

North Dakota Department of Environmental Quality
Division of Water Quality
Watershed Management Program



**North Dakota's Water Quality
Monitoring Strategy for Surface Waters**



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North Dakota's Water Quality Monitoring Strategy for Surface Waters 2020-2030

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I. INTRODUCTION

A. Background

The federal Clean Water Act provides the regulatory context and mandates state water quality monitoring and assessment programs. The North Dakota Department of Environmental Quality (NDDEQ) has been designated as the state water pollution control agency for purposes of the federal Clean Water Act and, as such, is authorized to take all actions necessary or appropriate to secure for the state all benefits of the Clean Water Act 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 Clean Water Act is to “restore and maintain the chemical, physical and biological integrity of the Nation’s waters.”

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

- Developing and adopting water quality standards designed to protect designated beneficial uses (Section 303).
- Establishing 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]).
- Identifying and prioritizing waters that do not meet water quality standards (Section 303[d]).
- Assessing the status and trends of water quality in lakes and identifying and classifying lakes according to trophic conditions (Section 314).
- Identifying waters impaired due to nonpoint sources of pollution as well as identifying those sources and causes of nonpoint source pollution (Section 319).

B. Purpose and Scope

This document describes the NDDEQ’s strategy to monitor and assess its surface water resources, including rivers and streams, lakes and reservoirs, and wetlands. It does not address ground water monitoring and assessment or regulatory monitoring for National Discharge Pollution Elimination System (NDPES) permit compliance. For more information on ground water monitoring and assessment and NDPES compliance monitoring, the reader is referred to the Division Water Quality’s Ground Water Protection and Permit Programs.

This strategy also fulfills requirements of Clean Water Act Section 106(e)(1) that requires the U.S. Environmental Protection Agency (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 CWA. The 10 key elements are:

- Monitoring Program Strategy.
- Monitoring Objectives.
- Monitoring Design.

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- Core and Supplemental Water Quality Indicators.
 - Quality Assurance.
 - Data Management.
 - Data Analysis/Assessment.
 - Reporting.
 - Programmatic Evaluation.
 - General Support and Infrastructure Planning.

The purpose of this multi-year strategy is to describe the goals, objectives, scope, and plan for surface water quality monitoring conducted by the NDDEQ. While the Department recognizes and benefits from numerous state, federal, and local partners in the state that conduct monitoring and assessment activities, this document does not provide direction for monitoring efforts outside the responsibility of the Department.

II. TYPES OF MONITORING

Environmental monitoring data, including water quality monitoring data, can be categorized for the purpose of monitoring and how the information is assessed and used. In general, the categories are: 1) condition monitoring, 2) problem investigation monitoring, 3) effectiveness monitoring and 4) special studies monitoring.

Condition monitoring is used to identify overall water quality status and trends by assessing the condition of individual waterbodies, populations of waterbodies or watersheds in terms of their ability to meet water quality standards or other established criteria (i.e., water quality index or biological indicators). Examples of condition monitoring include ambient water quality or rotating basin monitoring for Section 305(b) reporting, lake water quality assessments and Section 303(d) Total Maximum Daily Load (TMDL) listing activities.

Problem investigation monitoring involves studying specific water quality problems or watershed restoration issues that result in the development of a management or remediation plan to protect or improve the resource. Problem investigation monitoring is used to determine the specific causes and sources of water quality impairments to rivers, streams, lakes, reservoirs, or wetlands and to quantify pollutant loads. It is also used to determine the actions that are needed to return a waterbody to a condition that meets standards or other water quality goals. Examples of problem investigation monitoring include TMDL development projects, Section 319 Nonpoint Source (NPS) Pollution assessment projects and the investigation of specific water pollution issues (e.g., fish kills or pollution spills).

Effectiveness monitoring is used to assess the effectiveness and success of specific regulatory or voluntary management actions that have been implemented to improve or protect water quality. Effectiveness monitoring is not only used to evaluate the immediate success of management actions but is used in an adaptive management framework to improve and refine management actions to meet the projects goals. Examples include monitoring for TMDL implementation projects or Section 319 NPS watershed restoration projects.

Special studies monitoring addresses monitoring activities that do not fit neatly into the

other three categories. Typically, special studies monitoring would not directly result in an assessment of a specific lake, stream, or wetland or in the implementation of management actions for specific waterbodies or watersheds. These studies would include those stream, lake and wetland studies that are more research focused. Examples include monitoring for emerging issues, monitoring related to toxic pollutants such as mercury or pesticides, monitoring focused on specific geographic areas and studies focused on a specific problem, pollutant source, sampling method or to answer a specific question. These types of studies typically have a very specific purpose and are generally of relatively short duration.

III. MONITORING AND ASSESSMENT GUIDING PRINCIPLES

This strategy also incorporates six guiding principles considered by the Department to be essential for effective monitoring and necessary to meeting the goals and objectives.

Principle 1: Integrate and coordinate the use of scarce monitoring resources with those of other agencies and organizations.

The scarcity of funds and other resources necessary to adequately monitor and assess the state waters demands the Department work closely with other entities, both public and private, to ensure the broadest possible coverage of the state's surface water resources. The Department will seek opportunities to collaborate with other organizations to plan and implement monitoring programs and projects.

Principle 2: Maximize the use of local units of government and citizen volunteers to monitor surface water quality.

Local units of government such as soil conservation districts, water resource boards and cities have been important partners in conducting monitoring for nonpoint source assessments and for developing TMDLs. Citizen volunteers in the form of lake associations have conducted lake water quality monitoring. By using local governments and citizens in monitoring, more waters can be assessed. When local governments and citizens volunteers are involved in collecting the data, they are more likely to take the necessary steps to address water quality problems. Screening level monitoring by competent citizen volunteers will make more time for Department staff to address complex problems and issues.

Principle 3: Schedule field studies and other data acquisition activities to be consistent with the Department's rotating basin monitoring schedule.

North Dakota is a large state, and as a result, the expenditure of resources for travel and other logistics can be considerable. Monitoring programs and projects should be coordinated to occur within a basin at the same time. This would also facilitate the integration of data and reporting across water resource types.

Principle 4: Use a tiered monitoring approach consisting of rapid assessment of screening level assessments at numerous sites and intensive study designs at a smaller subset of pre-screened sites.

Whenever possible, the Department will use rapid assessments or screening level studies to

initially evaluate the water quality condition of a waterbody. If the initial screening data suggests a potential problem exists, then more intensive monitoring will be performed by Department staff to verify the problem and to determine its specific cause and source. This tiered approach will result in the assessment of more waters each year and will allow the Department to focus limited resources on those waters with the most pressing needs.

Principle 5: Generate monitoring data that are scientifically defensible and relevant to the decision-making process.

All the monitoring activities in this strategy are linked to specific goals and objectives and are established to be consistent with sound scientific and statistical concepts. Emphasis is given to quality assurance and quality control processes and procedures that will result in data that are of known precision and accuracy sufficient to support sound management decisions.

Principle 6: Manage and report water quality data in a way that is meaningful and understandable to the intended audience.

For monitoring data and information to be truly useful, it must be managed properly and reported to intended audiences in not only a meaningful way but in a timely manner. This strategy provides a commitment to data automation and the establishment of data management policies and procedures to ensure that water quality data are easily accessible and understandable to Department staff, other agencies and organizations and the public. Water quality monitoring and assessment programs, projects, and studies should recognize that different levels of detail are needed for both data analysis and reporting, depending on the audience.

IV. MONITORING AND ASSESSMENT GOALS AND OBJECTIVES

A. Monitoring and Assessment Goal

The overall water quality goal of the state is “to protect, maintain and improve the quality of waters of the state,” while the overall goal of the federal Clean Water Act is to “restore and maintain the chemical, physical and biological integrity of the Nation’s waters.” In support of these goals, this strategy and the Department have established a water quality monitoring goal ***“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. To fully meet these objectives, it will require additional time and resources to acquire and to develop the necessary database(s), indicators and staff expertise.

B. Monitoring And Assessment Objectives

The following general programmatic 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.

Table 1. Summary of Monitoring Program and Objectives.

Monitoring Program	Monitoring Objectives
Ambient River and Stream Water Quality Monitoring Program	1. To provide data for trend analysis, general water quality characterization and pollutant loading calculations. 2. To support the assessment of beneficial use attainment for Section 305(b) reporting and Section 303(d) listing 3. To identify water quality problems. 4. To evaluate the effectiveness of pollution control and abatement programs.
Biological Monitoring Program for Rivers and Streams	1. To assess aquatic life use attainment for Section 305(b) reporting and Section 303(d) listing purposes. 2. To identify water quality problems. 3. To evaluate the effectiveness of pollution control and abatement programs.
Ecoregion Reference Station Network	1. To develop biological indicators using fish, macroinvertebrates and/or periphyton and to use those indicators in biological condition assessment for the state's rivers and streams at varying spatial scales. 2. To develop/refine nutrient criteria for rivers and streams.
Lake Water Quality Assessment Program	1. To describe the general physical and chemical condition of the state's lakes and reservoirs, including trophic status. 2. To assess beneficial use attainment for Section 305(b) reporting and Section 303(d) listing. 3. To identify water quality problems. 4. To evaluate the effectiveness of pollution control and pollution abatement programs (e.g., NDPDES, Section 319). 5. To refine fishery classifications described in the state water quality standards.
Harmful Algal Bloom Surveillance Program	1. To respond to reported Harmful Algal Blooms (HABs). 2. Monitor lakes for cyanotoxins. 3. Inform the public of toxin levels in public waterbodies.

Monitoring Program	Monitoring Objectives
Fish Tissue Contaminant Surveillance Program	1. 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. 2. To use this data to develop and issue fish consumption advisories. 3. To assess fish consumption, use attainment for Section 305(b) reporting and Section 303(d) listing. 4. To identify water quality problems due to contaminants.
National Aquatic Resources Surveys (NARS)	1. To assess what percentage of waters support healthy ecosystems and recreation. 2. To identify the most common water quality problems. 3. To assess if water quality is improving or getting worse. 4. To identify if investments in improving water quality are focused appropriately.
TMDL Development Program	1. To assess the state's rivers, streams, lakes and reservoirs and to provide a list of waterbodies that are impaired. 2. To develop TMDLs for waterbodies on the state's Section 303(d) list that, when implemented, will restore the waterbody's impaired beneficial uses. 3. To develop scientifically defensible water quality targets that can be used in water quality assessment and in the development of TMDLs.
Nonpoint Source Pollution Management Program	1. To assess waterbodies with little or no water quality assessment information by identifying beneficial use impairments or threats to the waterbody and to determine the extent to which those threats or impairments are due to NPS pollution. 2. To evaluate the effectiveness of implemented BMPs in meeting the NPS pollutant reduction goals specified in NPS implementation projects. 3. To assess beneficial use attainment for Section 305(b) reporting and Section 303(d) listing.
Support Projects and Special Studies	1. To provide data or information to either answer a specific question or to provide program support.
Complaint Investigations	1. The objectives of complaint investigation are to determine whether an environmental or public health threat exists and the need for corrective action where problems are found.
Fish Kill Investigations	1. The objectives of the fish kill investigation are to determine the extent of the fish kill and the possible cause(s) of the fish kill.

V. MONITORING PROGRAM DESIGNS

To meet the goals and objectives outlined above, the Department has taken an approach which integrates three basic monitoring designs. They are: 1) a fixed station approach; 2) a probabilistically based approach; and 3) an approach to address source identification and/or environmental response (e.g., complaints, spills or fish kills).

A. Fixed Station Designs

Monitoring designed around fixed stations can be useful: 1) in targeting areas which are either subject to pollution, or which are least impacted “reference” sites; 2) in targeting areas which are expected to exhibit either significant improvement due to point source controls or watershed restoration activities, or degradation; or 3) in order to detect trends in water quality. It should be noted that while fixed station designs are useful, their applicability to conduct statewide assessments is limited. The Department's ambient water quality monitoring program, which samples from fixed stations over long periods of time does so to provide assessment information concerning both water quality status and trends.

B. Probabilistically Based Designs

This type of design allows a statistically derived estimate of water quality or biological conditions in a select area even when all the waters within that area are not directly sampled. Based upon the natural variability of the water quality or biological indicators used and the level of sampled effort used, a level of confidence or uncertainty in the condition estimate can be determined. While fixed sites are often used to quantify temporal change at targeted locations, probabilistic sampling emphasizes spatial quantification of water quality or biological conditions.

C. Source Identification and Environmental Response

A different approach is needed when monitoring to identify pollution sources impacting a waterbody or to measure impacts or recovery of a waterbody to a spill event. This type of sampling is normally very intensive, both spatially and temporally to characterize the local impact of a short-term pollution event. Sampling stations are established based on existing knowledge of the pollution source (e.g., historical monitoring or from predictive modeling). In cases involving spills, often multiple sampling events are necessary to properly characterize the impact. Sampling designs can often be dynamic, adjusting to changing pollution conditions, environmental conditions, or simply being fine-tuned based on information obtained from prior sampling events.

VI. CORE AND SUPPLEMENTAL WATER QUALITY INDICATORS

The Department's water quality monitoring program uses a suite of indicators to assess beneficial use attainment and to determine causes and sources of stressors affecting water quality. The Department uses a tiered approach that combines core indicators selected for each beneficial use and water resource type combination, plus supplemental indicators selected according to site-specific or project-specific decision criteria. Core and supplemental indicators for each water resource type (i.e., lakes, reservoirs, rivers, streams) include physical, chemical, habitat, biological and landscape variables and metrics. Tables 2 and 3 provide a matrix of core and supplemental indicators used by the Department to assess beneficial use attainment for rivers and streams, lakes, and reservoirs.

Table 2. Core (C) and Supplemental (S) indicators for rivers and streams by beneficial use designation.

Indicator Category	Indicator	Aquatic Life	Recreation	Drinking Water	Fish Consumption
Chemical	Dissolved Oxygen	Core	—	—	—
	Ammonia	Core	—	—	—
	pH	Core	—	—	—
	Sulfate	—	—	Core	—
	Chloride	—	—	Core	—
	Trace Metals – Water Column	Core	—	Core	—
	Trace Metals – Mercury in Fish Tissue	—	—	—	Core
	Pesticides	Supplemental	—	Supplemental	—
	Nutrients	Core	Core	—	—
Physical	Temperature	Core	—	—	—
	Habitat	Supplemental	—	—	—
	Flow	Core	—	—	—
	Suspended Sediment	Supplemental	—	—	—
	Taste and Odor	—	—	Supplemental	—
Biological	Pathogens – E. coli	—	Core	—	—
	Pathogens – Enterococcus	—	Supplemental	—	—
	Macroinvertebrates	Core	—	—	—
	Fish	Core	—	—	—
	Algae – Periphyton	Supplemental	—	—	—
	Algae – Phytoplankton	Supplemental	—	—	—
	Algae – Chlorophyll	Supplemental	—	Supplemental	—
Landscape	Land use, road density, population density	Supplemental	Supplemental	Supplemental	—

Table 3. Core (C) and Supplemental (S) indicators for lakes and reservoirs by beneficial use designation.

Indicator Category	Indicator	Aquatic Life	Recreation	Drinking Water	Fish Consumption
Chemical	Dissolved Oxygen	Core	—	—	—
	Ammonia	Core	—	—	—
	pH	Core	—	—	—
	Sulfate	—	—	Core	—
	Chloride	—	—	Core	—
	Trace Metals – Water Column	Core	—	Core	—
	Trace Metals – Mercury in Fish Tissue	—	—	—	Core
	Pesticides	Supplemental	—	Supplemental	—
	Nutrients (Total Nitrogen and Total Phosphorus)	Core	Core	Supplemental	—
Physical	Temperature	Core	—	—	—
	Sediment	Supplemental	Supplemental	Supplemental	—
	Taste and Odor	—	—	Supplemental	—
	Secchi Disk Transparency	Core	Core	—	—
Biological	Pathogens – E. coli	—	Core	—	—
	Pathogens – Enterococcus	—	Supplemental	—	—
	Fish	Supplemental	—	—	—
	Algae – Phytoplankton	Supplemental	—	—	—
	Algae – Chlorophyll a	Supplemental	—	Supplemental	—
Eutrophic Condition	Trophic State Index (TSI): Chlorophyll a, Total Phosphorus, and Secchi Disk	Core	Core	Supplemental	—
Landscape	Land use, road density, population density	Supplemental	Supplemental	Supplemental	—

VII. QUALITY ASSURANCE AND QUALITY CONTROL MEASURES

To ensure that all environmental and related data collected, compiled and/or generated for the Department are complete, accurate and of the type, quantity and quality required for their intended use, it is the policy of the Department that all environmental monitoring be in

conformance with the *Quality Management Plan for the Department of Environmental Quality* (NDDEQ Revision 12.2, December 2025) and with procedures described in project specific Quality Assurance Project Plans (QAPPs). All QAPPs are prepared according to guidance provided in the EPA document entitled *EPA Requirements for Quality Assurance Project Plans* (EPA, March 2001, reissued May 2006).

It is the policy of the DEQ that the primary responsibility for QA resides among program staff and designated project managers in each division; therefore, each program is responsible for the preparation, implementation, and assessment of its own project specific QAPPs.

The program manager for Division of Water Quality's Watershed Management Program has the following QA/QC responsibilities:

- Review and approve QAPPs before final submittal to DQAM;
- Providing oversight for study design, site selection, and adherence to design objectives;
- Review and approve the final project work plans and other materials to support the project (e.g., standard operating procedures);
- Selecting appropriate project subcontractors, as needed; and
- Coordinating with contractors, reviewers and EPA to ensure technical quality and contract adherence.

The Watershed Management Program's program manager also assigns a designated project manager for each QAPP. These designated project managers are responsible for overall project coordination and supervision, including the reduction and analysis of project data and the preparation of the final report.

To ensure that the Department's QA/QC policies are adhered to, the Department has instituted the following QA/QC activities and procedures:

- QAPPs and/or study plans must be submitted to the Department's QAC for review and approval prior to implementation;
- All data will be recorded on standardized reporting forms and should include a description of the sampling site(s), date and time of collection and collector identification;
- Equipment used in sample collection will be cleaned, repaired and calibrated according to the manufacturer's specifications, and a log will be maintained of all service and calibration activities;
- Standard Operating Procedures (SOPs) will be developed and periodically reviewed for all field sampling procedures (these SOPs should describe in detail the field sampling and/or measurement procedures, meter calibration and maintenance procedures, sample chain-of-custody documentation, sample preservation, holding times and recommended sample container specifications, data recording form examples and data submission requirements);

Staff within the Watershed Management Program will provide training, at least once each year, to field investigators in the measurement and collection of water quality samples;

- All samples collected for analysis will be submitted for analysis to the appropriate laboratory following standardized chain-of-custody procedures; and
- All data entered into the Department's data management system will be reviewed, checked and edited prior to final submission.

Additional information on program/project specific QA/QC requirements and procedures are provided within each of the individual program write-ups/ QAPPs.

VIII. DATA MANAGEMENT

The Department is committed to recording and managing water quality monitoring data electronically and in a timely manner; integrating its data in a way that allows for efficient storage, retrieval, and evaluation; and reporting and sharing its data with EPA, other state and government agencies, regulated entities, and the general public.

Efficient data management is essential to an effective water quality monitoring and assessment program. Data management is necessary for assessment, reporting, tracking, sharing data and meeting data quality objectives. Electronic data management technology has greatly expanded the Department's ability to manage, present and share water quality information. Data management is organized around four main data management systems. The following describes each of these database systems.

IX. DATA ANALYSIS, ASSESSMENT, AND REPORTING

North Dakota generates numerous reports dealing with findings associated with the Department's water quality monitoring programs and projects. Reports range from those required by the Clean Water Act to reports, factsheets, and StoryMaps summarizing the results of specific monitoring activities.

A. Clean Water Act Assessment And Reporting

As part of its CWA reporting responsibilities, the Department prepares and submits the *Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads* (NDDEQ 2023). This biennial report and accompanying Section 303(d) list **must** be submitted to EPA by April 1st of every even numbered year. As the title indicates, this report combines reporting requirements under Section 305(b) of the CWA and Section 303(d).

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

assessment unit (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* (NDDEQ 2023). These regulations define the protected beneficial uses of the state's rivers, streams, lakes and reservoirs. Six beneficial uses (human health, municipal & domestic drinking water, recreation, aquatic life, agriculture, and industrial) were assessed for purposes of Section 305(b) reporting and Section 303(d) listing

X. MONITORING PROGRAM COORDINATION AND COLLABORATION

Currently, there is no formal mechanism for monitoring coordination or communication in the state. There are, however, a number of collaborative efforts that enhance surface water quality monitoring programs in the state. Some of these efforts are formed through USGS cooperative agreements, contracts between the Department and local soil conservations districts or water resource boards.

Monitoring communication is also facilitated through the Department's involvement with two international organizations. 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. 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 the directive of 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 Watershed 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.

A. State Monitoring Council

As part of this strategy, the Department established a state monitoring council. The council is made up of agencies and organizations in the state with an interest in water quality monitoring. The primary purpose of the council is to review the state's monitoring strategy

and to make recommendations for improving state monitoring and assessment programs. The council will also provide a forum and an opportunity for agencies and organizations to: (1) share monitoring ideas, data and results; (2) discuss monitoring program successes and failures; and (3) develop or expand partnerships among council member agencies and organizations.

XI. PROGRAM EVALUATION

The Department will continue to refine its monitoring program through annual internal and external reviews. QAQC documents are reviewed internally and by EPA. The program conducts internal and external training and audits for field sampling.

XII. GENERAL SUPPORT AND INFRASTRUCTURE PLANNING

The Monitoring and Assessment Program is located within the Division of Water Quality's Watershed Management Program (WMP) and, as such, is also responsible for implementing the Water Quality Standards, Monitoring and Assessment, TMDL, Nonpoint Source, and Lake Water Quality.

For these multiple programs, there are a total of 10 FTEs in the WMP, including: one Program Manager (1 FTE), one Database Coordinator (1 FTE), one Water Quality Monitoring and Assessment Coordinator (1 FTE), one NPS Coordinator (1 FTE), one Impaired Waters 303(d) Coordinator (1 FTE), two Environmental Scientists/Water Quality Monitoring and Assessment Specialists (2 FTEs), and three Watershed Planners (3 FTEs). Duties are not as clearly divided as noted above. For example, monitoring staff also analyze data and develop indicators, and TMDL staff collect samples at Department fixed station network sites.

A. Resource Needs And Priorities

It should be recognized that the Department currently does not have the resources necessary to achieve all the goals, objectives, programs and projects identified in this strategy, therefore the Department has prioritized its monitoring program enhancements. These enhancements, provided in Table 4, describe the priority in which program enhancements will be funded by additional funding sources, including but not limited to supplemental Section 106 grants.

Table 4. Water Quality Monitoring and Assessment Program Enhancement Priorities.

Water Quality Monitoring Program Enhancement	Priority
Maintain and/or establish flow gauging stations at revised ambient monitoring sites	Medium
Implement biological monitoring as part of the national river and streams survey	Medium
Implement target monitoring and assessment on all sub-category 5A TMDL listed rivers and streams	High
Implement reference site biological monitoring and indicator development	High
Implement targeted lake water quality monitoring and assessment project by sampling a minimum of 20 lakes per year	High
Implement a rotating schedule whereby priority lakes and reservoirs are sampled every 5-10 years	Medium
Implement water quality monitoring and assessment as part of the survey of the nation's lakes	Medium
Implement ambient water quality monitoring on the mainstem Missouri River as part of the revised statewide ambient water quality monitoring program	Medium
Develop and implement mainstem Missouri River biological monitoring and assessment program	Medium
Implement enhanced targeted fish tissue contaminant surveillance program for the state's lakes, reservoirs, rivers and streams by 1) improving the Division of Laboratory Services capability to analyze mercury in fish tissues; and 2) increasing the laboratory's capability to analyze additional chemical contaminants.	Medium
Develop and implement a probabilistic fish tissue monitoring design for lakes, reservoirs, rivers and streams.	Medium
Assess mercury exposed to human populations in the state through human biological monitoring.	Low

XIII. NORTH DAKOTA MONITORING PROGRAMS, PROJECTS AND STUDIES

To meet the state's monitoring goal which 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”*, the Department has developed several monitoring programs, projects and studies. A summary of these programs, including the monitoring objectives for each program, is provided in Table 1.

In the following sections, current monitoring activities are also summarized in the form of narrative descriptions.

A. Ambient Water Quality Monitoring Network for Rivers and Streams

1. Monitoring Design

The network currently consists of 37 fixed-station ambient monitoring sites located on 22 rivers. Sites are both wadable and non-wadable. Where practical, these sites are co-located with USGS flow-gauging stations. The objective of maintaining a network of stream flow stations co-located with water quality monitoring stations is to provide stream flow data that is necessary for the analysis and interpretation of water quality data.

For more information and details on the Ambient Water Quality Monitoring Program a copy of the QAPP for Ambient River and Streams Water Quality Monitoring Program can be obtained through an open records request.

<https://deq.nd.gov/OpenRecords.aspx>

2. Implementation Plans and Schedule

2020-2025 Plan

- Implement current statewide ambient water quality monitoring network;
- Create fact sheets utilizing DEQ collected data;
- Revise the QAPP for the Ambient Water Quality Monitoring Network to reflect interim revisions to the network design; and
- Fully implement revisions to ambient water quality monitoring network, including maintaining and/or flow gauging stations which are collocated with water quality monitoring sites.

2026-2030 Plan

- Update fact sheets utilizing DEQ collected data.
- Revise the QAPP for the Ambient Water Quality Monitoring Network to reflect final revisions to the network design; and
- Fully implement revisions to ambient water quality monitoring network, including maintaining and/or flow gauging stations which are collocated with water quality monitoring sites.

B. Biological Monitoring and Assessment Program for Rivers and Streams

1. Monitoring Design

The goals of the Reference River and Stream Site Monitoring Project are to monitor the ambient chemical, physical and biological characteristics in perennial rivers and streams to assess/monitor: 1) the current status of aquatic life uses; 2) develop and refine indices of biotic integrity for fish and macroinvertebrate communities; 3) investigate the potential stressors of aquatic life uses.

Forty-two (42) sets of samples will be taken, (twenty (20) site visits during June-July (fish samples) and twenty (20) site visits during August-September (macroinvertebrate samples) plus two (2) repeat sites). Additionally, in-situ measurements, physical habitat (only during initial sampling event), and fish, macroinvertebrate and/or periphyton will be collected from twenty (20) sites selected for the season in addition to two (2) re-visit sites. All water quality samples will be collected from mid-stream.

For more information and details on the Biological Monitoring and Assessment Program for Rivers and Streams a copy of the QAPP for Reference River and Stream Site Monitoring Program can be obtained through an open records request.

<https://deq.nd.gov/OpenRecords.aspx>

2. Implementation Plans and Schedule**2020-2024 Plan****Table 5.** Implementation Schedule for the Reference River and Stream Site Monitoring Program.

Ecoregion Reference Site Monitoring	2020	2021	2022	2023	2024
Resample 20 targeted sites in Lake Agassiz Plain Ecoregion (48)	X				
Resample 20 targeted sites in the Northern Glaciated Plains Ecoregion (46)		X			
Resample 20 targeted sites in the combined Northwestern Glaciated Plains (42) and Northwestern Great Plains (43) Ecoregions			X		
National Rivers and Streams Assessment (NRSA)				X	
National Rivers and Streams Assessment (NRSA)					X

2025-2029 Plan**Table 6.** Implementation Schedule for the Reference River and Stream Site Monitoring Program.

Ecoregion Reference Site Monitoring	2025	2026	2027	2028	2029
Sample 20 targeted sites in Lake Agassiz Plain Ecoregion (48)	X				
Sample 20 targeted sites in the Northern Glaciated Plains Ecoregion (46)		X			
Sample 20 targeted sites in the combined Northwestern Glaciated Plains (42) and Northwestern Great Plains (43) Ecoregions			X		
National Rivers and Streams Assessment (NRSA)				X	
National Rivers and Streams Assessment (NRSA)					X

*2020-2024 reference and disturbed sites were sampled. For 2025-2030 only reference sites will be collected.

C. Ecoregion Reference Network Monitoring Program**1. Monitoring Design**

The goal of the Ecoregion Reference Network Monitoring Program is to establish a minimum set of “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 “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 Ortho quads and aerial photos via GIS; and 3) site inspection and ground truthing.

In the Lake Agassiz Plains ecoregion, sites will be sampled for fish, macroinvertebrates, and periphyton. In the remaining ecoregions sites will be sampled for fish and macroinvertebrates. Sites in all ecoregions will also be sampled for water chemistry and physical habitat.

For more information and details on the Ecoregion Reference Network Monitoring Program, a copy of the QAPP for Reference River and Stream Site Monitoring Program can be obtained through an open records request.
<https://deq.nd.gov/OpenRecords.aspx>

2. Implementation Plans and Schedule

2020-2029 Plan

- 2020- Ecoregion 48
- 2021- Ecoregion 46
- 2022- Ecoregion 42 and 43
- 2023- NRSA
- 2024- NRSA
- 2025- Ecoregion 48
- 2026- Ecoregion 46
- 2027- Ecoregion 42 and 43
- 2028- NRSA
- 2029- NRSA

*2020-2024 reference and disturbed sites were sampled. For 2025-2029 only reference sites will be collected.

D. Lake Water Quality Assessment Program

1. Monitoring Design

The LWQA Project identifies, through water quality sampling, the chemical, physical and biological condition of 20 North Dakota lakes and reservoirs, yearly. The lakes and reservoirs selected for sampling are based on: a) amount of time since the lake/reservoir was last sampled (e.g. typically ≥ 10 years); b) lack of any available monitoring data; or c) both a and b. The 20 selected lakes are sampled four times from May-October.

For more information and details on the Lake Water Quality Assessment Program, a copy of the QAPP for Lake Water Quality Assessment Project can be obtained through an open records request. <https://deq.nd.gov/OpenRecords.aspx>

2. Implementation Plans and Schedule**2020-2024 Plan**

- 2020- Red River Basin
- 2021- James and Souris River Basins
- 2022- NLA
- 2023- Upper Missouri River Basin
- 2024- Lower Missouri River Basin

2025-2029 Plan

- 2025- Red River Basin
- 2026- James and Souris River Basins
- 2027- NLA
- 2028- Upper Missouri River Basin
- 2029- Lower Missouri River Basin

E. Harmful Algal Bloom Surveillance Program**1. Monitoring Design**

Sampled waterbodies will vary year by year, based on HAB reports. The NDDEQ samples public access to recreational waterbodies. Sampling is conducted to inform the public of microcystin toxin levels on reported waterbodies.

For more information and details on the Harmful Algal Bloom Surveillance Program, a copy of the Harmful Algal Bloom Sampling and Analysis Plan can be obtained through an open records request. <https://deq.nd.gov/OpenRecords.aspx>

2. Implementation Plans and Schedule**2020-2029 Plan**

- For more information and details on the implementation plans and schedule for the Harmful Algal Bloom Surveillance Program, a copy of the Harmful Algal Bloom Sampling and Analysis Plan can be obtained through an open records request. <https://deq.nd.gov/OpenRecords.aspx>

F. Fish Tissue Contaminant Surveillance Program**1. Monitoring Design**

Fish Contamination Surveillance is conducted as budget allows. A project plan is in development for the 2027 sampling season.

2. Implementation Plans and Schedule

2027- NLA

2028- Lower Missouri River Basin

2029- Upper Missouri River Basin

G. National Aquatic Resource Surveys (Nars)**1. Monitoring Design**

Each survey has its own probabilistic design based on the NARS objectives. The individual designs and survey information can be found on the NARS website.

<https://www.epa.gov/national-aquatic-resource-surveys>

2. Implementation Plans and Schedule

The NARS are comprised of four different surveys that are conducted on a rotational basis:

- National Rivers and Streams Assessment (NRSA) – 2 years
- National Coastal Conditions Assessment (NCCA)
- National Wetland Conditions Assessment (NWCA)
- National Lakes Assessment (NLA)

NDDEQ has participated in all surveys except NCCA. As of 2025, NDDEQ will no longer participate in the NWCA. NWCA will be conducted by an EPA contractor.

2020-2029 Plans

- 2020- No Survey (NCCA)
- 2021- NWCA
- 2022- NLA
- 2023- NRSA
- 2024- NRSA
- 2025- No Survey (NCCA)
- 2026- No Survey (NWCA)
- 2027- NLA
- 2028- NRSA
- 2029- NRSA

H. TMDL Development Program**1. Monitoring Design**

Because each TMDL development project or impaired waterbody assessment is waterbody and pollutant specific, the design of each monitoring project depends on the issue or question to be answered.

For more information and details on the TMDL Development Program see: North Dakota Total Maximum Daily Load Prioritization Strategy (“TMDL Strategy”)
https://deq.nd.gov/publications/WQ/3_WM/TMDL/North_Dakota_V2_TMDL_Prioritization%20Strategy_FINAL_20240325.pdf

2. Implementation Plan and Schedule

For a list of monitoring efforts ongoing to support TMDL development, contact the TMDL Program staff.

I. Nonpoint Source Pollution Management Program

1. Monitoring Design

The design of all NPS Program monitoring efforts will be dependent on a number of factors including 1) watershed size; 2) waterbody type; 3) type of impaired beneficial uses; 4) NPS pollution sources and causes; 5) seasonal weather patterns; and 6) local land use practices. These same variables will also influence monitoring design considerations such as monitoring site locations, sampling frequencies, targeted parameters, and sampling methods. Given the diversity between watersheds, it is not feasible to have a set monitoring design for all NPS Program monitoring efforts.

For more information and details on the Nonpoint Source Pollution Management Program visit:

https://www.deq.nd.gov/WQ/3_Watershed_Mgmt/1_NPS_Mgmt/NPS.aspx

2. Implementation Plans and Schedule

For a list of projects conducting assessment or implementation monitoring, contact the NPS Program staff.

J. Other Monitoring and Assessment Related Activities

1. 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 Watershed Management Program may rely on its own staff or may contract with federal agencies, state agencies, academia or private consultants.

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.

2. Complaint Investigations

The primary objectives for the investigation of complaints are to determine: (1) whether 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 Department, 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, but necessary enforcement action can be taken under the state water pollution

laws (NDCC 61-28) and regulations or under other applicable state or federal laws.

3. Fish Kill Investigations

Fish mortality can result from a variety of causes and sources, some natural in origin and some human induced. It is recognized that speed is all-important in the initial phases of a fish kill investigation. Therefore, persons reporting a fish kill are encouraged to contact the DEQ or the North Dakota Game and Fish Department during normal working hours or Emergency Response through state radio. Once a fish kill is reported, staff from the Department's Watershed Management Program and/or North Dakota Game and Fish Department are dispatched to investigate. The objectives of the fish kill investigation are to: 1) determine the extent of the fish kill; and 2) the possible cause(s) of the fish kill. The extent of the investigation of a fish kill is dependent on the extent of the kill, the numbers and kinds of fish involved and the resources available at the time for the investigation. Following a decision to investigate, the investigation should continue until a cause is determined or until all known potential causes have been ruled out.

XIV. PLAN REVIEW AND MODIFICATION

This strategy outlines the NDDEQ's Watershed Management Monitoring and Assessment Program objectives for a ten-year period. A review of the strategy will be done every 5 years. Additional review and modification may be necessary as changes occur.

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