North Dakota 2006 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads

West Fargo High School River Watch Team and Randy Wald, Red River Center for Watershed Education, learning to use water quality monitoring equipment along the Sheyenne River (photo courtesy of the International Water Institute, Fargo, ND).

Final Draft
Submitted to EPA
April 13, 2006

North Dakota 2006 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads

John Hoeven, Governor
Terry Dwelle, M.D., State Health Officer

North Dakota Department of Health
Division of Water Quality
Gold Seal Center, 4th Floor
918 East Divide Ave.
Bismarck, North Dakota 58501-1947

701.328.5210

CONTENTS

PART I. EXECUTIVE SUMMARY..... I-1

PART II. INTRODUCTION..... II-1

A. Section 305(b) Water Quality Assessment Report..... II-1
B. Section 303(d) TMDL List of Water Quality-limited Waters..... II-1

PART III. BACKGROUND..... III-1

A. Atlas..... III-1
B. Total Waters..... III-2
C. Water Pollution Control Program……... III-4

Chapter 1. Water Quality Standards Program……. III-4
Chapter 2. Point Source Control Program……... III-5
Chapter 3. Nonpoint Source (NPS) Pollution Management Program……. III-12
Resource Assessment…… III-17
Prioritization……. III-18
Assistance……. III-18
Coordination……. III-19
Information and Education…… III-20
Program Evaluation……... III-21
Chapter 4. Total Maximum Daily Load (TMDL) Program……. III-27
Chapter 5. Coordination with Other Agencies……. III-29

D. Cost/Benefit Assessment……...…. III-30
E. Special State Concerns and Recommendations……...…… III-31

PART IV. SURFACE WATER MONITORING AND ASSESSMENT METHODOLOGY..... IV-1

A. Surface Water Quality Monitoring Program..... IV-1

Chapter 1. Monitoring Goals and Objectives…….. IV-1
Chapter 2. Monitoring Program, Projects and Studies…… IV-2
Ambient Water Quality Monitoring Network for Rivers and Streams… IV-2
Current and Historic Program…...…….…….. IV-2
Future Program Plans…… IV-3

Biological Monitoring Program…… IV-6
Current and Historic Program…… IV-6
Future Program Plans…… IV-8
Lake Water Quality Assessment Program…… IV-8
Current and Historic Program……...… IV-8
Future Program Plans…… IV-10
Fish Tissue Contaminant Surveillance Program……... IV-10
Current and Historic Program……... IV-10
Future Program Plans…… IV-11
NPS Pollution Management Program Monitoring…… IV-11
Program Background…… IV-11
NPS Development Phase Project Monitoring……... IV-12
NPS Watershed Implementation Project…….. IV-12
Future Program Plans…… IV-13
Support Projects and Special Studies…… IV-13
Complaint and Fish Kill Investigations……. IV-13
Complaint Investigations……... IV-13
Fish Kill Investigations…….. IV-14
Stream Flow…….. IV-14
Current and Historic Program……... IV-14
Future Program Plans…… IV-14

B. Assessment Methodology..... IV-15

Chapter 1. Introduction…… IV-15
Chapter 2. Assessment Database (ADB)……. IV-16
Chapter 3. Beneficial Use Designation…… IV-19
Chapter 4. Sufficient and Credible Data Requirements..... IV-20
Chapter 5. Existing and Available Water Quality Data..... IV-21
Rivers and Streams..... IV-21
Chemical Data..... IV-21
Biological Data..... IV-21
Lake and Reservoirs..... IV-22
Fish Tissue Data..... IV-25
Other Agency/Organization Data..... IV-25

Chapter 6. Beneficial Use Assessment Methodology..... IV-26
Rivers and Streams..... IV-26
Aquatic Life..... IV-26
Recreation..... IV-30
Drinking Water Supply..... IV-31
Lakes and Reservoirs..... IV-32
Aquatic Life and Recreation..... IV-32
Drinking Water Supply……. IV-33
Fish Consumption Assessment Methodology for Rivers and Lakes..... IV-33

PART V. SECTION 305(b) WATER QUALITY ASSESSMENT..... V-1

A. Rivers and Streams Water Quality Assessment..... V-1

Chapter 1. Assessment Category Summary..... V-1
Chapter 2. Water Quality Summary..... V-3

B. Lakes and Reservoirs Water Quality Assessment..... V-7

Chapter 1. Assessment Category Summary..... V-7
Chapter 2. Water Quality Summary..... V-8
Chapter 3. Trophic Status..... V-12
Chapter 4. Control Methods…… V-13
Chapter 5. Restoration/Rehabilitation Efforts……. V-14
Chapter 6. Acid Effects on Lakes and Reservoirs…… V-15
Chapter 7. Toxic Effects on Lakes and Reservoirs…….. V-16

C. Wetlands Assessment Program…… V-17

Chapter 1. Background……. V-17
Chapter 2. Extent of Wetland Resources…….. V-18
Chapter 3. Integrity of Wetland Resources…….. V-20
Chapter 4. Wetland Water Quality Standards……..… V-23
Chapter 5. Wetland Monitoring and Assessment Program……..... V-24
Current and Historic Program…… V-24
Future Program Plans…… V-24

D. Public Health/Aquatic Life Concerns……. V-25

PART VI. NORTH DAKOTA SECTION 303(d) LIST OF WATER QUALITY-LIMITED WATERS NEEDING TMDLS..... V1-1

A. Background..... VI-1
B. Prioritization of TMDL-Listed Waters..... VI-2
C. Public Participation Process..... VI-3
D. Listing of Impaired Waters Needing TMDLs..... VI-3
E. De-listing of 2002 Listed TMDL Waters..... VI-4
F. TMDL Development and Monitoring Schedule..... VI-47

PART VII. GROUND WATER ASSESSMENT……... VII-1

A. Description…….. VII-1
Chapter 1. Ground Water Use…….……...……. VII-3

B. Ground Water Contamination Sources…… VII-4

C. Ground Water Protection Programs…… VII-6
Chapter 1. Wellhead Protection and Source Water Protection Programs…… VII-7

D. Ground Water Quality……...…. VII-8
Chapter 1. Ambient Ground Water Monitoring Program…….…... VII-8
Chapter 2. Underground Injection Control (UIC) Program……..…….….. VII-9
Chapter 3. Additional Ground Water-Related Projects…….….. VII-10

REFERENCES..... VIII-1

APPENDICES..... A-1

Appendix A. Agency and Organization Data Request..... A-1

Appendix B. Estimated Weighted Average Methyl-Mercury Concentrations in Fish for Lake Sakakawea..... B-1

Appendix C. Estimated Weighted Average Methyl-Mercury Concentrations in Fish for Lake Oahe and the Missouri River..... C-1

Appendix D. Estimated Weighted Average Methyl-mercury Concentrations in Fish for Devils Lake..... D-1

Appendix E. Estimated Weighted Average Methyl-mercury Concentrations in Fish for the Red River of the North..... E-1

Appendix F. Public Notice Statement Requesting Public Comment on the State of North Dakota's Draft 2006 Section 303(d) List…. F-1

Appendix G. Public Comments Received on the State of North Dakota's Draft 2006 Section 303(d) List and the State Responses..... G-1

TABLES

Table III-1. Atlas..... III-1

Table III-2. Status and Budgets for Projects Supported Under the 2003 Consolidated Section 319 Grant (1/1/03-9/30/05)……. …….. III-14

Table III-3. Section 319 Allocation and Expenditures per Project Category (1/1/03-9/30/05)…….…… III-19

Table III-4. Agencies/Organizations Represented on the North Dakota NPS Pollution Task Force…….……. III-20

Table III-5. BMPs Supported Under the 2003 Consolidated Grant (1/1/03-9/30/05)……... III-22

Table III-6. STEPL Estimates – Nitrogen, Phosphorus and Sediment Load Reduction 2005……...….. III-24

Table IV-1. Ambient Water Quality Monitoring Network Sites……. IV-3

Table IV-2. Ambient Water Quality Monitoring Parameters……..… IV-6

Table IV-3. Assessment Categories for the Integrated Report..... IV-17

Table IV-4. Biological Integrity Scoring and Aquatic Life Use Support Criteria Based on the Lake Agassiz Plain Ecoregion Fish IBI..... IV-29

Table IV-5. Macroinvertebrate IBI Scores for Reference Sites in the Lake Agassiz Plain Ecoregion of North Dakota……..... IV-29

Table IV-6. Biological Integrity Scoring and Aquatic Life Use Support Criteria Based on the Lake Agassiz Plain Ecoregion Macroinvertebrate IBI……. IV-29

Table IV-7. State Water Quality Standards for Chloride, Sulfate and Nitrate (NDDoH, 2001)…….……. IV-31

Table V-1. Assessment Category Summary for Rivers and Streams in North Dakota (Miles)..... V-2

Table V-2. Individual Use Support Summary for Rivers and Streams in North Dakota (Miles)..... V-3

Table V-3. Impairment Summary for Rivers and Streams in North Dakota..... V-4

Table V-4. Impairment Source Summary for Rivers and Streams in North Dakota V-6

Table V-5. Assessment Category Summary for Lakes and Reservoirs in North Dakota (Acres)..... V-7

Table V-6. Individual Use Support Summary for Lakes and Reservoirs in North Dakota (Acres)..... V-8

Table V-7. Impairment Summary for Lakes and Reservoirs in North Dakota..... V-9

Table V-8. Impairment Source Summary for Lakes and Reservoirs in North Dakota..... V-11

Table V-9. Trophic Status of Lakes and Reservoirs in North Dakota..... V-12

Table V-10. Definitions of Functions for Temporary and Seasonal Prairie Pothole Wetlands…… V-21

Table VI-1. 2006 List of Section 303(d) TMDL Waters for the Souris River Basin in North Dakota..... VI-5

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota VI-8

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota..... VI-26

Table VI-4. 2006 List of Section 303(d) TMDL Waters for the James River Basin in North Dakota..... VI-37

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006..... VI-42

Table VII-1. 2003 Reported Ground Water Use in North Dakota…… VII-3

FIGURES

Figure III-1. Major Hydrologic Basins in North Dakota……..……..……. III-3

Figure III-2. Average BOD and TSS Concentrations for Wastewater Discharges…….. III-6

Figure III-3. Cumulative Cost Category Expenditures Under the 2003 Grant (1/1/03-9/30/05)…… III-25

Figure III-4. BMP Category Expenditures Under the 2003 Grant (1/1/03-9/30/05)…….. III-26

Figure III-5. Map Depicting Areas of Responsibility for Regional TMDL/Watershed Liaison Staff……. III-28

Figure IV-1. Ambient Water Quality Monitoring Network for Rivers and Streams…… IV-5

Figure IV-2. Map of Reach-Indexed Assessment Units Delineated in the Souris River Basin..... IV-18

Figure IV-3. Macroinvertebrate Sampling Sites in North Dakota (1995-2000)…….. IV-22

Figure IV-4. A Graphic Representation of Carlson's TSI..... IV-24

Figure V-1. Prairie Pothole Region…….… V-17

Figure VI-1. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Souris River Basin..... VI-7

Figure VI-2. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Upper Red River Basin..... VI-24

Figure VI-3. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lower Red River Basin..... VI-25

Figure VI-4. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lake Sakakawea/Missouri River Basin..... VI-35

Figure VI-5. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lake Oahe/Missouri River Basin..... VI-36

Figure VI-6. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the James River Basin..... VI-41

Figure VII-1. Major Glacial Drift Aquifers in North Dakota…….. VII-1

Figure VII-2. Location and Extent of North Dakota's Primary Bedrock Aquifers……. VII-2

PART I. EXECUTIVE SUMMARY

The Clean Water Act (CWA) contains several sections which require states to report on the quality of their waters. Section 305(b) (*State Water Quality Assessment Report*) requires a comprehensive biennial report and Section 303(d) requires, from time to time, a list of a state's water quality-limited waters needing total maximum daily loads (TMDLs). The primary purpose of the Section 305(b) *State Water Quality Assessment Report* is to assess and report on the extent to which beneficial uses of the state's rivers, streams, lakes, reservoirs and wetlands are met. Section 305(b) of the Clean Water Act requires states to submit this assessment report every two years; the information presented in this report is for the reporting period of 2004-2005. The Section 305(b) report is a summary report that presents information on use impairment and the causes and sources of impaired or threatened uses for the state as a whole. While the Section 305(b) report is considered a summary report, Section 303 and its accompanying regulations (CFR Part 130 Section 7) require each state to list individual waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) which are considered water quality limited and which require load allocations, waste load allocations and TMDLs. This list has become known as the "TMDL list" or "Section 303(d) list."

The North Dakota Department of Health (hereafter referred to as the department) currently recognizes 224 lakes and reservoirs for water quality assessment purposes. Of this total, there are 134 manmade reservoirs and 90 natural lakes. All lakes and reservoirs included in this assessment are considered significantly publicly owned. Based on the state's Assessment Database (ADB), the 134 reservoirs have an areal surface of 542,868 acres. Reservoirs comprise about 76 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 67 percent of the state's entire lake and reservoir acres are contained within the two mainstem Missouri River reservoirs (Lake Sakakawea and Lake Oahe). The remaining 132 reservoirs share 62,137 acres, with an average surface area of 471 acres. The 90 natural lakes in North Dakota cover 172,051 acres, with approximately 125,000 acres or 73 percent attributed to Devils Lake. The remaining 89 lakes average 523 acres, with half being smaller than 200 acres. There are 54,427 miles of rivers and streams in the state. Estimates of river stream miles in the state are based on the National Hydrography Dataset (NHD).

For purposes of 2006 Section 305(b) reporting and Section 303(d) listing, the U.S. Environmental Protection Agency (EPA) is encouraging states to submit an integrated report and to follow its integrated reporting guidance (EPA, 2005). Key to integrated reporting is an assessment of all of the state's waters and placement of those waters into one of five categories. The categories represent varying levels of water quality standards attainment, ranging from Category 1, where all of a waterbody's designated uses are met, to Category 5, where a pollutant impairs a waterbody and a TMDL is required.

Eighty-two percent (3,727 miles) of the rivers and streams assessed for this report fully support the beneficial use designated as aquatic life. Of the streams assessed as fully supporting aquatic life use, a little more than 62 percent (2,331 miles) are considered threatened. In other words, if water quality trends continue, the stream may not fully support its use for aquatic life in the future. The remaining 18 percent of rivers and streams assessed for this report were assessed as not supporting aquatic life use.

Nonpoint source (NPS) pollution (e.g., siltation/sedimentation and stream habitat loss or degradation) was the primary cause of aquatic life use impairment. Other forms of pollution causing impairment are trace element contamination, flow alteration and oxygen depletion. The primary sources of pollutants affecting aquatic life use in the state are cropland erosion and runoff, animal feeding operations and poor grazing management. Other sources linked to aquatic life use impairment are point source discharges, urban runoff and hydrologic modifications (e.g., upstream impoundments, low-head dams, channelization, flow regulation and diversion, riparian vegetation removal, wetland drainage).

Recreation use was assessed on 6,389 miles of rivers and streams in the state. Recreation use was fully supporting, fully supporting but threatened and not supporting on 2,191 miles, 2,435 miles and 1,763 miles, respectively. Fecal coliform bacteria data collected from monitoring stations across the state were the primary indicators of recreation use attainment. For this reason, pathogens (as reflected by fecal coliform bacteria) are the primary cause of recreation use impairment in North Dakota. The primary sources of fecal coliform bacteria contamination are animal feeding operations and riparian area grazing.

Drinking water supply use is classified for 5,483 miles of rivers and streams in the state. Of the 1515 miles assessed for this report, only 158 miles (8.6 percent) were assessed as threatened for drinking water supply use. The primary threats are taste and odor problems.

A total of 4,028 miles of rivers and streams were identified as capable of supporting a sport fishery from which fish could be used for consumption. Based on the EPA fish tissue of 0.3 micrograms (μg) methyl-mercury/gram of fish tissue, only the Red River of the North was assessed as not supporting fish consumption. While there are many potential sources of methyl-mercury, both anthropogenic and natural, to date there have been no specific causes or sources identified for the mercury present in North Dakota fish.

A total of 100 lakes and reservoirs (33 natural lakes and 67 reservoirs), representing 675,917 surface acres, were assessed for this report. The remaining 124 lakes and reservoirs not assessed represent 39,174 acres or only 5.5 percent of the total lake and reservoir acres. Ninety-seven lakes and reservoirs, representing 675,957 acres, were assessed as fully supporting aquatic life use; in other words, they are considered capable of supporting and maintaining a balanced community of aquatic organisms. Of this total, 37 lakes and reservoirs representing 378,757 acres are considered threatened. A threatened assessment means that if water quality and/or watershed trends continue, it is unlikely these lakes will continue to support aquatic life use. If this trend continues, these lakes and reservoirs will begin to experience more frequent algal blooms and fish kills. They will display a shift in trophic status from a mesotrophic or eutrophic condition to a hypereutrophic condition. Only three lakes, totaling 172 acres, were assessed as not supporting aquatic life use. One of the primary causes of aquatic life impairment to lakes and reservoirs is low dissolved oxygen (DO) in the water column. Low DO in lakes can occur in summer (summer kills) but usually occurs in the winter under ice-cover conditions. When fish kills occur, low DO-tolerant fish species (e.g., carp, bullhead, white suckers) will be favored, resulting in a lake dominated by these rough fish species. Pollutants which stimulate the production of organic matter, such as plants and algae, can also cause aquatic life impairment. Two secondary pollutant causes are excessive nutrient loading and siltation (Table V-5).

Major sources of nutrient loading to the state's lakes and reservoirs are erosion and runoff from cropland, runoff from animal feeding operations (e.g., concentrated livestock feeding and wintering operations) and hydrologic modifications. Hydrologic modifications, such as wetland drainage, channelization and ditching, increase the runoff and delivery rates to lakes and reservoirs, in effect increasing the size of a lake's watershed.

Recreation use (e.g., swimming, waterskiing, boating, sailing, sunbathing) was assessed for 675,921 lake and reservoir acres in the state. Of this total, three lakes, representing 5,565 acres, were assessed as not supporting use for recreation. The primary cause of use impairment is excessive nutrient loading, which results in nuisance algal blooms and noxious aquatic plant growth. Sources of nutrients causing algal blooms and weed growth are erosion and runoff from cropland, runoff from animal feeding operations and hydrologic modifications. Forty-four lakes and reservoirs, totaling 143,997 acres, were assessed as threatened.

Two-hundred and nine lakes and reservoirs, representing 708,248 acres, were assigned the use for fish consumption. Of these, only Devils Lake and Lake Sakakawea had sufficient methyl-mercury fish tissue data and fish population survey data necessary to calculate weighted average concentrations and to assess fish consumption use. Based on these data, both were assessed as not supporting fish consumption use. The remaining 207 lakes and reservoirs which support a sport fishery were not assessed for this report. Sources of methyl-mercury in fish remain largely unknown. Potential sources of mercury include natural sources and atmospheric deposition.

Four reservoirs (Lake Sakakawea, Homme Dam, Bisbee Dam and Mt. Carmel Reservoir) are currently used either directly or indirectly as municipal drinking water supplies, while two others (Patterson Lake and Renwick Dam) serve as back-up water supplies in the event the primary water supplies should fail. Homme Dam, Mt. Carmel Reservoir and Lake Sakakawea were assessed as fully supporting drinking water supply use. Drinking water supply use was not assessed for the remaining lakes and reservoirs.

Section 303(d) of the CWA and its accompanying regulations require each state to list waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) which are considered water quality limited and require load allocations, waste load allocations and TMDLs. This list has become known as the "TMDL list" or "Section 303(d) list." A waterbody is considered water quality limited when it is known that its water quality does not meet applicable standards or is not expected to meet applicable standards. Waterbodies can be water quality limited due to point source pollution, NPS pollution or both.

In considering whether or not applicable water quality standards are being met, the state should not only consider the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Where a waterbody is water quality limited, the state is required to determine, in a reasonable time frame, the reduction in pollutant loading necessary for that waterbody to meet water quality standards, including its beneficial uses. The process by which the pollutant-loading capacity of a waterbody is determined and the load is allocated to point and nonpoint sources is called a total maximum daily load (TMDL). While the term "total maximum daily load" implies that loading capacity is determined on a daily time scale, TMDLs can range from meeting an instantaneous

concentration (i.e., an acute standard) to computing an acceptable annual phosphorus load for a lake or reservoir.

When a state prepares its list of water quality-limited waterbodies, it is required to prioritize waterbodies for TMDL development and to identify those waterbodies which will be targeted for TMDL development within the next two years. Factors to be considered when prioritizing waterbodies for TMDL development include: (1) the severity of pollution and the uses which are impaired; (2) the degree of public interest or support for the TMDL, including the likelihood of implementation of the TMDL; (3) recreational, aesthetic and economic importance of the waterbody; (4) the vulnerability or fragility of a particular waterbody as an aquatic habitat, including the presence of threatened or endangered species; (5) immediate programmatic needs, such as wasteload allocations needed for permit decisions or load allocations for Section 319 NPS project implementation plans; and (6) national policies and priorities identified by EPA.

After considering each of the six factors, the state has developed a three-tiered priority ranking. Assessment units (AUs) listed as Priority 1 have been further categorized. Priority 1A are lakes and reservoirs and river and stream segments for which TMDLs are scheduled to be completed and submitted to EPA in the next two years. Priority 1B AUs are lakes and reservoirs and river and stream segments for which TMDL development projects are scheduled to be started in the next two years. The majority of these Priority 1A and 1B AUs were identified as such based largely on their degree of public support and interest and the likelihood of implementation of the TMDL once completed. Priority 2 AUs are those river and stream segments and lakes and reservoirs which are scheduled for completion in the next 10 years. Waterbodies for which fish consumption use is impaired due to methyl-mercury are considered Priority 3.

The 2006 Section 303(d) TMDL list for North Dakota has identified 90 waterbodies or 163 waterbody/pollutant combinations for TMDL completion in the next two years. These Priority 1A waterbodies are AUs for which the monitoring is either completed or near completion. The 2006 TMDL list has also targeted 17 waterbodies or 32 Priority 1B waterbody/pollutant combinations. These are waterbodies for which TMDL monitoring activities are scheduled to start in the next two years. These priority 1A and 1B waterbody/pollutant combinations represent more than 53 percent of all the priority 1A, 1B and 2 waterbody/pollutant combinations on the list. Based on an anticipated TMDL completion schedule of 25 additional waterbody/pollutant combinations per year following 2008, the department expects to complete TMDLs for all 2006-listed Priority 1A, 1B and 2 waters in 10 years. With the continued commitment to adequate TMDL development staffing and with a continuation in the growth of funding for TMDL development projects in the state, the department is confident it will meet its TMDL development schedule.

PART II. INTRODUCTION

The Clean Water Act (CWA) contains several sections which require states to report on the quality of their waters. Section 305(b) (*State Water Quality Assessment Report*) requires a comprehensive biennial report and Section 303(d) requires, from time to time, a list of a state's water quality-limited waters needing total maximum daily loads (TMDLs). In its regulations implementing Section 303(d), the U.S. Environmental Protection Agency (EPA) has defined "time to time" to mean April 1 of every even-numbered year. While due at the same time, states have historically submitted separate reports to EPA under these two sections. However, in guidance provided to the states by EPA dated July 29, 2005 (EPA, 2005), EPA suggested that states combine these two reports into one integrated report. The following is a brief summary of the requirements of each reporting section.

A. Section 305(b) Water Quality Assessment Report

The primary purpose of this *State Water Quality Assessment Report* is to assess and report on the extent to which beneficial uses of the state's rivers, streams, lakes, reservoirs and wetlands are met. Section 305(b) of the Clean Water Act requires states to submit this assessment report every two years; the information presented in this report is for the reporting period of 2004-2005. The Section 305(b) report is a summary report that presents information on use impairment and the causes and sources of impaired or threatened uses for the state as a whole.

This report is not a trends report, nor should the data or information in this report be used to assess water quality trends. Factors which complicate and prohibit comparisons between reporting years include changes in the number of sites, the quality of data upon which assessment information is based and changes to the estimated river and stream miles.

B. Section 303(d) TMDL List of Water Quality-limited Waters

While the Section 305(b) report is considered a summary report, Section 303 and its accompanying regulations (CFR Part 130 Section 7) require each state to list individual waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) which are considered water quality limited and which require load allocations, waste load allocations and TMDLs. This list has become known as the "TMDL list" or "Section 303(d) list."

A waterbody is considered water quality limited when it is known that its water quality does not or is not expected to meet applicable water quality standards. Waterbodies can be water quality limited due to point sources of pollution, nonpoint sources (NPS) of pollution or both.

In considering whether or not applicable water quality standards are being met, the state should not only consider the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Therefore, a waterbody could be considered water quality limited when it can be demonstrated that a beneficial use (e.g., aquatic life or recreation) is impaired, even when there are no demonstrated exceedances of either the narrative or numeric criteria. In cases where there is use impairment and no exceedance of the numeric standard, the state should provide information as to the cause of the

impairment. Where the specific pollutant (e.g., copper or phosphorus) is unknown, a general cause category (e.g., metals or nutrients) should be included with the waterbody listing.

Section 303(d) of the CWA and accompanying EPA regulations and policy only require impaired and threatened waterbodies to be listed and TMDLs developed when the source of impairment is a pollutant. Pollution, by federal and state definition, is "any man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water." Based on the definition of a pollutant provided in Section 502(6) of the CWA and in 40 CFR 130.2(d), pollutants would include temperature, ammonia, chlorine, organic compounds, pesticides, trace elements, nutrients, biochemical oxygen demand (BOD), sediment and pathogens. Waterbodies impaired by habitat and flow alteration and the introduction of exotic species would not be included in the Section 303(d) TMDL list, as these impairment categories would be considered pollution and not pollutants. In other words, all pollutants are pollution, but not all pollution is a pollutant.

Where a waterbody is water quality limited, the state is required to determine, in a reasonable timeframe, the reduction in pollutant loading necessary for that waterbody to meet water quality standards, including its beneficial uses. The process by which the pollutant loading capacity of a waterbody is determined and the load is allocated to point and nonpoint sources is called a total maximum daily load (TMDL). While the term "total maximum daily load" implies that loading capacity is determined on a daily time scale, TMDLs can range from meeting an instantaneous concentration (i.e., an acute standard) to computing an acceptable annual phosphorus load for a lake or reservoir.

Section 303(d) requires states to submit their lists of water quality-limited waterbodies "from time to time." Federal regulations have clarified this language; therefore, beginning in 1992 and by April 1 of every even-numbered year thereafter, states are required to submit a revised list of waters needing TMDLs. North Dakota's last TMDL list was submitted to EPA on March 31, 2004 and was approved by EPA on August 17, 2004.

This Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDLs and waterbodies which have been removed from the 2004 list. Reasons for removing a waterbody from the 2004 list include: (1) a TMDL has been completed for the waterbody and approved by EPA; (2) current data and/or information suggests the waterbody is now meeting water quality standards; (3) data and/or information used to list the waterbody as water quality limited has been determined to be insufficient and/or of poor quality; or (4) the assessment was made based on best professional judgment.

PART III. BACKGROUND

A. Atlas

Table III-1. Atlas

Topic	Value
State Population[1]	642,200.00
State Surface Area (Sq. Miles)	70,700.00
Total Miles of Rivers and Streams[2]	54,427.35
Total Miles of Rivers and Streams by Stream Class[3]	
Class I, IA, and II Streams	5,482.88
Class III Streams	48,944.47
Total Miles of Rivers and Streams by Basin	
Red River (including Devils Lake)	11,881.26
Souris River	3,645.00
Upper Missouri (Lake Sakakawea)	13,877.43
Lower Missouri (Lake Oahe)	22,271.01
James River	2,752.65
Border Miles of Shared Rivers and Streams[4]	427.03
Total Number of Lakes and Reservoirs[5]	224.00
Number of Natural Lakes	90.00
Number of Manmade Reservoirs	134.00
Total Acres of Lakes and Reservoirs	714,919.01
Acres of Natural Lakes	172,051.20
Acres of Manmade Reservoirs[6]	542,867.81
Acres of Freshwater Wetlands[7]	2,500,000.00

[1] Based on the 2000 Census
[2] Total miles are based on the National Hydrography Dataset (NHD).
[3] Stream classes are defined in the *Standards of Quality for Waters of the State* (North Dakota Department of Health, 2001). In general, Classes I, IA, and II streams are perennial, while Class III streams are intermittent or ephemeral.
[4] Includes the Bois de Sioux River and the Red River of the North
[5] Number includes only the lakes and reservoirs which are publicly owned and are in the Assessment Database.
[6] Estimates based on surface acreage at full pool elevation.
[7] Estimate provided by Dahl, T.E., *Wetlands - Losses in the United States: 1780's to 1980's*, Washington, D.C., U.S. Fish and Wildlife Service Report to Congress, 1990.

B. Total Waters

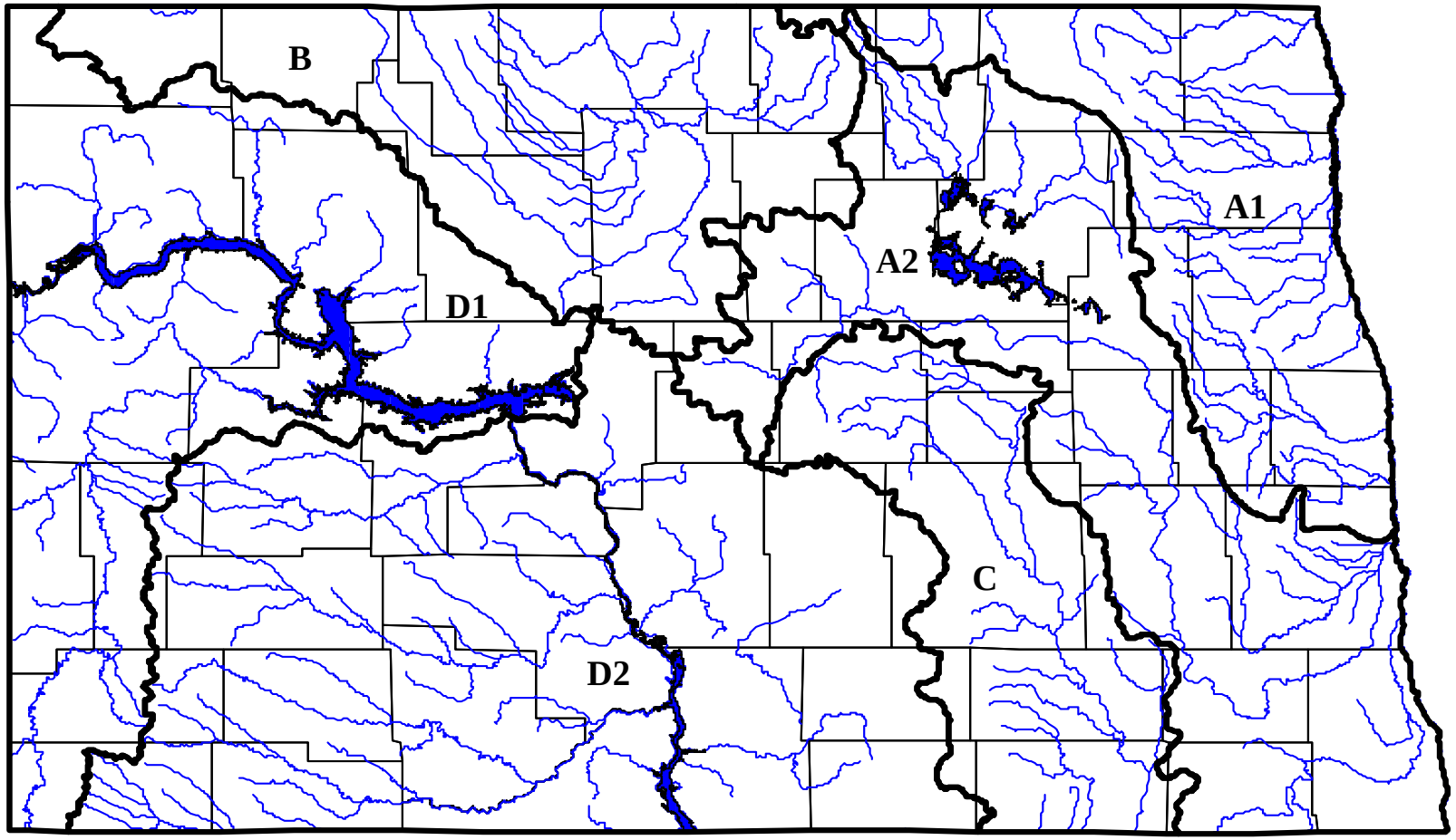
The North Dakota Department of Health (hereafter referred to as the department) currently recognizes 224 lakes and reservoirs for water quality assessment purposes. Of this total, there are 134 manmade reservoirs and 90 natural lakes. All lakes and reservoirs included in this assessment are considered significantly publicly owned.

Reservoirs are defined as waterbodies formed as a result of dams or dugouts constructed on natural or manmade drainages. Natural lakes are waterbodies having natural lake basins. A natural lake can be enhanced with outlet control structures, diversions, or dredging. Based on the state's Assessment Database, the 134 reservoirs have an areal surface of 542,868 acres. Reservoirs comprise about 76 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 67 percent of the state’s entire lake and reservoir acres are contained within the two mainstem Missouri River reservoirs (Lake Sakakawea and Lake Oahe). The remaining 132 reservoirs share 62,137 acres, with an average surface area of 471 acres.

The 90 natural lakes in North Dakota cover 172,051 acres, with approximately 125,000 acres or 73 percent attributed to Devils Lake. The remaining 89 lakes average 523 acres, with half being smaller than 200 acres.

There are 54,427 miles of rivers and streams in the state. Estimates of river stream miles in the state are based on the National Hydrography Dataset (NHD). The NHD is based upon the content of the U.S. Geological Survey (USGS) Digital Line Graph (DLG) hydrography data, integrated with reach-related information from the EPA Reach File Version 3 (RF3). The NHD incorporates the DLG and RF3; it does not replace them.

In this report, the state has been divided into five basins: Red River (including Devils Lake), Souris River, Upper Missouri River (Lake Sakakawea), Lower Missouri River (Lake Oahe), and James River (Figure III-1). The atlas provided in Table III-1 provides a basin-by-basin estimate of total river and stream miles.



A - Red River Basin
1 - Lower Red River Subbasin
2 - Upper Red River Subbasin
B - Souris River Basin
C - James River Basin
D - Missouri River Basin
1 - Lake Sakakawea Subbasin
2 - Lake Oahe Subbasin

Figure III-1. Major Hydrologic Basins in North Dakota

C. Water Pollution Control Program

Chapter 1. Water Quality Standards Program

The State of North Dakota periodically updates the standards of water quality. The standards describe the policy of the state which is to protect, maintain, and improve the quality of water for use as public and private water supplies; for propagation of wildlife, fish, and aquatic life; and for domestic, agricultural, industrial, recreational, and other legitimate beneficial uses.

The state classifies its water into five categories. The assignment of a waterbody into a particular classification is based on the water quality of record (1967), existing uses at that time, hydrology, and natural background factors.

The standards identify specific numeric criteria for chemical, biological, and physical parameters. The specific numeric standard assigned to each parameter ensures protection of the beneficial uses for that classification. The standards also contain general conditions applicable to all waters of the state. These general conditions contain provisions not specifically addressed in numeric criteria. These conditions add an extra level of protection for water quality.

The department developed a narrative biological goal. The goal is to restore all surface waters to a condition similar to that at sites or waterbodies determined to be regional reference sites. The goal is non-regulatory; however, it may be used in combination with other information in determining whether designated uses are attained. The state is also in the process of developing "biological criteria." These criteria will define ecological conditions in state waters and set goals for their attainment.

The beneficial uses of wetlands are currently under consideration. Wetlands are waters of the state and, therefore, protected by general conditions.

An antidegradation implementation procedure has been developed. This procedure delineates the specific process the department's Division of Water Quality uses to support the antidegradation policy. The antidegradation procedure was applied to the Maple River Dam Project and the Devils Lake Outlet Project. The Devils Lake outlet permit was challenged in court. On a number of issues, including antidegradation, the department's interpretation and subsequent application of the procedure was upheld in district court and the North Dakota Supreme Court.

Chapter 2. Point Source Control Program

The department regulates all releases of wastewater from point sources into waters of the state. Permitting point source discharges is the responsibility of the department's Division of Water Quality. The North Dakota Pollutant Discharge Elimination System (NDPDES) Program requires all point source dischargers (municipal and industrial) to obtain a permit. NDPDES permits outline technology-based and water quality-based limits for wastewater discharges. There are approximately 400 facilities (25 percent industrial and 75 percent municipal) that are permitted for discharges of treated wastewater.

The NDPDES Program also includes coverage for storm water discharges associated with industrial and construction activity. There are approximately 337 facilities covered under general permits for storm water discharges from industrial activities. Included in these general permits are requirements for monitoring and sampling of storm water discharges. All discharge data is evaluated and used to update the standard pollution prevention practices being used in the state. These facilities must implement pollution prevention plans aimed to improve the quality of storm water discharges.

There are approximately 669 facilities covered for construction storm water and 18 municipal separate storm sewer system (MS4) storm water permits. The department continues to implement the Storm Water Phase II regulations (December 8, 1999) to the maximum extent possible. The federal Storm Water Phase II regulations have been incorporated into the department's state rules. Permits for small construction and small MS4s have been and continue to be implemented. The designation criteria for small MS4s outside urbanized areas has been developed and applied. All regulated small MS4s have applied for and received permit coverage. The focus of activity with MS4s during the past year has been on the development of ordinances or other regulatory mechanisms for local construction site erosion and sediment and post construction controls.

The department is also actively involved with the Red River Work Group on issues relating to storm water discharges in the Red River Valley. The Energy and Environmental Research Center (EERC) from the University of North Dakota received funding from EPA to coordinate activities associated with requirements of MS4 permitting in the Red River Valley. The Regional Storm Water Coordination Program includes those select MS4 permitted communities in both North Dakota and Minnesota, and meetings are held quarterly. EERC has created an Education Outreach Presentation web page containing informational material on best management practices (BMPs) for industrial sites and construction activities

Rewriting of the industrial storm water permit resulted in substantial changes from the previous permit. Several of the forms and guidance materials for the industrial permit and the construction permit (finalized in October 2004) were revised or created to reflect the new permit conditions.

Many of the wastewater treatment systems in North Dakota consist of impoundments or lagoons. The availability of land and the low operation and maintenance costs are the main reasons for their use and acceptance in North Dakota. These wastewater stabilization pond systems discharge intermittently, and the discharges are short in duration. The average discharge

duration is less than six days in length with the majority of the discharges occurring in the spring and fall. A facility that receives permission to discharge treated wastewater is required to monitor the discharge for quality and quantity data. This information is submitted to the department in monthly, quarterly or semi-annual reports which are tracked and monitored for compliance with conditions of the permit.

The overall quality of wastewater is commonly indicated by 5-day biochemical oxygen demand (BOD-5) and total suspended solids (TSS). Typically, high concentrations of BOD and TSS indicate poor treatment system performance which can present an environmental concern. Treated wastewater from many of the state's permitted facilities is discharged over land or through ditches before it reaches waters of the state. In such cases, it is likely the reported concentrations for BOD-5 and TSS are further reduced prior to entering a waterbody.

Figure III-2 shows the mean concentrations of BOD-5 and TSS. Data used to generate these graphs are for the years 1981 through December of 2005. There continues to be a slight downward trend in the mean concentrations of TSS and BOD.

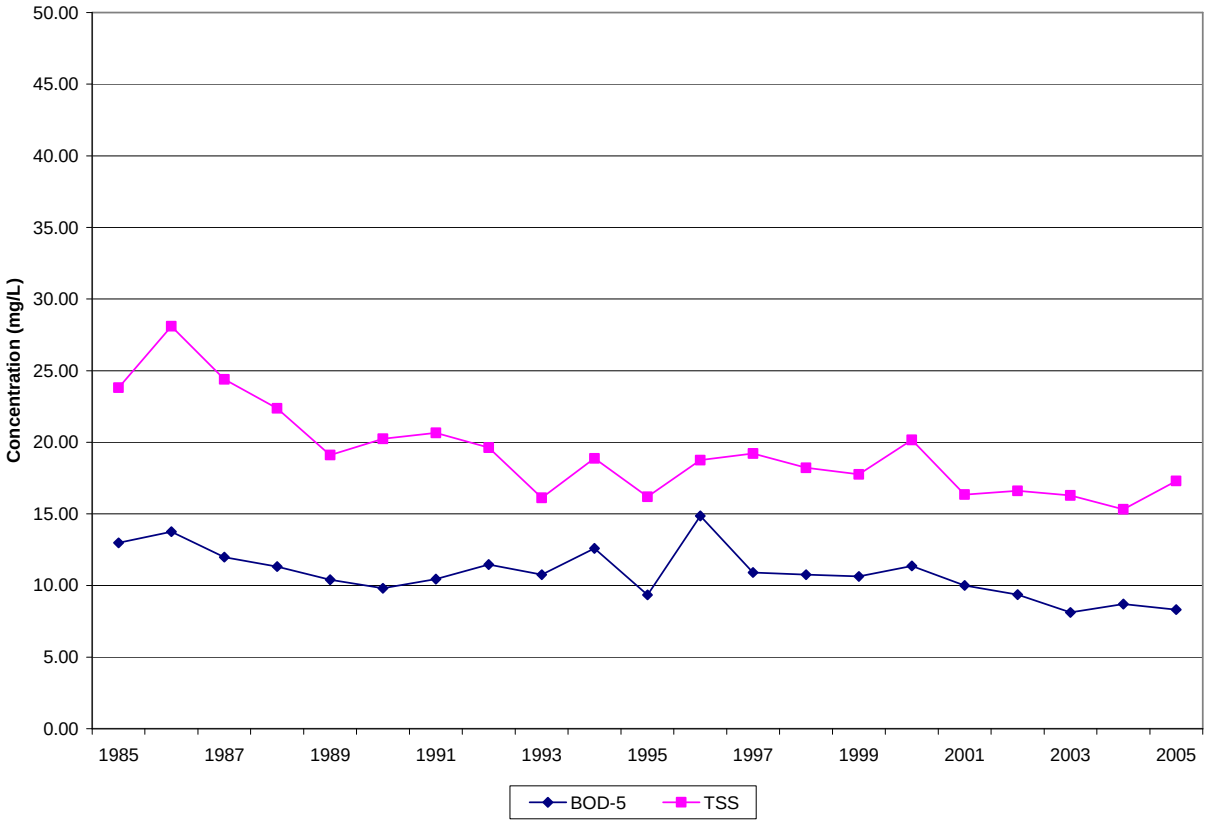


Figure III-2. Average BOD and TSS Concentrations for Wastewater Discharges

For 13 consecutive years, certain parts of eastern (primarily northeastern) North Dakota have received above-normal precipitation mainly in the form of rainfall. Localized flooding in these areas has compounded wastewater treatment and storage problems. The above-normal precipitation also has resulted in several bypasses and lagoon overflows. Several of the communities initiated major improvements to their wastewater collection and treatment systems. The number of discharges and total volume of water discharged annually continues to be above normal (upward trend that started in 1993). The NDPDES Program requires all permitted industrial and municipal facilities to report spills and releases of wastewater. Most releases were related to mechanical failure and/or excessive precipitation events.

Generally, development of TMDLs has not been required for point source discharges in North Dakota. TMDL development activity occurs mainly in rural watersheds dealing with NPS issues. There is effective internal coordination during the development of TMDL/waste load allocation (WLA) requirements, and no formal tracking mechanism has been required in the NDPDES Program at this time. There presently are no permits requiring modification/reissuance to implement applicable WLAs in approved TMDLs, and no permits have been modified or reissued to implement WLAs in approved TMDLs. The department, with the cooperation of the cities of Fargo and Moorhead, Minnesota Pollution Control Agency and the USGS, completed a time-of-travel study with synoptic sampling for the low-flow TMDL for the Red River in the Fargo area. The department is also completing a low-flow TMDL for the James River near Jamestown. Results of the TMDLs will be used to determine if modifications to NDPDES permits are needed for the cities of Fargo and Jamestown, respectively.

Toxic pollutants in wastewater discharges are an important concern, particularly for the larger cities and industries in North Dakota. They are regulated through the Industrial Pretreatment Program. North Dakota recently received primacy (September 9, 2005) from EPA for implementing the Industrial Pretreatment Program which had been administered by EPA Region VIII. The cities of Grand Forks, Fargo, Bismarck, Mandan and West Fargo have approved pretreatment programs. The department is working closely with EPA Region VIII on a smooth transition for implementing this program in North Dakota.

All waters of the state shall be free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to humans, animals, plants or resident biota. This standard is enforced in part through appropriate Whole Effluent Toxicity (WET) requirements. All major municipal and industrial permittees must monitor their discharges for WET on a regular basis. At a minimum, these municipalities and industries sample quarterly for WET testing with results submitted for review. Failures of WET testing can result in a toxicity identification evaluation (TIE) to determine the cause of toxicity in the effluent. TIEs that have been completed in the state have resulted in major and minor improvements to wastewater treatment systems.

Several cities and industries have selected biological treatment methods to improve their wastewater treatment systems and the quality of their discharge water. The biological treatment unit at the Amoco Refinery in Mandan is providing consistent, advanced treatment of its wastewater. The Devils Lake “Lemna” system was specifically designed to remove phosphorus from the wastewater. This treatment system generally provides an advanced level of nutrient removal; however, flooding in the Devils Lake basin since 1993 has taxed the system beyond its

design capabilities. An interim phosphorus limit/goal has been established to compensate for the adverse operating conditions which currently prevail.

The wetland treatment system for the city of Minot has resulted in the maintenance of low ammonia concentrations in the final effluent. The city is capable of continuously discharging a quality effluent which adds to the river flow and enhances aesthetic river quality. This has been extremely beneficial since the Souris River has a history of poor river quality and low- or no-flow conditions during the summer months.

American Crystal Sugar uses a combination of lagoons and constructed wetlands for wastewater treatment and polishing/finishing at both its Hillsboro and Drayton plants. The final effluent from both these facilities surpasses the federal effluent criteria for sugar beet processing plants. The 1.5 million-gallon-per-day (MGD) anaerobic digester and clarifier at the Hillsboro plant maximizes the performance of the existing aerobic digester, resulting in a reduction of the feed water strength while maintaining a constant temperature throughout the season. American Crystal Sugar can then route this high quality water to its wetlands earlier in the season, maximizing the wetland's ability to treat the wastewater prior to discharge. The wetland's effluent consistently surpasses the federal effluent criteria established for sugar beet processing for suspended solids and oxygen demand.

The Minn-Dak Farmer's Cooperative sugar beet processing plant uses both mechanical and facultative lagoons for wastewater treatment at the Wahpeton facility. The wastewater receives additional treatment/polishing in the large discharge reservoir from which the final effluent is discharged through an in-stream diffuser to the Red River. Minn-Dak continues to coordinate its discharges with the Cargill corn milling plant, since both facility permits contain receiving stream quality requirements for sulfate, chloride and total dissolved solids.

Cargill Corn Milling (ProGold) produces high fructose corn syrup at its facility near Wahpeton. The plant discharges select waste streams to the Red River on a continuous basis with storage ponds available to store wastewater when treatment is inadequate or when the river would be adversely affected. Wastewater high in total dissolved solids is stored in two ponds on site. To meet the requirements of ProGold's permit, these ponds must be discharged according to conditions in the Red River and coordinated with discharges from downstream users and the Minn-Dak Farmer's Cooperative Plant. The background water quality in the Red River has been the most limiting factor for coordinating discharges from the ponds, particularly when flows are predominantly from Lake Traverse.

The city of Fargo's wastewater treatment plant continues to provide a quality effluent to the Red River. Wastewater treatment consists of pretreatment/odor control, primary clarification, trickling filters, nitrification filters, final clarification and disinfection. The residuals management (biosolids) consists of digesters, sludge drying beds and belt presses. The processed solids are being used as cover at the municipal landfill. The city continues to explore several options to address the biosolids issue. Fargo still maintains its six, 90-acre wastewater stabilization ponds which can be used for storage during times of flooding or when an upset occurs in the treatment plant. The city is moving forward with the design and construction of a new force main interceptor to transport wastewater from south Fargo to the treatment plant located in the north part of town.

Bismarck continues to move forward with upgrades to its wastewater treatment plant. The facility master plan consists of long-term capital and life expectancy estimates, cost estimates, conclusions/recommendations and a prioritization of the order of improvements to the facility. The long-range improvements in the facility plan are expected to include new pretreatment (head-works) facilities, an additional primary clarifier as well as updates to the existing primary clarifiers, trickling filter, final clarifier and control systems. To assist with BOD-5 permit compliance, three large storage tanks for biosolids retention have been constructed. The second phase of improvements consists of the new pre-treatment facility which is proposed for bidding in calendar year 2006.

The city of Grand Forks started operation of its new wastewater treatment facility in late fall 2002. The activated sludge plant uses a European technology of "Micro-Bubble" flotation and is designed for 15 MGD. After startup, the ground settled and shifted in the vicinity of the main conduit between two sections of the plant. A temporary repair was made, which allows the plant to resume full-scale operation while a permanent solution is selected. Plant operations staff and the contractors are continuing to fine tune the process controls to provide optimal wastewater treatment. Water from the treatment plant is routed to the stabilization ponds which the city continues to operate. In the future, the city should be discharging on a continual basis to the river.

The Mandan wastewater treatment plant consists of a "biolac wave oxidation" process which includes extended aeration for BOD removal, nitrification and sludge stabilization. The whole process was constructed in the city's old primary aerated lagoon cell. The plant has averaged more than 90 percent removal of BOD and TSS. This plant is the first in the state to use ultraviolet disinfection of the treated wastewater.

The Jamestown mechanical wastewater treatment plant was designed to treat agricultural process wastes which are blended with domestic waste from the city. Excess oil and grease from the Cavendish Farms potato processing plant were causing operational difficulties with the low-rate anaerobic digester, and although discharge quality was not affected, the increased maintenance costs were burdensome to the city. A newly constructed grease and sand interceptor is now removing the majority of the grease coming into the plant. The city also has the capability of treating and storing wastewater in its lagoon system. The department is in the process of reissuing the city's NDPDES permit which may include discharge limitations based on results of the low-flow TMDL completed for that section of the James River.

The department has issued an NDPDES permit to the State Water Commission for the Devils Lake emergency outlet. The Devils Lake basin has received above-normal precipitation since 1993. This has resulted in a 25-foot rise in lake elevation. To address flooding concerns, federal, state and local officials have implemented a three-pronged approach consisting of basin water management, infrastructure protection and an outlet to the Sheyenne River. The NDPDES permit was issued for a temporary discharge from West Bay of Devils Lake to the Sheyenne River. The purpose of this project is to remove water from Devils Lake, to reduce damages around the lake and to reduce the risk of a natural overflow. The NDPDES permit has come under scrutiny. Several entities including Environment Canada, the province of Manitoba, Minnesota Department of Natural Resources, Minnesota Chapter of American Fisheries Society and the People to Save the Sheyenne River have objected to the issuance of the permit. The

NDPDES permit was challenged in State District Court in April 2004 and was appealed to the State Supreme Court in 2005. The Court ruled that the department followed appropriate procedures in issuing the permit. Construction was completed on the outlet, and water started flowing from Devils Lake to the Sheyenne River in August 2005.

The department and EPA continue to work on addressing storm water noncompliance in the construction and auto salvage sectors. The focus was on non-filers and on permitted facilities where there is water quality degradation and/or a threat to public health. Routine inspections resulted in informal enforcement letters requesting additional information and/or requiring repairs to BMPs. In addition, the department issued eight formal warning letters citing apparent noncompliance with permit rules and water quality statutes. Six Notices of Violation (NOVs) were issued through the Attorney General's office. The department initiated four consent agreements with penalties assessed. Penalties ranged from $16,000 to $24,000, which included both upfront and suspended penalties. For each case, the collected penalty exceeded any economic benefit of non-compliance.

The department continues to be very active in implementing the state's Livestock Feeding Operations Control Program and performs annual inspections at all large (more than 1000 animals) facilities. The department recently incorporated the February 12, 2003 federal CAFO rules into the state program. These consisted of updates to the NDPDES rules (NDAC 33-16-01) and Control of Pollution from Animal Feeding Operations rules (NDAC 33-16-03.1). The new state rules became final on January 7, 2005. The state continues to permit livestock facilities under the current program. The department has an internal draft general NDPDES permit for CAFOs; however, it is waiting for EPA's response to the 9th District Court decision (determining permit requirements for CAFOs) before moving forward with issuance of the new permit. In addition, EPA's response may require the department to amend the CAFO rules to be consistent with any changes resulting from the Court decision.

Facility, event and inspection data for all permitted livestock facilities are entered into the NDPDES permit data base system. This information is provided to EPA on a regular basis. The department's program has no NDPDES permits written for CAFOs at this time; however, the state continues to address all animal feeding operations through existing mechanisms or programs and by requiring operators to obtain permit coverage or eliminate unacceptable conditions that cause pollution.

The department is continuing to provide educational materials to livestock producers and the public on the impacts livestock manure has on waters of the state. Several times each year, the department participates in presentations to producer groups. Many of these groups continue to educate their members on pollution concerns and state regulations. In addition, the department is continuing to work closely with the Natural Resources Conservation Service (NRCS) and local health units on livestock manure systems. The department is also coordinating with the North Dakota Department of Agriculture and the North Dakota Stockmen's Association on assessing potential water quality impacts at livestock facilities.

The department works closely with local zoning boards and county commissions to help them recognize sensitive areas where livestock operations may cause problems and to encourage them to limit the expansion of operations in these areas. The department spearheaded a task force

consisting of planning and zoning boards, producer groups and environmental groups to develop a model zoning ordinance for concentrated animal feeding operations.

The Operator Training Program continues to be an important aspect of water quality protection. North Dakota regulations require a certified operator for municipalities with populations of greater than 500. The goal of the program is to conduct an inspection of each municipal treatment system at least once a year. These inspections verify proper system operation and reaffirm to the operator the importance of proper operation in protecting the state's water resources. The department also conducts annual wastewater operator training and certification seminars throughout the year. In addition to the seminars, the program provides individual training and assistance to facilities encountering treatment problems.

Contracts were awarded to several health districts in the state to provide assistance in water pollution investigations. The annual contracts run through the state fiscal year (July 1 - June 30). Activities associated with these contracts are water and wastewater inspections, odor readings at animal feeding operations and initial response to spills and releases to waters of the state.

Chapter 3. Nonpoint Source (NPS) Pollution Control Program

Surface water and ground water are two of North Dakota's most valuable natural resources. Water quality is affected by both natural and cultural, point source and nonpoint source (NPS) pollution, with NPS pollution being the major factor affecting surface water quality in the state. Ground water quality has remained relatively unaffected by major sources of pollution. However, some aquifers have experienced minor water quality impairments (see Part VII. Ground Water Assessment).

All rivers, streams, reservoirs and lakes assessed within the state are impacted to some degree by NPS pollution. Generally, most surface water quality impacts are associated with agricultural activities in these watersheds. Ground water impacts result from the improper use of agricultural chemicals, leaking underground petroleum storage tanks and pipelines, wastewater impoundments, oil and gas exploration activities, septic systems and improperly located and maintained solid waste disposal sites.

NPS pollution control efforts to maintain or improve the beneficial uses of North Dakota's water resources are primarily accomplished through the North Dakota NPS Pollution Management Program. The voluntary NPS Program is dependent on the formation of partnerships and coordination with local resource managers to effectively reduce and/or prevent NPS pollution from impairing beneficial uses of the state's water resources. Over the long term, through these coordinated efforts, the cumulative benefits of the local projects will help the department achieve its mission and long-term goal as identified in the North Dakota NPS Pollution Management Program Plan. The NPS Program's mission statement and long-term goal are as follows:

> North Dakota NPS Program Mission: "To protect or restore the chemical, physical and biological integrity of the waters of the state by promoting locally sponsored, incentive based, voluntary programs where those waters are threatened or impaired due to nonpoint sources of pollution."
>
> North Dakota NPS Management Program Long Term Goal: "To initiate a balanced program focused on the restoration and maintenance of the beneficial uses of the state's water resources (i.e., streams, rivers, lakes, reservoirs, wetlands, aquifers) impaired by NPS pollution."

To achieve the long-term goal, an average of five watershed restoration projects will be targeted for implemention each year. The objective is to initiate 75 watershed restoration projects by 2013. To maintain program balance and strengthen support for the watershed initiatives, financial and technical resources will be used to complete NPS assessments or TMDLs on additional waterbodies and implement various public education projects. In most cases, these projects will be initiated and managed by local entities such as soil conservation districts (SCDs) or water resource boards.

The local or state projects supported with Section 319 funding can be placed under one of four different categories. These project categories are: (1) development phase projects, (2) educational projects, (3) technical support projects and (4) watershed projects. Under each of these categories, there may also be one or more different project types or subcategories.

The primary purposes of the development phase projects are to identify beneficial use impairments or threats within specific waterbodies and determine the extent to which those threats or impairments are due to NPS pollution. Typically, development phase projects involve an inventory of existing data and supplemental monitoring to allow a thorough assessment of the targeted waterbody and its watershed. Through these efforts, the local project sponsors are able to: (1) determine the extent to which beneficial uses are being impaired by NPS pollution; (2) identify specific sources and causes of the pollutants; (3) establish preliminary pollutant reduction goals or TMDLs; and (4) identify management measures needed to restore or maintain the beneficial uses of the waterbody. Projects under this category include NPS Assessment Projects and TMDL Development Projects.

Educational projects are designed to increase public awareness and understanding of various NPS pollution issues and/or the solutions to specific NPS pollution concerns. The focus of these educational efforts may range from a local source or cause of NPS pollution to statewide measures that can be initiated to reduce NPS pollution. Educational tools typically used include brochures, all media (TV, radio, newspaper), workshops, "how to" manuals, tours, exhibits and demonstrations. Two types of educational projects are currently being delivered in the state. The first are demonstration projects that focus on the development of on-the-ground demonstrations for educational purposes. The other type of educational project is public outreach, which focuses on the distribution of information on various local and/or state NPS pollution issues.

Projects designed to deliver technical or financial assistance to other ongoing NPS pollution management projects are identified as "Technical Support Projects." These projects or programs are either offered statewide or targeted toward a "project area" that includes multiple NPS projects. The primary purpose of these projects is to deliver a specific service or "tool" to locally sponsored NPS projects. Specific types of assistance or management tools being delivered by the technical support projects include engineering designs, manure management planning, digitized soils, landuse satellite imagery and wetland restoration/creation support.

The watershed project category includes the most comprehensive projects currently implemented through the NPS Program. These projects are typically long-term efforts designed to address documented NPS pollution impacts and beneficial use impairments within priority watersheds. Common objectives for watershed projects include: (1) protection and/or restoration of impaired beneficial uses through voluntary implementation of BMPs; (2) dissemination of information on local NPS pollution concerns and effective solutions to those concerns; and (3) evaluation of progress toward identified use attainment or NPS pollutant reduction goals. In nearly all cases, the goals and objectives of the watershed projects are identified through implementation of some type of development project (e.g., NPS Assessment Project, TMDL development).

Through the 2003 Consolidated Section 319 Grant (2003 Grant), the NPS Program has provided financial support to more than 60 local and state projects. The budgets and status of the locally sponsored projects and NPS Program staffing are provided in Table III-2.

Table III-2. Status and Budgets for Projects Supported Under the 2003 Consolidated Section 319 Grant (1/1/03 -9/30/05)

Development Phase - NPS Assessment

Project Name	Status	319 Allocation	Local Match	Total Budget
Bear/Bonehill Creek Assessment	Completed	$ 15,253	$ 10,169	$ 25,422
Cass Co. - Three Rivers Assessment Project	Active	$ 99,430	$ 66,287	$ 165,717
Lake Hoskins Water Quality Assessment	Completed	$ 18,066	$ 12,044	$ 30,110
McDowell Dam Alum Treatment Demo	Active	$ 48,000	$ 32,000	$ 80,000
Ransom C. Sheyenne River Assessment	Completed	$ 79,480	$ 52,987	$ 132,467
Red River Basin Volunteer Monitoring Network	Active	$ 47,829	$ 31,886	$ 79,715
Rice Lake Water Quality Improvement Project	Active	$ 448,000	$ 298,667	$ 746,667
Stutsman Co. Subwatershed Assessment Project	Active	$ 11,845	$ 7,897	$ 19,742
Turtle River Assessment	Active	$ 87,079	$ 58,053	$ 145,132
Unobligated Development Phase Fund	Active	$ 240,731	$ 160,487	$ 401,218
Upper Goose River Watershed Assessment Project	Active	$ 71,616	$ 47,744	$ 119,360
Subtotal		$1,167,329	$ 778,219	$1,945,548

Development Phase - TMDL Development

Project Name	Status	319 Allocation	Local Match	Total Budget
Armourdale Dam TMDL	Completed	$ 4,055	$ 2,703	$ 6,758
Blacktail & McGregor TMDL Development Projects	Completed	$ 14,998	$ 9,999	$ 24,997
Carbury Dam TMDL	Completed	$ 6,184	$ 4,123	$ 10,307
Dickinson Dike TMDL Development - Phase II	Active	$ 1,000	$ 667	$ 1,667
Dickinson Dike TMDL Development - Phase I	Completed	$ 6,853	$ 4,569	$ 11,422
McDowell Watershed TMDL	Completed	$ 22,688	$ 15,125	$ 37,813
Northgate Dam TMDL	Active	$ 14,325	$ 9,550	$ 23,875
Subtotal		$ 70,103	$ 46,735	$ 116,838

Education - Demonstration

Project Name	Status	319 Allocation	Local Match	Total Budget
Kelly Creek Water Quality Improvement Demonstration	Completed	$ 7,860	$ 5,240	$ 13,100
SW North Dakota NPS/Water Quality I&E Project	Active	$ 910,886	$ 607,257	$1,518,143
Subtotal		$ 918,746	$ 612,497	$1,531,243

Education - Public Outreach

Project Name	Status	319 Allocation	Local Match	Total Budget
Digital Taxonomic Keys for Aquatic Insects in ND	Active	$ 76,520	$ 51,013	$ 127,533
Envirothon Program	Active	$ 142,948	$ 95,299	$ 238,247
Foster County - TREES Program	Active	$ 390,118	$ 260,079	$ 650,197
NDSU Livestock Waste Technical Info & Assistance	Active	$ 737,065	$ 491,377	$ 1,228,442
Project WET	Active	$ 344,067	$ 229,378	$ 573,445
Statewide ECO ED Camp	Active	$ 561,138	$ 374,092	$ 935,230
Subtotal		$ 2,251,856	$ 1,501,237	$ 3,753,093

Table III-2. Status and Budgets for Projects Supported under the 2003 Consolidated Section 319 Grant (1/1/03 – 9/30/05) (cont.)

Local Project Support (TA or FA)

Project Name	Status	319 Allocation	Local Match	Total Budget
Adams Co. Livestock Manure Management Program	Active	$ 1,009,584	$ 673,056	$ 1,682,640
Dairy Pollution Prevention Program	Active	$ 1,413,558	$ 942,372	$ 2,355,930
Ground Water Sensitivity Mapping	Completed	$ 335,311	$ 223,541	$ 558,852
Livestock Facility Assistance Program	Active	$ 1,029,240	$ 686,160	$ 1,715,400
ND Waterbank Program	Completed	$ 239,035	$ 159,357	$ 398,392
NDSU Satellite Imagery for WQ Protection	Completed	$ 150,167	$ 100,111	$ 250,278
NPS BMP Team	Active	$ 435,481	$ 290,321	$ 725,802
Project Safe Send - Dept. of Agriculture	Completed	$ 140,895	$ 93,930	$ 234,825
Stockmen's Association Manure Management Specialist	Active	$ 1,386,326	$ 924,217	$ 2,310,543
Subtotal		$ 6,139,597	$ 4,093,065	$10,232,662

NPS Assessment – Multi-Year Grant Award

Project Name	Status	319 Allocation	Local Match	Total Budget
Cannonball River Watershed Assessment - Phase II	Completed	$ 3,020	$ 2,013	$ 5,033
Devils Lake Basin Assessment (00 WRAS)	Completed	$ 3,864	$ 2,576	$ 6,440
NDSU Deep Soil Nitrogen Assessment	Completed	$ 15,960	$ 10,640	$ 26,600
Nine Township Assessment (Knife River)	Completed	$ 31,286	$ 20,857	$ 52,143
Pembina River Basin Assessment (99 WRAS)	Completed	$ 71,632	$ 47,755	$ 119,387
Rocky Run Watershed Assessment - Phase I	Completed	$ 0	$ 0	$ 0
UND Aquifer Denitrification Assessment	Completed	$ 39,517	$ 26,345	$ 65,862
Subtotal		$ 165,279	$ 110,186	$ 275,465

NPS Program Staffing and Support

Project Name	Status	319 Allocation	Local Match	Total Budget
NPS Program Staffing & Support	Active	$ 1,272,000	$ 848,000	$ 2,120,000
Subtotal		$ 1,272,000	$ 848,000	$ 2,120,000

Table III-2. Status and Budgets for Projects Supported under the 2003 Consolidated Section 319 Grant (1/1/03 – 9/30/05) (cont.)

Watershed Project

Project Name	Status	319 Allocation	Local Match	Total Budget
Barnes Co. Sheyenne River Watershed (01 WRAS)	Active	$ 1,453,114	$ 968,743	$ 2,421,857
Bear Creek Watershed	Active	$ 877,402	$ 584,935	$ 1,462,337
Beaver Creek Watershed (99 WRAS)	Active	$ 1,578,678	$ 1,052,452	$ 2,631,130
Bone Hill Creek Watershed	Active	$ 633,660	$ 422,440	$ 1,056,100
Buffalo Springs & Lightening Creek Watersheds	Active	$ 250,587	$ 167,058	$ 417,645
Cedar Lake Watershed	Completed	$ 205,105	$ 136,737	$ 341,842
Chanta Peta Watershed (00 WRAS)	Active	$ 229,070	$ 152,713	$ 381,783
Cottonwood Creek Watershed (99 & 02 WRAS)	Active	$ 615,708	$ 410,472	$ 1,026,180
Crooked Creek Watershed (00 WRAS)	Active	$ 164,003	$ 109,335	$ 273,338
Deep Creek Watershed	Active	$ 596,958	$ 397,972	$ 994,930
Griggs Co. 319 Water Quality Project (99 WRAS)	Active	$ 634,534	$ 423,023	$ 1,057,557
Hay Creek Watershed - Phase IV	Completed	$ 17,317	$ 11,545	$ 28,862
Hay Creek Watershed - Phase V	Completed	$ 212,922	$ 141,948	$ 354,870
Lake Hoskins Watershed	Active	$ 230,142	$ 153,428	$ 383,570
Lower Pipestem Creek Watershed (02 WRAS)	Active	$ 2,047,192	$ 1,364,795	$ 3,411,987
Maple Creek Watershed (00 WRAS)	Active	$ 781,709	$ 521,139	$ 1,302,848
Middle Cedar Creek Watershed (00 WRAS)	Active	$ 422,659	$ 281,773	$ 704,432
Mirror Lake Watershed	Completed	$ 71,856	$ 47,904	$ 119,760
Nine Townships Watershed - Implementation Phase	Active	$ 760,888	$ 507,259	$ 1,268,147
Pheasant Lake/Elm River Watershed (03 WRAS)	Active	$ 934,834	$ 623,223	$ 1,558,057
Powers Lake Watershed (03 WRAS)	Active	$ 538,205	$ 358,803	$ 897,008
Red River Riparian Project - Phases II & III (03 WRAS)	Active	$ 1,553,174	$ 1,035,449	$ 2,588,623
Rocky Run Watershed - Phase II (02 WRAS)	Active	$ 689,066	$ 459,377	$ 1,148,443
Sheyenne River & Dead Colt Watersheds (Ransom Co.)	Active	$ 635,919	$ 423,946	$ 1,059,865
Upper Sheyenne Watershed (02 WRAS)	Completed	$ 39,647	$ 26,431	$ 66,078
Wild Rice Watershed (99 & 00 WRAS)	Active	$ 1,420,061	$ 946,707	$ 2,366,768
Subtotal		$17,594,410	$11,729,607	$29,324,017
Grand Total		**$29,579,320**	**$19,719,547**	**$49,298,867**

Statewide delivery of the NPS Program is accomplished through six main goals identified in the NPS Program Management Plan. These goals are organized as individual sections of the Management Plan and are as follows:

- Resource Assessment - This section addresses the NPS Program's existing inventory/assessment system and future needs to improve or expand assessment efforts.

- Prioritization - This section discusses existing and future prioritization methods or strategies within the NPS Program.

- Assistance - This section focuses on "how" the financial and technical assistance available through the program is delivered to state/local project sponsors.

- Coordination - Development and maintenance of partnerships with private and local/state/federal agencies and organizations are described in this section.

- Information/Education - The program's multi-year strategy for public outreach and information dissemination is described under this section.

- Evaluation/Monitoring - Program and local project evaluation/monitoring efforts are addressed in this section.

Resource Assessment

Resource Assessment Goal: To accurately and thoroughly assess beneficial use support and the sources and causes of use impairments within the state's watersheds.

Resource assessment is being implemented at both the statewide and local level. On a statewide basis, data (e.g., water quality, biological) collected by state and local staff are utilized to evaluate and document water quality and beneficial use trends of numerous waterbodies across the state. At the local level, resource managers collect watershed-specific data to identify beneficial use and water quality impairments, establish waterbody priorities, develop watershed strategies and/or measure benefits of applied BMPs.

The locally sponsored NPS assessment or TMDL development projects are the primary means used to identify watershed priorities and management measures needed to address NPS pollution impairments. The local NPS assessments, commonly referred to as "development projects," provide the foundation for all watershed projects by identifying specific sources and causes of NPS pollutants impairing or threatening beneficial uses. This information is used to establish watershed priorities as well as to develop multi-year project implementation plans (PIP) that address the identified beneficial use impairments. When applicable, department staff members also coordinate with the local sponsors to utilize the assessment data to develop TMDLs.

There are two sources of Section 319 financial support for assessment level projects. Short-term (i.e., 1-2 years) NPS assessment projects are supported with Section 319 funds available through the NPS Program's "Development Fund." Section 319 funds available under the Development Fund are unexpended funds reallocated from other NPS projects that were completed under budget. If the waterbody is also listed on the TMDL List, alternative funding sources (e.g., 604[b], 104[b][3]) may also be used to support the assessment activities. For the multi-year or basin-wide NPS assessments, the local sponsors participate in the annual Section 319 grant application process to secure Section 319 support (Base or Incremental Funding).

Since January 1, 2003, financial and/or technical assistance has been provided to about 20 different assessment phase projects. Specific assessment phase projects are listed in Table III-2.

Prioritization

Prioritization Goal: Based on the most current inventory and assessment data, prioritize the state's waterbodies/watersheds for future NPS pollution assessment or abatement efforts.

The NPS Program utilizes a "process" rather than a "physical list" (with the exception of the TMDL List) to identify local waterbody priorities. On a statewide basis, waterbodies included on the TMDL List are considered high priority waterbodies for the development and implementation of watershed assessments. At the local level, the TMDL-listed waterbodies are also considered a high priority, although local resource managers may also establish priority rankings for other waterbodies not included on the TMDL List. For waterbodies lacking data and/or omitted from the TMDL List, a two-step process is used to establish the priorities. The first step involves a review of current information (e.g., local feedback, 305(b) reports, land use imagery) to establish a preliminary ranking for each subwatershed in the project area. These rankings are used to indicate the type of management or assessment activities needed in each subwatershed. The second step focuses on the development of a priority schedule for the implementation of the appropriate subwatershed assessment or management activities.

Typically, most waterbodies require the collection of additional data to identify beneficial use impairments and/or determine the sources and causes of pollutants impairing beneficial uses. For these waterbodies, the local sponsors coordinate with NPS Program staff to determine data collection needs and to establish a priority schedule for assessing the waterbodies. Following this prioritization process, financial and/or technical assistance can be provided to the sponsors to develop and implement quality assurance project plans (according to the priority schedule) to collect the necessary data. If sufficient data is already available on a waterbody to identify beneficial use impairments and the sources and causes of pollution, the local resource managers can seek Section 319 financial support to actively address the NPS pollutants impairing beneficial uses.

Assistance

Assistance Goal: Provide sufficient financial and technical assistance to local resource managers (e.g., SCDs, water resource boards) to ensure accurate identification of beneficial use and water quality impairments resulting from NPS pollution and effective development and completion of projects that will restore and/or maintain the beneficial uses of waterbodies impacted by NPS pollution.

NPS Program financial and/or technical assistance generally starts during the early stages of project development and continues throughout the implementation of the projects. Types of technical assistance being provided to local projects on an annual basis include project oversight, sample analysis, PIP review and comment, sample collection and project management training, quality assurance project plan development, distribution of educational materials and biological monitoring support. Section 319 funding is the primary type of financial support for the NPS Program and locally sponsored NPS projects initiated in the state.

Since January 1, 2003, approximately 8 percent of the NPS Program budget has been used to support NPS Program staff. The balance of expenditures (i.e., 92 percent) has been used to support locally sponsored NPS pollution management projects. These local projects can be grouped under one of seven NPS project categories. Specific projects supported under each

category are listed in Table III-2. Table III-3 lists the cumulative expenditures and distribution of costs between NPS program staffing and the different NPS project categories during the period of January 1, 2003 through September 30, 2005.

Table III-3. Section 319 Allocations and Expenditures per Project Category (1/1/03 -9/30/05)

Project Category	319 Allocation	319 Expenditures	Percent of Total 319 Expenditures
Development Phase - NPS Assessment	$ 1,167,329.00	$ 222,248.87	1.85%
Development Phase - TMDL Development	$ 70,103.00	$ 65,595.10	0.55%
Education - Demonstration	$ 918,746.00	$ 676,326.03	5.64%
Education - Public Outreach	$ 2,251,856.00	$ 1,223,556.06	10.20%
Local Project Support (TA or FA)	$ 6,139,597.00	$ 2,494,987.86	20.80%
NPS Assessment - Multi Year Grant Award	$ 165,279.00	$ 165,147.55	1.38%
NPS Program Staffing and Support	$ 1,272,000.00	$ 928,746.36	7.74%
Watershed Project	$17,594,410.00	$ 6,219,089.61	51.84%
Totals	**$29,579,320.00**	**$11,995,697.44**	

Coordination

Coordination Goal: Increase the effectiveness of NPS pollution management in the state by coordinating project development and implementation efforts with local, state and federal agencies and private organizations involved with natural resource management in the state.

Initiation and maintenance of a coordinated effort with appropriate entities is one of the most important activities within the project areas. At the onset of planning, the lead sponsors are encouraged to solicit the involvement of all groups or agencies that may have an interest in the planned project. For most projects, the involvement of multiple entities has helped ensure expertise is available and, in some cases, helped projects gain additional financial support.

Given the agricultural focus of most projects, local SCDs are the lead sponsors for most (56 percent) of the current projects. The SCDs provide the local leadership necessary to implement and manage projects as well as a “familiar face” to ensure effective communication with producers. However, as the NPS Program has expanded and diversified, more projects are being sponsored by other local and regional organizations (e.g., universities, state agencies, lake associations, resource conservation and development councils, water resource boards).

The NPS Task Force has also helped strengthen coordination between NPS projects and similar programs sponsored by other state or federal agencies and organizations. During the annual review process, the Task Force members become aware of the goals and objectives of the local

NPS projects. This, in turn, gives them the opportunity to recognize and develop new partnerships that may strengthen projects/programs managed by their agency or organization. Conversely, during the review process, the local sponsors also gain a better understanding of what the Task Force member agencies can offer to their NPS pollution management projects. Agencies and organizations represented on the North Dakota NPS Source Pollution Task Force are listed in Table III-4.

Table III-4. Agencies/Organizations Represented on the North Dakota NPS Pollution Task Force

Agency/Organization	Agency/Organization
Energy & Environmental Research Center	NDSU Extension Service
ND Farmers Union	USDA Farm Services Agency
USFS Dakota Prairies Grassland	ND Farm Bureau
ND Game & Fish Dept.	Bureau of Land Management
US Geological Survey	US Fish & Wildlife Service
ND Geological Survey	USDA Rural Development
US Bureau of Reclamation	ND Forest Service
ND Association of Soil Conservation Districts	State Soil Conservation Committee
ND Department of Agriculture	ND Water Resource Districts Association
US EPA Region VIII	Medora Grazing Association
ND Pork Producers	Grain Growers Association
ND Wildlife Federation	Rural Water Systems
USDA - Ag Research Station	USDA - NRCS
ND Parks & Recreation Dept.	ND Natural Resources Trust
ND State Water Commission	ND Stockmen's Association
ND Department of Health	

Information and Education

Information and Education Goal: Increase North Dakotans' understanding of the water quality and beneficial use impairments associated with NPS pollution, and strengthen public support for the voluntary implementation of NPS pollution control activities.

A variety of educational efforts are supported by the NPS Program to increase public awareness of NPS pollution issues as well as to strengthen support for current and future NPS pollution management projects. These educational efforts can include activities such as workshops, demonstrations, tours, fact sheets, radio ads and videos. Generally, the information/education (I/E) efforts are sponsored and implemented by SCDs, resource conservation and development councils or NDSU Extension Service. Although the goals and target audiences of the educational projects may vary, cumulatively, these state/locally sponsored I/E projects form a balanced statewide NPS pollution education program. Specific I/E projects supported under the 2003 Grant are listed in Table III-2.

On an annual basis, NPS Program staff members are also involved in numerous educational events. These efforts can include presentations at local tours and workshops, display booths at county fairs and agricultural shows, instruction at ECO ED camps, assistance with Envirothon competitions, newsletter articles and dissemination of various materials.

Program Evaluation

Evaluation Goal: Evaluate the successes and failures of the NPS Management Program and identify the necessary updates to the NPS Pollution Management Program to maintain successful delivery of financial and technical assistance to local and state agencies and private organizations addressing NPS pollution.

The overall success of the NPS Program is evaluated at both the state and local levels. At the state level, success is being measured by the degree of progress toward goals set forth in the Management Plan. Locally, progress toward project-specific goals and objectives will be used to evaluate the accomplishments of the individual projects.

The long-term goal of the NPS Program is to deliver a balanced program focused on the restoration and maintenance of beneficial uses impaired by NPS pollution. The 1998 305(b) Report and Section 303(d) list are the baseline documents that will be used to measure progress toward this goal. Initiation of watershed restoration projects in 75 of the "impaired" watersheds included on the 1998 303(d) list is the main objective associated with the long-term goal. This objective is scheduled to be met by 2013. With nearly 20 NPS assessment and/or TMDL development projects underway and approximately 25 watershed restoration projects currently supported under the 2003 grant, the NPS Program is on track to initiate 75 watershed restoration projects by the target date. It should be noted, however, that the objective is to initiate the restoration projects by 2013. Past experience has indicated that many of the watershed restoration projects initiated by 2013 may not actually be completed until 2020-2023. Consequently, the full benefits of the watershed restoration efforts may not be realized until 2023 and beyond.

A variety of water quality and land use data are collected annually to document improvements within the NPS project areas. During an average year, approximately 400 to 500 water quality samples are collected within the state's active watershed project areas. The main parameters being monitored include nitrogen, phosphorus, total suspended solids and fecal coliform bacteria. Stream discharge is also monitored at many of the STORET sites to determine pollutant loadings. To gauge land use improvements, the number and type of BMPs applied are also tracked by the local NPS projects. Table III-5 lists the amounts and costs of the BMPs applied within the NPS project areas since January 1, 2003. Sixty percent of the total BMP costs listed in Table III-5 were supported with Section 319 funds.

Table III-5. BMPs Supported Under the 2003 Consolidated Grant (1/1/03 - 9/30/05)

BMP Category and Practice	Amount	Units	Total Cost
Cropland Management			
GPS Equipment (Nutrient Management)	3.00	Number	$ 5,726.05
Nutrient Management	97,943.50	Acres	$ 423,226.36
Pasture/Hayland Planting	371.80	Acres	$ 11,471.53
Pest Management	28,530.90	Acres	$ 111,989.95
Residue Management (Mulch Till)	49,103.90	Acres	$ 364,448.08
Residue Management (No-Till and Strip Till)	78,956.80	Acres	$ 895,916.20
Soil Test (Nutrient Management)	36.00	Number	$ 2,022.20
Subtotal			$1,814,800.37
Erosion Control			
Critical Area Planting	671.10	Acres	$ 189,805.58
Grade Stabilization	1.00	Number	$ 2,694.81
Grassed Waterway	550.00	Linear Feet	$ 13,711.50
Subtotal			$ 206,211.89
Grazing Management			
Fencing	832,529.60	Linear Feet	$ 601,123.29
Mechanical Treatment	45.00	Acres	$ 373.50
Miscellaneous	1.00	System(s)	$ 3,800.40
Pasture/Hayland Planting	5,989.90	Acres	$ 192,126.76
Pipeline	233,151.00	Linear Feet	$ 491,998.38
Pond	48.00	Number	$ 79,665.72
Prescribed Grazing	320.00	Acres	$ 1,600.00
Range Planting	34.40	Acres	$ 1,729.00
Solar Pumps	3.00	Number	$ 16,117.00
Trough and Tank	115.00	Number	$ 141,533.51
Use Exclusion	10.00	Acres	$ 3,321.66
Well (Livestock Only)	29.00	Number	$ 147,513.65
Subtotal			$1,680,902.87
Livestock Manure Management System (Full System)			
Cultural Resource Review	2.00	Number	$ 1,019.26
Engineering Services - Preconstruction	2.00	System(s)	$ 13,287.52
Manure Removal (Ag Waste)	1.00	System(s)	$ 1,360.00
Phase I Waste Management System	12.27	System(s	$1,245,409.72
Phase II Waste Management System	6.07	System(s)	$ 617,637.51
Phase III Waste Management System	0.60	System(s)	$ 195,034.00
Soil Test (Ag Waste)	1.00	Number	$ 764.00
Waste Management System (Coordinated w/EQIP)	3.00	System(s)	$ 222,093.49
Waste Management System (Full System Complete)	12.00	System(s)	$ 812,850.60
Subtotal			$3,109,456.10

Table III-5. BMPs Supported Under the 2003 Consolidated Grant (1/1/03 – 9/30/05) (cont.)

BMP Category and Practice	Amount	Units	Total Cost
Livestock Manure Management System (Partial System)			
Building Relocation, Moving Costs (Ag Waste)	1.00	Number	$ 40,267.27
Bunk Line Fencing (Ag Waste)	1,920.00	Linear Feet	$ 4,800.00
Diversion	800.00	Linear Feet	$ 5,405.65
Perimeter Fencing (Ag Waste)	10,705.00	Linear Feet	$ 19,438.80
Phase II Waste Management System	0.10	System(s)	$ 18,017.35
Runoff Management System	1.00	System(s)	$ 95,589.38
Soil Test (Ag Waste)	4.00	Number	$ 3,580.60
Waste Storage Facility	1.00	System	$ 2,750.00
Waste Utilization	8,647.21	Acres	$ 177,080.21
Watering Facility (Ag Waste: Tank, Pipeline, Well)	2.00	Number	$ 12,667.60
Windbreak Fencing (Ag Waste)	6,736.00	Linear Feet	$ 7,381.76
Subtotal			$ 386,978.62
Miscellaneous Practices			
Cultural Resource Review	5.00	Number	$ 5,515.00
Engineering Services - Construction Phase	1.00	System(s)	$ 633.60
Engineering Services - Preconstruction	3.00	System(s)	$ 16,228.72
Miscellaneous	3,315.00	Number	$ 23,914.15
Soil Investigations	1.00	Number	$ 738.70
Solar Pumps	4.00	Number	$ 11,416.10
Urban Stormwater Management	1.00	System	$ 268,134.95
Well Decommissioning	23.00	Number	$ 23,213.12
Subtotal			$ 349,794.34
Riparian Area Management			
Engineering Services - Construction Phase	1.00	System(s)	$ 7,906.88
Engineering Services - Preconstruction	3.00	System	$ 12,320.26
Riparian Forest Buffer	12,259.60	Linear Feet	$ 55,998.62
Riparian Herbaceous Cover	14.00	Acres	$ 4,471.81
Stream Channel Stabilization	42,205.00	Linear Feet	$ 209,793.31
Streambank and Shoreline Stabilization	7,209.00	Linear Feet	$ 147,604.78
Timber Stand Improvement (Scarification)	2.00	Acres	$ 2,517.75
Tree Handplants	1,833.00	Number	$ 2,233.00
Subtotal			$ 442,846.41
Upland Tree Planting			
Cultural Resource Review	1.00	Number	$ 1,529.27
Mechanical Treatment	3.20	Acres	$ 64.00
Site Preparation - Heavy w/Chemical (Trees, G13)	32.20	Acres	$ 901.60
Tree/Shrub Establishment	149,355.34	Linear Feet	$ 41,468.57
Weed Control For Tree Establishment (Chem or Mech)	32.20	Acres	$ 615.00
Windbreak/Shelterbelt	85,139.00	Linear Feet	$ 34,839.27
Subtotal			$ 79,417.71
Wetland Restoration/Creation			
Wetland Creation	8.00	Acres	$ 32,396.36
Wetland Restoration	855.60	Acres	$ 223,554.27
Subtotal			$ 255,950.63
Grand Total			**$8,326,358.94**

Despite the implementation of multiple BMPs and the collection of extensive water quality and quantity data, documentation of annual pollutant load reductions continues to be very difficult across the state. This is particularly true within the large watershed project areas (i.e., greater than 50,000 acres). Given variables such as rainfall timing and amounts and cropping changes, it is anticipated that more than 10 years of data may be needed to accurately document pollutant load reductions within most watershed projects. As a result, for the short term, annual pollutant load reductions within some watershed projects are being estimated with the Spreadsheet Tool for the Estimation of Pollutant Load (STEPL) model. This model provides annual estimates for nitrogen, phosphorus and sediment load reductions associated with crop residue management practices and manure management systems implemented in the watersheds. Due to data limitations of the STEPL model, the benefits of other BMPs such as nutrient management and riparian buffers will not be included in these annual estimates. Despite these limitations, the results generated by the STEPL model do indicate that some Section 319 projects are having a positive affect on annual nitrogen, phosphorus and/or sediment loadings. The project-specific load reductions estimated with the STEPL model for 2005 are listed in Table III-6.

Table III-6. STEPL Estimates - Nitrogen, Phosphorus and Sediment Load Reductions in 2005

Project Name	Nitrogen Load Reduction (lbs/yr)	Phosphorus Load Reduction (lbs/yr)	Sediment Load Reduction (tons/yr)
Lower Pipestem watershed	20,238	6,637	1,351
Cottonwood Creek Watershed	63,570	17,661	2,142
Rocky Run Watershed	4,979	1,336	174
Upper Sheyenne Watershed	19,831	5,765	1,079
Nine Townships Watersheds	1,382	525	117
Beaver Creek Watershed	40,696	10,844	1,403
Powers Lake Watershed	1,589	677	159
Wild Rice River Watershed	38,083	8,285	1,130
Adams County Livestock Manure Management Program	4,409	992	0 *
Bear Creek Watershed	5,446	1,225	0 *
Dairy Pollution Prevention Program	40,409	6,403	0 *
Stockmen's Association - Environmental Services Program	107,722	24,237	0 *
Total	**348,596**	**84,650**	**7,563**

* Livestock manure management systems were the only BMPs installed by these projects. The STEPL model does not estimate sediment load reductions associated with manure management systems.

Documenting the type and amount of BMPs applied is another valuable measure of project and program success. As indicated in Figure III-3, 42 percent of total Section 319 expenditures under the 2003 Grant have been associated with the implementation of BMPs. The most common BMPs implemented with this financial support have included no-till residue management, nutrient management, manure management systems and grazing management practices. The main NPS pollutants addressed by these BMPs include nitrogen, phosphorus, sediment and fecal coliform bacteria. Figure III-4 shows the total expenditures under the 2003 grant associated with each BMP Category. Specific BMPs implemented since January 1, 2003 are listed in Table III-5.

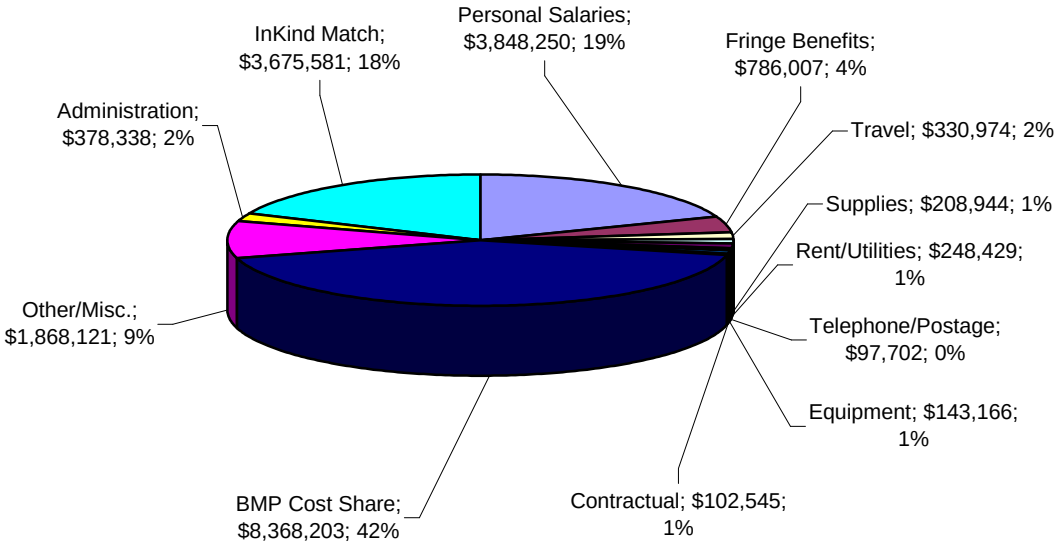


Figure III-3. Cumulative Cost Category Expenditures Under the 2003 Grant (1/1/03 – 9/30/05)

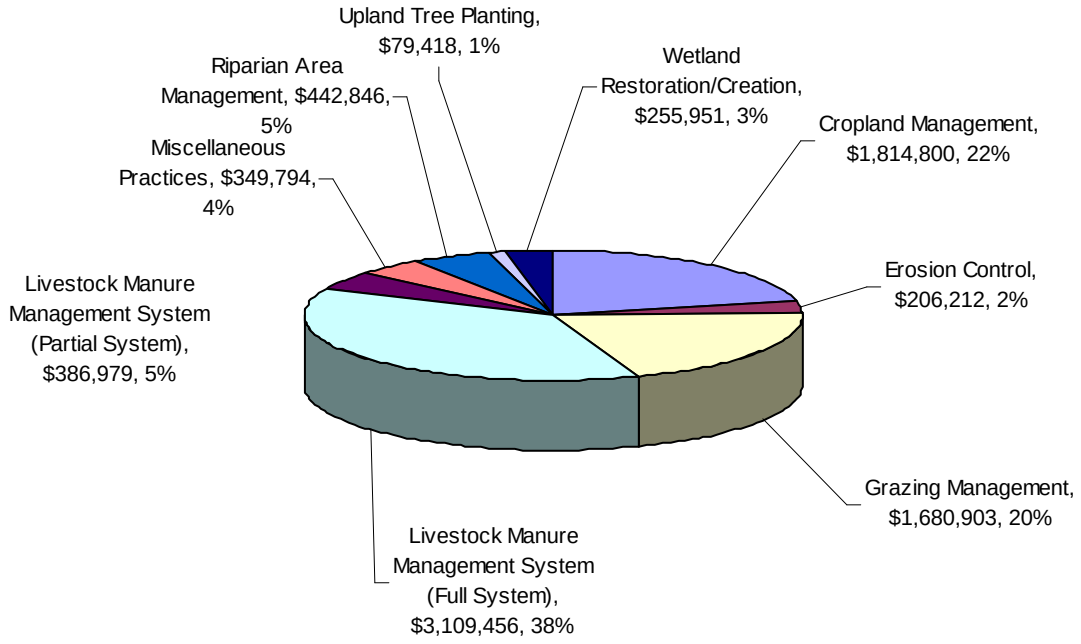


Figure III-4. BMP Category Expenditures Under the 2003 Grant (1/1/03 – 9/30/05)

Although it is currently difficult to measure actual statewide benefits of the NPS Program, STEPL modeling estimates and the number of applied BMPs does suggest Section 319 funding is having a positive impact on water quality in the state. Over the long term, as the applied BMPs mature and additional projects are initiated, the actual water quality data collected locally and statewide should begin to reflect reductions in NPS pollution. Continued coordination with USDA and other state, federal and local natural resource agencies will also be a key factor for ensuring measurable reductions in NPS pollution are realized statewide by 2013.

Chapter 4. Total Maximum Daily Load (TMDL) Program

Section 303(d) of the CWA and its accompanying regulations (CFR Part 130, Section 7) require each state to list waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) that are considered water quality limited and require load allocations, waste load allocations and total maximum daily loads (TMDLs). This list has become known as the "TMDL list" or "Section 303(d) list."

A waterbody is considered water quality limited when it is known that its water quality does not or is not expected to meet applicable standards. Waterbodies can be water quality limited due to point source pollution, NPS pollution or both. When a state prepares its list of water quality-limited waterbodies, it is also required to prioritize waterbodies for TMDL development and to identify those waterbodies that will be targeted for TMDL development within the next two years. Factors to be considered when prioritizing waterbodies for TMDL development include: (1) the severity of pollution and the uses which are impaired; (2) the degree of public interest or support for the TMDL, including the likelihood of implementation of the TMDL; (3) recreational, aesthetic and economic importance of the waterbody; (4) the vulnerability or fragility of a particular waterbody as an aquatic habitat, including the presence of threatened or endangered species; (5) immediate programmatic needs, such as wasteload allocations needed for permit decisions or load allocations for Section 319 NPS project implementation plans; and (6) national policies and priorities identified by EPA.

After considering each of the six factors, the state has developed a three-tiered priority ranking for impaired waterbodies. Those listed as Priority 1 have been further categorized. Priority 1A are lakes and reservoirs and river and stream segments for which TMDLs are scheduled to be completed and submitted to EPA in the next two years. Priority 1B are lakes and reservoirs and river and stream segments for which TMDL development projects are scheduled to be started in the next two years. The majority of these Priority 1A and 1B waterbodies were identified as such based largely on their degree of public support and interest and the likelihood of implementation of the TMDL once completed. Priority 2 waterbodies are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next 10 years.

Waterbodies for which fish consumption use is impaired due to methyl-mercury are considered Priority 3. These waterbodies are a low priority for TMDL development in the state. TMDL development for methyl-mercury-contaminated waterbodies is complicated by several factors including: (1) uncertainty regarding the fate and transport of atmospheric sources of mercury; and (2) the complexity of the biological and geochemical interactions that affect the conversion of elemental mercury to methyl-mercury and its bioaccumulation rate in fish. Due to these complexities and the interstate and international nature of atmospheric mercury sources, it is the department's recommendation that EPA take the lead in developing mercury TMDLs.

The responsibility for TMDL development for Priority 1 and 2 waterbodies in North Dakota lies primarily with the department's Division of Water Quality - Surface Water Quality Management Program. To facilitate the development of TMDLs, the department created three regional offices located in Fargo, Dickinson and Towner, N.D. (Figure III-5). The focus of the regional TMDL/Watershed Liaison staff is to work with local stakeholders in the development of TMDL water quality assessments and TMDLs based on the 303(d) list. Technical support for TMDL

development projects and overall program coordination are provided by Surface Water Quality Management Program staff located in Bismarck, North Dakota.

Typically, TMDL development projects involve monitoring and assessment activities which will:

- Quantify the amount of a pollutant that the impaired water can assimilate and still meet water quality standards.
- Identify all sources of the pollutant contributing to the water quality impairment or threat.
- Calculate the pollutant loading entering the waterbody from each source.
- Calculate the reduction needed in the pollutant load from each source necessary for attainment of water quality standards.

The goals, objectives, tasks and procedures associated with each TMDL development project are described in project-specific Quality Assurance Project Plans.

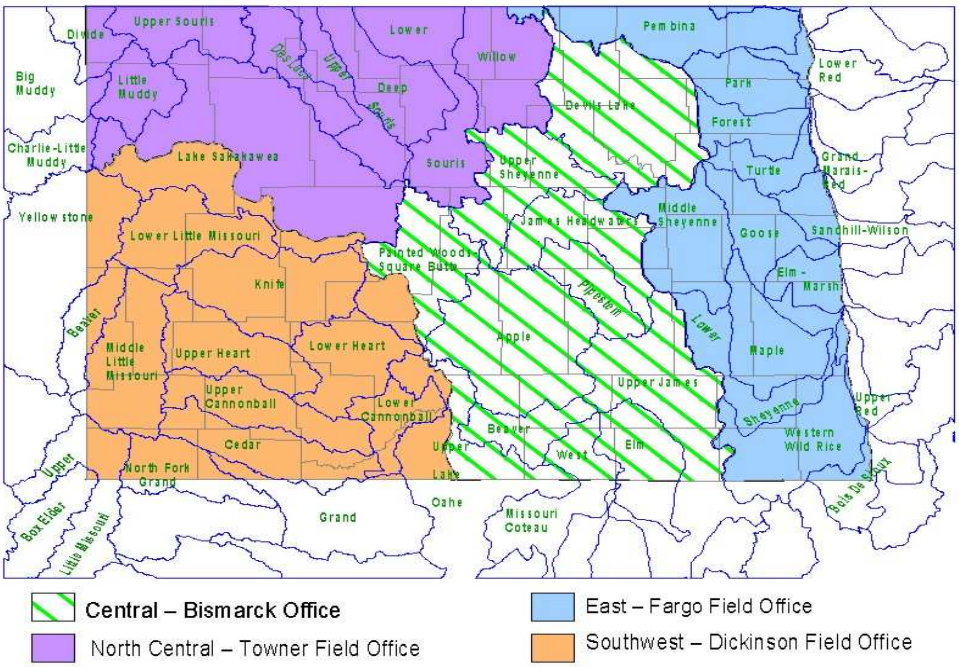


Figure III-5. Map Depicting Areas of Responsibility for Regional TMDL/Watershed Liaison Staff

Equally as important as the development of TMDLs is their implementation. The regional TMDL liaisons provide technical assistance to local SCDs and water resource boards in the development of NPS pollution management projects that address TMDL-listed waterbodies. Also, the liaisons provide technical expertise to local stakeholder groups and assist with youth and adult information/education events in their regions.

Chapter 5. Coordination with Other Agencies

North Dakota has two rivers of international significance. The Souris River originates in the Canadian province of Saskatchewan, loops through North Dakota and returns to the province of Manitoba (Figure III-1). The Red River of the North originates at the confluence of the Bois de Sioux and Ottertail Rivers at Wahpeton, North Dakota. The Red River flows north, forming the boundary between North Dakota and Minnesota before entering Manitoba. The department participates in two cross-border cooperative efforts to jointly manage and protect these rivers.

The Souris River Bilateral Water Quality Monitoring Group was established on October 26, 1989, in accordance with the Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin. Objectives of the group include: (1) designing a monitoring plan for the Souris River and (2) overseeing the review, interpretation and annual reporting of water quality conditions in the Souris River Basin. In addition to the department, other members of the group include Environment Canada, Saskatchewan Environment, Manitoba Water Stewardship, the USGS and EPA.

The other international water quality effort in which the department is involved is the International Red River Board. Created by the International Joint Commission (IJC), the board monitors Red River water quality. The board also informs the IJC of trends and exceedances of water quality objectives, documents discharges and control measures, establishes a spill contingency plan and identifies future water quality issues. Board activities are detailed in annual reports. Other members of the board include Environment Canada, Manitoba Water Stewardship, EPA, USGS, US Bureau of Reclamation and the Minnesota Pollution Control Agency.

The department monitors water quality in Devils Lake and distributes historical and current data to various federal and state agencies. Information and technical expertise is provided to sponsoring agencies that are planning mitigation measures for rising lake levels.

The Red River Basin Commission (RRBC) was formed in 2002 to initiate a grass roots effort to address land and water issues in a basin-wide context. The RRBC was formed as a result of a merger between The Red River Basin Board, The International Coalition and the Red River Water Resources Council.

The RRBC is not intended to replace governmental agencies or local boards that have water management responsibilities in the basin. Rather, it was created to develop a comprehensive plan on a scale never before attempted. Another purpose of the RRBC is to foster the inter-jurisdictional coordination and communication needed to implement such a plan and to resolve disputes that inevitably will arise among varied interests during the planning process.

The RRBC is made up of a 41-member board of directors, comprised of mainly representatives of local government, including the cities, counties, rural municipalities, watershed boards, water resource districts and joint powers boards, as well as representation from First Nations, a water supply cooperative, a lake improvement association and environmental groups. There also are four at-large members. The governors of North Dakota and Minnesota and the premier of the province of Manitoba have also appointed members to the board.

D. Cost/Benefit Assessment

Costs associated with municipal point source pollution control have been extensive. Capital investments in the form of additions to and construction of new wastewater treatment facilities account for the largest expenditure of funds. While the Clean Water State Revolving Fund (CWSRF) and other state and federal programs have been the major sources of funding, many communities have upgraded wastewater treatment facilities at their own expense.

In fiscal years 2000 thru 2005, approximately $58 million has been obligated from the CWSRF for the construction of wastewater system improvements. During the last 10 years, more than $142.3 million has been invested in wastewater system improvements. The cumulative amount since passage of the Clean Water Act in 1972 is approximately $402 million. In addition to the capital costs, an estimated $15 million per year is spent operating and maintaining wastewater treatment systems in the state.

While the costs of construction and maintenance of municipal wastewater treatment systems are relatively easy to compile, monetary benefits cannot be so easily quantified. Qualitative benefits include the reduction or elimination of waste loads to receiving waters (Figure III-2, page III-6) and the elimination of public health threats such as malfunctioning drain-field systems and sewer backups.

Federal, state and local governments have also made significant investments in NPS pollution controls. Since 1999, the state's Section 319 NPS Pollution Control Program has provided more than $29.5 million in financial support to more than 60 state and local projects, including more than $17.5 million to 26 watershed restoration projects. In addition to the Section 319 investment in these watershed projects, project sponsors have provided more than $11.7 million in local match to these watershed projects (Table III-2, page III-14). A variety of agricultural and other BMPs have been implemented through these watershed projects (Table III-5, page III-22). Total costs of these BMPs were more than $8.3 million.

The water quality benefits of these Section 319 NPS Pollution Control Program expenditures can be described through documented watershed reductions in nitrogen, phosphorus and sediment. Using EPA's Spreadsheet Tool for the Estimation of Pollutant Load (STEPL) model, Section 319 cost-shared BMPs are resulting in significant nitrogen, phosphorus and sediment reductions. Based only on crop residue management practices and manure management systems cost-shared in watershed projects through 2005, it is estimated that nitrogen, phosphorus and sediment loading will be reduced by more than 348,000 pounds, 84,000 pounds and 7,500 tons per year, respectively (Table III-6, page III-24).

E. Special State Concerns and Recommendations

The "watershed approach" is not a new or unique concept in water quality protection programs. The concept of conducting watershed planning and management first arose with Section 208 of the original 1972 Clean Water Act. The watershed approach is also a key element in EPA's Clean Water Action Plan. This cooperative approach involves state, tribal, federal and local governments and the public identifying the watersheds with the most critical water quality problems and then working together to focus resources and implement effective strategies to solve those problems.

It is the department's recommendation that a watershed approach be implemented for all of its water quality monitoring, assessment and nonpoint source pollution control programs. The department will continue to work with local governmental entities (e.g., SCDs, water resource boards, county commissions, cities) in the implementation of watershed restoration projects throughout the state.

Key to watershed management is the accurate delineation of watershed boundaries. The EPA has recently announced plans to require states to begin watershed reporting on the 12-digit sub-watershed scale. Watershed (10-digit) and sub-watershed (12-digit) delineations currently do not exist for the state. Since the mid 1990s, the department has been working with the State Water Commission, North Dakota Geological Survey, NRCS, the U.S. Forest Service and the USGS to accurately delineate and digitize the 10- and 12-digit hydrologic units (HUs) and to refine the 8-digit HU boundaries consistent with the Federal Standards for Hydrologic Unit Delineation. While progress has been slow, due largely to a lack of dedicated funding, the project partners have completed delineations for approximately 35 of the state's 50 8-digit HUs. Work is ongoing for another five 8-digit HUs leaving 15 HUs with no work projected. The project partners have set a goal to have the entire state completed by December 2007; however, this goal will only be met if adequate funding can be secured.

As the dominant land use in North Dakota, agriculture has been the primary focus of the state's NPS Pollution Management Program. Over the past seven years, the department has directed a majority of Section 319 funds to projects addressing agricultural NPS pollution (see Part III. C. Chapter 3). Given the magnitude and complexity of the agricultural industry, the department has developed a close working relationship with the NRCS to ensure sufficient resources are available to adequately address NPS pollution within the state. The combined resources from both the Section 319 Program and the NRCS have proven essential for a balanced NPS Pollution Management Program.

To maintain this coordinated effort, continued funding through Section 319 and the NRCS programs will be necessary. While NRCS programs (e.g., Environmental Quality Incentives Program) can provide funding for BMP cost-share, this funding is only available on an annual basis and producers and project sponsors are required to compete for this funding on a statewide basis. Section 319 provides long-term (five- to 10-year) funding to address water quality problems at the watershed scale. Section 319 funding is also used to hire watershed coordinators who are dedicated to the goals of each watershed project. These coordinators are responsible for providing much needed technical assistance to producers in their watersheds, assistance that would not be available through any other funding source.

The state has recently made a significant investment in NPS pollution control. Since 2001, the state has contributed $600,000 to the Section 319 funded watershed projects. Using state "Water Development Trust" funds either appropriated by the state legislature or obligated by the State Water Commission, these funds have provided a much needed source of the state/local match required by the Section 319 Program. The state should continue to maintain funding to support NPS pollution management projects throughout the state and to explore ways to expand state funding to support these efforts.

Public awareness of environmental issues, along with the trend toward larger, more concentrated livestock operations, has brought increased concern over these operations and their potential impacts to water quality. A recent revision to the federal NPDES program regarding concentrated animal feeding operations (CAFOs) has resulting in the department updating its rules to be consistent with the federal rules. The department will continue to work closely with the NRCS and others to provide assistance to implement approved livestock waste systems. Without consistent funding from federal programs like the Section 319 NPS Pollution Management Program and the NRCS Environmental Quality Incentives Program that are addressing animal feeding operations, efforts to bring impaired waters into compliance could be greatly hampered.

The department has taken an active approach in implementing its Storm Water Program. The federal Storm Water Phase II regulations have been incorporated into the department's state rules. The department continues to work with regulated small MS4s and the Red River Work Group on issues relating to storm water discharges. Runoff from construction storm water has been a major concern of EPA.

States need flexibility when managing their storm water management programs so they can find the best fit for their respective conditions. As long as the storm water requirements are being met and no water quality violations occur in the state, EPA should refrain from program micromanagement. The department also believes that EPA's "one-size-fits all" approach is not the best way to address construction storm water issues. Each state has its own unique set of conditions when it comes to topography, soils and associated BMPs. For example, BMPs that are used on locations with tighter (clay) soils and flat topography may not work in till or sandy soils with steeper slopes. A one-size-fits-all approach that does not recognize these differences can lead to over-regulation and inefficiencies in program implementation.

The department continues to develop and expand its biological assessment program. It is generally believed that the instream biological community (e.g., fish, aquatic insects and algae) exposed to pollutant stresses on a continual basis is the best measure of aquatic life use. In 2005, the department initiated a two-year biological assessment project in the Red River basin using a probabilistic study design. Once completed, this project will provide an unbiased estimate of biological condition in the Red River basin of North Dakota. Data collected as part of this study will also be used to refine existing fish and macroinvertebrate Indices of Biological Integrity. In subsequent years, the department plans to continue its biological assessment program in the Souris, James and Missouri Rivers basins. This plan will only become a reality, however, if supplemental funding for monitoring programs is maintained by Congress and the EPA.

The department has primacy for most Clean Water Act programs. These include the NDPDES

Permit Program, Industrial Pretreatment Program, Storm Water Management Program, Animal Waste Management Program, Clean Water State Revolving Loan Fund Program, Source Water Protection Program, Nonpoint Source Pollution Management Program, Total Maximum Daily Load Program, Clean Lakes Program, Surface Water Monitoring Program, Water Quality Standards, Section 401 Certification and Groundwater Monitoring and Assessment. In order to effectively implement these programs, the department relies on federal funding authorized and appropriated by Congress and provided by EPA. Competing federal priorities (e.g., disaster relief and the "War on Terror") have called into question the federal government's commitment to Clean Water Act programs. Recent cuts in EPA grants to states and rescission orders have put a strain on programs that are already suffering from funding shortfalls. If this trend continues and federal funding continues to decline, the state may have to consider returning some low priority CWA programs to the EPA.

Delays in EPA grant awards to the state are also becoming more problematic. It is not unusual for EPA grant awards to take six to eight months from the time of application to when the grant is awarded. These delays ultimately result in delays in implementing on-the-ground projects or programs. These delays also strain the department's relationships with local project sponsors. EPA needs to find ways to streamline the granting process by providing a consistent and timely funding source for all Clean Water Act programs. These improvements will ultimately lead to better long-term water quality planning and more effective implementation.

The department is in the process of revising its standards of water quality. The standards define the policy of the state which is to protect, maintain and improve the quality of water for use as public and private water supplies; for propagation of wildlife, fish and aquatic life; and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses. These standards identify specific numeric criteria for chemical, biological and physical parameters. The specific numeric standard assigned to each parameter ensures protection of the beneficial uses for that classification. Numeric standards have been established for bacteria, sulfate, chloride, ammonia, numerous trace elements and organic chemicals.

While nutrients and sediment are the two most prevalent pollutants affecting water quality in the state, no specific criteria exist for them in state water quality standards. EPA has developed guidance and is requiring states to develop a strategy or plan for the development of nutrient criteria. In the absence of a state plan, EPA has said it will promulgate nutrient criteria for the states. Through support provided by an EPA Nutrient Criteria grant, the department is currently in the process of developing a "Nutrient Criteria Development Plan." When completed, this plan will provide the blueprint for the development of nutrient criteria for the state's rivers, streams, lakes and rivers.

There are currently no consistent methods for the development of "clean" sediment criteria for the nation's rivers and streams. Without specific criteria or standards for sediment, it is difficult, if not impossible, to set TMDL goals for waterbodies impacted by sedimentation. EPA needs to expand efforts to develop technical guidance for the development of sediment criteria. EPA should also continue funding state efforts to implement its "Nutrient Criteria Development Plans" as well as state efforts to develop scientifically defensible "clean" sediment criteria.

Appropriation of water for consumptive use reduces river flows and subsequently contributes to

impaired water quality. Water quality and water quantity are inextricably linked. Reduction in flow reduces the dilution potential and limits the assimilative capacity of the river or stream. Current state appropriation policy contributes to an increasing challenge to meet ambient water quality criteria. The increase in the number of impaired and threatened waterbodies suggests a link to reduced flows. Changes in the natural flow regime of rivers and streams through water withdrawals can also negatively affect instream habitat for fish and other aquatic biotia and the aquatic food web.

In North Dakota, a large portion of the potable groundwater resource underlies agricultural areas. The department, in conjunction with the State Water Commission, is involved in several projects designed to evaluate and monitor the effects of agricultural practices on groundwater quality and quantity. The department also reviews water appropriation permits to assess potential impacts to groundwater quality. The department will need to allocate sufficient resources to continue providing project oversight and monitoring, reviewing appropriation permits and working with producers regarding irrigation and chemigation practices to protect groundwater resources.

Careful attention must be paid to the water quality and supply issues associated with the continued energy development, for example, in-situ fossil fuel recovery (oil and coal bed methane development) and the production of ethanol and biodiesel. Sufficient resources must be allocated to avoid impacts to water quality.

Certain areas of the state have experienced increased population growth, and additional funds and resources will be required to ensure waters of the state are protected in populous areas.

The North Dakota Department of Health continues its work to maintain and improve surface and ground water quality in the state. It has taken considerable funding, time and dedication to protect water quality from point and nonpoint sources. For example, more than $100 million will be spent by North Dakota's three largest cities in the next four years to maintain secondary treatment of wastewater. An additional $5 million is spent annually on NPS projects, and intensive, annual monitoring continues on the state's most vulnerable aquifers. To maintain this level of effort, both state and federal funding must be continued at current or increased levels.

While efforts to protect water quality have been successful, more remains to be done to achieve the goal of restoring and maintaining the chemical, physical and biological integrity of the state's and nation's waters.

PART IV. SURFACE WATER MONITORING AND ASSESSMENT METHODOLOGY

A. Surface Water Quality Monitoring Program

Chapter 1. Monitoring Goals and Objectives

North Dakota's surface water quality monitoring program is detailed in a report entitled *North Dakota's Water Quality Monitoring Strategy for Surface Waters: 2005-2014* (NDDoH, 2005). This document describes the department's strategy to monitor and assess its surface water resources, including rivers and streams, lakes and reservoirs and wetlands. This strategy also fulfills requirements of Clean Water Act Section 106(e)(1) that requires the EPA, prior to awarding a Section 106 grant to a state, to determine that the state is monitoring the quality of its waters, compiling and analyzing data on the quality of its waters and including those data in its Section 305(b) report. An EPA guidance document entitled *Elements of a State Water Monitoring and Assessment Program* (EPA, March 2003) outlines 10 key elements of a state monitoring program necessary to meet the prerequisites of the CWA. The 10 key elements are:

- Monitoring Program Strategy
- Monitoring Objectives
- Monitoring Design
- Core and Supplemental Water Quality Indicators
- Quality Assurance
- Data Management
- Data Analysis/Assessment
- Reporting
- Programmatic Evaluation
- General Support and Infrastructure Planning

The department's water quality monitoring goal for surface waters is ***"to develop and implement monitoring and assessment programs that will provide representative data of sufficient spatial coverage and of known precision and accuracy that will permit the assessment, restoration and protection of the quality of all the state's waters."*** In support of this goal and the water quality goals of the state and of the Clean Water Act, the department has established 10 monitoring and assessment objectives. The following objectives have been established to meet the goals of this strategy. They are:

- Provide data to establish, review and revise water quality standards.
- Assess water quality status and trends.
- Determine beneficial use support status.
- Identify impaired waters.
- Identify causes and sources of water quality impairments.
- Provide support for the implementation of new water management programs and for the modification of existing programs.
- Identify and characterize existing and emerging problems.
- Evaluate program effectiveness.
- Respond to complaints and emergencies.
- Identify and characterize reference conditions.

Chapter 2. Monitoring Programs, Projects and Studies

In order to meet the goals and objectives outlined above, the department has taken an approach which integrates several monitoring designs, both spatially and temporally. Monitoring programs include fixed station sites, stratified random sites, rotating basin designs, statewide networks, chemical parameters and biological attributes. In some cases, department staff conduct the monitoring, while in other instances monitoring activities are contracted to other agencies such as soil conservation districts, the USGS or private consultants.

In the following sections, current monitoring activities are documented in the form of narrative descriptions. These include the project or program purpose (objectives), monitoring design (selection of monitoring sites), selected parameters and the frequency of sample collection. Where appropriate, there is also a description of monitoring and assessment activities that will be implemented during the next two-year reporting period, assuming adequate financial and manpower resources are available.

Ambient Water Quality Monitoring Network for Rivers and Streams

Current and Historic Program

The department's Ambient Water Quality Monitoring Network for Rivers and Streams was established in the 1960s. The primary purpose of this network is to provide data for trend analysis, general water quality characterization and pollutant loading calculations. Although the network has undergone several modifications since that time, the network currently consists of 33 fixed-station ambient monitoring sites located on 19 rivers (Table IV-1 and Figure IV-1). Sites are both wadeable and non-wadeable. Where practical, these sites are co-located with USGS flow-gauging stations. Samples are collected and analyzed for water chemistry and bacteria at each of these sites every six weeks during the open-water period (generally from early April through November) and once during the winter under ice cover (generally in late January or early February). Parameters include major ions, trace elements, total suspended solids, total phosphorus, total nitrogen, ammonia, nitrate-nitrite, Total Kjeldahl Nitrogen, fecal strep. bacteria, fecal coliform bacteria and E. coli (Table IV-2). Field measurements are taken for dissolved oxygen (DO), temperature, conductivity and pH.

Through a cooperative agreement with the USGS, a new component was added to the network in September 2003. Equipment installed at the USGS gauging station at Fargo (USGS site 05054000) monitors field parameters continuously. Data are collected through the deployment of a continuous recording YSI Model 600 multi-probe sonde and datalogger. Output from the sonde is transmitted via telemetry and the data posted "real-time" on the USGS North Dakota district web site. The USGS is also collecting water quality samples 10 times per year from this site, and these are being analyzed for major cations and anions, total suspended sediment, total phosphorus, total nitrogen, ammonia, nitrate-nitrite and fecal coliform bacteria. As this data set increases, regression relationships will be developed for selected water quality variables (e.g., total suspended sediment, TDS, total phosphorus and total nitrogen) using the continuously recorded field parameters. The goal of this system will be to use these regression relationships to provide "real-time" concentration estimates of total suspended sediment, total phosphorus, total nitrogen and TDS and to post the data on the web.

Future Program Plans

During the next two years, the department will continue to maintain its 33 fixed-station network. The department will continue to collect samples at the same frequency and to analyze the samples for the same parameters.

Table IV-1. Ambient Water Quality Monitoring Network Sites

Station ID	River	Location
380161	Souris River	above Minot
380021	Des Lacs River	at Foxholm
380095	Souris River	at Verendrye
385055	Bois de Sioux	near Doran, MN
380083	Red River	at Brushville, MN
380031	Wild Rice River	near Abercrombie
385040	Red River	near Harwood
380010	Sheyenne River	at Warwick
380009	Sheyenne River	3 mi E of Cooperstown
380153	Sheyenne River	below Baldhill Dam
380007	Sheyenne River	at Lisbon
385001	Sheyenne River	near Kindred
384155	Maple River	at Mapleton
380156	Goose River	at Hillsboro
384156	Red River	at Grand Forks
380037	Turtle River	at Manvel
380039	Forest River	at Minto

Table IV-1. Ambient Water Quality Monitoring Network Sites (cont.)

Station ID	River	Location
380157	Park River	at Grafton
380158	Pembina River	at Neche
384157	Red River	at Pembina
384130	James River	at Grace City
380013	James River	at Jamestown
380012	James River	at LaMoure
380022	Little Missouri River	at Medora
380059	Little Missouri River	S of Watford City on Hwy 85 bridge
384131	Knife River	near Golden Valley
380060	Spring Creek	at Zap
380087	Knife River	at Hazen
380160	Heart River	above Lake Tschida
380151	Heart River	near Mandan
380077	Cedar Creek	at Raleigh
380105	Cannonball River	near Raleigh
380067	Cannonball River	S of Breien

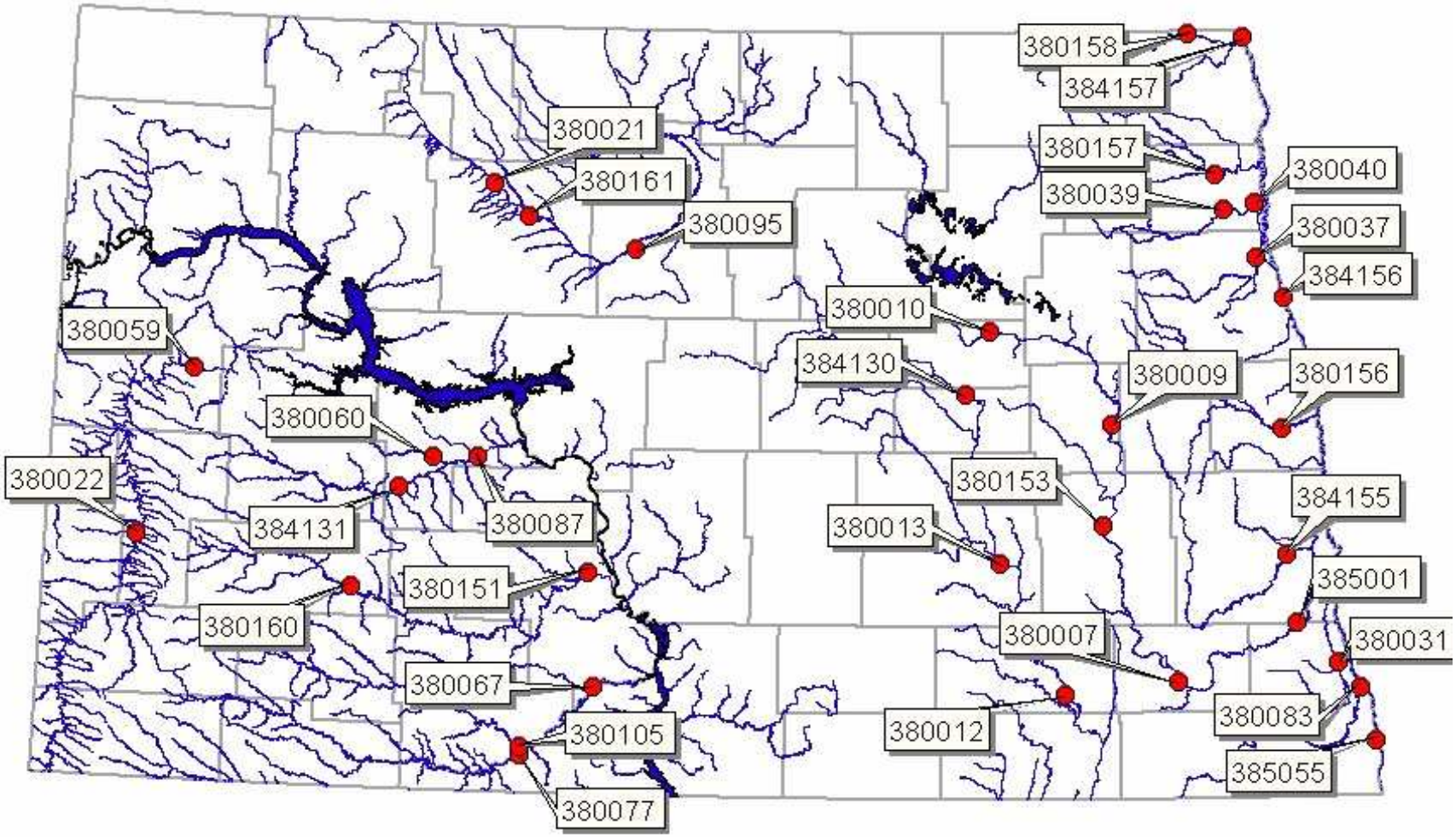


Figure IV-1. Ambient Water Quality Monitoring Network for Rivers and Streams

Table IV-2. Ambient Water Quality Monitoring Parameters

Field Measurements	Laboratory Analysis			
	General Chemistry	**Trace Elements**	**Nutrients**	**Biological**
Temperature	Sodium	Aluminum	Ammonia	Fecal coliform
pH	Magnesium	Antimony	Nitrate-nitrite	E. coli
DO	Potassium	Arsenic	Total Kjeldahl Nitrogen	Enterococcus sp.
Specific Conductance	Calcium	Barium	Total Nitrogen	
	Manganese	Beryllium	Total Phosphorus	
	Iron	Boron		
	Chloride	Cadmium		
	Sulfate	Chromium		
	Carbonate	Copper		
	Bicarbonate	Lead		
	Hydroxide	Nickel		
	Alkalinity	Silver		
	Hardness	Selenium		
	Total Dissolved Solids	Thallium		
	Total Suspended Solids	Zinc		

Biological Monitoring Program

Current and Historic Program

In response to a recognized need for more and better water quality assessment information, the department initiated a biological monitoring program in 1993. This initial program, a cooperative effort with the Minnesota Pollution Control Agency and the USGS's Red River National Water Quality Assessment Program, was conducted in 1993 and 1994 and involved approximately 100 sites in the Red River Basin. The result of this initial program was the development of the index of biological integrity (IBI) for fish in the Red River Basin. This program continued in the Red River Basin in 1995 and 1996 with the sampling of an additional 100-plus biological monitoring sites in the Souris River Basin in 1997, in the James River Basin in 1998 and in the Missouri River Basin in 1999 and 2000. The Upper Red River Basin, including the Sheyenne River and its tributaries, was sampled in 1995, while the Lower Red River Basin was sampled in 1996. Beginning in 1995, biological monitoring was expanded to include macroinvertebrate sampling in addition to fish. A habitat assessment also was conducted at each site following the Rapid Bioassessment Protocols published by EPA. The purpose of this

biological monitoring program was to (1) develop an IBI for fish and macroinvertebrates and (2) provide an assessment of aquatic life use attainment for those stream reaches that were assessed.

The rotating basin monitoring program was discontinued in 2001 while the department focused its resources in support of sampling for EPA's Environmental Monitoring and Assessment Program (EMAP) Western Pilot Project. The EMAP Western Pilot Project was the second regional pilot project within EMAP focusing on multiple resources. The first of these regional pilot projects focused on the mid-Atlantic region (Maryland, Delaware, Pennsylvania, Virginia and West Virginia). The Western Pilot was a five-year effort (2000-2004) targeted for the western conterminous United States. The pilot involves three EPA Regions (VIII, IX and X) and 12 states (North Dakota, South Dakota, Montana, Wyoming, Colorado, Utah, Arizona, Nevada, Idaho, California, Washington and Oregon). The pilot has three main resource components: surface waters (rivers and streams), landscapes and near coastal (estuaries and coastal waters).

North Dakota is part of the Western Pilot's Surface Water Project. The stated purpose of this part of the pilot is to: (1) develop the monitoring tools (e.g., biological indicators, stream survey design methods and description[s] of reference condition) necessary to produce unbiased estimates of the ecological condition of rivers and streams that are applicable for the west; and (2) demonstrate those tools in assessments of ecological condition of rivers and streams across multiple geographic regions in the west. In addition to state- and regional-specific assessment questions, the goal of the EMAP Western Pilot's Surface Water Project is to provide answers to three general assessment questions: (1) What proportion of the perennial river and stream miles in the western United States are in acceptable (or poor) biological condition? (2) What is the relative importance of potential stressors (e.g., habitat modification, sedimentation, nutrients, temperature, toxic contaminants, grazing, urbanization) in rivers and streams across the west? (3) With what stressors are perennial rivers and streams in poor condition associated? In addition to answering these questions for the western 12-state region of the United States, the EMAP sampling design will allow these questions to be answered in each of the three EPA regions in the west, in each participating state and in several more spatially-intensive "focus areas" in each region. Within North Dakota, these areas are the Upper Missouri River Basin and the Northern Glaciated Plains Ecoregion.

Field sampling for the project began in 2000 and continued through 2004. Based on the EMAP study design, approximately 50 to 60 sites were sampled within each state and focus area during the five-year monitoring period. Sites were chosen by EMAP staff based on a random site-selection process. By randomly selecting sites, results can be extrapolated to the entire resource population of concern (in this case, all perennial rivers and streams in the west, EPA Region VIII, North Dakota, the Missouri River Basin and the Northern Glaciated Plains Ecoregion). A total of 110 sites were sampled in North Dakota. Sixty-three of these sites were randomly selected sites, and 47 were chosen as "targeted reference" sites. Reference sites exemplify river and stream reaches that are considered "least impaired" with respect to anthropogenic (human) disturbance or stress.

Another key objective of the Western EMAP Pilot is to build state and tribal capacity for long-term monitoring through the development of monitoring tools, sampling designs and analytical capability and by creating strong partnerships among states, tribes, EPA Region VIII, EPA's Office of Research and Development and other federal resource agencies. In order to meet this

objective, EPA has encouraged the states to take the lead in carrying out the monitoring component of the project. In North Dakota, the department's Division of Water Quality is a partner in the project and entered into a cooperative agreement with the North Dakota district of the USGS to conduct sampling. It is anticipated that results from this project will become available beginning in 2006 and 2007.

Future Program Plans

Working cooperatively with the Minnesota Pollution Control Agency, the department began biological monitoring for fish and macroinvertebrates in the Red River Basin in 2005. Sampling will continue in the Red River Basin in 2006. Sampling procedures for fish, macroinvertebrates and physical habitat will follow those employed by the EMAP Western Pilot. Sample sites were selected in the Red River Basin based on a probabilistic design. Targeted reference sites (i.e., best available) and impaired sites were also selected based on an "a priori" screening process and sampled. The results from this monitoring program will be used to refine existing multi-metric IBIs for both fish and macroinvertebrates. Results from the analysis of the randomly selected sites will be used to provide estimates of biological condition and aquatic life use support for the Red River Basin in North Dakota. These results will be presented in the 2008 Integrated Report.

Following biological monitoring in the Red River basin in 2005 and 2006, the department plans to resample the Souris River, James River and Missouri River basins using a rotating basin approach.

Lake Water Quality Assessment Program

Current and Historic Program

The department currently recognizes 224 lakes and reservoirs for water quality assessment purposes. Of this total, 134 are manmade reservoirs and 90 are natural lakes. All lakes and reservoirs included in this assessment are considered significantly publicly owned.

Reservoirs are defined as waterbodies formed as a result of dams or dugouts constructed on natural or manmade drainages. Natural lakes are waterbodies having natural lake basins. A natural lake can be enhanced with outlet control structures, diversions or dredging. Based on the state's ADB, the 134 reservoirs have an areal surface of 542,868 acres. Reservoirs comprise about 76 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 67 percent of the state's entire lake and reservoir acres are contained within the two mainstem Missouri River reservoirs (Lake Sakakawea and Lake Oahe). The remaining 132 reservoirs share 62,137 acres, with an average surface area of 471 acres.

The 90 natural lakes in North Dakota cover 172,051 acres, with approximately 125,000 acres or 73 percent attributed to Devils Lake. The remaining 89 lakes average 523 acres, with half being smaller than 200 acres.

In 1991, through a grant from the EPA Clean Lakes Program, the department initiated the Lake Water Quality Assessment (LWQA) Project. Since that time, the department has completed sampling and analysis for 111 lakes and reservoirs in the state. The objective of the assessment

project is to describe the general physical and chemical condition of the state's lakes and reservoirs, including trophic status.

The lakes and reservoirs targeted for assessment were chosen in conjunction with the North Dakota Game and Fish Department. Criteria used during the selection process were geographic distribution, local and regional significance, fishing and recreational potential and relative trophic condition. Lakes without much historical monitoring information were given the highest priority.

The results from the LWQA Project have been prepared in a functional atlas-type format. Each lake report discusses the general description of the waterbody, general water quality characteristics, plant and phytoplankton diversity, trophic status estimates and watershed condition.

In addition to the chemical monitoring and analysis, a land-use assessment was completed for each lake assessment. Each lake's watershed is assessed to identify the major sources of point- and nonpoint-source pollution. Land use and land-use practices were inventoried by interviewing local Natural Resources Conservation Service (NRCS) field office staff and state NRCS personnel. This inventory was verified in the field in the late fall. An aerial watershed survey also was performed on approximately one-third of all lakes assessed.

Point-source assessments were accomplished for each watershed with the assistance of the department's National Pollutant Discharge Elimination System (NPDES) Permit Program staff. All contributing point sources were identified, and an estimate was made of the probable nutrient and organic loading to each lake or reservoir and its impact.

Beginning in 1997, LWQA Project activities were integrated into the department's rotating basin monitoring strategy. Lake Darling and the Upper Des Lacs Reservoir were sampled as the department focused its monitoring activities in the Souris River Basin in 1997. Pipestem Dam and Jamestown Reservoir were sampled in 1998; Lake Sakakawea was sampled in 1999; and Bowman-Haley Reservoir, Patterson Lake and Lake Tschida were sampled in 2000.

In addition to inclusion in the annual LWQA Project, Devils Lake and Lake Sakakawea have received special attention. Devils Lake has increased in elevation 26 feet since 1993. In response to questions about water quality changes resulting from these water level increases, the department initiated a comprehensive water quality monitoring program in 1993 for Devils Lake. Devils Lake is sampled approximately five times per year, including once during the winter.

While Devils Lake has increased in elevation over the last 10 years, Lake Sakakawea's lake level has dropped significantly since 2002. This drop has been due to drought conditions in the upper Missouri River Basin of Montana resulting in reduced runoff and by the U.S. Army Corps of Engineers' operating policies, which favor downstream navigation interests over the health and condition of the upper Missouri River reservoirs. Of particular concern in North Dakota is the quality of Lake Sakakawea's cold water fishery. Since 2002, the department and the North Dakota Game and Fish Department have cooperated in a project to monitor the condition of the lake. Sampling consists of weekly DO/temperature profiles and water quality samples collected once each month at seven locations.

While not a significant component of the state's lake assessment program, the department also cooperates and assists lake associations and citizen groups with volunteer lake monitoring and assessment projects. When a group or association requests assistance, department staff will meet with the group to define the overall goals and objectives of the project. Based on these goals and objectives, the department will prepare a sampling plan and provide training in sampling methods. The group is responsible for day-to-day monitoring activities, and the department provides laboratory analysis of all samples collected.

Future Program Plans

Given their statewide significance, Devils Lake and Lake Sakakawea will continue to be monitored by the department. Even with the cooperation and assistance provided by the North Dakota Game and Fish Department, sampling Lake Sakakawea requires a significant manpower commitment. The department will be looking for other partners (e.g., U.S. Army Corps of Engineers and USGS) to help with this effort.

Many of the lake/reservoir assessments conducted as part of the LWQA Project are now nine to 15 years old. Since that time, there has been a severe drought and significant statewide flooding, both which may have affected water quality. These climatic factors, along with normal eutrophication, make the assessments conducted as part of the LWQA Project highly questionable.

Working cooperatively with the North Dakota Game and Fish Department's Fisheries Division, the department re-initiated a targeted statewide LWQA Program in 2005. Through this program, 60 lakes and reservoirs were sampling in 2005. Samples were collected at least twice during the summer (May/June, July/August or September/October) and once during the winter. The department will continue this program with the North Dakota Game and Fish Department in 2006. The data will be used in the 2008 Integrated Report to (1) characterize general water quality conditions, (2) assess trophic conditions, (3) determine trends and (4) assess whether beneficial uses are being met.

During the next two years, the department will also continue to encourage and support ongoing volunteer lake monitoring and assessment programs and to seek new partnerships with lake associations and citizen volunteer groups.

Fish Tissue Contaminant Surveillance Program

Current and Historic Program

The purpose of the Fish Tissue Surveillance Program is to protect human health by monitoring and assessing the levels of commonly found toxic compounds in fish from the state's lakes, reservoirs and rivers. The department has maintained an active fish tissue monitoring and contaminant surveillance program since 1990. As part of this program, individual fish tissue samples are collected from selected lakes, reservoirs and rivers throughout the state and analyzed for methyl-mercury. For example, in 2004, the department cooperated with the North Dakota Game and Fish Department Fisheries Division in the collection and analysis of 700 fish tissue plug samples from 24 lakes and reservoirs, including Devils Lake and Lake Sakakawea.

These data are then used to issue annual species-specific fish advisories for the state's rivers, lakes and reservoirs based on risk-based consumption levels. The approach compares the estimated average daily exposure dose for specific waterbodies and species to EPA's recommended reference dose (RfD) for methyl-mercury. Using these relationships, fish tissue data are interpreted by determining the consumption rate (e.g., two meals per week, one meal per week or one meal per month) that would likely pose a health threat to the general population and to sensitive populations (i.e., children or pregnant or breast-feeding women).

The department has also participated in sampling for the National Fish Tissue in Lakes Survey. Eight lakes were selected in North Dakota as part of the national probability survey of 500 lakes and reservoirs. Sampling took place from 2000 through 2003.

Future Program Plans

The department will continue to conduct fish tissue sampling from lakes and reservoirs throughout the state that are sampled by the North Dakota Game and Fish Department Fisheries Division as part of its routine fisheries management activities (e.g., population surveys). Samples will continue to be analyzed for methyl-mercury. During the next two years, the department hopes to add additional analyses for contaminants such as heavy metals, pesticides and other organic compounds (e.g., PCBs, PBDEs, PAHs and dioxin).

NPS Pollution Management Program Monitoring

Program Background

Since the reauthorization of the Clean Water Act in 1987, the North Dakota NPS Pollution Management Program has used Section 319 funding to support more than 90 local projects throughout the state. While the size, target audience and design of the projects have varied significantly, they all share the same basic objectives. These common objectives are: (1) increase public awareness of NPS pollution issues; (2) reduce/prevent the delivery of NPS pollutants to waters of the state; and (3) disseminate information on effective solutions to NPS pollution where it is threatening or impairing uses.

State and local projects currently supported with Section 319 funding essentially include three different types of projects. These project types or categories are (1) development phase projects, (2) educational projects and (3) watershed projects. Although most projects clearly fit into one of these categories, there are also several projects which include components from all three categories. A portion of the Section 319 funds awarded to the state have also been used to assess major aquifers in the state as well as promote and implement practices that prevent groundwater contamination.

NPS Development Phase Project Monitoring

Locally sponsored NPS assessment or TMDL development projects continue to be the primary means to determine watershed priorities and to prescribe specific management measures. These local assessments, commonly referred to as "development projects," provide the foundation for watershed implementation projects. The primary purposes of development phase projects are to identify beneficial use impairments or threats to specific waterbodies and to determine the extent to which those threats or impairments are due to NPS pollution.

Work activities during a development phase project generally involve an inventory of existing data and information and supplemental monitoring, as needed, to allow an accurate assessment of the watershed. Through these efforts, the local project sponsors are able to: (1) determine the extent to which beneficial uses are being impaired; (2) identify specific sources and causes of the impairments; (3) establish preliminary pollutant reduction goals or TMDL endpoints; and (4) identify practices or management measures needed to reduce the pollutant sources and restore or maintain the beneficial uses of the waterbody. Development phase projects are generally one to two years in length.

As is the case with TMDL development projects, responsibility for development and implementation of NPS assessment projects lies primarily with the department's Surface Water Quality Management Program. Regional TMDL development staff members are also responsible for coordinating NPS assessment projects. Technical support for assessment projects and overall program coordination are provided by Surface Water Quality Management Program staff located in Bismarck.

The goals, objectives, tasks and sampling procedures associated with each NPS assessment project are described in project-specific Quality Assurance Project Plans (QAPPs).

NPS Watershed Implementation Project Monitoring

Watershed projects are the most comprehensive projects currently implemented through the NPS Pollution Management Program. These projects are typically long-term in nature (five to 10 years, depending on the size of the watershed and extent of NPS pollution impacts) and are designed to address documented NPS pollution impacts and beneficial use impairments within approved priority watersheds. Common objectives for a watershed project are to: (1) protect and/or restore impaired beneficial uses through the promotion and voluntary implementation of best management practices (BMPs) that reduce/prevent documented NPS pollution loadings; (2) disseminate information on local NPS pollution concerns and effective solutions; and (3) evaluate the effectiveness of implemented BMPs in meeting the NPS pollutant reduction goals of the project.

To evaluate the water quality improvement effects of BMPs that are implemented as part of a Section 319 NPS watershed restoration project, Surface Water Quality Management Program staff will assist local sponsors with the development and implementation of QAPPs specific to the pollutant reduction goals or TMDL endpoints described in the watershed restoration project implementation plan. Each QAPP developed for a watershed restoration project provides a detailed description of the monitoring goals, objectives, tasks and sampling procedures.

Future Program Plans

As Section 319 funding continues to be made available, the department will continue to work with local SCDs, water resource boards and other local agencies to develop and implement watershed assessment and implementation projects. Data collected from these projects will be used for Section 305(b) assessments and TMDL-listing decisions for the 2008 Integrated Report.

Support Projects and Special Studies

Support projects and special studies are activities that are conducted on an as-needed basis to provide data or information to either answer a specific question or to provide program support.

Special studies provide immediate and in-depth investigations of specific water quality problems or emerging issues and usually involve practical research. In conducting practical research, the Surface Water Quality Management Program may rely on its own staff or may contract with the USGS, academia or private consultants. Examples of special studies projects conducted by the department include:

- Studies to develop nutrient criteria for streams and lakes.
- Time of travel studies, dispersion and reareation studies in support of water quality model development.
- The Lostwood National Wildlife Refuge wetland mercury assessment project.

Support projects are activities conducted or supported by the department that result in products or tools that enhance overall program efficiency or lead to new assessment methods. Examples of support projects conducted or supported by the department include:

- Studies to evaluate or compare monitoring methods.
- The watershed and sub-watershed delineation and digitization project.

Complaint and Fish Kill Investigations

Complaint Investigations

The primary purpose for the investigation of complaints is to determine (1) whether or not an environmental or public health threat exists and (2) the need for corrective action where problems are found. Since customer service is a primary focus of the department, complaint response is a very high priority. When complaints are received by the department, they may be handled by department staff, including staff in other divisions of the Environmental Health Section, or forwarded to one of the local health districts located across the state. Once the complaint is routed to the appropriate state or local health district staff person, a field investigation is usually conducted. When problems are identified, voluntary correction is obtained in most cases. However, necessary enforcement action can be taken under the state water pollution laws (North Dakota Century Code 61-28) and regulations or under other applicable state or federal laws.

Fish Kill Investigations

Fish mortalities can results from a variety of causes and sources, some natural in origin and some induced by man. It is recognized that speed is all-important in the initial phases of a fish kill investigation. Therefore, persons reporting a fish kill are encouraged to contact the department or the North Dakota Game and Fish Department during normal working hours or Emergency Response through state radio. Once a fish kill is reported, staff members from the department's Surface Water Quality Management Program and/or North Dakota Game and Fish Department are dispatched to investigate. The extent of the investigation of a fish kill is dependent on the extent of the kill, the numbers and kinds of fish involved and the resources available at the time for the investigation. Following a decision to investigate, the investigation should continue until a cause is determined or until all known potential causes have been ruled out.

Stream Flow

Current and Historic Program

Stream flow data is critical to the analysis and interpretation of water quality data. Stream flow data is used to calculate critical flow conditions for TMDLs and NDPES permitting, to estimate pollutant loading and to interpret water quality results (e.g., load duration curve analysis). The USGS and agencies of the state of North Dakota have had cooperative agreements for the collection of stream flow records since 1903. During the 2003 water year (October 1, 2002 through September 30, 2003), the USGS cooperated with numerous state, federal and local agencies in the collection and reporting of stream flow data from 108 stream flow-gauging stations.

In addition to the extensive USGS streamflow gauging network, the department conducts flow monitoring at most water quality sites associated with NPS assessment and watershed implementation projects and TMDL development projects. This ensures that flow data is available for load calculations and other data analysis.

Future Program Plans

Diminishing resources, both state and federal, have significantly reduced the number of long-term stream flow gauging stations. During the next two years, efforts will be made to maintain the current network of stations and to add or reestablish historic stations that have been discontinued.

B. Assessment Methodology

Chapter 1. Introduction

As stated earlier, for purposes of 2006 Section 305(b) reporting and Section 303(d) listing, EPA encouraged states to submit an integrated report and to follow its integrated reporting guidance (U.S. EPA, 2005). Key to integrated reporting is an assessment of all of the state's waters and placement of those waters into one of five assessment categories. The categories represent varying levels of water quality standards attainment, ranging from Category 1, where all of a waterbody's designated uses are met, to Category 5, where a pollutant impairs a waterbody and a TMDL is required (Table IV-3). These category determinations are based on consideration of all existing and readily available data and information consistent with the state's assessment methodology.

The purpose of this section is to describe the assessment methodology used in this integrated report. In general, the state's assessment methodology is consistent with the state's beneficial use designations defined in the state's water quality standards (NDDoH, 2001). The assessment methodology is also consistent with the department's interpretation of the narrative and numeric criteria described in either the current state water quality standards (NDDoH, 2001) or the revised standards (NDDoH, 2006).

Assessments are conducted by comparing all available and existing information for an assessment unit to applicable water quality criteria (narrative and numeric). This information, which is summarized by specific lake, reservoir, river reach or sub-watershed, is integrated as beneficial use assessments that are entered into a water quality assessment "accounting"/database management system developed by EPA. This system, which provides a standard format for water quality assessment and reporting, is termed the Assessment Database Version 2.2.0 (ADB).

As part of integrated Section 305(b) and Section 303(d) reporting to EPA, the state also provides a copy of the ADB with the 2006 assessment cycle data. While the Section 303(d) TMDL list in Tables VI-1 through VI-5 provides all Category 5 waterbodies, the listing of all Category 1, 2, 3, 4A, 4B and 4C waterbodies are provided to EPA through the ADB.

Chapter 2. Assessment Database (ADB)

North Dakota's ADB for the 2006 assessment cycle contains 1,688 discreet assessment units (AUs) representing 54,427 miles of rivers and streams and 224 lakes and reservoirs. Within the ADB, designated uses are defined for each AU (i.e., river or stream reach, lake or reservoir) based on the state's water quality standards. Each use is then assessed using available chemical, physical and/or biological data.

With an estimated 54,427 miles of rivers and streams and 714,919 acres of lakes and reservoirs, it is impractical to adequately assess each and every mile of stream or every acre of lake. However, the department believes it is important to: (1) accurately assess those waters for which beneficial use assessment information is available; and (2) account for those stream miles and lake acres that are not assessed or for which there are insufficient data to conduct an assessment. As a result, the department has adopted the ADB to manage water quality assessment information for the state's rivers, streams, lakes and reservoirs.

Developed by EPA, the ADB is an Access® based "accounting"/database management system that provides a standard format for water quality assessment information. It includes a software program for adding and editing assessment data and transferring assessment data between the personal computer and EPA. Assessment data, as compared to raw monitoring data, describes the overall health or condition of the waterbody by describing beneficial use impairment and, for those waterbodies where beneficial uses are impaired or threatened, the causes and sources of pollution affecting the beneficial use. The ADB also allows the user to track and report on TMDL-listed waters, including their development and approval status.

Table IV-3. Assessment Categories for the Integrated Report

Assessment Category	Assessment Category Description
Category 1	All of the waterbody's designated uses have been assessed and are met.
Category 2	Some of the waterbody's 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 of the waterbody's designated uses are met.
Category 4	The waterbody is impaired or threatened, but a TMDL is not needed. This category has been further sub-categorized as: • 4A - waterbodies that are impaired or threatened, but TMDLs needed to restore beneficial uses have been approved or established by EPA; • 4B - waterbodies that are impaired or threatened, but do not require TMDLs because the state can demonstrate that "other pollution control requirements (e.g., BMPs) required by local, state or federal authority" • (see 40 CFR 130.7[b][1][iii]) are expected to address all waterbody-pollutant combinations and attain all water quality standards in a reasonable period of time; and • 4C - waterbodies that are impaired or threatened, but the impairment is not due to a pollutant.
Category 5	The waterbody is impaired or threatened for at least one designated use, and a TMDL is needed.

To create North Dakota's ADB, the state's 54,427 miles of rivers and streams and 224 lakes and reservoirs have been delineated into 1,688 discreet AUs. An AU can be an individual lake or reservoir, a specific river or stream reach or a collection of stream reaches in a sub-watershed. North Dakota's ADB is currently represented by 1,464 river and stream AUs and 224 lake and reservoir AUs. Each of these AUs are then assessed individually, based on the availability of sufficient and credible data. In order to delineate and define AUs used in the ADB, the department followed a general set of guidelines:

1. Each AU is within the eight-digit USGS hydrologic unit.

2. Each river and stream AU was composed of stream reaches of the same water quality standards classification (I, IA, II or III).

3. To the extent practical, each AU is within a contiguous Level IV ecoregion.

4. Mainstem perennial rivers were delineated as separate AUs. Where these rivers join with another major river or stream within the eight-digit hydrologic unit, the river was further delineated into two or more AUs.

5. Tributary rivers and streams, which are named on USGS 1:100,000 scale planimetric maps, were delineated as separate AUs. These AUs may have been further delineated, based on stream order or water quality standards classification.

6. Unnamed ephemeral tributaries to a delineated AU were consolidated into one unique AU. This was done primarily for accounting purposes so that all tributary stream reaches identified in the National Hydrography Dataset (NHD) are included in the ADB.

7. Stream reaches, which were identified in the NHD and on USGS 1:24,000 scale maps and which did not form either an indirect or direct hydrologic connection with a perennial stream, were not included in the ADB. This would include small drainages that originate and flow into closed basin lakes or wetlands. (Note: These delineation criteria do not apply to tributaries to Devils Lake.)

The ADB provides an efficient accounting and data management system. It also allows for the graphical presentation of water quality assessment information by linking assessments contained in the ADB to the NHD file through geographic information systems (GIS). In order to facilitate the GIS datalink, the department has "reach-indexed" each AU in the ADB to the NHD file. The product of this process is a GIS coverage that can be used to graphically display water quality assessment data entered in the ADB. An example can be seen in Figure IV-2, which depicts each of the reach-indexed AUs delineated in the Souris River Basin.

Assessments completed and entered into the ADB also form the basis for the state's Section 319 Nonpoint Source (NPS) Assessment Report and Management Plan. Because of the way the department's Surface Water Quality Management Program is structured, there is complete integration of the state's Section 305(b) Water Quality Assessment Report, the Section 303(d) TMDL List and the Section 319 NPS Assessment Report and Management Plan.

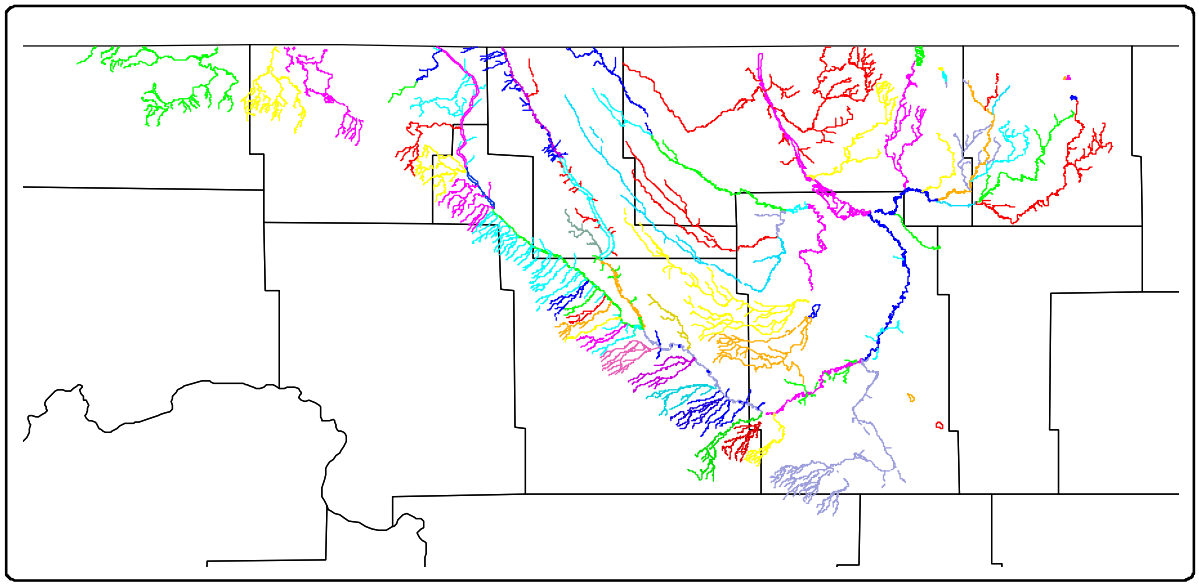


Figure IV-2. Map of Reach-Indexed Assessment Units Delineated in the Souris River Basin

Chapter 3. Beneficial Use Designation

Water quality reporting requirements under Sections 305(b) and 303(d) of the CWA require states to assess the extent to which their lakes and reservoirs and rivers and streams are meeting water quality standards applicable to their waters, including beneficial uses as defined in their state water quality standards. In addition to beneficial uses, applicable water quality standards also include narrative and numeric standards and antidegradation policies and procedures. While Section 305(b) requires states and tribes to provide only a statewide water quality summary, Section 303(d) takes this reporting a step further by requiring states to identify and list the individual waterbodies that are not meeting applicable water quality standards and to develop TMDLs for those waters. Both Section 305(b) reporting and Section 303(d) listing accomplished this assessment by determining whether the waterbody or AU is supporting its designated beneficial uses.

Beneficial uses are not arbitrarily assigned to AUs, but rather are assigned based on the *Standards of Quality for Waters of the State* (NDDoH, 2001). These regulations define the protected beneficial uses of the state's rivers, streams, lakes and reservoirs. Four beneficial uses (aquatic life, recreation, drinking water and fish consumption) were assessed for purposes of Section 305(b) reporting and Section 303(d) listing.

All waterbodies or AUs entered into the ADB and, therefore, all stream classes (I, IA, II and III) and all lake classes (1-5) are assigned aquatic life and recreation beneficial uses. All Class I, IA and II rivers and streams and all lakes are assigned the drinking water beneficial use.

While not specifically identified in state standards, fish consumption is protected through both narrative and numeric human health criteria specified in the state's water quality standards. Fish consumption has been assigned to all Class I, IA and II rivers and streams, to those Class III streams known to provide a sport fishery and to all Class 1 through 4 lakes. The state's statewide fish consumption advisory applies to all waters known to provide a sport fishery.

Other beneficial uses identified in the state's water quality standards are agriculture (e.g., stock watering and irrigation) and industrial (e.g., washing and cooling). These uses, while not assessed for either the Section 305(b) water quality assessment report or the Section 303(d) TMDL list, are presumed to be fully supporting.

Chapter 4. Sufficient and Credible Data Requirements

For purposes of Section 305(b) assessment and reporting and 303(d) listing, the department will use only what it considers to be sufficient and credible data. Sufficient and credible data are chemical, physical and biological data that, at a minimum, meet the following criteria:

- Data collection and analysis followed known and documented quality assurance/quality control procedures.

- Water column chemical data were 12 years old or less for rivers and streams and 14 years or less for lakes, unless there was adequate justification to use older data (e.g., land use or climatic conditions have not changed). Fish tissue methyl-mercury data are seven years old or less.

- There are a minimum of 10 chemical samples collected in the 12-year period. The 10 samples may range from one sample collected in each of 10 years or 10 samples collected all in one year.

- A minimum of five fecal coliform samples were collected during any calendar month from May through September. The five samples per month may consist of five samples collected during the month in the same year or five samples collected during the same calendar month, but pooled across multiple years (e.g., two samples collected in May 2000, two samples collected in May 2001 and one sample collected in May 2005).

- Only one biological sample (fish or macroinvertebrate) is necessary in the 12-year period.

- There are a minimum of 10 fish tissue samples per species per lake, reservoir or river representing the range in size classes present in the waterbody.

In a few cases, there may be overwhelming evidence to list a waterbody as impaired even though there may not be sufficient data (i.e., fewer than 10 chemical samples collected within a 12-year period or fewer than 5 fecal coliform samples collected during any calendar month). In the case of chemical samples, if five to nine samples are collected and half of them exceed the water quality standard, then the waterbody would be listed as impaired based on this "overwhelming evidence." In the case of fecal coliform samples, if less than five samples are collected during any calendar month, there be "overwhelming evidence to list the waterbody as impaired if there are a minimum of ten samples collected during all months, May through September, and half of them exceed the 400 CFU/100 ml criterion.

Chapter 5. Existing and Available Water Quality Data

River and Streams

Chemical Data

Since 1994, the department has operated a network of 26 to 33 ambient monitoring sites. Where practical, sites are co-located with USGS flow gauging stations, thereby facilitating the analysis of chemical data with stream hydrologic data. All of these sites are established as basin or subbasin integrator sites, where the chemical characteristics measured at each of these sites reflect water quality effects in the entire watershed. It is the department's intention to maintain these as long-term monitoring sites for the purpose of assessing water quality trends and to describe the general chemical character of the state's major river basins.

From 1997 through 1999, the department implemented an intensive survey approach to chemical monitoring and assessment. The approach complemented the ambient water quality monitoring network maintained by the department and other program-monitoring activities (e.g., lake water quality assessments, NPS pollution monitoring and assessment and point-source compliance monitoring). The approach integrated chemical monitoring at targeted sites with biological monitoring at sites throughout the basin. The Souris River Basin, James River Basin and the upper Missouri River Basin were sampled in 1997, 1998 and 1999, respectively.

The department also uses data collected by the USGS. The USGS maintains and operates several water quality monitoring sites that provide data used for assessment purposes. Many of these sites are maintained by the USGS through cooperative agreements with other agencies (e.g., North Dakota State Water Commission, U. S. Bureau of Reclamation and U.S. Army Corps of Engineers), through international agreements (e.g., the Souris River Bilateral Agreement) or with the department itself.

In addition to the 33-station ambient chemical monitoring network and the intensive basin survey program, the department cooperates with local project sponsors (e.g., soil conservation districts and water resource districts) in small watershed monitoring and assessment projects and in waterbody-specific TMDL development projects. These projects entail intensive water quality monitoring, stream flow measurements, land use assessments and biological assessments. Where lake water quality is a concern, lake monitoring also is included in the sampling and analysis plan. The goal of these small watershed monitoring and assessment projects and TMDL development projects is to estimate pollutant loadings to the lake or stream and, where appropriate, set target load reductions (i.e., TMDLs) necessary to improve beneficial uses (e.g., aquatic life and recreation). Most of these projects are followed by Section 319 NPS Pollution Management Program watershed implementation projects. Water quality data collected through these cooperative efforts also are used in assessment of waterbodies for the Section 305(b) report and the TMDL list.

Biological Data

In response to the growing need for better water quality assessment information, the department initiated a biological monitoring program in 1993 and 1994. This program, which was a

cooperative effort with the Minnesota Pollution Control Agency and the USGS's Red River National Water Quality Assessment Program, involved approximately 100 sites in the Red River Basin. The result of this initial program was the development of the Index of Biotic Integrity (IBI) for fish in the Lake Agassiz Plain ecoregion of the Red River Basin. The program continued in the Red River Basin in 1995 and 1996. The Upper Red River Basin, including the Sheyenne River and its tributaries, was sampled in 1995, while the Lower Red River Basin was sampled in 1996. Following these initial monitoring efforts in the Red River Basin, biological monitoring was expanded statewide with sampling in the Souris River Basin in 1997, the James River Basin in 1998, the Lake Sakakawea subbasin of the Missouri River Basin in 1999 and the Lake Oahe subbasin of the Missouri River Basin in 2000. Beginning in 1995, biological monitoring was expanded to include macroinvertebrate sampling in addition to fish. For purposes of this integrated report, only fish and macroinvertebrate data collected in the Lake Agassiz Plain ecoregion (Figure IV-3) were used to assess aquatic life use support.

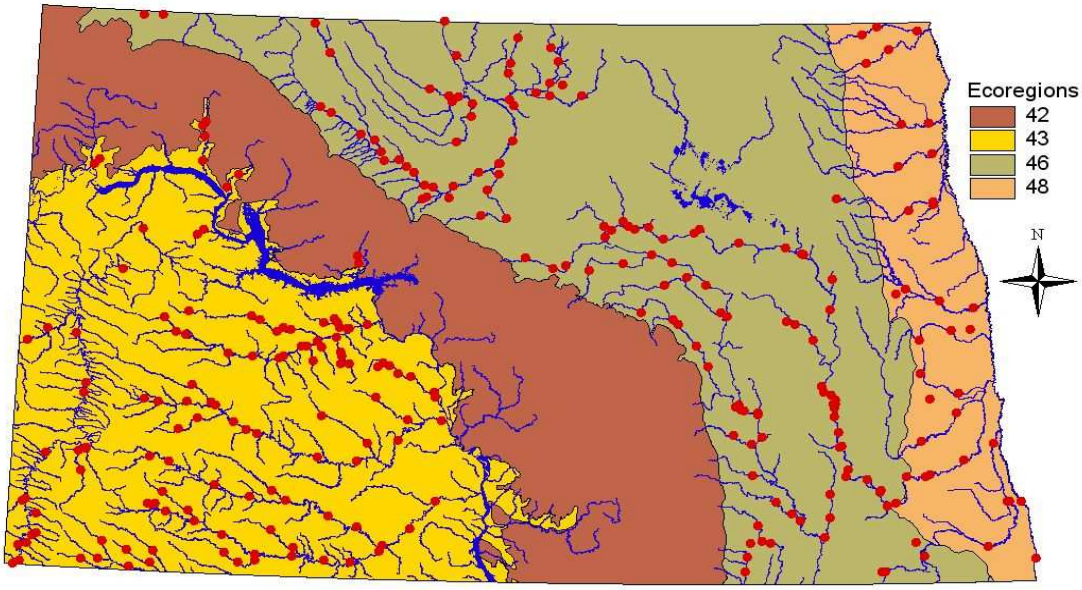


Figure IV-3. Macroinvertebrate Sampling Sites in North Dakota (1995-2000)
(Color-shaded areas are the Level III ecoregions in the state.)

Lakes and Reservoirs

From 1991 through 1996 the department conducted a Lake Water Quality Assessment (LWQA) Project. During that time, the department completed sampling and analysis for 111 lakes and reservoirs in the state. The objective of the assessment project was to describe the general physical and chemical condition of the state's lakes and reservoirs.

The lakes and reservoirs targeted for assessment were chosen in conjunction with the North Dakota Game and Fish Department. Criteria used during the selection process were geographic distribution, local and regional significance, fishing and recreational potential and relative trophic condition. Lakes without much historical monitoring information were given the highest priority.

The results from the LWQA Project have been prepared in a functional atlas-type format. Each lake report discusses the general description of the waterbody, general water quality characteristics, plant and phytoplankton diversity, trophic status estimates and watershed condition.

One of the most useful measures of lake water quality is trophic condition. Trophic condition is a means of expressing a lake's productivity as compared to other lakes in a district or geographical area. In general, oligotrophic lakes are deep, clear lakes with low primary production, while eutrophic lakes are shallow and contain macrophytes and/or algae. Eutrophic lakes are considered moderately to highly productive.

The trophic condition or status was assessed for each of the lakes and reservoirs included in the LWQA. Accurate trophic status assessments are essential for making sound preservation or improvement recommendations. In order to minimize errors in classification, a multiple indicator approach was initiated.

Since trophic status indices specific to North Dakota waters have not been developed, Carlson's trophic status index (TSI) (Carlson, 1977) was chosen to delineate the trophic status of an LWQA Project lake or reservoir. To create a numerical TSI value, Carlson's TSI uses a mathematical relationship based on three indicators: secchi disk transparency in meters, surface total phosphorus in $\mu g\ L^{-1}$ and chlorophyll-a in $\mu g\ L^{-1}$.

This numerical value then corresponds to a trophic condition ranging from 0 to 100, with increasing values indicating a more eutrophic condition. Carlson's TSI estimates are calculated using the following equations:

- Trophic status based on secchi disk (TSIS):
  $TSIS = 60 - 14.41 \ln (SD)$
  Where SD = Secchi disk transparency in meters.

- Trophic status based on total phosphorus (TSIP):
  $TSIP = 14.20 \ln (TP) + 4.15$
  Where TP = Total phosphorus concentration in $\mu g\ L^{-1}$.

- Trophic status based on chlorophyll-a (TSIC):
  $TSIC = 9.81 \ln (TC) + 30.60$
  Where TC = Chlorophyll-a concentrations in $\mu g\ L^{-1}$.

Trophic status using Carlson's TSI also is depicted graphically in Figure IV-4. A major drawback to using Carlson's TSI is that it was developed for lakes that are primarily phosphorus limited. Because most North Dakota lakes and reservoirs have an abundance of phosphorus,

ancillary information (e.g., DO concentrations, frequency of nuisance algal blooms, phytoplankton community structure and macrophyte biomass) was combined with Carlson's numerical TSI to prevent misclassification. Due to variations in geological and ecological regions and lake type (manmade or natural), numerical trophic status assessments were not assigned to waterbodies during the LWQA Project. Instead, the general trophic condition of the waterbody (e.g., mesotrophic, eutrophic or hypereutrophic) was identified.

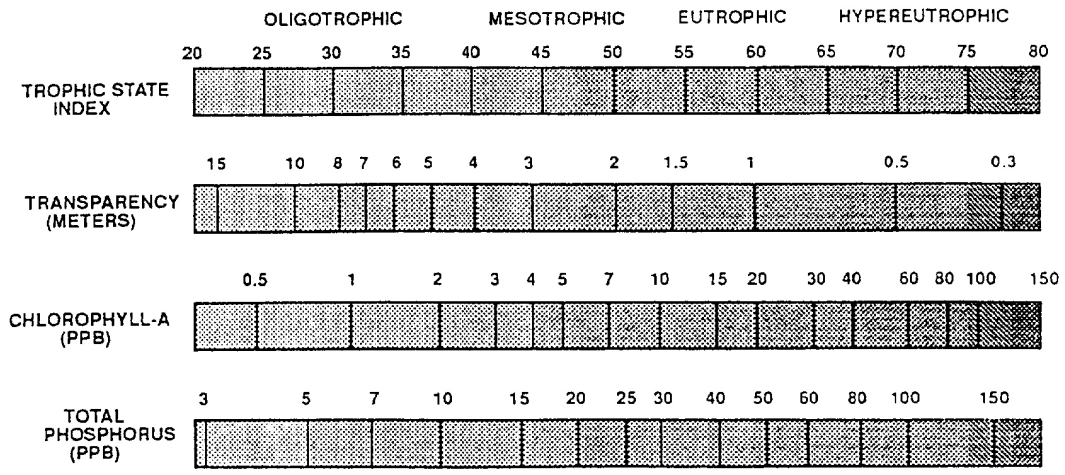


Figure IV-4. A Graphic Representation of Carlson's TSI

In addition to the chemical monitoring and analysis, a land-use assessment was completed for each lake assessment. Each lake's watershed was assessed to identify the major sources of point and nonpoint source pollution. Land use and land-use practices were inventoried by interviewing local NRCS field office staff and state NRCS personnel. This inventory was verified in the field in the late fall. An aerial watershed survey also was performed on approximately one-third of all lakes assessed.

Point-source assessments were accomplished for each watershed with the assistance of the department's National Pollutant Discharge Elimination System (NPDES) Permit Program staff. All contributing point sources were identified, and an estimate was made of the probable nutrient and organic loading to each lake or reservoir and its impact.
Beginning in 1997, LWQA Project activities were integrated into the department's rotating basin monitoring strategy. Lake Darling and the Upper Des Lacs Reservoir were sampled as the department focused its monitoring activities in the Souris River Basin in 1997. Pipestem Dam and Jamestown Reservoir were sampled in 1998; Lake Sakakawea was sampled in 1999; and Bowman-Haley Reservoir, Patterson Lake and Lake Tschida were sampled in 2000.

In addition to its inclusion in the annual LWQA Project, Devils Lake and Lake Sakakawea have received special attention. Devils Lake has increased in elevation approximately 25 feet since 1993 and is now spilling over into East and West Stump Lakes. In response to questions regarding water quality changes resulting from these water level increases, the department initiated a comprehensive water quality monitoring program in 1993 for Devils Lake. Devils Lake is sampled approximately five times per year, including once during the winter.

While Devils Lake has increased in elevation during the last 12 years, Lake Sakakawea's lake level has dropped significantly since 2002. This drop has been due to drought conditions in the upper Missouri River Basin of Montana resulting in reduced runoff and by the U.S. Army Corps of Engineers' operating policies, which favor downstream navigation interests over the health and condition of the upper Missouri River reservoirs. Of particular concern in North Dakota is the quality of Lake Sakakawea's cold water fishery. Since 2002, the department and the North Dakota Game and Fish Department have cooperated in a project to monitor the condition of the lake. Sampling consists of weekly DO/temperature profiles and water quality samples collected once each month at seven locations. Beginning in 2003 through 2005, the U.S. Army Corps of Engineers also conducted water quality monitoring at several fixed-station sites on Lake Sakakawea.

Fish Tissue Data

The department has maintained an active fish tissue monitoring and contaminant surveillance program since 1990. As part of this program, individual fish tissue samples are collected from the state's major lakes, reservoirs and rivers and analyzed for methyl-mercury. These data are then used to issue annual species-specific fish advisories for the state's rivers, lakes and reservoirs. Three rivers and 15 lakes and reservoirs met the "sufficient credible data" requirements for this report.

Other Agency/Organization Data

In addition to the water quality data available through existing department programs and projects and that provided by the USGS, the department also requested data from other agencies and organizations. In a letter dated October 21, 2005, the department requested all readily available and credible data from 24 agencies and organizations believed to have water quality data (Appendix A). In response to this request, the department received additional data and/or water quality reports from the U.S. Army Corps of Engineers, River Keepers, the Minnesota Pollution Control Agency, the North Dakota Game and Fish Department and the cities of Fargo, North Dakota and Moorhead, Minnesota. Others responding to the request had data that were deemed not readily available, or they had data that already had been provided to the department by the USGS.

Chapter 6. Beneficial Use Assessment Methodology

Rivers and Streams

The following is a description of the assessment methodology or decision criteria used to assess aquatic life, recreation and drinking water uses where they are assigned to rivers and streams in the state. The methodology used to assess the fish consumption use for both rivers and lakes is provided in Chapter 3 of this section.

All water quality assessments entered into the ADB for Section 305(b) reporting and Section 303(d) TMDL listing are based on "sufficient and credible" monitoring data. Physical and chemical monitoring data used for these assessments included conventional pollutants (e.g., DO, pH, temperature, ammonia and fecal coliform bacteria) and toxic pollutants (e.g., trace elements and pesticides) data collected between 1994 and 2005. Biological monitoring data used for this report included fish community data collected by the department from the Red River Basin between 1993 and 1996 and macroinvertebrate community data collected throughout the state between 1995 and 2000. If more than one site occurred within a delineated AU, data from all sites and for all years were pooled for analysis.

As stated previously, use impairment for the state's rivers and streams was assessed for aquatic life, recreation and drinking water. The following is the beneficial use decision criteria utilized for these assessments.

<u>Aquatic Life</u>

The department uses both chemical and biological data when assessing aquatic life use support for the state's rivers and streams. In some cases, both chemical data and biological data are used to make an assessment determination for an AU. Where both data are available, the department uses a weight-of-evidence approach in making an assessment decision. For example, if there are chemical data that do not show an aquatic life use impairment but the biological data show an impairment to the aquatic community, then the use-support decision will be to list the river or stream AU as "not supporting."

Chemical Assessment Criteria

In general, aquatic life use determinations utilizing chemical data were based on the number of exceedances of either the current *Standards of Quality for Waters of the State* (NDDoH, 2001) or the revised draft *Standards of Quality for Waters of the State* (NDDoH, 2006) for DO, pH and temperature and on the number of exceedances of the acute or chronic standards for ammonia, aluminum, arsenic, cadmium, copper, cyanide, lead, nickel, selenium, silver, zinc and chromium. The acute and chronic water quality standards for trace metals are expressed as total recoverable metals and not as dissolved metals. However, where dissolved metals data were available, use support assessments were made by applying the dissolved metals data to the water quality standards expressed as the total recoverable fraction.

The following are the use support decision criteria that the department uses to assess aquatic life use based on chemical data:

- Fully Supporting:

  For the conventional pollutants DO, pH and temperature, the standards of 5 mg/L (daily minimum) for DO, 7.0 to 9.0 (Class I and IA streams and all lakes) and 6.0 to 9.0 (Class II and III streams) for pH and 29.4 °C (85 °F) (maximum) for temperature were not exceeded in the AU. If the DO or pH standard was exceeded, but in less than 10 percent of the samples, there is no record of lethality to aquatic biota.

  For ammonia and other toxic pollutants (e.g., trace elements and organics), aquatic life is assessed as "fully supporting" if the acute or chronic standard is not exceeded during any consecutive three-year period between 1994 and 2005.

- Fully Supporting but Threatened:

  For DO and pH, one or more standards were exceeded in 11 to 25 percent of the measurements taken between 1994 and 2005. The temperature standard is exceeded, but in less than 10 percent of the measurements taken between 1994 and 2005.

  For ammonia and other toxic pollutants, the acute or chronic standard was exceeded once or twice during any consecutive three-year period between 1994 and 2005.

- Not Supporting:

  For DO and pH, one or more standards were exceeded in more than 25 percent of the measurements taken between 1994 and 2005. The temperature standard is exceeded in more than 10 percent of the measurements between 1994 and 2005.

  For ammonia and other toxic pollutants, the acute or chronic standard was exceeded three or more times during any consecutive three-year period between 1994 and 2005.

Biological Assessment Criteria

Aquatic-life use, or biological integrity, can be defined as "the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity and functional organization comparable to that of the natural habitats of the region." (Karr, 1981) When the aquatic community (e.g., fish and macroinvertebrates) is similar to that of "least disturbed" habitats in the region, termed "reference condition," aquatic life use can be assessed as fully supporting. When the aquatic community deviates significantly from reference condition, it is assessed as fully supporting but threatened or not supporting, depending upon the degree of impairment.

While chemical data provides an indirect assessment of aquatic life use impairment, direct measures of the biological community are believed to be a more accurate assessment of aquatic-

life use or biological integrity. The department began a stream biological monitoring and assessment program in 1993. Since then, fish and macroinvertebrate monitoring has been conducted throughout the entire state (Figure IV-3).

In order to interpret these biological data, the department has adopted the "multi-metric" index approach to assess biological integrity or aquatic-life use support for rivers and streams. The multi-metric index approach assumes that various measures of the biological community (e.g., species richness, species composition, trophic structure and individual health) respond to human-induced stressors (e.g., pollutant loadings or habitat alterations). Each measure of the biological community, termed a "metric," is evaluated and scored on either a 1-, 3-, 5-point scale (fish) or on a scale of 0-100 (macroinvertebrates). The higher the score, the better will be the biological condition and, presumably, the lower the pollutant or habitat impact.

To date, final multi-metric IBIs have only been developed for fish and macroinvertebrates in the Lake Agassiz Plain ecoregion. The Lake Agassiz Plain ecoregion is a part of the larger Red River of the North Basin. The department continues to analyze both fish and macroinvertebrate data from other river basins and ecoregions in the state; however, the lack of an adequate number of quantifiable reference sites within these regions has limited the analysis of metrics and the development of IBIs. As a result, most biological assessments conducted for this report have been restricted to biological monitoring sites in the Lake Agassiz Plain ecoregion. Biological assessment data were used to make aquatic life use support decisions for a limited number of sites located in other regions of the state. These sites, exemplified by low taxa richness, presence of pollutant tolerant taxa and/or low density, were assessed as not supporting aquatic life use.

The fish IBI was published in a report entitled *Development of Index of Biotic Integrity Expectations for the Lake Agassiz Plain Ecoregion* (EPA, 1998). This IBI is based on 12 metrics and a 1, 3, 5 scoring criteria similar to Karr et al. (1986). This IBI results in a total possible score of 60. Table IV-4 provides a summary of the IBI scores and their related biological integrity classes (excellent, good, fair, poor and very poor). Sites with biological integrity classes rated as excellent and good were assessed as fully supporting aquatic life use, while sites that were rated as poor and very poor were assessed as not supporting aquatic life use (Table IV-4). Sites with a biological condition class rated as fair were assessed as Fully Supporting, but Threatened.

The macroinvertebrate IBI for the Lake Agassiz Plain ecoregion was published in the report entitled *Macroinvertebrate Index of Biotic Integrity for the Lake Agassiz Plain Ecoregion (46) of North Dakota* (NDDoH, 2006). This IBI was developed based on 41 samples collected from 33 sites, including five reference site samples.

To determine the biological condition or aquatic life use support of streams, threshold values are required to determine what constitutes good biological condition scores (i.e., fully supporting aquatic life use) or poor biological condition scores (i.e., not supporting aquatic life use) in a multi-metric index. The assessment approach used for this report is outlined in Barbour et al (1999). First, the 25th percentile of the five reference sites IBI scores was determined. Based on the reference site macroinvertebrate IBI scores for sites in the Lake Agassiz Plain ecoregion (Table IV-5), the 25th percentile of reference site IBI scores is 53. This value is equivalent to the dividing line between good and fair biological condition. (Note: This threshold could be set

lower if there is more confidence that the reference sites truly represent non-impacted conditions. Since there is usually some doubt about the certainty of reference site population, using values above the 25th percentile was selected as a conservative approach to determine if a value at a site is within the range of reference sites.)

The thresholds between fair, poor and very poor were then determined by dividing the range below good (0-53) into three parts (0-17.77, 17.78-35.33 and 35.34-52.99). The very poor biological condition range is represented by the lower third of the range of IBI scores from 0-17.77, the poor range by scores ranging from 17.78-35.33 and the fair range by scores ranging from 35.34-52.99. Biological condition scores were then translated into aquatic life use attainment categories by assigning the good biological condition class as fully supporting aquatic life use and the poor and very poor biological condition class as not supporting aquatic life use. Due to uncertainty associated with the reference site population, sites classified with a biological condition score of fair were not assessed for this report.

Table IV-4. Biological Integrity Scoring and Aquatic Life Use Support Criteria Based on the Lake Agassiz Plain Ecoregion Fish IBI

IBI Score	Biological Integrity Class	Aquatic Life Use Support
60-51	Excellent	Fully Supporting
50-41	Good	Fully Supporting
40-31	Fair	Fully Supporting, but Threatened
30-21	Poor	Not Supporting
20-12	Very Poor	Not Supporting

Table IV-5. Macroinvertebrate IBI Scores for Reference Sites in the Lake Agassiz Plain Ecoregion of North Dakota

Site ID	Reference Site Description	IBI Score
551106	Tongue River Below Renwick Dam	72.7
551226	Turtle River Near Emerado, ND	44.6
551231	Pembina River 3.75 miles West of Neche, ND	52.8
551246	Sheyenne River 7.5 miles Southeast of Lisbon, ND	79.8
551248	Sheyenne River 1.5 miles West of Ransom/Richland County Line	88.1

Table IV-6. Biological Integrity Scoring and Aquatic Life Use Support Criteria Based on the Lake Agassiz Plain Ecoregion Macroinvertebrate IBI

IBI Score	Biological Integrity Class	Aquatic Life Use Support
100-53	Good	Fully Supporting
52.99-35.34	Fair	Not Assessed
35.33-17.78	Poor	Not Supporting
17.77-0	Very Poor	Not Supporting

In most cases, an assessment unit will have data based on only one sample, either macroinvertebrate or fish, and the use support decision for that sample will apply to the assessment unit. For assessment units with multiple samples (e.g., two or more sites sampled and/or two or samples per sites), the following use support decision criteria will apply:

- Fully Supporting:

  Use support assessments for all samples are fully supporting.

- Fully Supporting, but Threatened:

  Use support assessment for at least one sample is fully supporting, and use support assessments for all other samples are either fully supporting, but threatened or not supporting.

- Not Supporting:

  Use support assessments for all samples are not supporting.

Recreation

Recreation use is any activity that relies on water for sport or enjoyment. Recreation use includes primary contact activities such as swimming and wading and secondary contact activities such as boating and fishing, wading or any other recreational. Recreation use in rivers and streams is considered fully supporting when there is little or no risk of illness through either primary or secondary contact with the water. Recreation use determinations were made using fecal coliform data collected between 1994 and 2005. For each assessment based on fecal coliform data, the following criteria were used:

- Criterion 1: For each assessment unit, all monthly geometric means of samples collected from May 1 through September 30, pooled by month across all years (1994-2005), do not exceed a density of 200 colony forming units (CFUs) per 100 milliliters (ml).

- Criterion 2: For each assessment unit, less than 10 percent of monthly samples collected from May 1 through September 30, pooled by month across all years (1994-2005), exceed a density of 400 CFUs per 100 ml.

The two criteria were then applied using the following use support decision criteria:

- Fully Supporting: Both criteria 1 and 2 are met.

- Fully Supporting but Threatened: Criterion 1 is met, but 2 is not.

- Not Supporting: Criterion 1 is not met. Criteria 2 may or may not be met.

Drinking Water Supply

Drinking water is defined as "waters that are suitable for use as a source of water supply for drinking and culinary purposes, after treatment to a level approved by the department." (*Standards of Quality for Waters of the State*)

Drinking water use was assessed by comparing ambient water quality data to the state water quality standards (NDDoH, 2001) and the treated water quality to the Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs). Ambient water chemistry data were compared to the water quality standards for chloride, sulfate and nitrate (Table IV-7) and to the human health standards for Class I, IA and II rivers and streams (NDDoH, 2001). Drinking water supply is not a designated use for Class III rivers and streams. The human health standard for Class I, IA and II rivers and streams considers two means of exposure: (1) ingestion of contaminated aquatic organisms and (2) ingestion of contaminated drinking water.

Table IV-7. State Water Quality Standards for Chloride, Sulfate and Nitrate (NDDoH, 2001)

	Water Quality Standards (mg/L)		
Stream Classification	**Chloride**	**Sulfate**	**Nitrate[1]**
Class I	100	250	10
Class IA	175	450	10
Class II	250	450	10

[1]The water quality standard for nitrite of 1 mg/L shall also not be exceeded.

In order to make beneficial use determinations for drinking water, the following decision criteria were used:

- Fully Supporting:

  Treated: No reported exceedances of the SDWA MCLs and no drinking water complaints on record in the last two years.

  Ambient: Less than 25 percent of samples exceed the water quality standards for chloride, sulfate or nitrate, and less than 10 percent of the samples are exceeded for all of the human health criteria.

- Fully Supporting but Threatened:

  Treated: No reported exceedances of the SDWA MCLs in the last two years; however, knowledge of taste and odor problems or increased treatment costs have been associated with pollutants.

Ambient: Between 25 and 50 percent of samples are exceeded for the water quality standards for chloride, sulfate or nitrate and between 10 and 25 percent of the samples are exceeded for any of the human health criteria.

- Not Supporting:

  Treated: Reported exceedances of the SDWA MCLs in the last two years.

  Ambient: Greater than 50 percent of samples are exceeded for the water quality standards for chloride, sulfate or nitrate, and greater than 25 percent of the samples are exceeded for any of the human health criteria.

Lakes and Reservoirs

The following is a description of the assessment methodology or decision criteria used to assess aquatic life, recreation and drinking water uses for lakes and reservoirs in the state. The methodology used to assess the fish consumption use for both rivers and lakes is provided in Chapter 3 of this section.

Aquatic Life and Recreation

The state's narrative water quality standards form the basis for aquatic life and recreation use assessment for Section 305(b) reporting and the Section 303(d) TMDL list. State water quality standards contain narrative criteria that require lakes and reservoirs to be "free from" substances "which are toxic or harmful to humans, animals, plants or resident aquatic biota" or are "in sufficient amounts to be unsightly or deleterious." Narrative standards also prohibit the "discharge of pollutants" (e.g., organic enrichment, nutrients or sediment), "which alone or in combination with other substances, shall impair existing or reasonable beneficial uses of the receiving waters."

Trophic status is the primary indicator used to assess whether a lake or reservoir is meeting the narrative standards. Trophic status is the measure of productivity of a lake or reservoir and is directly related to the level of nutrients (phosphorus and nitrogen) entering the lake or reservoir from its watershed and/or from the internal recycling of nutrients. Highly productive lakes, termed "hypereutrophic," contain excessive phosphorus and are characterized by large growths of weeds, bluegreen algal blooms and low DO concentrations. These lakes experience frequent fish kills and are generally characterized as having excessive rough fish populations (carp, bullhead and sucker) and poor sport fisheries. Due to the frequent algal blooms and excessive weed growth, these lakes are undesirable for recreational uses such as swimming and boating.

Mesotrophic and eutrophic lakes, on the other hand, have lower phosphorus concentrations, low to moderate levels of algae and aquatic plant growth and adequate DO concentrations throughout the year. Mesotrophic lakes do not experience algal blooms, while eutrophic lakes may occasionally experience algal blooms of short duration, typically a few days to a week.

Due to the relationship between trophic status and the aquatic community (as reflected by the fishery) or between trophic status and the frequency of algal blooms, trophic status becomes an

effective indicator of aquatic life and recreation use support in lakes and reservoirs. For purposes of this report, it is assumed that hypereutrophic lakes do not fully support a sustainable sport fishery and are limited in recreational uses, whereas mesotrophic lakes fully support both aquatic life and recreation use. Eutrophic lakes may be assessed as fully supporting, fully supporting but threatened or not supporting their uses for aquatic life or recreation. Eutrophic lakes are further assessed based on: (1) the lake or reservoir's water quality standards fishery classification; (2) information provided by North Dakota Game and Fish Department Fisheries Division staff, local water resource managers and the public; (3) the knowledge of land use in the lake's watershed; and/or (4) the relative degree of eutrophication.

For example, a eutrophic lake, which has a well-balanced sport fishery and experiences infrequent algal blooms, is assessed as fully supporting. A eutrophic lake, which experiences periodic algal blooms and limited swimming use, would be assessed as not supporting recreation use. A lake fully supporting its aquatic life and/or recreation use, but for which monitoring has shown a decline in its trophic status (i.e., increasing phosphorus concentrations over time), would be assessed as fully supporting but threatened.

It is recognized that this assessment procedure ignores the fact that, through natural succession, some lakes and reservoirs may display naturally high phosphorus concentrations and experience high productivity. While natural succession or eutrophication can cause high phosphorus concentrations, research suggests that these lakes are typically eutrophic and that lakes classified as hypereutrophic are reflecting external nutrient loading in excess of that occurring naturally.

Drinking Water Supply

All lakes and reservoirs classified in the *Standards of Water Quality for Waters of the State* (NDDoH, 2001), with the exception of Lake George in Kidder County, are assigned the drinking water beneficial use. While most lakes and reservoirs are assigned this use, few currently are used as a drinking water supply. Lake Sakakawea, the current drinking water supply for the Southwest Water Pipeline and the cities of Garrison, Parshall, Pick City and Riverdale, is assessed as fully supporting. All other lakes and reservoirs assigned the drinking water supply beneficial use were not assessed.

Fish Consumption Assessment Methodology for Rivers and Lakes

Fish consumption use was assessed based on EPA guidance. To protect people from exposure to methyl-mercury, EPA recommends a fish tissue-based criterion of 0.3 micrograms (μg) methyl-mercury per gram (g) of fish tissue. This criterion is based on national average consumption rates of fish by recreational users and adjusted for exposures due to consumption of commercial fish. To determine whether the fish tissue criterion of 0.3 μg/g has been exceeded in a lake, reservoir or river and therefore assessed as not supporting fish consumption, the average fish tissue concentration, weighted by distribution of catch and consumption, is determined for each species in each lake or reservoir for which sufficient and credible data exist.

The weighted average methyl-mercury concentration for each fish species in each lake or river is calculated by multiplying the average methyl-mercury concentration for fish size range by the relative proportion of that size class in the creel of fisherman catching and keeping fish from that

lake or river. Data to estimate the proportion of each size class in the creel of fisherman were obtained from North Dakota Game and Fish Department creel survey reports. The weighted average concentration for each species in each lake or reservoir is then calculated by summing the average concentrations for each size class. Of the three rivers and 15 lakes and reservoirs for which there were sufficient credible methyl-mercury data, only Devils Lake, Lake Sakakawea, the Missouri River (including Lake Oahe) and the Red River were assessed for the integrated report. Creel survey reports were not available for the other lakes and rivers. Weighted average concentrations for each waterbody are presented in Appendices B-E.

PART V. SECTION 305(b) WATER QUALITY ASSESSMENT

A. Rivers and Streams Water Quality Assessment

Chapter 1. Assessment Category Summary

In EPA's guidance for preparing the Integrated Report, the states were encouraged to report on their waters based on five assessment categories (Table IV-1). In broad terms, the five assessment categories are as follows:

- Category 1: All designated uses are met.
- Category 2: Some designated uses are met, but there are insufficient data to determine if remaining designated uses are met.
- Category 3: There are insufficient data to determine whether any designated uses are met.
- Category 4: Water is impaired or threatened, but a TMDL is not needed for one of three reasons: (a) a TMDL already has been approved for all pollutants causing impairment; (b) the state can demonstrate that "other pollutant control requirements required by local, state or federal authority" are expected to address all waterbody-pollutant combinations and attain all water quality standards in a reasonable period of time; or (c) the impairment or threat is not due to a pollutant.
- Category 5: The waterbody is impaired or threatened for at least one designated use, and a TMDL is needed.

The ADB that has been submitted to EPA as part of this Integrated Report provides an assessment category for each lake, reservoir, river or stream AU.

Table V-1 provides a summary of the number of river and stream AUs and total miles of rivers and streams in each category that were assessed for this report. One AU, totaling 5.5 miles, was classified as Category 1, meaning all uses were assessed and fully supporting. Sixty-nine AUs totaling 2,523 miles were assessed as Category 2. These are AUs where at least one designated use was assessed as fully supporting, but the other uses were not assessed. A total of 19 AUs were assessed as Category 4 where at least one designated use was impaired or threatened, but where a TMDL is not required. Of these, four AUs do not need TMDLs because TMDLs have already been completed and approved by EPA (Category 4A) and 14 AUs do not need a TMDL because the cause of the impairment is not a pollutant (Category 4C). These are typically river and stream reaches where habitat degradation or flow alteration is impairing aquatic life use. A total of 180 AUs (5,973 miles) were assessed where at least one beneficial use is impaired and a TMDL is required. These Category 5 AUs are provided in a list in Tables VI-1 through VI-4. There were 11,195 river and stream AUs totaling 45,697 miles where there were either no data or insufficient data to assess any of the waterbody's designated uses.

Table V-1. Assessment Category Summary for Rivers and Streams in North Dakota (Miles)

Category	Description	Number AUs	Total Size (miles)
1	All uses met	1	5.46
2	Some uses met, others not assessed	70	2,595.23
3	No uses assessed	1,196	45,786.44
4A	Some or all uses impaired or threatened, but a TMDL(s) has been approved for all impaired uses.	4	77.28
4B	Some or all uses impaired or threatened, but other pollutant controls will result in water quality standards attainment.	0	0
4C	Some or all uses impaired or threatened, but impairment is not due to a pollutant.	15	300.06
5	Some or all uses impaired or threatened, and a TMDL is required.	176	5,662.88

Chapter 2. Water Quality Summary

Eighty-two percent (3,727 miles) of the rivers and streams assessed for this report fully support the beneficial use designated as aquatic life (Table V-2). Of the streams assessed as fully supporting aquatic-life use, a little more than 62 percent (2,331 miles) are considered threatened. In other words, if water quality trends continue, the stream may not fully support its use for aquatic life in the future. The remaining 18 percent (789 miles) of rivers and streams assessed for this report were assessed as not supporting aquatic life use (Table V-2).

Table V-2. Individual Use Support Summary for Rivers and Streams in North Dakota (Miles)

Use	Fully Supporting	Fully Supporting but Threatened	Not Supporting	Not Assessed	Insufficient Information for Assessment	Total Size
Aquatic Life	1,396.39	2,331.01	789.73	44,599.92	5,310.30	54,427.35
Fish Consumption	0	0	399.23	3,628.60	0	4,027.83
Recreation	2,262.94	2,417.36	1,619.79	46,445.75	1,681.51	54,427.35
Drinking Water Supply	1,385.43	129.99	0	3,297.66	669.80	5,482.88

NPS pollution (e.g., siltation/sedimentation and stream habitat loss or degradation) was the primary cause of aquatic life use impairment (Table V-3). Other forms of pollution causing impairment are trace element contamination, flow alteration and oxygen depletion. Organic enrichment creates conditions in the stream that cause DO to be depleted. Rivers and streams impaired by siltation/sedimentation, organic enrichment, eutrophication due to excess nutrients and habitat degradation also will display a degradation in the biological community. Typically, species composition will shift from an aquatic community comprised of intolerant species (e.g., mayflies, caddisflies, stoneflies and darters) to an aquatic community dominated by tolerant species (e.g., midges, carp and bullheads).

Table V-3. Impairment Summary for Rivers and Streams in North Dakota

Impairment	Miles
Total Fecal Coliform	3,996.23
Physical Habitat Alterations	2,562.63
Sedimentation/Siltation	2,001.79
Biological Indicators	1,150.31
Oxygen Depletion	462.62
Mercury in Fish Tissues	399.23
Flow Alterations	315.10
Nutrients	88.73
Trace Metals in the Water Column	67.58
Total Dissolved Solids	52.71
Temperature	40.09
Ammonia	34.50
Non-native Aquatic Plants	5.53

The primary sources of pollutants affecting aquatic life use in the state are cropland erosion and runoff, animal feeding operations and poor grazing management (Table V-4). Poor grazing management includes riparian grazing and season-long grazing, which result in the deterioration of the plant community or cause a shift in the plant community away from native grass and forbe species to non-native invader species. Evidence of poor grazing practices would include cattle trailing, gully erosion, poor water infiltration rates resulting from soil compaction and severe streambank erosion. Other sources linked to aquatic-life use impairment are point-source discharges, urban runoff and hydrologic modifications (e.g., upstream impoundments, low-head dams, channelization, flow regulation and diversion, riparian vegetation removal and wetland drainage) (Table V-4).

Recreation use was assessed on 6,300 miles of rivers and streams in the state. Recreation use was fully supporting, fully supporting but threatened and not supporting on 2,263 miles, 2,417 miles and 1,620 miles, respectively (Table V-2). Fecal coliform bacteria data collected from monitoring stations across the state were the primary indicators of recreation use attainment (see Part IV. B., Chapter 6. "Beneficial Use Assessment Methodology"). For this reason, pathogens (as reflected by fecal coliform bacteria) are the primary cause of recreation use impairment in North Dakota (Table V-3). Other factors affecting the use of the state's rivers and streams for recreation would be eutrophication from excessive nutrient loading, resulting in nuisance algae and plant growth. The primary sources of fecal coliform bacteria contamination are animal feeding operations and riparian area grazing (Table V-4). Point-source discharges also have been linked to exceedances of the fecal coliform bacteria standard of 200 colonies per 100 ml.

These exceedances occur when a municipality discharges from its sanitary sewer directly to the receiving stream, bypassing the wastewater treatment facility. These circumstances generally occur in the spring when flooding problems cause infiltration to the sanitary sewer.

Drinking water supply use is classified for 5,483 miles of rivers and streams in the state. Of the 1,515 miles assessed for this report, only 130 miles (2.4 percent) were assessed as threatened for drinking water supply use (Table V-2). The primary threats are taste and odor problems. While the source of taste and odor has not been specifically identified, potential sources include agricultural field runoff, reservoir releases, wetland drainage and industrial and/or municipal discharges.

A total of 4,028 miles of rivers and streams were identified as capable of supporting a sport fishery from which fish could be used for consumption (Table V-2). The Red River of the North (399.23 miles) and the Missouri River from Garrison Dam to Lake Oahe are the only two rivers listed in the state's fish consumption advisory. Methyl-mercury data collected for these advisories were used, along with fish population estimates provided by the North Dakota Game and Fish Department, to estimate the weighted average methyl-mercury concentration for fish in each of these rivers (see Part IV. B., Chapter 6. "Beneficial Use Assessment Methodology – Fish Consumption Assessment Methodology for Rivers and Lakes," page IV-32 and Appendices B-E). Based on the EPA fish tissue of 0.3 μg methyl-mercury/gram of fish tissue, only the Red River of the North was assessed as not supporting fish consumption. While there are many potential sources of methyl-mercury, both anthropogenic and natural, to date there have been no specific causes or sources identified for the mercury present in North Dakota fish (Tables V-3 and V-4).

Table V-4. Impairment Source Summary for Rivers and Streams in North Dakota

Source	Miles
Riparian Grazing	4,939.36
Animal Feeding and Handling Operations	3,351.52
Crop Production (Dryland)	2,664.32
Loss of Riparian Habitat	2,565.34
Stormwater Runoff	903.96
Source Unknown	771.53
Highway and Road Runoff	657.08
Streambank Modification	658.57
Channel Erosion/Incision from Upstream Hydromodifications	598.25
Wetland Loss (Drainage/Filling)	580.53
Upstream Impoundments	555.33
On-site Treatment Systems (Septic Systems)	494.85
Rangeland/Pastureland Grazing	454.04
Channelization	290.09
Hydrostructure Flow Regulation/Modification	260.20
Municipal Point Source Discharges	223.22
Land Development	123.16
Flow Alteration for Water Diversion	103.35
Industrial Point Source Discharge	78.45
Source Outside State Jurisdiction or Border	59.56
Natural	31.01
Dam Construction	34.39
Golf Courses	14.41

B. Lakes and Reservoirs Water Quality Assessment

Chapter 1. Assessment Category Summary

Table V-5 provides an assessment category summary for lakes and reservoirs in the state. One lake was classified as Category 1, meaning all uses were assessed and were fully supporting. Forty-eight lakes and reservoirs totaling 156,699 acres were assessed as Category 2. These are lakes and reservoirs where at least one designated use was assessed as fully supporting, but the other uses were not assessed. A total of three lakes and reservoirs were assessed as Category 4A, meaning at least one designated use was impaired or threatened, but a TMDL is not required because a TMDL already has been completed and approved by EPA. Forty-eight lakes and reservoirs totaling 516,502 acres were assessed where at least one beneficial use is impaired and a TMDL is required. These Category 5 lakes and reservoirs are provided in the state's TMDL list (Tables VI-1 through VI-4). There were 124 lakes and reservoirs with either no data or insufficient data available to assess any of the waterbody's designated uses.

Table V-5. Assessment Category Summary for Lakes and Reservoirs in North Dakota (Acres)

Category	Description	Number AUs	Total Size (acres)
1	All uses met	1	885.3
2	Some uses met, others not assessed	48	156,698.8
3	No uses assessed	124	39,174.44
4A	Some or all uses impaired or threatened, but a TMDL(s) has been approved for all impaired uses.	3	1,871.5
4B	Some or all uses impaired or threatened, but other pollutant controls will result in water quality standards attainment.	0	0
4C	Some or all uses impaired or threatened, but impairment is not due to a pollutant.	0	0
5	Some or all uses impaired or threatened and a TMDL is required.	48	516,502.4

Chapter 2. Water Quality Summary

A total of 100 lakes and reservoirs (33 natural lakes and 67 reservoirs), representing 675,917 surface acres, were assessed for this report. The remaining 124 lakes and reservoirs not assessed represent 39,174 acres or only 5.5 percent of the total lake and reservoir acres in the state.

For purposes of this report, the term "aquatic life use" is synonymous with biological integrity and is defined as the ability of a lake or reservoir to support and maintain a balanced, adaptive community of aquatic organisms (e.g., fish, zooplankton, phytoplankton, macroinvertebrates, vascular plants) having a species composition, diversity and functional organization comparable to that of least-impaired reference lakes and reservoirs in the region (modified from Karr et al., 1981). Ninety-seven lakes and reservoirs, representing 675,957 acres, were assessed as fully supporting aquatic life use (Table V-6); in other words, they are considered capable of supporting and maintaining a balanced community of aquatic organisms. Of this total, 37 lakes and reservoirs representing 378,757 acres are considered threatened (Table V-6). A threatened assessment means that if water quality and/or watershed trends continue, it is unlikely these lakes will continue to support aquatic life use. The lakes and reservoirs will begin to experience more frequent algal blooms and fish kills. They will display a shift in trophic status from a mesotrophic or eutrophic condition to a hypereutrophic condition. Only three lakes, totaling 172 acres, were assessed as not supporting aquatic life use (Table V-6).

Table V-6. Individual Use Support Summary for Lakes and Reservoirs in North Dakota (Acres)

Use	Fully Supporting	Fully Supporting but Threatened	Not Supporting	Not Assessed	Insufficient Information for Assessment	Total Size
Aquatic Life	297,029.1	378,757.1	171.8	32,912.3	6,263.1	715,133.4
Fish Consumption	0	0	493,231.0	215,017.1	0	708,248.1
Recreation	526,362.6	143,993.6	5,565.0	36,786.4	2,425.8	715,133.4
Drinking Water Supply	368,762.0	0	0	338,850.1	226.0	707,838.1

One of the primary causes of aquatic life impairment to the state's lakes and reservoirs is low DO in the water column (Table V-7). Low DO in lakes can occur in summer (summer kills), but usually occurs in the winter under ice-cover conditions. Low-DO and winter kills occur when senescent plants and algae decompose, consuming available oxygen. Because the lake is ice covered, re-aeration is minimal, and the lake goes anoxic, resulting in a fish kill. Fish kills are the most apparent impact to sensitive fish species (e.g., walleye, trout, bass, bluegill, crappie, northern pike), but impacts to other DO-sensitive aquatic organisms also may occur. When fish kills occur, low DO-tolerant fish species (e.g., carp, bullhead, white suckers) will be favored, resulting in a lake dominated by these rough fish species.

Pollutants that stimulate the production of organic matter also can cause aquatic life impairment. Two secondary pollutant causes are excessive nutrient loading and siltation (Table V-7).

Major sources of nutrient loading to the state's lakes and reservoirs are erosion and runoff from cropland, runoff from animal feeding operations (e.g., concentrated livestock feeding and wintering operations) and hydrologic modifications (Table V-8). Hydrologic modifications, such as wetland drainage, channelization and ditching, increase the runoff and delivery rates to lakes and reservoirs in effect increasing the size of a lake's watershed. Nutrients, sediment and organic matter that would be retained in wetlands under normal conditions become part of the lake's external budget.

Other sources of nutrient loading that affect lakes in the state are point source discharges from municipal wastewater treatment facilities, urban/stormwater runoff and shoreline development (Table V-8).

Table V-7. Impairment Summary for Lakes and Reservoirs in North Dakota

Impairment	Acres
Oxygen Depletion	377,166.3
Temperature	368,231.0
Nutrients	149,845.6
Sedimentation/Siltation	6,823.1
Turbidity	1,488.3
Total Dissolved Solids	36.8
Mercury in Fish Tissues	493,231.0

Shoreline or cabin development directly contributes nutrients to lakes in many ways. Typically, lake cabins or homes use septic systems (tanks and drain fields) to contain their wastewater. Many of these systems are poorly designed, poorly maintained or nonexistent. Poorly designed septic systems provide a direct path of nutrients from the cabin to the lake. In addition, cabins or homes along lakes can contribute nutrients through fertilizer runoff from lawns.

Shoreline development can indirectly lead to increased nutrient loading when development results in a loss of the natural vegetation surrounding the lake. This buffer, between the lake and its watershed, provides for the assimilation of nutrients and retention of sediments contained in the runoff from the surrounding landscape. When this buffer is lost or degraded due to development, nutrients, sediment and other chemicals (e.g., pesticides, road salts) are afforded a direct path to the lake.

The previously mentioned sources are considered external or watershed-scale sources of nutrient loading. Another source that can represent a significant portion of the nutrient budget at times is internal cycling, particularly in those lakes that periodically go anoxic either during ice cover or through thermal stratification in the summer. Under these circumstances, phosphorus and reduced forms of nitrogen (e.g., ammonia) can be released into the water column. The increased nutrient concentrations impair use by stimulating noxious weed growth and algal blooms.

Recreation use (e.g., swimming, waterskiing, boating, sailing, sunbathing) was assessed for 675,921 lake and reservoir acres in the state. Of this total, three lakes, representing 5,565 acres, were assessed as not supporting use for recreation (Table V-6). The primary cause of use impairment is excessive nutrient loading, which results in nuisance algal blooms and noxious aquatic plant growth (Table V-7). Sources of nutrients causing algal blooms and weed growth were described earlier (Table V-8). Forty-four lakes and reservoirs, totaling 143,994 acres, were assessed as threatened (Table V-6). Nutrient loading also is linked to the negative water quality trends these lakes are experiencing. If left unchecked, these lakes will degrade to the point where frequent algal blooms and/or excessive weed growth will negatively affect recreation.

Two-hundred and nine lakes and reservoirs, representing 708,248 acres, were assigned the use for fish consumption (Table V-6). Lakes not assigned the fish consumption use are saline lakes that cannot support a sport fishery. These lakes are also not assigned the use for municipal drinking water supply.

Of the 209 lakes entered into the ADB and assigned a use for fish consumption, only Devils Lake and Lake Sakakawea had sufficient methyl-mercury fish tissue data and fish population survey data necessary to calculate weighted average concentrations and to assess fish consumption use. Based on these data (see Appendices B-E), both were assessed as not supporting fish consumption use (Table V-6). The remaining 207 lakes and reservoirs that support a sport fishery were not assessed for this report.

Sources of methyl-mercury in fish remain largely unknown. Potential sources of mercury include natural sources and atmospheric deposition. Results of a report prepared by the department show an increase in mercury concentrations in the fillets of walleye, northern pike and chinook salmon in Lake Sakakawea following the drought and recent filling of the lake (Pearson et al., 1997). One possible reason for the higher mercury concentrations in fish is that the lake may be experiencing an increase in the rate of mercury methylization due to greater amounts of organic matter in the lake following flooding. The drought of the late 1980s and early 1990s lowered the lake level, allowing vast areas of dry lake bed to re-vegetate. When the lake began refilling in 1993, the vegetation was flooded and began decomposing. The organic matter provided to the lake during this period is thought to have favored the methylization process. This is a microbial process whereby bacteria present in the lake convert elemental mercury to its more bioavailable methyl-mercury form. The increase in bioavailable mercury in the lake is reflected in higher mercury concentrations in fish.

Four reservoirs (Lake Sakakawea, Homme Dam, Bisbee Dam and Mt. Carmel Reservoir) are currently used either directly or indirectly as municipal drinking water supplies, while two others (Patterson Lake and Renwick Dam) serve as back-up water supplies in the event the primary water supplies should fail.

Homme Dam, Mt. Carmel Reservoir and Lake Sakakawea were assessed as fully supporting drinking water supply use (Table V-6). Drinking water supply use was not assessed for the remaining lakes and reservoirs.

Table V-8. Impairment Source Summary for Lakes and Reservoirs in North Dakota

Source	Acres
Source Unknown	493,267.8
Hydrostructure Flow Regulation/Modification	368,231.0
Crop Production (Dryland)	149,920.6
Anoxia Due to Thermal Stratification/ Eutrophication	148,723.6
Internal Nutrient Recycling	148,723.6
Rangeland/Pastureland Grazing	134,005.5
Wetland Loss (Drainage/Filling)	133,217.9
Stormwater Runoff	125,082.1
Riparian Grazing	14,704.8
Animal Feeding and Handling Operations	13,716.7
On-site Treatment Systems (Septic Systems)	11,491.9
Sediment Resuspension	2,438.9
Upstream Impoundments	2,086.0
Loss of Riparian Habitat	414.0
Land Development	414.0
Silviculture	414.0
Flow Alteration for Water Diversion	323.5
Highway and Road Runoff	297.3
Surface Mining	260.5
Streambank Modification	198.5
Land Application of Biosolids/Septage Disposal	55.2

Chapter 3. Trophic Status

Reservoirs and natural lakes were assessed for trophic status only if appropriate data were available. For purposes of this report, "trophic status" refers to the present condition or measure of eutrophication of the waterbody at the time of the assessment.

Accurate trophic status assessments are essential to making sound management decisions. In order to minimize errors in classification, all existing chemical, physical, quantitative and qualitative data were used in making final trophic status assessments.

Because there are no TSIs specific to North Dakota waters, Carlson's TSI (Carlson, R. E. 1977, "A Trophic State Index for Lakes," *Limnology and Oceanography*, 22(2):361-369) was chosen as the initial method to describe a lake's or reservoir's trophic status. Carlson's TSI was selected because it is commonly used by limnologists and because it was developed for Minnesota, a state geographically close to North Dakota.

An attempt was made to gather enough chemical and ancillary data to group as many of North Dakota's 224 lakes/reservoirs into one of four trophic states (Table V-9). The four trophic states, in order of increasing productivity, are oligotrophic, mesotrophic, eutrophic and hypereutrophic. Adequate data was available to assess the trophic status of 113 of the 224 lakes entered into the ADB database. The majority of the state's assessed lakes and reservoirs range from eutrophic to hypereutrophic. Twenty lakes and reservoirs were assessed as mesotrophic. There were no oligotrophic lakes assessed in the state.

Table V-9. Trophic Status of Lakes and Reservoirs in North Dakota

Trophic Status	Number of Lakes	Acreage of Lakes
Oligotrophic	0	0.0
Mesotrophic	20	503,299.51
Eutrophic	52	20,803.50
Hypereutrophic	51	156,141.40
Not Assessed	101	34,889.03
Total Number of Lakes	224	715,133.44

Chapter 4. Control Methods

NPS pollution, particularly from agricultural lands and feedlots, is the main source of pollutants leading to the degradation of the state's lakes and reservoirs. North Dakota's Section 319 NPS Pollution Management Program is very active in reducing agricultural NPS pollution (see Part III. C. Chapter 3. “NPS Pollution Management Program”). This program has kept thousands of tons of soil, along with attached contaminants, out of the state's lakes and reservoirs.

Currently, the Section 319 NPS Pollution Management Program is providing cost-sharing for six watershed restoration projects that have a direct impact on lakes or reservoirs in the state. These include Cedar Lake, Lake LaMoure, Lake Hoskins, Mirror Lake, Pheasant Lake and Powers Lake. These projects treat entire watersheds through the promotion of sustainable agricultural and sound land management practices. Landowner participation is voluntary, with incentives provided by cost-share programs.

Point source pollution has the potential to severely impact individual lakes and reservoirs and is the second largest pollution problem. Protection of lakes and reservoirs from point source discharges is accomplished through the NDPDES Program (see Part III. C. Chapter 2. “Point Source Control Program”). While the NDPDES Program is thought of as regulating only industrial and municipal discharges, permits also are required for stormwater discharges and large animal feeding operations.

Chapter 5. Restoration/Rehabilitation Efforts

The primary intent of the Section 319 NPS Pollution Management Program is to control NPS pollution to lakes and reservoirs on a watershed scale. This program is complemented by the North Dakota Game and Fish Department's "Save Our Lakes" program. The main goal of the "Save Our Lakes" program is "to enhance and restore North Dakota's aquatic habitat resources in order to protect the fishery of North Dakota." In general, this encompasses shoreline enhancement projects, sediment dam installation, sediment removal, grass and tree plantings, cross fencing, alternate water sources, the installation of passive low water draw-downs, cost-share assistance for animal waste management systems and the establishment of exclusion areas in riparian corridors.

Chapter 6. Acid Effects on Lakes and Reservoirs

Acid precipitation and acid mine drainage pose significant threats to some of the nation's lakes and streams. Most surface waters in North Dakota are naturally alkaline (pH>7), while rainfall is naturally acidic (pH<7). Surface waters are able to resist acidification by what is termed "buffering capacity." In surface waters, buffering capacity is maintained largely by the carbonate (CO_3^{-2}) and bicarbonate (HCO_3^{-1}) ions in solution. These ions are collectively measured with hydroxide ions (OH^{-1}) as total alkalinity. Acidification in surface waters occurs when the buffering capacity is exhausted, thus causing a reduction in pH. North Dakota's lakes are highly alkaline and, as a result, do not show acidity caused by anthropogenic sources.

Chapter 7. Toxic Effects on Lakes and Reservoirs

Currently, mercury is the only contaminant assessed as causing lake and reservoir use impairment. As stated previously, elevated mercury concentrations in the tissues of fish have resulted in site-specific consumption advisories for Devils Lake, Lake Sakakawea and Lake Oahe and a general fish consumption advisory for all lakes and reservoirs in the state. Again, very little is known about the source of the mercury contamination in fish from these lakes. It is likely, however, that sources are both natural and anthropogenic.

In 1991, the department initiated the LWQA Project, by which the state's lakes and reservoirs were systematically sampled and assessed for trophic status and watershed condition. In addition to data for assessing the general condition of each lake, data were also collected on the type, concentration and location of contaminants like trace elements and organic compounds.

To date, sediments and fish have been collected from 113 lakes and reservoirs throughout the state. This data should provide useful information for determining baseline contaminant concentrations and examining patterns in contaminant concentrations in lakes and reservoirs.

C. Wetlands Assessment Program

Chapter 1. Background

Wetlands have long been regarded as nuisance areas or wastelands which only serve to impede agriculture, urban or transportation development. It is only recently that the ecological and social functions and values of wetlands been realized. It is now scientifically proven that wetlands are important for the storage of flood waters, for providing fish and wildlife habitat, for recharging ground water and for retaining and cycling chemical pollutants and particulates. Recently, wetlands have been recognized as a significant source for carbon sequestration. This could make wetlands an important component in the campaign to prevent global warming.

While these are important wetland functions, probably the best known function of wetlands in North Dakota is that of waterfowl production. Most of North Dakota's remaining wetlands are located in an area known as the Prairie Pothole Region. This area extends from the Missouri Coteau in central North Dakota eastward to the glacial Lake Agassiz Plain, also known as the Red River Valley. The region covers roughly 300,000 square miles and exists as a wide band extending from Central Alberta southwest into northwestern Iowa (Figure V-1). The Prairie Pothole Region, with its many types of wetlands, is arguably the most biologically diverse and productive habitat in North America.

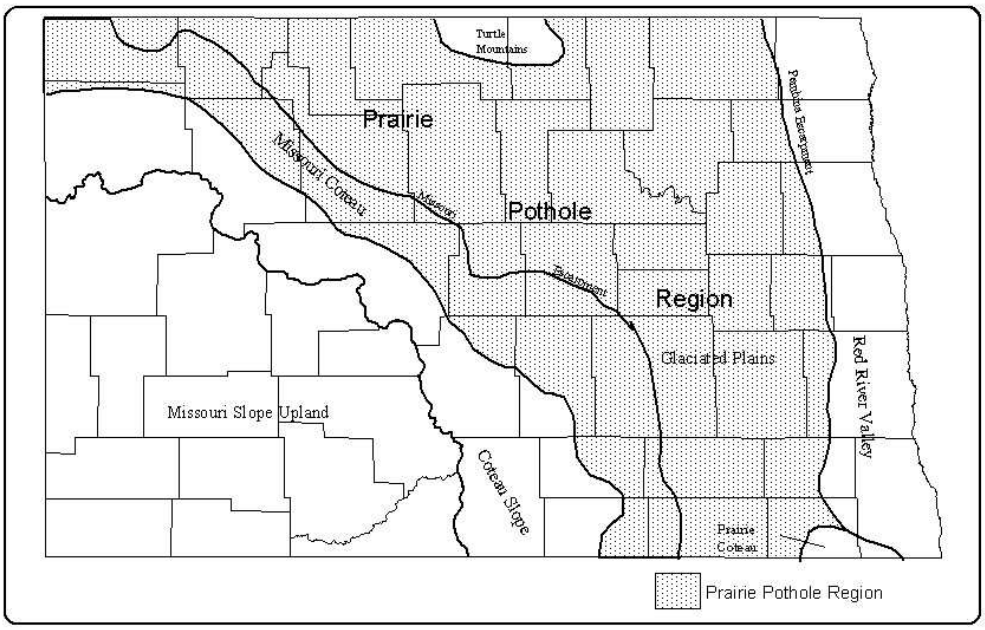


Figure V-1. Prairie Pothole Region

Chapter 2. Extent of Wetland Resources

There seem to be as many ways to classify wetlands as there are wetlands themselves. The U. S. Fish and Wildlife Service first began to classify wetlands based on a system developed by Martin et al. (1953). This classification system was then modified by Stewart and Kantrud (1971), specifically for the Prairie Pothole Region of North America. With the Stewart and Kantrud classification system, vegetational zones are described in detail, along with the plant species most commonly found in the zone. These zones are used to identify phases which indicate the wetland's water regime or disturbed bottom soil (e.g., cropland tillage). Seven wetland classes are identified with the Stewart and Kantrud system. These include the familiar Class I - ephemeral ponds, Class II - temporary ponds, Class III - seasonal ponds and lakes, Class IV - semi-permanent ponds and lakes, and Class V -permanent ponds and lakes. Also included in the Stewart and Kantrud system are Class VI - alkali ponds and lakes, and Class VII - fens. Along with each class, there are five subclasses, A through E, based on variations in surface water salinity. Those familiar with the Stewart and Kantrud classification system refer to temporary depressional wetlands as Class II wetlands, seasonal wetlands as Class III wetlands and semi-permanent wetlands as Class IV.

In 1979, the U.S. Fish and Wildlife Service adopted the Cowardin et al. (1979) classification system for wetlands and deep water habitats of the United States. The Cowardin et al. classification system was developed to be used with the National Wetlands Inventory. In the highest level of classification, wetlands are grouped into five ecological systems: palustrine, lacustrine, riverine, estuarine and marine. The palustrine class includes only wetlands, whereas each of the four other systems includes wetlands and associated deep-water habitats. For purposes of classification, deep-water habitats are defined as areas where water is greater than 6.6 feet deep. In North Dakota, only the palustrine, lacustrine and riverine wetland types exist.

Brinson (1993) developed a classification system for use by the U.S. Army Corps of Engineers. This classification system, termed the Hydrogeomorphic (HGM) classification system, is based upon the wetland's position in the landscape (i.e., geomorphic setting), dominant source of water and the flow and fluctuation of water in the wetland. Brinson (1993) describes seven HGM wetland classes: riverine, depressional, slope, mineral soil flats, organic soil flats, estuarine fringe and lacustrine fringe.

In North Dakota, wetlands are classified into four broad categories according to the State Engineer's drainage rules. The state wetland classification includes temporary wetlands, seasonal wetlands, semi-permanent wetlands and permanent wetlands. The following are brief descriptions of each wetland class, as adopted by the North Dakota State Game and Fish Director and the State Engineer.

"Temporary wetlands" are shallow depressions which hold water or are waterlogged from spring runoff until early June. In years with normal runoff and precipitation, these areas may be tilled for crop production. In years with high runoff or heavy spring rain, these areas may not dry out until mid-July. They cannot be tilled, but may be used for hayland or pasture. Temporary wetlands frequently reflood during heavy summer and fall rains. Sheet water, as defined in North Dakota's Century Code 61-32-02, does not fall under the temporary wetland classification.

“Seasonal wetlands” are depressions, which normally hold water from spring runoff until mid-July. In years with normal runoff and precipitation, these wetlands cannot be tilled but may be used for hayland and pasture. In low runoff or dry years, these areas may be tilled for crop production but commonly reflood with heavy summer and fall rains.

“Semi-permanent wetlands” are located in well-defined depressions or basins. In normal years, these areas hold water throughout the summer. Semi-permanent wetlands generally become dry only in years of below normal runoff and precipitation. Freshwater semi-permanent wetlands (commonly called cattail sloughs) are characterized by a predominance of cattail and bulrush vegetation in scattered areas of open water. Saline semi-permanent wetlands have a preponderance of alkali bulrush in scattered areas of open water.

“Permanent wetlands” are located in well-defined basins which characteristically hold water throughout the year. The wetlands become dry only after successive years of below normal runoff and precipitation. Freshwater permanent wetlands typically have a border of aquatic vegetation and predominant open-water areas in the interior. Saline permanent wetlands are typically devoid of emergent vegetation and exhibit a white, salt-encrusted shoreline.

Currently, there are no accurate estimates of state wetland acreage based on wetland class. Statewide, it is estimated there are approximately 2.5 million acres of wetlands. When compared to the approximately 4.9 million acres of wetlands which covered North Dakota prior to development, this represents a 49-percent reduction in wetlands. Stewart and Kantrud (1973) divided the state into four biotic regions: the Prairie Pothole Region, the Lake Agassiz Plain Region, the Coteau Slope Region and the Southwestern Slope Region. They estimated that 81 percent of the wetlands in the state are located in the Prairie Pothole Region. More than 90 percent of all wetlands in the state are considered natural basin wetlands, commonly referred to as prairie potholes. Furthermore, it is estimated that 78 to 79 percent of wetland basins in the Prairie Pothole Region are less than one acre in size (Ron Reynolds, personal communication). While the rate of wetland loss in the state seems to be decreasing, it is safe to assume that wetland losses still exceed wetland gains.

Chapter 3. Integrity of Wetland Resources

Wetland integrity should be thought of in terms of whether a wetland performs a set of functions or uses which would be expected for natural or "reference" wetlands of a similar class or type. The USDA NRCS and the U.S. Army Corps of Engineers have described 11 specific functions within three general functional categories for temporary and seasonal Prairie Pothole wetlands (Lee et al., 1997) (Table V-10). Therefore, whenever a wetland's function is diminished, it can be said that wetland integrity is diminished.

Hydrologic manipulation (e.g., drainage, wetland consolidation, channelization, filling) continues to be the greatest impact on the integrity of the state's wetlands. While not as dramatic, other factors such as chemical contamination, nutrient loading (i.e., eutrophication) and sedimentation can also affect a wetland's function and, therefore, its chemical, physical and biological integrity.

Table V-10. Definitions of Functions for Temporary and Seasonal Prairie Pothole Wetlands (Lee et al. 1997)

Physical/Hydrologic Functions
Maintenance of Static Surface Water Storage. The capacity of the wetland to maintain a hydrologic regime that supports static storage, soil moisture in the unsaturated zone and ground water interactions. **Maintenance of Dynamic Surface Water Storage**. The capacity of the wetland to maintain a hydrologic regime that supports dynamic storage, soil moisture in the unsaturated zone and ground water interactions. **Retention of Particulates**. Deposition and retention of inorganic and organic particulates (>0.45 μm) from the water column, primarily through physical processes.
Biogeochemical Functions
Elemental Cycling. Short- and long-term cycling of elements and compounds on-site through the abiotic and biotic processes that convert elements (e.g., nutrients and metals) from one form to another; primarily recycling processes. **Removal of Imported Elements and Compounds**. Nutrients, contaminants, and other elements and compounds imported to the wetland are removed from cycling processes.
Biotic and Habitat Functions
Maintenance of Characteristic Plant Community. Characteristic plant communities are not dominated by non-native or nuisance species. Vegetation is maintained by mechanisms, such as seed dispersal, seed banks and vegetative propagation which respond to variations in hydrology and disturbances, such as fire and herbivores. The emphasis is on the temporal dynamics and structure of the plant community as revealed by species composition and abundance. **Maintenance of Habitat Structure Within Wetland**. Soil, vegetation and other aspects of ecosystem structure within a wetland are required by animals for feeding, cover and reproduction. **Maintenance of Food Webs Within Wetland**. The production of organic matter of sufficient quantity and quality to support energy requirements of characteristic food webs within a wetland. **Maintenance of Habitat Interspersion and Connectivity Among Wetland**. The spatial distribution of an individual wetland in reference to adjacent wetlands within the complex. **Maintenance of Taxa Richness of Invertebrates**. The capacity of a wetland to maintain characteristic taxa richness of aquatic and terrestrial invertebrates. **Maintenance of Distribution and Abundance of Vertebrates.** The capacity of a wetland to maintain characteristic density and spatial distribution of vertebrates (aquatic, semi-aquatic and terrestrial) that utilize wetlands for food, cover and reproduction.

Landscape level changes outside the edge of the wetland basin can also negatively affect wetland integrity. Changes to the landscape, such as road construction, cropland conversion, urbanization or the drainage of adjacent wetlands, all affect wetland functions. Cowardin et al. (1981) found in a 3,877-square-mile area of the Prairie Pothole Region, 40 percent of wetlands were cultivated to the wetland edge, 33 percent were in pasture and 7 percent were hayed.

When viewed on a larger scale, wetlands are part of a larger unit known as a wetland complex. Wetland complexes are aggregates of individual wetland basins which are hydrologically connected. A typical wetland complex includes recharge wetlands, flow-through wetlands and discharge wetlands. Recharge wetlands are typically located at higher elevations in the landscape and receive the majority of their hydrologic budgets from precipitation and surface runoff. Recharge wetlands get their name because they recharge ground water. Flow-through wetlands, as their name implies, receive surface- and ground-water inflow and then outflow to both surface and ground water. Discharge wetlands receive the majority of their hydrologic budgets from ground-water discharge and rarely outflow to surface water. Because recharge wetlands receive most of their water through precipitation and surface-water inflow, they tend to be fresher. Discharge wetlands, which receive most of their water from ground water, tend to be higher in total dissolved solids.

Due to this hydraulic linkage in the landscape, any land use change which affects or changes the hydrologic relationship of wetlands in the complex can and will affect the hydrologic or physical integrity of each wetland basin in the complex. This, in turn, affects both the chemical and biological integrity of wetlands in the complex.

Chapter 4. Wetland Water Quality Standards

As the lead water quality agency in the state, the department is responsible for developing and implementing water quality standards. In general, the *State Water Quality Standards* (NDDoH, 2001) are regulations which specify the beneficial uses of lakes, reservoirs, rivers and streams in North Dakota. The standards include narrative descriptions, numeric criteria and an antidegradation policy to protect beneficial uses. Common beneficial uses for the state's lakes and rivers are recreation (e.g., swimming, wading, boating, skiing), fishing, drinking water supply and aquatic life. Agriculture (i.e., stock watering and irrigation) and industrial uses for water are also recognized.

The *State Water Quality Standards* already include wetlands in the state's definition of waters of the state. However, beneficial uses have not yet been assigned to wetlands, nor have numeric limits been assigned to protect those uses. Wetlands have been provided some water quality protection by applying North Dakota's narrative standards to wetlands. These narrative standards, also known as the "free from" standards, prohibit the disposal of garbage, oil or any toxic pollutant to wetlands.

Chapter 5. Wetland Monitoring and Assessment Program

Current and Historic Program

Wetlands are often ignored in state water quality monitoring and assessment programs. However, with more than 2.5 million acres of wetlands in the state, the department believes wetland monitoring and assessment should be an important component of its overall water quality monitoring and assessment strategy. To meet its monitoring and assessment goals and objectives for wetlands, the department began developing a Wetland Monitoring and Assessment Program in the early 1990s.

Key to the Wetland Monitoring and Assessment Program has been the development of an Index of Biotic Integrity (IBI) for macroinvertebrates and plants to be used as a tool for assessing the ecological condition of wetlands. While the development of widely applicable and robust indicators for macroinvertebrates has met with limited success, the development of an IBI for wetland plants has been extremely successful. Working in collaboration with the department and with funding provided by EPA's Wetland Program Grants, researchers in the North Dakota State University (NDSU) Animal and Range Sciences Department have developed IBIs for plants for temporary, seasonal and semi-permanent depressional wetlands. These IBIs can be applied throughout the Northern Glaciated Plains and Northwestern Glaciated Plains ecoregions.

While an IBI approach to wetland assessment can provide very precise information on the biological condition of individual wetlands or populations of wetlands within regions (e.g., watersheds or ecoregions), it does require the use of personnel skilled in wetland plant identification and can be costly to implement, especially on large regional scales. In order to find a wetland assessment method that is less costly to implement, the department is also collaborating with NDSU's Animal and Range Sciences Department to develop a regional-scale wetland assessment methodology using satellite remotely sensed data and GIS tools. This approach is being developed by assembling calibration and verification plant IBI data from wetlands sampled previously and by using multi-spectral Landsat TM and ETM+ satellite data.

Future Program Plans

With the development of plant IBIs nearly complete for temporary, seasonal and semi-permanent depressional wetlands in the Northern Glaciated Plains and Northwestern Glaciated Plains ecoregions, the department plans to begin development of a regional-scale wetland assessment pilot project. The purpose of this project will be to: (1) assess the biological condition of wetlands on a large geographic scale using a probabilistic study design to select and sample wetlands; and (2) apply the plant IBI to assess wetland condition. Results of this regional assessment will then be compared to wetland assessment results that will be conducted using the remote sensing methodology.

Other program plans for the future will be to develop wetland assessment methodologies for other wetland classes (e.g., riverine, lacustrine and slope) and to further investigate the use of other biological assemblages (e.g., macroinvertebrates, algae, amphibians or birds) in the development of wetland assessment indicators. The department would also like to refine existing, more labor-intensive wetland assessment methods into a "rapid assessment method" (RAM) for use by volunteer monitoring groups and the regulated community.

D. Public Health/Aquatic Life Concerns

Examples of public health or aquatic life concerns include fishing advisories or bans, pollution-caused fish kills or abnormalities, known sediment contamination, discontinued use of drinking water supplies, closure of swimming areas or incidents of waterborne disease. Unlike many other states, North Dakota has had no reported incidents of drinking water supply restrictions or swimming beach closures for the reporting period 2004 to 2005.

Fish kills occur periodically in the lakes and rivers of the state. When they do occur, it is generally the result of low-water conditions, heavy snow cover or both. Because most fish kills occur during the winter, documenting their occurrence and extent is difficult. In most instances, the occurrence of fish kills is inferred through spring test netting by the North Dakota Game and Fish Department.

The primary public health concern in the state associated with lakes and streams in North Dakota is mercury contamination. In March 1991, the state issued its first fish consumption advisory for lakes and rivers. As new data are collected and analyzed, the department updates the consumption advisory. As stated previously, the consumption advisory for all rivers and lakes in the state is due to elevated concentrations of methyl-mercury in fish tissues. To date, no specific source of mercury contamination has been identified.

PART VI. NORTH DAKOTA SECTION 303(d) LIST OF WATER QUALITY-LIMITED WATERS NEEDING TMDLs

A. Background

Section 303(d) of the CWA and its accompanying regulations (CFR Part 130, Section 7) require each state to list waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) that are considered water quality-limited and require load allocations, waste load allocations and total maximum daily loads (TMDLs). This list has become known as the "TMDL list" or "Section 303(d) list."

A waterbody is considered water quality limited when it is known that its water quality does not or is not expected to meet applicable standards. Waterbodies can be water quality limited due to point source pollution, NPS pollution or both.

In considering whether or not applicable water quality standards are being met, the state should consider not only the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Therefore, a waterbody could be considered water quality limited when it can be demonstrated that a beneficial use (e.g., aquatic life or recreation) is impaired, even when there are no demonstrated exceedances of either the narrative or numeric criteria. In cases where there is a use impairment but no exceedance of the numeric standard, the state should provide information as to the cause of the impairment. Where the specific pollutant (e.g., copper or phosphorus) is unknown, a general cause category (e.g., metals or nutrients) should be included with the waterbody listing.

Section 303(d) and accompanying EPA regulations and policy require only impaired and threatened waterbodies to be listed, and TMDLs are developed when the source of impairment is a pollutant. Pollution, by federal and state definition, is "any man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water." Based on the definition of a pollutant provided in Section 502(6) of the CWA and in 40 CFR 130.2(d), pollutants would include temperature, ammonia, chlorine, organic compounds, pesticides, trace elements, nutrients, biochemical oxygen demand (BOD), sediment and pathogens. Waterbodies impaired by habitat and flow alteration and the introduction of exotic species would not be included in the Section 303(d) TMDL list, as these impairment categories would be considered pollution and not pollutants. In other words, all pollutants are pollution, but not all pollution is a pollutant.

Where a waterbody is water quality limited, the state is required to determine, in a reasonable time frame, the reduction in pollutant loading necessary for that waterbody to meet water quality standards, including its beneficial uses. The process by which the pollutant-loading capacity of a waterbody is determined and the load is allocated to point and nonpoint sources is called a total maximum daily load (TMDL). While the term "total maximum daily load" implies that loading capacity is determined on a daily time scale, TMDLs can range from meeting an instantaneous concentration (i.e., an acute standard) to computing an acceptable annual phosphorus load for a lake or reservoir.

Section 303(d) requires states to submit their lists of water quality-limited waterbodies "from time to time." Federal regulations have clarified this language; therefore, beginning in 1992 and by April 1 of every even-numbered year thereafter, states are required to submit a revised list of waters needing TMDLs. North Dakota's 2004 TMDL list was submitted to EPA in May 2004 and was approved in August 2004. This 2006 Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDLs and waterbodies that have been removed from the 2004 list. Reasons for removing a waterbody from the 2004 list include: (1) a TMDL has been completed for the waterbody and approved by EPA; (2) current data and/or information suggests the waterbody is now meeting water quality standards; (3) data and/or information used to list the waterbody as water quality limited has been determined to be insufficient and/or of poor quality; (4) the assessment was made based on best professional judgment; (5) the cause of the use impairment was related to a pollutant for which there is not clearly defined or scientifically defensible chemical criteria; or (6) the water quality impairment is not due to a pollutant.

Along with the TMDL list, states are required to provide documentation to the EPA Regional Administrator in support of the state's decision to list or not list waterbodies. Information supporting North Dakota's 2006 TMDL list is provided in Part IV. B. "Assessment Methodology." At a minimum, a state's supporting information should include: (1) a description of the methodology used to develop the list; (2) a description of the data and information used to develop the list; (3) the rationale for any decision to not use this information; (4) the rationale for removing waterbodies previously listed as water quality limited; and (5) a summary of comments received on the list during the state's public comment period.

Following opportunity for public comment, the state must submit its list to the EPA Regional Administrator. The EPA Regional Administrator then has 30 days to either approve or reject the listings. If the EPA Regional Administrator rejects a state submittal, EPA has 30 days to develop a list for the state. This list also is required to undergo public comment prior to finalization.

B. Prioritization of TMDL-Listed Waters

When a state prepares its list of water quality-limited waterbodies, it is required to prioritize waterbodies for TMDL development and to identify those waterbodies that will be targeted for TMDL development within the next two years. Factors to be considered when prioritizing waterbodies for TMDL development include: (1) the severity of pollution and the uses which are impaired; (2) the degree of public interest or support for the TMDL, including the likelihood of implementation of the TMDL; (3) recreational, aesthetic and economic importance of the waterbody; (4) the vulnerability or fragility of a particular waterbody as an aquatic habitat, including the presence of threatened or endangered species; (5) immediate programmatic needs, such as wasteload allocations needed for permit decisions or load allocations for Section 319 NPS project implementation plans; and (6) national policies and priorities identified by EPA.

After considering each of the six factors, the state has developed a three-tiered priority ranking. Assessment units (AUs) listed as Priority 1 have been further categorized. Priority 1A are lakes and reservoirs and river and stream segments for which TMDLs are scheduled to be completed and submitted to EPA in the next two years. Priority 1B are lakes and reservoirs and river and stream segments for which TMDL development projects are scheduled to be started in the next

two years. The majority of these Priority 1A and 1B AUs were identified as such, based largely on their degree of public support and interest and the likelihood of implementation of the TMDL once completed. Priority 2 AUs are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next 10 years.

Waterbodies for which fish consumption use is impaired due to methyl-mercury are considered Priority 3. These AUs are a low priority for TMDL development in the state. TMDL development for methyl-mercury-contaminated waterbodies is complicated by several factors, including: (1) the uncertainty regarding the fate and transport of atmospheric sources of mercury and (2) the complexity of the biological and geochemical interactions that affect the conversion of elemental mercury to methyl-mercury and its bioaccumulation rate in fish. Due to these complexities and the interstate and international nature of atmospheric mercury sources, it is the department's recommendation that EPA take the lead in developing mercury TMDLs.

C. Public Participation Process

Public comments were solicited on the draft 2006 TMDL list through a public notice published in the following daily newspapers: Fargo Forum, Grand Forks Herald, Bismarck Tribune, Minot Daily News, The Dickinson Press and The Williston Daily Herald (Appendix F). The public notice encouraged interested parties to obtain a copy of the draft TMDL list by contacting the department in writing, by phone or by accessing the list through the department's website at www.health.state.nd.us.

Comment on the draft TMDL list also was requested through mail or email from individuals and specific agencies and organizations. These included the South Dakota Department of Environment and Natural Resources, Minnesota Pollution Control Agency (Detroit Lakes Regional Office), the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the North Dakota Game and Fish Department, the State Water Commission, the Red River Basin Commission, individuals on the State Water Pollution Advisory Board and EPA Region VIII. Comments were received from EPA Region 8, the State Water C omission, the US Bureau of Reclamation, the US Army Corps of Engineers and the Red River Basin Commission. These comments and the Department's response to are provided in Appendix G. When appropriate, these comments were incorporated in the final 2006 Integrated Report.

D. Listing of Impaired Waters Needing TMDLs

As stated previously for 2006 Section 305(b) reporting and Section 303(d) TMDL listing, states were encouraged to follow the "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act" (EPA, 2005). This guidance suggests that states place their assessed waterbodies into one of five assessment categories (Table VI-1). Waterbodies (also referred to as AUs) assessed as Category 5 form the basis of the state's Section 303(d) TMDL list. Tables VI-1, VI-2, VI-3 and VI-4 provide a list of AUs in the Souris, Red, Missouri and James River Basins, respectively, that are impaired and in need of TMDLs (i.e., Category 5). These impaired waters also are depicted graphically for the Souris River Basin (Figure VI-1), the Upper and lower Red River Basins (Figures VI-2 and VI-3), the Lake Sakakawea and Lake Oahe sub-basins of the Missouri River

Basin (Figures VI-4 and VI-5) and the James River Basin (Figure VI-6). The 2006 TMDL list is represented by 224 AUs (48 lakes and reservoirs and 176 river and stream segments) and 365 individual waterbody-pollutant combinations. For purposes of TMDL development, each waterbody-pollutant combination requires a TMDL.

E. De-listing of 2004-Listed TMDL Waters

Table VI-5 provides a list of lakes, reservoirs, rivers and streams that were listed in the previous 2004 TMDL list but that have been removed from this year's Section 303(d) list submittal. AUs were removed from the TMDL list for a number of reasons. The following are the primary reasons for de-listing an AU:

- Based on most recent data, use is fully supported.
- Use impairment is due to a nonpollutant (habitat).
- Sufficient credible data and/or information is lacking to make a use support determination.

In most cases, when the original assessment was judged not to be representative of current water quality conditions due to a lack of sufficient credible data, one of the following usually occurred:

1. The data used to conduct the assessment are now more than 12 years old for rivers and streams and 14 years old for lakes and reservoirs. Based on best professional judgment, the assessment is no longer believed to be valid. This would occur if it is believed that water quality has been altered due to significant changes in land use and/or due to climatic changes.

2. The original assessment was based only on best professional judgment.

3. The original assessment was based on data extrapolated from a monitoring station(s) located in an adjacent AU.

Table VI-1. 2006 List of Section 303(d) TMDL Waters for the Souris River Basin in North Dakota

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09010001-001-L_00	Short Creek Dam	96.3 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
ND-09010001-001-S_00	Souris River from the ND-Saskatchewan border downstream to Lake Darling	43.4 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09010001-006-S_00	Souris River from Lake Darling downstream to its confluence with the Des Lacs River	30.2 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-09010002-001-S_00	Des Lacs River from Lower Des Lacs Lake downstream to its confluence with the Souris River	71.1 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09010002-002-L_00	Northgate Dam	150.8 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A

Table VI-1. 2006 List of Section 303(d) TMDL Waters for the Souris River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09010003-001-L_00	Carbury Dam	130 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
ND-09010003-001-S_00	Souris River from its confluence with Oak Creek downstream to its confluence with the Wintering River	51.7 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09010003-003-S_00	Wintering River, including tributaries	195.9 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	1A
					Sedimentation, Siltation	1A
			Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09010003-005-S_00	Souris River from its confluence with the Wintering River downstream to its confluence with Willow Creek	76.2 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	2
					Sedimentation/Siltation	2
ND-09010004-001-S_00	Willow Creek from its confluence with Ox Creek downstream to its confluence with the Souris River	39.4 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-09010004-002-L_00	Long Lake	287 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Oxygen, Dissolved	2

[1] Priority 1A are those AUs for which TMDLs are scheduled for completion in the next two years. Priority 1B are AUs for which TMDL development activities (e.g., monitoring or modeling) are scheduled to begin in the next two years. Priority 2 are those AUs which are scheduled for TMDL development in the next 10 years. AUs listed as Priority 3 are listed as impaired for fish consumption due to methyl-mercury. These AUs are a low priority for the state due to complexities related to the fate and transport of methyl-mercury and due to the interstate and international nature of atmospheric mercury sources. It is the department's recommendation that EPA take the lead in developing mercury TMDLs.

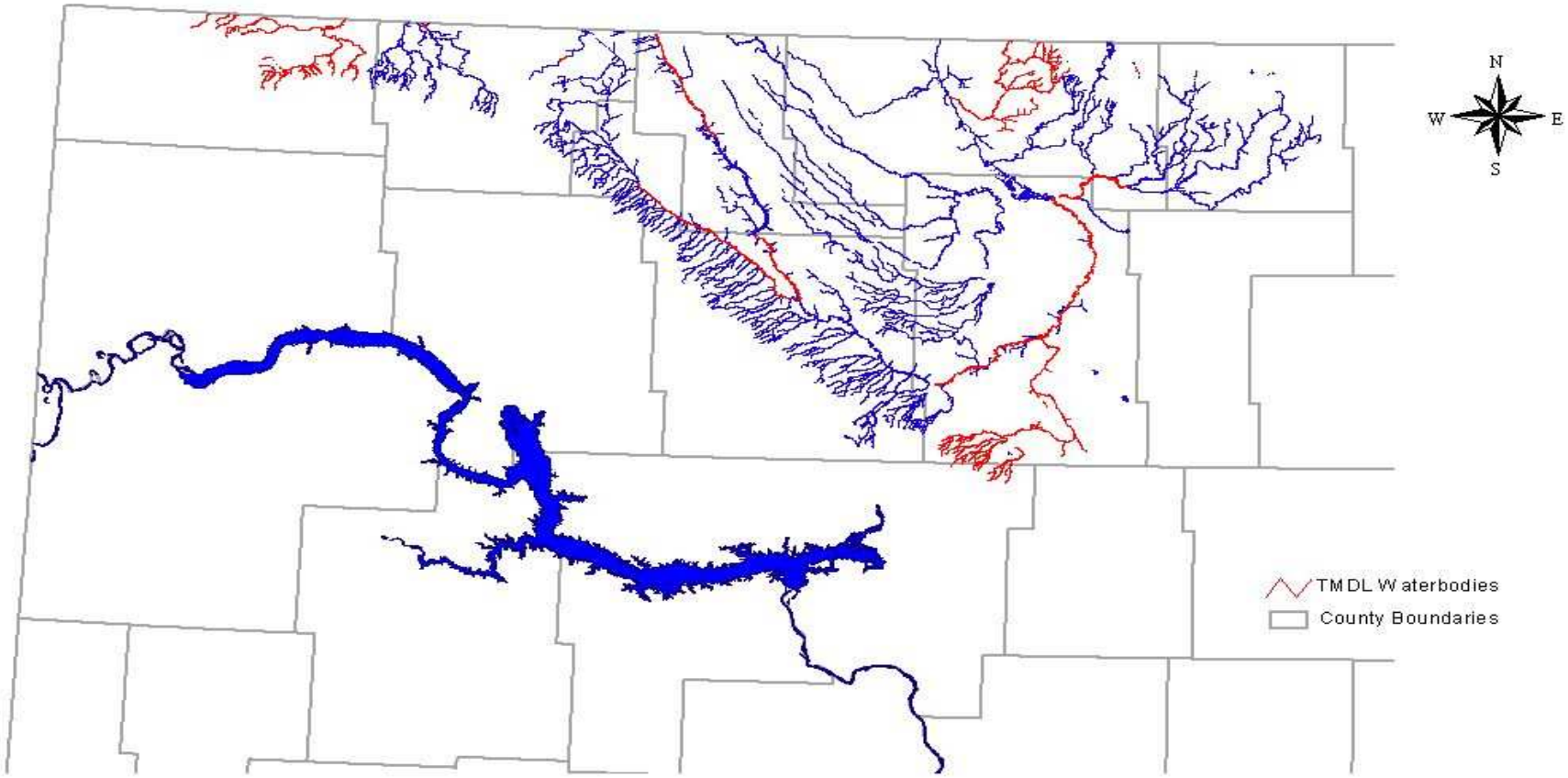


Figure VI-1. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Souris River Basin

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020101-001-S_00	Bois De Sioux River from the ND-SD border downstream to its confluence with the Rabbit River	12.77 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
					Biological Indicators	2
ND-09020101-002-S_00	Bois De Sioux River from its confluence with the Rabbit River downstream to its confluence with the Ottertail River	15.03 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
					Biological Indicators	2
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09020104-001-S_00	Red River of the North from its confluence with the Ottertail River downstream to its confluence with Whiskey Creek	26.81 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
			Recreation	Not Supporting	Total Fecal Coliform	2
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020104-002-S_00	Red River of the North from its confluence with Whiskey Creek downstream to its confluence with the Wild Rice River	51.64 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020104-003-S_00	Red River of the North from its confluence with the Wild Rice River downstream to the 12th Ave bridge in Fargo, ND (just upstream from the Moorhead, MN wastewater discharge)	21 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
			Fish Consumption	Not Supporting	Methyl-mercury	3

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020104-004-S_00	Red River of the North from the 12th Ave N bridge in Fargo, ND downstream to its confluence with the Sheyenne River	20.09 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Ammonia	1A
					BOD, carbonaceous	1A
					Oxygen, Dissolved	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020104-005-S_00	Red River of the North from its confluence with the Sheyenne River downstream to its confluence with the Buffalo River	10.45 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020105-001-L_00	Lake Elsie	260.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
					Turbidity	2
ND-09020105-001-S_00	Wild Rice River from its confluence with the Colfax watershed downstream to its confluence with the Red River of the North	38.01 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1B
					Biological Indicators	1B
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-09020105-002-L_00	Mooreton Pond	36.8 acres	Fish and Other Aquatic Biota	Not Supporting	Total Dissolved Solids	1B
					Turbidity	1B
ND-09020105-003-S_00	Wild Rice River from its confluence with a tributary NE of Great Bend, ND downstream to its confluence with the Colfax watershed	51.8 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1B
					Organic Enrichment/ Oxygen, Dissolved	1B

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020105-005-S_00	Antelope Creek downstream to its confluence with the Wild Rice River	40.09 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	1B
					Sedimentation/Siltation	1B
					Temperature, water	1B
ND-09020105-009-S_00	Wild Rice River from Elk Creek downstream to its confluence with a tributary NE of Great Bend, ND	52.31 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1B
					Organic Enrichment/ Oxygen, Dissolved	1B
			Recreation	Not Supporting	Total Fecal Coliform	1B
ND-09020105-012-S_00	Wild Rice River from its confluence with Shortfoot Creek downstream to its confluence with Elk Creek	44.78 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020105-016-S_00	Shortfoot Creek from its confluence with the Wild Rice River upstream to the ND-SD border, including tributaries	16.16 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020105-017-S_00	Unnamed tributaries to the Wild Rice River (ND-09020105-015-S), including Crooked Creek	16.17 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020105-018-S_00	Wild Rice River from its confluence with the Silver Lake diversion downstream to Lake Tewaukon	18.82 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020105-019-S_00	Wild Rice River upstream from its confluence with Wild Rice Creek, including tributaries	57.06 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020105-020-S_00	Wild Rice Creek from its confluence with the Wild Rice River upstream to the ND-SD border, including tributaries	118.17 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020105-022-S_00	Wild Rice River from its confluence with Wild Rice Creek downstream to its confluence with the Silver Lake diversion	5.54 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020107-001-S_00	Red River of the North from its confluence with the Buffalo River downstream to its confluence with the Elm River	29.4 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020107-006-S_00	Elm River from dam NE of Galesburg, ND downstream to its confluence with the South Branch Elm River	29.9 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020107-008-S_00	Elm River from dam NW of Galesburg, ND downstream to dam NE of Galesburg	20.49 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020107-011-S_00	North Branch Elm River downstream to its confluence with the Elm River	33.4 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020107-014-S_00	Red River of the North from its confluence with the Elm River downstream to its confluence with the Marsh River	29.83 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020109-001-S_00	Goose River from a tributary upstream from Hillsboro, ND downstream to its confluence with the Red River of the North	27.68 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09020109-002-L_00	South Golden Lake	323.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020109-007-S_00	North Branch Goose River downstream to its confluence with the Goose River	37.12 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020109-011-S_00	Goose River from its confluence with Beaver Creek downstream to its confluence with the South Branch Goose River	19.38 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020109-017-S_00	Middle Branch Goose River from its confluence with a tributary watershed near Sherbrooke, ND (ND-09020109-019-S) downstream to its confluence with the South Branch Goose River	17.99 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020109-027-S_00	Beaver Creek downstream to the Golden Lake Diversion channel	37.01 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020109-034-S_00	Little Goose River from Little Goose River National Wildlife Refuge downstream to the Goose River	28.64 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020201-006-L_00	Devils Lake	125000 acres	Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020202-001-L_00	Warsing Dam	53.4 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Sedimentation/Siltation	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020202-001-S_00	Sheyenne River from its confluence with the Warsing Dam watershed downstream to the end of the hydrologic unit boundary	8.9 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020202-002-L_00	Balta Dam	108 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020202-004-S_00	Sheyenne River from its confluence with Big Coulee downstream to its confluence with the Warsing Dam watershed (ND-09020202-003-S)	40.37 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
ND-09020202-006-S_00	Sheyenne River from Harvey Dam downstream to its confluence with Big Coulee	35.06 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
ND-09020202-012-S_00	Sheyenne River from Coal Mine/Sheyenne Lakes downstream to Harvey Dam	6.19 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09020202-013-S_00	Unnamed tributary watershed to the Sheyenne River (ND-09020202-012-S)	30.88 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-09020202-015-S_00	Sheyenne River downstream to Sheyenne Lake	16.7 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-09020203-001-L_00	Lake Ashtabula	5430 acres	Recreation	Not Supporting	Nutrients/Eutrophication	2
ND-09020203-002-S_00	Baldhill Creek from tributary watershed (ND-09020203-005-S) downstream to Lake Ashtabula	30.21 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020203-004-L_00	Red Willow Lake	130 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020203-004-S_00	Silver Creek, including Gunderson Creek and all tributaries	38.51 miles	Recreation	Not Supporting	Total Fecal Coliform	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020203-007-L_00	McVille Dam	33.4 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Sedimentation/Siltation	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020203-008-L_00	Tolna Dam	152 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Sedimentation/Siltation	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020203-008-S_00	Unnamed tributary watershed to Baldhill Creek (ND-09020203-007-S)	16.07 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020203-012-S_00	Pickerel Lake Creek, including tributaries	28.04 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020203-013-S_00	Unnamed tributary watershed to the Sheyenne River (ND-09020203-001-S)	33.92 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020203-018-S_00	Sheyenne River from the upstream end of the hydrologic unit boundary downstream to the Tolna Dam outlet	56.61 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
					Sedimentation/Siltation	2
ND-09020204-001-S_00	Sheyenne River from its confluence with an unnamed tributary watershed (ND-09020204-014-S) downstream to its confluence with the Maple River	25.26 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020204-003-L_00	Brewer Lake	128 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020204-003-S_00	Sheyenne River from its confluence with the Maple River downstream to its confluence with the Red River of the North	18.51 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020204-004-S_00	Rush River from its confluence with an unnamed tributary watershed (ND-09020204-011-S) downstream to its confluence with the Sheyenne River	17.44 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	1A
					Sedimentation/Siltation	1A
					Organic Enrichment	1A
ND-09020204-005-L_00	Dead Colt Creek Dam	124 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
ND-09020204-007-S_00	Rush River downstream to unnamed tributary watershed (ND-09020204-011-S)	40.92 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	1A
					Sedimentation/Siltation	1A
					Organic Enrichment	1A
			Recreation	Not Supporting	Total Fecal Coliform	1A
ND-09020204-015-S_00	Sheyenne River from its confluence with tributary watershed (ND-09020204-016-S) downstream to tributary (ND-09020204-014-S)	27.68 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020204-017-S_00	Sheyenne River from unnamed tributary (ND-09020204-018-S) downstream to unnamed tributary watershed (ND-09020204-016-S)	56.72 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020204-022-S_00	Sheyenne River from tributary near Lisbon (ND-09020204-0024-S) downstream to its confluence with Dead Colt Creek (ND-09020204-021-S)	11.37 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	1B
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-09020204-023-S_00	Tiber Coulee, including tributaries	32.33 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09020204-027-S_00	Sheyenne River from its confluence with a tributary watershed below Valley City (ND-09020204-028-S) downstream to its confluence with a tributary near Highway 46 (ND-09020204-026-S)	33.59 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B
ND-09020204-034-S_00	Sheyenne River from its confluence with a tributary above Valley City, near railroad bridge (ND-09020204-038-S) downstream to its confluence with a tributary below Valley City (ND-09020204-028-S)	13.18 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B
					Biological Indicators	1B
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-09020204-040-S_00	Sheyenne River from Lake Ashtabula downstream to its confluence with a tributary above Valley City, near railroad bridge (ND-09020204-038-S)	4.13 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020205-001-S_00	Maple River from its confluence with Buffalo Creek downstream to its confluence with the Sheyenne River	27.02 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1A
					Biological Indicators	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-09020205-010-S_00	Maple River from its confluence with tributary near Leonard (ND-09020205-011-S) downstream to its confluence with Buffalo Creek	13.96 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
					Biological Indicators	2
ND-09020205-012-S_00	Maple River from its confluence with the South Branch Maple River downstream to its confluence with a tributary near Leonard (ND-09020205-011-S)	25.92 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020205-015-S_00	Maple River from its confluence with a tributary watershed near Buffalo, ND (ND-09020205-019-S) downstream to its confluence with the South Branch Maple River	41.6 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-090202005-024-S_00	Maple River downstream to its confluence with a tributary near the Steele, Cass, Barnes Co. line (ND-09020205-023-S)	28.06 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-09020301-001-S_00	Red River of the North from its confluence with the Marsh River downstream to its confluence with Sandhill Creek	21.26 miles	Fish Consumption	Not Supporting	Methyl-mercury	3

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020301-002-S_00	English Coulee from its confluence with a tributary upstream from Grand Forks, ND downstream to its confluence with the Red River of the North (lower reach)	5.53 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	2
					Total Dissolved Solids	2
					Organic Enrichment	2
			Recreation	Not Supporting	Total Fecal Coliform	2
					Sedimentation/Siltation	2
ND-09020301-007-S_00	Red River of the North from its confluence with the Sand Hill River downstream to its confluence with Cole Creek	31.13 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020301-010-S_00	Red River of the North from its confluence with Cole Creek downstream to its confluence with the Red Lake River	8.06 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020301-014-S_00	Red River of the North from its confluence with the Red Lake River downstream to its confluence with English Coulee	4.02 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020306-001-S_00	Red River of the North from its confluence with English Coulee downstream to its confluence with Grand Marais Creek	8.65 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020306-003-S_00	Red River of the North from its confluence with Grand Marais Creek downstream to its confluence with the Turtle River	12.62 miles	Fish Consumption	Not Supporting	Methyl-mercury	3

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020306-004-S_00	Red River of the North from its confluence with the Turtle River downstream to its confluence with the Forest River	31.94 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020306-005-S_00	Red River of the North from its confluence with the Forest River downstream to its confluence with the Park River	22.02 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020307-001-S_00	Turtle River from its confluence with Salt Water Coulee downstream to its confluence with the Red River of the North	30.36 miles	Fish and Other Aquatic Biota	Not Supporting	Selenium	1A
					Sedimentation/Siltation	1A
					Total Dissolved Solids	1A
ND-09020307-006-S_00	Turtle River from its confluence with Kelly Slough downstream to its confluence with Salt Water Coulee	0.65 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Selenium	1A
					Sedimentation/Siltation	1A
					Total Dissolved Solids	1A
ND-09020307-019-S_00	Turtle River from its confluence with a tributary NE of Turtle River State Park downstream to its confluence with Kelly Slough	25.27 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	1A
ND-09020307-031-S_00	North Branch Turtle River from its confluence with Whiskey Creek downstream to its confluence with South Branch Turtle River	14.26 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	1A
ND-09020308-001-L_00	Fordville Dam	197 acres	Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020308-001-S_00	Forest River from Lake Ardoch downstream to its confluence with the Red River of the North	16.17 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
					Sedimentation/Siltation	2
					Total Dissolved Solids	2
ND-09020308-002-L_00	Whitman Dam	143 acres	Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020308-003-L_00	Matejcek Dam	130 acres	Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020308-015-S_00	Forest River from its confluence with South Branch Forest River downstream to its confluence with a tributary near Highway 18	13.26 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020308-023-S_00	Middle Branch Forest River from Matejcek Dam downstream to its confluence with North Branch Forest River	8.85 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-09020310-001-L_00	Homme Dam	194 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Sedimentation/Siltation	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020310-001-S_00	Park River from its confluence with Salt Lake outlet (ND-09020310-009-S) downstream to its confluence with the Red River of the North	15.06 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Copper	2
					Selenium	2
					Lead	2

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020310-010-S_00	Park River from its confluence with a tributary east of Grafton, ND (ND-09020310-012-S) downstream to its confluence with the outlet from Salt Lake (ND-09020310-009-S)	14.68 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Copper	2
					Selenium	2
					Lead	2
ND-09020310-013-S_00	Park River from the confluence of the South Branch Park River and the Middle Branch Park River downstream to its confluence with a tributary east of Grafton, ND (ND-09020310-012-S)	6.83 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Copper	2
					Selenium	2
					Lead	2
ND-09020310-020-S_00	South Branch Park River from its confluence with a tributary watershed near Adams, ND (ND-09020310-022-S) downstream to Homme Dam	16.9 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020310-029-S_00	Middle Branch Park River from tributary near Highway 32 downstream to tributary near Highway 18	26.18 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020310-039-S_00	North Branch Park River from a dam near Milton, ND downstream to its confluence with a tributary near Highway 32	15.52 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020311-001-S_00	Red River of the North from its confluence with the Park River downstream to its confluence with a small tributary north of Drayton, ND	19.02 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020311-003-S_00	Red River of the North from its confluence with a small tributary north of Drayton, ND downstream to its confluence with Two River	30.3 miles	Fish Consumption	Not Supporting	Methyl-mercury	3

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020311-005-S_00	Red River of the North from its confluence with Two River downstream to its confluence with the Pembina River	17.99 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020311-007-S_00	Red River of the North from its confluence with the Pembina River downstream to the US-Canada border	3.0 miles	Fish Consumption	Not Supporting	Methyl-mercury	3
ND-09020313-002-L_00	Renwick Dam	220 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1B
ND-09020313-006-S_00	Tongue River from its confluence with a tributary NE of Cavalier, ND downstream to its confluence with Big Slough	22.54 miles	Fish and Other Aquatic Biota	Not Supporting	Sedimentation/Siltation	1B
					Biological Indicators	1B
ND-09020313-007-L_00	Lake Upsilon	414 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Sedimentation/Siltation	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	2
ND-09020313-009-S_00	Tongue River from Renwick Dam downstream to its confluence with a tributary NE of Cavalier, ND	15.91 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B
					Biological Indicators	1B
ND-09020313-011-L_00	Armourdale Dam	79.8 acres	Fish and Other Aquatic Biota	Not Supporting	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Not Supporting	Nutrients/Eutrophication	1A

Table VI-2. 2006 List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09020313-021-S_00	Pembina River from its confluence with a tributary west of Neche, ND downstream to its confluence with the Tongue River	32.72 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
					Biological Indicators	2
			Recreation	Fully Supporting, but Threatened	Total Fecal Coliform	2
ND-09020313-023-S_00	Pembina River from its confluence with a tributary NE of Walhalla, ND downstream to its confluence with a tributary west of Neche, ND	36.97 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2
ND-09020313-025-S_00	Pembina River from its confluence with Little South Pembina River downstream to its confluence with a tributary NE of Walhalla, ND	13.09 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Biological Indicators	2

[1] Priority 1A are those AUs for which TMDLs are scheduled for completion in the next two years. Priority 1B are AUs for which TMDL development activities (e.g., monitoring or modeling) are scheduled to begin in the next two years. Priority 2 are those AUs which are scheduled for TMDL development in the next 10 years. AUs listed as Priority 3 are listed as impaired for fish consumption due to methyl-mercury. These AUs are a low priority for the state due to complexities related to the fate and transport of methyl-mercury and due to the interstate and international nature of atmospheric mercury sources. It is the department's recommendation that EPA take the lead in developing mercury TMDLs.

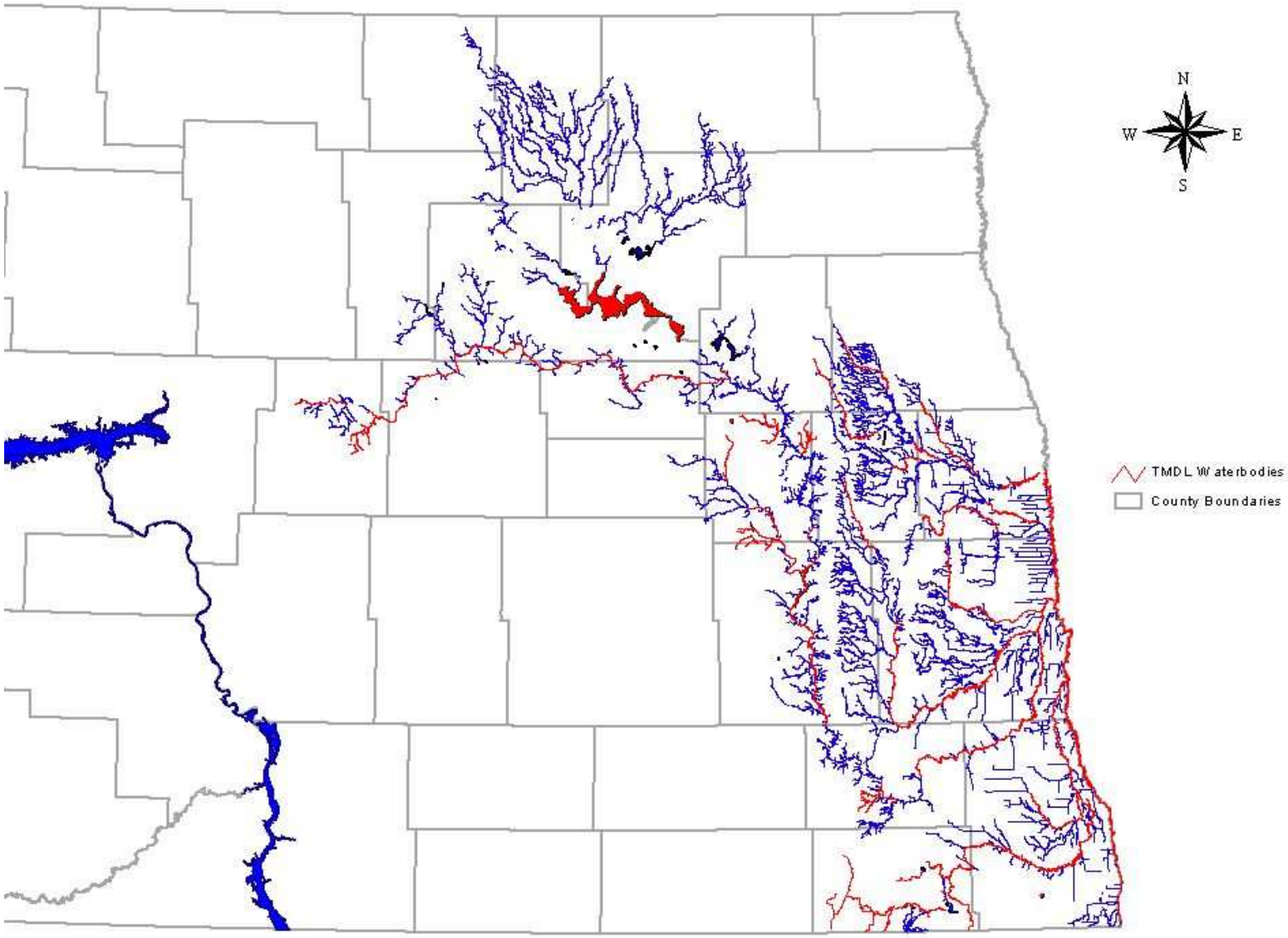


Figure VI-2. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Upper Red River Basin

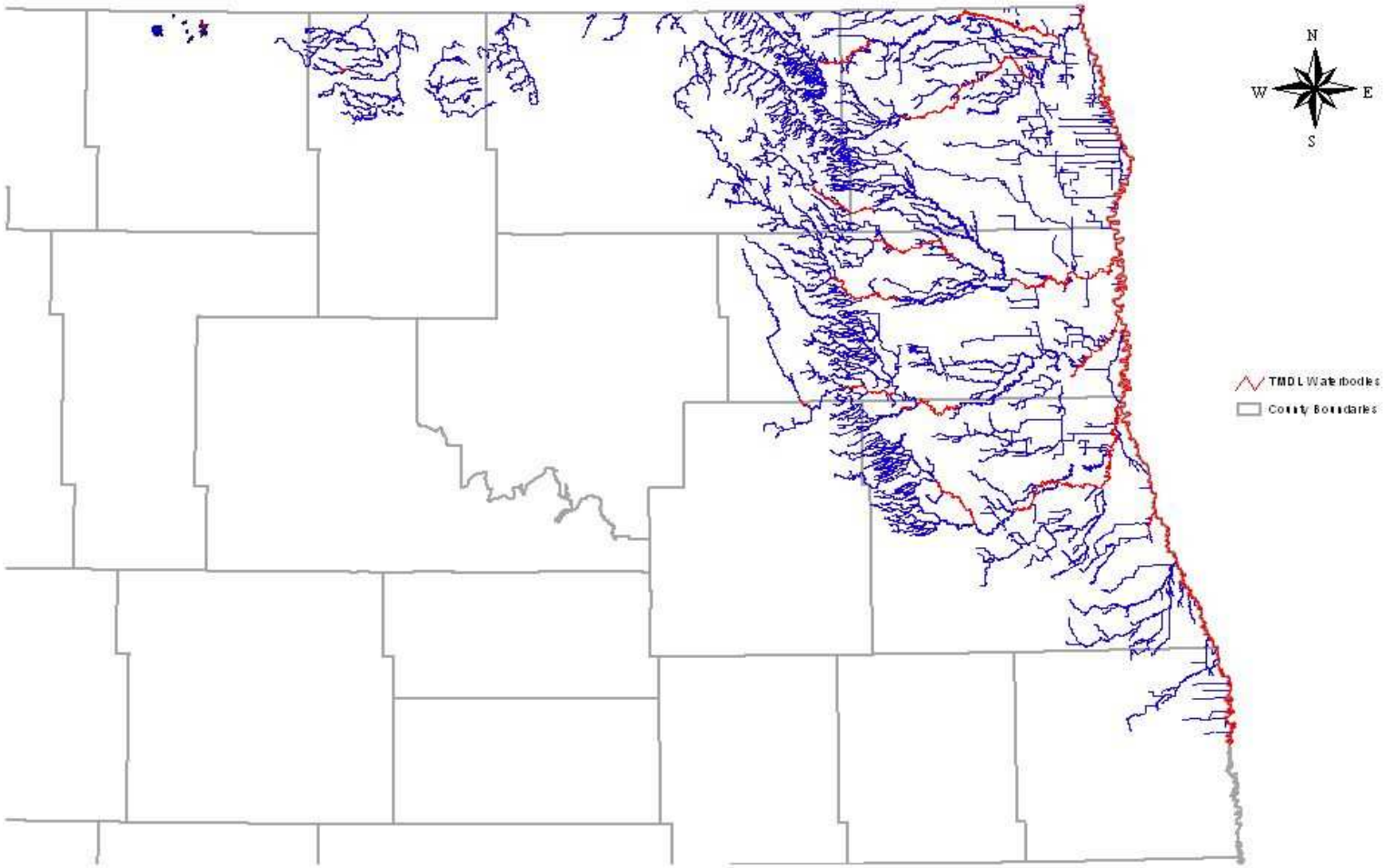


Figure VI-3. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lower Red River Basin

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10110101-001-L_00	Powers Lake	950.6 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10110101-019-L_00	McGregor Dam	54.3 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10110101-021-L_00	Lake Sakakawea	368,231 acres (based on lake surface area at full pool)	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	1B
					Temperature	1B
			Fish Consumption	Not Supporting	Methyl-mercury	3
ND-10110101-056-S_00	Handy Water Creek, including tributaries	42.41 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-10110101-080-S_00	Little Knife River from Stanley Reservoir downstream to Lake Sakakawea	45.44 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10110201-001-S_00	Little Muddy River from its confluence with East Fork Little Muddy River downstream to Lake Sakakawea	24.0 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10110102-003-L_00	Blacktail Dam	160 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10110203-001-S_00	Little Missouri River from its confluence with Little Beaver Creek downstream to its confluence with Deep Creek	75.79 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10110203-025-S_00	Little Missouri River from its confluence with Deep Creek downstream to its confluence with Andrews Creek	48.25 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10110205-001-S_00	Little Missouri River from its confluence with Beaver Creek downstream to Highway 85	58.94 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10110205-033-S_00	Little Missouri River from Highway 85 downstream to its confluence with Cherry Creek	23.79 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130101-002-L_00	Brush Lake	200 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130101-002-S_00	Square Butte Creek from its confluence with Otter Creek downstream to its confluence with the Missouri River	1.79 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
			Recreation	Not Supporting	Total Fecal Coliform	2

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130101-003-L_00	Crooked Lake	375 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
				Fully Supporting but Threatened	Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130101-004-L_00	Strawberry Lake	140 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130101-009-S_00	Square Butte Creek from Nelson Lake downstream to its confluence with Otter Creek	38.15 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	2
			Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130103-003-L_00	Braddock Lake	69.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
					Sedimentation/Siltation	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130103-007-S_00	Hay Creek downstream to its confluence with Apple Creek	15.78 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1B
ND-10130103-010-L_00	Lake Isabel	805.7 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130103-014-L_00	McDowell Dam	55.2 acres	Fish and Other Aquatic Biota	Not Supporting	Oxygen, Dissolved	1A
					Nutrient/Eutrophication	1A
			Recreation	Not Supporting	Nutrient/Eutrophication	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130104-001-L_00	Beaver Lake	953.1 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
					Sedimentation/Siltation	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130104-001-S_00	Beaver Creek from its confluence with Sand Creek downstream to Lake Oahe	8.43 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130104-003-S_00	Beaver Creek from its confluence with Spring Creek downstream to its confluence with Sand Creek	14.9 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130104-004-S_00	Sand Creek, including tributaries	108.56 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10130104-005-S_00	Spring Creek, including tributaries	63.14 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10130104-007-S_00	Beaver Creek from its confluence with the South Branch Beaver Creek downstream to its confluence with Spring Creek	37.68 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130104-008-S_00	Clear Creek, including tributaries	108.95 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130104-010-S_00	Beaver Creek from Beaver Lake downstream to its confluence with the South Branch Beaver Creek	38.92 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10130104-012-S_00	Unnamed tributary which is at the south end of Beaver Lake	158.02 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10130104-014-S_00	South Branch Beaver Creek from its confluence with the South Branch Beaver Creek watershed (ND-10130104-015-S) downstream to its confluence with Beaver Creek	43.45 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130106-002-L_00	Green Lake	868.6 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130106-003-L_00	Lake Hoskins	553.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130201-002-S_00	Knife River from its confluence with Antelope Creek downstream to its confluence with the Missouri River	19.83 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130201-003-S_00	Knife River from its confluence with Spring Creek downstream to its confluence with Antelope Creek	17.83 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130201-014-S_00	Antelope Creek from its confluence with East Branch Antelope Creek watershed (ND-10130201-016-S) downstream to its confluence with the Knife River	8.57 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130201-016-S_00	East Branch Antelope Creek upstream from Antelope Creek, including tributaries	83.04 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130201-017-S_00	Antelope Creek mainstem downstream to its confluence with East Branch Antelope Creek watershed	21.32 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130201-035-S_00	Knife River from its confluence with Coyote Creek downstream to its confluence with Spring Creek	14.65 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130201-036-S_00	Brush Creek, including tributaries	61.06	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130201-037-S_00	Coyote Creek from its confluence with Beaver Creek downstream to its confluence with the Knife River	17.24 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130201-042-S_00	Knife River from its confluence with branch of Knife River downstream to its confluence with Coyote Creek	35.99 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130202-001-L_00	Lake Tschida	5018 acres	Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130202-004-L_00	Dickinson Dike	18.8 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130202-050-S_00	Heart River from Patterson Lake downstream to its confluence with the Green River	24.7 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-10130203-002-L_00	Crown Butte Dam	31.2 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130203-005-L_00	Sweetbriar Reservoir	270.6 acres	Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130203-007-L_00	Danzig Dam	147.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	2
					Oxygen, Dissolved	2
					Sedimentation/Siltation	2
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10130204-001-L_00	Sheep Creek Dam	84.4 acres	Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130204-006-L_00	Indian Creek Dam	222 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130204-014-S_00	Thirtymile Creek from its confluence with Spring Creek downstream to its confluence with the Cannonball River	39.97 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130204-017-S_00	Thirtymile Creek from tributary watershed (ND-10130204-019-S)	19.75 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130204-044-S_00	Dead Horse Creek, including tributaries	40.18 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130204-047-S_00	Cannonball River from its confluence with White Lake watershed (ND-10130204-049-S) downstream to its confluence with Philbrick Creek	33.25 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10130204-051-S_00	Philbrick Creek from its confluence with Adobe Wall Creek downstream to its confluence with the Cannonball River	11.7 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-10130205-001-S_00	Cedar Creek from its confluence with Hay Creek downstream to its confluence with the Cannonball River	40.3 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130205-003-L_00	Cedar Lake	198.5 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10130205-006-S_00	Crooked Creek, including tributaries	40.68 miles	Recreation	Not Supporting	Total Fecal Coliform	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130205-021-S_00	Plum Creek, including tributaries	79.34 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130205-024-S_00	Cedar Creek from its confluence with Chanta Peta Creek downstream to its confluence with Duck Creek	67.56 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10130205-033-S_00	Cedar Creek from Cedar Lake downstream to its confluence with Chanta Peta Creek	43.06 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-10130205-042-S_00	Cedar Creek from its confluence with South Fork Cedar Creek downstream to Cedar Lake	30.86 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130205-043-S_00	North Fork Cedar Creek, including tributaries	14.5 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10130205-044-S_00	Unnamed tributaries to Cedar Creek (ND-10130205-042-S)	81.25 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10130205-045-S_00	South Fork Cedar Creek, including tributaries	21.99 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10130205-046-S_00	Cedar Creek upstream from its confluence with South Fork Cedar Creek, including tributaries	49.23 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10130205-047-S_00	North Cedar Creek, including tributaries	115.13 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Not Supporting	Total Fecal Coliform	1A

Table VI-3. 2006 List of Section 303(d) TMDL Waters for the Missouri River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10130206-001-S_00	Cannonball River from its confluence with Dogtooth Creek downstream to Lake Oahe	20.83 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130206-007-S_00	Cannonball River from its confluence with a tributary watershed near Shields, ND (ND-10130206-028-S) downstream to its confluence with Dogtooth Creek	21.15 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130206-027-S_00	Cannonball River from Cedar Creek downstream to a tributary near Shields, ND	23.52 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10130303-001-L_00	Mirror Lake	63.3 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
ND-10130303-001-S_00	Flat Creek downstream to Mirror Lake	21.03 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A

[1] Priority 1A are those AUs for which TMDLs are scheduled for completion in the next two years. Priority 1B are AUs for which TMDL development activities (e.g., monitoring or modeling) are scheduled to begin in the next two years. Priority 2 are those AUs which are scheduled for TMDL development in the next 10 years. AUs listed as Priority 3 are listed as impaired for fish consumption due to methyl-mercury. These AUs are a low priority for the state due to complexities related to the fate and transport of methyl-mercury and due to the interstate and international nature of atmospheric mercury sources. It is the department's recommendation that EPA take the lead in developing mercury TMDLs.

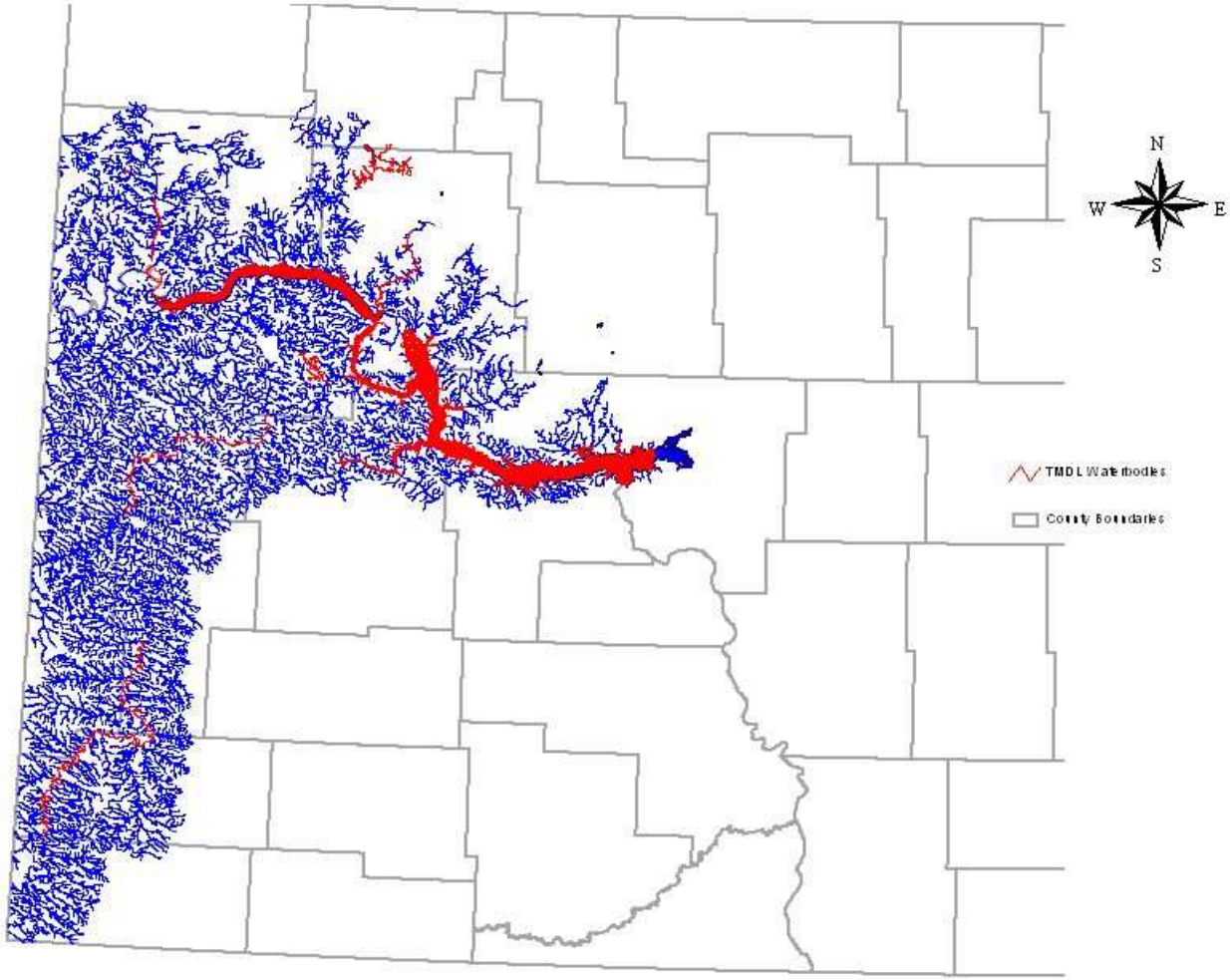


Figure VI-4. Graphic Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lake Sakakawea/Missouri River Basin

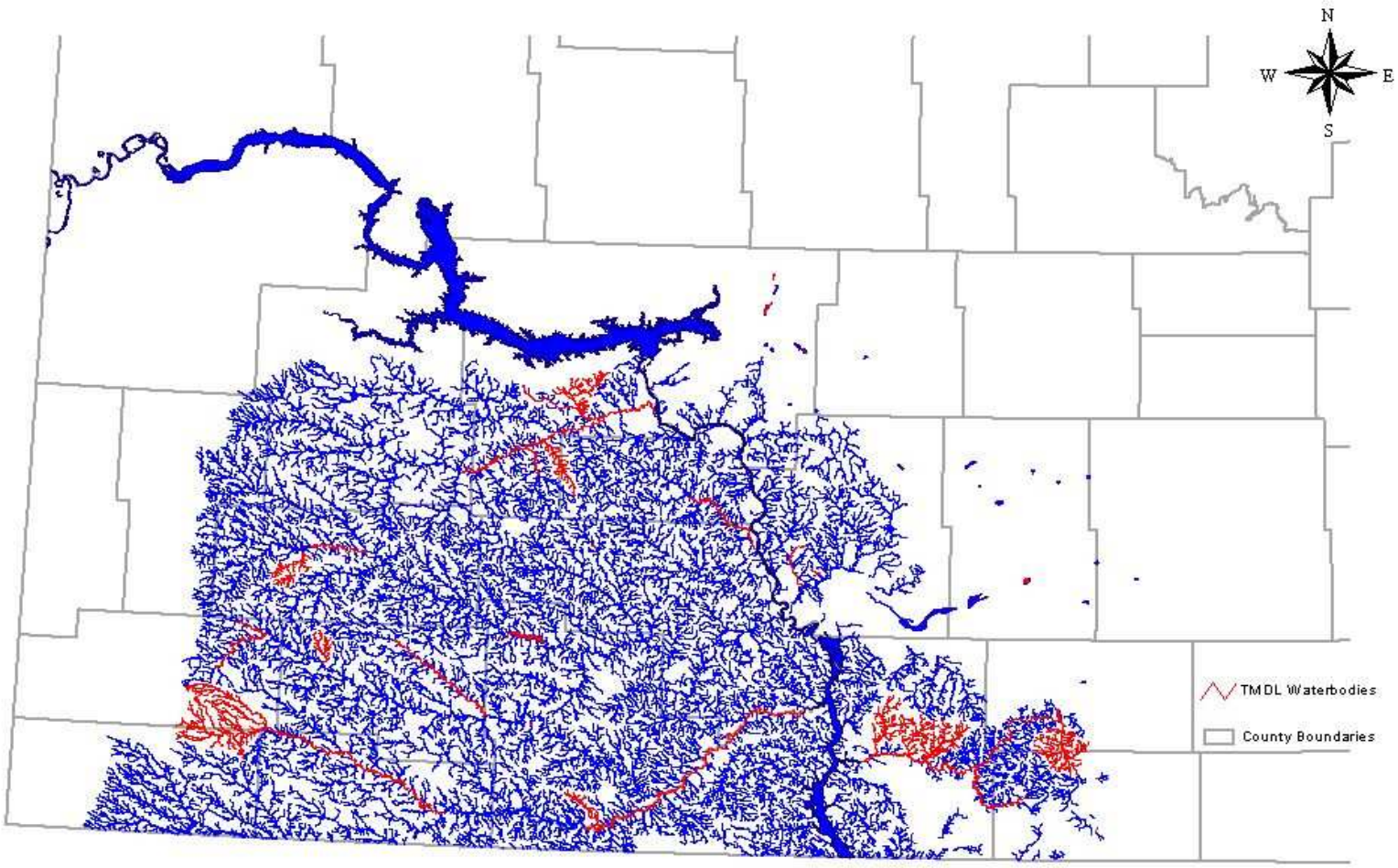


Figure VI-5. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the Lake Oahe/Missouri River Basin

Table VI-4. 2006 List of Section 303(d) TMDL Waters for the James River Basin in North Dakota

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10160001-002-L_00	Jamestown Reservoir	2086 acres	Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10160001-002-S_00	James River from Jamestown Reservoir downstream to its confluence with Pipestem Creek	1.48 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-10160001-003-S_00	James River from Arrowwood Lake downstream to Mud Lake	2.98 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	2
ND-10160001-013-S_00	James River from its confluence with Big Slough downstream to its confluence with Rocky Run	20.47 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10160001-015-S_00	Rocky Run from its confluence with Rosefield Slough downstream to its confluence with the James River	10.2 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160001-021-S_00	Rocky Run downstream to its confluence with a tributary watershed west of Cathay, ND	24.17 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160001-023-S_00	James River from its confluence with Rocky Run downstream to its confluence with Lake Juanita outlet	21.81 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-10160002-001-L_00	Pipestem Reservoir	892 acres	Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	2
ND-10160002-001-S_00	Pipestem Creek downstream to Sykeston Dam (Lake Hiawatha)	25.21 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160002-005-S_00	Pipestem Creek from Sykeston Dam downstream to small impoundment near Wells-Foster County line (ND-10160002-006-L)	10.53 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160002-007-S_00	Pipestem Creek from Pipestem Dam #3 (ND-10160002-006-l) downstream to its confluence with Little Pipestem Creek	7.22 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

Table VI-4. 2006 List of Section 303(d) TMDL Waters for the James River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10160002-008-S_00	Little Pipestem Creek downstream to its confluence with Pipestem Creek	24.26 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160002-010-S_00	Pipestem Creek from its confluence with Little Pipestem Creek downstream to Pipestem Dam #4 (ND-10160002-006-L)	28.95 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160002-012-S_00	Unnamed tributary watershed to Pipestem Creek (ND-10160002-013-S)	39.7 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160002-013-S_00	Pipestem Creek from Pipestem Dam #4 (ND-10160002-006-L) downstream to Pipestem Reservoir	20.52 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160003-001-S_00	James River from its confluence with Pipestem Creek downstream to its confluence with Sevenmile Coulee	14.41 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Ammonia	1A
					Oxygen, Dissolved	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-10160003-003-S_00	Cottonwood Creek downstream to Lake LaMoure	66.69 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10160003-025-S_00	Bone Hill Creek downstream to its confluence with the James River	38.87 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10160003-029-S_00	James River from its confluence with Bone Hill Creek downstream to its confluence with Cottonwood Creek	38.17 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-10160003-032-S_00	Bear Creek from tributary watershed (ND-10160003-035-S) downstream to its confluence with the James River	29.34 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160003-034-S_00	Bear Creek upstream from tributary watershed (ND-10160003-035-S), including tributaries	54.87 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160003-035-S_00	Unnamed tributary watershed to Bear Creek	30.07	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

Table VI-4. 2006 List of Section 303(d) TMDL Waters for the James River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10160004-001-S_00	Elm River from Pheasant Lake downstream to the ND-SD border	5.27 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-002-S_00	Maple River from its confluence with South Fork Maple River downstream to the ND-SD border	41.07 miles	Recreation	Not Supporting	Total Fecal Coliform	1A
			Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-003-S_00	Weber Gulch, including tributaries	114.75 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A
ND-10160004-005-L_00	Pheasant Lake	232.1 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrient/Eutrophication	1A
ND-10160004-005-S_00	Elm River downstream to Pheasant Lake	13.4 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-006-S_00	Upper Elm River, including tributaries	14.95 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-007-S_00	Bristol Gulch, including tributaries	43.45 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-008-S_00	Unnamed tributaries to Elm River (ND-10160004-005-S)	21.2 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-009-S_00	Unnamed tributary to Pheasant Lake	2.38 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
ND-10160004-013-S_00	Maple River from its confluence with Maple Creek downstream to its confluence with South Fork Maple River	15.79 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

Table VI-4. 2006 List of Section 303(d) TMDL Waters for the James River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-10160004-015-S_00	South Fork Maple River from its confluence with three tributaries downstream to its confluence with the Maple River	14.53 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10160004-022-S_00	Maple Creek downstream to its confluence with the Maple River	33.91 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Not Supporting	Total Fecal Coliform	1A
ND-10160004-026-S_00	Maple River from Schlect-Thom Dam downstream to its confluence with Maple Creek	20.01 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1A

[1] Priority 1A are those AUs for which TMDLs are scheduled for completion in the next two years. Priority 1B are AUs for which TMDL development activities (e.g., monitoring or modeling) are scheduled to begin in the next two years. Priority 2 are those AUs which are scheduled for TMDL development in the next 10 years. AUs listed as Priority 3 are listed as impaired for fish consumption due to methyl-mercury. These AUs are a low priority for the state due to complexities related to the fate and transport of methyl-mercury and due to the interstate and international nature of atmospheric mercury sources. It is the department's recommendation that EPA take the lead in developing mercury TMDLs.

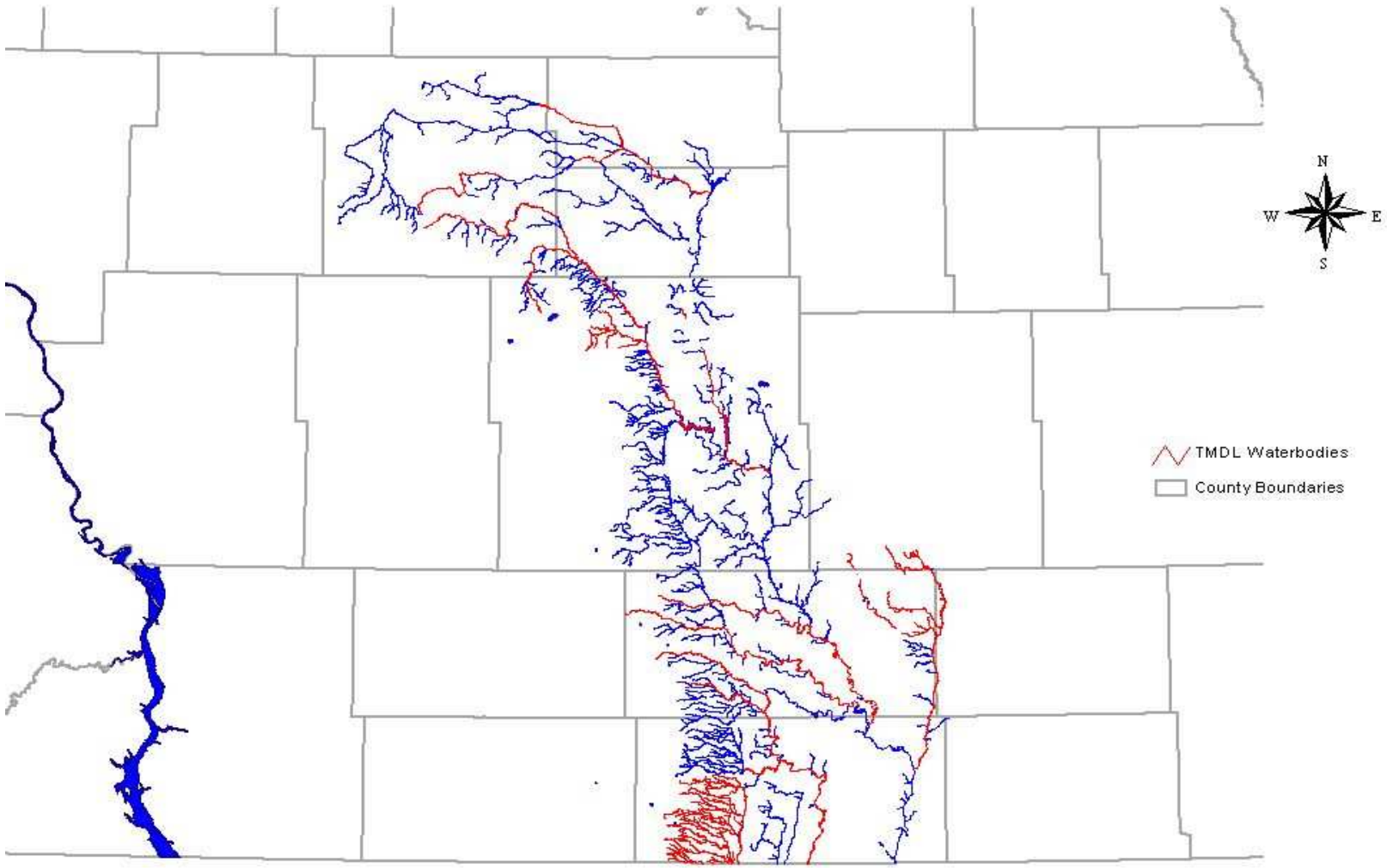


Figure VI-6. Graphical Depiction of 2006 List of Impaired Waters Needing TMDLs in the James River Basin

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006

Assessment Unit ID/Description	AU Size	Impaired Use	Pollutant	Rationale for De-listing
ND-09010001-001-S_00 Souris River from the ND-Saskatchewan border downstream to Lake Darling	43.3 miles	Fish and Other Aquatic Biota	Metals	In 2004, this AU was listed as fully supporting but threatened for metals. In a report prepared by NDSU (2006), all available trace metal data were compiled and analyzed. For all available trace metal data there was only one exceedence of the selenium standard. There were no other exceedences of either the acute or chronic standards for trace metals, therefore these analyses do not support the 2004 listing for metals.
			Nutrients/Eutrophication	In 1998, this AU was listed as fully supporting but threatened for nutrients/eutrophication. This listing was due in part to limited biological data collected in 1997. Currently, there are no scientifically credible and defensible nutrient criteria in place to justify a TMDL listing for nutrients as a pollutant. Due to a lack of reference sites and a final IBI within this river basin and ecoregion, there is also no justification for the initial listing based on biological data.
ND-09010001-002-S_01 Long Creek mainstem	25 miles	Recreation	Total Fecal coliform	This AU was listed as fully supporting but threatened for recreation use based on four fecal coliform samples collected in 1997. Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, two samples in June, and one sample each in July, August and September. Only one sample exceeded the 400 CFU/100 mL criterion. This sample, collected on June 16, 1997 was 1100 CFUs/100 mL..
ND-09010003-009-S_00 Boundary Creek, including tributaries	143.8 miles	Recreation	Total Fecal coliform	This AU was listed as fully supporting but threatened for recreation use based on four fecal coliform samples.collected by the USGS in 1999 and 2000 Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, one in June and one in July. Only two samples exceeded the 400 CFU/100mL criterion. One sample collected on May 17, 2000 was 1200 CFUs/100mLand one sample collected on June 7, 2000 was 520 CFUs/100mL.
ND-09020307-001-S_00 Turtle River from its confluence with Salt Water Coulee downstream to its confluence with the Red River of the North	30.36 miles	Fish and Other Aquatic Biota	Cadmium	Analysis of 34 samples shows no exceedances of either the acute or chronic cadmium standards
ND-09020307-006-S_00 Turtle River from its confluence with Kelly Slough downstream to its confluence with Salt Water Coulee	0.65 miles	Fish and Other Aquatic Biota	Cadmium	Based on the analysis of 34 samples collected from a site located in AU ND-09020307-001-S, there are no exceedances of either the acute or chronic cadmium standards

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006 (cont.)

Assessment Unit ID/Description	AU Size	Impaired Use	Pollutant	Rationale for De-listing
ND-09020310-001-S_00 Park River from its confluence with Salt Lake outlet (ND-09020310-009-S) downstream to its confluence with the Red River of the North	15.06 miles	Fish and Other Aquatic Biota	Biological Indicators Sediment/Siltation Total Dissolved Solids Organic Enrichment	The biological indicator impairment is based on one macroinvertebrate sample collected in August 1996. Based on the current macroinvertebrate IBI ranking of fair for this site, the assessment based on biological data is "Not Assessed". Chemical/physical data collected from a site located upstream from this AU support a "Fully Supporting but Threatened" assessment for copper, selenium and lead. The previous TMDL listings for sediment/siltation, total dissolved solids or organic enrichment were based on best professional judgement inferred from the biological data collected in August 1996. Since the IBI ranking for this site is now fair and is considered "Not Assessed", then current data do not support TMDL listings for these impairment causes.
ND-09020310-010-S_00 Park River from its confluence with a tributary east of Grafton, ND (ND-09020310-012-S) downstream to its confluence with the outlet from Salt Lake (ND-09020310-009-S)	14.68 miles	Fish and Other Aquatic Biota	Sediment/Siltation Total Dissolved Solids Organic Enrichment	Chemical/physical data collected from a site located upstream from this AU support a "Fully Supporting but Threatened" assessment for copper, selenium and lead. The previous TMDL listings for sediment/siltation, total dissolved solids or organic enrichment were based on best professional judgement inferred from the biological data collected from a site located in AU ND-09020310-001-S in August 1996. Since the IBI ranking for this site is now fair and is considered "Not Assessed", then current data do not support TMDL listings for these impairment causes.
ND-09020310-013-S_00 Park River from the confluence of the South Brach Park River and the Middle Branch Park River downstream to its confluence with a tributary east of Grafton, ND (ND-09020310-012-S)	15.06 miles	Fish and Other Aquatic Biota	Sediment/Siltation Total Dissolved Solids Organic Enrichment	Chemical/physical data collected from a site located within this AU support a "Fully Supporting but Threatened" assessment for copper, selenium and lead. The previous TMDL listings for sediment/siltation, total dissolved solids or organic enrichment were based on best professional judgement inferred from the biological data collected from a site located in AU ND-09020310-001-S in August 1996. Since the IBI ranking for this site is now fair and is considered "Not Assessed", then current data do not support TMDL listings for these impairment causes.
ND-10110101-013-S Powers Lake Watershed	71.97	Recreation	Total Fecal Coliform	Current data show that the water quality standard is being met. Based on 73 fecal coliform samples collected from sites in the Powers Lake watershed in 2000 and 2001, the fecal coliform standard of 200 colonies per 100 ml (expressed as a monthly geometric mean) is not exceeded. Nor do more than 10 % of monthly samples exceed 400 colonies per 100 ml.

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006 (cont.)

Assessment Unit ID/Description	AU Size	Impaired Use	Pollutant	Rationale for De-listing
ND-10100004-001-S Yellowstone River from the ND-MT border downstream to its confluence with the Missouri River	21.62 miles	Fish and Other Aquatic Biota	Atrazine Simazine Copper Lead Selenium Zinc	Based on a review of all available water quality data collected from 1994-2004 at the USGS station located near Sidney, MT (06329500), this station is being de-listed for the pesticides atrazine and simazine and the trace elements copper, lead, selenium and zinc. This AU was previously listed for atrazine and simazine based only on observed concentrations of these two pesticides that were above the detection limit value. Currently, there are no aquatic or chronic aquatic life standards for these two pesticides, and all concentrations are below the Safe Drinking Water Act MCLs. All reported copper, lead, selenium and zinc data are below both the acute and chronic standards, indicating there are no risks to aquatic biota.
ND-10130101-006-S Unnamed tributaries to Square Butte Creek (ND-10130101-005-S)	97.75 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting but threatened for recreation use based on eight fecal coliform samples collected in 1998. Analysis of the data based on the 2006 IR Assessment Methodology results in only three samples in May, one in June, two samples in July, and one each in August and September. Only one sample exceeded the 400 CFU/100 mL criterion. This sample, collected on July 28, 1998, was 1000 CFUs/100 mL.
ND-10100004-001-S Yellowstone River from the ND-MT border downstream to its confluence with the Missouri River	21.62 miles	Fish and Other Aquatic Biota	Atrazine Simazine Copper Lead Selenium Zinc	Based on a review of all available water quality data collected from 1994-2004 at the USGS station located near Sidney, MT (06329500), this station is being de-listed for the pesticides atrazine and simazine and the trace elements copper, lead, selenium and zinc. This AU was previously listed for atrazine and simazine based only on observed concentrations of these two pesticides that were above the detection limit value. Currently, there are no aquatic or chronic aquatic life standards for these two pesticides, and all concentrations are below the Safe Drinking Water Act MCLs. All reported copper, lead, selenium and zinc data are below both the acute and chronic standards, indicating there are no risks to aquatic biota.
ND-10130101-006-S Unnamed tributaries to Square Butte Creek (ND-10130101-005-S)	97.75 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting but threatened for recreation use based on eight fecal coliform samples collected in 1998. Analysis of the data based on the 2006 IR Assessment Methodology results in only three samples in May, one in June, two samples in July, and one each in August and September. Only one sample exceeded the 400 CFU/100 mL criterion. This sample, collected on July 28, 1998, was 1000 CFUs/100 mL.

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006 (cont.)

Assessment Unit ID/Description	AU Size	Impaired Use	Pollutant	Rationale for De-listing
ND-10130201-010-S Otter Creek from its confluence with a tributary watershed (ND-10130201-012-S) downstream to its confluence with the Knife River	18.45 miles	Recreation	Total Fecal Coliform	Current data show that the water quality standard is being met. Based on 16 fecal coliform samples collected from one site on Otter Creek, the fecal coliform standard of 200 colonies per 100 ml (expressed as a monthly geometric mean) is not exceeded. Nor do more than 10 % of monthly samples exceed 400 colonies per 100 ml.
ND-10130201-013-S Otter Creek upstream from its confluence with a tributary watershed (ND-10130201-012-S)	95.19 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting but threatened for recreation use based on nine fecal coliform samples.collected in 1997 Analysis of the data based on the 2006 IR Assessment Methodology results in only three samples in May, three in June and one each in July, August and September. Only two samples exceeded the 400 CFU/100 mL criterion. One sample, collected on June 30, 1997, was greater than 1600 CFUs/100 mL and the other sample, collected on July 14, 1997, was 430 CFUs/100 mL.
ND-10130201-015-S_00 Unnamed tributaries to Antelope Creek (ND-10130201-014-S)	16.7 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting but threatened for recreation use based on six fecal coliform samples collected in 1996, 1998, 1999 and 2000. Analysis of the data based on the 2006 IR Assessment Methodology results in only four samples in May and two samples in June. Three samples exceeded the 400 CFU/100 criterion. One sample, collected on June 18, 1998, was greater than 1600 CFus/100 mL, one sample, collected on May 4, 1999, was 100 CFUs/100 mL, and one sample, collected on June 13, 2000, was 1100 CFUs/100 mL.
ND-10130204-001-S_00 Cannonball River from its confluence with Snake Creek downstream to its confluence with Cedar Creek	34.16 miles	Recreation	Total Fecal Coliform	A TMDL (TMDL Tracking System ID 11624) to address fecal coliform loading was completed and approved by EPA on June 29, 2005. For purposes of 303(d) reporting, recreation use for this waterbody is considered fully supporting but threatened, but the AU is considered a category 4A since a TMDL for fecal coliform has been completed.
ND-10130205-012-S_00 Brushy Creek, including tributaries	49.99 miles	Recreation	Total Fecal Coliform	This AU was listed as not supporting recreation use based on five fecal coliform samples collected in 1999. Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, two samples in June and one in July. Three samples exceeded the 400 CFU/100 mL criterion. One sample, collected on May 3, 1999, was 600 CFUs/100 mL, one sample, collected on June 3, 1999, was 830 CFUs/100 mL, and one sample, collected on July 15, 1999, was 510 CFUs/100 mL.

Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2006 (cont.)

Assessment Unit ID/Description	AU Size	Impaired Use	Pollutant	Rationale for De-listing
ND-10130205-017-S_00 Timber Creek from its confluence with Sheep Creek downstream to its confluence with Cedar Creek	23.57 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting, but threatened for recreation use based on 10 fecal coliform samples collected in 1998. Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, two samples in June, one sample in July, two samples in August and three samples in September. Three samples exceeded the 400 CFU/100 mL criterion. Two samples, one collected on August 17, 1998 and one collected on September 1, 1998, were 1300 CFUs/100 mL, and one sample, collected on September 28, 1998, was 620 CFUs/100 mL.
ND-10130204-001-S_00 Cannonball River from its confluence with Snake Creek downstream to its confluence with Cedar Creek	34.16 miles	Recreation	Total Fecal Coliform	A TMDL (TMDL Tracking System ID 11624) to address fecal coliform loading was completed and approved by EPA on June 29, 2005. For purposes of 303(d) reporting, recreation use for this waterbody is considered fully supporting but threatened, but the AU is considered a category 4A since a TMDL for fecal coliform has been completed.
ND-10130205-012-S_00 Brushy Creek, including tributaries	49.99 miles	Recreation	Total Fecal Coliform	This AU was listed as not supporting recreation use based on five fecal coliform samples collected in 1999. Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, two samples in June and one in July. Three samples exceeded the 400 CFU/100 mL criterion. One sample, collected on May 3, 1999, was 600 CFUs/100 mL, one sample, collected on June 3, 1999, was 830 CFUs/100 mL, and one sample, collected on July 15, 1999, was 510 CFUs/100 mL.
ND-10130205-017-S_00 Timber Creek from its confluence with Sheep Creek downstream to its confluence with Cedar Creek	23.57 miles	Recreation	Total Fecal Coliform	This AU was listed as fully supporting, but threatened for recreation use based on 10 fecal coliform samples collected in 1998. Analysis of the data based on the 2006 IR Assessment Methodology results in only two samples in May, two samples in June, one sample in July, two samples in August and three samples in September. Three samples exceeded the 400 CFU/100 mL criterion. Two samples, one collected on August 17, 1998 and one collected on September 1, 1998, were 1300 CFUs/100 mL, and one sample, collected on September 28, 1998, was 620 CFUs/100 mL.
ND-10160001-002-S_00 James River from Jamestown Reservoir downstream to its confluence with Pipestem Creek	1.48 miles	Fish and Other Aquatic Biota	Oxygen, Dissolved	Based on 10 DO measurements taken in 1998 from a site located within the reach and 59 measurements taken at a site located immediately downstream from this AU, there have been no exceedances of the DO standard. The AU will remain listed as not supporting fish and other aquatic biota use based on biological data collected in 1998.

F. TMDL Development and Monitoring Schedule

The responsibility for TMDL development in North Dakota lies primarily with the department's Division of Water Quality - Surface Water Quality Management Program. TMDL development staff is located in three regional field offices in Dickinson, Fargo and Towner, N.D. Technical support for TMDL development projects and overall program coordination are provided by Surface Water Quality Management Program staff located in Bismarck, N.D.

Historically, the technical and financial resources necessary to complete the state's TMDL development priorities have hampered the pace of TMDL development in the state. Recently, however, the state's TMDL program has seen an improvement in the financial resources available for TMDL development projects. While still significantly short of the funding necessary to meet the state's TMDL development schedule, EPA and the state of North Dakota have made available additional grants and funding to complete TMDLs. Examples of these new financial resources include the TMDL development grants available through EPA Regional VIII and state funding through the North Dakota Game and Fish Department's Save Our Lakes Program.

With the continued commitment to adequate TMDL development staffing and with a continuation in the growth of funding for TMDL development projects in the state, the department is confident it will meet its TMDL development schedule.

The 2006 Section 303(d) TMDL list for North Dakota has identified 92 waterbodies or 167 waterbody/pollutant combinations for TMDL completion in the next two years. These Priority 1A waterbodies are AUs for which the monitoring is either completed or near completion. The 2006 TMDL list also has targeted 17 waterbodies or 32 Priority 1B waterbody/pollutant combinations. These are waterbodies for which TMDL monitoring activities are scheduled to start in the next two years. These Priority 1A and 1B waterbody/pollutant combinations represent 53 percent of all the Priority 1A, 1B and 2 waterbody/pollutant combinations on the list. Based on an anticipated TMDL completion schedule of approximately 25 additional waterbody/pollutant combinations per year following 2008, the department expects to complete TMDLs for all 2006-listed Priority 1A, 1B and 2 waters in the next 10 years.

PART VII. GROUND WATER ASSESSMENT

A. Description

Ground water underlies the land surface throughout all of North Dakota and is present in both unconsolidated deposits and bedrock. Unconsolidated deposits are loose beds of sand, gravel, silt or clay that are of glacial origin. Aquifers in the unconsolidated deposits are called glacial drift aquifers and are the result of glacial outwash deposits. Glacial drift aquifers are generally more productive than aquifers found in the underlying bedrock and provide better quality water. Approximately 206 glacial drift aquifers have been identified and delineated throughout the state. The locations and aerial extent of the major glacial drift aquifers in the state are shown in Figure VII-1. It is estimated that 60 million acre-feet (AF) of water are stored in the major glacial drift aquifers in the state.

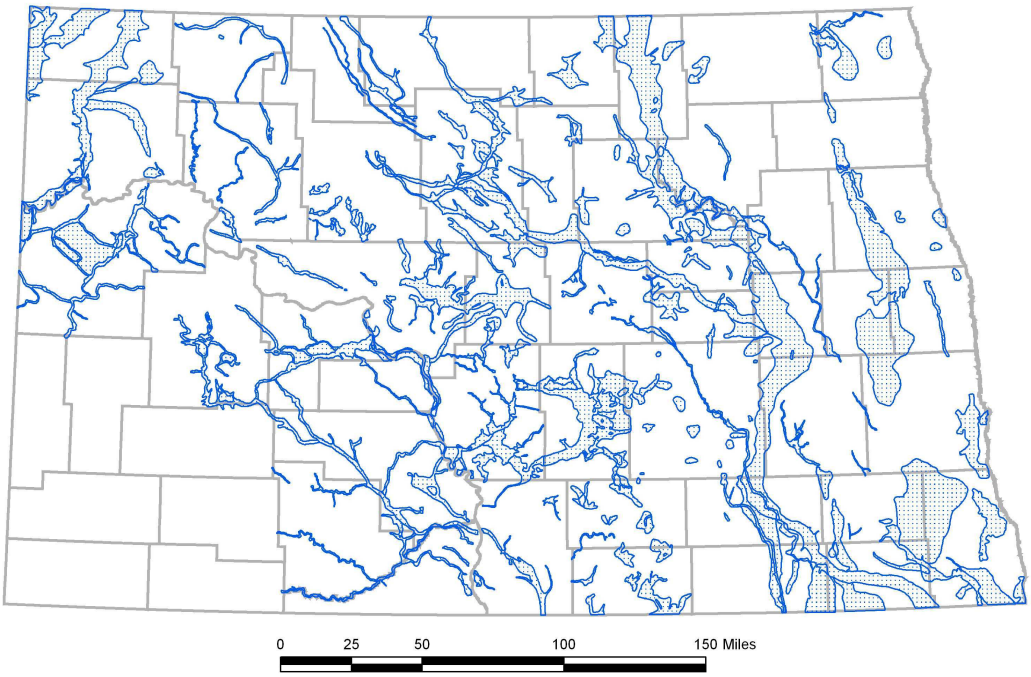


Figure VII-1. Major Glacial Drift Aquifers in North Dakota

The bedrock underlying North Dakota consists primarily of shale and sandstone that generally (except in southwestern North Dakota) underlie the unconsolidated deposits. Bedrock aquifers underlie the entire state and tend to be more continuous and widespread than glacial drift aquifers. Water contained within bedrock aquifers occurs primarily along fractures in the rock, and the water produced is generally more mineralized and saline than water from glacial drift aquifers. The major bedrock aquifers that underlie North Dakota are shown in Figure VII-2. The amount of water available in the bedrock aquifers is unknown.

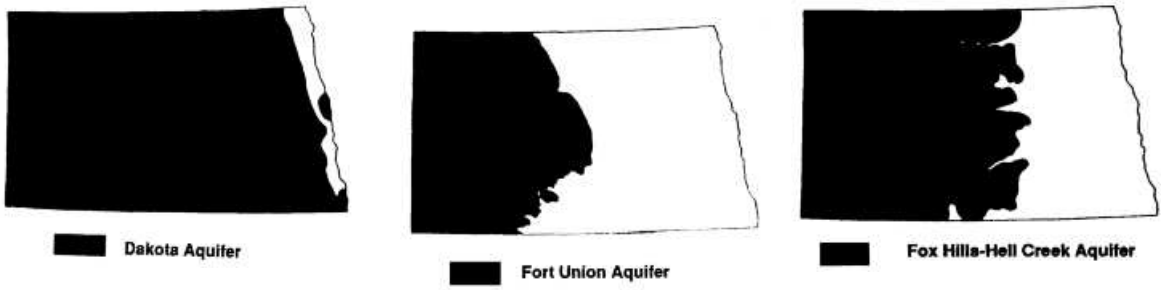


Figure VII-2. Location and Extent of North Dakota's Primary Bedrock Aquifers

North Dakota has completed a multi-agency effort to assess and map the major ground water resources found within the state's boundaries. The County Ground Water Studies Program provides a general inventory of the state's ground water resources and was completed through a cooperative effort of the State Water Commission (SWC), the North Dakota Geological Survey, the United States Geological Survey, county water resource districts and county commission boards. The country ground water studies identified the location and extent of major aquifers, hydraulic properties of the aquifers, water chemistry, estimated well yields and the occurrence and movement of ground water, including sources of recharge and discharge. The county studies were prepared in three parts:

- Part I describes the geology.
- Part II provides basic ground water data, including descriptive lithologic logs of test holes and wells, water levels in observation wells and water chemistry analyses.
- Part III describes the general hydrogeology.

The County Ground Water Studies are available for all counties in North Dakota. The SWC and other federal and state agencies continue to evaluate the ground water resources and expand the available knowledge of the quantity and quality of these resources.

Chapter 1. Ground Water Use

Ground water use in North Dakota has historically been categorized as agricultural (irrigation or livestock watering), industrial and domestic (private or public). Ninety-four percent of the incorporated communities in the state rely on ground water from private wells, municipal distributions systems and/or rural water systems. Ground water is virtually the sole source of all water used by farm families and residents of small communities having no public water distribution system.

As indicated in Table VII-1, the highest consumptive use of ground water is related to irrigation.

Table VII-1. 2003 Reported Ground Water Use in North Dakota

Type of Water Use	Amount of Water Used (acre-feet)	Percent of Total Water Used (%)
Irrigation	111,581	61
Municipal	27,782	15
Livestock	17,589	10
Rural Water Systems/Other	10,479	6
Industrial	9,648	5
Rural Domestic	5,887	3
Total	**182,966**	**100**

Notes: 1 acre-foot = 325,850 gallons
Data was obtained from the North Dakota State Water Commission website.

B. Ground Water Contamination Sources

Contamination of ground water from manmade and natural sources has been detected in every county of the state. The degree to which contamination incidents are investigated or remediated is a function of the contaminant, its impact on the beneficial use of the resource and the overall risk it poses to the public or the environment. The following are the highest priority contaminant sources which have caused adverse impacts on the beneficial use of ground water resources throughout the state:

- Agricultural chemical facilities
- Animal feedlots
- On-farm agricultural mixing and loading procedures
- Above ground and underground storage tanks
- Surface impoundments
- Large industrial facilities
- Spills and releases.

Common contaminants associated with these facilities include organic pesticides, nitrates, halogenated solvents, petroleum hydrocarbon compounds, sulfates, chlorides and total dissolved solids.

The major sources of ground water contamination were determined utilizing a combination of professional experience and a review of existing department computer databases. Several databases, maintained by the Division of Water Quality, compile information relating to the type of regulated activity, its size and location and, in some cases, regional ground water quality information. The primary databases used to identify the major sources of ground water contamination are:

<u>Concentrated Animal Feeding Operations (CAFO) Database</u>

Since 1972, North Dakota has maintained an active concentrated animal feeding operations permit program. The program is designed to protect the quality of the state's water resources through oversight of the construction and management of concentrated animal feeding operations. The program regulates animal feeding operations and can require design or operational modifications to protect the quality of the waters of the state. Regulatory authority is provided in North Dakota Century Code (NDCC) 61-28 and North Dakota Administrative Code (NDAC) 33-16, which can require specific actions for construction, water quality monitoring, animal disposal, contingency planning and animal waste disposal. The CAFO database provides location, operation and contact information. The database is updated as needed to reflect changes in the program, such as the approval of new operations or modifications to existing operations. At present, information regarding 540 facilities is listed in the CAFO database.

<u>Underground Injection Control (UIC) Program Class V Database</u>

The UIC Program regulates the injection of liquid waste into the ground where it may have the potential to adversely impact underground sources of drinking water. The department has

regulatory primacy to oversee and enforce the Class I and Class V UIC Programs. As part of this effort, the department completed a statewide survey designed to identify the type, location and use of small industrial or commercial injection systems. The UIC Class V database was developed to catalog information obtained during the survey and is updated as needed. At present, 2,515 sites are in the database, with a total of 555 identified as facilities that discharge waste fluids into a Class V underground injection well.

Spill Response/Contaminant Release Database

The department maintains databases which track the initial response and subsequent follow-up action at locations where contaminants released to the environment impact water quality. Site location, contaminant type, responsible party and a historical record of activities conducted at the site are maintained.

Ambient Ground Water Quality Monitoring Database

The Ambient Ground Water Quality Program was developed to monitor ground water quality in the 50 most vulnerable aquifers in the state. In general, vulnerability was determined based upon natural geologic conditions, total appropriated water use and land use. The program was originally designed to identify the occurrence of about 60 different pesticides in ground water. New pesticides are added from time to time in response to increased production of specialty crops and/or new pest infestations. The Ambient Ground Water Quality Database contains all the data obtained through the implementation of the monitoring program. This includes sample location, analytical results and other site-specific information.

C. Ground Water Protection Programs

In 1967, North Dakota enacted legislation enabling the state regulation of activities which have caused, or which have the potential to cause, adverse impacts to the quality of the waters of the state. NDCC 61-28 entitled, "Control, Prevention and Abatement of Pollution of Surface Waters," not only defines the statement of policy for surface and ground water quality protection, but also sets specific prohibitions and penalties for violation of the state law. Since the enactment of NDCC 61-28, the state has pursued a policy to:

> "...act in the public interest to protect, maintain and improve the quality of the waters of the state for continued use as public and private water supplies, propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial and recreational and other legitimate beneficial uses...."

North Dakota has historically envisioned ground water quality protection to include a mix of financial and technical cooperation among federal, state, and local governmental agencies and private entities. Since the early 1970s, the department has continued to build upon existing ground water protection capacities through the attainment of primacy for federal programs or through cooperative working relationships with other state, federal and local entities.

The following are brief descriptions of the programs administered by the department's Division of Water Quality.

Chapter 1. Wellhead and Source Water Protection Programs

The 1996 Amendments to the Safe Drinking Water Act established the Source Water Protection Program to serve as an overall umbrella of protection efforts for all public water systems, including ground water- and surface water-dependent systems. In North Dakota, the Wellhead Protection Program serves the ground water-dependent systems, while the Source Water Protection Program serves surface water-dependent systems. The Source Water Protection Program involves the delineation of a protection area along rivers or reservoirs that provide source water for the system and an inventory of potential contaminant sources within the protection area. Under both wellhead and source water protection, the department assesses the system's susceptibility to potential contaminant sources found in the protection area.

The 1996 Amendments to the Safe Drinking Water Act required all states to complete the minimum elements of wellhead and source water protection (delineation, contaminant source inventory and susceptibility) by May 2003. The department completed the mandatory elements for all of the Community Water Systems and all of the Non-community Water Systems in the state by the required deadline.

North Dakota continues to promote and implement the Source Water Assessment Program. Public water systems are encouraged to implement the voluntary elements of wellhead and source water protection. These elements include the development of management strategies, contingency planning and public awareness programs. The department works with, and provides assistance to, all public water systems who desire to follow through with the voluntary elements of the program.

Following the completion of source water assessment requirements in 2003, the Wellhead Protection Program is conducting source water monitoring and contaminant source studies for ground water-dependent community public water systems that have been rated as susceptible or for systems that have had detections of organic or inorganic contaminants regulated by the Safe Drinking Water Act National Primary Drinking Water Regulations. Source water monitoring typically involves the use of existing monitoring wells at contaminant release sites or the use of private water supply wells in or near the wellhead protection area. Source water monitoring for these public water systems is accomplished through coordination with the public water system and the department's Municipal Facilities and Waste Management Divisions.

D. Ground Water Quality

Chapter 1. Ambient Ground Water Monitoring Program

Ambient ground water quality monitoring activities are conducted by several agencies, with the primary activities being conducted by the North Dakota State Water Commission and the department. The monitoring programs have been developed to assess ground water quality and/or quantity in the major aquifer systems located throughout the state. The monitoring is designed to evaluate the condition of ground water quality as it relates to inorganic/organic chemical constituents and the occurrence of selected agricultural chemical compounds. Additional water quality information is collected as part of the Safe Drinking Water Act requirements through the monitoring of public drinking water programs.

The maintenance of a baseline description of ground water quality is an essential element of any statewide comprehensive ground water protection program. In recent years, concern for the quality of North Dakota's environment and drinking water has increased as it is learned that many states in the country have experienced ground water contamination from a variety of point and nonpoint sources of pollution.

In North Dakota, a large portion of the potable ground water resource underlies agricultural areas. Prior to the inception of the Ambient Ground Water Monitoring Program in 1992, only limited data were available to assess the impact of agricultural chemicals on the state's ground water quality. The goal of the Ambient Ground Water Monitoring Program is to provide an assessment of the quality of North Dakota's ground water resources with regard to agricultural chemical contamination.

Several glacial drift aquifers have been monitored each year of the program since 1992. The monitoring conducted in 1996 marked the completion of the first five-year round of monitoring high-priority glacial drift aquifers in the state. The second five-year round of monitoring began in 1997, during which time the aquifers sampled five years earlier in 1992 were resampled. Conducting the monitoring on five-year cycles, preferably using most of the same wells for sampling, will provide a temporal assessment of agricultural chemical occurrence in specific aquifers. Results of each year's monitoring are described in annual ground water monitoring reports.

Chapter 2. Underground Injection Control (UIC) Program

The department's Class I and V Underground Injection Control (UIC) Programs have been administered in accordance with UIC rules and program descriptions. Program activities include administration of the program grant, permitting, surveillance and inspections, quality assurance, enforcement, data management, public participation, training, technical assistance and Class V assessment activities. The current UIC inventory includes four active Class I wells and 576 active Class V injection wells of various subclasses. The UIC Program coordinates with other programs, including RCRA, UST, NPDES and Wellhead/Source Water Protection to identify activities which may threaten ground water quality.

Chapter 3. Additional Ground Water-Related Projects

Ground Water Protection Program staff work on many projects related to the protection of the ground water resources of North Dakota. Projects include special monitoring projects, review of sites for livestock feeding operations, review of sites for landfill operations, and working on emergency response, investigations and cleanup of releases to the environment.

Facility Location Reviews

The Ground Water Protection Program takes the lead, or assists other programs and agencies, in evaluating the impacts land use activities may have on ground water quality. Site reviews or preliminary site reviews are conducted for new feedlot or CAFO operations, landfill or waste disposal facilities and industrial facilities. The Ground Water Protection Program also conducts special monitoring projects at CAFO facilities in the state to evaluate/identify potential ground water quality changes. Site reviews are also conducted for on-site sewage systems in new residential subdivisions to assess potential ground water impacts.

Water Appropriation and Monitoring

The department reviews approximately 40 water appropriation permits each year to assess potential impacts to ground water quality. Proposed water uses includes agricultural, public water supply, recreational and industrial uses. A cooperative project with the State Water Commission is underway involving the Karlsruhe aquifer to identify causes and potential solutions to nitrate increases in irrigated areas. Meetings were conducted with State Water Commission personnel and local residents to discuss survey results and ongoing research. Currently, voluntary measures such as BMPs and reduced nutrient application rates are being implemented and evaluated in these areas. One of the irrigators has voluntarily installed shallow recovery/production wells to recover nitrate in the area of highest contamination. Residential drinking water wells are being monitored to ensure that there is no danger to public health.

Contaminant Release Sites

The Ground water Protection Program coordinates with the UST program, RCRA/CERCLA program, and the Drinking Water Program to provide technical oversight relating to the assessment and remediation of ground water contamination incidents. The majority of sites are related to fuel storage facilities, although other types of sites include pesticides, nutrients/fertilizers, chlorinated solvents, metals and trace metals, and other inorganic compounds.

Pesticide Use Exemption Evaluations

The department also reviews applications for pesticide use exemptions (FIFRA Section 18 Requests) for potential impacts to surface or ground water. Approximately six requests are reviewed each year and comments regarding each request are provided to the North Dakota Department of Agriculture.

Emergency Response and Spills

Additional project oversight is provided by the Ground Water Protection Program staff for a wide variety of emergency response and release incidents. The Ground Water Program provides technical assistance to the Division of Emergency Management to address potential water quality impacts from accidental or intentional releases. The department continues to work with the North Dakota Oil and Gas Division on response to oilfield spills, using the one-stop online spill reporting capabilities which were added to the department web site, with automatic notification to appropriate department personnel. The Ground Water Protection Program also provides oversight or technical comment either directly to the responsible party, or through the appropriate oversight agency, on other ground water contamination projects as well. Typical projects include sites that require one or more of the following activities: site assessment, selection and implementation of appropriate corrective action and sample collection and data review/evaluation.

REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder, J.B. Stribling, 1999, *Rapid Bioassessment Protocols for Use in Wadable Streams and Rivers*, EPA 841-B-99-002.

Brinson, M.M.,1993, *A Hydrogeomorphic Classification for Wetlands*, technical report WRP-DE-4, U.S. Army Corps of Engineer Waterways Experiment Station, Vicksburg, MS.

Carlson, R.E., 1997, *A Trophic Status Index for Lakes, Limnology and Oceanography*, Vol. 22 (Issue 2), pp. 361-364.

Cowardin, L.M., D.S. Gilmes and L.M. Mechlin, 1981, "*Characteristics of Central North Dakota Wetlands Determined from Sample Areal Photographs and Ground Study*," The Wildlife Society Bulletin 9 (4): pp. 280-288.

------, V. Carter, F.C. Golet and E.T. LaRoe, 1979, *Classification of Wetlands and Deepwater Habitats of the United States*, U.S. Fish and Wildlife Service, Office of Biological Services – 79/31.

Dahl, T.E., 1990, *Wetlands - Losses in the United States: 1780's to 1980's*, Washington, D.C., U.S. Fish and Wildlife Service Report to Congress.

EPA, 1998, *Development of Index of Biotic Integrity Expectations for the Lake Agassiz Plain Ecoregion*, U.S. Environmental Protection Agency Region V, Chicago, IL.

------, March 2003, *Elements of a State Water Monitoring and Assessment Program*, Assessment and Watershed Protection Division, Office of Wetlands, Oceans and Watershed, U.S. Environmental Protection Agency, Washington, DC.

------, July 2005, *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act*, Watershed Branch, Assessment and Watershed Protection Division, Office of Wetlands, Oceans and Watershed, U.S. Environmental Protection Agency, Washington, DC.

Karr, J.R. and D. R. Dudley, 1981, *Ecological Perspectives on Water Quality Goals*, Env. Mgmt. 5:44-68.

------, K.D. Fausch, P.L., Angermeier, P.R. Yant, and I.J. Schlosser, 1986,

Lee, L.S. and Mark M. Brinson, William J. Kleindl, P. Michael Whited, Michael Gilbert, Wade L. Nuttes, Dennis F. Whigham, Dave DeWald, 1997, *Operational Draft Guidebook for the Hydrogeomorphic Assessment of Temporary and Seasonal Prairie Pothole Wetlands*.

Martin, A.C., N. Hotchkiss, F.M. Uhles and W.S. Bourn, 1953, *Classification of Wetlands in the U.S.*, U.S. Fish and Wildlife Service, Resource Publication 92.

NDDoH, 2001, *Standards of Quality for Waters of the State*, North Dakota Century Code 33-16-02.1., North Dakota Department of Health, Bismarck, ND.

------, 2005, *North Dakota's Water Quality Monitoring Strategy for Surface Waters: 2005-2014*, North Dakota Department of Health, Bismarck, ND.

------, 2006, *Standards of Quality for Waters of the State* (revised), North Dakota Century Code 33-16-02.1., North Dakota Department of Health, Bismarck, ND.

------, 2006, *Macroinvertebrate Index of Biotic Integrity for the Lake Agassiz Plain Ecoregion (46) of North Dakota*, North Dakota Department of Health, Bismarck, ND.

Pearson, Eric and M.J. Ell, 1997, *Effects of Rising Reservoir Water Levels Resulting from the 1993 Flood on the Methyl-Mercury Concentrations in Fish Tissues in Lake Sakakwea, ND*, North Dakota Department of Health, Bismarck, ND.

Reynolds, Ron, 1997, personal communication, project leader, HAPET Office, U.S. Fish and Wildlife Service, Bismarck, ND.

Stephen, C. E., 1995, *Derivation of Conversion Factors for the Calculation of Dissolved Freshwater Aquatic Life Criteria for Metals*, U.S. EPA, Environmental Research Laboratory, Duluth, MN.

Stewart, R.E. and H.A. Kantrud, 1971, *Classification of Natural Ponds and Lakes in the Glaciated Prairie Region*, Resource Publication 92, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C.

------ and H.A. Kantrud, 1973, *Ecological Distribution of Breeding Waterfowl Populations in North Dakota*, Journal of Wildlife Management 37(1): 39-50.

Appendix A

Agency and Organization Data Request

Letter, Form and Contacts

October 21, 2005

Contact

Dear Agency/Organization:

The Clean Water Act requires states and tribes to monitor and assess the quality of its lakes, reservoirs, rivers, streams and wetlands and to report on the status and condition of its surfaces waters every two years. The next report, which will be a consolidation of both the Section 305(b) Water Quality Assessment Report and the Section 303(d) List of Impaired Waters Needing Total Maximum Daily Loads is due to the US Environmental Protection Agency on April 1, 2006. The North Dakota Department of Health is primary agency for water quality monitoring and assessment in the state of North Dakota and is therefore responsible for assessing the state's surface waters and preparing the consolidated report.

As part of its responsibility, the Department maintains a network of water quality monitoring sites where it collects data on the chemical, physical and biological quality. While these data will be used to provide an assessment of the state's surface water quality, the Department is also requesting additional data that may be used for the 2006 report. If your agency or organization has chemical, physical or biological water quality data that you believe would be beneficial to the state's water quality assessment then please fill out the attached form and return it to me in the enclosed self addressed envelope at your earliest convenience.

If you have any questions concerning this request, please contact me at 701.328.5214. Your cooperation in this matter is appreciated.

Sincerely,

Michael J. Ell
Environmental Administrator
Division of Water Quality

Agency/Organization Contacts

Jeff Towner
Field Supervisor
North Dakota Field Office
US Fish and Wildlife Service
3425 Miriam Avenue
Bismarck, ND 58501

Dennis Breitzman
Dakotas Area Office
Bureau of Reclamation
P.O. Box 1017
304 East Broadway
Bismarck, ND 58502-1017

Dr. Mark Gozalez
Soil Scientist/Hydrologist
Dakota Prairies Grasslands
US Forest Service
240 West Century Ave
Bismarck, ND 58503

Keith Weston
Assistance State Conservationist for Water Resources, Acting
Natural Resources Conservation Service
220 East Rosser Avenue
P.O. Box 1458
Bismarck, ND 58502-1458

Dean Hildebrand
Director
ND Game and Fish Department
100 North Bismarck Expressway
Bismarck, ND 58501-5095
cc. Terry Steinwand
Steve Dyke

Bob Backman
River Keepers
325 7th Street South
Fargo, ND 58103

Gerald Groenewold
Energy and Environmental Research Center
University of North Dakota
P.O. Box 9018
Grand Forks, ND 58202-9018
cc. Wes Peck

Molly McGregor
Minnesota Pollution Control Agency
714 Lake Avenue, No. 220
Detroit Lakes MN 56501
cc. Jim Ziegler

Dr. John Watson
School of Engineering and Mines
University of North Dakota
P.O. Box 8155
Grand Forks, ND 58202-8155

Dr. Steven Kelsch
Department of Biology
University of North Dakota
P.O. Box 9019
Grand Forks, ND 58202-8155

Dr. Richard Crawford
Institute for Ecological Studies
University of North Dakota
P.O. Box 9019
Grand Forks, ND 58202-8155

Dr. Carolyn E. Grygiel
Natural Resources Management Program Director
Department of Animal and Range Sciences
North Dakota State University
Hultz Hall 163
Fargo, ND 58105

Dr. Frank Yazdani, Chairman
Department Civil Engineering and Construction
North Dakota State University
Civil and Industrial Engineering 201
Fargo, ND 58105

Dr. William Bleier, Chairman
Department of Biological Sciences
North Dakota State University
Stevens Hall, Room 218
Fargo, ND 58105

Edward Murphy
North Dakota Geological Survey
600 East Boulevard Avenue
Bismarck, ND 58505-0840

Greg Wiche
US Geological Survey
821 East Interstate Avenue
Bismarck, ND 58503

Lance Yohe
Red River Basin Commission
119 5th Street South, #209
P.O. Box 66
Moorhead, MN 56561-0066

Col. Jeffrey A. Bedey, Commander
US Army Corps of Engineers
Omaha District
106 S. 15th Street
Omaha, NE 68102-1618

Judith L. A. DesHarnais
Deputy for Programs and Project Management
US Army Corps of Engineers
St Paul District
190 5th Street East
St. Paul, MN 55101-1638

Rosie Sada
Montana Department of Environmental Quality
Water Quality Monitoring Section
Metcalf Building Office
1520 E. Sixth Avenue
P.O. Box 200901
Helena, MT 59620

Jim Feeney
Watershed Protection Program
South Dakota Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, SD 57501-3181

Jeanne Goodman
Surface Water Quality Program
South Dakota Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, SD 57501-3181

Don Rufledt
Bureau of Land Management
2933 3rd Ave West
Dickinson, ND 58601

Dale Frink
North Dakota State Water Commission
900 East Boulevard Avenue
Bismarck, ND 58505-0850

Water Quality Data Summary for North Dakota

Contact Person: _____

Address: _____

_____

_____

Phone: _____

Email: _____

Data Description: _____

_____

_____

_____

_____

_____

Data Period of Record: _____

_____

Were the data collected according to standard operating procedures and by following a documented quality assurance/quality control plan?

Yes No Other: _____

Data Availability (e.g., electronic, report): _____

If you have any questions concerning this information, please contact Mike Ell at 701.328.5214. Please return form to: Mike Ell, North Dakota Department of Health, Division of Water Quality, P.O. Box 5520, 1200 Missouri Ave, Bismarck, ND 58502-5520

Appendix B

Estimated Weighted Average Methyl-mercury Concentrations in Fish for Lake Sakakawea

Chinook Salmon			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 63	0.173	0.236	0.041
63-72	0.298	0.646	0.192
>73	0.270	0.128	0.035
Weighted Average[4]			0.268

Northern Pike			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 58	0.12	0.138	0.017
59-77	0.355	0.454	0.161
78-99	0.479	0.408	0.195
>99	0.895	0	0
Weighted Average[4]			0.373

Sauger			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 37	0.17	0.028	0.005
38-47	0.337	0.873	0.294
>47	0.72	0.099	0.071
Weighted Average[4]			0.37

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Lake Sakakawea, North Dakota - May 1 Through October 24, 2000*, prepared by Larry Brooks and Jeff Hendrickson, submitted to North Dakota Game and Fish Department, Project F-2-R-47, Study 3, Number A-1275, Job C.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Walleye			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 40	0.171	0.216	0.037
40-46	0.196	0.411	0.081
47-50	0.389	0.248	0.096
>50	0.508	0.125	0.064
Weighted Average[4]			0.278

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Lake Sakakawea, North Dakota - May 1 Through October 24, 2000*, prepared by Larry Brooks and Jeff Hendrickson, submitted to North Dakota Game and Fish Department, Project F-2-R-47, Study 3, Number A-1275, Job C.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Appendix C

Estimated Weighted Average Methyl-mercury Concentrations in Fish for Lake Oahe and the Missouri River

Walleye			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 36	0.15	0.218	0.033
36-39	0.152	0.505	0.077
40-51	0.243	0.264	0.064
>51	0.63	0.013	0.008
Weighted Average[4]			0.183

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Lake Sakakawea, North Dakota - April 1 Through October 15, 2000*, prepared by Larry Brooks and Jeff Hendrickson, submitted to North Dakota Game and Fish Department, Project F-2-R-47, Study 3, Number A-1275, Job B.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Appendix D

Estimated Weighted Average Methyl-mercury Concentrations in Fish for Devils Lake

Walleye			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 34	0.43	0.187	0.081
34-40	0.623	0.462	0.288
41-49	0.608	0.249	0.151
50-60	1.248	0.083	0.104
>60	1.79	0.019	0.034
Weighted Average[4]			0.658

Northern Pike			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 58	0.43	0.11	0.047
59-67	0.569	0.439	0.25
68-77	0.659	0.356	0.235
>77	1.153	0.095	0.11
Weighted Average[4]			0.642

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Lake Sakakawea, North Dakota - May 1 Through October 31, 2001*, prepared by Larry Brooks and Randy Hiltner, submitted to North Dakota Game and Fish Department, Project F-2-R-49, Study 3, Number 2, October 2002.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Yellow Perch			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 21	0.27	0.082	0.022
21-25	0.529	0.539	0.285
26-30	0.437	0.333	0.146
>30	0.62	0.046	0.029
Weighted Average[4]			0.482

White Bass			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 28	0.31	0.061	0.02
28-35	0.54	0.338	0.182
36-41	0.933	0.41	0.382
>41	1.31	0.191	0.25
Weighted Average[4]			0.834

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Lake Sakakawea, North Dakota - May 1 Through October 31, 2001*, prepared by Larry Brooks and Randy Hiltner, submitted to North Dakota Game and Fish Department, Project F-2-R-49, Study 3, Number 2, October 2002.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Appendix E

Estimated Weighted Average Methyl-mercury Concentrations in Fish for the Red River of the North

Walleye			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 41	0.74	0.484	0.36
41-63	0.885	0.484	0.428
>63	1.598	0.032	0.051
Weighted Average[4]			0.839

Channel Catfish			
Size Range (cm)	Average methyl-Hg Concentration (μg/g)[1]	Weighting Factor[2]	Weighted Concentration (μg/g)[3]
< 38	0.17	0.276	0.046
38-46	0.287	0.141	0.04
47-56	0.381	0.245	0.093
57-68	0.527	0.252	0.133
>68	0.814	0.086	0.07
Weighted Average[4]			0.382

[1] Based on the average methyl-mercury concentration for fish sampled in the size range.

[2] Estimated as the proportion of fish caught and kept by fisherman for that species and waterbody. Based on data obtained from the report entitled *Angler Use and Sport Fishing Catch Survey on Red River, North Dakota - March 15 Through October 31, 2000*, prepared by Larry Brooks and Lynn Schlueter, submitted to North Dakota Game and Fish Department, Project F-2-R-48, Study 3, June 2002.

[3] Calculated by multiplying the average concentration per size range with the weighting factor for the size range.

[4] Calculated as the sum of the weighted concentrations for each size range.

Appendix F

Public Notice Statement Requesting Public Comment on the State of North Dakota's Draft 2006 Section 303(d) List

PUBLIC NOTICE STATEMENT

Notice of submittal to the U.S. Environmental Protection Agency (EPA) and a request for public comment on the State of North Dakota's draft 2006 Section 303(d) List of Waters Needing Total Maximum Daily Loads (TMDLs).

1. Summary

Section 303(d) of the Clean Water Act (CWA) and its accompanying regulations (CFR Part 130 Section 7) requires each state to identify waterbodies (i.e., lakes, reservoirs, rivers, streams, and wetlands) which are considered water quality limited and requiring load allocations, waste load allocations, or total maximum daily loads. A waterbody is considered water quality limited when it is known that its water quality does not meet applicable water quality standards or is not expected to meet applicable water quality standards. Waterbodies can be water quality limited due to point sources of pollution, nonpoint sources of pollution, or both.

Section 303(d) of the Clean Water Act requires states to submit their lists of water quality limited waterbodies "from time to time". Federal regulations have clarified this language, therefore, beginning in 1992 and by April 1st of every even numbered year thereafter, states were required to submit a revised list of waters needing TMDLs. This list has become known as the "TMDL list" or "Section 303(d) list." The state of North Dakota last submitted its TMDL list to EPA in May 2004. This list, referred to as the "2004 list" was approved by EPA on August 17, 2004. The draft 2006 Section 303(d) list, which will be submitted to EPA as part of the integrated Section 305(b) water quality assessment report and Section 303(d) TMDL list, includes a list of waterbodies not meeting water quality standards and which need TMDLs, and a list of waterbodies which have been removed from the list submitted in as part of the 2004 list.

Following an opportunity for public comment, the state must submit its list to the EPA Regional Administrator. The EPA Regional Administrator then has 30 days to either approved or disapprove the state's listings. The purpose of this notice is to solicit public comment on the draft list prior to formally submitting the list to the EPA Regional Administrator.

2. Public Comments

Persons wishing to comment on the State's draft 2006 Section 303(d) List of Waters Needing TMDLs may do so, in writing, within thirty (30) days of the date of this public notice or by March 31, 2006. Comments must be received within this 30-day period to ensure consideration in the EPA approval or disapproval decision. All comments should include the name, address, and telephone number of the person submitting comments, and a statement of the relevant facts upon which they are based. All comments should be submitted to the attention of the Section 303(d) TMDL Coordinator, North Dakota Department of Health, Division of Water Quality, 918 East Divide Avenue, 4th Floor, Bismarck, ND 58501 or by email at mell@state.nd.us. The 2006 Section 303(d) TMDL list may be reviewed at the above address during normal business hours or by accessing it through the Department's web address (http://www.health.state.nd.us). Copies may also be requested by writing to the Department at the above address or by calling 701.328.5210.

Public Notice Number ND-2006-012

Appendix G

Public Comments on the State of North Dakota's Draft 2006 Section 303(d) List and the State's Responses

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

April 5, 2006

Ref: 8EPR-EP

Mike Ell
Division of Water Quality
North Dakota Department of Health
918 East Divide Ave., 4th Floor
Bismarck, ND 58501-1947

RE: North Dakota Draft 2006 Section 303(d) List of Waters Needing Total Maximum Daily Loads

Dear Mr. Ell:

We have reviewed the Department's draft 2006 Section 303(d) List of Waters Needing Total Maximum Daily Loads and appreciate the opportunity to provide comment. We would like to commend the Department of Health for continuing to utilize the integrated report format and updating the ADB to Version 2.2. We look forward to seeing the final IR that combines the Section 305(b) Water Quality Report to Congress and the Section 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.

Our comments are provided as below. Please contact me or Kris Jensen at 303-312-6234 or 303-312-6237 respectively, if you have any questions with regard to our comments.

Sincerely,

Vern Berry

Vern Berry
Water Quality Unit

Comments Related to Categories 1-4

• Assessment Methodology: We recommend the methodology section include a general statement that the interpretations described are consistent with NDDoH's interpretations of their water quality standards.

• Category 4a: The following waters are listed as category 4a (from the ADB files we reviewed): Mirror Lake and Flat Creek. We don't have any records of approving TMDLs for these waterbodies. They should be in another applicable category unless a category 4a listing can be justified.

• Category 4b: Yellowstone River appeared in our ADB query as a category 4b listing. Please check to see if this is an error. We are not aware of any actions that would qualify this waterbody for a category 4b listing.

• Category 4c: Our ADB query shows 18 category 4c waterbody listings. Many of these show the cause as "physical substrate habitat alterations." Could these be related to a sediment imbalance? If they are related to a sediment impairment the waterbody should be listed in category 5. Also, please clarify what the "fishes bioassessments" cause means. If there is a biological impairment, but the specific pollutant is unknown it should be included in category 5.

• Pages I-14 and I-16, Table I-5: Two different table I-5's appear in the document. It seems that the second Table should be Table I-6. In addition, both Table I-3f and I-5 show "Fish IBI Score" in the first column. It seems that Table I-5 should be "Macroinvertebrates" in the first column.

Comments Related to Category 5

• Page I-4, Part I.D, Sufficient and Credible Data Requirements: 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. In our comments on the 2004 listing methodology we recommended that NDDoH develop criterion for making overwhelming evidence determinations using small data sets for the 2006 listing cycle. The current example of how it might be applied is insufficient. Colorado, Montana and Utah have developed overwhelming evidence criterion for small data sets which could be used as a guide for North Dakota.

Colorado's criteria are contained in the following two paragraphs which are quoted from their 2006 methodology:

> Sample size: Data sets comprised of three or fewer samples that indicate impairment of the chronic standard will result in placement on the M&E list. Data sets comprised of four to ten samples where there is overwhelming evidence of non-attainment of data is supported by biological or physical evidence indicating non-attainment, or data sets of more than ten samples

indicating any degree of non-attainment, will result in inclusion on the 303(d) list unless it is determined that the data is not representative (see paragraph below).

Overwhelming Evidence: Overwhelming evidence consists of sufficient and credible data that clearly demonstrate that a water body's designated beneficial uses are impaired. Overwhelming evidence is demonstrated when representative data (data that accounts for temporal and spatial variation) indicates an exceedance of numeric water quality standards by more than 50 percent in magnitude or frequency.

We also note that NDDoH's 2004 assessment methodology stated "Water column chemical data were 10 years old or less for rivers and streams and 12 years or less for lakes, unless there was adequate justification to use older data..." The 2006 assessment methodology has adjusted this requirement to reflect "water column data were 12 years or less for rivers and streams and 14 years or less for lakes". This represents an incremental increase from the last reporting cycle. The State should describe the reason for this change in the methodology. NDDoH should consider creating a monitoring and evaluation list to collect new data for those waterbodies with old data.

• Page II-23, Powers Lake watershed listing: We commend NDDoH for having such a through accounting for nearly all waters on the 2004 list. However, we noticed that the Powers Lake watershed (ND-10110101-013-S_00) fecal coliform listing from 2004 is missing from the 2006 303(d) list. Please add it back to the list or provide adequate justification for delisting the waterbody.

• Pages II-36 to II-39, Table II-5, Delisted Waters: Several waterbodies have been proposed for delisting for total fecal coliform based on a lack of sufficient data (i.e., less than 5 samples collected during any calendar month from May through September). As noted above, NDDoH needs to develop defensible overwhelming evidence criteria for these small data sets and apply that criteria to these fecal coliform listings. For each waterbody being proposed for delisting based on lack of sufficient data, we would like to know how many of the samples exceeded the water quality standard and the maximum value, or be given the opportunity to review the data.

• Page II-36, Table II-5, Delisted Waters: The Souris River, Turtle River (two segments) and the Yellowstone River are proposed for delisting for metals. The Souris rationale simply states that the "analysis do not support the 2004 listing for metals." Is that because there was < 1 exceedance of acute or chronic standards in any 3 year period? If so, we recommend that the rationale be revised to reflect that. In all instances we are curious why these waterbodies were included on past 303(d) lists if data showed no exceedances.

• Pages II-36 and II-37, Table II-5, Delisted Waters: Three segments of the Park River are being proposed for delisting for sediment/siltatation, TDS and organic enrichment. The rationale for delisting these segments says that data do not support listings. There needs to be a more explicit

explanation given for these delistings. What data is available and what methodology was used to draw these conclusions?

• Public Notice: Please provide a description of the circulation for the public notice (i.e., name of newspaper(s)), and a summary of other contacts that received the notice. The final IR should include a response to comments section that includes the comments and NDDoH's response in order to demonstrate how the public comments were considered in the final decisions.

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850 • 701-328-2750
TDD 701-328-2750 • FAX 701-328-3696 • INTERNET: http://www.swc.state.nd.us/

RECEIVED
APR 05 2006
DIV. OF WATER QUALITY

Water Appropriation Division
(701) 328-2754

April 4, 2006

Mr. Dennis Fewless, Director
Division of Water Quality
Environmental Health Section
ND Department of Health
918 E Divide Ave
Bismarck, ND 58501-1947

Dear Mr. Fewless:

Enclosed please find comments prepared by Mr. William Schuh, Hydrologist, Water Appropriation Division, after reviewing the draft report entitled, "North Dakota 2006 Section 303 (d) List of Waters Needing Total Maximum Daily Loads". If you have any questions regarding Mr. Schuh's comments please contact him at our office.

Sincerely,

Robert Shaver
Director, Water Appropriation Division

RS:kh

Memorandum

To: Dale Frink, through Bob Shaver

From: W.M. Schuh

RE: Review of North Dakota 2006 Section 303(d) List of Waters Needing Total Maximum Daily Loads

Date: 3/27/06

The document "North Dakota 2006 Section 303(d) List of Waters Needing Total Maximum Daily Loads", dated march 3, 2006 and provided for comment, consists of two parts: (1) an description of "Assessment Methodology", and (2) a list and description of Section 303(d) waters. The document is primarily methodological and does not contain an intrinsic regulatory framework or, to the best of my estimation any major alteration of the current state Administrative Rules.

A multiple classification system and methods of assessment within those criteria are described. It appears that care has been taken to describe the methods used and their limitations in some detail.

Some concerns are:

(1) Because these assessments will be used as regulatory criteria within the federal framework, proper care in achieving an accurate assessment is critical. This is a difficult task in a region where climatic variability and natural reservoirs of chemical substances can cause large shifts in water quantity and quality. A classification formed during a favorable period could result in unreasonable hardship for water users when natural levels of regulated substances increase. An example would be recent shifts in salt concentrations delivered to the Sheyenne River caused by high water tables. Similarly, one might expect natural fluctuations in biological communities caused by natural changes in the hydrologic environment.

Given limited funding for expensive assessment, and recognizing that the Health Department is charged with this formidable task and must start somewhere, I believe that a flexible and adjustable framework, which can be adapted to ongoing data acquisition and to fact-based challenge is critical. I believe that reasonable efforts are being made in

this direction as exemplified by: (1) the Section titled "Sufficient and Credible Data Requirements" ; (2) clear efforts toward full disclosure of methods and limitations in the document; and particularly (3) in the section describing inclusion of 303(d) water bodies on page II-2.

> "this Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDs, and waterbodies that have been removed from the 2004 list. Reasons for removing a water body from the 2004 list include (1) a TMDL has been completed for the waterbody and approved by EPA; (2) current data and/or information suggest that the waterbody is now meeting water quality standards; (3) current data and/or information used to list the waterbody as water quality limited has been determined to be insufficient and/or of poor quality; (4) the assessment was made based on best professional judgment; (5) the cause of the use impairment was related to a pollutant for which there is not clearly defined or scientifically defensible chemical criteria; or (6) the water quality impairment is not due to a pollutant.

This section assures that classification is not a "one-time" and "one-way" designation, but a fluid process that can be challenged on the basis of various factual criteria. The only remaining concern is that the Department itself not apply this as a strictly internal matter, but maintain an open structure for input and evidence from other agencies and parties.

(2) From the standpoint of water appropriation and non-polluting water users, there is concern that changes in water pollution caused by water withdrawal in and of itself, would be considered and regulated on the basis of TMDL's. In such a case a downstream non polluting user could be prohibited from using water in lieu of restricting discharge by an upstream pollution source, natural or manmade. This would cause severe problems in meeting water needs of the state.

I find nothing in the document explicitly stating that water withdrawal is in itself a criterion of the TMDL classifications. To the contrary, at statement on page II-1:

> "Waterbodies impaired by habitat and flow alteration and the introduction of exotic species would not be included in the Section 303(d) TMDL list, as these impairment categories would be considered pollution and not pollutants. In other words all pollutants are pollution, but not all pollution is a pollutant."

Here it is explicitly stated that water use would not be considered in designating a stream as impaired under Section 303(d).

While this is encouraging, I am concerned about considering water withdrawal to be pollution. The exotic species example has validity. But the water-use inclusion is not at all similar, and labeling withdrawal in an of itself to be or cause pollution is not reasonable or correct. I suggest modifying the statement to:

"Waterbodies impaired by habitat and flow alteration and the introduction of exotic species would not be included in the Section 303(d) TMDL list, as these impairment categories would (not) be considered (pollutants). Introduced exotic species would be considered pollution, but not pollutants. In other words all pollutants are pollution, but not all pollution is a pollutant."

Thus excluding the reference to non contaminating users as pollution by virtue of use alone.

Other than these comments and concerns, the document indicates reasonable care for an appropriate and realistic process of designation.

Red River Basin Commission

Manitoba • Minnesota • North Dakota • South Dakota
RRBC • 119 5th St. S. • PO Box 66 • Moorhead, MN 56561-0066
Phone 218-291-0422 • FAX 218-291-0438 • staff@redriverbasincommission.org
RRBC • 410-283 Bannatyne Ave. • Winnipeg, MB R3B 3B2
Phone 204-982-7250 • FAX 204-982-7255 • redriverbasincommission@shawcable.com
www.redriverbasincommission.org

BOARD OF DIRECTORS
EXECUTIVE COMMITTEE
Daniel Wilkens, MN *Chair*
Tom Fischer, ND *Vice Chair*
Herm Martens, MB *Sec./Treas.*
Joe Belford, ND
John Finney, MN
Bruce Furness, ND Ex Officio
R.S. "Bud" Oliver, MB Ex Officio
Riley Rogers, ND
Sam Schellenberg, MB
Mike Shkolny MB
MANITOBA
Brian Charles
Lindy Clubb
Dave Gera
Herm Martens
Don Norquay
R.S. "Bud" Oliver
Bill Paulishyn
Sam Schellenberg
Mike Shkolny
Muriel Smith
Steve Topping
Larry Whitney
MINNESOTA
Sheryl Corrigan
Jerry Dahl
Jon Evert
John Finney
Ron Harnack
Gene Merriam
Don Osborne
Bill Schwandt
Warren Seykora
Henry Van Offelen
Daniel Wilkens
NORTH DAKOTA
Joe Belford
Tom Fischer
Dale Frink
Bruce Furness
Dave Glatt
Jake Gust
Riley Rogers
Fred Stark
Genevieve Thompson
Constance Triplett
Ben Varnson
SOUTH DAKOTA
Eddie Madsen
TRIBAL
Melissa Hotain
Allen Pemberton
FEDERAL EX OFFICIO
Judith DesHarnais
Jim Tokarchuk
FEDERAL ELECTED EX OFFICIO
Sen. Coleman
Sen. Conrad - Scott Stofferahn
Sen. Dayton - Valerie Gravseth
Sen. Dorgan - Pam Gulleson
Rep. Peterson - Maynard Pick
Rep. Pomeroy - Joan Carlson

April 4, 2006

RECEIVED
APR 06 2006
DIV. OF WATER QUALITY

Mike Ell
ND Dept. of Health
918 E. Divide Ave.
Bismarck, ND
58501-1947

Dear Mike,

The Red River Basin Commission received the "2006 303(d), List of Waters needing Total Maximum Daily Load" to review. The following comments reflect the review of that document.

The Red River Basin Commission is supportive of the efforts that the Department of Health is undertaking in regards to enhancing water quality in the Red River Basin. The report was reviewed by RRBC staff using the Natural Resources Framework Plan (NRFP) as a guideline. The 13 Goals within the NRFP were derived, in part, by the efforts of many basin stakeholders, whose objective was to develop a basin vision that would **unify** all groups to implement land and water stewardship actions **within the basin**.

The NRFP Goal and objectives call for "maintaining, protecting and restoring surface and ground water quality in the Red River Basin. Specifically an objective under Goal 9 is to reduce nutrient loading to Lake Winnipeg by 10%. Phosphorus and nitrogen are the two nutrients that have shown general upward loading over the last 30 years in the Red River as it enters the Canada. Lake Winnipeg is showing the effects of nutrient loading with toxic blue-green algae blooms occurring annually. We encourage all basin stakeholders to reduce sediment, phosphorus and nitrogen loads in the tributaries that feed into the Red River. We encourage all basin stakeholders to review their actions from the most simple, such as decreasing the use of phosphate containing cleaning products, to the most complex, and determine where they can share the burden in reducing the impacts to their downstream neighbors.

The Red River Basin Commission supports the identification of sediment loading and the implementation of strategies to curtail sediment and its associated nutrient impairments. The Red River Basin Commission would encourage the State to work with the neighboring states of South Dakota and Minnesota, whose waters may impact North Dakota waters to implement cross-jurisdiction monitoring and implementation of programs to enhance the water quality in the Red River. The RRBC also supports the efforts of the Department to work with local jurisdictions, as they have been, with implementing 319 programs to enhance water quality in the Basin.

The Red River Basin Commission supports the Department of Health in its implementation of their Water Quality Programs and looks forward to continued working relationship.

Sincerely,

Lance Yohe

Lance Yohe
Executive Director

Ell, Mike J.

From: Kelly McPhillips [KMcPhillips@gp.usbr.gov]
Sent: Wednesday, April 05, 2006 7:48 AM
To: Ell, Mike J.
Cc: Allen Schlag; Gregory Gere; Gregory Hiemenz; Joseph Hall; Ronald Melhouse; Richard Nelson; Signe Snortland
Subject: Re:Draft March 3 - North Dakota 2006 Section 303(d) List ofWaters Needing Total Maximum Daily Loads

Michael Ell,

Reclamation staff from Dakota's Area Office, Bismarck, North Dakota have reviewed the Draft document and have no comment at this time. Thank you for the opportunity to review the document.

Kelly McPhillips
Environmental Specialist
Bureau of Reclamation
Dakotas Area Office
Bismarck, ND
701-250-4242 ext 3606

Ell, Mike J.

From: Jensen, David E NWO [David.E.Jensen@nwo02.usace.army.mil]
Sent: Friday, April 07, 2006 10:01 AM
To: Ell, Mike J.
Subject: Comments and Information Regarding Draft 2006 303(d) List
Attachments: 2006SAP-AMB-MAINST-003.pdf; 2006SAP-AMB-PWRPLT-003.pdf; 2006SAP-AMB-MSANCL-001.pdf

Dear Mr. Ell,
I didn't receive a copy of North Dakota's draft 303(d) list with enough lead time to meet the 5 April 2006 commenting deadline. I'm providing these comments for your consideration to the extent you can and for information sharing to let you know what the Corps is planning regarding water quality monitoring and modeling at Lake Sakakawea.

The Corps conducted "intensive water quality surveys" at Lake Sakakawea during the 3-year period of 2003-2005. A final draft report evaluating this monitoring was prepared and has been provided to the State of North Dakota (Mr. Michael Sauer of your Agency should have received a copy by email). A report evaluating the short-term water quality management measures that were implemented at Garrison Dam during last summer is also planned. The State of North Dakota has agreed to help assist us in developing this report which will hopefully be completed this summer. The Corps is also planning to continue to monitor water quality at Lake Sakakawea, Garrison Dam, and Lake Audubon during 2006. I have attached final drafts of Sampling and Analysis Plans that will cover these efforts. Please let me know if you see any opportunities to cooperate/coordinate this monitoring with monitoring that is being planned by the State of North Dakota.

We are continuing to apply the CE-QUAL-W2 hydrodynamic and water quality model to Lake Sakakawea. Accounting for the lake bathymetry near the dam (i.e., submerged intake channel) has slowed this effort somewhat, but we hope to have a "first-cut" of a model done by the end of the year that can predict temperature and dissolved oxygen levels in the lake and evaluate nutrient loadings. Application of the CE-QUAL-W2 model to Lake Sakakawea should be a useful tool to evaluate the temperature and dissolved oxygen concerns at Lake Sakakawea and what may be causing these conditions, and should help to address whether nutrient loading to the lake is a factor that needs to be controlled through development of a TMDL. This model may also help address whether the temperature and dissolved oxygen situation can be attributed to low pool levels resulting from the ongoing drought or impacted by the bottom withdrawal at Garrison Dam. This will also provide your state valuable information concerning whether a TMDL needs to be developed for Lake Sakakawea, and whether it would be appropriate for your state to place Lake Sakakawea within category 4C of the State's 303(d) list.

Again, thank you for allowing us to comment on the draft North Dakota 2006 Section 303(d) List. If you have any questions or suggestions regarding planned water quality monitoring at Lake Sakakawea, Lake Audubon, and Garrison Dam, or regarding other issues involving the Corps of Engineers in North Dakota, please us know.

Dave Jensen
Team Leader, Water Quality
USACE, Omaha District
Omaha, Nebraska 68102
(402)-221-4622

<<2006SAP-AMB-MAINST-003.pdf>> <<2006SAP-AMB-PWRPLT-003.pdf>> <<2006SAP-AMB-MSANCL-001.pdf>>

North Dakota Department o Health
Response to Comments on the Draft 2006 Integrated Report

North Dakota State Water Commission

Comment:
The State Water Commission raised concerns with the Department including water withdrawl as pollution and suggested changes to language in Part VI, page VI-1 (paragraph 4) that excludes references to habitat and flow alteration as pollution.

Department's Response:
NDCC 61-28 defines "pollution" as "the manmade or man-induced alteration of the physical, chemical, biological, or radiological integrity of any waters of the state." This definition is reaffirmed in the state's water quality standards (ND Administrative Code Chapter 33-16-02.1). While flow alteration, including flow alteration caused by water appropriation, would not necessarily be pollution in and of itself. It would be pollution if it were causing an alteration of the physical, chemical, biological, or radiological integrity of the stream and that alteration was known to be causing an impairment to the stream's beneficial uses (i.e., fish and other aquatic biota).

US Environmental Protection Agency

Comments Related to Categories 1-4

Comment:
Assessment Methodology: We recommend the methodology section include a general statement that the interpretations described are consistent with NDDoH's interpretations of their water quality standards.

Department Response:
Language has been added. See Part IV.B. "Assessment Methodology", Chapter 1. "Intrduction".

Comment:
Category 4a: The following waters are listed as category 4a (from the ADB files we reviewed): Mirror Lake and Flat Creek. We don't have any records of approving TMDLs for these waterbodies. They should be in another applicable category unless a category 4a listing can be justified.

Department Response:
Mirror Lake and Flat Creek, a tributary to Mirror Lake was originally listed on the state's Section 303(d) list in 1996. Based on a Section 319 watershed Project Implementation Plan (PIP) for the Mirror Lake watershed that was submitted and approved by EPA in December 1997, these two waterbodies were included in the 1998 Section 303(d) TMDL submittal as waterbodies that should be de-listed due to the completion of a TMDL. While the Mirror Lake Watershed PIP was submitted and approved by EPA, a TMDL was never approved. Therefore, these two waterbodies have been added to the 2006 Section 303(d) list of impaired waters

needing a TMDL. These two waterbodies have been listed as priority 1A meaning a TMDL is scheduled for completion in the next two years.

Comment:
Category 4b: Yellowstone River appeared in our ADB query as a category 4b listing. Please check to see if this is an error. We are not aware of any actions that would qualify this waterbody for a category 4b listing.

Department Response:
The listing of the Yellowstone River as category 4B was an error in the ADB. With the de-listing for trace metals and pesticides this AU is now category 4C. The AU is assessed as fully supporting, but threatened for aquatic life use due to habitat alteration which is not a pollutant.

Comment:
Category 4c: Our ADB query shows 18 category 4c waterbody listings. Many of these show the cause as "physical substrate habitat alterations." Could these be related to a sediment imbalance? If they are related to a sediment impairment the waterbody should be listed in category 5. Also, please clarify what the "fishes bioassessments" cause means. If there is a biological impairment, but the specific pollutant is unknown it should be included in category 5.

Department Response:
The ADB currently contain 14 Assessment Units (AUs) that are category 4C. All of these these listing are related to habitat and/or flow alteration cause categories. While the Pembina River (ND-09020313-023-S) was assigned to category 4C in the ADB, it was in fact listed in the draft TMDL list due to biological indicators. This was related to a fish community assessment IBI score with a "fair" ranking. All tables and narrative language in the final report have been changed to reflect the category change.

While physical habitat alterations may be a result of sedimentation or result in sedimentation, there are no data or information to indicate sediment problems associated with these category 4C waterbodies. These AUs, therefore, will remain assessed as either fully supporting, but threatened or not supporting aquatic life use and the cause will only be habitat alteration.

Comment:
Pages I-14 and I-16, Table I-5: Two different table I-5's appear in the document. It seems that the second Table should be Table I-6. In addition, both Table I-3f and I-5 show "Fish IBI Score" in the first column. It seems that Table I-5 should be "Macroinvertebrates" in the first column.

Department Response:
Changes made to final report.

Comments Related to Category 5

Comment:
Page I-4, Part I.D, Sufficient and Credible Data Requirements: 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. In our comments on the 2004 listing methodology we recommended that NDDoH develop criterion for making overwhelming evidence determinations using small data sets for the 2006 listing cycle. The current example of how it might be applied is insufficient. Colorado, Montana and Utah have developed overwhelming evidence criterion for small data sets which could be used as a guide for North Dakota.

Colorado's criteria are contained in the following two paragraphs which are quoted from their 2006 methodology:

> Sample size: Data sets comprised of three or fewer samples that indicate impairment of the chronic standard will result in placement on the M&E list. Data sets comprised of four to ten samples where there is overwhelming evidence of non-attainment of data is supported by biological or physical evidence indicating non-attainment, or data sets of more than ten samples indicating any degree of non-attainment, will result in inclusion on the 303(d) list unless it is determined that the data is not representative (see paragraph below).
>
> Overwhelming Evidence: Overwhelming evidence consists of sufficient and credible data that clearly demonstrate that a water body's designated beneficial uses are impaired. Overwhelming evidence is demonstrated when representative data (data that accounts for temporal and spatial variation) indicates an exceedance of numeric water quality standards by more than 50 percent in magnitude or frequency.

Department Response:
Additional language has been added to Part IV. D. "Sufficient and Credible Data Requirements" to more fully describe how the Department deals with small sample sizes and overwhelming evidence.

Comment:
We also note that NDDoH's 2004 assessment methodology stated "Water column chemical data were 10 years old or less for rivers and streams and 12 years or less for lakes, unless there was adequate justification to use older data…" The 2006 assessment methodology has adjusted this requirement to reflect "water column data were 12 years or less for rivers and streams and 14 years or less for lakes". This represents an incremental increase from the last reporting cycle. The State should describe the reason for this change in the methodology. NDDoH should consider creating a monitoring and evaluation list to collect new data for those waterbodies with old data.

Department Response:
The increase, by two year, in the Department's sufficient and credible data requirements is logical since the last report was two years ago. Any change in this requirement would exclude data used in previous assessments.

Comment:
Page II-23, Powers Lake watershed listing: We commend NDDoH for having such a through accounting for nearly all waters on the 2004 list. However, we noticed that the Powers Lake watershed (ND-10110101-013-S_00) fecal coliform listing from 2004 is missing from the 2006 303(d) list. Please add it back to the list or provide adequate justification for delisting the waterbody.

Department Response:
Powers Lake watershed (ND-10110101-013-S) was included in Table VI-5. 2004 Section 303(d) TMDL Waters in the State Which Have Been De-Listed for 2006. The rationale for de-listing is as follows: "Current data show that the water quality standard is being met. Based on 73 fecal coliform samples collected from sites in the Powers Lake watershed in 2000 and 2001, the fecal coliform standard of 200 colonies per 100 ml (expressed as a monthly geometric mean) is not exceeded. Nor do more than 10 % of monthly samples exceed 400 colonies per 100 ml."

Comment:
Pages II-36 to II-39, Table II-5, De-listed Waters: Several waterbodies have been proposed for delisting for total fecal coliform based on a lack of sufficient data (i.e., less than 5 samples collected during any calendar month from May through September). As noted above, NDDoH needs to develop defensible overwhelming evidence criteria for these small data sets and apply that criteria to these fecal coliform listings. For each waterbody being proposed for delisting based on lack of sufficient data, we would like to know how many of the samples exceeded the water quality standard and the maximum value, or be given the opportunity to review the data.

Department Response:
Additional language has been added to the de-listing rationale for the waterbodies that the Department proposes to de-list for total fecal coliform based on a lack of sufficient data (i.e., less than 5 samples collected during any calendar month from May through September). One AU, Plum Creek, including tributaries (ND-10130205-021-S), was added back into the TMDL list based on the Department's overwhelming evidence criteria for fecal coliform bacteria data.

Comment:
Page II-36, Table II-5, De-listed Waters: The Souris River, Turtle River (two segments) and the Yellowstone River are proposed for delisting for metals. The Souris rationale simply states that the "analysis do not support the 2004 listing for metals." Is that because there was < 1 exceedance of acute or chronic standards in any 3 year period? If so, we recommend that the rationale be revised to reflect that. In all instances we are curious why these waterbodies were included on past 303(d) lists if data showed no exceedances.

Department Response:
Additional language has been added to the de-listing rationale for the Souris River segment (ND-09010001-001-S).

Comment:
Pages II-36 and II-37, Table II-5, De-listed Waters: Three segments of the Park River are being proposed for delisting for sediment/siltation, TDS and organic enrichment. The rationale for

delisting these segments says that data do not support listings. There needs to be a more explicit explanation given for these de-listings. What data is available and what methodology was used to draw these conclusions?

Department Response:
Additional language has been provided in the de-listing rationale for these three Park River AUs.

Comment:
Public Notice: Please provide a description of the circulation for the public notice (i.e., name of newspaper(s)), and a summary of other contacts that received the notice. The final IR should include a response to comments section that includes the comments and NDDoH's response in order to demonstrate how the public comments were considered in the final decisions.

Department Response:
The names of the newspapers were added as well as a description of whom the draft report was sent to for comment. A copy of the public comments and the Department's response to comments is provided in Appendix G of the final Integrated Report.