# North Dakota 2010 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads

**Submitted to the US EPA**
**March 24, 2010**

**Approved**
**April 23, 2010**

NORTH DAKOTA
DEPARTMENT *of* HEALTH

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
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APR 23 2010

Ref: 8EPR-EP

Dennis Fewless, Director
North Dakota Department of Health
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947

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

Dear Mr. Fewless:

Thank you for your submittal of the North Dakota Department of Health's 2010 Water Quality Integrated Report (IR) dated March 24th, 2010. The Environmental Protection Agency Region 8 (EPA) has conducted a complete review of the Clean Water Act (CWA) Section 303(d) waterbody list (Section 303(d) list) and supporting documentation and information. EPA has determined that North Dakota's 2010 Section 303(d) list meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations and approves North Dakota's 2010 Section 303(d) list.

The enclosure describes, in detail, the statutory and regulatory requirements and a summary of EPA's review of North Dakota's compliance with each requirement. We appreciate your work to produce North Dakota's 2010 Section 303(d) list. If you have questions, the most knowledgeable EPA staff person is Kris Jensen and she may be reached at (303) 312-6237.

Sincerely,

Martin Hestmark

for Eddie Sierra
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

# North Dakota 2010 Integrated
# Section 305(b) Water Quality Assessment Report and
# Section 303(d) List of Waters Needing
# Total Maximum Daily Loads

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**Cover Photograph**

Twenty-two teams of canoers, kayakers, and hydrobikers participated in River Keepers' 18th Annual Race the Red canoe and kayak races which began at Lindenwood Park in Fargo, ND. The photo is courtesy of River Keepers, a non-profit organization established in 1990 to protect and preserve the integrity and natural environment of the Red River of the North in the F-M area.

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## 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 2008-2009. 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 248 public lakes and reservoirs. Of the 248 public lakes and reservoirs recognized as public waters and included in the Assessment Database (ADB), only 196 are included in the state's water quality standards as classified lakes and therefore are assigned designated beneficial uses. The remaining 52 lakes and reservoirs, while included in the state's estimate of total lake acres, are not classified and therefore were not assessed for this report. Based on the state's Assessment Database (ADB), the 138 reservoirs have an areal surface of 543,168 acres. Reservoirs comprise about 71 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 63 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 138 reservoirs share 62,436 acres, with an average surface area of 449 acres. The 108 natural lakes in North Dakota cover 218,518 acres, with approximately 117,697 acres or 54 percent attributed to Devils Lake. The remaining 107 lakes average 942 acres, with half being smaller than 250 acres. There are an estimated 54,606 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 2010 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-six percent (4,645 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 less than 50 percent (2,316 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 14 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 6,987 miles of rivers and streams in the state.  Recreation use was fully supporting, fully supporting but threatened and not supporting on 1,489 miles, 3,689 miles and 1,809 miles, respectively.  Fecal coliform and/or E. coli 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 and E. coli 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 5,558 miles of rivers and streams in the state.  Of the 2,123 miles assessed for this report, only 86 miles (4 percent) were assessed as threatened for drinking water supply use.  The primary threats are taste and odor problems.

A total of 4,093 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 ($\mu$g) 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 196 lakes and reservoirs, representing 700,259 surface acres, were assessed for this report.  The remaining 52 lakes and reservoirs, included in the ADB but not assessed, represent 61,427 acres or only 8.1 percent of the total lake and reservoir acres in the state.  One-hundred-twenty-two (122) lakes and reservoirs, representing 686,108 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, 28 lakes and reservoirs, representing 7,957 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.  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.  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.

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 686,243 lake and reservoir acres in the state. Of this total, two (2) lakes, representing 5,547 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 were described earlier. Thirty-six (36) lakes and reservoirs, totaling 134,948 acres, were assessed as threatened.

One-hundred and ninety-five (195) lakes and reservoirs, representing 699,373 acres, were assigned the use for fish consumption. Of the 195 lakes and reservoirs entered into the ADB and assigned a use for fish consumption, only Devils Lake, Lake Sakakawea, Lake Oahe, Lake Tschida, and Nelson Lake had sufficient methyl-mercury fish tissue data and fish population survey data necessary to calculate average concentrations and to assess fish consumption use. Based on these data and the EPA recommended fish tissue criterion for methylmercury of 0.3 µg/g, Lake Sakakawea, Devils Lake, and Lake Tschida were assessed as not supporting fish consumption use, while Lake Oahe and Nelson Lake were assessed as fully supporting fish consumption use. The remaining 190 lakes and reservoirs that support a sport fishery were not assessed for this report. Potential sources of mercury include natural sources and atmospheric deposition.

Five reservoirs (Lake Sakakawea, Lake Ashtabula, 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 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 two-tiered priority ranking. Assessment units (AUs) listed as “High” priority are: (1) 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; or (2) 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 “High” priority 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. “Low” priority AUs are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next eight years.

The 2010 TMDL list is represented by 214 AUs (26 lakes and reservoirs and 188 river and stream segments) and 337 individual waterbody/pollutant combinations. For purposes of TMDL development, each waterbody/pollutant combination requires a TMDL. Of this total, the department has targeted 65 waterbodies or 74 waterbody/pollutant combinations for completion in the next three years. These “High” priority waterbody/pollutant combinations are AUs for which the monitoring is either completed, near completion or has recently been initiated. Based on the department’s TMDL development “Pace” commitment, it is anticipated that TMDLs will be completed at a rate of approximately 26 additional waterbody/pollutant combinations per year following 2012. 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 2008-2009. 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 August 4, 2008 and was approved by EPA on September 29, 2008.

This Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDLs and waterbodies which have been removed from the 2008 list.  Reasons for removing a waterbody from the 2008 list include: (1) a TMDL was completed for the waterbody/pollutant combination; (2) the applicable water quality standard is now attained and/or the original basis for the listing was incorrect; (3) the applicable water quality standard is now attained due to a change in the water quality standard and/or assessment methodology; (4) the applicable water quality standard is now attained due to restoration activities; or (5) sufficient data and/or information lacking to determine water quality status and/or the original basis for listing was incorrect.

## PART III. BACKGROUND

### A. Atlas

### Table III-1. Atlas

| Topic | Value |
|---|---|
| State Population[1] | 639,715 |
| State Surface Area (Sq. Miles) | 70,700 |
| Total Miles of Rivers and Streams[2] | 54,606.23 |
| Total Miles of Rivers and Streams by Stream Class[3] | |
| Class I, IA and II Streams | 5,971.24 |
| Class III Streams | 48,634.99 |
| Total Miles of Rivers and Streams by Basin | |
| Red River (including Devils Lake) | 11,990.13 |
| Souris River | 3,670.18 |
| Upper Missouri (Lake Sakakawea) | 13,877.43 |
| Lower Missouri (Lake Oahe) | 22,276.60 |
| James River | 2,791.89 |
| Border Miles of Shared Rivers and Streams[4] | 429.84 |
| Total Number of Lakes and Reservoirs[5] | 248 |
| Number of Natural Lakes | 108 |
| Number of Manmade Reservoirs | 140 |
| Total Acres of Lakes and Reservoirs | 761,685.83 |
| Acres of Natural Lakes | 218,518.15 |
| Acres of Manmade Reservoirs[6] | 543,167.68 |
| Total Acres of Lakes and Reservoirs by Lake Class[7] | |
| Class 1 | 481,730.59 |
| Class 2 | 62,930.97 |
| Class 3 | 145,602.15 |
| Class 4 | 9,096.70 |
| Class 5 | 885.30 |
| Unclassified | 61,427.12 |
| Acres of Freshwater Wetlands[8] | 2,500,000 |

[1] Based on U.S. Census Bureau estimates provided on July 1, 2007
[2] Total miles are based on rivers and streams entered into the Assessment Database (ADB) and reach indexed to the 1:100,000 scale National Hydrography Dataset (NHD).
[3] Stream classes are defined in the *Standards of Quality for Waters of the State* (North Dakota Department of Health, 2006). 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 ADB.
[6] Estimates based on surface acreage at full pool elevation.
[7] Lake and reservoir classes are defined in the *Standards of Quality for Waters of the State* (North Dakota Department of Health, 2006).
[8] 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 248 public lakes and reservoirs. Of the 248 public lakes and reservoirs recognized as public waters and included in the Assessment Database (ADB), only 196 are included in the state's water quality standards as classified lakes and therefore are assigned designated beneficial uses (Table III-1). The remaining 52 lakes and reservoirs, while included in the state's estimate of total lake acres, are not classified and therefore were not assessed for this report.

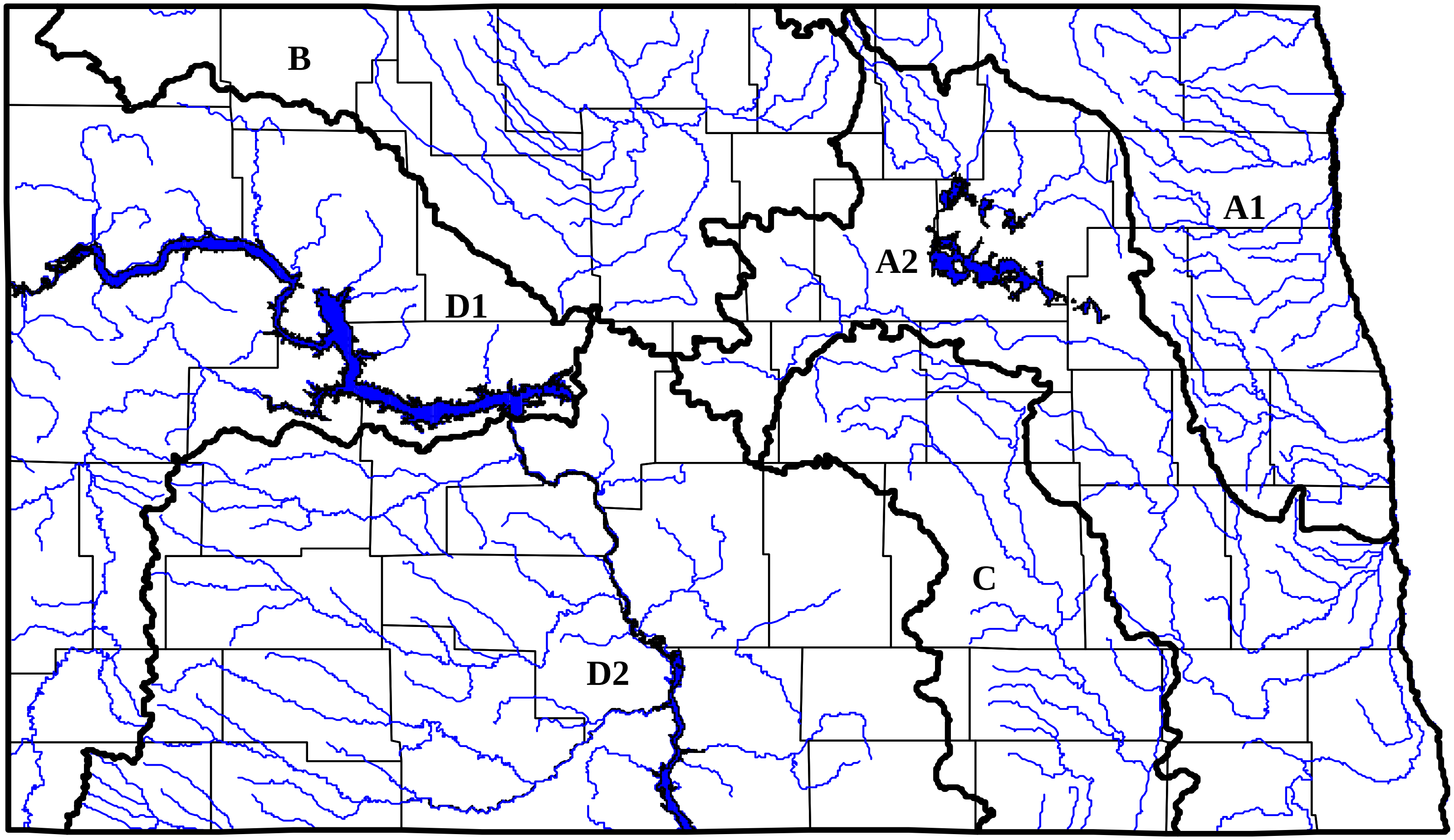
Of the 248 public lakes and reservoirs included in the ADB, there are 140 manmade reservoirs and 108 natural lakes. All lakes and reservoirs included in this assessment are considered significantly publicly owned. Reservoirs are defined as waterbodies formed as a result of dams or dugouts constructed 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 (ADB), the 140 reservoirs have an areal surface of 543,168 acres. Reservoirs comprise about 71 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 63 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 138 reservoirs share 62,436 acres, with an average surface area of 449 acres.

The 108 natural lakes in North Dakota cover 218,518 acres, with approximately 117,697 acres[1] or 54 percent attributed to Devils Lake. The remaining 107 lakes average 942 acres, with half being smaller than 250 acres.

There are an estimated 54,606 miles of rivers and streams in the state. Estimates of river stream miles in the state are based on rivers and streams entered into the ADB and reach indexed to the 1:100,000 scale National Hydrography Dataset (NHD).

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.

[1] The estimated surface area for Devils Lake is based on a lake elevation of 1446 mean sea level (msl), which is the elevation at which water overflows to Stump Lake.




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

State water quality 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 surface water resources 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.

Water quality standards also 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 water quality standards also contain general conditions, termed "narrative standards," 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 has also developed a narrative biological goal for all waters of the state. The goal is to restore all surface waters to a condition similar to that of 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 aquatic life 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.

In addition to numeric and narrative standards and the beneficial uses they protect, a third element of water quality standards is antidegradation. The fundamental concept of antidegradation is the protection of waterbodies which currently have better water quality than applicable standards. Antidegradation policies and procedures are in place to maintain high quality water resources and prevent them from being degraded to the level of water quality standards.

State water quality standards have established three categories or tiers of antidegradation protection. Category 1 is a very high level of protection and automatically applies to all Class I and IA rivers and streams, all Class 1, 2 and 3 lakes and reservoirs, and wetlands that are functioning at their optimal level. Category 1 may also apply to some Class II and III rivers and streams, but only if it can be demonstrated that there is remaining pollutant assimilative capacity, and both aquatic life and recreation uses are currently being supported. Category 2 antidegradation protection applies to Class 4 and 5 lakes and reservoirs and to Class II and III rivers and streams not meeting the criteria for Category 1. Category 3 is the highest level of protection and is reserved for Outstanding State Resource Waters. Waterbodies may only be designated Category 3 after they have been determined to have exceptional value for present and future potential for public water supplies, propagation of fish or aquatic biota, wildlife, recreation, agriculture, industry, or other legitimate beneficial uses.

The U.S. EPA requires the department to review and update, as necessary, the state water quality standards based on new information and EPA guidance a minimum of every three years. This process is termed the "triennial review." Issues currently being considered for this review are beneficial use designations for wetlands and associated numeric criteria. Currently, wetlands are considered waters of the state and are protected by general conditions.

The department is also in the process of developing nutrient criteria which are needed to address the eutrophication of the state's surface waters. Excessive nutrients typically manifest themselves as elevated amounts of algae in lakes and reservoirs and as epiphytic algae in streams and rivers. In preparation for the development of nutrient criteria, the department has developed a plan for developing technically defensible nutrient criteria specific to the unique resources of North Dakota. The Nutrient Criteria Development Plan describes the anticipated conceptual approach for developing nutrient water quality criteria. The plan specifically focuses on lotic systems (i.e., small to large wadeable and non-wadeable streams and rivers) and lentic systems (i.e., lakes and reservoirs). The plan is intended to provide clear and meaningful guidance for the development of nutrient criteria within North Dakota. The report does not represent a binding commitment, and modification of the plan will likely be needed as new information becomes available or unanticipated issues arise.

The approach described by the Nutrient Criteria Development Plan has enabled North Dakota to explore in detail the feasibility of implementing various development concepts. The department, through funding provided by EPA Headquarters, is currently performing a pilot project on establishing numeric standards for lentic systems. This project will result in a proposed state-wide classification system for all lake and reservoir systems based on an intensive examination and analysis of database information. The project will identify a major geographic region of the state and assess nutrient criteria for the lakes within that region. Outcomes of the regional assessment will determine what numeric endpoints should be set for different types of lakes and reservoirs (i.e., small versus large water bodies).

## Chapter 2. Point Source Control Program

The department regulates all releases of wastewater from point sources into waters of the state. Point source pollution is defined simply as pollution coming from a specific source, like the end of a pipe. The regulation of all 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/or water quality-based limits for wastewater discharges.

Environmental regulations implemented during the last 30 years have resulted in a significant reduction in pollution from major point sources (e.g., municipal and industrial wastewater treatment facilities). There are approximately 400 facilities (25 percent industrial and 75 percent municipal) that are permitted for discharges of treated wastewater.

Since 1992, permits have been required for stormwater discharges associated with construction and industrial facilities. Permitting stormwater discharges from industrial sites, construction sites and larger municipalities has become a major portion of the NDPDES program. The department has issued four separate general permits for stormwater discharges. The general permits outline requirements for stormwater discharges from construction activities, industrial activities, mining operations, and municipal separate storm sewer systems (MS4's).

The department continues to implement the Stormwater Phase II regulations (effective December 8, 1999) to the maximum extent possible. The federal stormwater regulations have also been incorporated into the state rules. The primary focus in the area of stormwater discharges continues to be meeting the obligations of Phase II of EPA's Stormwater Rule.

There are approximately 397 facilities covered under general permits for stormwater discharges from industrial activities. Included in these general permits are requirements for monitoring and sampling of stormwater discharges. All discharge data is evaluated and used to update the standard pollution prevention practices that are currently used in the state. These facilities must implement pollution prevention plans which are intended to improve the quality of stormwater discharges.

There are approximately 1215 facilities covered for construction stormwater in the state. The permitting procedure for small construction was revised to better address building/construction in subdivisions. Several of the forms and guidance materials for the industrial permit and the construction permit were revised or created to assist permit holders. A stormwater sampling guide was developed and posted on the department's website, and a new construction stormwater pollution prevention plan guide. The department continues to provide stormwater education, including an annual conference on stormwater issues.

The department continues to work with the regulated small MS4s (18) on issues relating to stormwater discharges. The focus of MS4 activity continues to be development/implementation of ordinances or other regulatory mechanisms for local construction site erosion and sediment control and post construction controls. The NDDH provides information on compliance assistance activities and training conducted for permitted small MS4s. The department has developed an audit/inspection plan for Phase II MS4s to ensure that compliance determinations for these systems are completed within the next 6 years.

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 discharging 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 the conditions outlined in 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-5 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 or unnamed drainages 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 annual concentrations of BOD-5 and TSS reported for wastewater discharges in North Dakota. Data used to generate this graph are for the years 1985 through December 2009. The overall trend in the mean annual concentrations of these two pollutants appears to be decreasing, which generally means wastewater treatment systems in the state are doing a good job of operating.

For this reporting period, most of North Dakota returned to normal precipitation, while some of the state received above normal precipitation. This was apparent during the winter of 2008-2009 which produced record snowfall that resulted in extensive flooding throughout the state. The flooding resulted in inflow and infiltration problems statewide. Wastewater treatment and storage problems consisted of bypasses, lagoon overflows, and lagoon inundation. Several communities in the state initiated major improvements to their wastewater collection and treatment systems. 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 Total Maximum Daily Loads (TMDLs) has not been required for point source discharges in North Dakota. TMDL development activity occurs mainly in rural watersheds dealing with nonpoint source pollution issues. There is effective internal coordination during the development of TMDLs and waste load allocation (WLA) requirements in NDPDES permits, and no formal tracking mechanism is required or necessary in the NDPDES Program at this time. For this reporting period, no permits have been modified or reissued to implement WLAs in approved TMDLs. With the cooperation of the cities of Fargo and Moorhead, the department and the Minnesota Pollution Control Agency are in the process of finalizing a bacteria TMDL for the Red River in the Fargo area. The department is also finalizing a low-flow TMDL for the James River near Jamestown. Results of these TMDLs will be used to determine if modifications to NDPDES permits are needed for the cities of Fargo and Jamestown, respectively.

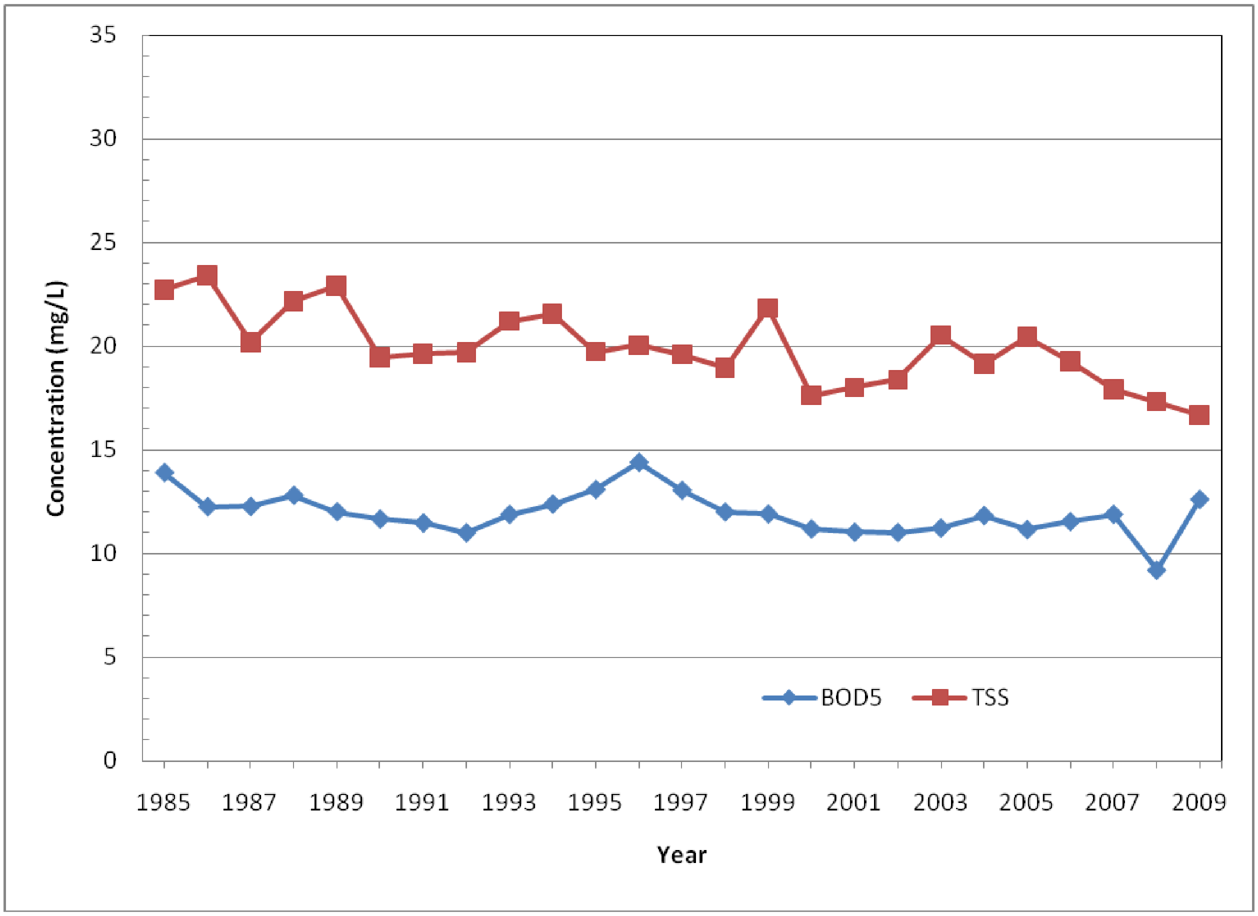



**Figure III-2. Average Annual BOD-5 day and TSS Concentrations Wastewater Discharges in North Dakota (1985-2009).**

Toxic pollutants in wastewater discharges are a concern, particularly for the larger cities and industries in North Dakota. They are regulated through the Industrial Pretreatment Program which the department has primacy (effective September 9, 2005) to implement in North Dakota. The cities of Grand Forks, Fargo, Bismarck, Mandan and West Fargo have approved pretreatment programs. The department continues to work closely with pretreatment personnel from select industries and municipalities on providing training and updates on issues associated with the pretreatment program.

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 narrative water quality standard is enforced in part through appropriate whole effluent toxicity (WET) requirements in NDPDES permits. All major municipal/industrial permittees and select minors are required to monitor their discharges for WET. Municipalities and industries sample at an appropriate frequency for WET with results submitted for the department's review. Failure of WET tests can result in toxicity identification evaluations (TIEs) to determine the cause of the toxicity in the effluent. TIEs that have been completed in the state have resulted in major and minor improvements to wastewater treatment systems.

Several municipalities and industries have selected biological treatment methods to improve their wastewater treatment systems and the quality of their discharge water. The biological treatment system at the Amoco Refinery in Mandan is providing consistent, advanced treatment of its wastewater. The city of 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 continues to be implemented to compensate for the adverse operating conditions which currently prevail.

The wetland treatment system for the city of Minot continues to provide low ammonia concentrations in the final effluent. The city is continuously discharging a quality effluent during non-ice conditions which adds to the river flow and enhances aesthetic river quality. This is extremely beneficial since the Souris River has a history of poor river quality and low/no-flow conditions during several months of the year. Recent improvements to the wastewater treatment and collection system include lift station upgrades and primary aeration pond upgrades with solids removal.

American Crystal Sugar (ACS) 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 these facilities surpasses the federal effluent criteria for sugar beet processing plants. The Hillsboro plant plans to replace the existing aerobic clarifier with a new and larger gravity clarifier to provide improved efficiency of the water quality by capturing the solids, along with improved capacity. ACS is also planning to construct additional yard lift station(s) for the purpose of separating high strength and low strength water collected on site, directing the waters to the appropriate ponds for further analysis and treatment. Third project is the diffuser installation, based on the recommended (CorMIX) mixing model, which will allow discharges to occur during low river flow conditions. Upgrades to the Drayton plant included mechanical aeration to their condenser pond.

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. This plant is the first in the state to use ultraviolet disinfection of the treated wastewater. The city recently (July 2008) invested in capital improvements to address their solids on a permanent basis. Equipment was purchased for removal, pumping, hauling and injection of the solids on a regular basis. In addition, a new building was constructed for storage of equipment and housing the pumps and loading of the semi-trailers for solids removal.

The city of Fargo’s 15 MGD wastewater treatment plant continues to provide a quality effluent to the Red River. Treatment consists of pretreatment/odor control, primary clarification, trickling filters, nitrification filters, final clarification and disinfection. Residuals management (biosolids) consists of digesters, sludge drying beds and belt presses. The processed solids are used as cover at the municipal landfill. 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 putting the finishing touches on construction of a new force main interceptor to transport wastewater from south Fargo to the treatment plant located in the north part of town. This construction consisted of several new lift stations and one large master lift located north of the airport. Here, wastewater can be routed directly to the mechanical plant or pumped to the six wastewater storage ponds. This allows greater flexibility especially during heavy precipitation events and localized flooding. In addition, the "infiltration and inflow" (I & I) issues identified in downtown Fargo will be reduced also.

Fargo has also added a water reclamation facility at the treatment plant. A portion of the final effluent is routed to the reclamation plant; this treated water is then pumped to an Ethanol plant located in Casselton, twenty some miles from Fargo. A second pipeline is used to bring the industries wastewater back to Fargo for treatment at the headwork's of their plant.

The city of Bismarck's key wastewater treatment process consists of two 85-foot diameter primary clarifiers, two 136-foot diameter, 14-foot deep synthetic media trickling filters, and three 80-foot diameter final clarifiers. Water from the clarifiers is transferred to mixed media granular filters, then to a chlorine contact chamber, and eventually discharged to the Missouri River. Sludge from the clarifiers is transferred to anaerobic digesters for further treatment prior to land application. Bismarck continues with improvements/upgrades to its wastewater treatment plant. The facility master plan consists of short-term and long-term improvements to the facility. Phase one up-grades completed in 2006 consisted of three large storage tanks for biosolids retention. The second phase of improvements completed in 2009 consists of a new pre-treatment facility (head-works). Other phase II improvements consist of a new primary clarifier; additional updates to the existing primary clarifiers, trickling filter, final clarifier and control systems.

The city of Grand Forks has been operating their new wastewater treatment facility since late fall 2002. The activated sludge plant uses a European technology of "Micro-Bubble" flotation and is designed for 15 MGD. The plant staff continues to fine tune the process controls to provide optimal wastewater treatment. The effluent from the treatment plant is routed to the stabilization ponds which the city continues to operate. Long range goal is to discharge on a continual basis to the river. EPA Region VIII approved the city's plan to combine activated sludge with influent that has been pretreated through screening and grit separation processes and sent to one of the lagoon cells for temporary storage.

The Jamestown mechanical wastewater treatment plant was designed to treat agricultural process wastes which are blended with domestic waste from the city. The industrial wastewater is routed to a large grease trap then to the low-rate anaerobic treatment (LRATs). Water from the LRATs is then blended with municipal wastewater prior to being pumped to the SBRs for advanced treatment. Water is then routed to an equalization basin, chlorine contact basin and then continuous discharge to the river. Solids from the SBRs go to an aerobic digester for treatment prior to land disposal. The wastewater plant and lagoon system was tasked to the max during the spring flooding that occurred in the city.

The department is waiting on the conversion of QUAL2E model results of the low-flow TMDL for the James River to an Excel based QUAL2K model which will be used to determine if modifications to Jamestown's NDPDES permits are needed.

Great River Energy is in the process of constructing a power plant at Spiritwood, North Dakota. Because of limited water supplies available for plant use, Jamestown will be supplying the plant with treated effluent that can be used for Spiritwood processes; the wastewater generated at the power plant will then be piped back to the headworks of the Jamestown wastewater plant for treatment. Completion of the transmission line with pumping stations to the power plant and return line to Jamestown's mechanical plant has recently been completed.

Several other permitted facilities invested major capital improvements for upgrades to their wastewater systems. The city of Enderlin constructed a new 15 acre cell. Valley City constructed a new discharge pipe to the river. The old discharge was temporary abandoned and the erosion taking place in the natural drainage was fixed and/or repaired. Major wastewater collection improvements took place following the 2009 spring flood. Williston, Dickinson, Beulah, ADM Processing and others also completed updates to their wastewater systems consisting of new piping, valves, transfer lines, relining lagoons, etc.

Rules/regulations of the Safe Drinking Water Act have resulted in the movement to membrane filtration water treatment plants in the state. As a result, the department has been very active in permitting these new membrane filtration water treatmetn plants. The discharge of wastewater generated in the production of drinking water is not regulated by national effluent limitations guidelines, which establish technology-based effluent limitations for various industries. In the absence of a federal standard, limitations may be determined using Best Professional Judgment (BPJ) to ensure reasonable control technologies are used to prevent potential harmful effects of the discharge. In addition the department must consider and include limitations necessary to protect water quality standards applicable to the receiving waters. The challenge for the program is working with the facilities and their consultants on discharge requirements especially for low base-flow streams in the state of North Dakota.

The department continues working on addressing noncompliance in the program. The main emphasis from EPA continues to be wet weather issues like stormwater, SSO's and CAFOs. Routine inspections result in formal and informal enforcement actions. Informal enforcement can be letters requesting additional information and/or requiring repairs to best management practices (BMPs). In addition, the department issues formal warning letters citing apparent noncompliance with permit rules and water quality statutes (LOAN letters). Notices of Violation (NOVs) and Consent Agreements are issued through the Attorney General's office. The consent agreements include both upfront and suspended penalties. For each case, the collected penalty exceeded any economic benefit of non-compliance.

Impacts to water from livestock operations are an increasing concern in North Dakota. Currently, about 724 livestock facilities have been approved to operate. Most of these are cattle, hog and dairy facilities that are part of a farmer's total farm operation. In recent years, however, there has been an increase in the number of large concentrated animal feeding operations (CAFOs) proposed in North Dakota.

The department addresses all animal feeding operations impacting water quality through mechanisms or existing programs in the state. The department incorporated the February 12, 2003 federal CAFO rules into the state program. This consisted of updates to the North Dakota Pollutant Discharge Elimination System (NDPDES) rules (NDAC 33-16-01) and Control of

Pollution from Animal Feeding Operations rules (NDAC 33-16-03.1). These rules became final on January 7, 2005.

EPA's CAFO rules were challenged which resulted in new rules on CAFOs (Nov 2008) taking into account the Circuit Court of Appeals decision. The department has initiated the process of looking into potential state rule revisions as a result of the 2008 CAFO rule updates. There presently are new challenges to the 2008 federal CAFO rule which have been consolidated in the 5th Circuit U.S. Court of Appeals. Whatever the court outcome, it can pose new challenges and legal concerns for states that are in the process of updating their state rules.

In the interim, the department continues to permit animal feeding operations under the current state program (NDAC 33-16-03.1) which also includes large CAFOs. For all state-permitted CAFOs, permit facility data, permit event data and inspection data are entered into the state data base system. CAFO inspections are performed yearly, and information is provided to EPA on a regular basis.

The department provides educational materials to livestock producers and the public on the impacts that livestock manure has on waters of the state. Several times each year, the department participates in presentations to producer groups. The department works closely with the Natural Resources Conservation Service (NRCS) and Ag Extension Service (NDSU) on livestock manure systems. The department coordinates 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 also meets with individual producers on site to determine what impacts the facility may have on water quality and discuss ways to prevent water quality impacts, if needed

The department works closely with local zoning boards and county commissions to help them recognize sensitive areas where animal feeding 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. Recent revisions to state rules identified the Department of Health as the clearing-house for county zoning requirements relating to animal feeding operations.

The Operator Training Program is 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 every other 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 wastewater operator training and certification seminars. 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 contracts run through the state fiscal year (July 1 - June 30) and are for a two-year period. Activities associated with these contracts are water and wastewater inspections, odor readings at animal feeding operations, initial response to spills and releases to waters of the state and initial response to complaints on water quality issues.

A NDPDES program audit and State Review Framework (SRF) audit was performed by EPA Region 8 during calendar year 2009. Considerable time and resources were spent on these audits/reviews by both agencies. These processes are time-consuming for department staff and take away from other program work. In the future, EPA should look at combining the two processes which will shorten up the time needed to conduct the audits.

The following summarizes major accomplishments in the NDPDES program for the reporting period:

- Assisted many communities and individuals directly and indirectly with issues associated with the 2009 spring flooding;

- Maintained less than 1 percent backlog of major and minor North Dakota Pollutant Discharge Elimination System (NDPDES) permits;

- Reissued several municipal and stormwater general permits covering over 662 permittees or facilities; issued 67 individual new NDPDES permits;

- Conducted 274 stormwater inspections, 13industrial pretreatment inspections and 122 industrial and municipal wastewater compliance evaluations/records reviews; conducted 779 requests to discharge including follow-up correspondence;

- Reissued three stormwater general permits, one for the mining industry, one for construction activity and one for phase II municipalities (MS4s); in the process of reissuing the general permit for industrial activity;

- Revised forms for the industrial stormwater permit to better reflect the permit conditions on discontinuing coverage, sampling and reporting also;

- Arranged and conducted annual two-day conferences on stormwater management, erosion and sediment control practices and permit requirements;

- Implemented a new data base to monitor and track compliance in the NDPDES Program. The database includes stormwater permits, pretreatment permits, permits for majors and minors facilities, permits for animal feeding operations, and permits for hydrostatic testing and dewatering activities. The database tracked over 10,000 significant correspondence related events including phone call, letters sent, as well as memos and emails;

- Updated and standardized the NDPDES permit and fact sheet; developed a standardized sample identification and collection form with the Chemistry Division;

- Conducted 266 inspections of livestock facilities of which 166 were large CAFOs; issued “approvals to operate” to 61new or expanding facilities, of which 21 were for large CAFOS; and conducted 5 public hearings for 5 large swine or dairy CAFOs. Ninety (90) percent of all state permitted CAFOs are inspected annually;

- Participated 20 informational meetings to producer groups held 4 public meetings on new or expanding facilities and conducted 45 site visits at producers request to evaluate their operation;

- Conducted groundwater sampling at 28 large CAFOs; initiated soil samples at 5 Hog, 1 Beef and two Dairy CAFOs to verify compliance with permit conditions;

.

- Participated in 16 educational/professional events to provide information on stormwater permit requirements; including four one-day LTAP workshops for state highway department supervisors and engineers;

- Terminated the Devils Lake Outlet permit as the result of the federal court decision regarding NPDES permits are not required for moving surface water from one area to another (water-to-water transfer rule); and

- Participated in the annual operator training and the North Dakota Water Pollution Control Conference, providing updates/training on stormwater, pretreatment and wastewater discharge issues.

## 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 implementation 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 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, land use 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 based on data collected through some type of development project (e.g., NPS Assessment Project, TMDL development).

Section 319 funding is the primary source of financial support for projects addressing NPS pollution. Through the 2003, 2006, 2007, 2008 and 2009 Section 319 Grants (Active Grants), the NPS Program has provided funding to 89 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 Fiscal Year 2003, 2006, 2007, 2008 and 2009 Section 319 Grants (1/1/03 -12/31/09)

### 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 | Completed | $128,403 | $85,602 | $214,005 |
| English Coulee Watershed Assessment | Active | $84,660 | $56,440 | $141,100 |
| Lake Hoskins Water Quality Assessment | Completed | $18,066 | $12,044 | $30,110 |
| McDowell Dam Alum Treatment Demo | Completed | $47,664 | $31,776 | $79,440 |
| McDowell Post Alum Treatment Assessment Project | Active | $14,446 | $9,631 | $24,077 |
| ND Ag Department Pesticide Assessment Program | Active | $42,000 | $28,000 | $70,000 |
| Ransom C. Sheyenne River Assessment | Completed | $79,480 | $52,987 | $132,467 |
| Red River Basin Volunteer Monitoring Network | Completed | $47,829 | $31,886 | $79,715 |
| Red River Valley Tile Drainage Water Quality Assessment | Completed | $12,727 | $8,485 | $21,212 |
| Rice Lake Water Quality Improvement Project | Completed | $448,200 | $298,800 | $747,000 |
| Stutsman Co. Subwatershed Assessment Project | Completed | $9,246 | $6,164 | $15,410 |
| Turtle River Assessment | Completed | $114,117 | $76,078 | $190,195 |
| NDSU AnnAGNPS Modeling (Spring Crk & James River) | Active | $19,048 | $12,699 | $31,747 |
| River Keepers Water Quality Data Analysis | Active | $16,335 | $10,890 | $27,225 |
| Upper Goose River Watershed Assessment Project | Completed | $82,159 | $54,773 | $136,932 |
| Unobligated Development Phase Fund - 2008 Grant | Active | $603,513 | $402,341 | $1,005,854 |
| Upper Sheyenne Watershed Assessment | Active | $64,650 | $43,100 | $107,750 |
| **Subtotal** | | $1,847,796 | $1,231,865 | $3,079,661 |

### 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 | Completed | $2,800 | $1,867 | $4,667 |
| Dickinson Dike TMDL Development - Phase III | Completed | $6,455 | $4,303 | $10,758 |
| Dickinson Dike TMDL Development - Phase I | Completed | $6,853 | $4,569 | $11,422 |
| Fordville Dam TMDL Development Project | Active | $21,279 | $14,186 | $35,465 |
| McDowell Watershed TMDL | Completed | $22,688 | $15,125 | $37,813 |
| Northgate Dam TMDL | Completed | $14,245 | $9,497 | $23,742 |
| **Subtotal** | | $99,557 | $66,371 | $165,928 |

### Education - Demonstration

| Project Name | Status | 319 Allocation | Local Match | Total Budget |
|---|---|---|---|---|
| Kelly Creek Water Quality Improvement Demonstration | Completed | $7,860 | $5,240 | $13,100 |
| NDSU Vegetative Buffer Demonstration and Evaluation Program | Active | $119,436 | $79,624 | $199,060 |
| SW North Dakota NPS/Water Quality I&E Project | Active | $1,784,086 | $1,189,390 | $2,973,476 |
| **Subtotal** | | $1,911,382 | $1,274,254 | $3,185,636 |

## Table III-2 (cont.). Status and Budgets for Projects Supported Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Section 319 Grants (1/1/03 -12/31/09)

### Education - Public Outreach

| Project Name | Status | 319 Allocation | Local Match | Total Budget |
|---|---|---|---|---|
| Digital Taxonomic Keys for Aquatic Insects in ND | Completed | $72,324 | $48,216 | $120,540 |
| Envirothon Program | Active | $261,364 | $174,243 | $435,607 |
| Foster County - TREES Program | Active | $726,523 | $484,349 | $1,210,872 |
| ManDak Zero Till Manual | Active | $54,000 | $36,000 | $90,000 |
| ND Groundwater Pesticide Assessment Educational Program | Completed | $19,615 | $13,077 | $32,692 |
| NDSU Livestock Waste Technical Info & Assistance | Active | $1,634,090 | $1,089,393 | $2,723,483 |
| Project WET | Active | $863,325 | $575,550 | $1,438,875 |
| Statewide ECO ED Camp | Active | $1,116,138 | $744,092 | $1,860,230 |
| Water Quality Mentorship and Outreach Program | Active | $575,000 | $383,333 | $958,333 |
| **Subtotal** | | $5,322,379 | $3,548,253 | $8,870,632 |

### Local Project Support (TA or FA)

| Project Name | Status | 319 Allocation | Local Match | Total Budget |
|---|---|---|---|---|
| Adams Co. Livestock Manure Management Program | Discontinued | $505,842 | $337,228 | $843,070 |
| Dairy Pollution Prevention Program | Active | $2,671,598 | $1,781,065 | $4,452,663 |
| Groundwater Sensitivity Mapping | Completed | $329,704 | $219,803 | $549,507 |
| 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 | $1,290,267 | $860,179 | $2,150,446 |
| Project Safe Send - Dept. of Agriculture | Completed | $140,895 | $93,930 | $234,825 |
| Stockmen's Association Manure Management Specialist | Active | $2,931,326 | $1,954,217 | $4,885,543 |
| **Subtotal** | | $9,288,074 | $6,192,050 | $15,480,124 |

### 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 |
| Red River Valley Tile Drain Water Quality Assessment - Phase II | Active | $183,283 | $122,189 | $305,472 |
| Rocky Run Watershed Assessment - Phase I | Completed | $0 | $0 | $0 |
| UND Aquifer De-nitrification Assessment | Completed | $39,388 | $26,259 | $65,647 |
| **Subtotal** | | $348,433 | $232,289 | $580,722 |

**Table III-2 (cont.). Status and Budgets for Projects Supported Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Section 319 Grants (1/1/03 -12/31/09).**

## NPS Program Staffing and Support

| Project Name | Status | 319 Allocation | Local Match | Total Budget |
|---|---|---|---|---|
| NPS Program Staffing & Support | Active | $3,597,416 | $2,398,277 | $5,995,693 |
| **Subtotal** | | $3,597,416 | $2,398,277 | $5,995,693 |

## Watershed Project

| Project Name | Status | 319 Allocation | Local Match | Total Budget |
|---|---|---|---|---|
| Antelope Creek Watershed & Wild Rice Riparian Corridor Project | Active | $814,895 | $543,263 | $1,358,158 |
| Barnes Co. Sheyenne River Watershed (01 WRAS) | Active | $1,228,114 | $818,743 | $2,046,857 |
| Bear Creek Watershed | Active | $671,402 | $447,601 | $1,119,003 |
| Beaver Creek/Seven Mile Coulee Watershed | Active | $1,340,600 | $893,733 | $2,234,333 |
| Beaver Creek Watershed (99 WRAS) | Active | $1,884,678 | $1,256,452 | $3,141,130 |
| Bone Hill Creek Watershed | Active | $327,251 | $218,167 | $545,418 |
| Buffalo Springs & Lightening Creek Watersheds | Completed | $250,587 | $167,058 | $417,645 |
| Cannonball River TMDL Implementation Project | Active | $165,065 | $110,043 | $275,108 |
| Cedar Lake Watershed | Completed | $205,105 | $136,737 | $341,842 |
| Chanta Peta Watershed (00 WRAS) | Completed | $109,153 | $72,769 | $181,922 |
| Cottonwood Creek Watershed (99 & 02 WRAS) | Completed | $783,734 | $522,489 | $1,306,223 |
| Crooked Creek Watershed (00 WRAS) | Completed | $144,149 | $96,099 | $240,248 |
| Deep Creek Watershed | Active | $596,958 | $397,972 | $994,930 |
| Dickey/LaMoure Livestock Manure Management Program | Active | $933,900 | $622,600 | $1,556,500 |
| Griggs Co. 319 Water Quality Project (99 WRAS) | Completed | $702,570 | $468,380 | $1,170,950 |
| Hay Creek Watershed - Phase IV | Completed | $17,317 | $11,545 | $28,862 |
| Hay Creek Watershed - Phase V | Completed | $212,922 | $141,948 | $354,870 |
| James River Headwaters Watershed | Active | $485,000 | $323,333 | $808,333 |
| 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 | $1,335,709 | $890,473 | $2,226,182 |
| Middle Cedar Creek Watershed (00 WRAS) | Completed | $345,714 | $230,476 | $576,190 |
| Mirror Lake Watershed | Completed | $71,856 | $47,904 | $119,760 |
| Morton Co. Livestock Manure Management Program | Active | $611,200 | $407,467 | $1,018,667 |
| Nine Townships Watershed - Implementation Phase | Active | $1,076,735 | $717,824 | $1,794,559 |
| Northgate Dam & Short Creek Watershed | Active | $537,150 | $358,100 | $895,250 |
| Pheasant Lake/Elm River Watershed (03 WRAS) | Completed | $351,494 | $234,329 | $585,823 |
| Powers Lake Watershed (03 WRAS) | Active | $453,205 | $302,137 | $755,342 |
| Red River Riparian Project - Phases II & III (03 WRAS) | Completed | $1,603,428 | $1,068,952 | $2,672,380 |
| Red River Riparian Project - Phase IV | Active | $1,424,966 | $949,977 | $2,374,943 |
| Rocky Run Watershed - Phase II (02 WRAS) | Completed | $443,710 | $295,807 | $739,517 |
| Rush River & Brewer Lake Watershed | Active | $434,160 | $289,440 | $723,600 |
| Sheep Creek Watershed | Active | $167,108 | $111,405 | $278,513 |
| Sheyenne River & Dead Colt Watersheds (Ransom Co.) | Active | $540,919 | $360,613 | $901,532 |
| Turtle River Watershed | Active | $498,358 | $332,239 | $830,597 |
| Upper Sheyenne Watershed (02 WRAS) | Completed | $39,647 | $26,431 | $66,078 |
| Upper Cannonball Manure Management Program | Active | $790,830 | $527,220 | $1,318,050 |
| Upper Red River Valley Riparian Project | Active | $618,499 | $412,333 | $1,030,832 |
| Wild Rice Watershed (99 & 00 WRAS) | Active | $1,420,061 | $946,707 | $2,366,768 |
| **Subtotal** | | $25,915,483 | $17,276,989 | $43,192,472 |
| **Cumulative Budget for all the Active Grants** | | $48,330,520 | $32,220,348 | $80,550,868 |

Statewide delivery of the NPS Program is accomplished through six main goals identified in the NPS Program Management Plan. These goals, organized as individual sections of the management plan, 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**

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

Resource assessment is implemented at both the statewide and local levels. 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. 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 (PIPs) 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 30 different assessment phase projects. Specific assessment phase projects are listed in Table III-2.

**Prioritization**

<u>Prioritization Goal:</u> 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**

<u>Assistance Goal:</u> 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 7 percent of the NPS Program budget has been used to support NPS Program staff. The balance of expenditures (i.e., 93 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 for NPS program staffing and the different NPS project categories during the period of January 1, 2003 through December 31, 2009.

**Table III-3. Section 319 Allocations and Expenditures per Project Category (1/1/03 -12/31/09).**

| Project Category | 319 Allocation | 319 Expenditures | Percent of Total 319 Expenditures |
|---|---|---|---|
| Development Phase - NPS Assessment | $ 1,847,796 | $ 1,120,337 | 3.50% |
| Development Phase - TMDL Development | $ 99,557 | $ 78,276 | 0.24% |
| Education - Demonstration | $ 1,911,382 | $ 1,624,900 | 5.08% |
| Education - Public Outreach | $ 5,322,379 | $ 3,532,719 | 11.05% |
| Local Project Support (TA or FA) | $ 9,288,074 | $ 6,484,180 | 20.29% |
| NPS Assessment - Multi Year Grant Award | $ 348,433 | $ 165,148 | 0.52% |
| NPS Program Staffing and Support | $ 3,597,416 | $ 2,104,346 | 6.58% |
| Watershed Projects | $ 25,915,483 | $ 16,855,434 | 52.73% |
| **Totals** | **$ 48,330,520** | **$ 31,965,340** | |

## 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 (62 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 among 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. 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 | ND Grain Growers Association |
| ND Wildlife Federation | ND Rural Water Systems Association |
| 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 | ND Resource Conservation & Development Councils |
| Red River Basin Commission | |

## 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 the NDSU Extension Service. Although the goals and target audiences of the educational projects may vary, these state/locally sponsored I/E projects cumulatively form a balanced statewide NPS pollution education program. Specific I/E projects supported under the 2003, 2006, 2007, 2008 and 2009 Grants are listed in Table III-2. The primary goals of the NPS educational projects supported since January 2003 are provided in Table III-5.

**Table III-5. Primary Goals and Target Audience of NPS Pollution Education Projects Supported Since January 2003.**

| Project Name | Primary Target Audience | Major Goals |
|---|---|---|
| Kelly Creek Water Quality Improvement Demonstration | General Public | Established interpretive sites focused on a series of created wetlands to disseminate information on the function and benefits of wetlands for sediment and nutrient retention |
| SW North Dakota NPS/Water Quality I&E Program | Resource Managers* and Agricultural Producers | Provide financial support for educational events (e.g. workshops, tours, newsletters, demonstrations, etc.) focused on agricultural practices and management options that are effective at controlling NPS pollution. |
| Digital Taxonomic Keys of Aquatic Insects in ND | Resource Managers, Teachers & Students | Develop and manage a web site with the digital keys for aquatic insects in ND. The web address is http://www.waterbugkey.vcsu.edu/. |
| Envirothon Program | Students in grades 9-12 | Deliver a statewide program that strengthens problem solving skills by providing the opportunity to learn and use science based information to identify and prescribe potential solutions for addressing NPS pollution and other natural resource concern. |
| The Regional Environmental Education Series (TREES) | Students in grades K-12 | Deliver a series of lyceum-style programs to schools to create a greater appreciation for the state's water resources and increase participants understanding of the importance of the wise use of all natural resources. |
| NDSU Livestock Waste Technical Information & Assistance Program | Resource Managers & Livestock Producers | Maintain a statewide program focused on the development and delivery of training programs, bulletins, workshops, demonstrations, and one-on-one planning assistance to promote better management of livestock manure. The Discovery Farms Program was also initiated under this project. |
| ND Project WET (Water Education for Teachers) | K-12 Teachers & Students | Deliver a variety of educational offerings throughout the state to increase participants' knowledge and understanding of NPS pollution impacts to our water resources and potential solutions to those impacts. |
| Statewide ECO ED Program | Students in grades 6-8 | Provide technical and financial assistance for local soil conservation districts to conduct one-day tours or two-day camps that provide hands-on, outdoor instruction on water quality, soil/erosion; wetlands, prairies, and woodlands. |

**Table III-5 (cont.). Primary Goals and Target Audience of NPS Pollution Education Projects Supported Since January 2003.**

| Project Name | Primary Target Audience | Major Goals |
|---|---|---|
| ND Groundwater Pesticide Assessment Educational Program | Resource Managers & Agricultural Producers | Develop and maintain the ND Groundwater Pesticide Assessment web site to disseminate information on site-specific concerns for potential groundwater contamination associated with pesticides. The web address is http://www.ageng.ndsu.nodak.edu/pest/ |
| ManDak Zero Till Manual | Resource Managers & Agricultural Producers | Develop a 3rd zero-till manual to disseminate new information that will assist famers to better utilize zero till management systems to reduce cropland erosion, improve soil health and protect downstream water quality. |
| NDSU Vegetative Buffer Demonstration and Evaluation Program | Resource Managers & Livestock Producers | Collect and interpret data from two vegetative buffer demonstration sites to evaluate the effectiveness in reducing water quality impacts associated with the livestock feeding areas. If appropriate, the information will also be used to establish guidelines and recommendations for vegetative buffers and other BMP. |
| Water Quality Mentorship and Outreach Program | Resource Managers & Agricultural Producers | Deliver a balanced educational program in southwestern ND that promotes concepts and practices that improve cropland and grazing management and protect water quality. The project also includes a mentor assistance program that supports the exchange of ideas and information between "producer-mentors" and other producers who want to incorporate new or innovative management practices into their existing grazing operations. |

*Resource managers include individuals from NRCS, Extension Service, Soil Conservation Districts, 319 Projects, State Agencies, Private Organizations, Water Resource Districts, etc. who are involved in resource management planning

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 Pollution 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 30 NPS assessment and/or TMDL development projects and 37 watershed restoration projects supported under the Active Grants, 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 watershed project areas.  During an average year, over 1500 water quality samples are collected from approximately 150 different STORET sites within the active watershed project areas.  The main parameters typically monitored include nitrogen, phosphorus, TSS and fecal coliform bacteria.  Stream discharge is also measured at many of the STORET sites to determine pollutant loadings.  Upon completion of a project, a summary of the water quality data is developed and incorporated into the final project report.  All final reports are entered in the EPA Grants Reporting and Tracking System.

To gauge land use improvements, the number and type of BMPs applied are also tracked by the local NPS projects.  Table III-6 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-6 were supported with Section 319 funds.

Despite the implementation of multiple BMPs and the collection of extensive water quality data, documentation of annual pollutant load reductions continues to be very challenging.  This is particularly true within the large watershed projects (i.e., greater than 50,000 acres).  In most watershed projects, because of variables such as rainfall timing and cropping changes, more than 10 years of data are generally needed to accurately evaluate pollutant load reductions resulting from applied BMP.  Consequently, for the short term, annual pollutant load reductions within the watershed projects are being estimated with the Spreadsheet Tool for the Estimation of Pollutant Load (STEPL) or the Animal Feedlot Runoff Risk Index (AFRRI) worksheet.   Both models are used to estimate annual nitrogen and phosphorus load reductions associated with completed manure management systems.  When applicable, the STEPL model is also used to estimate nutrient load reductions associated with septic system renovations as well as sediment load reductions associated with crop residue management.  Regardless of which model is used, the load reduction values generated by the models are useful for predicting if a project is likely to have a positive impact on water quality and impaired beneficial uses over the long term.  Project-specific annual load reductions estimated with STEPL or the AFRRI worksheet for BMP applied during the period of 2006 through 2009 are listed in Table III-7.

**Table III-6. BMPs Supported Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Grants (1/1/03 - 12/31/09)**

| Category/Practice | Amount | Units | Total Cost |
|---|---|---|---|
| ***Cropland Management*** | | | |
| Cover Crop | 5906.5 | Acres | $ 26,302.16 |
| GPS Equipment (Nutrient Management) | 3.00 | Number | $ 5,726.05 |
| Nutrient Management | 138,823.30 | Acres | $ 624,611.16 |
| Pest Management | 36,503.20 | Acres | $ 151,851.45 |
| Residue Management (Mulch Till) | 52,790.90 | Acres | $ 392,181.68 |
| Residue Management (No-Till and Strip Till) | 99,493.30 | Acres | $ 1,137,242.68 |
| Soil Test (Nutrient Management) | 36.00 | Number | $ 2,022.20 |
| **Subtotal** | | | $ 2,339,937.38 |
| ***Erosion Control*** | | | |
| Critical Area Planting | 686.40 | Acres | $ 191,408.24 |
| Grade Stabilization | 1.00 | Number | $ 2,694.81 |
| Grassed Waterway | 550.00 | Linear Feet | $ 13,711.50 |
| Miscellaneous (Erosion Control) | 1.00 | Misc | $ 4,228.70 |
| Sediment Basin | 2.00 | Number | $ 122,483.34 |
| Water and Sediment Control | 2.00 | Number | $ 12,755.00 |
| **Subtotal** | | | $ 347,281.59 |
| ***Grazing Management*** | | | |
| Alternative Power Source (Livestock Watering Only) | 14.00 | Number | $ 75,936.04 |
| Fencing | 1,450,773.60 | Linear Feet | $ 1,180,620.53 |
| Heavy Use Protection | 1.00 | Number | $ 1,400.00 |
| Mechanical Treatment | 45.00 | Acres | $ 373.50 |
| Miscellaneous (Grazing Management) | 8.00 | Misc | $ 27,511.00 |
| Pasture/Hayland Planting | 11,660.80 | Acres | $ 421,263.90 |
| Pipelines | 563,888.00 | Linear Feet | $ 1,354,593.41 |
| Pond | 55.00 | Number | $ 94,402.67 |
| Prescribed Grazing | 28,969.00 | Acres | $ 1,600.00 |
| Range Planting | 47.40 | Acres | $ 2,479.72 |
| Solar Pumps | 5.00 | Number | $ 30,215.46 |
| Spring Development | 6.00 | Number | $ 47,734.35 |
| Trough and Tank | 330.00 | Number | $ 453,984.24 |
| Use Exclusion | 332.00 | Acres | $ 3,611.66 |
| Well (Livestock Only) | 100.00 | Number | $ 633,093.09 |
| **Subtotal** | | | $ 4,328,819.57 |
| ***Livestock Manure Management System (Full System)*** | | | |
| Miscellaneous (Full Manure Management System) | 7.00 | Misc | $ 152,976.28 |
| Phase I Waste Management System | 55.00 | System(s) | $ 3,816,425.78 |
| Phase II Waste Management System | 44.00 | System(s) | $ 1,900,709.62 |
| Phase III Waste Management System | 8.00 | System(s) | $ 388,363.73 |
| Waste Management System (Coordinated With EQIP) | 42.00 | System(s) | $ 2,296,778.56 |
| Waste Management System (Full System Completed) | 24.00 | System(s) | $ 1,962,087.03 |
| **Subtotal** | | | $ 10,517,341.00 |

**Table III-6 (cont.). BMPs Supported Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Grants (1/1/03 - 12/31/09).**

| Category/Practice | Amount | Units | Total Cost |
|---|---|---|---|
| ***Livestock Manure Management System (Partial Sys)*** | | | |
| Access Road (Ag Waste) | 1,690.00 | Linear Feet | $ 10,329.28 |
| Building Relocation, Moving Costs (Ag Waste) | 2.00 | Number | $ 55,367.27 |
| Bunk Line Fencing (Ag Waste) | 1,920.00 | Linear Feet | $ 4,800.00 |
| Diversion | 3,353.00 | Linear Feet | $ 21,125.57 |
| Engineering Services - Construction Phase | 1.00 | System(s) | $ 11,192.00 |
| Engineering Services – Preconstruction | 3.00 | System(s) | $ 9,067.63 |
| Excavation and Earth Fill (Ag Waste)b | 4,800 | Cubic Yards | $ 9,142.00 |
| Fencing (Ag Waste) | 17,810.00 | Linear Feet | $ 47,765.55 |
| Heavy Use Protection (Ag Waste/Concrete) | 66.18 | Cubic Yards | $ 15,135.00 |
| Manure Removal (Ag Waste) | 1.00 | System(s) | $ 1,360.00 |
| Miscellaneous (Partial Manure Management System) | 1.00 | Misc | $ 3,722.26 |
| Perimeter Fencing (Ag Waste) | 11,633.00 | Linear Feet | $ 30,646.95 |
| Runoff Management System | 1.00 | System(s) | $ 95,589.38 |
| Site Prep (Ag Waste) | 1.00 | System(s) | $ 3,625.00 |
| Soil Test (Ag Waste) | 5.00 | Number | $ 4,344.60 |
| Underground Outlet Pipes/Culverts (Ag Waste) | 1 | Number | $ 8,860.19 |
| Waste Storage Facility | 1.00 | System(s) | $ 2,750.00 |
| Waste Utilization | 9,817.92 | Acres | $ 198,881.61 |
| Water Supply (Ag Waste) | 6.00 | Number | $ 3,000.00 |
| Watering Facility (Ag Waste: Tank, Pipeline, Well) | 6.00 | Number | $ 71,345.03 |
| Windbreak Fencing (Ag Waste) | 7,591.00 | Linear Feet | $ 16,821.76 |
| **Subtotal** | | | $ 624,871.08 |
| ***Miscellaneous Practices*** | | | |
| Cultural Resource Review | 27.00 | Number | $ 30,534.26 |
| Engineering Services - Construction Phase | 7.00 | System(s) | $ 24,778.24 |
| Engineering Services - Post Construction | 6.00 | System(s) | $ 55,021.01 |
| Engineering Services – Preconstruction | 14.00 | System(s) | $ 61,238.15 |
| Miscellaneous (Full Manure Management System) | 1.00 | Misc | $ 7,925.50 |
| Miscellaneous (Grazing Management) | 1 | Misc | $ 6,967.50 |
| Miscellaneous (Miscellaneous Practices) | 15.00 | Misc | $ 35,719.69 |
| Septic System Renovation | 59.00 | System(s) | $ 475,453.44 |
| Site Preparation - Heavy w/Chemical (Trees, G13) | 2.00 | Acres | $ 340.00 |
| Soil Investigations | 1.00 | Number | $ 738.70 |
| Solar Pumps | 6.00 | Number | $ 15,886.86 |
| Urban Stormwater Management | 2.00 | System(s) | $ 273,223.70 |
| Well Decommissioning | 40.00 | Number | $ 32,104.18 |
| **Subtotal** | | | $ 1,019,931.23 |

**Table III-6 (cont.). BMPs Supported Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Grants (1/1/03 - 12/31/09).**

| Category/Practice | Amount | Units | Total Cost |
|---|---|---|---|
| ***Riparian Area Management*** | | | |
| Engineering Services - Construction Phase | 1.00 | System(s) | $ 7,906.88 |
| Engineering Services – Preconstruction | 3.00 | System(s) | $ 12,320.26 |
| Exclusion Fencing | 27,959.00 | Linear Feet | $ 27,651.05 |
| Reshape/Stabilize Stream Banks (Earth Moving) | 9,130.00 | Linear Feet | $ 134,084.33 |
| Riparian Easement (On Cropland) | 139.48 | Acres | $ 241,378.84 |
| Riparian Easement (On Pasture/Rangeland) | 716.00 | Acres | $ 1,022,823.07 |
| Riparian Forest Buffer | 515.92 | Acres | $ 193,225.13 |
| Riparian Herbaceous Cover | 223.00 | Acres | $ 18,550.26 |
| Selective Debris Removal (Site-Specific Approval Required) | 5 | Sites | $ 4,916.65 |
| Site Preparation – Heavy w/Chemical (Trees, G13) | 46.80 | Acres | $ 1,000.39 |
| Stream Channel Stabilization | 44,845.00 | Linear Feet | $ 236,867.81 |
| Streambank and Shoreline Stabilization | 15,364.00 | Linear Feet | $ 508,534.38 |
| Timber Stand Improvement (Scarification) | 30.80 | Acres | $ 7,664.55 |
| Tree Hand Plants (2' Non-Rooted Stakes) | 325.00 | Number | $ 406.25 |
| Tree Hand plants | 1,833.00 | Number | $ 2,233.00 |
| Tree Planting – Machine (Scalp Plant/Site Pep) | 96,765.00 | Linear Feet | $ 58,069.80 |
| Tree Thinning (Riparian Areas Only) | 46.00 | Acres | $ 11,040.00 |
| Willow Post Planting (4' to 6') by auger/stinger | 775.00 | Number | $ 4,650.00 |
| **Sub-total** | | | $ 2,493,322.65 |
| ***Upland Tree Planting*** | | | |
| Cultural Resource Review | 1.00 | Number | $ 1,529.27 |
| Mechanical Treatment | 3.20 | Acres | $ 64.00 |
| Miscellaneous (Upland Tree Planting) | 1.00 | Misc | $ 3,560.27 |
| Site Preparation - Heavy w/Chemical (Trees, G13) | 32.20 | Acres | $ 901.60 |
| Tree Hand plants | 2,446.00 | Number | $ 4,196.44 |
| Tree/Shrub Establishment | 150,625.34 | Linear Feet | $ 43,881.57 |
| Weed Control For Tree Establishment (Chem or Mech) | 32.20 | Acres | $ 615.00 |
| Windbreak/Shelterbelt | 150,894.00 | Linear Feet | $ 69,525.77 |
| **Subtotal** | | | $ 124,273.92 |
| ***Vegetative Buffers*** | | | |
| Filter Strip | 48.50 | Acres | $ 6,079.25 |
| **Subtotal** | | | $ 6,079.25 |
| ***Wetland Restoration/Creation*** | | | |
| Wetland Creation | 23.70 | Acres | $ 65,359.14 |
| Wetland Restoration | 855.60 | Acres | $ 223,554.27 |
| **Subtotal** | | | $ 288,913.41 |
| **Grand Total** | | | **$22,090,771.08** |

**Table III-7. Estimated Annual Nitrogen, Phosphorus and Sediment Load Reductions Associated with BMPs Applied from 2006 – 2009.**

| Project Name | Nitrogen Load Reduction (lbs/yr) | Phosphorus Load Reduction (lbs/yr) | Sediment Load Reduction (tons/yr) |
|---|---|---|---|
| Lower Pipestem Watershed | 12,999 | 5,328 | 75 |
| Cottonwood Creek Watershed | 80,284 | 38,751 | 2,142 |
| Rocky Run Watershed | 12,003 | 2,526 | 175 |
| Maple Creek Watershed | 74,933 | 15,738 | 1,824 |
| Nine Townships Watersheds | 1,296 | 251 | 117 |
| Beaver Creek Watershed | 633 | 111 | 41 |
| Powers Lake Watershed | 1,068 | 212 | 105 |
| Wild Rice River Watershed | 7,113 | 1,897 | 10 |
| Bear Creek Watershed | 14,592 | 7,164 | 0* |
| Dairy Pollution Prevention Program | 178,617 | 66,604 | 0* |
| Stockmen's Association - Environmental Services Program | 196,355 | 92,954 | 0* |
| Sheyenne River Watershed (Barnes Co.) | 8,779 | 4,280 | 0* |
| Sheyenne River/Dead Colt Watershed (Ransom Co.) | 7,518 | 1,692 | 0* |
| Lake Hoskins Watershed | 1,215 | 218 | 87 |
| Bone Hill Creek Watershed | 4,921 | 2,399 | 0* |
| Pheasant Lake Watershed | 5,222 | 2,472 | 15 |
| Buffalo Springs/Lightning Creek Watershed | 3,941 | 1,894 | 0 |
| Middle Cedar Creek Watershed | 9,870 | 2,248 | 158 |
| Antelope Creek Watershed (Richland Co.) | 11,019 | 5,268 | 0 |
| Deep Creek Watershed | 5,138 | 2,469 | 0 |
| Upper Cannonball Manure Management Program | 10,385 | 2,075 | 0* |
| Dickey LaMoure Manure Management Program | 2,752 | 1,342 | 0* |
| **Total** | **650,653** | **257,893** | **4,749** |

***** Livestock manure management systems were the only BMPs installed by these projects. The AFRRI worksheet was used to estimate load reductions. The AFFRI worksheet 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, 41 percent of total Section 319 expenditures under the Active Grants have been associated with the implementation of BMPs. The most common BMPs implemented with this financial support have included livestock management systems and grazing management practices. The main NPS pollutants addressed by the BMPs include nitrogen, phosphorus and fecal coliform bacteria. Figure III-4 shows the total BMP expenditures associated with each BMP Category. Specific BMPs implemented since January 1, 2003 are listed in Table III-6.

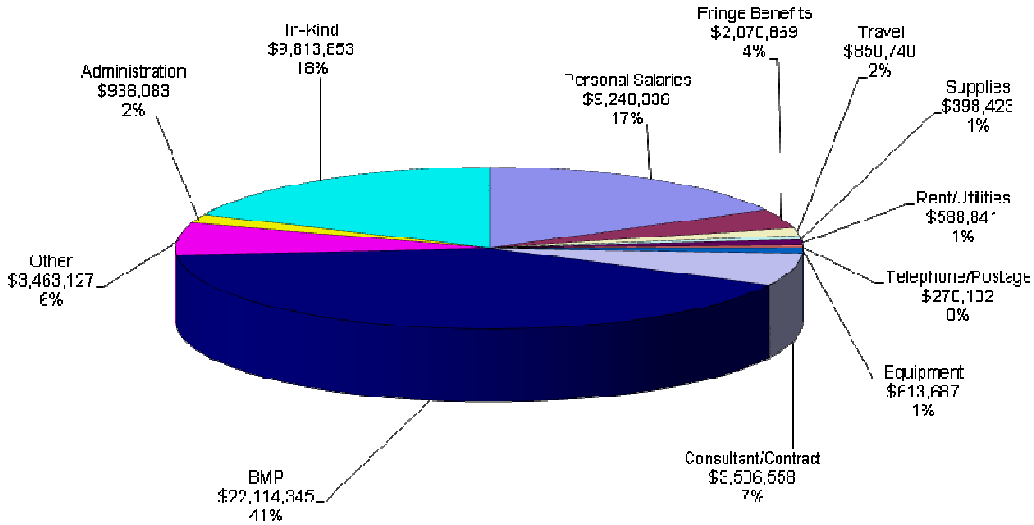



**Figure III-3. Cumulative Cost Category Expenditures Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Grants (1/1/03 –12/31/09).**

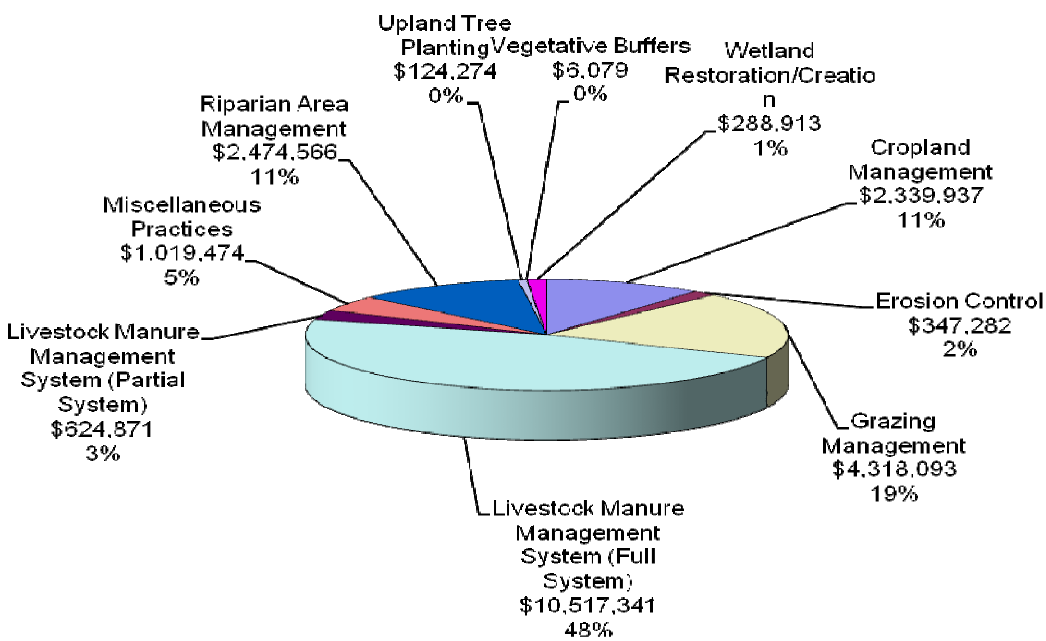



**Figure III-4. BMP Category Expenditures Under the Fiscal Year 2003, 2006, 2007, 2008 and 2009 Grants (1/1/03 – 12/31/09).**

Based on the annual load reduction estimates generated with STEPL and the AFFRI worksheet, the BMP applied in the watershed projects should effectively reduce the amount of nitrogen and phosphorus reaching nearby surface water systems. Over the long term, the expectation has always been that as the BMP mature, the estimated load reductions will increase and the predicted trends will become evident in the water quality data collected in the project areas. With many of the “older” watershed projects ending over the next two years, this expectation should be realized in a number of watersheds.

**Watershed Project Case History: Cottonwood Creek/Lake LaMoure**

The Cottonwood Creek Watershed project, which was completed in 2009, is one example of an older project that has only recently began to show measurable water quality and beneficial use improvements after 10+ years of BMP implementation.

The primary focus of the Cottonwood Creek Watershed project was Lake LaMoure, which was constructed in 1973. The lake is a 495-acre reservoir on Cottonwood Creek in southeastern North Dakota. The reservoir's watershed encompasses approximately 107,000 acres, and agricultural production (crops and livestock) is the primary land use in the watershed. Swimming, boating and fishing are the main recreational uses of the reservoir. In the 1990’s, however, local residents became increasingly more concerned about the deteriorating recreational opportunities at the lake. Of particular concern were the frequent algae blooms in mid to late summer and a fish community dominated by rough fish such as carp and bullheads.

The LaMoure County Soil Conservation District (SCD) initiated an assessment of the Lake LaMoure/Cottonwood Creek watershed in 1995 to evaluate the relationship between land management and degrading water quality. Assessment activities included measuring water quality and quantity in the creek and lake, and inventorying current land use practices in the watershed. The SCD was able to determine that the recreational use impairments in Lake LaMoure were associated primarily with nonpoint source pollutants from agricultural lands, including nutrients (nitrogen and phosphorus) and suspended solids. Potential pollutant sources included excessively tilled croplands, overgrazed rangeland and livestock winter feeding areas. In addition, re-suspended sediments and nutrients resulting from an excessive carp population were possibly contributing to the declining recreational use of the reservoir.

As a result of the assessment, the SCD targeted the use of conservation planning assistance, along with voluntary implementation of best management practices (BMPs). This approach was initiated in 1997 with the development of a watershed project implementation plan that identified beneficial use improvement and pollutant reduction goals, specific activities for accomplishing these goals and a method for evaluating progress.

The primary goal of the Cottonwood Creek watershed project was to improve the fishery and recreational use of Lake LaMoure by improving agricultural land management practices in the watershed. Land use objectives included installing 12 livestock waste management facilities and implementing conservation plans on more than 50 percent of the acreage in the watershed.
To fund the watershed project, the LaMoure County SCD applied for and received a Section 319 Nonpoint Source Pollution grant. Total Section 319 funding utilized by the project was $1,767,642. Additional USDA program funding totaled more than $396,000. Producers and

other local sources contributed $2,950,812 of non-federal match through cash and in-kind services.

The project sponsors worked with producers to develop 84 contracts resulting in the implementation of BMPs on 58,277 acres or 54 percent of land in the watershed. In addition, 10 manure management systems were installed with Section 319 funds, and three more are scheduled to be installed through other programs. A successful program to remove carp and bullheads (27 tons) also was completed by the North Dakota Game and Fish Department. The fish removal, in combination with a new automated, low-level drawdown system that removes nutrient-rich water from the lake bottom, has helped reduce the internal nutrient storage in Lake LaMoure.

As a result of applied BMP, sampling shows significant improvements in the lake's water quality. As measured by chlorophyll-a[1], the photosynthetic pigment that causes the green color in algae and plants, and Secchi disk transparency measurements (clarity), Lake LaMoure has improved from a more eutrophic (high nutrient concentrations and poor water clarity) to a mesotrophic state (lower nutrient concentrations/greater water clarity) (Table III-5). Associated with this improvement in water quality and trophic status is an assessment that Lake LaMoure is no longer threatened for aquatic life and recreation uses.

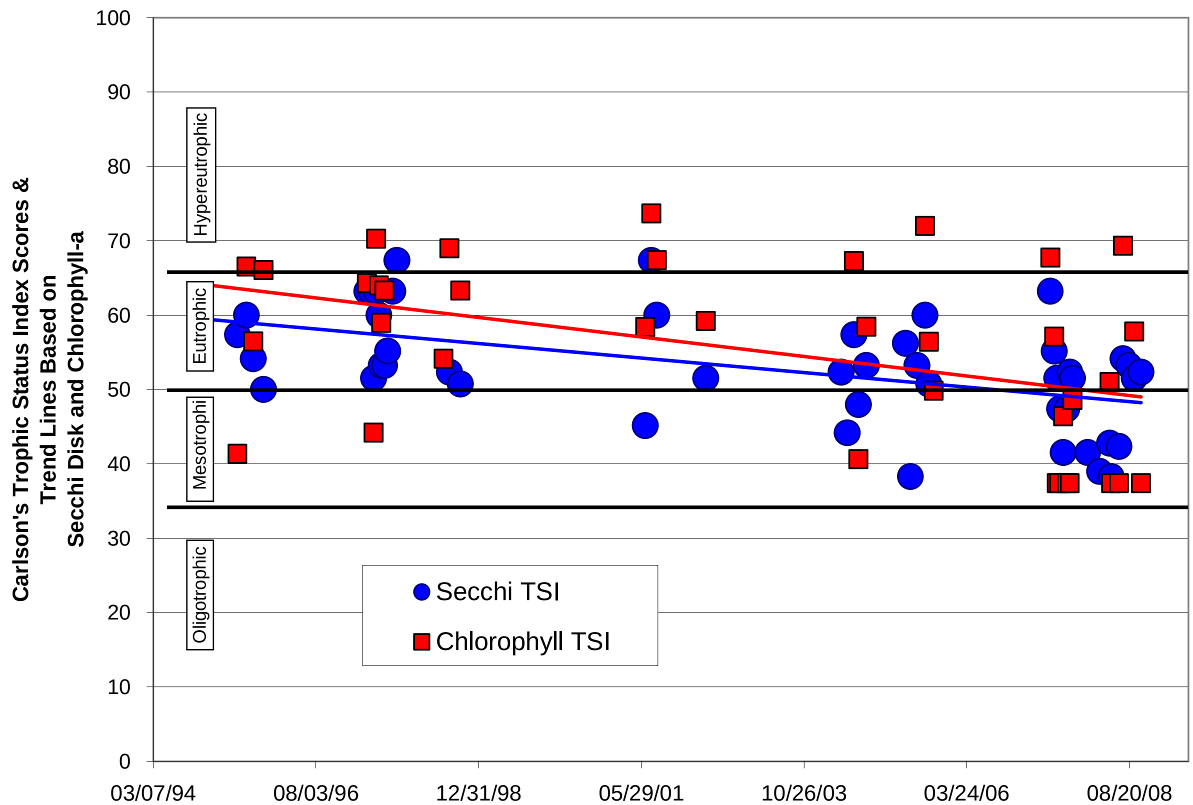



**Figure III-5. Trends in the Trophic Status Index Scores in Lake LaMoure.**

[1]Concentrations of chlorophyll-a are directly related to the amount of algae in the water.

Higher dissolved oxygen (DO) concentrations are another measurement that shows there have been improvements in the lake. Prior to 2004, DO concentrations were consistently below the state's water quality standard of 5.0 milligrams per liter (mg/l) throughout much of the lake. Measurements taken after 2004 now show only small portion of the lake with DO concentration below 5 mg/L. These lower concentrations generally only occur in the hypolimnion during winter thermal stratification. As a third source of supporting information, several of the sampling sites on tributaries in the watershed are also showing reductions in the concentrations of total phosphorus, total suspended solids and fecal coliform bacteria.

A watershed project is only as successful as the support it receives from producers and the partnerships it builds with other agencies and organizations. Project partners included the North Dakota Game and Fish Department (Save Our Lakes Program), Natural Resources Trust Fund (formerly North Dakota Wetlands Trust), Nonpoint Source BMP Team-Sheyenne James RC&D, Natural Resources Conservation Service, and U.S. Fish and Wildlife Service. Project staff worked with these entities and watershed producers to maximize the number of BMPs installed, thus contributing to improved water quality in Cottonwood Creek and Lake LaMoure. As previously indicated, the producers and local partners committed almost $3 million dollars worth of non-federal cash or inkind match to support the project. Most of this match consists of the time and money producers spent to build livestock waste systems, install buffer strips and implement minimum tillage and several other BMPs.

Given the success of the Cottonwood Creek Watershed project, the NPS Program has submitted the project to EPA to meet the state's 2009 targets for the EPA performance measures SP-12 and WQ-10. The target for each measure was one watershed/waterbody in 2009. With potentially three eligible 12-digit hydrologic units (HUs) in the Cottonwood Creek watershed, the SP-12 goal will be met and it is very likely it will be exceeded this year. Since the WQ-10 measure requires an actual delisting, additional data interpretation is required to fully determine eligibility. However, given the in-lake improvements in DO and trophic status, it is expected Lake LaMoure will meet the WQ-10 requirements. Final determinations on the qualification for the WQ-10 measure will be made in April/May 2010.

The success documented in the Cottonwood Creek Watershed project reinforces expectations that the benefits of BMP can be measured if given sufficient time. In the larger watersheds, it is likely ten or more years will be needed, to not only apply the necessary BMP, but also to effectively document the delayed benefits resulting from those practices. This long term commitment needs to be recognized at the onset of a project and maintained for the duration to ensure the benefits of the project can be measured and the goals can be realized.

## 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 required to prioritize waterbodies for TMDL development and to identify those "High" priority waterbodies that will be targeted for TMDL development within the next two to four 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 waste load 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 two-tiered priority ranking. Assessment units (AUs) listed as "High" priority are: (1) 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; or (2) 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 "High" priority 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. "Low" priority AUs are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next eight years.

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, Bismarck and Towner, N.D. (Figure III-6). 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 also 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.

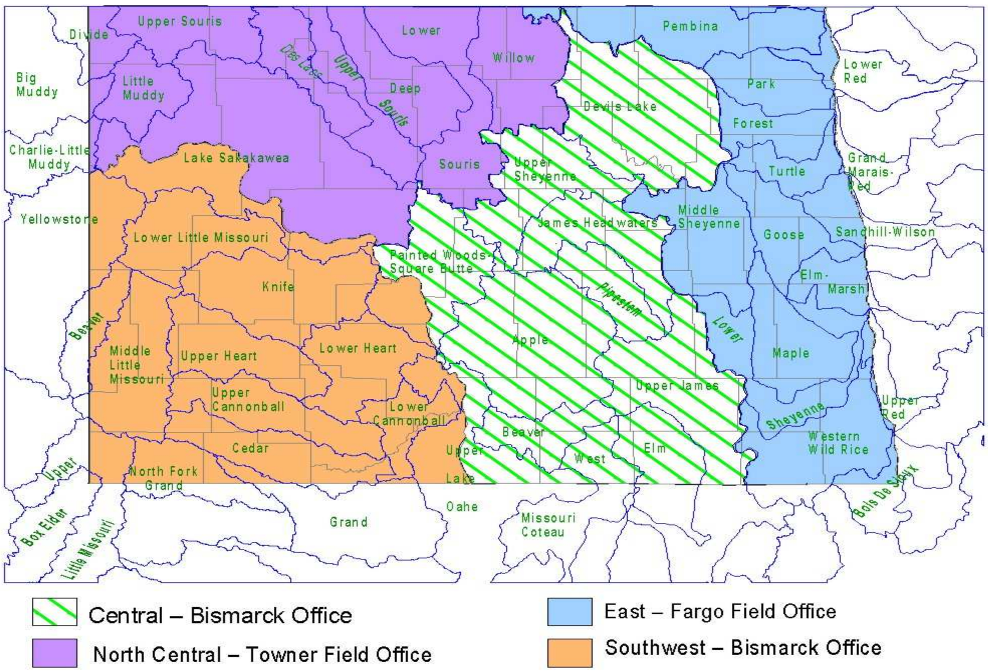



**Figure III-6. Map Depicting Areas of Responsibility for Regional TMDL/Watershed Liaison Staff**

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. The liaisons also 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.

To ensure an ecosystems approach to transboundary water issues and to achieve greater operational efficiencies in the conduct of the International Joint Commission (IJC) and its responsibilities, the IJC has combined the ongoing responsibilities of the International Souris River Board of Control and the Souris River aspects of the International Souris-Red River Engineering Board into the International Souris River Board (ISRB). The ISRB operates under a directive from the IJC dated April 11, 2002. Part of the ISRB's mission is to assist the IJC in preventing and resolving disputes related to the transboundary waters of the Souris River basin.

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, U.S. 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 the last two years, approximately $92 million has been obligated from the CWSRF for the construction of wastewater system improvements. The cumulative amount invested in wastewater system improvements since passage of the Clean Water Act in 1972 is approximately $547 million. In addition to the capital costs, an estimated $20 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 2003, the state's Section 319 NPS Pollution Control Program has provided more than $48 million in financial support to more than 89 state and local projects, including more than $25.9 million to 37 watershed restoration projects. In addition to the Section 319 investment in these watershed projects, project sponsors have provided more than $17.2 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 $22 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 STEPL model, Section 319 cost-shared BMPs are resulting in significant nitrogen, phosphorus and sediment reductions. Based only on crop residue management practices, septic system upgrades, and manure management systems cost-shared in watershed projects from 2003 through 2009, it is estimated that annual nitrogen, phosphorus and sediment loading has been reduced by more than 650,653 pounds, 257,893 pounds and 4,749 tons per year, respectively (Table III-6, page III-25).

**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.

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 $800,000 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. The department continues 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 Stormwater Program. The department continues to work with regulated small MS4s and the Red River Work Group on issues relating to stormwater discharges. Runoff from construction stormwater has been a major concern of EPA.

States need flexibility when managing their stormwater management programs so they can find the best fit for their respective conditions. As long as the stormwater 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 state's water quality standards define the water quality 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 recently completed it's "Nutrient Criteria Development Plan." This plan provides 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.

The installation of tile drains in North Dakota, especially in the Red River valley, is increasing at an exponential rate and presents new challenges to improving and maintaining water quality. Tile drains are designed remove excessive sub-surface soil moisture and to reduce the movement of salts upward into the root zone. Tile drainage allows farmers to plant their fields earlier when wet spring conditions prevail, reduces the potential for drown out during heavy summer rains, and reduces soil salinity. Tile drains can also enhance crop yields and improve soil health. While the production benefits from tile drainage are clear, the cumulative water quality impacts of the water discharged from tile drains is unknown. Tile drainage water often contains high concentrations of nitrates, minerals, and some trace metals. The cumulative impacts from these drains on tributaries and subsequently the Red River are largely unknown.

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: 2008-2019* (NDDoH, 2009). 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 members 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.

### Ambient Water Quality Monitoring Network for Rivers and Streams

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 34 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 and dissolved nutrients (phosphorus, nitrogen, ammonia, nitrate-nitrite, Total Kjeldahl Nitrogen), total and dissolved organic carbon, and fecal coliform and E. coli bacteria, (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 and May 2007.  Equipment was installed at the USGS gauging stations at Fargo (USGS site 05054000; NDDoH site 385414) and Grand Forks (USGS site 05082500; NDDoH site 384156) that 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 these sites that are analyzed for major cations and anions, total suspended solids (TSS), total phosphorus, total nitrogen, ammonia, nitrate-nitrite and fecal coliform bacteria.  As this data set has increased, regression relationships have been developed for select water quality variables (e.g., TSS,  TDS, total phosphorus and total nitrogen) using the continuously recorded field parameters.  These regression relationships have now been used to provide "real-time" concentration estimates of TSS, total phosphorus, total nitrogen and TDS that are posted on the USGS North Dakota District web site (http://nd.water.usgs.gov).  As the data set increases for the Grand Forks site, regression relationships will be developed and "real-time" concentration estimates provided for this site as well.

**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 |
| 385414[1,2] | Red River | at Fargo |
| 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[1,2] | Red River | at Grand Forks |
| 380037[1] | Turtle River | at Manvel |
| 380039[1] | Forest River | at Minto |

[1] Sampling conducted by the USGS through a cooperative agreement
[2] USGS "real-time" station

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

| Station ID | River | Location |
|---|---|---|
| 380157[1] | Park River | at Grafton |
| 380158[1] | Pembina River | at Neche |
| 384157[1] | 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 |

[1] Sampling conducted by the USGS through a cooperative agreement

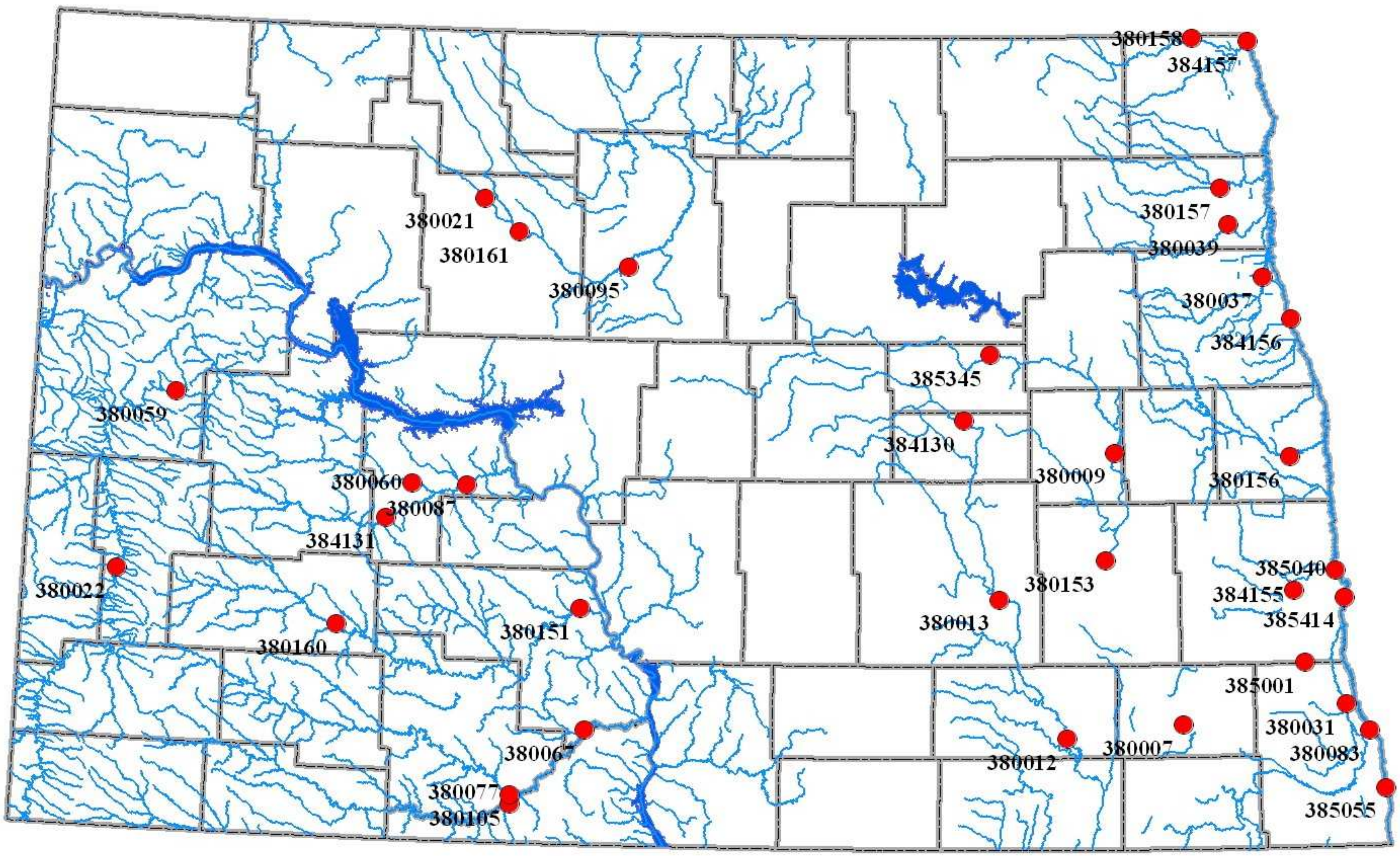



**Figure IV-1. Ambient Water Quality Monitoring Network for Sites Rivers and Streams.**

**Table IV-2. Ambient Water Quality Monitoring Parameters.**

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

## Biological Monitoring Program

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. 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. From this initial work the program expanded to the Souris River Basin in 1997, the James River Basin in 1998 and the Missouri River Basin in 1999 and 2000. Beginning in 1995, biological monitoring was expanded to include macroinvertebrate sampling in addition to fish. 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.

Environmental Monitoring and Assessment Program Western Pilot Project

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 EMAP Western Pilot Project was a five-year effort (2000-2004) targeted for the western conterminous United States. The pilot involved 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 purpose of the EMAP Western Pilot Project was 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) What are the stressors associated with the perennial rivers and streams in poor condition? 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 2003. Based on the EMAP study design, 64 probability-based sites (representing 4,278 perennial stream miles) were sampled within the state. 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). In addition to the 64 random sites, an additional 47 sites were chosen as targeted "reference" and "trashed" sites. Reference sites exemplify river and stream reaches that are considered "least impaired" with respect to anthropogenic (human) disturbance or stress, while "trashed" sites are believed to be impaired due to one or more anthopogenic stressors (e.g., nutrients, habitat, toxics).

Current Program

Beginning in the spring of 2005 through 2007, the department conducted a biological monitoring and assessment project in the Red River Basin. This project was a joint effort with the

Minnesota Pollution Control Agency which sampled the Minnesota side of the Red River Basin. The purposes of this project are to: (1) assess (using biological, physical and chemical data) the current biological condition of perennial, wadeable rivers and streams in the North Dakota and Minnesota portions of the Red River basin; (2) assess the current status of aquatic life use attainment of the perennial, wadeable streams of the Red River basin; (3) develop and refine indices of biological integrity for the fish and macroinvertebrate communities; and (4) investigate potential stressors to impaired aquatic life uses.

Sampling consisted of macroinvertebrates, fish, physical habitat and water chemistry. Sampling in 2005 was limited to the Lake Agassiz Plain ecoregion; however, due to above normal precipitation in June and July 2005, only nine sites (three reference and six probabilistic) were sampled for fish and physical habitat. A total of 41 sites (eight reference, nine trashed, eight duplicate Minnesota and 16 probabilistic) were sampled for macroinvertebrates in September 2005. Due, in part, to delays in securing the state FY05 supplemental grant carry-over funds and to staffing shortages caused by untimely employee resignations, sampling was again limited in 2006. Fish were not collected in 2006, and only 17 sites were sampled in the Northern Glaciated Plains ecoregion for macroinvertebrates. All sampling activities were completed in 2007. In the Lake Agassiz Plain ecoregion, a total of 24 random, 10 targeted reference and 10 targeted impaired sites were sampled for the fish indicator. A total of 25 random, 10 targeted reference and 10 targeted impaired sites were visited for the macroinvertebrate indicator in the Lake Agassiz Plain ecoregion. Within-year and among-year replicate samples were also collected as a measure of variability. In the Northern Glaciated Plains ecoregion, field sampling was conducted only for macroinvertebrates. A total of 25 random, 10 targeted reference and 10 targeted impaired sites were sampled for macroinvertebrates. Within-year and among-year samples were once again collected as a measure of variability. Fish were not sampled in this ecoregion.

National Rivers and Streams Assessment

In 2008 and 2009, the department participated in the EPA-sponsored National Rivers and Streams Assessment (NRSA). The NRSA was a probabilistic assessment of the condition of the nation's rivers and streams and is designed to:

- Assess the condition of the nation's rivers and streams;
- Establish a baseline to compare future rivers and streams surveys for trends assessments;
- Evaluate changes in condition from the 2004 Wadeable Streams Assessment; and
- Help build state and tribal capacity for monitoring and assessment and promote collaboration across jurisdictional boundaries.

The NRSA is one in a series of water assessments being conducted by states, tribes, the EPA and other partners. In addition to rivers and streams, the water assessments will also focus on coastal waters, lakes and wetlands in a revolving sequence. The purpose of these assessments is to generate statistically valid reports on the condition of our nation's water resources and identify key stressors to these systems.

The goal of the NRSA is to address two key questions about the quality of the nation's rivers and streams:

- What percent of the nation's rivers and streams are in good, fair and poor condition for key indicators of water quality, ecological health and recreation?
- What is the relative importance of key stressors such as nutrients and pathogens?

The NRSA was designed to be completed during the index period of late May through September.  Field crews collected a variety of measurements and samples from predetermined sampling reaches (located with an assigned set of coordinates) and from randomly selected stations along the sampling reach. The field crews also documented the physical habitat conditions along the sampling reach.

<u>Ecoregion Reference Network Monitoring Program</u>

The Ecoregion Reference Network Monitoring Program is used to support a variety of water quality management and biological monitoring and assessment activities by providing a network of biologically "least disturbed" reference sites within each of the states four major level 3 ecoregions (Lake Agassiz Plain, Northern Glaciated Plain, Northwestern Glaciated Plain, and Northwestern Great Plain) (Figure IV-2).  Objectives of the Ecoregion Reference Network Monitoring Program include the development of biological indicators.  Reference sites are also expected to support the development of nutrient criteria for rivers and streams and the refinement of existing clean sediment reference yields.

First introduced by the EPA in the 1980's, the ecoregion concept assumes that waterbodies reflect the character of the land they drain, and that where sites are physically comparable, chemical and biological conditions should also be comparable.  As such, reference sites located within a given ecoregion can serve as benchmarks for all other sites within the same ecoregion. Reference sites, therefore, become powerful tools when assessing or comparing results from both chemical and biological monitoring stations.

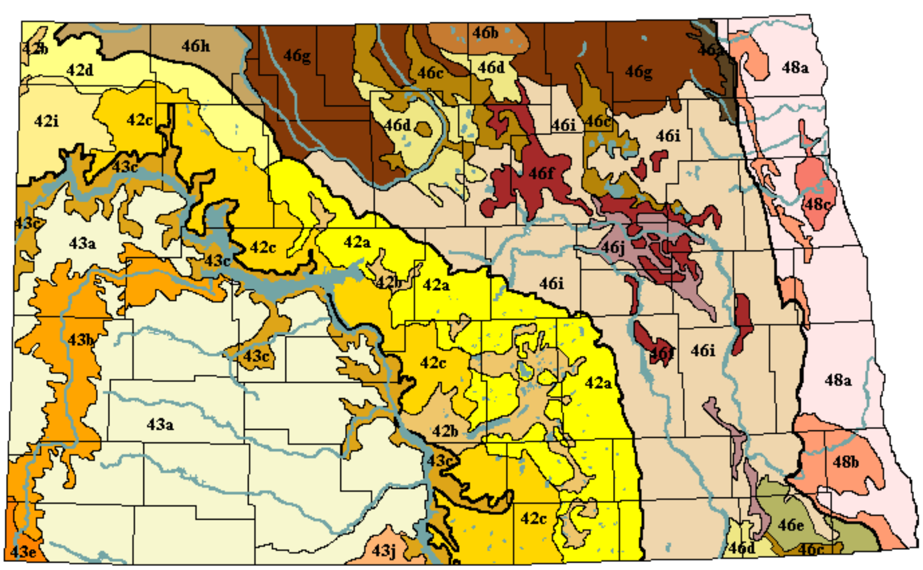



**Figure IV-2.  Map Depicting Ecoregions in North Dakota (Lake Agassiz Plain [48], Northern Glaciated Plain [46], Northwestern Glaciated Plain [42], Northwestern Great Plain [43]).**

The goal of the Ecoregion Reference Network Monitoring Program is to establish a minimum set of 30 "reference sites" within each of the following level 3 ecoregions or ecoregion combinations: Lake Agassiz Plain (48), Northern Glaciated Plains (46), and combination Northwestern Glaciated Plains/Northwestern Great Plains (42/43). In addition to the 30 "reference sites" per ecoregion/ecoregion combination, the department will also select and sample 30 companion "highly disturbed" or "trashed" sites. These sites will be used as a basis of comparison when selecting and calibrating metrics used in IBIs.

Reference sites and companion "trashed" sites are selected through a three step process, including: 1) landscape metric analysis using GIS; 2) site reconnaissance using digital orthoquads and aerial photos via GIS; and 3) site inspection and ground truthing.

During 2005, 2006, and 2007, as part of the Red River Biological Monitoring and Assessment Project, the department sampled 10 reference and 10 trashed sites in the Lake Agassiz Plain ecoregion and 10 reference and 10 trashed sites in the Red River basin portion of the Northern Glaciated Plains ecoregion. In 2008, another 10 reference and 10 trashed sites were sampled in the remaining portions of the Northern Glaciated Plains ecoregion. Reference site sampling will continue in 2009 with 20 reference and 20 trashed sites sampled in the combined Northwestern Glaciated Plains/Northwestern Great Plains ecoregions and 5 reference and 5 trashed sites sampled in the Northern Glaciated Plains ecoregion. In 2010 and again in 2011, 10 reference and 10 trashed sites will be sampled each year in the Lake Agassiz Plain and 5 reference and 5 trashed sites will be sampled each year in the Northern Glaciated Plains ecoregion. The department's first round of reference site sampling will conclude in 2012 with the sampling of 10 reference and 10 trashed sites sampled in the combined Northwestern Glaciated Plains/Northwestern Great Plains ecoregions.

**Lake Water Quality Assessment Program**

Historic Program

The department currently recognizes 248 lakes and reservoirs for water quality assessment purposes. Of this total, 140 are manmade reservoirs and 108 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 Assessment Database (ADB), the 140 reservoirs have an areal surface of 543,168 acres. Reservoirs comprise about 71 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 63 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 138 reservoirs share 62,436 acres, with an average surface area of 449 acres.

The 108 natural lakes in North Dakota cover 218,518 acres, with approximately 117,697 acres[1]

[1] The estimated surface area for Devils Lake is based on a lake elevation of 1446 mean sea level (msl), which is the elevation at which water overflows to Stump Lake.

or 54 percent attributed to Devils Lake. The remaining 107 lakes average 942 acres, with half being smaller than 250 acres.

Through a grant from the U.S. EPA Clean Lakes Program, the department initiated the Lake Water Quality Assessment (LWQA) Project from 1991-1996. 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, including trophic status.

The lakes and reservoirs targeted for assessment were chosen in conjunction with the North Dakota Game and Fish Department (NDGF). 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 were 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.

From 1997-2000, LWQA Project activities were integrated into the department’s rotating basin monitoring strategy. Lake Darling and the Upper Des Lacs Reservoir were sampled in 1997 as the department focused its monitoring activities in the Souris River Basin. 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.

Current Program

As was stated previously the department recognizes 249 public lakes and reservoirs for assessment purposes. Of this total, 121 have no monitoring data, or so little monitoring data, that water quality cannot be assessed. These remaining lakes and reservoirs are the current target of lake water quality monitoring and assessment. Beginning in 2008 and extending through 2011, the department will sample approximately 15 lakes or reservoirs in the state. Through this “Targeted Lake Water Quality Assessment Project”, lakes will be sampled 2 times per year, twice during the summer. Classified lakes and reservoirs in the state with little or no monitoring data are targeted for monitoring and assessment under this project. This initial 4-year project will result in water quality and trophic status assessments for a minimum of 60 lakes in the state. Information from these assessments will be published in a lake atlas format and posted on the department's web site. These assessments will also be used to assess beneficial use attainment status for Section 305(b) reporting and Section 303(d) listing. Assuming continued funding can be secured, the department plans to continue or expand this program beyond 2011.

Devils Lake and Lake Sakakawea Monitoring

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 currently sampled four 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 NDGF 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.

Survey of the Nation's Lakes

In 2007, the U.S. EPA, in partnership with the department and other state agencies, initiated the Survey of the Nation's Lakes to answer key environmental questions about the quality of the nation's lakes. The survey provides a snapshot of the condition of our nation's lake resource on a broad geographic scale. Results from this assessment will allow water quality managers, the public, state agencies and others to say, with known statistical confidence, what proportion of the nation's lakes are in poor biological condition and identify key stressors affecting this resource. Data collected from the lakes will be analyzed on both a regional and national scale. The information generated from this survey fills an important gap in meeting the requirements of the Clean Water Act. The goals of the lakes survey are to:

- Provide regional and national estimates of the condition of lakes in good, fair and poor condition.
- Explore the relative importance of key stressors such as nutrients and pathogens and their extent across the population.
- Establish a baseline to compare future surveys for trends assessment and to evaluate trends since the 1970's National Eutrophication Study.
- Help build state and tribal capacity for monitoring and assessment.

To answer these questions and to achieve the goals of the program, the lakes survey focused on identifying and measuring relevant lake quality indicators in three basic categories: 1) ecological integrity; 2) trophic status; and 3) recreational condition. Data collected on stressors will be analyzed to explore associations between stressors and ecological condition.

For the purposes of this survey, lakes are defined as natural or manmade freshwater lakes, ponds and reservoirs in the conterminous U.S. Additional criteria included lake size greater than 10 acres (4 hectares), lake depth greater than 1 meter, and lake area greater than 1000 square meters of open water. Water bodies that were excluded include the Great Lakes (surveyed as part of the

National Coastal Condition Assessment), the Great Salt Lake and other naturally saline systems, and water treatment or disposal ponds.

The lake sampling locations were selected using a modern probabilistic survey design approach. In North Dakota, the department, working in cooperation with the USGS, conducted lake sampling at 38 lakes. Four of the state's 38 lakes were replicate sampled for a total of 42 lakes sampled in North Dakota in 2007.

**Fish Tissue Contaminant Surveillance Program**

Program Background

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 2009, the department cooperated with the North Dakota Game and Fish Department's Fisheries Division in the collection and analysis of more than 300 fish tissue samples collected from Devils Lake, Lake Sakakawea, Lake Oahe, and Alkaline Lake.

These data are then used to issue periodic 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 and pregnant or breast-feeding women).

**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 to: (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 phase 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 members 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.

**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**

<u>Complaint Investigations</u>

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.

<u>Fish Kill Investigations</u>

Fish mortalities can result from a variety of causes and sources, some natural in origin and some induced by man. It is recognized that response time is all-important in the initial phases of a fish kill investigation. Therefore, persons reporting a fish kill are encouraged to immediately? contact the department or the NDGF 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 NDGF are dispatched to investigate. The extent of a fish kill investigation is dependent on 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**

Stream flow data is critical to the analysis and interpretation of water quality data. Stream flow data are 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 2007 water year (October 1, 2006 through September 30, 2007), the USGS cooperated with numerous state, federal and local agencies in the collection and reporting of stream flow data from 117 stream flow-gauging stations.

In addition to the extensive USGS stream flow 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 analyses.

## B. Assessment Methodology

### Chapter 1. Introduction

As stated earlier, for purposes of 2010 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). The purpose of this section is to briefly summarize the assessment methodology used in this integrated report. A complete description of the state's assessment methodology for surface waters is provided in Appendix A. 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, 2006). The assessment methodology is also consistent with the department's interpretation of the narrative and numeric criteria described in its state water quality 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 2.3.1 (ADB).

### Chapter 2. Assessment Database (ADB)

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. A complete description of the ADB is provided in the "Water Quality Assessment Methodology for North Dakota's Surface Waters" (Appendix A).

North Dakota's ADB for the 2010 assessment cycle contains 1,711 discreet assessment units (AUs) representing 54,606 miles of rivers and streams and 248 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.

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 2010 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 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 accomplish 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, 2006). These regulations define the protected beneficial uses of the state's rivers, streams, lakes and reservoirs. Six beneficial uses (aquatic life, recreation, drinking water, fish consumption, agriculture, industrial 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.

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 are applicable to all stream classes and, unless available data provide evidence of impairment, are presumed to be fully supporting.

## Chapter 4. Sufficient and Credible Data Requirements

Water quality assessments, done for purposes of Section 305(b) assessment and reporting and 303(d) listing, require the department to use only what it considers to be sufficient and credible data. A complete description of the department's "sufficient and credible data requirements" is provided in the "Water Quality Assessment Methodology for North Dakota's Surface Waters" (Appendix A). In general, 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 or biological data are 10 years old or less for rivers and streams and lakes and reservoirs, unless there is adequate justification to use older data (e.g., land use, watershed, or climatic conditions have not changed). There is no age limit for fish tissue mercury data. Data for all 10 years of the period are not required to make an assessment.

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

- There should be a minimum of two samples collected from lakes or reservoirs during the growing season, May through September. The samples may consist of two samples collected the same year or samples collected in separate years.

- A minimum of five fecal coliform and/or E. coli samples are 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).

- For all chemical criteria that are expressed as a 30-day arithmetic average (e.g., chloride, sulfate, radium 226 and 228, and boron), a minimum of four daily samples must be collected during any consecutive 30-day period.

- A minimum of two biological samples (fish and/or macroinvertebrate) are necessary in the most recent 10-year period. Samples may be collected from multiple sites within the assessment stream reach, multiple samples collected within the same year, or individual samples collected during multiple years. Samples may consist of a minimum of two fish samples, two macroinvertebrate samples, or one fish and one macroinvertebrate sample.

- The mean methylemercury concentration is estimated from a minimum of 3 composite samples (preferred) or 9 individual fish samples representative of the filet. When composite samples are used, each composite sample should consist of a minimum of three individual fish per composite with the smallest fish in the composite no less than 75% of the largest fish by length. Each composite sample should also be representative of a distinct age class of the target fish species in the waterbody. In other words, if three composite samples are collected, one composite should represent small fish, one representing medium sized fish and one representing large fish in the population.

- If individual fish samples are collected then a minimum of 9 fish samples should be used to estimate the mean methylmercury concentration. The same criteria used to collect a composite sample should be used for individual fish samples where fish should be representative of at least three size classes and a minimum of three fish should be collected per size class (3 size classes times 3 fish per size class equals 9 fish). In cases where individual fish samples are used, then the number of fish per size class should be equal.

## Chapter 5. Existing and Available Water Quality Data

### River and Stream Assessment Data

Chemical Data

Since 1994, the department has operated a network of 26 to 34 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 current 34-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.

Based on the department's "credible and sufficient data requirements," only the previous 10 years of water column chemistry data will be used for assessments. Years of record are based on the USGS water year. Water years are from October 1 (or one year) through September 30 of the following year. It should be noted that it is preferable to split the year in the fall when hydrologic conditions are stable, rather than to use calendar years. Data for all 10 years of the period are not required to make an assessment**. For purposes of assessments conducted for 2010 Section 305(b) report and Section 303(d) list, the period of record will be from October 1, 1998 through September 30, 2009.**

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.

**Lake and Reservoir Assessment Data**

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 NDGF. 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 assessments 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.

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 four 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 NDGF 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 2007, the U.S. Army Corps of Engineers also conducted water quality monitoring at several fixed-station sites on Lake Sakakawea.

Beginning in 2005 and continuing in 2006 and 2007 the department initiated a cooperative Lake Water Quality Assessment Project with the NDGF Fisheries Division. The goal of this long-term monitoring and assessment project is to: (1) monitor the chemical, physical and biological character of the state's lakes and reservoirs; (2) use chemical, physical and biological indicators to assess the current water quality condition and trophic status of monitored lakes and reservoirs; (3) determine spatial differences among lakes and reservoirs; and (4) determine temporal trends in lake water quality by comparing project data to Lake Water Quality Assessment data or other historic water quality data. Assessment information generated from this project will be used by both the NDGF and the North Dakota Department of Health's Division of Water Quality to prioritize lakes, reservoirs and their watersheds for lake maintenance and improvement projects (i.e., Save Our Lakes, Total Maximum Daily Loads, Section 319 Nonpoint Source Pollution Management Program). Samples are collected from each lake or reservoir two to four times per year and are coordinated with existing NDGF district lake sampling activities (e.g., standard adult fish population sampling, summer water quality sampling, fall reproduction sampling and winter water quality sampling). At a minimum, two samples are collected during the year, one during the summer (June, July and/or August) and one during the winter under ice cover (January or February). Sixty lakes within five of the six NDGF districts were targeted for sampling in 2005/2006. Ten lakes were targeted for sampling in 2006/2007, and six lakes were targeted in 2007/2008.

**Fish Consumption Use Assessment 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 species-specific fish advisories for the state's rivers, lakes and reservoirs. These data have also been used to assess fish consumption use for the integrated report.

**Other Agency/Organization Assessment 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 May 18, 2009, the department requested all readily available and credible data from 23 agencies and organizations believed to have water quality data (Appendix B). In response to this request, the department received no other additional data. While the North Dakota State Water Commission did respond to the request for additional data, it was determined that their data had already been provided to the department by the USGS.

## Chapter 6. Beneficial Use Assessment Methodology

The assessment methodology or decision criteria used to assess aquatic life, recreation, drinking water, fish consumption, agricultural, and industrial uses where they are assigned to the state's surface waters is provided in Appendix A. 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 and E. coli bacteria) and toxic pollutants (e.g., trace elements and pesticides) data collected between October 1, 1998 and September 30, 2009. 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 are pooled for analysis.

## Chapter 7. Assessment Categories

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. Guidance provided by the U.S. EPA (U.S. EPA, 2005) provides for five assessment categories representing varying levels of water quality standards attainment. These assessment categories range 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 (Appendix A).

For purposes of the 2010 Integrated Report and Section 303(d) list of impaired waterbodies needing TMDLs, the department has identified a subcategory to Category 5 waterbodies. This subcategory, termed Subcategory 5A, includes rivers, streams, lakes or reservoirs that were assessed and listed in previous Section 303(d) lists, including the 2008 list, but where the original basis for the assessment decision and associated cause of impairment is questionable. These Subcategory 5A waterbodies include rivers and streams listed for biological impairments based on only one sample for the entire segment or on samples collected more than 10 years ago, waterbodies listed for sediment/siltation impairments, or lakes and reservoirs where the assessments are based on one sampling event or on data that are greater than 10 years old. These waterbodies will remain on the 2010 Section 303(d) list, but will be targeted for additional monitoring and assessment during the next two to four years.

**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 | There is 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 subcategorized as:<br>• 4A - waterbodies that are impaired or threatened, but TMDLs needed to restore beneficial uses have been approved or established by EPA.<br>• 4B - waterbodies that are impaired or threatened, but do not require TMDLs because the state can demonstrate "other pollution control requirements (e.g., BMPs) required by local, state or federal authority."<br>• (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.<br>• 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.<br>• 5A – waterbodies currently listed on the Section 303(d) list, but are targeted for additional monitoring and assessment during the next two to four years. |

# 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.

In addition to these five broad categories, the department has identified a subset of Category 5 waterbodies as Subcategory 5A. This subcategory includes rivers, streams, lakes or reservoirs that were assessed and listed in previous Section 303(d) lists, including the 2008 list, but where the original basis for the assessment decision and associated cause of impairment is questionable. These Subcategory 5A waterbodies include rivers and streams listed for biological impairments based on only one sample for the entire segment or on samples collected more than 10 years ago, waterbodies listed for sediment/siltation impairments, or lakes and reservoirs where the assessments are based on one sampling event or on data that are greater than 10 years old. These waterbodies will remain on the 2010 Section 303(d) list, but they will be targeted for additional monitoring and assessment during the next two to four years.

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. Three AUs, totaling 55 miles, were classified as Category 1, meaning all uses were assessed and fully supporting. One-thousand-two-hundred-forty-seven (1247) AUs totaling 47,460 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. In most cases, agriculture and industrial uses were assessed as fully supporting with the remaining aquatic life, recreation and/or municipal water supply uses not assessed.  A total of 24 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, 14 AUs do not need TMDLs because TMDLs have already been completed and approved by EPA (Category 4A) and 10 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 188 AUs (6,448 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.

**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 | 3 | 54.55 |
| 2 | Some uses met, others not assessed | 1247 | 47,459.59 |
| 3 | No uses assessed | 0 | 0 |
| 4A | Some or all uses impaired or threatened, but a TMDL(s) has been approved for all impaired uses. | 14 | 452.78 |
| 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. | 10 | 191.45 |
| 5 | Some or all uses impaired or threatened, and a TMDL is required. Includes category 5A waterbodies. | 188 | 6,447.86 |

## Chapter 2. Water Quality Summary

Eighty-six percent (4,645 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 less than 50 percent (2,316 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 14 percent (762 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 | 2,328.93 | 2,316.28 | 762.20 | 44,518.06 | 4680.76 | 54,606.23 |
| Fish Consumption | 95.53 | 0 | 401.48 | 3,596.18 | 0 | 4,093.19 |
| Recreation | 1,489.39 | 3,689.22 | 1,808.72 | 46,196.54 | 1,422.36 | 54,606.23 |
| Drinking Water Supply | 2,037.14 | 85.74 | 0 | 3,204.67 | 230.41 | 5,557.96 |
| Agriculture | 54,606.23 | 0 | 0 | 0 | 0 | 54.606.23 |
| Industrial | 54,606.23 | 0 | 0 | 0 | 0 | 54,606.23 |

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 dissolved oxygen (DO) to be depleted. Rivers and streams impaired by siltation/sedimentation, organic enrichment, eutrophication due to excess nutrients and habitat alteration also will result in a degradation of 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/E. coli | 5,497.94 |
| Physical Habitat Alterations | 2,470.51 |
| Sedimentation/Siltation | 1,783.11 |
| Biological Indicators | 1,288.56 |
| Oxygen Depletion | 466.71 |
| Mercury in Fish Tissues | 401.48 |
| Flow Alterations | 274.25 |
| Nutrients | 51.40 |
| Trace Metals in the Water Column | 196.63 |
| Total Dissolved Solids/Chloride | 35.89 |
| Ammonia | 13.04 |

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 6,987 miles of rivers and streams in the state. Recreation use was fully supporting, fully supporting but threatened and not supporting on 1,489 miles, 3,689 miles and 1,809 miles, respectively (Table V-2). Fecal coliform and/or E. coli 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 and E. coli 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).

Drinking water supply use is classified for 5,558 miles of rivers and streams in the state. Of the 2,123 miles assessed for this report, only 86 miles (4 percent) were assessed as threatened for drinking water supply use (Table V-2).

A total of 4,093 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 (401.48 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 to estimate the 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). Based on the recommended EPA fish tissue criterion of 0.3 $\mu$g methyl-mercury/gram of fish tissue, only the Red River of the North was assessed as not supporting fish consumption. The Missouri River below Garrison Dam (95.5 miles) is assessed as fully supporting fish consumption use based on the EPA fish tissue criterion for methyl-mercury. 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 | 5,410.98 |
| Animal Feeding and Handling Operations | 3,545.28 |
| Crop Production (Dryland) | 2,574.99 |
| Loss of Riparian Habitat | 2,441.56 |
| Stormwater Runoff | 871.38 |
| Source Unknown | 910.32 |
| Highway and Road Runoff | 634.89 |
| Channel Erosion/Incision from Upstream Hydromodifications | 530.31 |
| Streambank Modification | 527.96 |
| On-site Treatment Systems (Septic Systems) | 645.34 |
| Wetland Loss (Drainage/Filling) | 449.83 |
| Rangeland/Pastureland Grazing | 411.87 |
| Upstream Impoundments | 313.49 |
| Channelization | 275.95 |
| Natural | 207.80 |
| Hydrostructure Flow Regulation/Modification | 226.66 |
| Municipal Point Source Discharges | 203.54 |
| Land Development | 110.77 |
| Industrial Point Source Discharge | 79.60 |
| Source Outside State Jurisdiction or Border | 59.56 |
| Flow Alteration for Water Diversion | 27.15 |
| Dam Construction | 13.05 |
| Golf Courses | 13.04 |

## B. Lakes and Reservoirs Water Quality Assessment

### Chapter 1. Assessment Category Summary

Of the 248 public lakes and reservoirs included in the Assessment Database (ADB), only 196 are included in the state's water quality standards as classified lakes and therefore are assigned designated beneficial uses. The remaining 52 lakes and reservoirs, while included in the state's estimate of total lake acres, were not assessed for this report. Table V-5 provides an assessment category summary for the 196 classified lakes and reservoirs in the state. One lake was classified as Category 1, meaning all uses were assessed and were fully supporting. One-hundred-fifty-two (152) lakes and reservoirs totaling 189,981 acres were assessed as Category 2. These are lakes and reservoirs where at least one designated use, mostly agriculture use and industrial use, was assessed as fully supporting, but the other uses were not assessed. A total of 17 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. Twenty-six (26) lakes and reservoirs totaling 505,752 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).

**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 | 885.30 |
| 2 | Some uses met, others not assessed | 152 | 189,980.60 |
| 3 | No uses assessed | 0 | 0 |
| 4A | Some or all uses impaired or threatened, but a TMDL(s) has been approved for all impaired uses. | 17 | 3,640.80 |
| 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. | 26 | 505,752.00 |

## Chapter 2. Water Quality Summary

A total of 196 lakes and reservoirs, representing 700,259 surface acres, were assessed for this report. The remaining 52 lakes and reservoirs, included in the ADB, but not assessed, represent 61,427 acres or only 8.1 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). One-hundred-twenty-two (122) lakes and reservoirs, representing 686,108 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, 28 lakes and reservoirs representing 7,957 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 | 678,151.0 | 7,956.6 | 171.8 | 12,629.6 | 1,349.7 | 700,258.8 |
| Fish Consumption | 113,160.0 | 0 | 490,946.0 | 95,267.4 | 0 | 699,373.4 |
| Recreation | 545,748.1 | 134,947.7 | 5,546.8 | 13,369.1 | 647.0 | 700,258.8 |
| Drinking Water Supply | 368,762.0 | 0 | 0 | 330,201.4 | 0 | 698,963.4 |
| Agriculture | 700,258.8 | 0 | 0 | 0 | 0 | 700,258.8 |
| Industrial | 700,258.8 | 0 | 0 | 0 | 0 | 700,258.8 |

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 |
|---|---|
| Nutrients | 140,549.7 |
| Oxygen Depletion | 5,857.0 |
| Sedimentation/Siltation | 4,692.1 |
| Turbidity | 1,567.8 |
| Total Dissolved Solids | 36.8 |
| Mercury in Fish Tissues | 490,946.0 |

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 686,243 lake and reservoir acres in the state. Of this total, two (2) lakes, representing 5,547 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). Thirty-six (36) lakes and reservoirs, totaling 134,948 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.

One-hundred and ninety-five (195) lakes and reservoirs, representing 699,373 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 195 lakes and reservoirs entered into the ADB and assigned a use for fish consumption, only Devils Lake, Lake Sakakawea, Lake Oahe, Lake Tschida, and Nelson Lake had sufficient methyl-mercury fish tissue data and fish population survey data necessary to calculate average concentrations and to assess fish consumption use. Based on these data and the EPA recommended fish tissue criterion for methylmercury of 0.3 µg/g, Lake Sakakawea, Devils Lake, and Lake Tschida were assessed as not supporting fish consumption use, while Lake Oahe and Nelson Lake were assessed as fully supporting fish consumption use (Table V-6). The remaining 190 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.

Five reservoirs (Lake Sakakawea, Lake Ashtabula, 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 (Associated with Mercury in Fish) | 485,928.0 |
| Crop Production (Dryland) | 140,863.5 |
| Internal Nutrient Recycling | 139,358.6 |
| Rangeland/Pastureland Grazing | 126,299.7 |
| Wetland Loss (Drainage/Filling) | 125,895.3 |
| Stormwater Runoff | 118,173.9 |
| Riparian Grazing | 14,647.5 |
| Animal Feeding and Handling Operations | 13,484.2 |
| On-site Treatment Systems (Septic Systems) | 9,607.2 |
| Anoxia Due to Thermal Stratification/Eutrophication | 5,857.0 |
| Sediment Resuspension | 2,518.4 |
| Upstream Impoundments | 2,073.4 |
| Highway and Road Runoff | 413.6 |
| Surface Mining | 376.8 |
| Streambank Modification | 392.5 |
| Loss of Riparian Habitat | 194.0 |
| Land Application of Biosolids/Septage Disposal | 55.2 |
| Flow Alteration for Water Diversion | 36.8 |

## 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 196 classified 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 126 of the 196 lakes entered into the ADB database.  The majority of the state’s assessed lakes and reservoirs range from eutrophic to hypereutrophic.  Thirty-nine (39) lakes and reservoirs were assessed as mesotrophic.  There were no oligotrophic lakes assessed in the state.

**Table V-9.  Trophic Status Summary for Lakes and Reservoirs in North Dakota**

| Trophic Status | Number of Lakes | Acreage of Lakes |
|---|---|---|
| Oligotrophic | 0 | 0.0 |
| Mesotrophic | 39 | 509,453.6 |
| Eutrophic | 61 | 47,283.7 |
| Hypereutrophic | 26 | 128,925.9 |
| Not Assessed | 70 | 14,595.6 |
| Total Number of Lakes | 196 | 700,258.8 |

## 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 seven (7) watershed restoration projects that have a direct impact on lakes or reservoirs in the state. These include Lake Hoskins, Northgate Dam, Short Creek Dam, Powers Lake, Sheep Creek Dam, Brewer Lake, and Larimore Dam. 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.

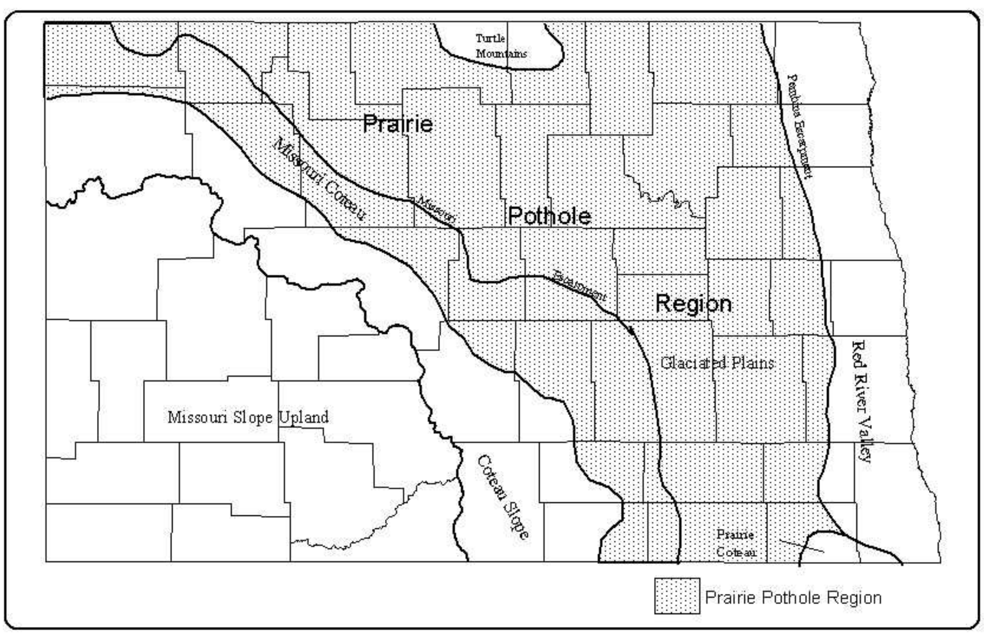



**Figure V-1. Prairie Pothole Region**

## 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.

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 40 percent of wetlands were cultivated to the wetland edge, 33 percent were in pasture and 7 percent were hayed within a 3,877-square-mile area of the Prairie Pothole Region.

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.

**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.<br><br>**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.<br><br>**Retention of Particulates**. Deposition and retention of inorganic and organic particulates (>0.45 $\mu$m) 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.<br><br>**Removal of Imported Elements and Compounds**. Nutrients, contaminants, and other elements and compounds imported to the wetland that are removed from cycling processes. |
| **Biotic and Habitat Functions** |
| **Maintenance of Characteristic Plant Community**. Characteristic plant communities 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.<br><br>**Maintenance of Habitat Structure Within Wetland**. Soil, vegetation and other aspects of ecosystem structure within a wetland required by animals for feeding, cover and reproduction.<br><br>**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.<br><br>**Maintenance of Habitat Interspersion and Connectivity Among Wetland**. The spatial distribution of an individual wetland in reference to adjacent wetlands within the complex.<br><br>**Maintenance of Taxa Richness of Invertebrates**. The capacity of a wetland to maintain characteristic taxa richness of aquatic and terrestrial invertebrates.<br><br>**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. |

## 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, 2006) 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

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. The primary objectives of the Wetland Monitoring and Assessment Program are to develop biological indicators and assessment methodologies for wetlands and to use those indicators and methods to monitor and assess wetland condition at varying spatial scales (e.g.,. individual wetland, wetland complex, watershed, ecoregion). Secondary objectives of the Wetland Monitoring and Assessment Program are to: 1) refine and apply these methods to evaluate the effectiveness of wetland mitigation and restoration programs and projects; and 2) support the development of water quality standards for wetlands.

EPA recommends wetland assessment projects use the three tiered approach in the form of landscape assessment (level I), rapid assessment (level II), and intense assessment (level III) (EPA, 2006, Kentula, 2007). Recent studies have successfully used this methodology to determine wetland health (Brooks et al. 2004, Wardrop et al. 2007). Each level of assessment provides the resource manager with wetland condition information with varying levels of accuracy. Since most level I assessment methods are larger scale landscape assessments based on remote sensing data (Phillips et al. 2005, Mita et al. 2007, Wardrop et al. 2007), they are considered the least accurate. They also require fewer resources and are generally less costly to implement. Once developed, level I assessments, using remote sensing, require no field work and can be done from an office. These assessments are typically general assessments, intending to give the surveyor a first glimpse into the landscape condition of wetlands in an area.

Level III assessment methods, on the other hand, are considered the most accurate since they require field data collection at the wetland scale. Level III assessment methods are also resource intensive and quite costly to implement.

Recent efforts to establish level II wetland assessment methods have come in the form of rapid assessments (Mack et al. 2001, Collins et al. 2008). Rapid assessment methods are less time and financially intensive than level III methods utilizing IBI's; however, the information is less detailed. Rapid assessments can be used where level III surveys are not possible or too expensive to conduct. Rapid assessments are meant to give a rapid on the ground assessment of wetland condition, and identify possible stressors to the biotic communities.

Since the early 1990's the department has been active in the development of wetland monitoring methods and sampling designs to assess the quality (i.e., biological integrity) wetland resources across the state. In particular, the department has developed an active research program in collaboration with academic partners at North Dakota State University and the University of North Dakota to monitor and assess wetlands.

Working in collaboration with its academic partners, the department now has available assessment methods for each level of wetland assessment. The following is a brief description of methods which have been developed for each level of wetland assessment.

**Level III Assessment**

Since it's beginning, the key to the development of the department's Wetland Monitoring and Assessment Program has been the development of biological indicators which can be used as a level III wetland assessment 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 index of biological integrity (IBI) for wetland plants has been extremely successful.

DeKeyser et al. (2003) developed an IBI for seasonal wetlands in the Prairie Pothole Region (PPR) that is termed the Index of Plant Community Integrity (IPCI). An IPCI was also developed to quantitatively assess the condition of temporary and semi-permanent wetlands of the Northwestern Glaciated Plains (NWGP) ecoregion of North Dakota (DeKeyser 2000, Kirby and DeKeyser 2003).

The IPCI for temporary, seasonal, and semi-permanent wetlands was further evaluated over a wider variety of disturbances and a larger geographic area including sites in the Northern Glaciated Plains (NGP) and sites in other sub-ecoregions of the NWGP in northeastern Montana and North and South Dakota (Hargiss 2005, Hargiss et al. 2008). These IBIs can now be applied in level III assessments throughout the Northern Glaciated Plains and Northwestern Glaciated Plains ecoregions of North Dakota, South Dakota, and Montana.

**Level II Assessment**

The level II, North Dakota Rapid Assessment Method (NDRAM), was developed by researchers at North Dakota State University for the Missouri River Coteau Regional Wetland Assessment Pilot Project (see below) (Hargiss 2009). The NDRAM incorporates metrics from other rapid assessment methods for wetlands currently being used around the nation, as well as characteristics specific to the Prairie Pothole Region (Mack 2001, Collins et al. 2008). The NDRAM assesses the three factors needed for a site to be considered a wetland: hydrology; hydric soils; and hydric vegetation (Tiner 1999). It takes into account physical and biological characteristics of a site, as well as stressors affecting the site.

The NDRAM can be used to predict wetland condition using a rapid process for temporary, seasonal, or semi-permanent wetlands and is completed with a general walking survey. The NDRAM is conducted by walking around the wetland observing the vegetation, land use, management, and hydrologic features. This information is then used to complete the NDRAM field form.

The first step to completing the NDRAM involves filling out a general site description, land owner and land use information, amount and type of cover, and filling out a site map. This information may be useful during return visits to the site to determine trends and changes at the site. The portion of the NDRAM used to determine the final score utilizes a three metrics system. The three metrics used are: 1) buffers and surrounding land use; 2) hydrology, habitat alteration, and development; and 3) vegetation. Metric 1 is worth 20 points and includes two parts: 1a) average buffer width; and 1b) intensity of surrounding land use. Metric 1a calculates the average buffer on a scale from 0 to 10 points ranging from very narrow (<10 meters wide around the wetland) to wide (50 meters or more). Metric 1b assesses the intensity of surrounding land use on a scale from 0 to 10 points ranging from high (urban area or row crop) or very low (native prairie and/or light to moderate grazing).

Metric 2, which assesses hydrology, habitat alteration, and development, is worth a total of 57 points, and includes 6 sections: 2a) substrate/soil disturbance; 2b) plant community and habitat development; 2c) habitat alteration and recovery from current and past disturbance; 2d) management; 2e) modifications to natural hydrologic regime; and 2f) potential of wetland to reach reference (native) condition for the area. Metric 2a is worth a potential 7 points and asks the rater to assess the soil/substrate disturbance on a scale from undisturbed to recent or no recovery. Metric 2b is potentially worth 12 points and assesses the plant community and habitat development on a scale from poor to excellent. Metric 2c assesses habitat alteration and recovery on a scale from most suitable to recent or no recovery and is worth a potential 10 points. Metric 2d assesses the management techniques used at a site and is worth 4 points. Management techniques are rated on a gradient starting with cropped sites as the 0 points valued, restored, CRP, idle, or hayed areas at the 2 point level and burned or moderately grazed areas at the 4 point level. Metric 2e assesses modifications that have occurred within the wetland basin. It is worth a potential 12 points and rates sites on a scale from no modifications to recent or no recovery. Metric 2f assesses the potential of a wetland for a potential 12 points on a scale from no potential to excellent potential.

Metric 3 assesses the vegetation of a site, is worth a potential 23 points and encompasses two parts: 3a) invasive species; and 3b) overall condition. Metric 3a has a potential three points possible for a site absent of invasive species, but it is possible for a site to lose 3 points if invasives are extensive (covering >75% aerial cover). Metric 3b is worth a potential 20 points and rates sites on a condition gradient from very poor to very good.

Scores for each metric are added to produce a total score between 0 and 100. A score of 0 is indicative of a site in very poor condition, while a score of 100 indicates a native condition reference site.

**Level I Assessment**

While an IBI approach to wetland assessment using the IPCI 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 has also collaborated with NDSU's Soil Sciences Department to develop a regional-scale wetland assessment methodology using satellite remotely sensed data and GIS tools. This approach was developed by assembling calibration and verification IPCI data from wetlands sampled previously and by using multi-spectral Landsat Thematic Mapper ™ and Enhanced Thematic Mapper (ETM+) satellite data. The result, termed the Landscape Wetland Condition Assessment Model (LWCAM) is used to predict wetland condition through the use of GIS software (Mita et al. 2007).

The LWCAM uses LANDSAT TM and ETM+ satellite data as a means of classifying, mapping, and quantifying landscape land cover components. Wetlands are assessed as a data point representing a single landscape. A 0.283 $km^2$ (300m radius extent) buffer is delineated from the center of each wetland. Landscape characteristics (i.e., metrics) are then analyzed within this buffer. A three-year temporal-scale analysis (e.g., 2002, 2003, 2004 map years) is generally selected to allow for the comparison of different wetland landscapes or the same landscape model at different times. Landscape pattern metrics are derived from land cover components within the landscape extent using the ArcView-for-FRAGSTAT program.

LWCAM data are analyzed according to the system used by Mita et al. (2007). The landscape metrics are quantified in terms of the individual patches, classes (specific land cover), and the landscape unit as a whole. Metric values at the class level are computed by summing and averaging over all patches of the same type, while landscape level metrics are summarized from class level information. Based on the metrics, wetlands were grouped according to condition of Good, Intermediate, and Poor. Intermediate wetlands are further separated into trending towards Good or trending towards Poor based on habitat fragmentation characteristics.

**Regional Scale Wetland Assessment Pilot Project**

In March 2008, the department received a Section 104(b)(3) Wetland Protection Grant to implement Phase III of a regional wetland condition assessment for the Missouri Coteau ecoregion. Estimating the wetland quality for the Missouri Coteau ecoregion within North Dakota was conducted as a three phase process: Phase I = Reconnaissance; Phase II = Field Survey; and Phase III = Data Entry and Analysis. Phase I entailed compiling a GIS database for a section of the Missouri Coteau (Figure V-2) which is approximately 2,500 km2. The database includes orthophotos and National Wetland Inventory (NWI) layers, and includes a layer in which a random set of points have been placed on the landscape utilizing a probabilistic sample design. Further, around each point a 750m X 750m quadrat was formed as a sample area. Quadrat locations were visually identified during the process of obtaining landowner permission. Standard operating procedures for Phase II of this project were drafted, tested, and refined on 7 of the quadrats. Also, initial development of a rapid assessment method needed in Phase II was accomplished during this time period. The prediction of the wetland plant community condition on the wetlands located in each of the quadrats using the Landscape Level Wetland Condition Assessment and Monitoring (LWAM) Model was completed.

The field survey phase (Phase II) of this project entailed assessing 255 seasonal wetlands with the North Dakota Rapid Assessment (NDRAM), the Hydrogeomorphic (HGM) Model method, and the Index of Plant Community Integrity (IPCI) method. An additional 719 wetlands were surveyed utilizing the NDRAM. Each wetland was mapped using a GPS unit and pictures were taken. The majority of time during Phase II of the study was spent assessing wetlands in the field. Data was organized and entered into databases developed at North Dakota State University (NDSU). During this same time period, researchers from the United State Department of Agriculture (USDA), Agricultural Research Service (ARS), and the University of North Dakota (UND) were conducting field analysis of landscape level assessment methods of not only the wetland plant communities, but also hydrologic aspects.

The final phase of this project (Phase III) has been completed and the results are available in a report entitled *Estimating Wetland Quality for the Missouri Coteau Ecoregion in North Dakota* (Dekeyser et al., 2009) focused on data analysis and reporting. Data obtained from the LWCAM, IPCI, HGM, and NDRAM models were analyzed utilizing relevant statistical methods such as analysis of variance, multivariate analysis, and structural equation modeling. The products of this analysis were, but not limited to: 1) a measure of the capability, variability, and reliability of the landscape and rapid methods as compared to the IPCI method to estimate wetland plant community condition; 2) identification of those HGM environmental variables most effecting wetland plant community composition; 3) determination of sample size needed utilizing a probabilistic design to effectively estimate wetland condition for large areas within an ecoregion; 4) an estimate of wetland acres based on plant community characteristics within the surveyed area; 5) an estimate of the condition of the wetland plant communities of the surveyed area; and 6) a repeatable tool for the state of North Dakota to accurately estimate wetland plant community condition on a regional basis within the Prairie Pothole Region (PPR).

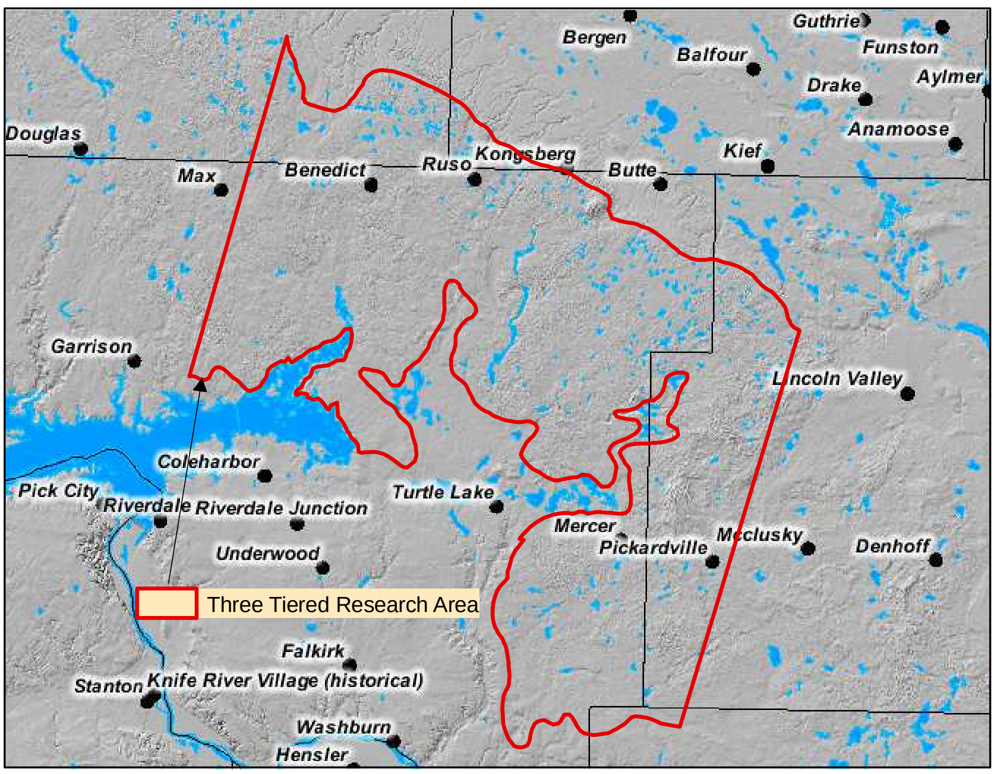



**Figure V-2. Research Area Within the Missouri Coteau Ecoregion of North Dakota (outlined in red).**

## 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 2008 to 2009.

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 but also the classified uses defined for the waterbody and whether the 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 2008 TMDL list was submitted to EPA in August 2008 and was approved on September 29, 2008. This 2010 Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDLs and waterbodies that have been removed from the 2008 list. Reasons for removing a waterbody from the 2008 list include: (1) a TMDL was completed for the waterbody/pollutant combination; (2) the applicable water quality standard is now attained and/or the original basis for the listing was incorrect; (3) the applicable water quality standard is now attained due to a change in the water quality standard and/or assessment methodology; (4) the applicable water quality standard is now attained due to restoration activities; or (5) sufficient data and/or information is lacking to determine water quality status and/or the original basis for listing was incorrect.

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 2010 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 "High" priority waterbodies that will be targeted for TMDL development within the next two to four 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 waste load 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 two-tiered priority ranking. Assessment units (AUs) listed as "High" priority are: (1) 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; or (2) 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

"High" priority 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. "Low" priority AUs are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next eight to thirteen years.

The department has also identified a subcategory to Category 5 waterbodies. This subcategory, termed Subcategory 5A, includes "Low" priority lakes and reservoirs and river and stream segments that were assessed and listed in previous Section 303(d) lists, including the 2006 list, but where the original basis for the assessment decision and associated cause of impairment is questionable. These Subcategory 5A waterbodies include: (1) rivers and streams listed for biological impairments based on only one sample for the entire segment or on samples collected more than 10 years ago; (2) waterbodies listed for sediment/siltation impairments; or (3) lakes and reservoirs where the assessments are based on one sampling event or on data that are greater than 10 years old. These waterbodies will remain on the 2010 Section 303(d) list, but they will be targeted for additional monitoring and assessment during the next two to four years.

Waterbodies for which fish consumption use is impaired due to methyl-mercury are also considered "Low" priority. 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.

### C. Public Participation Process

Public comments were solicited on the draft 2010 TMDL list through a public notice published in the following daily newspapers: Fargo Forum, Grand Forks Herald, Bismarck Tribune, Minot Daily News, Dickinson Press and Williston Daily Herald (Appendix C). 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.ndhealth.gov.

Comments on the draft TMDL list were also 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 North Dakota State Water Commission, the Red River Basin Commission, individuals on the North Dakota State Water Pollution Advisory Board and EPA Region VIII. Comments on the draft 2010 TMDL list were only received from EPA Region VIII. These comments and the Department's response are provided in Appendix D. When appropriate, these comments were incorporated in the final 2010 Integrated Report.

## D. Listing of Impaired Waters Needing TMDLs

As stated previously for 2010 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 IV-3). Waterbodies (also referred to as AUs) assessed as Category 5 (including subcategory 5A) 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. 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 subbasins of the Missouri River Basin (Figures VI-4 and VI-5) and the James River Basin (Figure VI-6).

The 2010 TMDL list is represented by 214 AUs (26 lakes and reservoirs and 188 river and stream segments) and 337 individual waterbody/pollutant combinations. For purposes of TMDL development, each waterbody/pollutant combination requires a TMDL. Of the 337 individual waterbody/pollutant combinations listed in Tables V-1 through V-4, 112 waterbody/pollutant combinations were further identified as Category 5A. These waterbodies will be targeted for additional monitoring in the next two to four years to verify the current use impairment assessments and pollutant causes.

## E. De-listing of 2008-Listed TMDL Waters

Table VI-5 provides a list of lakes, reservoirs, rivers and streams that were listed in the previous 2008 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:

- A TMDL was completed for the waterbody/pollutant combination.
- The applicable water quality standard is now attained and/or the original basis for the listing was incorrect.
- The applicable water quality standard is now attained due to a change in the water quality standard and/or assessment methodology.
- The applicable water quality standard is now attained due to restoration activities.
- Sufficient data and/or information is lacking to determine water quality status and/or the original basis for listing was incorrect.

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.

**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 are located in three regional field offices in Bismarck, Fargo and Towner, N.D. Technical support for TMDL development projects and overall program coordination are provided by Surface Water Quality Management Program staff also 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 CWA Section 319 grants administered by the state's Nonpoint Source Pollution Management 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 2010 Section 303(d) TMDL list for North Dakota has targeted 65 waterbodies or 74 waterbody/pollutant combinations for completion in the next three years. These "High" priority waterbody/pollutant combinations represent 33 percent of all "High" and "Low" priority Category 5 waterbody/pollutant combinations on the list. These are waterbody/pollutant combinations for which the monitoring is either completed, near completion or has recently been initiated. Based on the department's TMDL development "Pace" commitment, it is anticipated that TMDLs will be completed at a rate of approximately 26 additional waterbody/pollutant combinations per year following 2012.

## Table VI-1. 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09010001-001-S_00** | Souris River from the N.D./Saskatchewan border downstream to Lake Darling. | 43.4 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | H | No |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09010001-006-S_00** | Souris River from Lake Darling downstream to its confluence with the Des Lacs River. Located in Northern Ward County. | 20.3 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **ND-09010002-001-S_00** | Des Lacs River from lower Des Lacs Reservoir downstream to its confluence with the Souris River. Located in Ward and SW Renville counties. | 71.5 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09010003-001-S_00** | Souris River from its confluence with Oak Creek downstream to its confluence with the Wintering River. Located in McHenry | 51 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09010003-003-S_00** | Wintering River, including all tributaries. Located in SW McHenry and NE McLean counties. | 207.8 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | H | No |
| **ND-09010003-005-S_00** | Souris River from its confluence with the Wintering River downstream to its confluence with Willow Creek. Located in NE McHenry County. | 74.9 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |

## Table VI-1 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09010004-001-S_00** | Willow Creek from its confluence with Ox Creek downstream to its confluence with the Souris River. This ID originally was assigned to the entire Willow Creek reach. The upper reach is assigned the ID of ND-09010004-003-S_01 | 46.75 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09010004-002-S_00** | Oak Creek from its confluence with Willow Creek, upstream to Lake Metigoshe, including all tributaries. Located in Eastern Bottineau County. | 82.4 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |

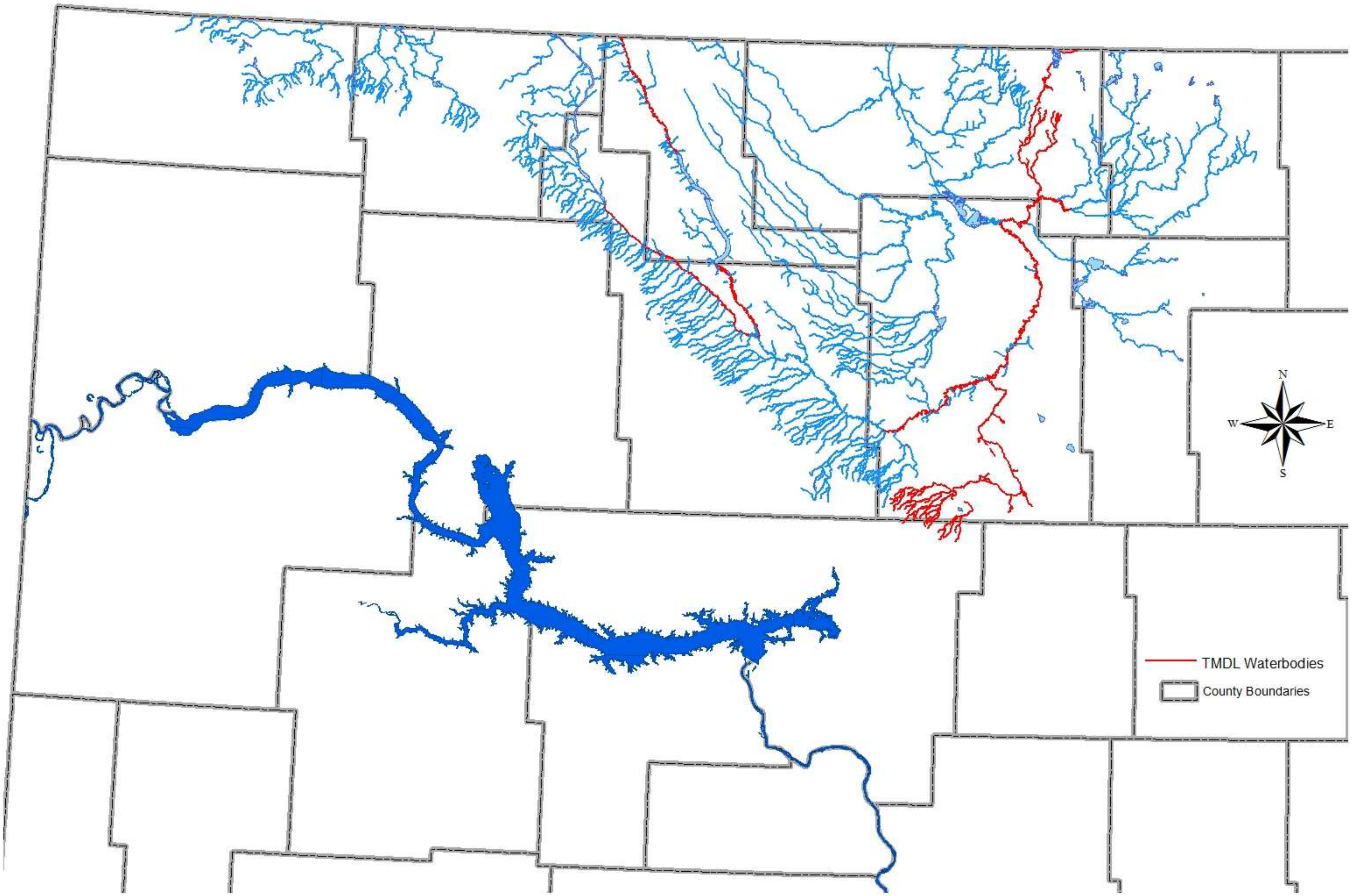



**Figure VI-1. Graphical Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the Souris River Basin.**

# Table VI-2. 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020101-001-S_00** | Bois De Sioux River from the ND-SD border, downstream to its confluence with the Rabbit River on MN side. Located in the SE corner of Richland County. | 13.05 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020101-002-S_00** | Bois De Sioux River from its confluence with the Rabbit River (MN), downstream to its confluence with the Ottertail River. Located on the Eastern border of Richland | 15.31 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020104-001-S_00** | Red River of the North from its confluence with the Ottertail River downstream to its confluence with the Whiskey Creek. Located in Eastern Richland County. | 27.3 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **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. Located in NE Richland and SE Cass | 52.3 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **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 Moorhead, MN waste water discharge). Eastern Cass County. | 21 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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. Eastern Cass County. | 21.1 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **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. Located in NE Cass County. | 10.45 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020105-001-L_00** | Lake Elsie | 376.8 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Turbidity | L | No |
| | | | | | Sedimentation/Siltation | L | No |
| **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. Located in NE Richland and SE Cass | 38.6 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020105-002-L_00** | Mooreton Pond | 36.8 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Total Dissolved Solids | L | No |
| **ND-09020105-003-S_00** | Wild Rice River from its confluence with a tributary about 3.6 miles NE of Great Bend, ND downstream to its confluence with the Colfax Watershed. Located in Eastern Richland County. | 47.5 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020105-005-S_00** | Antelope Creek, in Richland County, from its headwaters downstream to its confluence with the Wild Rice River. | 40.73 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | | | Temperature, water | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020105-009-S_00** | Wild Rice River from Elk Creek (ND-09020105-010-S_00), downstream to its confluence with a tributary 3.5 miles NE of Great Bend, ND (ND-09020105-008-S_00). Located in South Central Richland County. | 53.4 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020105-012-S_00** | Wild Rice River from its confluence with Shortfoot Creek (ND-09020105-016-S_00) downstream to its confluence with Elk Creek (ND-09020105-010-S_00). | 45.68 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020105-016-S_00** | Shortfoot Creek from its confluence with the Wild Rice River upstream to the ND-SD border, including all tributaries. | 16.16 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **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 | | | |
| | | | | | Fecal Coliform | H | No |
| **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 | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020105-019-S_00** | Wild Rice River upstream from its confluence with Wild Rice Creek, including all tributaries. | 57.06 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020105-020-S_00** | Wild Rice Creek from its confluence with the Wild Rice River upstream to the ND-SD border, including all tributaries. | 118.17 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **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 | | | |
| | | | | | Fecal Coliform | H | No |
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **ND-09020107-006-S_00** | Elm River from the 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 | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020107-008-S_00** | Elm River from the dam NW of Galesburg, ND downstream to the dam NE of Galesburg. | 20.49 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **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 | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| **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 | | | |
| | | | | | Methylmercury | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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 | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **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 | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **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 | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020109-015-S_00** | South Branch Goose River downstream to its confluence with the Middle Branch Goose River. | 33.35 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020109-017-S_00** | Middle Branch Goose River, from its confluence with a tributary watershed near Sherbrooke, ND (ND-09020109-019-S_00), downstream to its confluence with the South Branch Goose River. | 17.99 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| **ND-09020109-024-S_00** | Beaver Creek from the Golden Lake Diversion, downstream to its confluence with the Goose River. | 24.81 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020109-027-S_00** | Beaver Creek, downstream to the Golden Lake diversion channel. | 37.01 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020109-029-S_00** | Spring Creek, including tributaries | 123.75 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |

# Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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 | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020201-001-S_00** | Mauvais Coulee from Big Coulee, downstream to Mauvais Coulee Flats (ND-09020201-022-S). | 24.7 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | L | No |
| **ND-09020201-006-L_00** | Devils Lake | 117697 Acres | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-09020201-021-S_00** | Calio Coulee, upstream from Chain Lake including all tributaries. | 98.8 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | L | No |
| **ND-09020202-001-L_00** | Warsing Dam | 53.4 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Oxygen, Dissolved | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-09020202-001-S_00** | Sheyenne River from its confluence with the Warsing Dam Watershed, downstream to the end of the hydrologic unit. Located along the Benson and Eddy County Line. | 8.9 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020202-004-S_00** | Sheyenne River from its confluence with Big Coulee (ND-09020202-007-S_00), downstream to its confluence with the Warsing Dam Watershed (ND-09020202- | 40.37 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | H | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | E. coli | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020202-006-S_00** | Sheyenne River from Harvey Dam, downstream to its confluence with Big Coulee (ND-09020202-007-S_00). Located near the Pierce, Benson and Wells County | 35.06 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | H | Yes |
| **ND-09020202-012-S_00** | Sheyenne River from Coal Mine/Sheyenne Lakes downstream to Harvey Dam. Located along the Sheridan and Wells County border. | 20.8 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020202-013-S_00** | Unnamed tributary watershed to the Sheyenne River (ND-09020202-012-S). Located in Eastern Sheridan County. | 36.24 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-09020203-001-L_00** | Lake Ashtabula | 5467 Acres | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | H | No |
| **ND-09020203-001-S_00** | Sheyenne River from Tolna Dam outlet (ND-09020203-020-S) downstream to Lake Ashtabula. Located in Southern Nelson and Eastern Griggs County. | 93.81 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-002-S_00** | Baldhill Creek from tributary watershed (ND-09020203-005-S_00) downstream to Lake Ashtabula. Located in Griggs and Barnes County. | 30.21 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-004-S_00** | Silver Creek, including Gunderson Creek and all tributaries. Located in southern Griggs County. | 38.51 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-007-L_00** | McVille Dam | 36.7 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | | | Oxygen, Dissolved | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |

# Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020203-008-L_00** | Tolna Dam | 152 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Oxygen, Dissolved | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-09020203-008-S_00** | Unnamed tributary watershed to Baldhill Creek (ND-09020203-007-S). Located in NW Griggs County. | 16.07 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-009-S_00** | Unnamed tributaries to Baldhill Creek (ND-09020203-007-S). Located in eastern Foster and western Griggs County. | 30.5 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-012-S_00** | Pickerel Lake Creek, including all tributaries. Located in NE Griggs County. | 28.04 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-013-S_00** | Unnamed tributary watershed to the Sheyenne River (ND-09020203-001-S). Located in northern Griggs County. | 33.92 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020203-018-S_00** | Sheyenne River, downstream to the Tolna Dam outlet (ND-09020203-020-S). Located in Benson, Eddy, and Nelson Counties. | 56.61 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Fishes Bioassessments | L | Yes |
| **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. Located in | 26.74 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-003-L_00** | Brewer Lake | 117.8 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |

# Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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. Located in Eastern Cass County. | 19.01 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **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. | 17.6 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | H | Yes |
| | | | | | Combination Benthic/Fishes Bioassessments | H | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-007-S_00** | Rush River, downstream to an unnamed tributary watershed (ND-09020204-012-S_00). Located in north central Cass | 41.4 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | H | Yes |
| | | | | | Fishes Bioassessments | H | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-015-S_00** | Sheyenne River, from its confluence with tributary watershed (ND-09020204-016-S_00), downstream to tributary ND-09020204-014-S_00. Located along the Richland and Cass County border. | 28.03 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-017-S_00** | Sheyenne River from unnamed tributary (ND-09020204-018-S_00), downstream to unnamed tributary watershed (ND-09020204-016-S_00). Located in northern Ransom and Richland County. | 57.5 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |

## Table VI-2 (cont.).  2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020204-022-S_00** | Sheyenne River from tributary near Lisbon (ND-09020204-0024-S_00), downstream to its confluence with Dead Colt Creek (ND-09020204-021-S_00). Located in central Ransom County. | 11.5 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-023-S_00** | Tiber Coulee, including all tributaries. Located in south central Ransom County. | 32.7 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-025-S_00** | Sheyenne River, from its confluence with a tributary near Highway 46 (ND-09020204-025-S_00) downstream to its confluence with a tributary near Lisbon, ND (ND-09020204-024-S_00). | 46.96 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-027-S_00** | Sheyenne River, from its confluence with a tributary watershed below Valley City (ND-09020204-028-S_00), downstream to its confluence with a tributary near Highway 46 (ND-09020204-026-S_00). Located in south central Barnes County. | 34.04 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-09020204-034-S_00** | Sheyenne River from its confluence with a tributary above Valley City, near railroad bridge, (ND-09020204-038-S_00) downstream to its confluence with a tributary below Valley City (ND-09020204-028-S_00). Located in Central Barnes County. | 14.73 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020204-040-S_00** | Sheyenne River from Lake Ashtabula downstream to its confluence with a tributary above Valley City, near rail road bridge (ND-09020204-038-S_00). Located in Central Barnes County. | 13.41 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020205-001-S_00** | Maple River, from its confluence with Buffalo Creek downstream to its confluence with the Sheyenne River. Located in Eastern Cass County. | 27.92 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020205-010-S_00** | Maple River, from its confluence with a tributary near Leonard, ND (ND-09020205-011-S_00) downstream to its confluence with Buffalo Creek. Located in south central Cass County. | 48.9 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Fishes Bioassessments | L | Yes |
| **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. Located in S.W. Cass County. | 26.15 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020205-015-S_00** | Maple River from its confluence with a tributary watershed near Buffalo, ND (ND-09020205-019-S_00) downstream to its confluence with the South Branch Maple River. Located in Western Cass County. | 40.06 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020205-024-S_00** | Maple River downstream to its confluence with a tributary near the Steele, Cass, and Barnes County Line (ND-09020205-023- | 28.28 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020301-001-S_00** | Red River of the North, from its confluence with the Marsh River, downstream to its confluence with the Sand Hill River. Located in Eastern Trail County. | 21.35 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| **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 | | | |
| | | | | | Oxygen, Dissolved | H | No |
| | | | | | Total Dissolved Solids | H | No |
| | | | | | Sedimentation/Siltation | H | No |
| | | | | | Selenium | L | No |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | H | No |
| | | | | | Fecal Coliform | H | No |
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **ND-09020306-001-S_00** | Red River of the North from its confluence with English Coulee, downstream to the confluence with Grand Marais Creek. | 8.65 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| **ND-09020306-003-S_00** | Red River of the North from its confluence with Grand Marais River, downstream to its confluence with the Turtle River. | 12.62 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **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 | | | |
| | | | | | Methylmercury | L | No |
| **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** | Fully Supporting But Threatened | | | |
| | | | | | Cadmium | L | No |
| | | | | | Selenium | L | No |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Municipal and Domestic** | Fully Supporting But Threatened | | | |
| | | | | | Chloride | L | No |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |
| | | | | | Arsenic | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **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 | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |
| **ND-09020307-007-S_00** | Fresh Water Coulee from its confluence with Salt Water Coulee downstream to its confluence with the Turtle River. | 6.5 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Cadmium | L | No |
| | | | | | Selenium | L | No |
| **ND-09020307-016-S_00** | Kelly Slough from the control structure at Kelly Slough National Wildlife Refuge downstream to its confluence with the Turtle | 2.69 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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 | 25.27 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Cadmium | L | No |
| | | | | | Selenium | L | No |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020307-021-S_00** | Turtle River from its confluence with South Branch Turtle River downstream to its confluence with A tributary NE oF Turtle River State Park. | 13.9 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |
| | | | **Municipal and Domestic** | Fully Supporting But Threatened | | | |
| | | | | | Selenium | L | No |
| | | | | | Arsenic | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020307-024-S_00** | South Branch Turtle River downstream to Larimore Dam. | 18.42 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020307-031-S_00** | North Branch Turtle River from its confluence with Whiskey Creek, downstream to its confluence with South Branch Turtle | 15.26 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| | | | | | Selenium | L | No |
| | | | | | Cadmium | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020308-001-L_00** | Fordville Dam | 197 Acres | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | H | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020308-001-S_00** | Forest River from Lake Ardoch, downstream to its confluence with the Red River Of The | 16.17 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **ND-09020308-002-L_00** | Whitman Dam | 143 Acres | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | Yes |
| **ND-09020308-003-L_00** | Matejcek Dam | 130 Acres | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | Yes |
| **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 | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **ND-09020308-023-S_00** | Middle Branch Forest River from Matecjek Dam, downstream to its confluence with North Branch Forest River. | 8.85 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **ND-09020310-001-L_00** | Homme Dam | 194 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-09020310-001-S_00** | Park River from its confluence with Salt Lake Outlet (ND-09020310-009-S_00), downstream to its confluence with the Red River Of The North. | 15.06 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Lead | L | No |
| | | | | | Copper | L | No |
| | | | | | Cadmium | L | No |
| | | | | | Selenium | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020310-010-S_00** | Park River from its confluence with a tributary east of Grafton, ND (ND-09020310-012-S_00), downstream to its confluence with the outlet from Salt Lake (ND-09020310-009-S_00). | 14.68 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Lead | L | No |
| | | | | | Cadmium | L | No |
| | | | | | Copper | L | No |
| | | | | | Selenium | L | No |
| **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_00). | 6.83 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Cadmium | L | No |
| | | | | | Copper | L | No |
| | | | | | Lead | L | No |
| | | | | | Selenium | L | No |
| **ND-09020310-020-S_00** | South Branch Park River from its confluence with a tributary watershed near Adams, ND (ND-09020310-022-S_00), downstream to Homme Dam. | 16.9 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **ND-09020310-029-S_00** | Middle Branch Park River from a tributary near Highway 32, downstream to tributary near Highway 18. | 26.18 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **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 | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **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 | 19.02 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| **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 | 30.3 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-09020311-005-S_00** | Red River of the North from its confluence with Two Rivers, downstream to its confluence with the Pembina River. | 17.99 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| **ND-09020311-007-S_00** | Red River of the North from its confluence with the Pembina River, downstream to the US/Canada border. | 3 Miles | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| **ND-09020313-001-S_00** | Pembina River from its confluence with the Tongue River downstream to its confluence with the Red River of the North | 8.76 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Copper | L | No |
| | | | | | Cadmium | L | No |
| | | | | | Selenium | L | No |
| | | | | | Lead | L | No |
| | | | **Municipal and Domestic** | Fully Supporting But Threatened | | | |
| | | | | | Lead | L | No |
| | | | | | Arsenic | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020313-002-L_00** | Renwick Dam | 220 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-09020313-006-S_00** | Tongue River from its confluence with a tributary N.E. of Cavalier, ND downstream to its confluence with Big Slough. | 22.54 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |
| **ND-09020313-009-S_00** | Tongue River from Renwick Dam, downstream to a tributary N.E. of Cavalier, | 15.91 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Combination Benthic/Fishes Bioassessments | L | Yes |

## Table VI-2 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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 | | | |
| | | | | | Selenium | L | No |
| | | | | | Copper | L | No |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | | | Lead | L | No |
| | | | | | Cadmium | L | No |
| | | | **Municipal and Domestic** | Fully Supporting But Threatened | | | |
| | | | | | Arsenic | L | No |
| | | | | | Lead | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-09020313-023-S_00** | Pembina River from its confluence with a tributary N.E. 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 | | | |
| | | | | | Fishes Bioassessments | L | Yes |
| **ND-09020313-025-S_00** | Pembina River from its confluence with Little South Pembina River, downstream to its confluence with a tributary N.E. of Walhalla, ND. | 13.09 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Fishes Bioassessments | L | Yes |

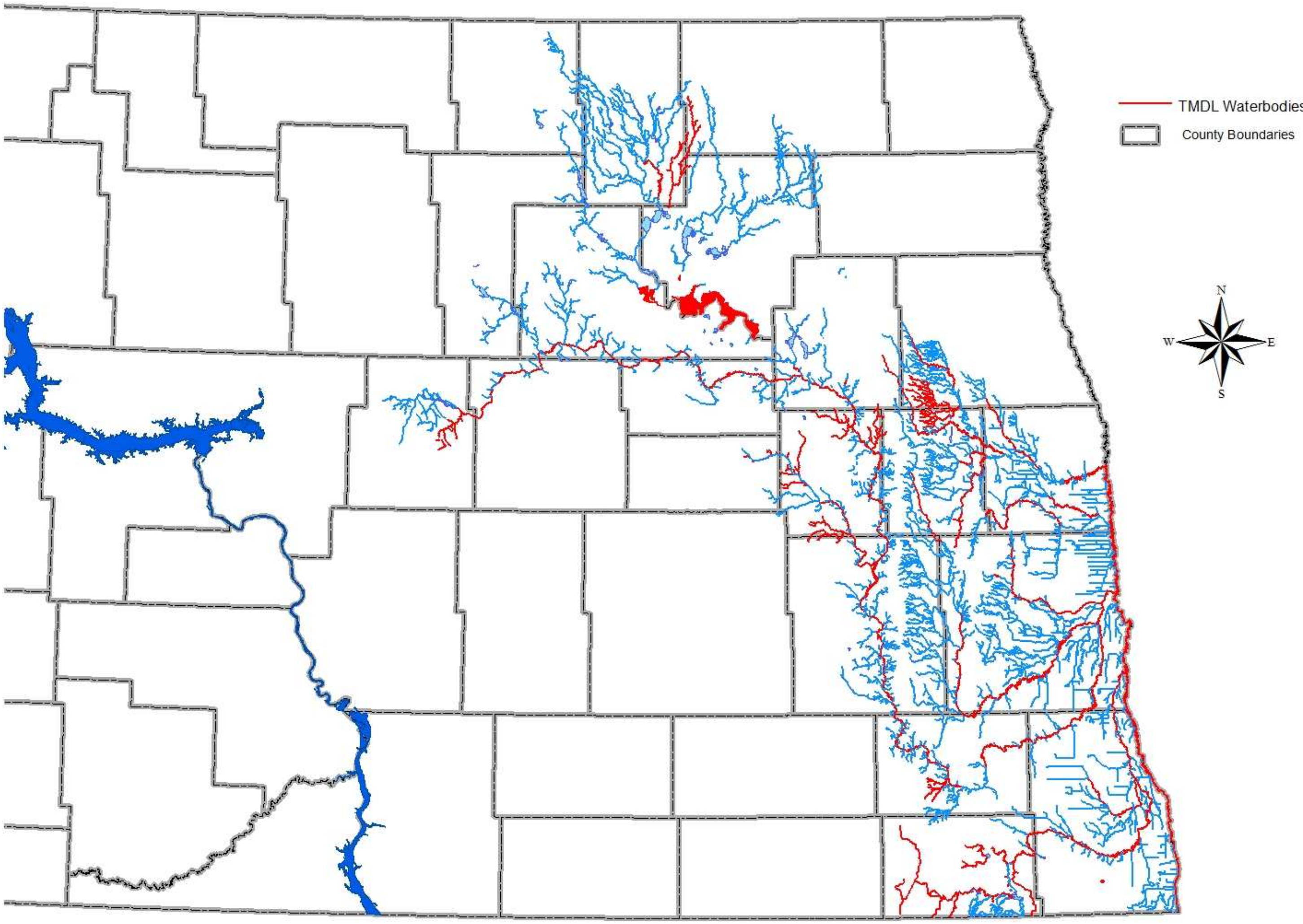



**Figure VI-2. Graphical Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the Upper Red River Basin**

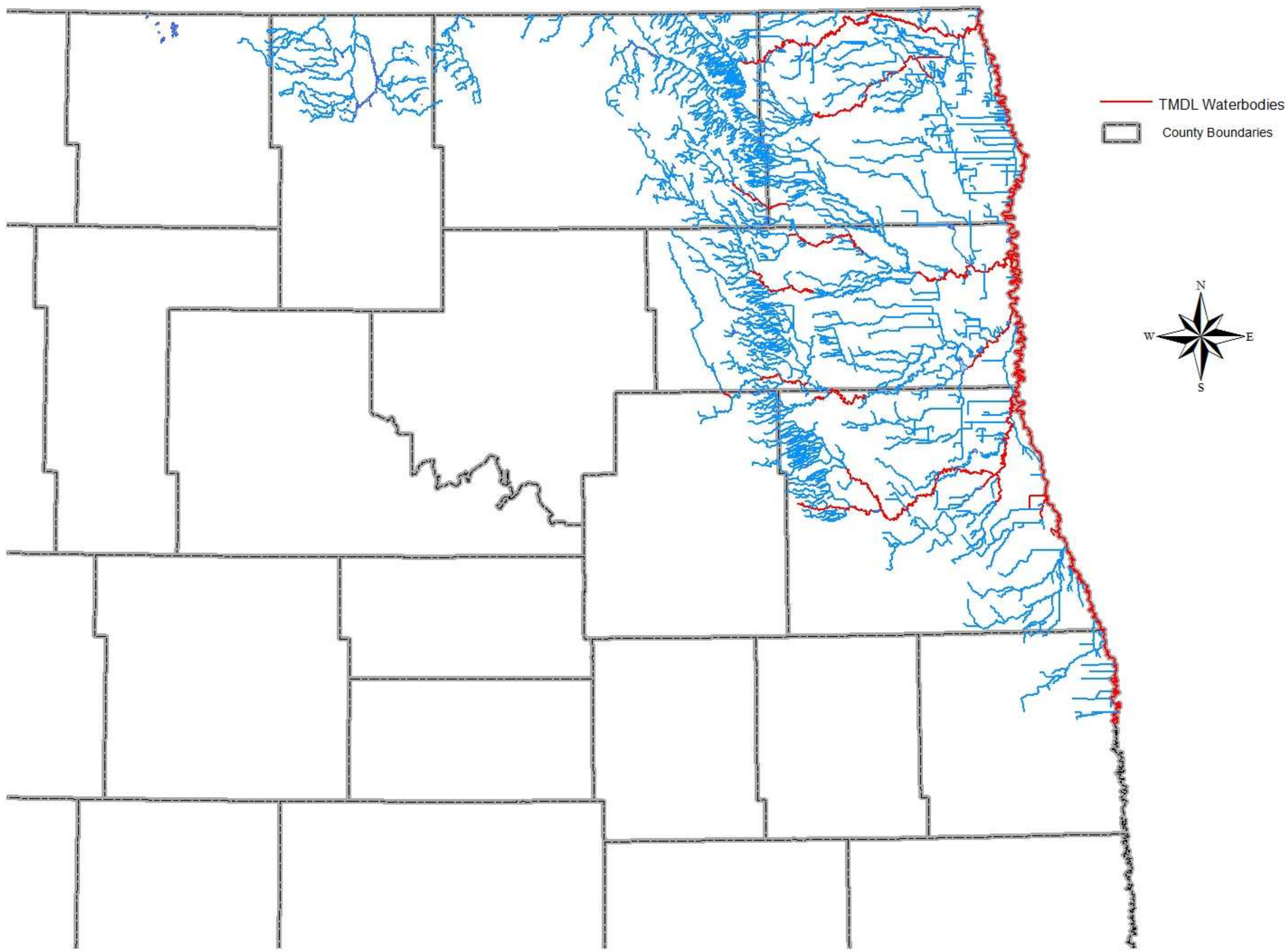



**Figure VI-3. Graphical Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the Lower Red River Basin.**

## Table VI-3. 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10110101-001-L_00** | Powers Lake | 950.6 Acres | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | Sedimentation/Siltation | L | No |
| **ND-10110101-021-L_00** | Lake Sakakawea | 368231 Acres | **Fish Consumption** | Not Supporting | Methylmercury | L | No |
| **ND-10110101-056-S_00** | Handy Water Creek, including all tributaries. Located in Eastern McKenzie County. | 42.41 Miles | **Fish and Other Aquatic Biota** | Not Supporting | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **ND-10110101-080-S_00** | Little Knife River from Stanley Reservoir, downstream to Lake Sakakawea. Located in Central Mountrail County. | 45.44 Miles | **Recreation** | Not Supporting | Fecal Coliform | L | Yes |
| **ND-10110102-001-S_00** | Little Muddy River from its confluence with East Fork Little Muddy River, downstream to Lake Sakakawea. Located in Central Williams County. | 24 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | Yes |
| **ND-10110203-001-S_00** | Little Missouri River from its confluence with Little Beaver Creek downstream to its confluence with Deep Creek. Located in Slope County. | 75.79 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | No |
| **ND-10110203-003-S_00** | Deep Creek from the confluences of East Branch Deep Creek and West Brach Deep Creek downstream to its confluence with the Little Missouri River. Located in Slope | 42.51 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | No |
| **ND-10110203-004-S_00** | West Branch Deep Creek, including tributaries. Located in Slope County. | 117.25 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | No |
| **ND-10110203-025-S_00** | Little Missouri River from its confluence with Deep Creek, downstream to its confluence with Andrew's Creek. Located in Billings and Slope Counties. | 48.25 Miles | **Recreation** | Not Supporting | Fecal Coliform | L | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10110205-001-S_00** | Little Missouri River from its confluence with Beaver Creek downstream to highway 85. Located in McKenzie County. | 58.94 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10110205-033-S_00** | Little Missouri River from Hwy 85 downstream to its confluence with Cherry Creek. Located in McKenzie and Dunn | 23.79 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10130101-002-L_00** | Brush Lake | 200 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130101-002-S_00** | Square Butte Creek from its confluence with Otter Creek downstream to its confluence with the Missouri River. Located in Morton | 1.79 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130101-003-L_00** | Crooked Lake | 375 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130101-009-S_00** | Square Butte Creek from Nelson Lake downstream to its confluence with Otter Creek. Located in Oliver and Morton | 38.15 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10130103-003-L_00** | Braddock Lake | 69.5 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130103-007-S_00** | Hay Creek downstream to its confluence with Apple Creek. Located in Burleigh County. | 15.78 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | H | Yes |
| **ND-10130103-010-L_00** | Lake Isabel | 805.7 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | | | Oxygen, Dissolved | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130104-001-L_00** | Beaver Lake | 953.1 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Oxygen, Dissolved | L | No |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130104-001-S_00** | Beaver Creek from its confluence with Sand Creek downstream to Lake Oahe. Located in Emmons County. | 8.43 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-003-S_00** | Beaver Creek from its confluence with Spring Creek downstream to its confluence with Sand Creek. Located in Emmons County. | 14.9 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-004-S_00** | Sand Creek and tributaries, located in Emmons County. | 108.56 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10130104-005-S_00** | Spring Creek and tributaries, located in Emmons County. | 63.14 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-007-S_00** | Beaver Creek from its confluence with the South Branch Beaver Creek downstream to its confluence with Spring Creek. Located in Emmons County. | 37.68 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-008-S_00** | Clear Creek and tributaries, located in Emmons County. | 108.95 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-010-S_00** | Beaver Creek from Beaver Lake downstream to its confluence with the South Branch Beaver Creek. Located in Emmons and | 38.92 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130104-012-S_00** | Unnamed tributary on the south side of Beaver Lake, Logan and McIntosh Counties. | 158.02 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **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. Located in McIntosh and Emmons | 43.45 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-001-S_00** | Spring Creek from its confluence with Goodman Creek downstream to its confluence with the Knife River. Located in Mercer County. | 28.56 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | H | No |
| **ND-10130201-002-S_00** | Knife River from its confluence with Antelope Creek downstream to its confluence with the Missouri River. Located in Mercer | 19.83 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-003-S_00** | Knife River from its confluence with Spring Creek downstream to its confluence with Antelope Creek. Located in Mercer County. | 17.83 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **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. Located in Mercer County. | 8.57 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10130201-016-S_00** | East Branch Antelope Creek upstream from Antelope Creek, including tributaries. Located in Mercer County. | 83.04 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10130201-017-S_00** | Antelope Creek main stem downstream to its confluence with East Branch Antelope Creek Watershed (ND-10130201-016-S). Located in Mercer County. | 21.32 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10130201-023-S_00** | Spring Creek from its confluence with North Creek downstream to its confluence with Goodman Creek. Located in Mercer and Dunn Counties. | 36.36 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | H | No |
| **ND-10130201-028-S_00** | Spring Creek from Lake Ilo downstream to its confluence with North Creek. Located in Dunn County. | 23.3 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | H | No |
| **ND-10130201-035-S_00** | Knife River from its confluence with Coyote Creek downstream to its confluence with Spring Creek. Located in Mercer County. | 14.65 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-036-S_00** | Brush Creek and tributaries, located in Mercer and Oliver Counties. | 61.06 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-037-S_00** | Coyote Creek from its confluence with Beaver Creek downstream to its confluence with the Knife River. Located in Mercer | 17.24 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10130201-042-S_00** | Knife River from its confluence with Branch Knife River downstream to its confluence with Coyote Creek. Located in Dunn and Mercer Counties. | 35.99 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-045-S_00** | Elm Creek and tributaries, located in Mercer County. | 137.89 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130201-046-S_00** | Willow Creek and tributaries, located in Mercer County. | 29.54 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130202-001-L_00** | Lake Tschida | 5018 Acres | | | | | |
| | | | **Fish Consumption** | Not Supporting | | | |
| | | | | | Methylmercury | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130202-050-S_00** | Heart River from Patterson Lake, downstream to its confluence with the Green River. Located in Stark County. | 24.7 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **ND-10130203-002-L_00** | Crown Butte Dam | 31.2 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |
| **ND-10130203-007-L_00** | Danzig Dam | 147.5 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | No |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| | | | | | Oxygen, Dissolved | L | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | No |
| **ND-10130204-007-S_00** | Cannonball River from its confluence with Sheep Creek downstream to its confluence with Snake Creek. Located in Grant County. | 46.7 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10130204-014-S_00** | Thirty Mile Creek from its confluence with Springs Creek downstream to its confluence with the Cannonball River. Located in Hettinger County. | 39.97 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | Yes |
| **ND-10130204-017-S_00** | Thirty Mile Creek from tributary watershed (ND-10130204-019-S_00), downstream to its confluence with Springs Creek. Located in Hettinger County. | 19.75 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | Yes |
| **ND-10130204-032-S_00** | Cannonball River from its confluence with Philbrick Creek downstream to its confluence with Indian Creek. Located in Hettinger and Slope County. | 54.25 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | L | No |
| **ND-10130204-044-S_00** | Dead Horse Creek, including all tributaries. Located in Hettinger County. | 40.18 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | Yes |
| **ND-10130204-047-S_00** | North Fork Cannonball River from its confluence with White Lake Watershed (ND-10130204-049-S_00), downstream to its confluence with Philbrick Creek. Located in Slope County. | 33.25 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | L | No |
| **ND-10130205-003-L_00** | Cedar Lake | 198.5 Acres | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-021-S_00** | Plum Creek, including all tributaries. Located in Adams County. | 79.34 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | Yes |
| **ND-10130205-033-S_00** | Cedar Creek from Cedar Lake, downstream to its confluence with Chanta Peta Creek. Located in Adams County. | 43.06 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Not Supporting | | | |
| | | | | | Benthic-Macroinvertebrate Bioassessments | L | Yes |

## Table VI-3 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10130205-042-S_00** | Cedar Creek from its confluence with South Fork Cedar Creek, downstream to Cedar Lake. Located in Slope and Bowman County. | 30.86 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-043-S_00** | North Fork Cedar Creek, including all tributaries. Located in Slope County. | 14.5 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-044-S_00** | Unnamed tributaries to Cedar Creek (ND-10130205-042-S_00). Located in Slope and Bowman counties. | 81.25 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-045-S_00** | South Fork Cedar Creek, including all tributaries. Located in Bowman County. | 21.99 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-046-S_00** | Cedar Creek upstream from its confluence with South Fork Cedar Creek, including all tributaries. Located in Bowman and Slope Counties. | 49.23 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10130205-047-S_00** | North Cedar Creek, including all tributaries. Located in Slope County. | 115.13 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10130303-001-S_00** | Flat Creek, downstream to Mirror Lake. Located in Adams County. | 21.03 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Nutrient/Eutrophication Biological Indicators | L | Yes |
| **ND-10130303-003-S_00** | Flat Creek from Mirror Lake downstream to the ND-SD border. Located in Adams | 24.11 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | Yes |

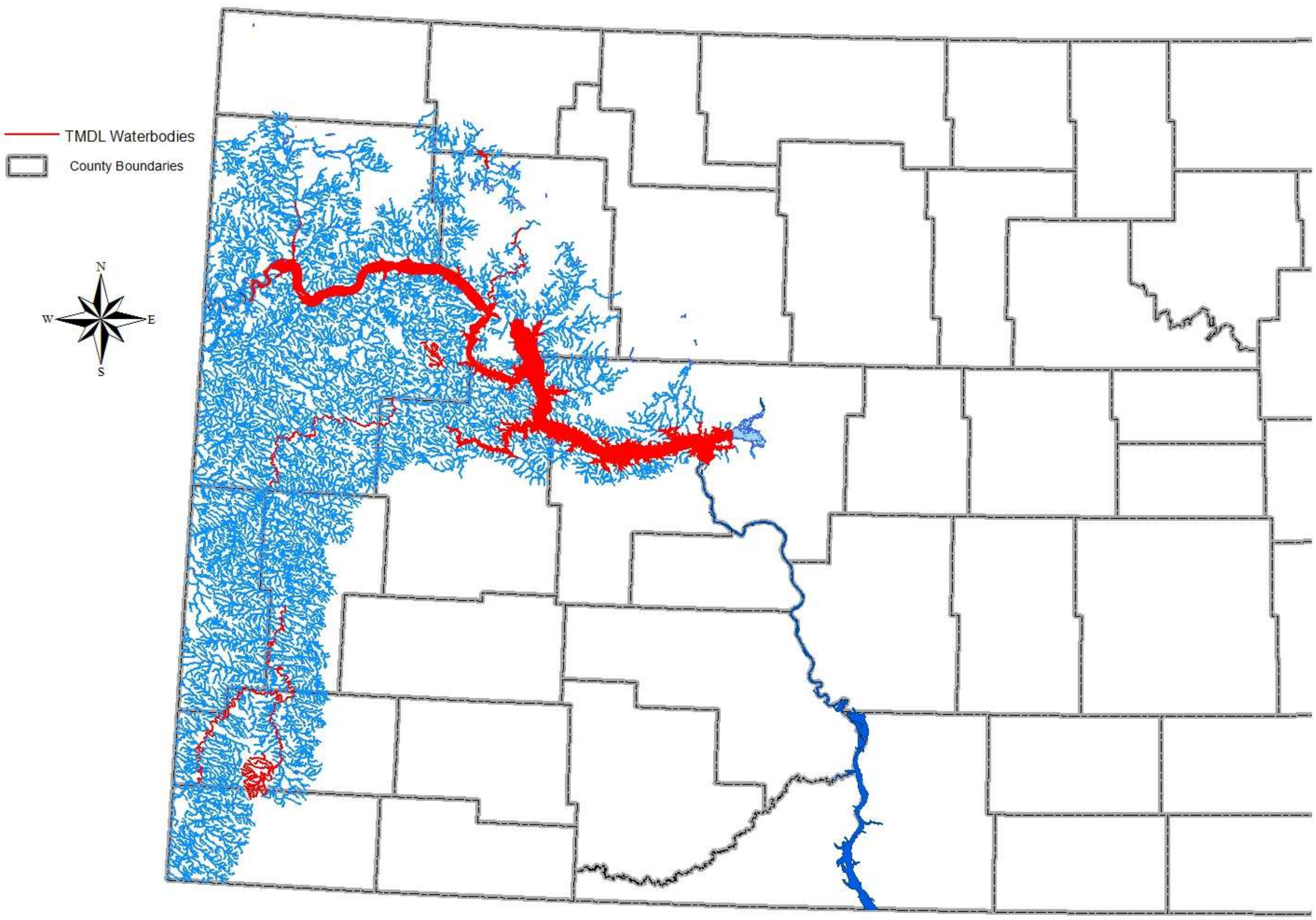



**Figure VI-4. Graphic Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the Lake Sakakawea/Missouri River Basin.**

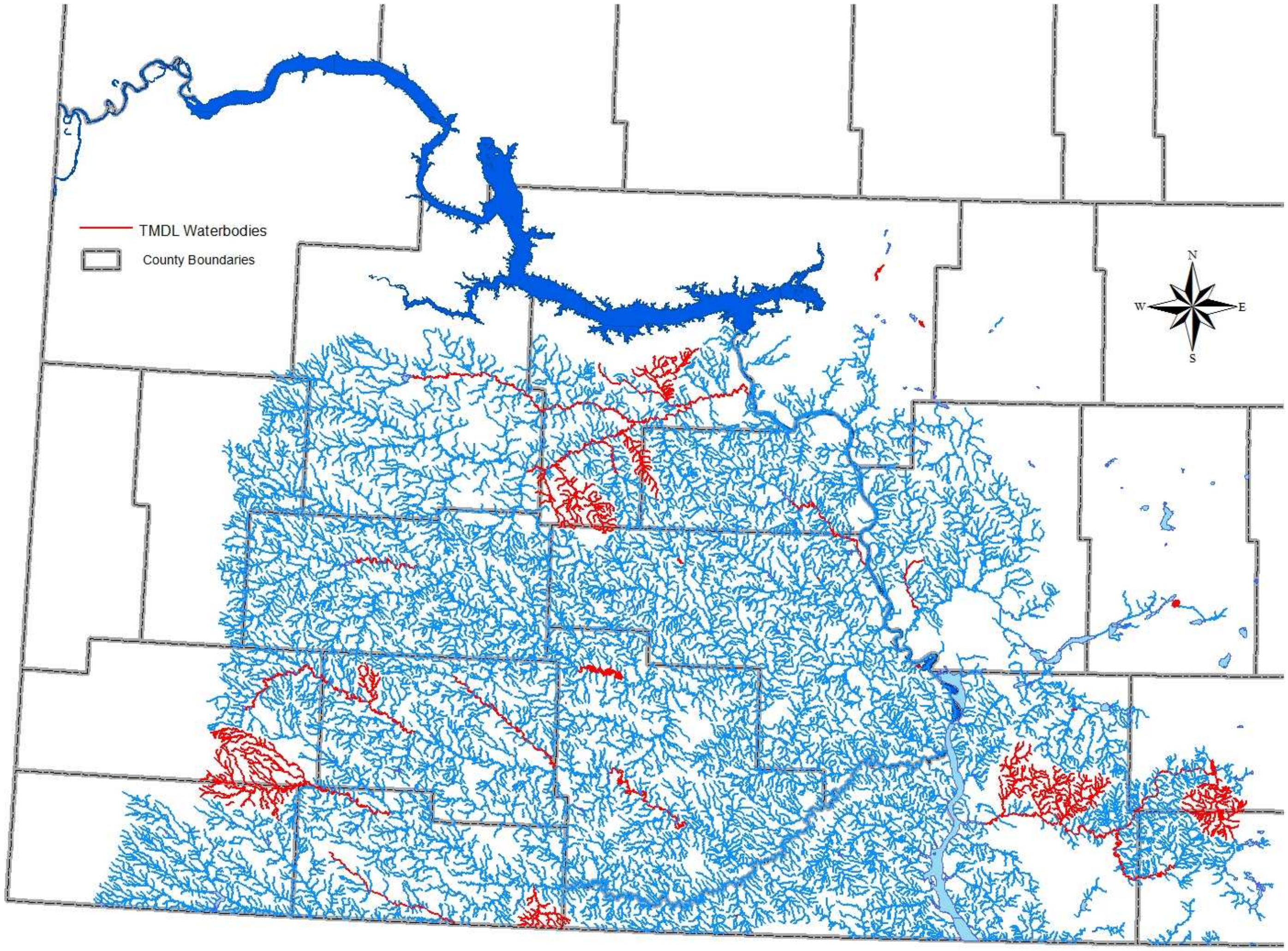



**Figure VI-5. Graphical Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the Lake Oahe/Missouri River Basin.**

## Table VI-4.  2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10160001-002-L_00** | Jamestown Reservoir | 2073.4 Acres | **Recreation** | Fully Supporting But Threatened | Nutrient/Eutrophication Biological Indicators | H | No |
| **ND-10160001-002-S_00** | James River downstream from Jamestown Reservoir to its confluence with Pipestem Creek. | 3.33 Miles | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | Benthic-Macroinvertebrate Bioassessments | L | Yes |
| **ND-10160001-003-S_00** | James River from Arrowwood Lake, downstream to Mud Lake. | 3.01 Miles | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | Oxygen, Dissolved | L | No |
| **ND-10160001-006-S_00** | James River from Jim Lake, downstream to Jamestown Reservoir.  The length of this segment may be open for interpretation, depending upon how far the Jamestown Reservoir backs up on full pool. | 7.1 Miles | **Recreation** | Fully Supporting But Threatened | E. coli | L | No |
| **ND-10160001-013-S_00** | James River from its confluence with Big Slough, downstream to its confluence with Rocky Run. | 20.27 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | No |
| **ND-10160001-018-S_00** | Rocky Run from its confluence with a tributary watershed west of Cathay, ND, downstream to its confluence with Rosefield | 14.53 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | H | No |
| **ND-10160001-021-S_00** | Rocky Run from its beginning, downstream to its confluence with a tributary watershed located west of Cathay, ND (ND-10160001-020-S_00). | 24.3 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | H | No |
| **ND-10160001-023-S_00** | James River from its confluence with Rocky Run, downstream to its confluence with Lake Juanita Outlet (ND-10160001-027-S_00). | 21.94 Miles | **Recreation** | Fully Supporting But Threatened | Fecal Coliform | L | No |
| **ND-10160002-001-L_00** | Pipestem Reservoir | 1877 Acres | **Recreation** | Fully Supporting But Threatened | Nutrient/Eutrophication Biological Indicators | H | No |

## Table VI-4 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10160002-001-S_00** | Pipestem Creek, from its beginning, downstream to Sykeston Dam (Lake | 25.21 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160002-010-S_00** | Pipestem Creek from its confluence with Little Pipestem Creek, downstream to Pipestem Dam #4 (ND-10160002-006- | 29.22 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160002-012-S_00** | Unnamed tributary watershed to Pipestem Creek (ND-10160002-013-S_00). | 40.74 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160002-013-S_00** | Pipestem Creek from Pipestem Dam #4 (ND-10160002-006-L_00), downstream to Pipestem Reservoir. | 21 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160003-001-S_00** | James River from its confluence with Pipestem Creek, downstream to its confluence with Seven Mile Coulee. | 13.04 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Ammonia (Un-ionized) | H | No |
| | | | | | Oxygen, Dissolved | H | No |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160003-003-S_00** | Cottonwood Creek, downstream to Lake LaMoure. | 67.67 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10160003-005-S_00** | Beaver Creek from its confluence with Buffalo Creek, downstream to its confluence with the James River, situated in SE | 16.05 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | E. coli | L | No |
| **ND-10160003-008-S_00** | Buffalo Creek from its beginning, downstream to its confluence with Beaver Creek (ND-10160003-005-S_00). | 32 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | H | No |
| **ND-10160003-013-S_00** | Seven Mile Coulee, including all tributaries. Located in Eastern Stutsman County. | 39.87 Miles | | | | | |
| | | | **Recreation** | Not Supporting | | | |
| | | | | | Fecal Coliform | H | No |

## Table VI-4 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10160003-029-S_00** | James River from its confluence with Bone Hill Creek, downstream to its confluence with Cottonwood Creek. | 38.65 Miles | | | | | |
| | | | **Recreation** | Fully Supporting But Threatened | | | |
| | | | | | Fecal Coliform | L | No |
| **ND-10160004-001-S_00** | Elm River from Pheasant Lake, downstream to the ND/SD border and Elm Lake. | 5.56 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-002-S_00** | Maple River from its confluence with South Fork Maple River, downstream to the ND/SD border. | 41.59 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-005-S_00** | Elm River, downstream to Pheasant Lake. Located in Dickey County. | 13.79 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-006-S_00** | Upper Elm River, including all tributaries. Located in Dickey County. | 15.24 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-007-S_00** | Bristol Gulch, including all tributaries. Located in Dickey County. | 45.93 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-008-S_00** | Unnamed tributaries to the Elm River (ND-10160004-005-S_00). Located in Dickey County. | 21.69 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-009-S_00** | Unnamed tributary to Pheasant Lake. Located in Dickey County. | 2.53 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-013-S_00** | Maple River from its confluence with Maple Creek, downstream to its confluence with South Fork Maple River. Located in Dickey | 15.79 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |

## Table VI-4 (cont.). 2010 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 | 5A |
|---|---|---|---|---|---|---|---|
| **ND-10160004-015-S_00** | South Fork Maple River from its confluence with three tributaries, downstream to its confluence with the Maple River. Located in Dickey County. | 14.53 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-022-S_00** | Maple Creek, downstream to its confluence with the Maple River. Located in Lamoure County. | 33.91 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |
| **ND-10160004-026-S_00** | Maple River from Schlect-Thom Dam, downstream to its confluence with Maple Creek. Located in Lamoure County. | 20.01 Miles | | | | | |
| | | | **Fish and Other Aquatic Biota** | Fully Supporting But Threatened | | | |
| | | | | | Sedimentation/Siltation | L | Yes |

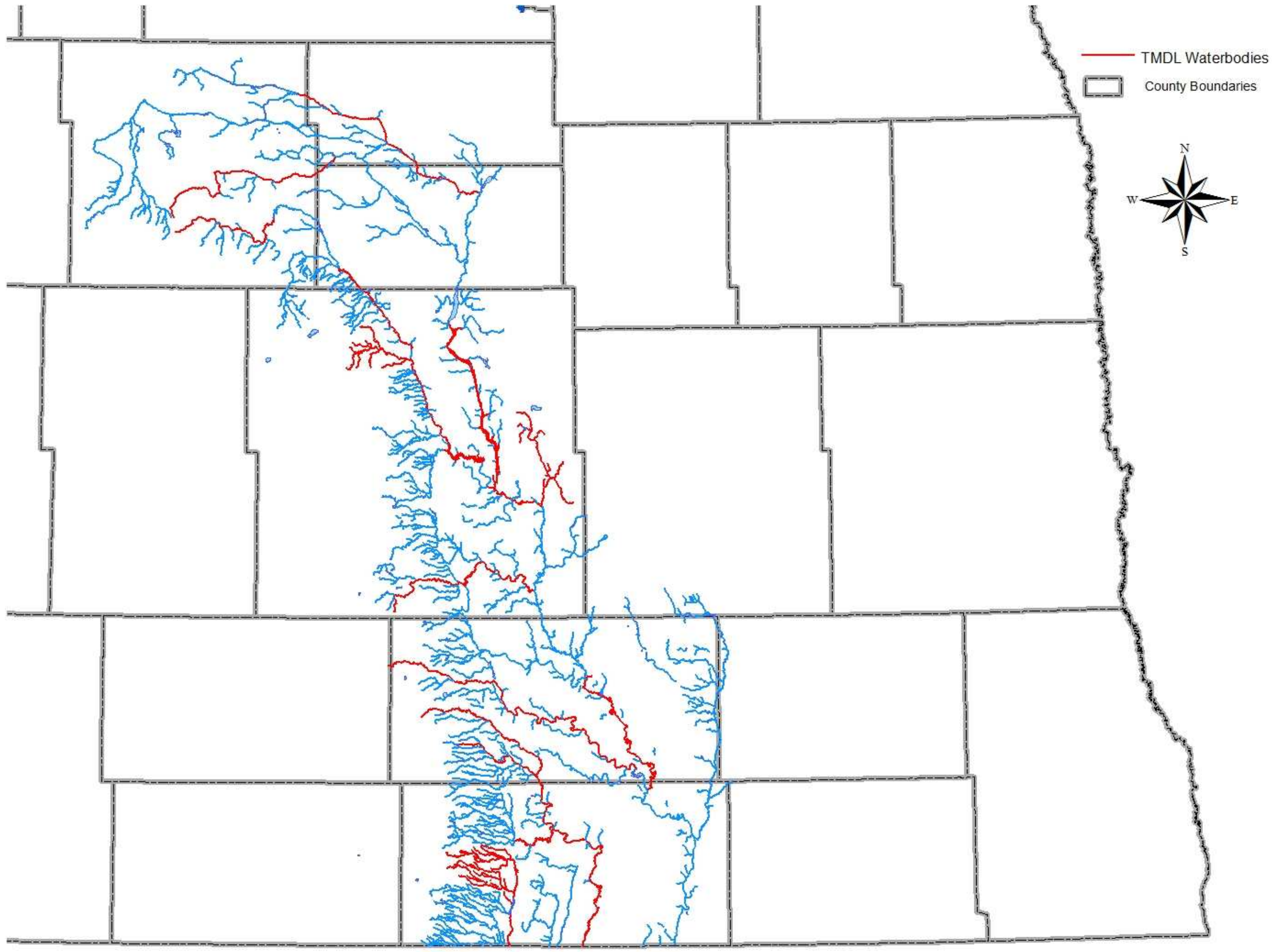



**Figure VI-6. Graphical Depiction of 2010 Section 303(d) Listed Waters Needing TMDLs in the James River Basin.**

## Table VI-5. 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-09010001-001-L_00 - Short Creek Dam** | 111.5 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2009. |
| | | | *Oxygen, Dissolved* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2009. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | | *Sedimentation/Siltation* | |
| | | | | Applicable WQS attained; original basis for listing was incorrect. A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2009. The TMDL report also includes de-listing justification for the sediment/siltation impairment suggesting the narrative criteria for sediment is currently being met. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2009. |
| **ND-09010003-003-S_00 - Wintering River, including all tributaries. Located in SW McHenry and NE McLean counties.** | 207.8 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **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. Eastern Cass County.** | 21.1 Miles | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Ammonia (Un-ionized)* | Applicable WQS attained; threatened water no longer threatened. Based on 64 ammonia samples collected within this reach of the Red River, there have been no exceedences of the acute or chronic ammonia standards within the last 10 years. Further, water quality modeling conducted by the USGS shows that with the upgrades the cities of Fargo, ND and Moorhead, MN have done to their respective wastewater treatment plants and based their current effluent limits for ammonia, there are no predicted exceedences of the ammonia standards at critical low flow (<18 cfs) or under ice cover conditions. |
| | | | *BOD, carbonaceous* | Applicable WQS attained; threatened water no longer threatened. Based on 83 dissolved oxygen measurements taken within this reach of the Red River, there have been no exceedences of the dissolved oxygen standard of 5 mg/L within the last 10 years. Further, water quality modeling conducted by the USGS shows that with the upgrades the cities of Fargo, ND and Moorhead, MN have done to their respective wastewater treatment plants and based their current effluent limits for BOD and ammonia, there are no predicted exceedences of the dissolved oxygen standard at critical low flow (<18 cfs) or under ice cover conditions. |
| | | | *Oxygen, Dissolved* | Applicable WQS attained; threatened water no longer threatened. Based on 83 dissolved oxygen measurements taken within this reach of the Red River, there have been no exceedences of the dissolved oxygen standard of 5 mg/L within the last 10 years. Further, water quality modeling conducted by the USGS shows that with the upgrades the cities of Fargo, ND and Moorhead, MN have done to their respective wastewater treatment plants and based their current effluent limits for BOD and ammonia, there are no predicted exceedences of the dissolved oxygen standard at critical low flow (<18 cfs) or under ice cover conditions. |
| **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. Located in NE Richland and SE Cass Counties.** | 38.6 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-09020105-003-S_00 - Wild Rice River from its confluence with a tributary about 3.6 miles NE of Great Bend, ND downstream to its confluence with the Colfax Watershed. Located in Eastern Richland County.** | 47.5 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-09020202-015-S_00 - Sheyenne River, downstream to Sheyenne Lake. Located in North Central Sheridan County.** | 16.7 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | Applicable WQS attained; reason for recovery unspecified. Based on pooled monthly fecal coliform and E coli data collected in 1999, 2000, 2002 and most recently in 2009, the waterbody is assessed as fully supporting. |
| **ND-09020204-003-L_00 - Brewer Lake** | 117.8 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. |
| | | | *Oxygen, Dissolved* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. |
| **ND-09020307-001-L_00 - Larimore Dam (TR #9)** | 76 Acres | | | |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for phosphorus was approved by EPA on September 29, 2009. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10110101-001-L_00 - Powers Lake** | 950.6 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. |
| | | | *Oxygen, Dissolved* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 29, 2008. |
| **ND-10110101-019-L_00 - McGregor Dam** | 54.3 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on July 7, 2009. while not previously listed, the TMDL report also identifies DO as a use impairment and provides a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also result in attainment of the dissolved oxygen standard. |
| | | | *Sedimentation/Siltation* | |
| | | | | Applicable WQS attained; original basis for listing was incorrect. A TMDL for nutrients (phosphorus) was completed and approved by EPA on July 7, 2009. The TMDL report also includes de-listing justification for the sediment/siltation impairment suggesting the narrative criteria for sediment is currently being met. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on July 7, 2009. while not previously listed, the TMDL report also identifies DO as a use impairment and provides a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also result in attainment of the dissolved oxygen standard. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10110101-021-L_00 - Lake Sakakawea** | 368231 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Oxygen, Dissolved* | Applicable WQS attained; threatened water no longer threatened. The lake has returned to normal pool elevations. That, combined with US Army Corps of Engineers modifcations to the outlet structure has resulted in attainment of dissolved oxygen and temperature standards and the lake currently attaining aquatic life and fisheries uses. |
| | | | *Temperature, water* | Applicable WQS attained; threatened water no longer threatened. The lake has returned to normal pool elevations. That, combined with US Army Corps of Engineers modifcations to the outlet structure has resulted in attainment of dissolved oxygen and temperature standards and the lake currently attaining aquatic life and fisheries uses. |
| **ND-10110102-003-L_00 - Blacktail Dam** | 160 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. |
| | | | *Oxygen, Dissolved* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | | *Sedimentation/Siltation* | Applicable WQS attained; original basis for listing was incorrect. A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. The TMDL report also includes de-listing justification for the sediment/siltation impairment suggesting the narrative criteria for sediment is currently being met. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10130101-002-S_00 – Square Butte Creek from its confluence with Otter Creek downstream to the Missouri River. Located in Morton County.** | 1.79 Miles | ***Recreation*** | *Fecal Coliform* | Data and/or information lacking to determine water quality status; original basis for listing was incorrect (Category 3). The original recreation use impairment assessment was based on 4 samples collected in May 1999. Based on the department's assessment methodology this is insufficient data with which to make an assessment. |
| **ND-10130203-002-L_00 - Crown Butte Dam** | 31.2 Acres | ***Fish and Other Aquatic Biota*** | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on December 3, 2008. |
| | | | *Oxygen, Dissolved* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on December 3, 2008. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | ***Recreation*** | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on December 3, 2008. |
| **ND-10130203-005-L_00 - Sweetbriar Reservoir** | 270.6 Acres | ***Recreation*** | *Nutrient/Eutrophication Biological Indicators* | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) was approved by EPA on December 3, 2008. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10130205-001-S_00 - Cedar Creek from its confluence with Hay Creek, downstream to its confluence with the Cannonball River. Located on border of Grant and Sioux Counties.** | 40.3 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 18, 2008. |
| **ND-10130205-006-S_00 - Crooked Creek, including all tributaries. Located in Grant County.** | 40.68 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 18, 2008. |
| **ND-10130205-024-S_00 - Cedar Creek from its confluence with Chanta Peta Creek, downstream to its confluence with Duck Creek. Located in Adams County.** | 67.56 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10130205-033-S_00 - Cedar Creek from Cedar Lake, downstream to its confluence with Chanta Peta Creek. Located in Adams County.** | 43.06 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10130205-042-S_00 - Cedar Creek from its confluence with South Fork Cedar Creek, downstream to Cedar Lake. Located in Slope and Bowman County.** | 30.86 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |

**Table VI-5 (cont').  2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.**

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10130206-001-S_00 - Cannonball River from its confluence with Dogtooth Creek, downstream to Lake Oahe. Border of Morton and Sioux County.** | 20.83 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | TMDL approved or established by EPA (4A).  A TMDL for bacteria (fecal coliform and E. coli) was approved by EPA on September 29, 2009. |
| **ND-10130206-007-S_00 - Cannonball River from its confluence with a tributary watershed near Shields, ND  (ND-10130206-028-S_00), downstream to its confluence with Dogtooth Creek.** | 21.15 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | TMDL approved or established by EPA (4A).  A TMDL for bacteria (fecal coliform and E. coli) was approved by EPA on September 29, 2009. |
| **ND-10130206-027-S_00 - Cannonball River from Cedar Creek, downstream to a tributary near Shields, ND.** | 23.52 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | TMDL approved or established by EPA (4A).  A TMDL for bacteria (fecal coliform and E. coli) was approved by EPA on September 29, 2009. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10130303-001-L_00 - Mirror Lake** | 63.3 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. |
| | | | *Oxygen, Dissolved* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18 2008. The TMDL includes a linkage analysis between phosphorus and low dissolved oxygen that provides justification that meeting the phosphorus target will also meet the dissolved oxygen TMDL target. |
| | | | *Sedimentation/Siltation* | |
| | | | | Applicable WQS attained; original basis for listing was incorrect. The report entitled "De-Listing of Sediments for Mirror Lake, Adams County, ND" was prepared and submitted to EPA in March 2008. This report provides the de-listing justification for the sediment/siltation impairment suggesting the narrative criteria for sediment is currently being met. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | |
| | | | | TMDL approved or established by EPA (4A). A TMDL for nutrients (phosphorus) and dissolved oxygen was completed and approved by EPA on September 18, 2008. |
| **ND-10160001-002-S_00 - James River downstream from Jamestown Reservoir to its confluence with Pipestem Creek.** | 3.33 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | Applicable WQS attained; reason for recovery unspecified. Based on a minimum of 5 monthly E coli and fecal coliform samples collected during each month (May, June, July, August and September) in 2008 and 2009, recreation use is assessed as fully supporting. |
| **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*** | | |
| | | | *Fecal Coliform* | |
| | | | | Applicable WQS attained; reason for recovery unspecified. Based on a minimum of 5 samples collected during May and June in 2003, 2004 and 2005, recreation use is assessed as fully supporting. Due to the intermittant nature of this stream no samples were collected during the months of July, August, or September. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10160002-007-S_00 - Pipestem Creek from Pipestem Dam #3 (ND-10160002-005-L_00), downstream to its confluence with Little Pipestem Creek.** | 7.22 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | Applicable WQS attained; due to restoration activities. Based on a minimum of 5 monthly fecal coliform samples collected during May, June, July, August and September in 2005, 2006, 2007 and 2009, recreation use is assessed as fully supporting. |
| **ND-10160002-008-S_00 - Little Pipestem Creek, downstream to its confluence with Pipestem Creek.** | 24.28 Miles | | | |
| | | ***Recreation*** | | |
| | | | *Fecal Coliform* | |
| | | | | Applicable WQS attained; due to restoration activities. Based on a minimum of 5 monthly fecal coliform samples collected during May, June, July, August and September in 2005, 2006, 2007 and 2009, recreation use is assessed as fully supporting. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10160003-004-L_00 - Lake LaMoure** | 418.73 Acres | | | |
| | | ***Fish and Other Aquatic Biota*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | Applicable WQS attained; due to restoration activities. Based on the final Lake LaMoure/Cottonwood Creek Section 319 Implementation Project Water Quality Assessment Report, Lake LaMoure's trophic status, based on chlorophyll-a and Secchi disk transparency, is mesotrophic. Further, dissolved oxygen profile data collected through 2008 show that the standard has been attained. In-lake Secchi disk transparency measurements as well as total suspended solids data collected from Cottonwood Creek also so that sediment and siltation is no longer threatening the reservoir's aquatic life uses. |
| | | | *Oxygen, Dissolved* | Applicable WQS attained; due to restoration activities. Based on the final Lake LaMoure/Cottonwood Creek Section 319 Implementation Project Water Quality Assessment Report, Lake LaMoure's trophic status, based on chlorophyll-a and Secchi disk transparency, is mesotrophic. Further, dissolved oxygen profile data collected through 2008 show that the standard has been attained. In-lake Secchi disk transparency measurements as well as total suspended solids data collected from Cottonwood Creek also so that sediment and siltation is no longer threatening the reservoir's aquatic life uses. |
| | | | *Sedimentation/Siltation* | Applicable WQS attained; due to restoration activities. Based on the final Lake LaMoure/Cottonwood Creek Section 319 Implementation Project Water Quality Assessment Report, Lake LaMoure's trophic status, based on chlorophyll-a and Secchi disk transparency, is mesotrophic. Further, dissolved oxygen profile data collected through 2008 show that the standard has been attained. In-lake Secchi disk transparency measurements as well as total suspended solids data collected from Cottonwood Creek also so that sediment and siltation is no longer threatening the reservoir's aquatic life uses. |
| | | ***Recreation*** | | |
| | | | *Nutrient/Eutrophication Biological Indicators* | Applicable WQS attained; due to restoration activities. Based on the final Lake LaMoure/Cottonwood Creek Section 319 Implementation Project Water Quality Assessment Report, Lake LaMoure's trophic status, based on chlorophyll-a and Secchi disk transparency, is mesotrophic. Further, dissolved oxygen profile data collected through 2008 show that the standard has been attained. In-lake Secchi disk transparency measurements as well as total suspended solids data collected from Cottonwood Creek also so that sediment and siltation is no longer threatening the reservoir's aquatic life uses. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
| --- | --- | --- | --- | --- |
| **ND-10160003-025-S_00 - Bone Hill Creek, downstream to its confluence with the James River.** | 39.33 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160003-032-S_00 - Bear Creek from tributary watershed (ND-10160003-035-S_00), downstream to its confluence with the James River.** | 30.35 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160003-034-S_00 - Bear Creek, upstream from tributary watershed (ND-10160003-035_00), including all tributaries.** | 58.42 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160003-035-S_00 - Unnamed tributary watershed to Bear Creek.** | 33.36 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160004-002-S_00 - Maple River from its confluence with South Fork Maple River, downstream to the ND/SD border.** | 41.59 Miles | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |

## Table VI-5 (cont'). 2008 Section 303(d) TMDL Waters in the State Which Have Been De-listed for 2010.

| Assessment Unit ID/Description | AU Size | Impaired Use | Pollutant | Rationale for De-listing |
|---|---|---|---|---|
| **ND-10160004-013-S_00 - Maple River from its confluence with Maple Creek, downstream to its confluence with South Fork Maple River. Located in Dickey County.** | 15.79 Miles | | | |
| | | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160004-015-S_00 - South Fork Maple River from its confluence with three tributaries, downstream to its confluence with the Maple River. Located in Dickey County.** | 14.53 Miles | | | |
| | | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160004-022-S_00 - Maple Creek, downstream to its confluence with the Maple River. Located in Lamoure County.** | 33.91 Miles | | | |
| | | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |
| **ND-10160004-026-S_00 - Maple River from Schlect-Thom Dam, downstream to its confluence with Maple Creek. Located in Lamoure County.** | 20.01 Miles | | | |
| | | ***Recreation*** | *Fecal Coliform* | TMDL approved or established by EPA (4A). A TMDL for fecal coliform bacteria was approved by EPA on September 29, 2009. |

## PART VII. GROUND WATER ASSESSMENT

### A. Ground Water Extent and Uses

### Chapter 1. Aquifer 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.

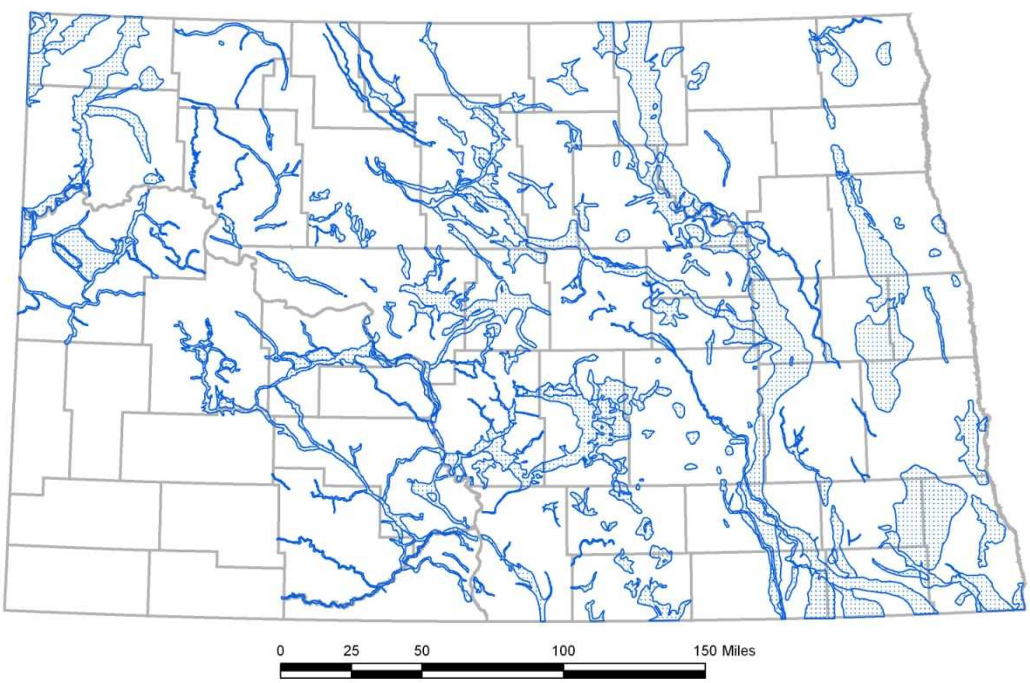



**Figure VII-1. Major Glacial Drift Aquifers in North Dakota.**

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.

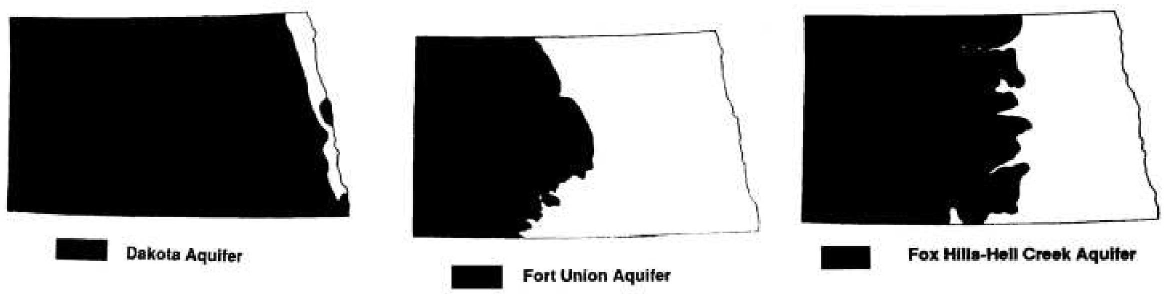



**Figure VII-2. Location and Extent of North Dakota's Primary Bedrock Aquifers.**

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 North Dakota 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 2. 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

### Chapter 1. Contaminant Source Description

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.

### Chapter 2. Ground Water Contaminant Source Databases

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:

#### Concentrated Animal Feeding Operations (CAFO) Database

Since 1972, North Dakota has maintained an active concentrated animal feeding operations (CAFO) permit program. The program is designed to protect the quality of the state's water resources through oversight of the construction and management of CAFOs. 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 715 facilities is listed in the CAFO database.

**Underground Injection Control (UIC) Program Class V Database**

The Underground Injection Control (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 State developed and maintained a UIC Class V database to catalog information obtained during the survey and to document inspection and enforcement activities.

In response to EPA's effort to create a national UIC database, North Dakota's existing database was updated to include the data fields required in the national database. The new database will facilitate the electronic submission of inspection and enforcement information to EPA, which will reduce the State's reporting burden. The new Class V database was created and was submitted to EPA for a Quality Assurance/Quality Control review. EPA has approved the initial dataset, and all future reporting will be through updates to the database and subsequent quarterly submittals of the information to EPA. At present, 543 active Class V sites are in the databaseThe State is currently working on entering Class I well information into the national database.

**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 focuses on the ground water-dependent systems, while the Source Water Protection Program addresses 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 began 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 is accomplished through coordination with the local public water system and the department's divisions of Municipal Facilities and Waste Management.

## 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 SWC 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 cycle of monitoring high-priority glacial drift aquifers in the state. The second five-year cycle of monitoring began in 1997, during which time the aquifers sampled five years earlier in 1992 were resampled. The third five-year cycle of monitoring was completed in 2006. 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 543 active Class V injection wells of various subclasses. The UIC Program coordinates with other programs, including the Resource Conservation and Recovery Act (RCRA), Underground Storage Tank (UST), National Pollutant Discharge Elimination System (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.  In addition, site reviews are conducted for on-site sewage systems in new residential subdivisions to assess potential ground water impacts.

### Water Appropriation and Monitoring

The department reviews water appropriation permits 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 SWC is underway involving the Karlsruhe aquifer to identify causes and potential solutions to nitrate increases in irrigated areas.  Meetings were conducted with SWC 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 there is no danger to public health.

### Contaminant Release Sites

The Ground Water Protection Program coordinates with the UST Program, RCRA/Comprehensive Environmental Response, Compensation and Liability Act (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 storage 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 (Federal Insecticides, Fungicides and Rodenticides Act Section 18 Requests) for potential impacts to surface or ground water.   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 Protection 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. 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.

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# Appendix A

# North Dakota Water Quality Assessment Methodology for Surface Waters

# Water Quality Assessment Methodology for North Dakota's Surface Waters

**North Dakota Department of Health**
**Division of Water Quality**

Revised
January 2010

# Water Quality Assessment Methodology
# for North Dakota's Surface Waters

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**Appendices**

# I. INTRODUCTION

## A. Background

The federal Clean Water Act (CWA) +provides the regulatory context and mandate for state water quality monitoring and assessment programs. The North Dakota Department of Health (NDDoH) has been designated as the state water pollution control agency for purposes of the federal CWA and, as such, is authorized to take all actions necessary or appropriate to secure for the state all benefits of the CWA and similar federal acts (NDCC 61-28-04). State law establishes policy to protect, maintain, and improve the quality of waters of state, while the overall goal of the federal CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

Various sections in the CWA require states to conduct specific activities to monitor, assess, and protect their waters. These activities include:

- Develop and adopt water quality standards designed to protect designated beneficial uses (Section 303);
- Establish and maintain monitoring programs to collect and analyze water quality data (Section 106). Reporting on the status of waters and the degree to which designated beneficial uses are supported (Section 305[b]);
- Identify and prioritize waters that are not meeting water quality standards (Section 303[d]);
- Assess the status and trends of water quality in lakes and identifying and classifying lakes according to trophic condition (Section 314); and
- Identify waters impaired due to nonpoint sources of pollution as well as identifying those sources and causes of nonpoint source pollution (Section 319).

## B. North Dakota's Surface Water Resources

The North Dakota Department of Health currently recognizes 249 lakes and reservoirs for water quality assessment purposes. Of this total, 141 are manmade reservoirs, and 108 are natural lakes. All lakes and reservoirs included in this assessment are considered significantly publicly owned. Based on the state's Assessment Database, the 141 reservoirs have an areal surface of 543,168 acres. Reservoirs comprise about 71 percent of North Dakota's total lake/reservoir surface acres. Of these, 480,731 acres or 63 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 139 reservoirs share 62,437 acres, with an average surface area of 449 acres. The 108 natural lakes in North Dakota cover 218,518 acres, with approximately 117,697 acres or 54 percent attributed to Devils Lake. The remaining 107 lakes average 942 acres, with 40 percent being smaller than 200 acres.

There are 54,606 miles of rivers and streams in the state. Estimates of river stream miles in the state are based on the 1:100K National Hydrography Dataset (NHD) and include ephemeral, intermittent and perennial rivers and streams.

One of the most significant water resource types in the state are wetlands. There are an estimated 2.5 million acres of wetlands in the state. The majority of these wetlands are temporary, seasonal, semi-permanent and permanent depressional wetlands located in what is commonly called the Prairie Pothole Region.

## C. Purpose and Scope

Water quality standards provide the fundamental benchmarks by which the quality of all surface waters are measured. It is the water quality standards that are used to determine impairment. As a general policy, the assessment procedures described in this methodology are consistent with the NDDoH's interpretation of the state's water quality standards.

For purposes of Section 305(b) reporting and Section 303(d) listing, the US Environmental Protection Agency (EPA) encourages 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 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 fully supporting, to Category 5, where a pollutant impairs a waterbody and a TMDL is required (Table 1). These category determinations are based on consideration of all existing and readily available data and information consistent with the state's water quality assessment methodology.

The purpose of this document is to describe the assessment methodology used in the state's biennial integrated report. 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 (ADB).

**Table 1. 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 fully supporting. |
| Category 2 | Some of the waterbody's designated uses are fully supporting, but there is insufficient data to determine if remaining designated uses are fully supporting. |
| Category 3 | Insufficient data to determine whether any of the waterbody's designated uses are met. |
| Category 4 | At least one of the waterbody's beneficial uses is not supported or has been assessed as fully supporting, but threatened, but a TMDL is not needed. This category has been further sub-categorized as:<br>• 4A - waterbodies that are impaired or threatened, but TMDLs needed to restore beneficial uses have been approved or established by EPA;<br>• 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"<br>• (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<br>• 4C - waterbodies that are impaired or threatened, but the impairment is not due to a pollutant. |
| Category 5 | At least one of the waterbody's beneficial uses is not supported or has been assessed as fully supporting, but threatened, and a TMDL is needed.<br>• 5A – waterbodies currently listed on the Section 303(d) list, but are targeted for additional monitoring and assessment during the next two to four years. |

## II. WATER QUALITY STANDARDS

### A. Background

As stated previously, water quality standards are the fundamental benchmarks by which the quality of all of the state's surface waters are assessed. It is the state's water quality standards that are ultimately used to determine beneficial use impairment status.

Water quality standards were first adopted into North Dakota administrative code beginning in the late 1960's. "Water quality standards" is a term which is used in both a broad and narrow sense. In its broadest sense, water quality standards include all the provisions and requirements in water quality rules and regulations, including minimum wastewater treatment requirements and effluent limits for point source dischargers. In the more narrow sense, water quality standards define the specific uses we make of waters of the state and set forth specific criteria, both numeric and narrative, that define acceptable conditions for the protection of these uses, including antidegradation provisions (Appendix A). The term "water quality standards" is used in the more narrow sense throughout this document.

Water quality reporting requirements under Sections 305(b) and 303(d) of the CWA require states to assess the extent to which their lakes, reservoirs, 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 accomplish this assessment by determining whether a waterbody is supporting its designated beneficial uses.

### B. Beneficial Use Designation

The protected beneficial uses of the state's surface waters are defined in the *Standards of Quality for Waters of the State* (Appendix A). The state's water quality standards provide for four stream classes (I, IA, II, and III) and five lake classes (1-5). While considered "waters of the state" and protected under the state's narrative standards, the state's water quality standards do not define beneficial uses for wetlands.

All classified lakes, reservoirs, rivers, and streams in the state are protected for aquatic life and recreation. Protection for aquatic life means surface waters are suitable for the propagation and support of fish and other aquatic biota, including aquatic macroinvertebrates, and that these waters will not adversely affect wildlife in the area. Protection of all surface waters, except wetlands, for recreation means waters should be suitable for direct body contact activities such as bathing and swimming and for secondary contact activities such as boating, fishing, and wading.

Class I, IA, and II rivers and streams and all classified lakes and reservoirs are designated for use as municipal and drinking water supplies. Specifically, these waters shall be suitable for use as a source of water supply for drinking and culinary purposes after treatment to a level approved by the NDDoH.

While not specifically identified in state water quality standards, fish consumption is protected through both narrative and numeric human health criteria specified in the state's water quality standards (Appendix A). The state's narrative water quality standards provide that surface waters shall be "free from materials attributable to municipal, industrial, or other discharges or agricultural practices" which will "render any undesirable taste to fish flesh or, in any way, make fish inedible." In addition, 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 apply to all classified rivers, streams, lakes, and reservoirs.

Four beneficial uses (aquatic life, recreation, drinking water, and fish consumption) are typically assessed for purposes of Section 305(b) reporting and Section 303(d) listing. All waterbodies included in the assessment database (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 classified lakes and reservoirs are assigned the drinking water beneficial use. Fish consumption use is assumed to apply 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 and reservoirs.

### C. Numeric Water Quality Standards

A numeric water quality standard is considered a safe concentration of a pollutant in water, associated with a specific beneficial use. Numeric standards are associated with all use classes.

Ideally, if the numeric standard is not exceeded, the use will be protected. However, nature is very complex and variable, and the NDDoH may use a variety of assessment tools (e.g., chemical and biological monitoring) to fully assess beneficial uses. With few exceptions, protection for aquatic life and/or drinking water uses will also provide protection for less sensitive uses (e.g., agriculture and industrial uses). For some pollutants, numeric standards may applicable to more than one use and may be more stringent for one use than another. For example, the drinking water standard for selenium is 50 µg/L, while the chronic aquatic life standard is 5 µg/L.

As is the case for most states, the state of North Dakota's numeric standards for toxic pollutants are based on the EPA's aquatic life criteria. The EPA develops and publishes these criteria as required by Section 304(a) of the CWA. Most numeric standards have two parts, a chronic value and an acute value. The chronic standard is the highest concentration of a toxicant to which organisms can be exposed indefinitely with no harmful effects, including growth and reproduction. The acute standard protects aquatic organisms from potential lethal effects of a short-term "spike" in the concentration of the toxicant.

In the development of aquatic life criteria and associated standards, the EPA and the NDDoH have addressed some of the many toxicological, water chemistry, and practical realities the affect a toxicant's impact on aquatic biota. For example, pollutant concentrations and flow volumes vary in effluents and in receiving streams over time, aquatic organisms generally can tolerate higher concentrations of toxicants for shorter periods of time, and the sensitivity of aquatic organisms to toxicants often varies over their lifespan. EPA's approach for expressing water quality standards addresses varying toxicant concentrations, length of an averaging period for the standard, and the number of acceptable exceedances over time. These concepts are highly relevant to the interpretation of water quality standards and the assessment of waterbodies based on available data. In the development and implementation of numeric water quality standards, these concepts are referred to as:

- Magnitude;
- Duration; and
- Frequency.

**Magnitude** refers to the concentration of a given pollutant and is represented by the numeric standard. For example, the chronic and acute standards for copper are 14.0 and 9.3 µg/L, respectively. This is the "magnitude" of copper that, if not exceeded in water, will protect aquatic biota from chronic and acute effects.

**Duration** refers to the period of time the measured concentration of a toxicant can be averaged and still provide the desired level of protection to the aquatic community. In the context of toxicity to aquatic organisms, it would be unrealistic to consider a standard as an instantaneous maximum concentration never to be exceeded. On the other hand, toxicant concentrations averaged over too long a time could be under-protective, if it allowed exceedingly high lethal concentrations to be masked by the average. In general, EPA recommends a 4-day averaging period for chronic standards and a 1-hour averaging period for acute standards.

**Frequency** refers to the number of times a standard may be exceeded over a prescribed time period and still provide adequate protection. EPA guidance and state water quality standards specify that the numeric standards, both chronic and acute, should not be exceeded more than once in three years. The three year time frame is based on studies of the time its takes for aquatic communities to recover from a major disturbance.

## D. Narrative Water Quality Standards

A narrative water quality standard is a statement(s) that prohibits unacceptable conditions from occurring in or upon surface waters, such as floating debris, oil, scum, garbage, cans, trash, or any unwanted or discarded material. Narrative standards also prohibit the discharge of pollutants, which alone or in combination with other substances, can 1) cause a public health hazard or injury to the environment; 2) impair existing or reasonable beneficial uses of surface waters; or 3) directly or indirectly cause concentrations of pollutants to exceed applicable standards. Narrative standards are often referred to as "free froms" because they help keep surface waters free from very fundamental and basic forms of water pollution (e.g., sediment and nutrients).

The association between narrative standards and beneficial use impairment is less well defined than it is for numeric standards. Because narrative standards are not quantitative, the determination that one has been exceeded typically requires a "weight-of-evidence" approach to the assessment showing a consistent pattern of water quality standards violations. The narrative standards relevant to this guidance document are found in state water quality standards Section 33-16-02.1-08 (Appendix A). These standards protect surface waters and aquatic biota from:

- Eutrophication (particularly lakes and reservoirs);
- Impairment of the biological community (exemplified by the Index of Biotic Integrity); and
- Impairment of fish for human consumption.

## E. Antidegradation Policies and Procedures

In addition to numeric and narrative standards and the beneficial uses they protect, a third element of water quality standards is antidegradation. The fundamental concept of antidegradation is the protection of waterbodies whose water quality is currently better than applicable standards. Antidegradation policies and procedures are in place to maintain high quality water resources and prevent them from being degraded down to the level of water quality standards.

State water quality standards has established three categories or tiers of antidegradation protection (Appendix A). Category 1 is a very high level of protection and automatically applies to all Class I and IA rivers and streams, all Class 1, 2, and 3 lakes and reservoirs, and wetlands that are functioning at their optimal level. Category 1 may also apply to some Class II and III rivers and streams, but only if it can be demonstrated that there is remaining pollutant assimilative capacity, and both aquatic life and recreation uses are currently being supported. Category 2 antidegradation protection applies to Class 4 and 5 lakes and reservoirs and to Class II and III rivers and streams not meeting the criteria for Category 1. Category 3 is the highest level of protection and is reserved for Outstanding State Resource Waters. Waterbodies may only be designated Category 3 after they have been determined to have exceptional value for present and prospective future use for public water supplies, propagation of fish or aquatic biota, wildlife, recreational purposes, or agricultural, industrial, or other legitimate beneficial uses.

## III. ASSESSMENT DATABASE

North Dakota's Assessment Database (ADB) contains 1,711 discreet assessment units (AUs) representing 54,606 miles of rivers and streams and 249 lakes and reservoirs. Within the ADB, designated uses are defined for each AU (i.e., river or stream reach and 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 54,606 miles of rivers and streams and 761,686 acres of lakes and reservoirs, it is impractical to adequately assess each and every mile of stream or every acre of lake. However, the NDDoH 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 NDDoH 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 and de-listing rationale.

To create North Dakota's ADB, the state's 54,606 miles of rivers and streams and 247 lakes and reservoirs have been delineated into 1,711 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 1,462 river and stream AUs and 249 lake and reservoir AUs. Each of these AUs is then assessed individually, based on the availability of sufficient and credible data. In order to delineate and define AUs used in the ADB, the NDDoH follows a general set of guidelines:

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

2. Each river and stream AU is 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 are 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 or the National Hydrography Dataset (NHD), are delineated as separate AUs. These AUs may be further delineated, based on stream order or water quality standards classification.

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

7. Stream reaches, which are identified in the NHD and on USGS 1:24,000 scale maps and which do not form either an indirect or direct hydrologic connection with a perennial stream, are 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.)

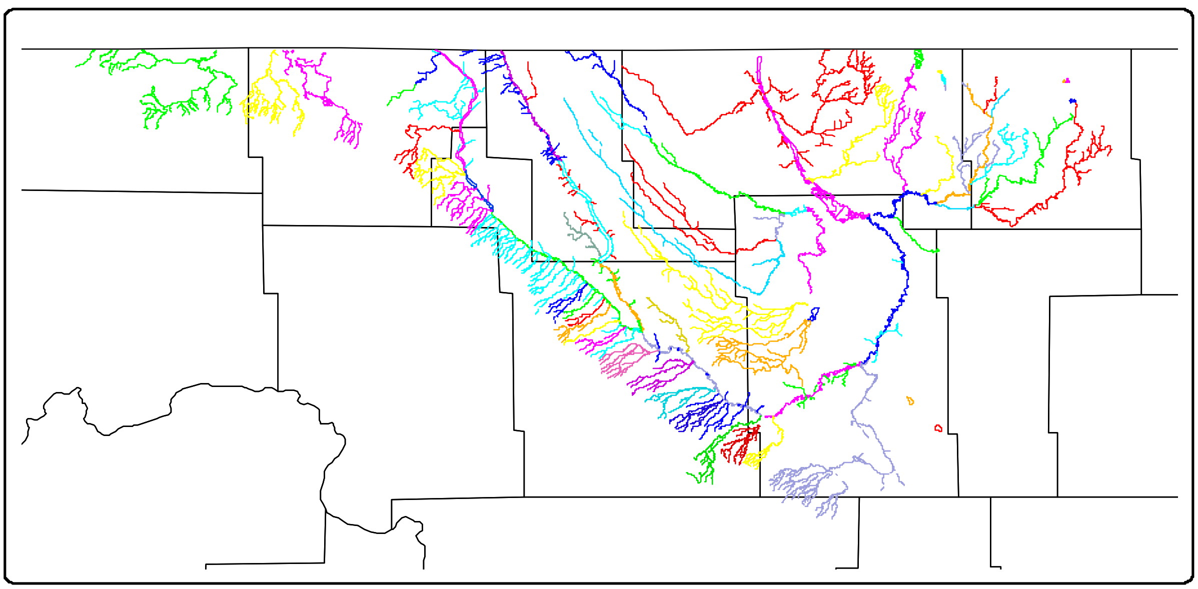

**Figure 1. Map of Reach-Indexed Assessment Units Delineated in the Souris River Basin.**

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 "reach indexing" and geographic information systems (GIS). In order to facilitate the GIS data link, the NDDoH 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 1, 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 NDDoH'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.

# IV. SUFFICIENT AND CREDIBLE DATA REQUIREMENTS AND OVERWHELMING EVIDENCE

## A. Sufficient and Credible Data Requirements

For water quality assessments, including those done for purposes of Section 305(b) assessment and reporting and 303(d) listing, the NDDoH 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 or biological data are 10 years old or less for rivers and streams and lakes and reservoirs, unless there is adequate justification to use older data (e.g., land use, watershed, or climatic conditions have not changed). There is no age limit for fish tissue mercury data. Years of record are based on the USGS water year. Water years are from October 1 in one year through September 30 of the following year. It should be noted that it is preferable to split the year in the fall when hydrologic conditions are stable, rather than to use calendar years. Data for all 10 years of the period are not required to make an assessment.
-
- There are a minimum of 10 chemical samples collected in the 10-year period for rivers and streams. The 10 samples may range from one sample collected in each of 10 years or 10 samples collected all in one year.

- There should be a minimum of two samples collected from lakes or reservoirs collected during the growing season, May-September. The samples may consist of two samples collected the same year or samples collected in separate years.

- A minimum of five fecal coliform and/or E. coli samples are 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).

- For all chemical criteria that are expressed as a 30-day arithmetic average (e.g., chloride, sulfate, radium 226 and 228, and boron) a minimum of four daily samples must be collected during any consecutive 30-day period. Samples collected during the same day shall be averaged and treated as one daily sample.

- A minimum of two biological samples (fish and/or macroinvertebrate) are necessary in the most recent 10-year period. Samples may be collected from multiple sites within the assessment stream reach, multiple samples collected within the same year, or individual samples collected during multiple years. Samples may consist of a minimum of two fish samples, two macroinvertebrate samples, or one fish and one macroinvertebrate sample.

- The mean methylemercury concentration is estimated from a minimum of 3 composite samples (preferred) or 9 individual fish samples representative of the filet. When composite samples are used, each composite sample should consist of a minimum of three individual fish per composite with the smallest fish in the composite no less than 75% of the largest fish by length. Each composite sample should also be representative of a distinct age class of the target fish species in the waterbody. In other words, if three composite samples are collected, one composite should represent small fish, one representing medium sized fish and one representing large fish in the population.

- If individual fish samples are collected then a minimum of 9 fish samples should be used to estimate the mean methylmercury concentration. The same criteria used to collect a composite sample should be used for individual fish samples where fish should be representative of at least three size classes and a minimum of three fish should be collected per size class (3 size classes times 3 fish per size class equals 9 fish). In cases where individual fish samples are used, then the number of fish per size class should be equal.

### B. Overwhelming Evidence

There are situations where a single set of data is all that is needed to make a use support determination. For example, a single set of water chemistry data may be sufficient to establish that a waterbody is not supporting aquatic life use. In such situations where a single data set irrefutably proves that impairment exists, an impairment determination may be based on this “overwhelming evidence.”

A number of factors are evaluated when making a determination as to whether data can be used as a basis for an “overwhelming evidence” assessment. Factors include the technical soundness of the methods used to collect the data and the spatial and temporal coverage of the data as it relates to the waterbody being assessed. Data quality and data currency (i.e., how old are the data?) are also factors which are considered.

Data cannot be overwhelming evidence unless the methods used for collection and analysis meets the most stringent standards for reliability and validity. The person evaluating the data must be certain that the data are representative of actual current waterbody conditions. The data must be representative of the spatial extent of the waterbody and of relevant temporal patterns. Data more than three or four years old should not be used as overwhelming evidence unless there is a strong basis for concluding that conditions have not changed since the data were collected.

## V. BENEFICIAL USE ASSESSMENT METHODOLOGY

### A. Aquatic Life Use Assessment Methodology for Rivers and Streams

The following is a description of the assessment methodology or decision criteria used to assess aquatic life and recreation uses where they are assigned to rivers and streams in the state. The methodologies used to assess drinking water and fish consumption uses are the same for both rivers and lakes and are provided in separate sections of this document.

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 includes conventional pollutant (e.g., dissolved oxygen, pH, temperature, ammonia, fecal coliform bacteria, and E. coli bacteria) and toxic pollutant (e.g., trace elements and pesticides) data collected for the most recent 10-year period. Biological monitoring data used for assessment includes fish community data collected by the NDDoH from the Red River Basin between 1993 and 1996, macroinvertebrate community data collected throughout the state between 1995 and 2000, and data collected between 2000 and 2004 as part of the EMAP Western Pilot Project.

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

The NDDoH 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 NDDoH 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 there are sufficient and credible biological data to show an impairment to the aquatic community, then the use-support decision will be to list the river or stream AU as “not supporting.”

1. Chemical Assessment Criteria

In general, aquatic life use determinations utilizing chemical data are based on the number of exceedances of the current *Standards of Quality for Waters of the State* (Appendix A) 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 are available, use support assessments are 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 NDDoH 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 are not exceeded in the AU. Consistent with state water quality standards (Appendix A), if the DO or pH standard is exceeded, but in less than 10 percent of the samples and there is no record of lethality to aquatic biota, then the AU is also assessed as “fully supporting.”.

  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.

- *Fully Supporting but Threatened*:

  For DO and pH, one or more standards were exceeded in 11 to 25 percent of the measurements taken during the 10-year assessment period. The temperature standard is exceeded, but in less than 10 percent of the measurements taken during the 10-year assessment period.

  For ammonia and other toxic pollutants, the acute or chronic standard was exceeded once or twice during any consecutive three-year period during the 10-year assessment period.

- *Not Supporting*:

  For DO and pH, one or more standards were exceeded in more than 25 percent of the measurements taken during the 10-year assessment period. The temperature standard is exceeded in more than 10 percent of the measurements taken during the 10-year assessment period.

  For ammonia and other toxic pollutants, the acute or chronic standard was exceeded three or more times during any consecutive three-year period during the 10-year assessment period.

2. 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 either 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 state water quality standards (Appendix A) describe a narrative biological goal that "the biological condition of surface waters shall be similar to that of sites or waterbodies determined by the NDDoH to be regional reference sites." This narrative standard also states that it is the intent of the state, in adopting this narrative goal, "to provide an additional assessment method that can be used to identify impaired surface waters."

The NDDoH began a stream biological monitoring and assessment program in 1993. In order to interpret these biological data and to develop a biological assessment methodology, the NDDoH 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, the NDDoH has developed final multi-metric IBIs (Index of Biotic Integrity) for only 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. While the NDDoH continues to analyze both fish and macroinvertebrate data from other river basins and ecoregions in the state, including data collected as part of the EMAP Western Pilot Project, the lack of an adequate number of quantifiable reference sites within these regions has limited the analysis of metrics and the development and interpretation of IBIs. As a result, biological assessments based on IBI results are limited to only the Lake Agassiz Plain ecoregion in the state.

Biological Assessment Methods for the Lake Agassiz Plain Ecoregion

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 2 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 are 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 2). Sites with a biological condition class rated as fair were not assessed.

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 25$^{th}$ 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 3), the 25$^{th}$ 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 25$^{th}$ 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 (Table 4). Due to uncertainty associated with the reference site population, sites classified with a biological condition score of fair should not be assessed (Table 4).

**Table 2. Biological Integrity Scoring Criteria and Aquatic Life Use Support Criteria Based on the Lake Agassiz Plain Ecoregion Fish IBI.**

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

**Table 3. 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 4. Biological Integrity Scoring Criteria 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 |

A minimum of two samples which result in beneficial use assessments of fully supporting and/or not supporting are required to assess a waterbody based on biological data (see Section IV. Sufficient and Credible Data Requirements). For assessments based on biological monitoring data, 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 not supporting.

- *Not Supporting*:

  Use support assessments for all samples are not supporting.

Biological Assessment Methods for Other Regions in the State

The NDDoH recognizes that there may be biological data that are available for other regions in the state that meet the sufficient and credible data requirements. Where these data are available the NDDoH encourages the use of this information to make aquatic life use support decisions. While it is not possible to assess these sites or waterbodies as fully supporting, sites that are exemplified by low taxa richness, presence of pollutant tolerant taxa and/or low density, can be assessed as not supporting aquatic life use.

**B. Recreation Use Assessment Methodology for Rivers and Streams**

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, fishing, and wading. 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. The state's recreation use support assessment methodology for rivers and streams is based on the state's numeric water quality standards for fecal coliform bacteria and E. coli bacteria (Appendix A).

For each assessment based solely on fecal coliform data, the following criteria are used:

- Assessment Criterion 1a: For each assessment unit, the geometric mean of samples collected during any month from May 1 through September 30 does not exceed a density of 200 colony forming units (CFUs) per 100 milliliters (mL). A minimum of five monthly samples is required to compute the geometric mean. If necessary, samples may be pooled by month across years.

- Assessment Criterion 2a: For each assessment unit, less than 10 percent of samples collected during any month from May 1 through September 30 exceed a density of 400 CFUs per 100 ml. A minimum of five monthly samples is required to compute the percent of samples exceeding the criteria. If necessary, samples may be pooled by month across years.

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

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

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

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

For each assessment based solely on E. coli data, the following criteria are used:

- Assessment Criterion 1b: For each assessment unit, the geometric mean of samples collected during any month from May 1 through September 30 does not exceed a density of 126 CFUs per 100 mL. A minimum of five monthly samples is required to compute the geometric mean. If necessary, samples may be pooled by month across years.

- Assessment Criterion 2b: For each assessment unit, less than 10 percent of samples collected during any month from May 1 through September 30 exceed a density of 409 CFUs per 100 ml. A minimum of five monthly samples is required to compute the percent of samples exceeding the criteria. If necessary, samples may be pooled by month across years.

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

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

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

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

For each assessment base on both fecal coliform and E. coli data, the following criteria are used:

- Fully Supporting: Criteria 1a, 1b, 2a, and 2b are all met.

- Fully Supporting but Threatened: Criterion 1 a and 1b are both met, but criterion 2a and/or 2b are not.

- Not Supporting: Criterion 1a and/or 1b are not met. Criteria 2a and/or 2b may or may not be met.

## C. Aquatic Life and Recreation Use Assessment Methodology for Lakes and Reservoirs

The following is a description of the assessment methodology or decision criteria used to assess aquatic life and recreation uses for lakes and reservoirs in the state. The methodology used to assess the drinking water, fish consumption, agricultural, and industrial uses is the same for both rivers and lakes and is provided in a separate section of the document.

1. Aquatic Life and Recreation

The state's narrative water quality standards (Appendix A) 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 a measure of the productivity of a lake or reservoir and is directly related to the level of nutrients (i.e., 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, low transparency, and low dissolved oxygen (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 also 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, high transparency, 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 indicators and the aquatic community (as reflected by the fishery) or between trophic status indicators 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 assessment methodology, 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 with respect to aquatic life and recreation use. 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.

Since trophic status indicators specific to North Dakota waters have not been developed, Carlson's trophic status index (TSI) (Carlson, 1977) has been chosen to assess the trophic status of lakes or reservoirs. To create a numerical TSI value, Carlson's TSI uses a mathematical relationship based on three indicators: 1) Secchi Disk Transparency in meters (m); 2) surface total phosphorus concentration expressed as µg/ L; and 3) chlorophyll-a concentration expressed as µg/L.

This numerical value, ranging from 0-100, corresponds to a trophic condition with increasing values indicating a more eutrophic (degraded) condition. Carlson's TSI estimates are calculated using the following equations and is also depicted graphically in Figure 2.

- Trophic status based on Secchi Disk Transparency (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 µg $L^{-1}$.

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

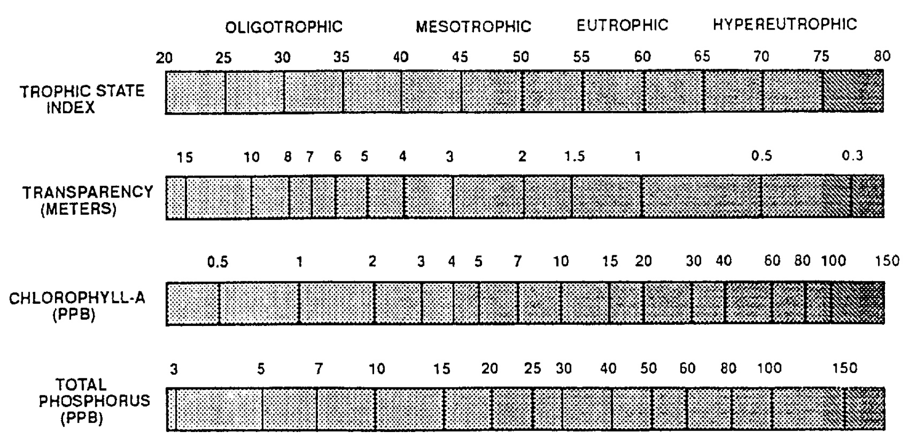


**Figure 2. A Graphic Representation of Carlson's TSI**

In general, of the three indicators, it is believed that chlorophyll-a is the best indicator of trophic status, since it is a direct measure of lake productivity. Secchi disk transparency should be used next, followed by phosphorus concentration. In theory, for a given lake or reservoir, the measures of chlorophyll-a, Secchi disk transparency, and phosphorus concentration are all interrelated and should yield similar trophic status index values. This, however, is usually not the case. Many lakes and reservoirs in the state are shallow and windswept causing non-algal turbidity to limit light penetration. This situation may result in a lake having a high phosphorus concentration, low Secchi disk transparency, and low chlorophyll-a concentration. In other instances, other micronutrients may be limiting algal growth even though excessive phosphorus is present.

When conducting an aquatic life and recreation use assessment for a lake or reservoir, the average trophic status index score should be calculated for each indicator. When the trophic status index scores for each indicator (chlorophyll-a, Secchi disk transparency, and phosphorus concentration) each result in a different trophic status assessment then the assessment should be based first on chlorophyll-a, followed by Secchi disk transparency. Only when there are not adequate chlorophyll-a and/or Secchi disk transparency data available to make an assessment should phosphorus concentration data be used.

**D. Drinking Water Supply Use Assessment Methodology for Rivers, Lakes, and Reservoirs**

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 NDDoH” (Appendix A). All Class I, IA, and II rivers and streams and all lakes and reservoirs classified in the state water quality standards (Appendix A), with the exception of Lake George in Kidder County, are assigned the drinking water supply beneficial use. While most lakes and reservoirs are assigned this use, few currently are used as a drinking water supply. Lake Sakakawea is the current drinking water supply for the Southwest Water Pipeline and the cities of Garrison, Parshall, Pick City, and Riverdale.

Drinking water use is assessed by comparing ambient water quality data to the state water quality standards (Tables 1 and 2 in Appendix A). Ambient water chemistry data are compared to the water quality standards for chloride, sulfate, and nitrate (Table 5) and to the human health standards for Class I, IA, and II rivers and streams (see Table 2 in Appendix A). 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.

Drinking water use is also protected through the state’s narrative water quality standards. To paraphrase, narrative standards provide language that waters of the state shall be free from materials that produce a color or odor, or other conditions to such a degree as to create a nuisance. Further, state narrative standards provide language that states that waters of the state shall be “free from substances….in concentrations or combinations which are toxic or harmful to **humans**, animals, plants, or resident biota.” There shall also be “no discharge of pollutants, which …..shall cause a public health hazard or injury to environmental resources.”

**Table 5. State Water Quality Standards for Chloride, Sulfate, and Nitrate (Appendix A)**

| Stream Classification | Water Quality Standards (mg/L) | | |
|---|---|---|---|
| | Chloride[1] | Sulfate[1] | Nitrate[2] |
| **Class I** | 100 | 250 | 10 |
| **Class IA** | 175 | 450 | 10 |
| **Class II** | 250 | 450 | 10 |

[1]Expressed as a 30-day arithmetic average based on a minimum of four daily samples collected during the 30-day period.
[2]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 are used:

- *Fully Supporting:*

  Based on Numeric Standards: No exceedances of the water quality standard for nitrate, one or fewer exceedances of the 30-day average standards for chloride or sulfate, and no exceedances of any of the human health standards.

  Based on Narrative Standards: No drinking water complaints on record in the last two years.

- *Fully Supporting but Threatened:*

  Based on Numeric Standards: The fully supporting, but threatened use assessment designation is not applied to the drinking water use. Waters are either assessed as fully supporting or not supporting based on chemical data applied to the numeric standards.

  Based on Narrative Criteria: No impairment based on the numeric criteria, but a declining trend in water quality over time suggests a measurable increase in the cost to treat water for drinking water supply may occur if the trend continues.

- *Not Supporting*:

  Based on Numeric Criteria: One or more exceedances of the water quality standard for nitrate, two or more exceedances of the 30-day average criteria for chloride or sulfate, or one or more exceedances of any of the human health standards.

  Based on Narrative Criteria: Knowledge of taste and odor problems or increased treatment costs have been associated with pollutants.

## E. Fish Consumption Use Assessment Methodology for Rivers, Lakes and Reservoirs

As stated previously, the state's narrative water quality standards provide that surface waters shall be "free from materials attributable to municipal, industrial, or other discharges or agricultural practices" which will "render any undesirable taste to fish flesh or, in any way, make fish inedible." Fish consumption use is assumed to apply 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 and reservoirs.

The beneficial use assessment methodology for fish consumption is based on the U.S. Environmental Protection Agency's (EPA) recommended methylmercury fish tissue criterion of 0.3 µg/g (EPA, 2001), and is consistent with the state's fish advisory guidelines for the general population. The EPA recommended mercury criterion is based on a reference dose (based on noncancer human health effects) of 0.0001 mg methylemercury/kg body weight-day minus the relative source contribution which is estimated to be $2.7 \times 10^{-5}$ mg methylmercury/kg body weight-day. The EPA criterion assumes an average human body weight default value of 70 kg (154 pounds) for adults and an average meal size of 0.0175 kg (6 ounces).

The Department's assessment methodology for fish consumption is also based on the US EPA's "Guidance for Implementing the January 2001 Methylymercury Water Quality Criterion, Final" (EPA, 2009) and "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories", volume 1 (EPA, 2000). Based on these two guidance documents a waterbody is assessed for fish consumption use using the mean concentration of at least one piscivorous game fish species (e.g., walleye, sauger, northern pike, catfish, largemouth bass, or small mouth bass) found in the waterbody. The mean methylemercury concentration is estimated from a minimum of 3 composite samples (preferred) or 9 individual fish samples representative of the filet. When composite samples are used, each composite sample should consist of a minimum of three individual fish per composite with the smallest fish in the composite no less than 75% of the largest fish by length. Each composite sample should also be representative of a distinct age class of the target fish species in the waterbody. In other words, if three composite samples are collected, one composite should represent small fish, one representing medium sized fish and one representing large fish in the population.

If individual fish samples are collected then a minimum of 9 fish samples should be used to estimate the mean methylmercury concentration. The same criteria used to collect a composite sample should be used for individual fish samples where fish should be representative of at least three size classes and a minimum of three fish should be collected per size class (3 size classes times 3 fish per size class equals 9 fish). In cases where individual fish samples are used, then the number of fish per size class should be equal.

The EPA recommends using the t-test to determine whether the mean methylmercury concentration in fish tissue samples in a waterbody exceeds the criterion with statistical significance. The t-statistic is used to test the null hypothesis that the mean concentration of methylmercury in fish is equal to or less than the fish tissue criterion of 0.3 µg/g. The alternate hypothesis is that the mean concentration of methylmercury in fish is greater than the criterion. Where the null hypothesis is true the result is an assessment where fish consumption is "fully supporting." Where the null hypothesis is rejected in favor of the alternative hypothesis then fish consumption use is assessed as "not supporting." For purposes of the state's assessment methodology the 0.05 significance level ($p \leq 0.05$) has been selected. This means there is a 5% chance of rejecting the null hypothesis when it is really true (Type I error).

The t-test ($t_c$) is calculated from the sample mean (z) and variance ($s^2$) from the sample data as:

$$t_c = (z-c) / s$$

Where,

$t_c$ = test statistic;

z = mean methylmercury concentration;

c = methylmercury criterion; and

s = standard deviation of the mean.

The null hypothesis of no difference is rejected in favor of the alternative hypothesis of exceedance if:

$$t_c > t_{\alpha,n-1}$$

Where, $t_{\alpha,n-1}$ is the tabulated value of the Student-t distribution corresponding to the level of significance $\alpha$=0.05 and n-1 degrees of freedom (n=sample size) (Table 1).

**Table 6. One-sided Student-t Distribution Values for α=0.05 and n-1 Degrees of Freedom.**

| | **n-1 degrees of freedom** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| **Student-t value** | 2.920 | 2.353 | 2.132 | 2.015 | 1.943 | 1.895 | 1.860 | 1.833 | 1.812 | 1.796 |

Fish Consumption Use Assessment Example

A sample of nine individual walleye representing three size classes (three fish per class) were collected from Jensen Lake and analyzed for mercury. The mercury samples were collected as dorsal plugs and are assumed to represent the concentration of mercury in the filet of each fish.

| Size Class | Length (inches) | Mercury Concentration (µg/g) |
|---|---|---|
| Small | 12 | 0.23 |
| | 12.5 | 0.24 |
| | 13.6 | 0.27 |
| Medium | 16.5 | 0.33 |
| | 17.1 | 0.36 |
| | 18.0 | 0.38 |
| Large | 23 | 0.45 |
| | 23.5 | 0.46 |
| | 24.2 | 0.47 |

The mean concentration (z) for the nine samples (n=9) is 0.35 with a variance ($s^2$) equal to 0.008828. Based in this mean and variance the test statistic is calculated as:

$$t_c = (z-c) / s$$

$$t_c = (0.35-0.3)/0.09396$$

$$t_c = 0.532$$

The null hypothesis of no difference between the mean and the criterion is accepted if $t_c > t_{\alpha,n-1,}$ where $\alpha$=0.05 and n-1=8. Since $t_c$ = 0.532 is not greater than $t_{\alpha,n-1}$ = 1.860 (Table 1) then the null hypothesis is rejected in favor of the alternative hypothesis that the mean methylmercury concentration is greater than the criterion and fish consumption use for Jensen Lake is assessed as not supporting.

## F. Agricultural Use Assessment Methodology for Rivers, Lakes and Reservoirs

Agricultural uses are defined in the state water quality standards as " waters suitable for irrigation, stock watering, and other agricultural uses, but not suitable for use as a source of domestic supply for the farm unless satisfactory treatment is provided." While not specifically stated in state water quality standards, the numeric standards for pH (6.0-9.0), boron (750 µg/L as a 30-day average), sodium (less than 50% of cation based on mEq/L), and radium (5 pCi/L as a 30-day average) are intended for the protection of agricultural uses. Further, state water quality standards provide for the protection of agricultural uses by providing language that states that waters of the state shall be “free from substances….in concentrations or combinations which are toxic or harmful to humans, **animals, plants**, or resident biota.”

In order to make beneficial use determinations for agricultural uses, the following decision criteria are used:

- *Fully Supporting:*

  Based on Numeric Standards: Ten percent or less of the samples exceed the water quality standard for pH or sodium and one or fewer exceedances of the 30-day average criteria for boron or radium.

  Based on Narrative Standards: Water supply supports normal crop and livestock production.

- *Fully Supporting but Threatened:*

  Based on Numeric Standards: The fully supporting, but threatened use assessment designation is not applied to agricultural use. Waters are either assessed as fully supporting or not supporting based on chemical data applied to the numeric standards.

  Based on Narrative Standards: No impairment based on the numeric criteria, but a declining trend in water quality over time suggests a measurable decrease in crop and/or livestock production may occur if the trend continues.

- *Not Supporting*:

  Based on Numeric Standards: Greater than 10 percent of samples are exceeded for the water quality standard for pH or sodium, or two or more exceedances of the 30-day average criteria for boron or radium.

  Based on Narrative Standards: At least on pollutant has been demonstrated to cause a measurable decrease in crop or livestock production.

## G. Industrial Use Assessment Methodology for Rivers, Lakes and Reservoirs

Industrial uses are defined in the state water quality standards as “waters suitable for industrial purposes, including food processing, after treatment.” While there are no specific numeric criteria in the state’s water quality standards intended to protect industrial uses, it is assumed that if the state’s narrative standards are met, or if other numeric water quality standards are met, the beneficial uses for industry will also be met.

## VI. REFERENCES

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

# Appendix A

# Standards of Quality for Waters of the State

# Appendix B

## Agency and Organization Data Request

Letter, Form and Contacts

May 15, 2009

Contact

Dear :

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 Section 303(d) List of Impaired Waters Needing Total Maximum Daily Loads is due to the US Environmental Protection Agency on April 1, 2010. The North Dakota Department of Health is the 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 integrated 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 2010 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 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

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Angela Wetz
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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 standard operating procedures and/or 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, 918 E Divide Ave, 4th Floor, Bismarck, ND 58501-1947

## Appendix C

## Public Notice Statement Requesting Public Comment on the State of North Dakota’s Draft 2010 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 2010 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 require 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 August 2008. This list, referred to as the "2008 list" was approved by EPA on September 29, 2008. The draft 2010 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 "2008 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 approve or disapprove the state's listings. The purpose of this notice is to solicit public comment on the draft "2010 list" prior to formally submitting the list to the EPA Regional Administrator.

2. Public Comments

Persons wishing to comment on the State's draft 2010 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 19, 2010. 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@nd.gov. The 2010 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.ndhealth.gov). Copies may also be requested by writing to the Department at the above address or by calling 701.328.5210.

Public Notice Number ND-2010-004

# Appendix D

# Public Comments on the State of North Dakota's Draft 2008 Section 303(d) List and the North Dakota Department of Health's Responses

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 8**
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

March 19, 2010

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: EPA Comments on North Dakota's Draft 2008 Integrated Report (IR)

Dear Mr. Ell:

We have reviewed North Dakota's draft 2010 Integrated Report and appreciate the opportunity to provide comments. We commend the North Dakota Department of Health for the use of the integrated report format, the Assessment Database (ADB), and associated GIS files for reporting both the Section 305(b) Water Quality Report to Congress and the Section 303(d) list of impaired or threatened waterbodies.

We have enclosed individual comments that should be addressed prior to finalizing the document, primarily noted discrepancies between the IR and the ADB along with some specific issues in the Report itself. The comments can be found in the enclosure. Please contact me (303-312-6237) if you have any questions with regard to our comments.

Sincerely,

Kris Jensen
Monitoring and Assessment Team
Water Quality Unit
Ecosystems Protection Program

Enclosure
Cc: Karen Hamilton, Vern Berry, EPA

Enclosure
Specific Comments on North Dakota's 2010 Draft Integrated Report

1. Wild Rice River, Assessment Unit ID: ND-09020105-019-S_00 is present in ADB but not in the hard copy.

2. Brewer Lake, Assessment Unit ID: ND- 09020204-003-L_00: sediment/siltation. A TMDL was approved for Brewer Lake on September 29, 2008 for nutrients and dissolved oxygen. The TMDL document indicated sediment would be addressed separately and the lake would remain listed for this cause. Sediment/siltation is listed in ADB as a cause, although it is not included in the hard copy list. It should be added to the hard copy list and counts adjusted if necessary.

3. Powers Lake: Same comment as for Brewer Lake. It should be added to the hard copy list.

4. Crown Butte Dam: Same comment as above. It should be added to the hard copy list.

5. Page V-26: First paragraph, last sentence. Are the dates listed here (2006-2007) the most current reporting period?

6. Page VI-2: First paragraph, 4th full sentence. Should this be a reference to the 2008 rather than the 2006 list?

7. Page VI-9: Bois De Sioux River, ND-09020101-002-S_00: No assessment date is listed for *fish and other aquatic biota*. Is it intended to be the same as for the recreation use?

8. Page VI-12: Red River, ND-09020107-001-S_00: No assessment date is listed for fish and other aquatic biota. Please clarify.

9. Page VI-19, Maple River, ND-09020205-012-S_00: Should be listed for recreation as shown in ADB, however, no causes are listed. Please correct.

10. Page VI-30: ND-10130101-002-S_00, Square Butte Creek – Shows one delisting in ADB but is not included in delistings in hard copy. Please provide additional documentation for "original basis for listing was incorrect."

11. Page VI-49: Top of page. Assessment Unit not clearly identified. Unable to cross-check. Please clarify.

12. Page VI-49: Sweet Briar Reservoir: Date listed for approved TMDL in ADB is December 4, 2008, while date listed in hard copy is December 8, 2008. Please correct.

**North Dakota Department of Health**
**Response to Comments on the Draft 2010 Integrated Report**

**US Environmental Protection Agency, Region 8**

Comments 1:
Wild Rice River, Assessment Unit ID: ND-09020105-019-S_00 is present in ADB but not in the hard copy.

Department Response:
Due to an error in the TMDL Information table in the ADB, this waterbody was inadvertently left off the draft 2010 Section 303(d) list of impaired waters needing TMDLs. The TMDL completion date has been changed in the ADB and the waterbody has been added to the final 2010 list.

Comment 2:
Brewer Lake, Assessment Unit ID: ND- 09020204-003-L_00: sediment/siltation. A TMDL was approved for Brewer Lake on September 29, 2008 for nutrients and dissolved oxygen. The TMDL document indicated sediment would be addressed separately and the lake would remain listed for this cause. Sediment/siltation is listed in ADB as a cause, although it is not included in the hard copy list. It should be added to the hard copy list and counts adjusted if necessary.

Department Response:
Due to an error in the TMDL Information table in the ADB, this waterbody was inadvertently left off the draft 2010 Section 303(d) list of impaired waters needing TMDLs. The TMDL completion date has been changed in the ADB and the waterbody has been added to the final 2010 list.

Comment 3:
Powers Lake: Same comment as for Brewer Lake. It should be added to the hard copy list.

Department Response:
Due to an error in the TMDL Information table in the ADB, this waterbody was inadvertently left off the draft 2010 Section 303(d) list of impaired waters needing TMDLs. The TMDL completion date has been changed in the ADB and the waterbody has been added to the final 2010 list.

Comment 4:
Crown Butte Dam: Same comment as above. It should be added to the hard copy list.

Department Response:
Due to an error in the TMDL Information table in the ADB, this waterbody was inadvertently left off the draft 2010 Section 303(d) list of impaired waters needing TMDLs. The TMDL completion date has been changed in the ADB and the waterbody has been added to the final 2010 list.

Comment 5:
Page V-26: First paragraph, last sentence. Are the dates listed here (2006-2007) the most current reporting period?

Department Response:
The dates have been changed to “2008-2009.”

Comment 6:
Page VI-2: First paragraph, 4th full sentence. Should this be a reference to the 2008 rather than the 2006 list?

Department Response:
The date has been changed to 2008.

Comment 7:
Page VI-9: Bois De Sioux River, ND-09020101-002-S_00: No assessment date is listed for *fish and other aquatic biota*. Is it intended to be the same as for the recreation use?

Department Response:
An assessment date of January 29, 2010 was added to the ADB for the “fish and other aquatic biota” beneficial use.

Comment 8:
Page VI-12: Red River, ND-09020107-001-S_00: No assessment date is listed for fish and other aquatic biota. Please clarify.

Department Response:
An assessment date of February 2, 2010 was added to the ADB for the “fish and other aquatic biota” beneficial use.

Comment 9:
Page VI-19, Maple River, ND-09020205-012-S_00: Should be listed for recreation as shown in ADB, however, no causes are listed. Please correct.

Department Response:
This waterbody was listed previously as fully supporting, but threatened for aquatic life use. For the 2010 assessment cycle it is now also listed as “not supporting” for recreational use due to fecal coliform bacteria. This use impairment an cause has been added to the 2010 list and the fecal coliform cause has been added to the ADB.

Comments 10 and 11:
10. Page VI-30: ND-10130101-002-S_00, Square Butte Creek – Shows one delisting in ADB but is not included in delistings in hard copy. Please provide additional documentation for "original basis for listing was incorrect."

11. Page VI-49: Top of page. Assessment Unit not clearly identified. Unable to cross-check. Please clarify.

Department Response:
The waterbody that is not clearly identified in the de-listing table on the top of page VI-49 (comment 11) is the Square Butte Creek waterbody (ND-10130101-002-S_00) that is shown as de-listed in the ADB. The waterbody ID and description on the top of page VI-49 has been corrected to reflect this de-listing.

Comment 12:
Page VI-49: Sweet Briar Reservoir: Date listed for approved TMDL in ADB is December 4, 2008, while date listed in hard copy is December 8, 2008. Please correct

Department Response:
In a follow-up email with EPA Region 8 it has been determined that the TMDL approval date for Sweet Briar Reservoir is actually December 3, 2008, not December 4$^{th}$ or December 8$^{th}$. All references to the TMDL approval date for this waterbody in both the ADB and in the 2010 list have been changed to December 3, 2008. EPA Region 8 will also change the TMDL approval date in the ATTAINS database to December 3, 2008.

It should also be noted that these changes have also been made for Crown Butte Dam, waterbody ID ND-10130203-002-L_00.