification	Waterbody	Conclusions /Cause of Fish Kill
Week of July 15, 2002	Black Bullheads: Northern Pike: Common Carp: Bigmouth Buffaloes:	>54 >4 >1 >2	Moderate (Minor or none in some area, Major near Sand Lake NWR)	James River	GF&P personnel on-site. Kill spread out over many miles. Appeared to be due to natural conditions caused by low water levels, algae blooms, and high water temperatures (drought conditions).
July 8, 2002	Not documented	Not documented	Minor	Unnamed Creek	Milbank WWTP upset. (WWTP received high temperature water from an industrial source, causing aeration process to work less efficient).
May 29, 2002	Black Bullheads: Common Carp: Channel Catfish:	7 2 1	Minor	Moccasin Creek	DENR personnel investigated. H_2O had high DO concentration (23.2). Algae bloom noted.
February 5, 2002	Frogs:	5	Minor	Unnamed Creek near Canton	Appeared to be due to natural winter conditions (winter kill).

Unsafe Beaches

Recent monitoring data compiled for swimming beaches by the DENR Drinking Water Program appear in Table 34. Monitoring of the approximately 58 designated beach areas in the state is conducted weekly during the swimming season from May to September. Water quality samples are collected by the municipality or governmental agency charged with managing the given waterbody. The South Dakota Department of Game, Fish and Parks is most often the monitoring agency responsible for managing lake swimming beaches in the state. Following analysis of such samples by an approved lab, the Drinking Water Program will close a beach area if fecal bacteria concentrations exceed Beach Closure Standards. Beach closings are controlled by the entity regulating the swimming areas.

Table 34: Waterbodies Affected by Swimming Beach Closures

Name of Waterbody	Waterbody Type	Date of Closure	Cause of Pollutant	Conc. of Pollutant[a]	Source of Pollutant	Number of Events[c]
American Creek	Missouri River (Mainstem Reservoir)	6/10/2002 6/17/2002 6/19/2002	Fecal Coliform	9,300 280 220	NPS Runoff	3
North Shore-Ft. Thompson	Missouri River (Mainstem Reservoir)	8/4/2003	" "	1,300	" "	1
St. Francis Beach	Missouri River (Mainstem Reservoir)	8/19/2003	" "	1,700	" "	1
Big Stone Lake (Hartford Beach)	Lake	8/13/2002 7/1/2003	" "	1,200 1,700	" "	2
James River (Ravine Beach)	River	8/5/2002 8/7/2002	" "	1,300 830	" "	2
Lake Kampeska (Memorial Park Beach)	Lake	8/25/2003	" "	16,000	" "	1
Lake Kampeska (Watertown City Park Beach)	" "	7/22/2002 7/24/2002	" "	1,200 600	" "	2
Lake Thompson (Lake Thompson Beach)	" "	6/5/2003 6/9/2003	" "	330 1,100	" "	2
Lake Vermillion	" "	5/21/2002 5/28/2002	" "	3,800 3,300	" "	2
Legion Lake	" "	6/23/2003	" "	2,500	" "	1
Letcher Lake	" "	7/23/2003	" "	1,800	" "	1
Richmond Lake	" "	8/12/2002	" "	1,200	" "	1
Roy Lake, East	" "	6/17/2002	" "	1,900	" "	1
Roy Lake, West	" "	6/17/2002	" "	1,400	" "	1
Shadehill Reservoir	" "	6/3/2003	" "	1,500	" "	1

Surface Drinking Water and Fish Consumption Restrictions

During the years 2002 and 2003, the Surface Water Quality Program, in partnership with the South Dakota Department of Game, Fish and Parks, sampled fish from a variety of sites. The department has been collecting and actively studying fish flesh analysis data since 1994. The purpose of this work is to determine the concentration of various contaminants in fish from locations throughout the state.

In 2002 and 2003, fish were collected from a total of 22 different sites:

Waterbody	County	Years Sampled
Roosevelt Lake	Tripp	2002
Lynn Lake	Day	2002
West 81 Lake	Kingsbury	2002
Lake Oahe (Minneconjou Bay)	Stanley	2002
Newell Lake	Butte	2002
Dimock Lake	Hutchinson	2002
Lake Oahe (West Whitlock)	Potter	2002
Little Moreau Impoundment	Dewey	2002
Little Missouri	Harding	2002
McNenney Hatchery	Lawrence	2002
Hurley Lake	Potter	2002
Lake Isabel	Dewey	2002
Twin Dams	Stanley	2002
Angostura	Fall River	2003
Wilmarth Lake	Aurora	2003
Hurley Lake	Potter	2003
West 81 Lake	Kingsbury	2003
East 81 Lake	Kingsbury	2003
Bitter Lake	Day	2003
Little Moreau Impoundment	Dewey	2003
East 81 Lake	Brookings	2003
Pott's Dam	Potter	2003

All samples are composites of fillets from five fish. Initial fish analysis for each waterbody typically includes the parameters listed below. Following receipt and study of initial data, intensive sampling for specific parameters may be performed. The parameters sampled are listed below.

PCB's	Pesticides		Metals
Aroclor 1016	DDT	DDD	Total Cadmium
Aroclor 1221	DDE	Aldrin	Total Selenium
Aroclor 1232	BHC alpha	Dieldrin	Total Mercury
Aroclor 1242	BHC-beta	Endosulfan I	
Aroclor 1248	BHC-delta	Endosulfan II	
Aroclor 1254	BHC-gamma	Endosulfan Sulfate	
Aroclor 1260	Heptachlor	Chlorodane	
Total PCB's	Heptachlor Epoxide	Toxaphene	
	Hexachlorobenzene	Endrin	
	Methoxychlor	Andrin Aldehyde	

The Food and Drug Administration (FDA) has set 1 ppm (part per million) total mercury as the action level for commercial fish. In South Dakota, the Department of Health is responsible for issuing fish consumption advisories. Please refer to Table 35 for specific fish consumption guidelines.

Table 35: Waterbodies Affected by Fish and Shellfish Consumption Restrictions

Name of Waterbody	Pollut-ant of Concern	Size Affected	Type of Fishing Restriction				Consumption Guidelines
			Non Consumption		Limited Consumption		
			General Popula-tion	Sub-Popula-tion	General Popu la-tion	Sub-Popula-tion	
Bitter Lake	Mercury	10,000 Acre Lake	-	-	1	1	Adults should eat no more than 7 ounces of fish per week. Women who plan to become pregnant, are pregnant or are breast-feeding, should eat no more than 7 ounces per month. Children under age 7 should eat no more than 4 ounces per month.
Lake Hurley	Mercury		-	-	1	1	
Lake Isabel	Mercury		-	-	1	1	
Twin Lakes W. Hwy 81, Kingsbury County	Mercury		-	-	1	1	

Table 36: Waterbodies Affected by Surface Drinking Water Restrictions

Name of Waterbody	Waterbody Type	Type of Restriction			Cause(s) (Pollutant(s)) of Concern	Source(s) of Pollutant(s)
		Closure[a] (Y/N)	Advisory[b] (Y/N)	Other (explain)		
NONE	-	-	-	-	-	-

[a] Closures restrict all consumption from a drinking water supply.
[b] Advisories require that consumers disinfect water (through boiling or chemical treatment before ingestion).

Table 37: Summary of Waterbodies Not Fully Supporting Drinking Water Use

Waterbodies (List)	Source(s) of Data (√)			Characterization	Major Causes
	Ambient	Finished	Use Restrictions		
River and Streams					
Big Sioux River near Watertown	√	√	None	Not Supporting	Nitrates
Firesteel Creek	√	√	None	Not Supporting	Total Dissolved Solids
Lakes and Reservoirs					
None	√	√			

Table 38: State-Level Summary of Drinking Water Use Assessments for Rivers and Streams

Total Miles Designated for Drinking Water Use total unknown[a]

Total Miles Assessed for Drinking Water Use 1,809

Miles Fully Supporting Drinking Water Use	1,750	% Fully Supporting Drinking Water Use	97%	Major Causes
Miles Fully Supporting but Vulnerable For Drinking Water Use	-	% Fully Supporting but Vulnerable for Drinking Water Use	-	-
Miles Not Supporting Drinking Water Use	59	% Not Supporting Drinking Water Use	3%	Nitrates; Total Dissolved Solids
Total Miles Assessed for Drinking Water Use	1,809			

[a]Includes the Missouri River (mainstem reservoirs and flowing river)

Table 39: State-Level Summary of Drinking Water Use Assessment for Lakes and Reservoirs

Total Waterbody Area designated for Drinking Water Use 13,321 acres

Total Waterbody Area Assessed for Drinking Water Use 6,252 acres

Acres Fully Supporting Drinking Water Use	6,252	% Fully Supporting Drinking Water Use	100%	Major Causes
Acres Fully Supporting but Vulnerable For Drinking Water Use	-	% Fully Supporting but Vulnerable for Drinking Water Use	-	-
Acres Not Supporting Drinking Water Use	-	% Not Supporting Drinking Water Use	-	-
Total Acres Assessed for Drinking Water Use	6,252		100%	

IV. POLLUTION CONTROL PROGRAMS

POINT SOURCE POLLUTION CONTROL PROGRAM

The state received delegation of the federal National Pollutant Discharge Elimination System (NPDES) program from the United States Environmental Protection Agency (EPA) on December 30, 1993. The NPDES permits issued by the state are referred to as Surface Water Discharge (SWD) permits. EPA continues to issue NPDES permits in South Dakota for facilities over which they retained jurisdiction. As of October 9, 2003, a total of 391 SWD permits have been issued in South Dakota.

Technology-based controls are placed in most SWD and NPDES permits. However, technology-based controls alone do not necessarily protect waters of the state from toxic pollutants. Therefore, water quality-based limits and toxicity testing requirements are also placed in many of the permits.

Water quality-based limits are developed when technology-based limits alone are not adequate to protect the beneficial uses of the receiving stream. In these cases, the state develops a total maximum daily load (TMDL). The TMDL is implemented through the use of water quality-based effluent limits in the SWD permits. TMDLs are generally developed for water bodies that are not fully supporting their beneficial uses or that would not support their uses with technology-based controls alone.

The state continues to require whole effluent toxicity testing for all major SWD permittees. The goal of the whole effluent toxicity approach is to ensure that point source discharges do not contain toxics in toxic amounts. If toxicity is found, the discharger is required to conduct an evaluation of the discharge to determine the source of the toxicity and identify ways to eliminate the toxicity.

NONPOINT SOURCE POLLUTION CONTROL PROGRAM

South Dakota's nonpoint source (NPS) pollution management activities are implemented through the South Dakota Nonpoint Source Pollution Management Program. The primary focus of the program is the control of nonpoint source pollution through the use of voluntary implementation of best management practices (BMPs) and holistic resource management plans. The major sources of NPS pollution in South Dakota are summarized in Table 40.

The program coordinates its NPS control activities with local, state, and federal agencies and stakeholder organizations. These agencies and organizations provide BMPs and financial and technical assistance that increase the program's capacity to develop and implement NPS management projects.

The remainder of this section provides a summary which describes the South Dakota Nonpoint Source Pollution Management Program and the types of NPS projects developed and implemented. Additional information concerning the program and projects may be obtained by consulting the South Dakota Nonpoint Source Management Program Plan and annual reports. Copies of these documents are available from the Department of Environment and natural Resources, the South Dakota State Library or by visiting:

http://www.state.sd.us/denr/DFTA/WatershedProtection/wpprg.htm

South Dakota Nonpoint Source Management Program

The South Dakota Nonpoint Source Pollution (NPS) Management Program is housed in the South Dakota Department of Environment and Natural Resources' (DENR) Water Resources Assistance Program (WRAP). The NPS Program, along with the Pollution Prevention (P2) Program, makes up the WRAP's Watershed Protection activity. NPS pollution activities completed by program staff are selected to improve, restore and maintain the water quality of the state's lakes, streams, wetlands, and ground water in partnership with other agencies, organizations, and citizen groups.

Implementation of the South Dakota NPS Pollution Management Program is guided by the South Dakota Nonpoint Source Management Plan. South Dakota's revised NPS Management Plan was approved by EPA during March 2000. The revised plan:

- addresses the nine mandated elements required to access Section 319 incremental funds,
- expands on activities included in previous editions of the plan, and
- continues to achieve improved water quality through voluntary actions developed in partnership with the landowners and managers.

The primary tools selected to accomplish the tasks outlined in the plan include:
technical and financial assistance delivered through program staff and project partnerships, and
a comprehensive information and education effort.
A copy of the management plan is available upon request or by visiting:

www.state.sd.us/denr/watershed.

The water quality assessment and implementation strategy outlined in the management plan has been amended to address the development and implementation of TMDLs. The department established a goal of:
Develop 11 TMDLs and implement five work plans each year to achieve the
TMDLs for all of the state's impaired waters over a 13 year period.

A key element in implementing the South Dakota NPS Management Plan is the South Dakota Nonpoint Source Task Force. The task force is a citizen's advisory group is composed of approximately sixty agencies, organizations and tribal representatives. The task force:

- provides a forum for the exchange of information on activities which impact nonpoint source pollution control,
- prioritizes waterbodies for NPS control activities,
- provides guidance and application procedures for funding NPS source control projects,
- reviews project applications,
- recommends projects to the South Dakota Board of Water and Natural Resource for funding approval,
- serves as the coordinating body for the review and direction of federal, state, and local government programs to ensure that the programs will achieve NPS source pollution control efficiently,
- serves as a focal point for information, education, and public awareness regarding NPS pollution control,
- provides oversight of NPS source control activities and prioritize the activities, and
- provides a forum for discussion and resolution of program conflicts.

For additional information about the task force visit:

http://www.state.sd.us/denr/DFTA/WatershedProtection/npstf.htm

South Dakota Nonpoint Source Projects
Since the reauthorization of the Clean Water Act during 1987, the South Dakota NPS Pollution Management Program has used Section 319, 104(b)(3), 106, and 604(b) and state and local funding to support the more than 160 NPS projects. A list of the projects funded is contained in the South Dakota Nonpoint Source Management Program Annual Report. A copy of the report may be obtained from the South Dakota Department of Environment and Natural Resources, the South Dakota State Library, or by visiting:

http://www.state.sd.us/denr/DFTA/WatershedProtection/NPS_ANNUAL_REPORTS.htm

While the size, target audience, and structure of the projects vary; all share common elements:

- increase awareness of NPS pollution issues,
- identify, quantify, and locate sources of nonpoint source impairment,
- reduce/prevent the delivery of NPS pollutants to waters of the state with emphasis on meeting targets established through total maximum daily loads (TMDLs), and

- disseminate information about effective solutions to NPS pollution.

Although most of the projects fit into one of three categories:

- assessment/development,
- information and education (I&E), or
- watershed implementation;

most include components of each category.

A portion of the Section 319 funds awarded to the state has also been used to assess major aquifers in the state and promote and implement practices that prevent ground water contamination.

Historically, the majority of the projects developed and implemented focused on reducing NPS pollution originating from agricultural operations. More recently, increased resources have been directed toward local initiatives that:

- evaluate water quality conditions,
- determine sources and causes of NPS pollution within priority watersheds, and
- develop and implement total maximum daily loads (TMDLs) for impaired waterbodies.

Waterbodies assessed are selected from those on the 303(d) list of impaired waterbodies. Activities included in implementation project workplans are selected to reach the TMDLs developed as part of the assessment process.

The 2002 303(d) list 95 segments requiring nonpoint source TMDLs. The revised 2004 list includes 148 segments which need assessments and TMDLs to address impairments resulting from NPS.

The primary purposes of assessment/development projects are:

- identify beneficial use impairments or threats to specific water bodies, and
- determine the extent to which the threats or impairments are from NPS pollution.

TMDLs are prepared as a part of an assessment project. Activities completed during an assessment project include an inventory of existing data and information and supplemental monitoring, as needed, to allow an accurate assessment of the watershed. Through these efforts, local project sponsors are able to:

- determine the extent to which beneficial uses are impaired,
- identify specific sources and causes of the impairments,
- establish preliminary pollutant reduction goals or TMDL endpoints, and
- identify management practices and alternatives that will reduce the pollution at its source(s) and restore or maintain the beneficial uses of the water body.

The project period for assessment/development projects generally ranges from one to three years.

DENR has completed NPS TMDL assessments of 37 waterbodies, EPA has approved 30 NPS TMDLs developed by DENR, and three water bodies were determined not to be impaired as a result of assessments completed.

Information and education (I & E) projects are designed to provide information about NPS pollution issues and solutions. Information transfer tools typically used by the department and its project partners include brochures, print and electronic media, workshops, BMP implementation manuals, tours, exhibits, and demonstrations. I & E projects usually range from one to five years in length.

Watershed projects are the most comprehensive type of project implemented through the South Dakota NPS Pollution Management Program. Watershed projects are typically long-term in duration and designed to implement TMDLs that address NPS pollution sources and beneficial use impairments identified during the completion of an assessment project. Common watershed project objectives include:

- protect/restore impaired beneficial uses through the promotion and voluntary implementation of best management practices (BMPs) that prevent/reduce NPS pollution,
- disseminate information about NPS pollution and effective solutions, and
- evaluate project progress toward use attainment or NPS pollutant reduction goals.

Watershed projects typically range from four to ten years in length with the duration being dependant on the size of the watershed and extent of the NPS pollution impacts that must be addressed.

For information about specific South Dakota NPS projects funded using Clean Water Act Section 319 funds, contact the South Dakota Department of Environment and Natural Resources or access the US EPA Grants Reporting and Tracking System (GRTS) database.

Table 40: South Dakota Categories and Subcategories of NPS Pollution Sources

Agriculture

Non-irrigated crop production
Irrigated crop production
Pasture grazing - riparian and upland
Pasture grazing - riparian
Pasture grazing - upland
Concentrated animal feeding operations
Confined animal feeding operations
Aquaculture
Rangeland - riparian and upland
Rangeland - riparian
Rangeland – upland

Silviculture

Harvesting, restoration, residue management
Forest management
Logging road construction/maintenance
Bank or shoreline modification/destabilization

Construction Runoff

Highway/road/bridge construction
Land development
Channelization

Other

Dam construction
Golf courses
Erosion from derelict land
Atmospheric deposition
Waste storage/storage tank leaks
Highway maintenance and runoff
Spills
Natural sources
Internal nutrient cycling
Sediment resuspension
Sources outside jurisdiction or borders
Erosion and sedimentation

Resource Extraction/Exploration/Development

Surface mining
Subsurface mining
Petroleum activities
Abandoned mining

Land Disposal (runoff/leachate from areas)

Sludge
Wastewater
Landfills
Industrial land treatment
On-site wastewater systems (septic tanks, etc.)

Habitat Modification

Removal of riparian vegetation

Drainage/filling of wetlands

Hydromodification

Dredging

Upstream impoundment
Flow regulation/modification

Urban Runoff/Storm Sewers

Nonindustrial
Industrial
Surface runoff
Other urban runoff
Highway/road/bridge runoff

Future Nonpoint Source Program Directions

NPS pollution originates from diverse sources. Nonpoint pollution controls must reflect this by using all of the resources available from the various state, federal, and local organizations and in addition have landowner support and participation. The technical and financial assistance currently available is not sufficient to solve all of the NPS pollution problems in the state. Additional solutions must be tried. Landowners have the capability to accomplish much if they understand the problems and the ways to solve them. Educating the public about NPS pollution issues may prompt landowners to voluntarily implement activities to control NPS pollution. New federal programs must also be developed to supplement existing programs. The continuation of existing activities coupled with the addition of innovative new programs will ensure that South Dakota remains a leader in nonpoint source pollution control.

V. PUBLIC PARTICIPATION PROCESS

To fulfill the requirements of the federal Clean Water Act, and involve the affected community and stakeholders in the water quality improvement process, a public participation process was implemented. Summarized below are the procedures employed by DENR to involve the public.

Process Description

First Public Review/Input Period

On or around August 1, 2003, an ad was published in 11 statewide daily newspapers and Indian Country Today, announcing the DENR was developing the Integrated Report and requesting water quality data that would aid in the assessment of South Dakota's waters. This announcement was also sent to approximately 70 individuals and organizations.

Second Public Review Period

Data received after the first public review period, and additional data gathered by DENR were reviewed, and a draft Integrated Report was developed. The draft report was released for a 30-day public review and comment period in late January 2004. The announcement on the availability of the draft report was again published in the 11 daily newspapers and Indian Country Today. The draft report was also made available on DENR's web page at: **http://www.state.sd.us/denr/denr.html**. At this time, the draft list was also provided to USEPA Region VIII for review and comment.

Personnel from DENR responded to inquiries and were available to meet with interested groups about the list and listing process. Copies of public participation documents and responses to oral and written comments received during the comment period are included in Appendix B.

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VII. KEY TO ABBREVIATIONS

AGNPS - agricultural nonpoint source computer model
ARSD - Administrative Rules of South Dakota
BMP - best management practice
COE - United States Army Corps of Engineers
CWA - Clean Water Act
DENR - Department of Environment and Natural Resources
DO - dissolved oxygen
EPA - Environmental Protection Agency
NPDES - National Pollutant Discharge Elimination System
NPS - nonpoint source
NRCS - Natural Resources Conservation Service (formerly SCS)
QA - quality assurance
QC - quality control
SDGF&P - South Dakota Department of Game, Fish and Parks
SDSWQS - South Dakota Surface Water Quality Standards
STORET - EPA computer data storage and retrieval system
SWD - Surface Water Discharge program
TDS - total dissolved solids
TMDL - Total Maximum Daily Load
TSI - Carlson's (1977) Trophic State Indices
TSS - total suspended solids
USGS - United States Geological Survey
WQM - ambient water quality monitoring
WQS - water quality standards

APPENDICES

APPENDIX A – Waterbodies from the 2002 303(d) List to be Delisted

Basin Name	Waterbody	Location	Parameter	Information to Support Delisting	EPA Approved
Bad River Basin	Bad River	Near Ft. Pierre (SD0023582)	Ammonia	EPA Approved TMDL	10/21/2003
	Bad River	Near Midland (SD0020630)	Ammonia	Permit changed to "No Discharge"	NA
	Bad River	Near Philip (SD0020303)	Ammonia	EPA Approved TMDL	8/6/2003
Belle Fourche River Basin	Bear Butte Creek	Headwater to Strawberry Creek	Suspended Solids	Waterbody was listed in error	NA
	Belle Fourche River	Near Nisland (SD0020109)	Ammonia	EPA Approved TMDL	3/28/2002
	Whitewood Creek	Spruce Gulch to Sandy Creek	Suspended Solids	New information indicates full support	NA
	Whitewood Creek	Near Lead-Deadwood (SD0020796)	Ammonia	EPA Approved TMDL	5/14/2003
Big Sioux River Basin	South Buffalo Lake	Marshall County	TSI	New Information indicates full support	NA
	South Red Iron Lake	Marshall County	TSI	New Information indicates full support	NA
	Beaver Creek	Near Valley Springs (SD0020923)	Ammonia	EPA Approved TMDL	5/14/2003
	Big Sioux River	Near Baltic (SD0022284)	Ammonia	EPA Approved TMDL	5/14/2003
	Big Sioux River	Near Flandreau (SD0021831)	Ammonia	EPA Approved TMDL	10/21/2003
	Big Sioux River	Near Trent (SD0020265)	Ammonia	Permit changed to "No Discharge"	NA
	East Brule Creek	Near Alcester (SD0021695)	Ammonia	EPA Approved TMDL	9/9/2002
	Medary Creek	Near Aurora (SD0021661)	Ammonia	EPA Approved TMDL	11/25/2002
	Six Mile Creek	Near White (SD0021636	Ammonia	EPA Approved TMDL	3/25/2004
	Skunk Creek	Near Chester (SD0020338)	Ammonia	EPA Approved TMDL	12/2/2002
	Skunk Creek	Near Hartford (SD0021750)	Ammonia	EPA Approved TMDL	11/25/2002
	Spring Creek	Near Elkton (SD0020788)	Ammonia	EPA Approved TMDL	11/25/2002
Cheyenne River Basin	Battle Creek DENR 460103	Near Horsethief Lake to Teepee Creek	pH	New information indicates full support	NA

Basin Name	Waterbody	Location	Parameter	Information to Support Delisting	EPA Approved
Cheyenne River Basin	Battle Creek	Near Hermosa (SD0022349)	Ammonia	EPA Approved TMDL	9/9/2002
	Battle Creek	Near Keystone (SD0024007)	Ammonia	EPA Approved TMDL	5/14/2003
	Box Elder Creek	Near Box Elder CCC (SD0020834)	Ammonia	EPA Approved TMDL	8/6/2003
	Cheyenne River	Near Edgemont (SD0023701)	Ammonia	EPA Approved TMDL	12/12/2001
	French Creek	Near Blue Bell Lodge (SD0024228)	Ammonia	EPA Approved TMDL	11/25/2002
	Lafferty Gulch	Near Keystone (SD0021610)	Ammonia	EPA Approved TMDL	5/16/2002
	Willow Creek	Near Sylvan Lake (SD0024279)	Ammonia	EPA Approved TMDL	9/3/2003
James River Basin	Cresbard Lake	Faulk County	TSI	EPA Approved TMDL	12/3/2003
	James River	Near Ashton (SD0022276)	Ammonia	EPA Approved TMDL	7/16/2002
	James River	Near Menno (SD0020087)	Ammonia	EPA Approved TMDL	12/2/2002
	Moccasin Creek	Near Aberdeen (SD0020702)	Ammonia	EPA Approved TMDL	3/19/2001
	S. Fork Snake Creek	Near Faulkton (SD0021971)	Ammonia	EPA Approved TMDL	3/28/2002
	Wolf Creek	Near Bridgewater (SD0021512)	Ammonia	EPA Approved TMDL	9/3/2003
Little Missouri River Basin	Little Missouri River	Near Camp Crook (SD0024759)	Ammonia	EPA Approved TMDL	5/16/2002
Minnesota River Basin	Lake Alice	Deuel County	TSI	New information indicates full support	NA
	Whetstone River	Near Big Stone City (SD0023663)	Ammonia	EPA Approved TMDL	10/21/2003
	South Fork Whetstone River	Near Milbank (SD0020371)	Ammonia, dissolved oxygen	EPA Approved TMDL	3/25/2004
Missouri River Basin	Choteau Creek	Near Wagner (SD0020184)	Ammonia	EPA permit – not under DENR jurisdiction	NA
	Medicine Creek	Near Presho (SD0020117)	Ammonia	EPA Approved TMDL	8/6/2003
	Okobojo Creek	Near Agar (SD0022241)	Ammonia	EPA Approved TMDL	9/9/2002
	Ponca Creek	Near Gregory (SD0022179)	Ammonia	EPA Approved TMDL	7/11/2002
	Spring Creek	US Hwy 83 to mouth	Dissolved Oxygen	New information indicates full support	NA
	Spring Creek	Near Herreid	Ammonia	EPA Approved	11/25/2002

Basin Name	Waterbody	Location	Parameter	Information to Support Delisting	EPA Approved
		(SD0022900)		TMDL	
Moreau River Basin	Moreau River	Headwaters to near Iron Lightning	Suspended Solids	New information indicates full support	NA
	Thunder Butte Creek	Near Bison (SD0022411)	Ammonia	Permit changed to "No Discharge"	NA
Vermillion River Basin	Turkey Ridge Creek	Near Viborg (SD0020541)	Ammonia	EPA Approved TMDL	3/28/2002
	Vermillion River	Near Centerville (SD0022527)	Ammonia	EPA Approved TMDL	8/6/2003
	Vermillion River	Near Hurley (SD0021997)	Ammonia	EPA Approved TMDL	5/16/2002
Vermillion River Basin	Vermillion River	Near Vermillion (SD0020061)	Ammonia, Dissolved Oxygen	EPA Approved TMDL	5/28/2003
	W. Fork Vermillion River	Near Canistota (SD0022497)	Ammonia	EPA Approved TMDL	12/2/2002
	W. Fork Vermillion River	Near Marion (SD0020311)	Ammonia	EPA Approved TMDL	10/21/2003
	W. Fork Vermillion River	Near Parker (SD0020940)	Ammonia	EPA Approved TMDL	10/21/2003
	W. Fork Vermillion River	Near Salem (SD0020966)	Ammonia	EPA Approved TMDL	3/28/2002

APPENDIX B – Surface Water Quality Monitoring Schedule and Sampling Site Description

Surface Water Quality Monitoring Schedule and Laboratory Analysis Parameters ***for streams:***

		Analysis Group							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Field Analysis Parameters:									
	Water Temperature	X	X	X	X	X	X	X	X
	Air Temperature	X	X	X	X	X	X	X	X
	Dissolved Oxygen	X	X	X	X	X	X	X	X
	pH	X	X	X	X	X	X	X	X
	Waterbody Depth	X	X	X	X	X	X	X	X
	Waterbody Width	X	X	X	X	X	X	X	X
Laboratory Analysis Parameters:									
	Alkalinity	X	X	X	X	X	X	X	X
	Conductivity	X	X	X	X	X	X	X	X
	Hardness	X	X	X	X	X	X	X	X
	Dissolved Solids	X	X	X	X	X	X	X	X
	Suspended Solids	X	X	X	X	X	X	X	X
	Total Phosphorous	X	X	X	X	X	X	X	X
	Dissolved Phosphorous	X	X	X	X	X	X	X	X
	Ammonia	X	X	X	X	X	X	X	X
	Nitrate-Nitrite	X	X	X	X	X	X	X	X
	TKN	X	X	X	X	X	X	X	X
	BOD				X				X
	E-Coli	*	*	*	*	*		*	
	Fecal Coliforms	M/S	M/S	M/S	M/S	M/S	M/S	M/S	X
	Calcium	M/A	M/A		M/A		M/A	X	M/A
	Chloride	X						X	
	Magnesium	M/A	M/A		M/A		M/A	X	M/A
	Sodium	M/A	M/A		M/A		M/A	X	M/A
	Sulfates	X						X	X
	Total Cyanide					X	X		
	WAD Cyanide					X	X		
	Total Arsenic					X	X		
	Dissolved Arsenic					X	X		
	Total Cadmium					X	X		
	Dissolved Cadmium					X	X		
	Total Chromium					X	X		
	Dissolved Chromium					X	X		
	Total Copper					X	X		
	Dissolved Copper					X	X		
	Total Lead					X	X		
	Dissolved Lead					X	X		
	Total Mercury					X	X		
	Dissolved Mercury					X	X		
	Total Nickel					X	X		
	Dissolved Nickel					X	X		
	Total Selenium					X	X		
	Dissolved Selenium					X	X		
	Total Silver					X	X		
	Dissolved Silver					X	X		
	Total Zinc					X	X		
	Dissolved Zinc					X	X		

				Analysis Group						
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
M/A = May through August. M/S = May through September. X=Every Station Visit										
*Perform E-Coli analysis May through September at only the following sites:										
	WQM-1	WQM-3	WQM-5	WQM-6	WQM-8	WQM-10	WQM-11	WQM-12		
	WQM-14	WQM-16	WQM-17	WQM-19	WQM-24	WQM-25	WQM-29	WQM-32		
	WQM-33	WQM-34	WQM-35	WQM-40	WQM-65	WQM-66	WQM-67	WQM-71		
	WQM-79	WQM-90	WQM-112	WQM-116	WQM-117	WQM-123	WQM-BS29			

ALL WQM SITES
IN ORDER BY WATERBODY NAME

Waterbody	Station	Storet ID	County	Sampling Frequency	Analysis Group	Region
Annie Creek	WQM -MN31	46MN31	Lawrence	Quarterly@	5	Black Hills
Bad River	WQM -29	460850	Stanley	Quarterly*	4	Central
Battle Creek	WQM -17	460905	Pennington	Monthly	3	Black Hills
Battle Creek	WQM -103	460103	Pennington	Seasonal**	3	Black Hills
Bear Butte Creek	WQM -125	460125	Lawrence	Monthly	5	Black Hills
Bear Butte Creek	WQM -126	460126	Lawrence	Monthly	5	Black Hills
Beaver Creek	WQM -128	460128	Fall River	Monthly	7	Black Hills
Belle Fourche River	WQM -21	460880	Meade	Quarterly*	2	Black Hills
Belle Fourche River	WQM -76	460676	Meade	Monthly	2	Black Hills
Belle Fourche River	WQM -81	460681	Butte	Quarterly*	6	Black Hills
Belle Fourche River	WQM -83	460683	Butte	Quarterly*	6	Black Hills
Belle Fourche River	WQM -130	460130	Butte	Monthly	7	Black Hills
Big Sioux River	WQM -1	460740	Codington	Monthly	1	Northeast
Big Sioux River	WQM -2	460702	Brookings	Monthly	1	Southeast
Big Sioux River	WQM -3	460703	Minnehaha	Monthly	1	Southeast
Big Sioux River	WQM -31	460831	Minnehaha	Monthly	2	Southeast
Big Sioux River	WQM -32	460832	Union	Monthly	3	Southeast
Big Sioux River	WQM -55	460655	Codington	Monthly	2	Northeast
Big Sioux River	WQM -62	460662	Brookings	Monthly	1	Southeast
Big Sioux River	WQM -64	460664	Minnehaha	Monthly	4	Southeast
Big Sioux River	WQM -65	460665	Lincoln	Monthly	2	Southeast
Big Sioux River	WQM -66	460666	Lincoln	Monthly	2	Southeast
Big Sioux River	WQM -67	460667	Union	Monthly	2	Southeast
Big Sioux River	WQM -117	460117	Minnehaha	Monthly	4	Southeast
Big Sioux River	WQM -BSA1	46BSA1	Grant	Monthly	1	Northeast
Big Sioux River	WQM -BS08	46BS08	Hamlin	Monthly	1	Northeast
Big Sioux River	WQM -BS18	46BS18	Moody	Monthly	1	Southeast
Big Sioux River	WQM -BS23	46BS23	Minnehaha	Monthly	4	Southeast
Big Sioux River	WQM -BS29	46BS29	Minnehaha	Monthly	4	Southeast
Box Elder Creek	WQM -30	460925	Lawrence	Monthly	3	Black Hills
Box Elder Creek	WQM -79	460679	Pennington	Quarterly@	2	Black Hills
Castle Creek	WQM -46	460646	Pennington	Monthly	3	Black Hills
Cherry Creek	WQM -131	460131	Meade	Quarterly*	2	Central
Cheyenne River	WQM -14	460875	Fall River	Monthly	7	Black Hills
Cheyenne River	WQM -15	460865	Pennington	Monthly	2	Black Hills
Cheyenne River	WQM -16	468860	Ziebach	Monthly	2	Central
Cheyenne River	WQM -132	460132	Custer	Monthly	2	Black Hills
Cheyenne River	WQM -133	460133	Haakon	Monthly	2	Central
Cheyenne River	WQM -156	460156	Fall River	Monthly	7	Black Hills
Choteau Creek	WQM -134	460134	Bon Homme	Quarterly*	2	Southeast
Cleopatra Creek	WQM -MN39	46MN39	Lawrence	Quarterly@	5	Black Hills
Cottonwood Creek	WQM -153	460153	Mellette	Monthly	2	Central
Crow Creek	WQM -135	460135	Buffalo	Quarterly*	2	Central

Waterbody	Station	Storet ID	County	Sampling Frequency	Analysis Group	Region
Deadwood Creek	WQM -127	460127	Lawrence	Monthly	5	Black Hills
Elm River	WQM -136	460136	Brown	Monthly	2	Northeast
Fall River	WQM -57	460657	Fall River	Quarterly*	1	Black Hills
False Bottom Creek	WQM -MN38	46MN38	Lawrence	Quarterly@	5	Black Hills
Fantail Creek	WQM -119	460119	Lawrence	Quarterly*	5	Black Hills
Firesteel Creek	WQM -137	460137	Davison	Quarterly*	2	Southeast
Flynn Creek	WQM -111	460111	Custer	Quarterly*	3	Black Hills
French Creek	WQM -51	460651	Custer	Quarterly*	3	Black Hills
French Creek	WQM -53	460653	Custer	Quarterly*	3	Black Hills
French Creek	WQM -102	460102	Custer	Monthly	2	Black Hills
Grace Coolidge Creek	WQM -50	460650	Custer	Quarterly*	3	Black Hills
Grand River	WQM -25	460945	Corson	Monthly	2	Central
Grand River	WQM -40	460640	Perkins	Quarterly*	2	Central
Grand River	WQM -138	460138	Corson	Quarterly*	2	Central
Grand River, N Fork	WQM -77	460677	Perkins	Quarterly*	2	Central
Grand River, S Fork	WQM -78	460678	Perkins	Quarterly*	2	Central
Grand River, S Fork	WQM -139	460139	Harding	Quarterly*	2	Central
James River	WQM -6	460805	Brown	Monthly	2	Northeast
James River	WQM -7	460707	Hanson	Quarterly*	2	Southeast
James River	WQM -8	460761	Yankton	Monthly	2	Southeast
James River	WQM -33	460733	Brown	Monthly	2	Northeast
James River	WQM -34	460734	Brown	Quarterly*	2	Northeast
James River	WQM -35	460735	Beadle	Quarterly*	2	Southeast
James River	WQM -36	460736	Beadle	Quarterly*	2	Southeast
James River	WQM -37	460737	Davison	Quarterly*	2	Southeast
James River	WQM -112	460112	Brown	Monthly	2	Northeast
James River	WQM -113	460113	Brown	Monthly	2	Northeast
James River	WQM -140	460140	Spink	Monthly	2	Northeast
Keya Paha River	WQM -10	460815	Tripp	Quarterly*	1	Central
Lac Qui Parle River, W Branch	WQM -45	460645	Deuel	Biennial***	3	Northeast
Little Minnesota River	WQM -27	460710	Roberts	Quarterly*	3	Northeast
Little Missouri River	WQM -26	460955	Harding	Quarterly*	2	Central
Little White River	WQM -13	460840	Mellette	Monthly	2	Central
Medicine Creek	WQM -141	460141	Lyman	Monthly	2	Central
Medicine Knoll Creek	WQM -142	460142	Hughes	Quarterly*	2	Central
Missouri River	WQM -71	460671	Hughes	Quarterly*	2	Central
Missouri River	WQM -72	460672	Lyman	Quarterly*	2	Central
Missouri River	WQM -73	460673	Charles mix	Quarterly*	2	Southeast
Missouri River	WQM -74	460674	Yankton	Quarterly*	2	Southeast
Moccasin Creek	WQM -94	460694	Brown	Monthly	3	Northeast
Moccasin Creek	WQM -95	460695	Brown	Monthly	3	Northeast
Moreau River	WQM -24	460935	Dewey	Monthly	2	Central
Moreau River	WQM -39	460039	Perkins	Quarterly*	2	Central
Moreau River	WQM -143	460143	Ziebach	Quarterly*	2	Central
Moreau River, S Fork	WQM -144	460144	Perkins	Quarterly*	2	Central
Mud Creek	WQM -145	460145	Brown	Quarterly*	2	Northeast
Ponca Creek	WQM -70	460670	Gregory	Quarterly*	1	Central
Rapid Creek	WQM -19	460910	Pennington	Monthly	2	Black Hills

Waterbody	Station	Storet ID	County	Sampling Frequency	Analysis Group	Region
Rapid Creek	WQM -47	460647	Pennington	Monthly	1	Black Hills
Rapid Creek	WQM -69	460669	Pennington	Monthly	1	Black Hills
Rapid Creek	WQM -92	460692	Pennington	Monthly	2	Black Hills
Rapid Creek	WQM -110	460110	Pennington	Monthly	3	Black Hills
Redwater River	WQM -23	460895	Butte	Monthly	2	Black Hills
Skunk Creek	WQM -121	460121	Minnehaha	Quarterly*	4	Southeast
Snake Creek	WQM -146	460146	Spink	Quarterly*	2	Northeast
Spearfish Creek	WQM -22	460900	Lawrence	Monthly	3	Black Hills
Spearfish Creek	WQM -89	460689	Lawrence	Monthly	3	Black Hills
Spearfish Creek	WQM -MN32	46MN32	Lawrence	Quarterly@	5	Black Hills
Spearfish Creek	WQM -MN33	46MN33	Lawrence	Quarterly@	5	Black Hills
Spearfish Creek	WQM -MN34	46MN34	Lawrence	Quarterly@	5	Black Hills
Spearfish Creek	WQM -MN35	46MN35	Lawrence	Quarterly@	5	Black Hills
Spring Creek	WQM -49	460649	Pennington	Quarterly*	3	Black Hills
Spring Creek	WQM -54	460654	Pennington	Monthly	3	Black Hills
Spring Creek	WQM -155	460155	Campbell	Monthly	2	Central
Stewart Gulch	WQM -120A	460124	Lawrence	Quarterly*	5	Black Hills
Strawberry Creek	WQM -116	460116	Lawrence	Monthly	5	Black Hills
Thunder Butte Creek	WQM -147	460147	Perkins	Quarterly*	2	Central
Turtle Creek	WQM -148	460148	Spink	Quarterly*	2	Northeast
Vermillion River	WQM -4	460755	Clay	Monthly	2	Southeast
Vermillion River	WQM -5	460745	Clay	Monthly	2	Southeast
Vermillion River	WQM -61	460661	Turner	Monthly	2	Southeast
Vermillion River, E Fork	WQM -150	460150	McCook	Quarterly*	2	Southeast
Vermillion River, E Fork	WQM -154	460154	McCook	Quarterly*	2	Southeast
West Strawberry Creek	WQM -75	460675	Lawrence	Quarterly*	3	Black Hills
Whetstone River	WQM -28	460700	Grant	Quarterly*	3	Northeast
Whetstone River, S Fork	WQM -90	460690	Grant	Quarterly*	3	Northeast
Whetstone River, S Fork	WQM -91	460691	Grant	Quarterly*	3	Northeast
White River	WQM -11	460835	Jackson	Monthly	2	Central
White River	WQM -12	460825	Lyman	Monthly	2	Central
White River	WQM -42	460842	Shannon	Quarterly*	2	Black Hills
White River	WQM -152	460152	Mellette	Monthly	2	Central
Whitetail Creek	WQM -118	460118	Lawrence	Monthly	5	Black Hills
Whitewood Creek	WQM -52	460652	Lawrence	Monthly	3	Black Hills
Whitewood Creek	WQM -82	460682	Butte	Monthly	5	Black Hills
Whitewood Creek	WQM -84	460684	Lawrence	Monthly	5	Black Hills
Whitewood Creek	WQM -85	460685	Lawrence	Quarterly*	5	Black Hills
Whitewood Creek	WQM -86	460686	Lawrence	Quarterly*	5	Black Hills
Whitewood Creek	WQM -122	460122	Lawrence	Monthly	5	Black Hills
Whitewood Creek	WQM -123	460123	Lawrence	Monthly	5	Black Hills
Wolf Creek	WQM -151	460151	Spink	Quarterly*	2	Northeast
Wolf Creek	WQM -157	460157	Hutchinson	Monthly	8	Southeast
Wolf Creek	WQM -158	460158	Hutchinson	Monthly	8	Southeast
Yellow Bank River, N Fork	WQM -88	460688	Grant	Biennial***	3	Northeast
Yellow Bank River, S Fork	WQM -87	460687	Grant	Biennial***	3	Northeast
				Number of Monthly Stations:		72

Number of Quarterly* Stations:	53
Number of Quarterly@ Stations:	8
Number of Seasonal** Stations:	1
Number of Biennial*** Stations:	3
Total Number of WQM Stations:	137

** = Quarterly WQM sites sampled in January, April, July, and October.*
@ = Quarterly WQM sites sampled in February, May, August, and November.
*** = Seasonal WQM Sites sampled in May, June, July, and August.*
**** = Biennial WQM sites sampled in April and October.*

Lakes Sampling Schedule for 2004 – 2008

Water_body	Basin	County	Lake ID	Rotation Year
Albert	Big Sioux	Kingsbury	4202	1
Alvin	Big Sioux	Lincoln	4401	1
Amsden	James	Day	2201	1
Buffalo North	Big Sioux	Marshall	4803	1
Campbell	Big Sioux	Brookings	9606	1
Center	Cheyenne	Custer	2105	1
Cochrane	Minnesota	Deuel	2305	1
Corsica	Missouri	Douglas	2502	1
Cottonwood	Missouri	Sully	5901	1
Dante	Missouri	Charles Mix	1703	1
Deerfield	Cheyenne	Pennington	9207	1
East Oakwood	Big Sioux	Brookings	9613	1
Faulkton	James	Faulk	2802	1
Freeman	Bad	Jackson	3907	1
Geddes	Missouri	Charles Mix	1705	1
Jones	James	Hand	3304	1
Mina Parmley	James	Edmunds	2606	1
New Wall No. 1	Cheyenne	Pennington	9243	1
Newell	Belle Fourche	Butte	1501	1
North Waubay	Big Sioux	Day	2226	1
Oliver	Minnesota	Deuel	2315	1
Punished Woman	Minnesota	Codington	9518	1
Richmond	James	Brown	9309	1
Shadehill	Grand	Perkins	5315	1
Silver	Vermillion	Hutchinson	3703	1
Wall	Big Sioux	Minnehaha	9118	1
Wilmarth	James	Aurora	1015	1
Yankton	Missouri	Yankton	9704	1
Alice	Minnesota	Deuel	2301	2
Angostura	Cheyenne	Fall River	2701	2
Buffalo South	Big Sioux	Marshall	4804	2
Bullhead	Big Sioux	Deuel	2303	2
Campbell	Missouri	Campbell	1601	2
Coldbrook	Cheyenne	Fall River	2705	2
Cottonwood	Big Sioux	Marshall	4808	2
Cresbard	James	Faulk	2801	2
Fish	Minnesota	Deuel	2310	2

Year 1	28 Lakes
Year 2	27 Lakes
Year 3	32 Lakes
Year 4	29 Lakes
Total	116 Lakes

Water_body	Basin	County	Lake ID	Rotation Year
Iron Creek	Belle Fourche	Lawrence	9903	2
John St. John	Big Sioux	Hamlin	3211	2
Legion	Cheyenne	Custer	2107	2
Madison	Big Sioux	Lake	4309	2
McCook	Missouri	Union	6202	2
Murdo	Bad	Jones	4102	2
Newell City Pond	Belle Fourche	Butte	1502	2
Orman	Belle Fourche	Butte	1503	2
Pickerel	Big Sioux	Day	2219	2
Platte	Missouri	Charles Mix	1711	2
Ravine	James	Beadle	9406	2
Red Iron South	Big Sioux	Marshall	4834	2
Rose Hill	James	Hand	3307	2
School	Big Sioux	Deuel	2319	2
State (Beaver)	James	Yankton	9701	2
Traverse	Red	Roberts	5521	2
Vermillion	Vermillion	McCook	4613	2
Preston	Vermillion	Kingsbury	4214	2
Andes	Missouri	Charles Mix	1708	3
Big Stone	Minnesota	Roberts	5502	3
Bismarck	Cheyenne	Custer	2103	3
Blue Dog	Big Sioux	Day	2207	3
Carthage Lake	James	Miner	5103	3
Clear	Big Sioux	Deuel	2304	3
Coal Springs	Moreau	Perkins	5303	3
Covell	Big Sioux	Minnehaha	9105	3
Elm	James	Brown	9301	3
Four Mile	Big Sioux	Marshall	4814	3
Hanson	James	Hanson	3404	3
Hayes	Bad	Stanley	5802	3
Herman	Big Sioux	Lake	4306	3
Hiddenwood	Missouri	Walworth	6301	3
Kampeska	Big Sioux	Codington	9508	3
Mirror 1	Belle Fourche	Lawrence	9904	3
Nine Mile	Big Sioux	Marshall	4830	3
Norden	Big Sioux	Hamlin	3214	3
Pierpont	James	Day	2220	3
Pocasse	Missouri	Campbell	1608	3
Poinsett	Big Sioux	Hamlin	3215	3
Rahn	Niobrara	Tripp	6008	3
Sheridan	Cheyenne	Pennington	9233	3
Sully	Missouri	Sully	5908	3
Swan	Vermillion	Turner	6103	3
Swan	Missouri	Walworth	6304	3
Sylvan	Cheyenne	Custer	2111	3
Thompson	Vermillion	Kingsbury	4222	3
Waggoner	Bad	Haakon	3104	3
West Oakwood	Big Sioux	Brookings	9615	3

Year 1	28 Lakes
Year 2	27 Lakes
Year 3	32 Lakes
Year 4	29 Lakes
Total	116 Lakes

Water_body	Basin	County	Lake ID	Rotation Year
White	Red	Marshall	4843	3
Mirror 2	Belle Fource	Lawrence	9908	3
Academy	Missouri	Charles Mix	1701	4
Biltmore	Cheyenne	Custer	2102	4
Brakke	Missouri	Lyman	4502	4
Brandt	Big Sioux	Lake	4302	4
Burke	Missouri	Gregory	3004	4
Byron	James	Beadle	9403	4
Clear	Big Sioux	Marshall	4807	4
Cottonwood	James	Spink	5702	4
Cottonwood Springs	Cheyenne	Fall River	2706	4
Enemy Swim	Big Sioux	Day	2209	4
Eureka No. 1	Missouri	McPherson	4703	4
Fate	Missouri	Lyman	4505	4
Flat Creek	Grand	Perkins	5305	4
Hendricks	Minnesota	Brookings	9609	4
Horsethief	Cheyenne	Pennington	9213	4
Isabel	Grand	Dewey	2408	4
Louise	James	Hand	3305	4
Loyalton Stafford	James	Edmunds	2605	4
Marindahl	Vermillion	Yankton	9702	4
Minnewasta	Big Sioux	Day	2216	4
Mitchell Lake	James	Davison	9801	4
Pactola	Cheyenne	Pennington	9223	4
Pelican	Big Sioux	Codington	9517	4
Redfield	James	Spink	5706	4
Roosevelt	Missouri	Tripp	6009	4
Roy	Big Sioux	Marshall	4835	4
Stockade	Cheyenne	Custer	2110	4
Twin	James	Sanborn	5606	4
Whitewood	Vermillion	Kingsbury	4223	4

Year 1	28 Lakes
Year 2	27 Lakes
Year 3	32 Lakes
Year 4	29 Lakes
Total	116 Lakes

SDDENR Water Quality Monitoring Sites

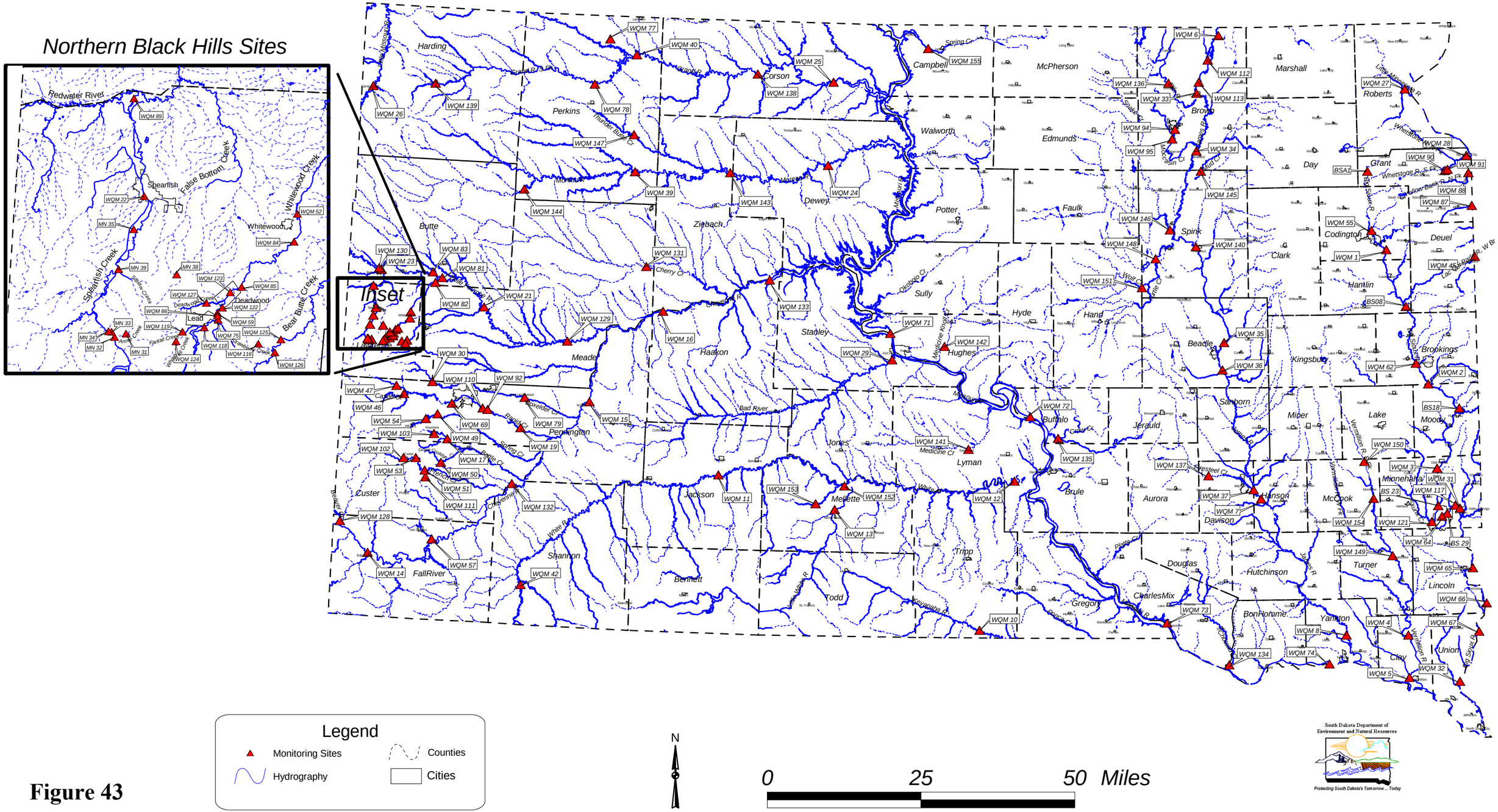

Figure 43

BACK OF FOLDOUT MAP

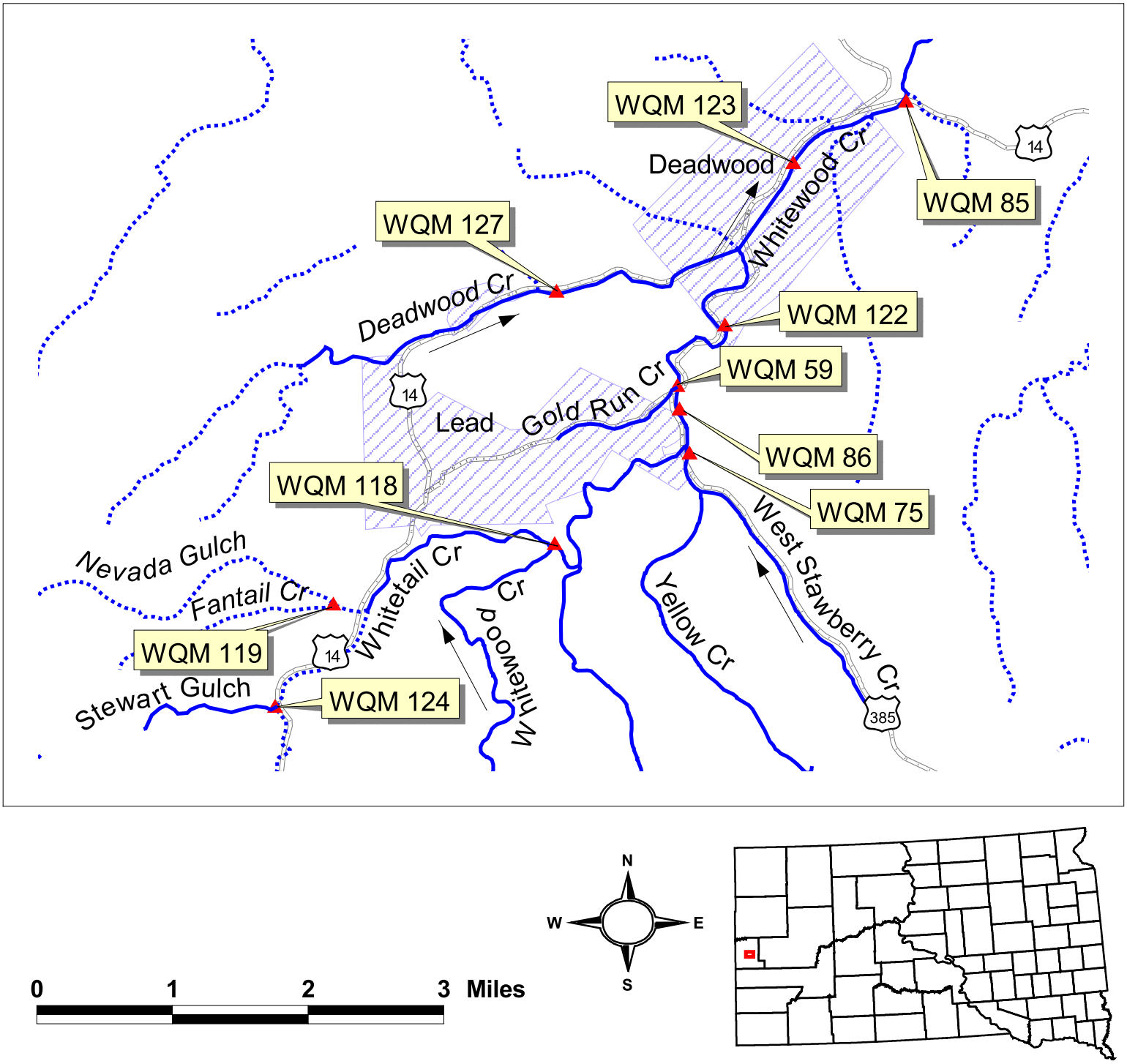

Figure 44: Water Quality Monitoring Stations on Whitewood Creek and tributaries in the Lead-Deadwood Area

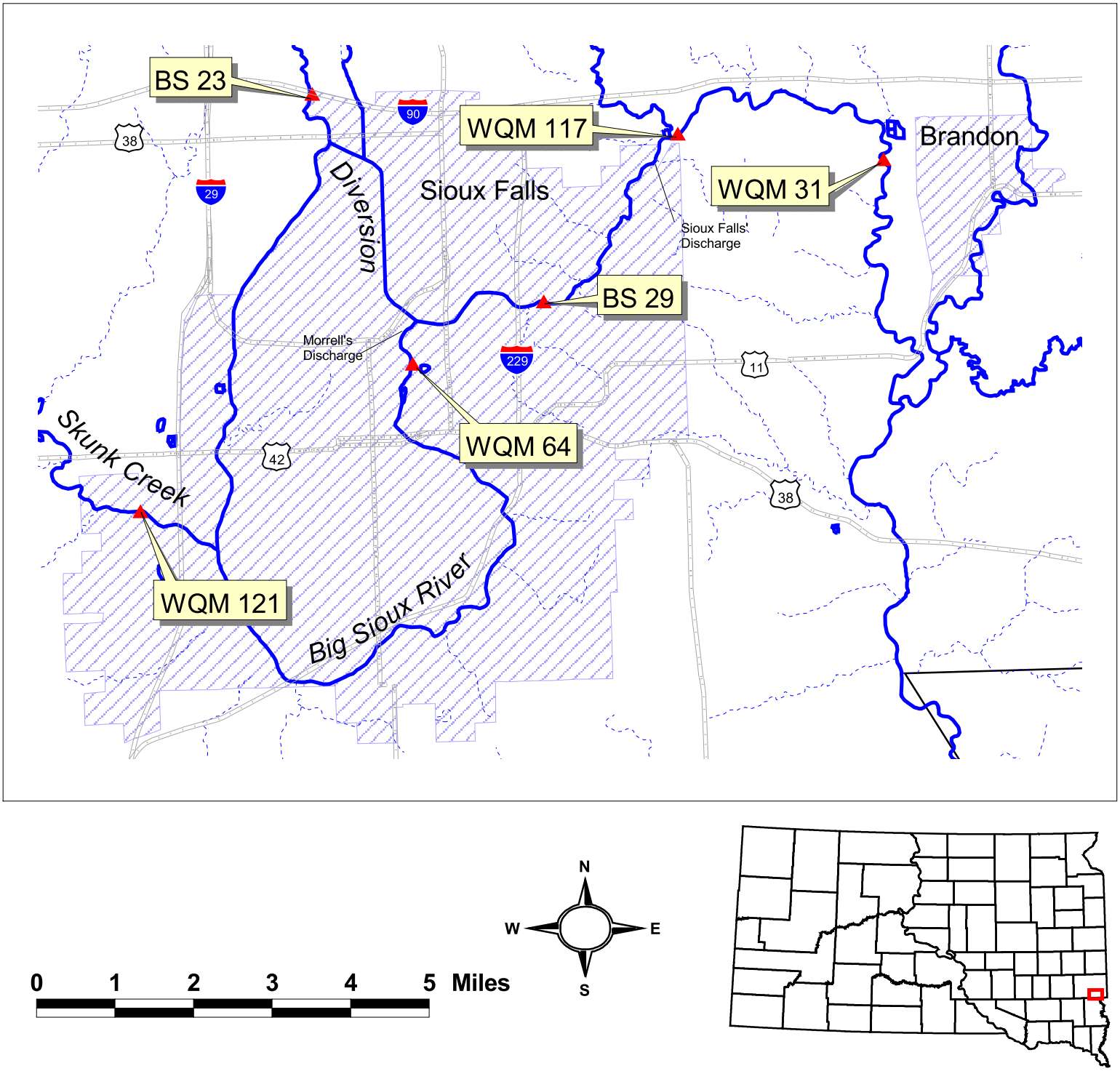

Figure 45: Water Quality Monitoring Stations located on the Big Sioux River in the Sioux Falls Area

APPENDIX C – Public Participation Displays and Response to Public Comments

Summary of Public Comments Received on
South Dakota's Draft 2004
Integrated Report
and
DENR's Response to Comments

Comment: Jay P. Gilbertson, East Dakota Water Development District, Brookings, SD. Mr. Gilbertson had the following comments:

I am writing to provide comments on the Draft 2004 South Dakota Integrated Report for Surface Water Quality Assessment. I have numbered each comment, and included the page number and paragraph (if possible) from the text that generated the comment.

1. Page 3, second paragraph. The sentence that describes the support status for swimmable waters. The percentages given lump together the do not support streams and the insufficient data streams. The actual numbers of each are listed later, but I would encourage you to separate these numbers here as well. There is a significant difference here.

Response to Comment: *DENR agrees with Mr. Gilbertson's comment and the suggested change was made.*

2. Page 5, second paragraph (also Page 177). The statement is made that regulatory controls may be necessary in order to increase compliance with state and federal standards. This is a very important and powerful concept, and one that should perhaps be developed a little further. For example, why is such a statement/concept necessary? For those who have looked at the long-term impact of purely voluntary measures, the answer is obvious-we have not seen the requisite improvements in water quality. I applaud the Department for including this statement, but it needs to be supported.

Response to Comment: *DENR deleted the sentence referring to enforcement because the federal Clean Water Act still relys on voluntary programs to deal with nonpoint source pollution.*

3. Page 8, last paragraph (also covered on 168 & 169). I have recently had the opportunity to review the Minnesota version of this list, and they site a significant number of waterbodies that are impaired as the result of heavy metal and organic contamination (>1,000). By comparison, South Dakota has barely covered the issue. I am somewhat concerned when Minnesota has listed many of the border and near-border water bodies as being impaired for mercury accumulation, and we are hardly checking for this contaminant.

Response to Comment: *DENR, Game, Fish, and Parks, and the Department of Health have been cooperatively monitoring fish flesh statewide for heavy metals, PCBs, and pesticides since 1994. Thirty-two species of fish have been sampled from 75 waterbodies*

from across the state. Five of the 75 waterbodies have a fish consumption advisory (mainly for only larger fish). The results to date indicate that South Dakota does not have the extent of the problem that Minnesota has.

4. Page 26, last paragraph. The last few sentences speak of significant reductions in impairments due to fecal coliform bacteria. What is the basis for these statements? My own experience with our Big Sioux River assessment projects is that fecal coliform bacteria are occurring at levels far in excess of standards where ever we have looked.

Response to Comment: *DENR's water quality monitoring data show a statewide reduction in impairments due to fecal coliform and is the basis for the statement. DENR agrees that the Big Sioux River remains impaired for fecal coliform and because of that we are in the process of establishing a fecal coliform TMDL for this waterbody.*

5. Page 32, second paragraph. In the last sentence, the report mixes numbers of lakes and (I assume) the percentage of total acres of lakes. In the absence of an explanation, the casual reader would assume that the percentages given are intended to refer to the lakes. 57 lakes out of a total of 122 equals 47%, not 35%. It looks like your math is in error.

Response to Comment: *DENR has made the change to add the words "of lake acreage" behind the percentage to clarify the support status.*

6. Page 36. In this general section, both the text and table indicate that the long-term trend for lake water quality in all 128 monitored lakes is stable. However, in later sections, the text indicates that some lakes have shown trends toward improvement, while others have remained stable or declined (see for example, page 62, 4th paragraph, or page 96, 4th paragraph). How do we reconcile this?

Further, if this is in fact the actual long-term trend, what are the implications for our watershed/lake/stream restoration efforts? I would hope that after investing millions and millions of dollars in efforts to improve the water quality in South Dakota's lakes, we would be able to point to at least one lake that is responding positively. Perhaps this is one of the factors that would support item 2 above.

Response to Comment: *Additional regarding trend has been added to the section. The long-term trend table for lakes found on page 36 is the overall trend for lakes within the state since the lakes monitoring began approximately 1989. This table shows that water quality is being protected. The discussions of trends found in the text are generally referring to short-term trends of lakes by comparing data between the current and previous reporting cycles.*

7. Page 62, first paragraph. Reference is made to the likely source of the fecal coliform bacteria in the lower reaches of the river, but not the upper reaches where this is also a problem.

Response to Comment: *DENR agrees with this comment and has changed the text accordingly.*

8. Page 62, last paragraph. Lake Alice and Fish Lake are incorrectly listed here as being in the Big Sioux watershed. The rest of the text and tables are correct.

Response to Comment: *This error has been corrected.*

9. Page 111, fifth paragraph. The restoration effort on Punished Woman Lake started in the late 1980s, not the late 1990s.

Response to Comment: *This error has been corrected.*

10. Page 154, second paragraph. The last sentence lists "ground water recharge" as one of the major functions of wetlands in South Dakota. In eastern South Dakota, prairie pothole wetlands are located in areas largely underlain by glacial till. As a consequence, there is very little recharge of ground water resources from these features. At the least, this section needs to have some sort of qualifying statement (check with Derric Iles, State Geologist).

Response to Comment: *DENR agrees with this comment and had deleted the phrase "ground water recharge".*

11. Page 154, third paragraph. The first sentence lists "flood control" as an important function of wetlands. I believe this should actually read "water storage," as is stated in the second paragraph. In the context used here, the "floods" are human-induced events, exacerbated by the loss of natural water storage due to wetland drainage.

Response to Comment: *DENR agrees with this comment and has changed the text accordingly.*

Comment: Karen Hamilton and Vern Berry, US Environmental Protection Agency, Denver, CO. Ms. Hamilton and Mr. Berry had the following comments:

"We have reviewed the Department's draft 2004 Integrated Report for Surface Water Quality Assessment and appreciate the opportunity to provide comment. We would like to commend the Department of Environment and Natural Resources (DENR) for creating South Dakota's first integrated report (IR). The IR combines the 305(b) Water Quality Report to Congress and the 303(d) list of waterbodies not meeting water quality standards (i.e., waters in need of total maximum daily loads (TMDLs)) into one cohesive document.

Overall, DENR's draft IR is well-organized and comprehensive. However, we have several comments that should be addressed prior to finalizing the document. A few of our more significant comments include the need to: specify priorities for developing TMDLs for categories 5 and 6 waters (including those that are targeted for development

during the next biennium); specify pollutant impairments for category 6 waters; provide more explicit reasons for waters removed from the prior 303(d) list; and include mercury-impaired waters in category five."

Category 2 and 3:
The terms "unknown" and "insufficient" are used under the "Support" heading for the tables for each watershed. It would be helpful if you could describe the difference between these two terms in the report.

Response to Comment: *DENR agrees with this comment and has defined "insufficient information" and "unknown" on page 41 in the Key For River Basin Information Tables.*

Existing and Readily Available Data:
Limited biological data has been collected by DENR in several watersheds (e.g. Big Sioux). We recommend that the final report include an explanation of how DENR considered biological data in making impairment determinations.

Response to Comment: *DENR has collected limited biological data. However, the data are being collected on those waterbodies which are already listed as impaired. The data are collected to help TMDL writers determine the extent if any impairment to the biological community. At this time, no biological data are being used for impairment determinations.*

Wetlands:
For the 2006 Integrated Report cycle, EPA anticipates that additional wetlands information may be requested. The wetlands information contained in the 2004 report does not highlight any progress made with wetlands programs since 1992. We recommend that the final report include updated information on any recent wetlands work that has been completed.

Response to Comment: *At this time, DENR does not have any additional information to add to this section.*

Monitoring Schedule (Appendix A):
EPA's 2004 IR guidance requests that states submit their monitoring schedule for the next two-year cycle. DENR's draft 2004 IR, Appendix A outlines the sampling associated with the fixed station monitoring sites. Please include a brief description of the state's plan to monitor waters that are currently unassessed (Category 3). For lakes, the existing monitoring effort has focused on a subset of the 573 lakes in South Dakota. Please include a monitoring schedule for lakes, and elaborate on the monitoring approach that will be used to expand data collection beyond the 128 lakes presently sampled.

Response to Comment: *We have included a 4-year lakes sampling schedule in Appendix A. DENR has analyzed its available resources and made a decision to continue existing monitoring levels during the next two years.*

- Page 15, Prioritization of TMDL Waters: As referenced on this page, Section 303(d) of the CWA (see also 40 CFR § 130.7(b)(4)) requires that "each state shall provide a priority ranking for such waters." The draft IR does a good job of explaining the factors for determining which waters are given a high or low priority, however, these priorities are not reflected in the listing tables. As was done for previous 303(d) lists, the final IR needs to specify priorities for TMDL development (including those that are targeted for development in the next biennium) for categories 5 and 6 waters.

Response to Comment: *DENR agrees with this comment and has changed the River Basin Tables to include a priority ranking for each waterbody.*

- Page 22, Sample Size and Age of Data: EPA does not recommend that data be excluded from consideration solely on the basis of age, nor do we recommend the use of a rigid minimum sample size in the assessment process. Please explain whether any data were not considered based on age or sample size alone. Also, explain how small data sets (<20 samples according to DENR's criteria) were evaluated and whether any of these small data sets resulted in a category 5 listing based on overwhelming evidence of impairment.

Response to Comment: *DENR did consider and include/exclude some sites with small datasets depending on the number of samples. For example, if a water quality monitoring site had five samples and one violated water quality standards, it was considered to have "insufficient information" or if a site had five samples and three violated water quality standards, it was considered to be "nonsupporting". DENR has remained consistent with previous EPA approved minimum data requirements within the 305(b) and 303(d) reports. DENR's assessment methodology is based on sound science and statistics as outlined in EPA's 2004 IR guidance.*

- Pages 22-23, Table 6 and text: DENR's assessment methodology that specifies the criteria for determining use support status defines fully supporting as "1 – 10" of values violate standards." EPA guidance (i.e. 1997 305(b) and CALM) defines that use of the 10% threshold for making a fully supporting determination be used only for conventional pollutants (e.g., pH, temperature, dissolved oxygen). For toxic pollutants (e.g., priority pollutants, metals, chlorine, ammonia) the fully supporting threshold should be no more than one exceedance of acute or chronic water quality criteria every three years (i.e., 1 in 3 yr excursion recurrence frequency). We are in the process of drafting our 2006 IR guidance which will provide a clear explanation of how water quality criteria should be used to make use support determinations for conventional and toxic pollutants. We recommend that DENR modify their methodology starting with the 2006 listing cycle to be consistent with EPA guidance.

Response to Comment: *DENR will take this comment into consideration for the 2006 report cycle.*

- Page 36, Trends in Lake Water Quality: The discussion of lake water quality trends differentiates between long term and short term. Table 16 indicates that none of the

assessed lakes in South Dakota have shown a positive or negative water quality trend for the 14 years of monitoring data. However, in the basin assessment tables of this report and on past 303(d) lists the state indicated that many lakes have experienced a declining trend in water quality. Please provide a more detailed definition of how long term and short term lake water quality trends are determined.

Response to Comment: *Additional information has been added to this section. DENR has looked at trends in lake water quality. There are a number of short-term cyclical changes, or fluctuations. These short-term fluctuations are mainly due to yearly variations in precipitation and temperature in a semi-arid climate. The maximum rate of change observed on long-term trends was one TSI point every 125 years (0.8% slope). DENR does not believe these are significant changes.*

- Pages 159-165, Fish Kills: Some of the information presented seems to indicate that poor water quality may be a factor in some of the fish kills. Generally, it is difficult to determine causes and sources of such fish kills, however, the state should use this information along with other readily available data and information to make determinations on use impairments. We recommend that additional text be added at the beginning of this section to explain how this data was used in combination with other available data to make use support determinations, and whether it was a contributing factor to conclude that any of the waters should be listed in category 5 as impaired.

Response to Comment: *For the 2006 report cycle, DENR will develop additional text on how this data will be used to determine if waters should be listed in category 5 as impaired. DENR used information collected from fish kill investigations along with other available data to determine if the waterbody is still supporting its designated uses. Additional text will be added for the 2006 report cycle.*

- Page 169, Table 35, Waterbodies Affected by Fish and Shellfish Consumption Restrictions: As explained in the text, the State has placed fish/shellfish consumption restrictions on the lakes listed in the table (Bitter, Hurley, Isabel and Twin). The basis for these restrictions is the FDA 1 ppm total mercury concentration advisory level. EPA considers a fish consumption advisory and the supporting data to be existing and readily available data and information that demonstrate non-attainment of a Section 101(a) "fishable "use. We consider these waters to be impaired by a pollutant which meets the criteria for listing these waterbodies as category 5 waters requiring a TMDL. This is based on EPA's October 24, 2000 guidance on the use of fish and shellfish consumption advisories in determining attainment of water quality standards and listing impaired waterbodies under Section 303(d) (see Chart 1).

Response to Comment: *DENR disagrees with listing waters with limited fish consumption advisories. Section 101 (a)(2) states, "It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;" All of these uses are being met with the waters with*

the limited consumption advisories because the advisories issued by South Dakota recommend limited consumption, as opposed to no consumption, of specific fish species in a waterbody. Furthermore, because most advisories are for only a few species and for really large fish such as northern pike and bass, which shows these species are doing well. For all these reasons, these water bodies obviously support the beneficial uses of fish propagation and recreation in and on the water. Finally the majority of the fish and fish species are not mentioned in the advisories.

However, even though mercury in fish flesh is not a regulatory standard at this time, EPA is requiring states to list waters with fish consumption advisories because they believe this is impairment of an implied use. DENR will list these waterbodies with a low priority for TMDL development.

- Category 6 Listings: We support DENR's creation of a separate category for NPDES permits that my need TMDLs for various pollutants. However, we suggest that subcategories be used (similar to category 4) to differentiate those waters that are part of the 303(d) list and those that are not. We suggest the following subcategories:
  6a – on 303(d) list due to need for new or revised TMDL when permit is reissued during current listing cycle
  6b – not on 303(d) list due to an existing TMDL approval

Response to Comment: *DENR agrees with this comment and has changed the text accordingly.*

- Category 6 Listings: The category 6 listings that are part of the 303(d) list need to include the expected pollutants (i.e., under the "cause" heading) that will need waste load allocations to ensure compliance with water quality standards.

Response to Comment: *DENR agrees with this comment and has changed the text accordingly.*

- Category 5 Listings: Waterbodies from previous 303(d) lists should generally be included in the 2004 IR as a category 5 listing until a TMDL is established unless: 1) there is reason to believe that conditions that led to the initial listing have changed; or 2) that the basis for the initial listing was in error. The criteria for removing individual waterbodies or pollutants from a previous 303(d) list should be provided along with a brief explanation for each waterbody/pollutant of why it is being delisted. EPA's 2004 IR guidance (July 21, 2003, pp 8-9) lists good cause reasons for delisting entire waterbodies or individual pollutants. We recommend that the final IR for South Dakota include good cause reasons (along with any additional site specific explanation) for all waterbodies and pollutants that are being delisted from the 2002 303(d) list. In order to facilitate these actions we recommend that DENR create a separate delisting table, as was done with previous 303(d) lists, that includes the basin name, waterbody name and location description, specific pollutant(s) and the explanation for the removal from the list.

Response to Comment: *DENR inadvertently left off the reasons for de-listing certain waterbodies. This has been corrected in the final report. We have also created a separate delisting table in the appendices.*

- The following table contains those waterbodies where we noticed discrepancies between the 2002 list and the draft 2004 IR, or where additional information is needed. Please address the comments listed in the last column.

Response to Comment: *See table below for our comments.*

We would like to highlight the 2004 category 4c listings in the following table. EPA's 2004 IR guidance for category 4c (p.8) says that "waters should be listed in this subcategory when an impairment is not caused by a pollutant." All four waters listed as category 4c on DENR's 2004 IR are for impairments associated with a pollutant. In the case of pH we believe that DENR's water quality standards (see 74:51:01:07) include an allowance for natural fluctuations. If our interpretation of the standards are correct it seems that the two waters listed in category 4c for pH would be meeting standards and should be placed in category 1, 2, or 3. We were unable to find a similar allowance for temperature in the standards. Please direct us to the language in the standards that provides the allowance for temperature standards to be exceeded due to natural causes. If no such allowance currently exists in the standards, the Fall River listing should be in category 5 until the standard is changed. The category 4c listing for conductivity in Lindsey Draw is puzzling, and does not seem appropriate.

Response to Comment: *DENR agrees with EPA's comments about the waters listed in category 4c for pH. We have changed these waters to category 1 (fully supporting). The Department does not agree with listing Fall River for temperature because these temperature violations are due to natural hot springs that contribute water to the base flow of the river. However, since SD does not address these temperature fluctuations in the water quality standards, Fall River has been changed to category 5 until site specific criteria or natural temperature fluctuations are addressed in the water quality standards as per EPA's directive.*

Basin / Waterbody	2004 Listing	2002 Listing	Comments
All Basins / All waters	Categories 5 & 6 – missing TMDL priority information	Included TMDL priority information mostly as 1 (high) or 3 (low)	Priority ranking explanation should indicate if priority 1 waters are those that are targeted for TMDL development within the next biennium ***Response: DENR agrees and has added this information to the River Basin Tables.***
All Basins / NPDES Permits	Category 6 – missing listing information for "Cause"	Included pollutant information – primarily ammonia and DO	Add missing information for permits ***Response: DENR agrees and has added the missing information to the River Basin Tables.***
Bad River / Freeman Lake	Category 5 - TSI	Listed as impaired for TSI	The text on page 44 seems to indicate that Freeman Lake may be impaired for selenium – please provide more information on its impairment status ***Response: EPA approved a selenium TMDL for Freeman Lake on2/7/2001. DENR does not have any recent data to show support status for selenium at this time. A change was made to the text on page 44 to reflect this information.***
Belle Fourche / Horse Creek	Missing description of the stream reach that is impaired	Impaired from "Indian Creek to mouth"	Add missing stream reach description information ***Response: The description has been added.***
Belle Fourche / Spearfish Creek-McKinley Gulch to Squaw Ck.	Category 4c-impaired for pH due to natural sources	Not listed	Seems to be meeting pH WQS that allows for fluctuations due to natural sources – recommend listing in category 1,2, or 3 ***Response: DENR agrees with this comment. The segment has been changed to category 1. We would like to note that Squaw Creek has officially been renamed to Cleopatra Creek.***
Belle Fourche / Whitewood Creek – Spruce Gulch to Sandy Creek	Category 5 – temp and fecal coliform	Listed as impaired for suspended solids in addition to temp and fecal coliform	Add solids back to list or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality data indicate full support for total suspended solids. An explanation was included in a footnote for this waterbody in the final report.***
Belle Fourche / Whitewood Creek – Sandy Creek to I-90	Category 4c – impaired for pH due to natural sources	Not listed	Seems to be meeting pH WQS that allows for fluctuations due to natural sources – recommend listing in category 1, 2, or 3 ***Response: DENR agrees with this comment. The segment has been changed to category 1.***

Basin / Waterbody	2004 Listing	2002 Listing	Comments
Big Sioux/Minnewasta Lake	Category 5 – missing listing information for "Cause" and "Source"	Not listed	Add missing pollutant(s) and source(s) information ***Response: This information has been added to the final report.***
Big Sioux / South Red Iron Lake	Category 2 – insufficient data	Listed as impaired for TSI	Add water back to category 5 or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality information indicates the lake is fully supporting its fishery use. Category 2 is the correct category for South Red Iron Lake.***
Big Sioux / South Buffalo Lake	Category 2 – insufficient data	Listed as impaired for TSI	Add water back to category 5 or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality information indicates the lake is fully supporting its fishery use. Category 2 is the correct category for South Buffalo Lake.***
Cheyenne / Canyon Lake	Category 4b – TSI	Not listed	See EPA's 2004 IR guidance on category 4b listings (p5-6). Provide information based on the criteria in the guidance, to support the 4b categorization ***Response: Canyon Lake was listed as category 4b in error. The lake has been changed to category 3 since there is insufficient sampling data to determine support status.***
Cheyenne / Battle Creek – Horsethief Lake to Hwy 79	Segment 1 – Temp only Segment 2- Temp & pH	Listed as impaired the entire length for temp and pH	Add pH back to list for segment 1 or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality data indicate full support for pH in segment 1 of Battle Creek. An explanation was included in a footnote for this waterbody in the final report.***
Cheyenne / Fall River – Hot Springs to mouth	Category 4c – temperature due to natural sources	Not listed	Temperature is a pollutant. Move to category 5 or provide reference to language in standards ***Response: As per EPA's directive Fall River has been changed to category 5.***
Cheyenne / Lindsey Draw	Category 4c – conductivity due to unknown sources	Not listed	Conductivity is a pollutant. Move to category 5 or provide justification for another category ***Response: Lindsey Draw was listed as category 4c in error. It has been changed to category 5.***

Basin / Waterbody	2004 Listing	2002 Listing	Comments
Grand / Shadehill Reservoir	Category 5 – TDS & chlorides	Listed as impaired for SAR	Add SAR back to list or provide justification of why it no longer meets criteria for 303(d) listing ***Response: SAR was left out in error due to constraints with the Assessment Database and will now be included in the final report.***
Grand / North Fork Grand – ND border to Shadehill Reservoir	Category 5 – conductivity & TDS	Listed as impaired for SAR	Add SAR back to list or provide justification of why it no longer meets criteria for 303(d) listing ***Response: SAR was left out in error due to constraints with the Assessment Database and will now be included in the final report.***
Grand / South Fork Grand – Jerry Creek to Skull Creek	Category 5 – TSS	Not listed	The text on page 89 seems to indicate that this segment should be listed for SAR in addition to TSS ***Response: DENR did not have enough sample data to calculate SAR for this segment of the river.***
Grand / South Fork Grand – Skull Creek to Shadehill Reservoir	Category 5 – TSS	Listed as impaired for SAR and suspended solids	Add SAR back to list or provide justification of why it no longer meets criteria for 303(d) listing ***Response: SAR was left out in error due to constraints with the Assessment Database and will now be included in the final report.***
James / Moccasin Creek – Headwaters to Aberdeen & Aberdeen to Warner	Category 2 – insufficient data	Not listed	We believe that DENR has data that shows that one or both of these segments are impaired for ammonia and that a TMDL is currently being drafted. One or both segments should be listed for ammonia in category 5 ***Response: Moccasin Creek is meeting existing EPA approved standards at this time. Category 2 is the correct category for Moccasin Creek.***
Minnesota / Lake Alice	Category 2 – insufficient data	Listed as impaired for TSI	Add water back to category 5 or provide justification of why it no longer meets criteria for 303(d) listing. Note: DENR recently submitted TMDL to EPA for approval. ***Response: New water quality information indicates full support and the Lake Alice TMDL was submitted to EPA on 1/29/2004.***
Minnesota / Big Stone Lake	Category 2 – insufficient data	Not listed	TMDL approved by EPA in 1996 – should be category 4a ***Response: DENR agrees with this comment and has changed Big Stone Lake to category 4a.***

Basin/Waterbody	2004 Listing	2002 Listing	Comments
Minnesota / Lake Oliver	Category 2 – insufficient data	Not listed	TMDL approved by EPA in 2001-should be category 4a ***Response: DENR agrees with this comment and has changed Lake Oliver to category 4a.***
Missouri / Byre Lake	Missing "location" information	Not listed	Add missing County information ***Response: The missing information has been added to the final report.***
Missouri / Cottonwood Lake	Missing "location" information	Listed in Sully county	Add missing County information ***Response: The missing information has been added to the final report.***
Missouri / Spring Creek - US Hwy 83 to mouth	Category 1 – full support of all uses	Listed as impaired for dissolved oxygen	Add water back to category 5 or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality data indicate full support for dissolved oxygen in Spring Creek. An explanation was included in a footnote for this waterbody in the final report.***
Moreau / Moreau River – headwaters to near Iron Lightning	Category 5 - SAR	Listed as impaired for suspended solids	Add suspended solids back to list or provide justification of why it no longer meets criteria for 303(d) listing ***Response: New water quality data indicate full support for total suspended solids in this segment of the Moreau River. An explanation was included in a footnote for this waterbody in the final report.***

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
PMB 2020
JOE FOSS BUILDING
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www.state.sd.us/denr

July 3, 2003

Re: 303(d) request for water quality data

Dear Interested Party:

It is time for the department to begin preparation of the 2004 303(d) waterbody list. This list is required by the federal Clean Water Act. The list identifies waterbodies that are targeted for the development of Total Maximum Daily Loads. Total Maximum Daily Loads calculate the amount of pollution a waterbody can receive and still meet water quality standards and support assigned beneficial uses. Once loads are determined, local, state and federal activities can be directed toward improving the quality of the waterbody.

To develop an accurate, defensible, and comprehensive list, the department is soliciting water quality data or other information you may have to help us determine the quality of South Dakota's waters. Chemical, physical, or biological data will be considered. Data that represent the condition of a specific waterbody will be used to update the list. Data less than five years old is of the greatest value. Please provide any quality assurance/quality control measures that were used in collecting the data you submit. Specific water quality reports that explain and interpret the data are also requested.

We need to have this information for the 2004 list by August 31, 2003. Information regarding Total Maximum Daily Loads and South Dakota's most recent 303(d) list are available at the department's web site http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf. If you have questions or water quality data for our list, contact either Stacy Splittstoesser or Lee Baron at (605) 773-3151, or email an electronic version of the data in Microsoft Excel or Access to stacy.splittstoesser@state.sd.us or lee.baron@state.sd.us. Thank you for your help.

Sincerely,

Steven M. Pirner
Secretary

Letter sent to academic institutions, agencies, tribes, and interested individuals

NOTICE OF THE 2004 SOUTH DAKOTA INTEGRATED REPORT FOR SURFACE WATER QUALITY ASSESSMENT AND OPPORTUNITY FOR COMMENT

The Department of Environment and Natural Resources (DENR) is announcing the availability of the draft 2004 South Dakota Integrated Report for Surface Water Quality Assessment (Integrated Report) and the opportunity for public comment on the draft report.

The Integrated Report combines the previous 305(b) Water Quality Report to Congress and the 303(d) Total Maximum Daily Load list into one document for the purposes of reporting on South Dakota's surface water quality. The Integrated Report also lists those water bodies that require the completion of a Total Maximum Daily Load. This final Integrated Report must be submitted to the U.S. Environmental Protection Agency (EPA) on or before April 1, 2004.

The 2004 Integrated Report contains the following information:

1. An assessment of the surface water quality of South Dakota's waters;
2. A description of South Dakota's water quality monitoring programs;
3. Pollutants causing or expected to cause violations of the applicable water quality standards; and
4. Identification of waters targeted for TMDL development.

The department is providing a public participation process in which the members of the general public, affected organizations, and other interested parties can review and comment on the content of the draft 2004 Integrated Report. A copy of the draft 2004 Integrated Report is available on DENR's web site at: **http://www.state.sd.us/denr/Draft303d2004.pdf.**

Copies of the draft may also be obtained from Lois Docken by writing to the address below, emailing Lois Docken at Lois.Docken@state.sd.us or by calling 1-800-438-3367.

Any person desiring to comment on the list should submit comments to the address below. Persons are encouraged to comment electronically by sending the comments to Lois Docken at the email address in the above paragraph. The department must receive public comments by March 5, 2004.

At the conclusion of the public comment period, the department will prepare a written response to each comment received and post the response to the department web site or, if requested, by written response to each person who provided comments or requested a copy of the department's response.

The department will finalize the 2004 Integrated Report after consideration of the comments received during the public participation process. The final 2004 Integrated Report will then be sent to EPA for approval. Once EPA approves the list, the Integrated Report will be made available on the department's web site and will be sent to persons who request a copy.

Department of Environment and Natural Resources
Water Resources Assistance Program
523 East Capitol Avenue – Joe Foss Building
Pierre, South Dakota 57501-3181

Steven M. Pirner
Secretary

Display Ad published in daily newspapers and sent to academic institutions, agencies, tribes, wastewater dischargers, and interested individuals