Montana Statewide Water Quality Monitoring and Assessment Strategy

2009-2019

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1.0 INTRODUCTION

1.1 Background

Montana is the fourth largest state in the nation. The state's 145,552 square miles of land area contain headwater streams within three major river basins: the Clark Fork and Flathead rivers in the Columbia Basin, the Missouri and Yellowstone rivers in the Mississippi Basin, and the St. Mary River in the Saskatchewan-Nelson Basin. Statewide water resources include nearly 50,000 miles of perennial rivers and streams, more than 100,000 miles of intermittent and ephemeral streams, an additional 7,000 miles of ditches and canals, and well over a million acres of lakes, reservoirs and wetlands. Montana's surface and groundwater resources support drinking water uses, fish and other aquatic life, recreation and aesthetic appreciation, wildlife habitat, and livestock and agricultural production. The Montana Department of Environmental Quality (DEQ) has primary responsibility for managing and protecting the quality of Montana's water resources to support all of these designated uses.

Monitoring has been a key tool used by Montana DEQ and its predecessor agencies to protect statewide water quality since the state's first water pollution control laws were enacted in the 1950's. Montana's water quality monitoring programs have continuously evolved to reflect changing state and federal requirements, growing public interest, and increasingly sophisticated water resources management approaches. Montana's present-day water quality monitoring programs support the assessment of statewide water quality conditions and trends, help protect public drinking water supplies and other designated uses, identify impaired water resources and priorities for restoration, and help the state evaluate the effectiveness of its water resources management programs and activities.

In late-2008 Montana DEQ, working in cooperation with U.S. EPA Region 8 staff and other monitoring partners, initiated the development of a comprehensive water quality monitoring strategy. This document presents Montana's water quality monitoring strategy and describes the process that was used to determine the state's monitoring and assessment priorities. The strategy charts a vision for monitoring and assessment activities in the state and defines both short- and long-term needs and priorities.

1.2 Purpose

This document represents a long-term strategy for the monitoring and assessment of Montana's water resources by the Montana Department of Environmental Quality and its monitoring partners. The federal Clean Water Act gives states primary responsibility for implementing programs to protect and restore water quality, including monitoring and assessing water quality conditions and reporting on their quality. Additionally, Section 106(e)(1) of the federal Clean Water Act requires states that receive Clean Water Act Section 106 funding, including Montana, to develop and implement a strategy for monitoring the quality of state waters, compiling and analyzing water quality data, and reporting on statewide water quality conditions. The Montana Water Quality Act, and its implementing regulations, gives additional authority to the Montana Department of Environmental Quality to monitor and assess water quality, and to apply assessment information in the management and restoration of statewide water resources. Montana DEQ's water quality monitoring and assessment program is at a pivotal juncture, with an opportunity to create a new program vision while addressing fundamental core Clean Water Act and Montana Water Quality Act program needs and issues.

The Montana Water Quality Monitoring Strategy is intended to define Montana DEQ's priority monitoring objectives. The strategy establishes a long-term (10-year) framework for attainment of these objectives, and provides details for short-term (5-year) priority monitoring objectives and tasks. The Montana Water Quality Monitoring Strategy will serve as a tool to evaluate incremental progress in meeting Montana DEQ's short and long-term goals and will be revisited on an annual basis.

1.3 Strategy Development Approach

A committee consisting of staff of the Montana Department of Environmental Quality and the U.S. EPA Montana Operations Office followed a structured sequence of activities in developing the Montana Water Quality Monitoring Strategy. The process began with a review of EPA's water monitoring program guidance document entitled *Elements of a State Water Monitoring and Assessment Program* to determine the federal expectations for Clean Water Act Section 106 funded state programs (U.S. EPA 2003). Montana statutory requirements for water quality monitoring, assessment and reporting were also reviewed, together with the associated administrative rules and regulations. Example monitoring strategies from other states were also examined. Existing water quality monitoring programs and activities of the Montana Department of Environmental Quality and its monitoring cooperators were then reviewed in the context of the state and federal requirements. The monitoring strategy oversight committee then developed a structured questionnaire to be used as a starting point for additional information gathering.

A series of meetings were scheduled with each of the department's programs that participated in the collection, interpretation and application of water resources monitoring information. Program staff members were interviewed with regard to:

- Program responsibilities and basis in law
- Data types collected by program staff and clients
- Programmatic data needs provided by others
- Purposes of data collection activities
- Data applications and assessment methods
- Data storage systems and locations
- Data quality control approaches
- Data sharing and dissemination
- Presently unfilled monitoring needs and their implications
- Emerging/future program monitoring needs
- Highest priority program monitoring related needs
- Recommendations for departmental monitoring program improvement

Information from these interviews was cataloged in a series of spreadsheets and narrative summaries. Follow-up meetings were then held with most of the interviewed programs to pose additional questions and to refine the input. The monitoring strategy oversight committee used this collective program level input, together with the state and federal requirements, to tabulate department-wide monitoring goals and objectives and to list and rank short- and long-term needs and priorities. Monitoring inter-dependencies were identified and a critical flow path analysis was performed to determine the appropriate sequencing of implementation activities. Finally, the collective department-wide monitoring goals and objectives, needs assessment, short- and

long-term goals and priorities were organized and described within draft and final versions of the Montana Water Quality Monitoring Strategy.

1.4 Document Organization

The Montana Water Quality Monitoring Strategy is organized loosely around the 10 elements of EPA's *Elements of a State Water Monitoring and Assessment Program*, as follows:

- Section 1. Introduction
- Section 2. Water Quality Program Descriptions and Needs Evaluation
- Section 3. Monitoring Program Goals, Objectives and Priorities
- Section 4. Short-Term Monitoring Strategy and Design
- Section 5. Long-Term Monitoring Strategy and Design
- Section 6. Data Analysis and Assessment
- Section 7. Reporting
- Section 8. Program Evaluation
- Section 9. General Support and Infrastructure
- Section 10. Implementation Schedule
- References

Appendices to this document include summaries of the federal and state statutory requirements for monitoring (**Appendix A**), the program interview questionnaire (**Appendix B**), monitoring program summary information (**Appendix C**), departmental monitoring goals, objectives and priorities (**Appendix D**), and other supporting reference information (**Appendix E**).

2.0 WATER QUALITY PROGRAM DESCRIPTIONS AND NEEDS ASSESSMENT

2.1 Overview

The following sections of the Montana Water Quality Monitoring Strategy summarize monitoring, assessment and reporting activities, program priorities and future needs for each of the water management programs administered by the Montana Department of Environmental Quality. Additional information on the monitoring programs described below can be found in **Appendix C** to this document and in the *2008 Water Quality Integrated Report* available at: http://cwaic.mt.gov/wqrep/2008/2008DraftIntegratedReportMaster.pdf

2.2 Water Quality Planning Bureau

The Water Quality Planning Bureau (WQPB) sets water quality standards, monitors and assesses statewide water quality conditions and trends, maintains a water quality data management system, and develops and provides assistance with implementing watershed-based water quality restoration plans. The Water Quality Planning Bureau is organized within six sections, as follows: 1) Water Quality Standards, 2) Water Quality Monitoring, 3) Watershed Management, 4) Watershed Protection, 5) Data Management, and 6) Quality Assurance. Each section's water quality monitoring related activities and needs is summarized below.

2.2.1 Water Quality Standards Section

Program Description

The Water Quality Standards Section reviews Montana's water quality standards (WQS) on an ongoing basis and updates or modifies existing standards, as needed, to insure full support of designated beneficial uses. The department works with the Board of Environmental Review to adopt standards into the Administrative Rules of Montana (ARM) through the rulemaking process. Operational roles of the Water Quality Standards Section include: 1) water body classification and use designations, 2) review/revision of existing WQS, 3) development of new WQS, 4) development of site-specific WQS, and 5) state 401 certification reviews. Support roles of the section include: 1) advising the department on state and national water quality goals, initiatives, policy and emerging issues, providing WQS interpretation and guidance to department programs, and 3) providing oversight to department programs in the application of WQS.

Monitoring and Assessment Activities and Approach

All monitoring and assessment activities conducted by the section support the section's operational roles. The program's current focus is on:

- development of numeric nutrient standards for rivers and streams;
- biological water quality criteria and assessment tools (periphyton and macroinvertebrate emphasis);
- maintenance of a reference condition dataset through reference stream monitoring and research; and
- site-specific data needs associated with Section 401 water quality certification reviews and use-attainability analyses (UAAs).

Details of the section's monitoring and assessment activities can be found within the associated quality assurance project plans and sampling and analysis plans available at: (insert link to website here). The Water Quality Standards Section relies heavily on monitoring support provided by Water Quality Monitoring Section (described below), but occasionally conducts monitoring led by WQS staff.

Needs Analysis

The Water Quality Standards program plans to develop a comprehensive work plan, and an associated schedule and budget, which identifies and sequences the department's highest priority water quality standards related needs. In general, clear implementation guidance for all of Montana's water quality standards is needed, as well as a consistent approach to interpret narrative standards. Additionally, it is anticipated that a number of water quality standards updates, changes, modifications will be outlined in the comprehensive work plan. Ultimately, this Program's monitoring and assessment needs and priorities will be defined by this work plan. However, some short-term high priority needs for the water quality standards program have been identified:

- data in support of nutrient standards development for streams / rivers;
- periphyton and macroinvertebrate based biological water quality criteria and assessment tools;
- reference stream data and research to refine natural thresholds;
- site-specific data for Section 401 water quality certification reviews and use-attainability analyses (UAAs).

Additional longer term needs that have been identified include:

- data to support nutrient standards development for lakes and large rivers;
- data for ongoing water body classification work (lakes, wetlands, "2B" class waters);
- other special data or study needs associated with coal bed methane permitting and development in southeastern Montana; and
- emerging issues investigations, such as the effects of personal care products and pharmaceuticals on beneficial uses.

2.2.2 Water Quality Monitoring Section

Program Description

The Water Quality Monitoring Section's mission is to evaluate statewide water quality conditions and trends, to assess beneficial use and water quality standards attainment, to identify impaired waters and assist with restoration strategies, and to report on statewide water quality conditions to the public and EPA.

Monitoring and Assessment Activities and Approach

Until recently, the Water Quality Monitoring Section has focused its efforts on 303(d) list reassessments, monitoring of lakes and reference streams and, to a lesser degree, on monitoring projects in support of water quality standards and TMDL development.

The section's monitoring and assessment activities are described below in the following manner: a) prior to 2006; b) 2006-2008; and c) planned activities for 2009.

Prior to 2006, the list of monitoring projects conducted by Montana DEQ included:

- 303(d) reassessment monitoring;
- monitoring of reference sites;
- monitoring support to EPA for the national Environmental Monitoring and Assessment (EMAP) Program;
- lakes and reservoirs monitoring;
- large rivers monitoring;
- statewide fixed station monitoring;
- biological monitoring; and
- wetlands

Most of the above projects used a targeted design with the exception of the EMAP project, which is based on a probabilistic design. A brief description of each of these projects is summarized in Montana's *2006 Water Quality Integrated Report* available at: http://cwaic.mt.gov/wqrep/2006/FINAL_PART_C_SURFACE_WATER_MONITORING_AND_ASSESSMENT.pdf

Monitoring projects conducted by Montana DEQ during the 2006-2008 period included:

- completion of sampling for EPA's Nation's Lakes project;
- continuation and expansion of a baseline lake monitoring program;
- continuation and expansion of a baseline reference stream monitoring program;
- continuation and expansion of biological monitoring to support biocriteria development; and

- continuation and expansion of monitoring to support water quality standards, TMDL development, and 303(d) issues.

Most of the above projects used a targeted design approach with the exception of the EPA Nation's Lakes project which is based on a probabilistic design. A brief description of each of these projects is summarized in the *2008 Water Quality Integrated Report* available at: http://cwaic.mt.gov/wqrep/2008/2008DraftIntegratedReportMaster.pdf

In 2009, the Water Quality Monitoring Section plans to conduct the following monitoring projects:

- continuation and expansion of a baseline reference stream monitoring program, including: 1) triannual monitoring of 16 newly established sites and several previously monitored reference sites, and 2) biological reference streams monitoring (macroinvertebrates) to support development of an assessment tool;
- continuation and expansion of monitoring to support water quality standards development, including baseline conditions monitoring for a Plains region nutrient dose-response study;
- continuation and expansion of monitoring to support TMDL development, with assistance from University of Montana graduate students; and
- continuation and expansion of monitoring to support 303(d) list issues, including monitoring to evaluate informal stakeholder petitions to remove four water bodies from the Montana 303(d) list.

The section's monitoring activities, including many of the above described activities, are often conducted in collaboration with other agencies and entities. The section has cooperative monitoring agreements with the Bureau of Land Management, the University of Montana, the United States Geological Survey, numerous Montana conservation districts, and a number of watershed groups and non-profit organizations.

The section also develops and revises the Montana 303(d) list of threatened and impaired waters in need of water quality restoration. It also performs a biennial statewide water quality assessment and contributes to the development of the Montana 303(d)/305(b) integrated water quality reports.

Needs Analysis

The Water Quality Monitoring Section has identified a large number of presently unfilled monitoring and assessment needs that will need to be addressed to achieve a truly comprehensive statewide monitoring strategy that addresses all state waters and meets all of the department's programmatic needs.

The immediate, highest priority needs include:

- development of an accurate, up-to-date 303(d) list to support TMDL development.
- TMDL program support in synchronization with the TMDL Program's schedule for development of TMDLs (e.g., impairment status verification, providing diagnosis/definition of water quality problems, pollutant source identification and source load quantification, etc.)

Revision of the current list will require the development of improved assessment methods referenced under the Water Quality Standards Section discussion above and the incorporation of new and revised water quality standards within the assessment process.

Other high priority monitoring needs include:

- a variety of special studies and assessments, for example to address public requests to add or remove waters from the 303(d) list.

Other longer term, lower priority monitoring and assessment needs include:

- an expanded approach for evaluating statewide water quality status/condition and evaluation of statewide water quality trends.

2.2.3 Watershed Management Section

Program Description

The Watershed Management Section's primary purpose is to develop TMDLs and associated water quality restoration plans and to submit them for federal approval. The section conducts intensive surveys of pollution causes and sources, develops TMDL pollution load allocations, and identifies pollution control alternatives.

Monitoring and Assessment Activities and Approach

The Watershed Management Section develops TMDLs within a framework consisting of 99 watershed-based TMDL Planning Areas (TPAs) across the state. A schedule has been developed for completing all necessary TMDLs by 2012. The schedule is available at: http://deq.mt.gov/wqinfo/TMDL/TPAmap.mcpx.

TMDL development by Watershed Management Section staff generally begins with monitoring and assessment activities to verify a water body's impairment status and to further define the nature of the impairment causes/pollutants of concern. Once the need for a TMDL has been confirmed, additional monitoring may be conducted to support the following TMDL components:

- establishing TMDL water quality targets;
- assessing pollutant sources (model calibration, targeted sampling);
- quantifying pollutant source loads;
- determining water body loading capacities (LC) and setting TMDLs;
- allocating pollutant loads;
- determining appropriate Margins of Safety (MOS); and
- TMDL implementation and adaptive management.

Responsibility for TMDL effectiveness monitoring rests with the Watershed Protection Section, which is discussed in the following section. Other monitoring related support needs of the Watershed Management Section include the development of sampling and analysis plans (SAPs) and quality assurance project plans (QAPPs), and monitoring data management. These elements are also discussed in more detail in subsequent sections.

Needs Analysis

The Watershed Management Section is charged with completing all court ordered TMDLs on a statewide basis by 2012. Monitoring resources are needed to verify 303(d) listings and impairment causes and sources, and to develop high quality, scientifically based TMDLs are

limited. The Watershed Management Section will require assistance and cooperation from other sections and programs within the department to accomplish this.

The highest priority, short-term monitoring and assessment need of the section includes:

- Monitoring support in synchronization with the TMDL Program's schedule for development of TMDLs (e.g., impairment status verification, providing diagnosis/definition of water quality problems, pollutant source identification and source load quantification, etc.)
- Addressing priority de-listings identified during TMDL development.

This is a required precursor to TMDL development and further steps cannot be completed until the impairment and its causes are thoroughly understood.

All of the monitoring and assessment activities needed to support TMDL development listed earlier are high priority, immediate needs of the section and will remain as such until the TMDL development schedule has been addressed. Longer term, lower priority monitoring and assessment needs are likely to focus on phased TMDLs/adaptive management support needs to help fine-tune restoration plans following their implementation.

2.2.4 Watershed Protection Section

Program Description

The Watershed Protection Section has responsibility for implementing the Montana Nonpoint Source Management Plan (available on the department's website at: http://deq.mt.gov/wqinfo/nonpoint/2007NONPOINTPLAN/Final/NPSPlan.pdf). The section provides financial and technical resources to local governments and watershed groups for implementation of watershed-based TMDLs and associated restoration plans. The section also: 1) evaluates effectiveness of nonpoint source best management practices, 2) completes 5-year TMDL implementation reviews, 3) assists local governments in establishing and maintaining local water quality districts through the provision of technical assistance and monitoring support, and 4) supports watershed monitoring through citizen monitoring efforts.

Monitoring and Assessment Activities and Approach

The Watershed Protection Section conducts or oversees three types of water quality monitoring: 1) effectiveness monitoring of Section 319 grant projects, 2) 5-year TMDL reviews required by the Montana Water Quality Act, and 3) monitoring to evaluate the statewide effectiveness of the Montana Nonpoint Source Management Plan.

DEQ provides monitoring guidance and technical assistance to Section 319 grant recipients for evaluating and documenting the effectiveness of nonpoint source control projects and individual best management practices (BMPs). The monitoring is conducted by the local entity that is implementing the project and may take the form of conventional chemical, physical and biological water quality measurements, or other documentation of BMP effectiveness.

Montana state law requires monitoring and evaluation of TMDL effectiveness after the TMDL has been implemented. The 5-year TMDL reviews may include actual water quality monitoring to assess water quality standards attainment resulting from TMDL implementation. However, in some cases, the evaluations may simply rely on reviews of

implemented pollution control projects. The monitoring information is used to determine whether TMDL goals/water quality standards have been attained, whether modifications to the TMDLs or adaptive management elements are required, or if additional time is needed under the current approach (MCA 75-5-703).

The evaluation of DEQ's overall nonpoint source program effectiveness is evolving and relies on information from multiple sources, including the two aforementioned monitoring components. The nonpoint source program is also required to track:

- the number of water bodies partially or fully restored;
- the number of watershed-based plans supported by the 319 program;
- estimated pounds of nutrients (nitrogen and phosphorus) reduced from 319 projects in nutrient-impaired waters;
- estimated tons of sediment reduced from 319 projects in sediment-impaired waters; and
- watershed trends towards meeting water quality standards.

The Watershed Protection Section also encourages and supports citizen volunteer monitoring of lakes and streams through the provision of training and laboratory analysis services to local groups. The primary mechanism for accomplishing this is through support to the Montana Watercourse.

Needs Analysis

Monitoring and assessment needs of the Watershed Protection Section are not being met at the present time, and shortfalls are projected to escalate in the near future. The section needs to develop a comprehensive section work plan and a TMDL implementation strategy to help identify priorities and timelines, and to allocate limited staff resources towards highest priority departmental needs. Additionally, the Watershed Protection Section needs an up-to-date database for tracking TMDL implementation activities, to evaluate nonpoint source program effectiveness, to help prioritize 319 grant funds and to evaluate TMDL program status and effectiveness. As with the Water Quality Standards work plan, the Monitoring Program's monitoring and assessment needs and priorities will ultimately be defined by this work plan. Short- and long-term priority monitoring and assessment needs are described below.

Highest priority short-term monitoring and assessment needs include:

- developing an overall monitoring and assessment strategy to evaluate the effectiveness of Montana's nonpoint source management program relative to EPA's Strategic Measures.

High priority longer-term monitoring and assessment needs include:

- TMDL follow-up monitoring and assessment to support adaptive management/phased approaches;
- TMDL 5-year reviews, which may include monitoring to assess water quality standards attainment and/or field inspections of implemented pollution control projects (this will be a growing need as increasing numbers of TMDLs are completed on a statewide basis);
- nonpoint source implementation projects effectiveness monitoring by Section 319 grant recipients (with Watershed Protection Section guidance); and

- continued support for citizen volunteer monitoring activities and mechanisms for incorporating resulting assessment information within the nonpoint source management program.

2.2.5 Data Management Section

Program Description

The Data Management Section is essentially a technical and administrative services support section for the WQPB. Support is provided in the areas of data and application systems development and management for water quality metric data, water quality assessments, a technical reference library, and contracts management and administration. The section also provides technical support for water quality modeling and model development for TMDLs and water quality standards projects. Finally, the section is responsible for preparing the agency's biennial integrated water quality report. Section services are summarized below:

- water quality modeling and watershed analysis;
- operation and maintenance of statewide water quality databases;
- preparation of reports on the condition of Montana's water resources;
- dissemination of monitoring data and assessments using online web services;
- technical assistance in development of water pollution abatement plans (TMDLs);
- computer systems analysis, development, and management; and
- Water Quality Planning Bureau Library management.

Monitoring and Assessment Activities and Approach

As a support section, the Data Management Section performs limited monitoring except for activities associated with the validation of models. These monitoring projects are considered under the monitoring needs of the section whose work is being supported by models

Data Management and Assessment Activities and Approach

The databases that are used by the Water Quality Planning Bureau include:

1) EPA STORET/WQX national water quality database,
2) EPA Assessment Database (or ADB),
3) Water Quality Assessment, Reporting, and Documentation System (or WARD),
4) Clean Water Act Information Center (CWAIC), and
5) Ecological Data Application System (EDAS).

These systems and associated needs are described below.

<u>STORET / WQX</u>

The U.S. EPA's STORET water quality data management system serves as the department's primary repository and long-term archive for surface water quality metric data. It contains a diversity of water quality information gathered from fixed-station monitoring networks, intensive surveys, ambient water quality investigations, and all nonpoint source surface water quality monitoring activities performed by the Water Quality Planning Bureau and its grantees. The system accommodates chemical, physical, and biological water quality information as well as a wide array of metadata describing the data results. Metadata include quality assurance documentation, laboratory analytical flags and other quality

control flags, analytical methods, detection limits, and sampling location descriptions, among others. The Data Management Section manages the state's primary instance of STORET and uploads copies of the state's database to the national STORET database, which is maintained by the U.S. EPA. Water quality data for Montana can be obtained from the national STORET Warehouse maintained by EPA at http://www.epa.gov/storet/index.html

All environmental monitoring projects funded by EPA, such as 319 grants and 106 funds, are required to enter their data into STORET. The Web STORET Import Module (WebSIM) is the primary mechanism for entering water quality data into STORET. WebSim, available at www.montanastoret.com, is a web-based STORET Import Module that was developed to aid users in importing and migrating their data to STORET. WebSIM loads user data into a secure, off-site copy of STORET. Migrated data in the off-site copy is uploaded to the National EPA STORET Data Warehouse where it becomes available to anyone with internet access.

A short-term high priority need of the Data Management Section is a replacement system for the EPA STORET database that EPA will no longer use as the primary state-federal data exchange mechanism beginning in September 2009. EPA has recently implemented the WQX system for state-federal data transfers but the department will need to develop a replacement data management and storage system for future and legacy water quality monitoring data. The section is presently working with a contractor to develop a replacement system know as EQUIS5, which will be operated and maintained at the local level. There are numerous data cleaning, data transfer and training issues that will accompany the conversion to the new system in late-2009. Legacy STORET and the modernized STORET system data will still be accessible through the EPA STORET warehouse.

Assessment Database (ADB)

The Assessment Database (ADB) is a relational database application for tracking water quality assessment data, including use attainment, and causes and sources of impairment. The system provides a method for tracking statewide water quality assessments by water body (assessment unit). The department uses the ADB system to identify and track impaired or threatened water bodies and their associated causes and sources of impairment.

Water Quality Assessment, Reporting, and Documentation System (WARD)

The Montana Water Quality Act directs the department to "...develop and maintain a data management system that can be used to assess the validity and reliability of the data used in the (303(d)) listing and priority ranking process". The department is also required to make available to the public, upon request, data from its data management system (MCA 75-5-702(5)). The Water Quality Assessment, Reporting, and Documentation System (WARD) is the primary tool used by the department to meet these requirements. WARD is a relational database management system that integrates EPA's ADB and Water Quality Standards Database systems with a newly created Water Quality Standards Attainment Database and Library References Database. WARD eliminates double data entry, improves QA/QC through database rules and validation routines, improves the reporting capabilities for Integrated Reports, agency staff, and interested public, and improves overall tracking of standards attainment decisions.

Clean Water Act Information Center (CWAIC)

The Clean Water Act Information Center (CWAIC) conveys information about the quality of Montana's rivers, streams, lakes and wetlands in relation to the Montana water quality standards. Specifically, it displays the results of water quality assessments made on the basis of available water monitoring data. It is not intended to provide a means of accessing water quality monitoring field data. CWAIC replaces the department's earlier EnviroNet system with more up-to-date web programming, interfaces, and mapping capabilities. The CWAIC also allows for on-line comment submissions that are linked to specific water bodies on the 303(d) list and is maintained in a relational database at DEQ.

Ecological Data Application System (EDAS)

EDAS is a relational database application designed to manage, aggregate, integrate and analyze aquatic biological monitoring data from water quality monitoring programs. EDAS is designed to facilitate data analysis, particularly the calculation of biological metrics and indices. EDAS has the following functionality:

- storage of many types of ecological data, including benthic macroinvertebrates fish, water chemistry, physical habitat, and physical characteristics;
- calculation of metrics and indices of benthic macroinvertebrate ecological integrity;
- management of data (import, storage, queries, QA/QC);
- reporting of data and results; and
- preparation of files for transfer of data to other programs (e.g. predictive models)

EDAS provides tables and queries that allow a user to enter, manipulate, and print data. The metrics used in most bioassessments can be calculated with simple queries that have already been created within the system. New queries may also be created. EDAS is flexible enough to be customized to specific programs yet has been structured to ease the migration of data to STORET.

Needs Analysis

The department's present data management systems for storing, interpreting and reporting water quality monitoring information represent major improvements over systems that were in place in the recent past. However, a need for additional enhancements, and perhaps some new systems, has been voiced by the department's various water quality management programs.

A high priority, short-term data management need relates to development of an up-to-date database for tracking TMDL implementation activities that was referenced under the Watershed Protection Section program review. This system is needed to track TMDL implementation activities, to evaluate nonpoint source program effectiveness, to help prioritize 319 grant funds, to evaluate TMDL program status and effectiveness, and to facilitate integration of discharge permitting and other water quality management activities with TMDLs.

High priority but longer-term data management needs within the department includes water quality management program-wide access to spatially enabled water quality and facility data for many different program applications. Data application needs range from discharge

permit development, cumulative effects and temporal trends analysis, facility siting, and program effectiveness monitoring, among others. The department utilizes and maintains dozens of state and federally supported data management systems to conduct its business, but these systems are not well integrated at the present time. The EQuIS5 data management system has the capability to integrate water quality monitoring and permitted facilities information which may present opportunities with regard to department-wide data integration needs. There is also a cross-training need for department staff in the use of the many independent systems.

Other longer term needs include improved public access to water quality monitoring data and assessment information and the management of independent data sets compiled by contractors and cooperators. The department has made great improvements in the area of public access to information in recent years but more user-friendly tools and applications to facilitate communication and outreach to internal and external watershed stakeholders and other department customers remains a goal.

Habitat assessment information used in statewide water quality assessments also has data storage and access limitations within the department's existing data management systems.

DEQ currently has funding available from the state legislature to develop and apply models in support of TMDLs and water quality standards. These models will enable DEQ to address long-term goals of evaluating cumulative watershed impacts and to model watershed conditions with limited monitoring data. Continuation and expansion of these tools will be contingent upon legislative approval.

Lastly, as the department modifies its biological assessment tools, there is an ongoing need to maintain and update EDAS to generate the relevant biological metrics and indices. DEQ will need to secure funding to cover the ongoing costs to support system maintenance, hosting and enhancements for the EQuIS, WARD and EDAS systems.

2.2.6 Quality Assurance Section

Program Description

The Quality Assurance Section administers the bureau's quality system. This system is described in the bureau's EPA approved Quality Management Plan (QMP), which includes the bureau quality policy, quality system responsibilities, and quality tools of the system. Under this system section staff review and approve internal quality assurance documents (quality assurance project plans, guidance, standard operating procedures) and external quality assurance project plans, conduct a QA system training program for bureau staff and external contractors, and perform data quality assessments, data verification and validation, and annual technical system reviews of bureau field staff and subcontract laboratories.

Quality Assurance Activities and Approach

The Quality Assurance Section's quality assurance/quality control program applies to the programs within the Water Quality Planning Bureau and its contractors. It includes management and technical procedures that assure the quality of environmental information used to support decisions. This "quality system" provides the bureau programs with a practical framework for managing the quality of activities that are used in environmental decision-making and controls. The bureau's EPA approved Quality Management Plan

establishes autonomy for approving individual project-specific QA plans and standard operating procedures.

The focus of the quality system is upfront planning of environmental data projects, and bureau processes and methods. The quality system applies a "graded approach", defining "quality data" as those data that enable the user to make a timely decision with an acceptable risk of decision error. Primary tools for assuring data quality include the bureau Quality Management Plan (QMP), Quality Assurance Project Plans (QAPPs), Sampling and Analysis Plans (SAPs), Standard Operating Procedures (SOPs), staff training, and system audits.

Needs Analysis

The Quality Assurance Section provides support to all of the bureau's previously described monitoring and assessment programs. As environmental data projects increase, so does the workload demands of the section. As the monitoring strategy is implemented numerous project-specific quality assurance project plans and sampling and analysis plans will need to be developed with assistance from the Quality Assurance Section. Also, as new or modified methods and processes are completed the section will be tasked with revision of many of the bureaus SOPs. Key among these topics will be the anticipated changes and revisions being pursued by the water quality standards section and the data management processes necessary for the bureau's WQX node.

2.3 Technical and Financial Assistance Bureau

The Technical and Financial Assistance Bureau (TFAB) plays an integral role in the function of the Department of Environmental Quality by providing alternatives and solutions to environmental problems and fostering effective working relationships with a variety of customers across Montana. The bureau consists of four primary programs, as follows: 1) Source Water Protection, 2) Wetlands Protection, 3) Water Pollution Control State Revolving Fund, and 4) Drinking Water State Revolving Fund. Water quality monitoring related activities and needs of the Source Water Protection and Wetlands Protection programs are summarized below.

2.3.1 Source Water Assessment Program

Program Description

The federal Safe Drinking Water Act requires each state with primacy to assess the source water of every public water system. Montana's source water assessment program (SWAP) was formally approved by EPA in November 1999. Major components of the program are source water delineation and assessment. Delineation is the process of identifying areas that contribute water to aquifers or surface waters used for drinking, called Source Water Protection Areas (SWP). Assessment involves identifying businesses, activities, or land uses that generate, store, transport, or dispose of certain contaminants within SWP areas, and determining the potential for contamination from these sources.

The department's Source Water Assessment Program completed source water assessments for each of more than 2,200 public water supply systems in Montana in late 2006. SWAP program staff continue to provide support to other DEQ programs in matters relating to protection of drinking water sources, complete source water assessments for new drinking

water systems as they are approved, and assist with the implementation of source water protection plans.

Monitoring and Assessment Activities and Approach

SWAP program staff gathered and assessed a large variety of monitoring and other data while preparing the original source water delineations and assessments. However, the program generally does not conduct significant monitoring on its own. Data types used in the source water delineations and assessments included: public water supply monitoring data collected by system operators, groundwater data collected by the Montana Bureau of Mines and Geology (MBMG), U.S. Geological Survey (USGS) and the Montana Department of Agriculture, and a range of spatial (GIS) and other data pertaining to potential contaminant sources. Some limited site-specific data are gathered in response to source contamination problem investigations.

Data Management, Assessment and Reporting

The Source Water Assessment Program maintains a database of spatial information pertaining to public drinking water sources areas. Other water quality monitoring data used in the assessments are stored in data management systems operated by others, including: public water supply monitoring data stored in EPA's Safe Drinking Water Information System (SDWIS); statewide groundwater monitoring data stored in the Montana Groundwater Information System (MBMG); national surface and groundwater monitoring data in USGS's National Water Information System (NWIS), chemical, physical and biological water quality monitoring data in EPA's STORET system; and others.

The joint EPA-Montana source water assessment document describes methods for interpreting data from all of the above sources for the assessment of risks to public water supplies and their source areas. Data interpretations are reported within the respective source water assessment reports for each public water supply.

Needs Analysis

The Source Water Assessment Program has expressed a strong interest in better integrating its program activities with other departmental watershed protection and restoration elements. These include TMDLs, wetlands protection, and nonpoint source pollution control. Montana presently does not have a comprehensive statewide groundwater protection plan or strategy, even though most public water supplies in Montana rely on groundwater sources. The SWAP program has set a long-term goal of working with EPA, other agencies, local governments and public water supplies to develop a comprehensive, coordinated statewide groundwater plan. There are many water quality monitoring related data needs that would be associated with developing such a plan, for example to assess the overall condition of groundwater resources, to assess regional hydrogeology and groundwater-surface water interactions, to prioritize problems for attention, and to integrate groundwater problems within watershed TMDLs and restoration planning.

2.3.2 Wetlands Protection Section

Program Description

DEQ's Wetland Program is responsible for coordinating and providing leadership to statewide wetlands conservation activities. Activities include staffing and providing leadership to the Montana Wetland Council. The Council acts as a forum for all stakeholders to participate in wetland issues. Wetland conservation priorities are funded by a competitive EPA grant program. Currently, there are about 20 active grant projects involving state and local governments. Projects range from evaluation of wetland impacts in Montana, developing education and information about Montana wetlands, and creation of a local partnership composed of local government, wetland ecologists and community volunteers to inventory wetlands for restoration and management needs.

The Council developed *Priceless Resources: Strategic Framework for Wetland and Riparian Area Conservation and Restoration in Montana, 2008-2012*, which provides guidance for statewide wetland conservation activities. The strategic framework was approved by the Governor and directors of the state natural resource agencies as the state plan for wetlands and riparian areas. The strategic framework includes eight elements aimed at a goal of no net loss of the state's remaining wetland resource base. These include:

- public education;
- professional training;
- mapping, monitoring and assessment;
- restoration;
- assistance to local governments;
- vulnerability evaluations;
- public policy development; and
- Montana Wetland Council effectiveness.

Several working groups are implementing the strategic framework.

Monitoring and Assessment Activities and Approach

The Wetland Program and the Montana Wetland Council have worked with the Montana Natural Heritage Program (MTNHP) to develop and implement an effective wetlands monitoring and assessment strategy. The MTNHP has received EPA funding to develop GIS-based, rapid and intensive assessment methods. These methods are currently being used in a rotating basin assessment project, which began this year in the Milk and Marias River Basins. Additional monitoring data are acquired from BLM (Proper Functioning Condition (PFC) assessments), MFWP (INFISH data), MDT (mitigation site monitoring data), and tribes.

Data Management, Assessment and Reporting

Most of the statewide wetlands monitoring and assessment data are presently managed within the Montana Natural Heritage Program database. Data collected prior to 2008 using MT-DEQ's Rapid Assessment Method (MTRAM) are publicly accessible from the MTNHP interactive web mapping application. The MTNHP is currently building a geodatabase to store and manage wetland assessment data collected with EPA-funded ecological integrity assessment protocols. The department has an additional wetlands database that has not been

actively managed since 2007. Other data generated by cooperators are stored in a variety of locations.

Needs Analysis

The Wetlands Section has identified a number of unfilled monitoring and assessment needs that include:

- wetland mapping;
- wetland reference network;
- mitigation site monitoring;
- voluntary restoration monitoring;
- baseline condition assessments; and
- integration with other department monitoring activities.

Each of these needs is discussed in more detail below.

Wetland Mapping

Montana needs additional funding to complete wetland mapping. Wetlands are one of 13 priority data layers for the Montana Spatial Data Infrastructure with a goal of mapping all wetlands and riparian areas in Montana as defined by the U.S. Fish and Wildlife Service National Wetland Inventory (NWI) wetland classification system and the Western U.S. Riparian mapping system. The target for this theme is statewide coverage of functional wetlands and riparian areas at 1:12,000 scale that meets the USFWS National Wetlands Inventory and riparian classification standards and FGDC wetland mapping standards. The theme will also include periodic updates of the Montana Wetlands and Riparian Areas Framework layer to evaluate rates of wetland and riparian change and to better understand the transient nature of wetlands. The MT NHP Wetland and Riparian Mapping Center reports the following information as of May 15, 2009: 3% of Montana's quads (97 of 3,019) are completed and have been incorporated into the USFWS NWI master geodatabase. 29% of Montana's quads (888 of 3,019) are under contract to be mapped. Of these, 468 quads or 53% have been completed.

Reference Standard Network

Establishing a reference network of wetlands as described in Montana's Strategic Framework, Strategic Direction #3D. Further refine this to target wetlands on public lands when possible for ease of access. In addition, if standing water is present, consider collecting water quality samples to begin baseline collection of wetland water quality from a diverse range of wetland types and conditions. Sampling parameters should follow the standardized protocols being developed as part of the Rocky Mountain Regional Monitoring and Assessment Project (RM ReMAP) under the auspices of the EPA's Office of Water and Wetlands (project underway through MTNHP, Colorado Natural Heritage Program, and Wyoming Natural Diversity Database)

Mitigation Site Monitoring

The Wetlands program plans to initiate reviews of existing monitoring reports submitted by Montana Department of Transportation to U.S. Army Corps of Engineers for the compensatory mitigation component of CWA 404 permits. The purpose of the reviews would be to evaluate whether the ecological performance standards were met and if the

performance standards are adequate? How do mitigation sites compare to reference standard sites? What recommendations can be made to improve wetland mitigation based on the monitoring and is the monitoring sufficient to determine mitigation success, failure, or corrective action? After this review, then additional monitoring may be needed to provide site specific management recommendations and program recommendation to improve the effectiveness of compensatory mitigation.

Voluntary Restoration Monitoring

Formal monitoring is often a missing component of voluntary restoration efforts and little evaluation of the effectiveness of voluntary wetland restoration occurs. The first step is to examine existing approaches used to evaluate restoration efforts such as the project evaluation and planning tool (Skidmore 2009).

Integration

A high priority long-term goal is to integrate wetlands resources into the state's water monitoring and assessment activities as part of the routine approach to sampling.

2.4 Water Protection Bureau

The Water Protection Bureau manages the discharge of wastewater into state waters in order to protect public health and the environment. The Water Protection Bureau is organized within two sections, the Water Quality Discharge Permits Section and the Compliance and Technical Support Section. Monitoring and assessment activities and needs of the Water Protection Bureau are summarized below.

2.4.1 Water Quality Discharge Permits and Compliance and Technical Support Sections

Program Description

Water Quality Discharge Permits Section staff develop and administer Montana Pollutant Discharge Elimination System (MPDES), Storm Water and Concentrated Animal Feeding Operation (CAFO) permits. The Compliance and Technical Support Section conducts facility inspections and reviews reports to determine compliance with permit conditions and the laws and regulations

.

Monitoring and Assessment Activities and Approach

Water quality monitoring and assessment activities of the Water Quality Discharge Permits Section relate mostly to data needed to complete reviews of discharge permit applications and to perform nondegradation reviews. Permittees and permit applicants generally provide the monitoring data which are reviewed by section staff. Most data represent wastewater sample analyses but receiving water data may be required on a case-by-case basis. In many cases, ambient water quality data to facilitate discharge permit development (e.g., to characterize the current conditions of receiving waters, evaluate upstream and downstream conditions, and conduct nondegradation reviews) are limited. In these cases, there is often an unfulfilled need for ambient water quality data.

Additionally, municipalities authorized under the General Permit for Storm Water Discharge Associated with Small Municipal Separate Storm Sewer Systems (MS4) are required to collect storm water grab samples semi annually for a standard suite of chemical and physical parameters. Monitoring results must be reported to DEQ semiannually on DMR forms. However, there is a need for additional data characterizing the quality of storm water runoff in Montana. At this point in time, there are no water quality monitoring requirements or activities associated with the CAFO permit program.

If violations are discovered, the Compliance and Technical Support Section provides the technical assistance needed to bring the facility back into compliance or prepares an enforcement request for further action by the Enforcement Division. Water quality data in receiving water bodies for diagnosis of violations are often limited.

Data Management, Assessment and Reporting

The EPA ICIS (Integrated Compliance Information System) database is the primary repository used for MPDES permit related water quality monitoring data. Section staff use ICIS to store discharge as well as receiving water body monitoring data. ICIS is the primary vehicle for reporting to EPA.

Needs Analysis

The Water Protection Bureau has indicated general limitations in the currently available data to support permit development, mixing zone delineations, non-degradation reviews, and compliance assessments. Needs include:

- data characterizing the current water quality condition of receiving waters to assist with issuance/reissuance of discharge permits;
- access to data and information on water quality trends, emerging problems, and cumulative effects to assist with issuance/reissuance of discharge permits and to assist with compliance;
- occasional rapid response water quality monitoring support to assist in diagnosing potential compliance problems and violations;
- data characterizing the quality of storm water in the state of Montana; and
- additional training in the use of existing department water quality data systems and, over the longer term, development of an integrated department-wide data storage and retrieval system would be helpful to the section.

2.5 Public Water Supply and Subdivisions Bureau

The Public Water Supply and Subdivisions Bureau regulates public drinking water and subdivision facilities in Montana. The Bureau's Public Water Supply Section assures that public health is maintained through provision of safe and adequate supplies of drinking water. These functions are achieved by technical reviews, licensing, certifications, compliance monitoring, training and technical assistance. The section also licenses operators of certain public drinking water and wastewater treatment facilities. The Bureau's Subdivision Review Section reviews applications for proposed subdivisions to ensure compliance with the Sanitation in Subdivisions Act. This process includes reviewing the adequacy of water supply, wastewater treatment and disposal, solid waste disposal, and storm water control systems for parcels of land smaller than 20 acres, and for condominiums and recreational vehicle and mobile home parks, regardless of

their size. Included in this review is the evaluation of water quality impacts from wastewater disposal systems in accordance with Montana's nondegradation and mixing zone rules

Monitoring and assessment activities and needs for each of the Public Water Supply and Subdivisions Bureau's two sections are summarized below.

2.5.1 Public Water Supply Section

Program Description

The Public Water Supply Section regulates public drinking water and wastewater treatment facilities in Montana. The section also licenses operators of certain public drinking water and wastewater treatment facilities. Functions include technical review, licensing, certifications, compliance monitoring, training and technical assistance. Approval from the department is also required to construct, alter or extend public water or sewer systems serving 15 or more families or 25 or more persons daily for any 60 or more days in a calendar year. Operators in charge of public water or wastewater treatment systems must be licensed by the DEQ.

Monitoring and Assessment Activities and Approach

The Public Water Supply Section relies heavily on water quality monitoring data to carry out its responsibilities. Certified operators of individual public water systems collect samples of water from the systems, submit them to certified laboratories for analysis, and provide the analysis results to the program for review. Most, but not all, data represent finished (rather than raw) water from primarily groundwater sources. Exceptions are analyses for turbidity and coliform bacteria in surface water supplies, and for groundwater supplies determined to be under the direct influence of surface water. The section uses the provided data to review and approve new systems, evaluate and document compliance of existing systems, establish baseline water quality, evaluate trends and detect emerging problems, and to report to EPA. Program staff and contractors do collect additional water quality monitoring data during audits of public water supplies and when conducting sanitary surveys and problem investigations.

Data Management, Assessment and Reporting

Public drinking water monitoring data are stored in Montana's copy of EPA's Safe Drinking Water Information System (SDWIS). All data in SDWIS are geographically referenced and linked to potential contaminant source information.

Needs Analysis

The Public Water Supply Section has identified the inadequacy of existing groundwater monitoring data for assessment of contaminant source impacts to public drinking water supplies as a presently unfilled monitoring need. This could be addressed as one component of a statewide groundwater protection strategy. Monitoring information pertaining to pharmaceuticals and personal care products in ground and surface water supplies is an additional emerging area of interest. The section has identified the need for improved communication and coordination with other department water quality programs, including water quality standards (common data needs relative to new standards and emerging issues), water quality monitoring and 305(b)/303(d) list development (impairment cause/source linkages to public water supplies), and TMDL water quality restoration programs (restoration of impaired designated uses). The department's Source Water Assessment Section already works closely with the Public Water Supply Section.

2.5.2 Subdivision Review Section

Program Description

The Subdivision Review Section reviews proposed divisions of land comprising less than 20 acres, as well as condominiums and recreational camping vehicle and mobile home parks. Reviews under the sanitation in subdivisions regulations are limited to sanitation facilities, including water supply, sewage disposal, solid waste disposal, and storm drainage systems. Proper design and location of these facilities is necessary to protect the quality of water for public water supplies, domestic uses, and other beneficial uses, including uses related to agricultural, industry, recreation, and wildlife. Subdivisions are reviewed prior to parcel creation to assure that adequate sanitation facilities can be constructed, operated, and maintained to support each parcel. Planning ahead for proper design and location of the facilities helps protect both surface and groundwaters. The regulations and subdivision review are structured to prevent pollution problems through the proper design, location, operation, and maintenance of sanitation facilities.

Monitoring and Assessment Activities and Approach

Water quality monitoring needs of the Subdivision Review Section relate mostly to data needed to complete reviews of proposed subdivisions. Reviews include assessments of the adequacy of water supplies (quantity and quality), technical designs for water supply and subsurface wastewater treatment systems, and storm water drainage plans. Monitoring data are also needed to complete nondegradation reviews for nitrogen and phosphorus discharged from subsurface wastewater treatment systems. These data are generally provided by the subdivision applicant. However, program staff members frequently compile and review monitoring data from other sources to conduct groundwater modeling and to screen for existing problems. These data are usually for groundwater stored in the MBMG GWIC system and public water supply SDWIS databases. Guidelines for interpreting monitoring data in the application review process are contained in the state administrative rules and state and federal standards, and all decisions and supporting rationale are documented.

Data Management, Assessment and Reporting

Subdivision applications are managed within a plan review database. However, all supporting data are stored only as paper copies and microfilm. The availability of a spatially enabled electronic database has been identified as an important need (see next section).

Needs Analysis

The Subdivision Review Section has identified the need for electronic geographically referenced data capabilities as a high priority. This system is needed to facilitate cumulative impacts assessments of multiple subdivisions and to evaluate time trends in water quality in relation to development activities. The section has also identified the need for better communication and coordination with other DEQ programs, including the water quality monitoring, TMDL and source water programs. Additional water quality monitoring data, or improved access to existing monitoring data, are also needed to evaluate watershed conditions and trends in relation to development activities and to calibrate water quality predictive models. The Subdivision Review Section also has a strong interest in development of a comprehensive statewide groundwater protection strategy.

2.6 Mine Waste Cleanup Bureau

The Mine Waste Cleanup Bureau (MWCB) was formed within the Department of Environmental Quality (DEQ) in 1995 as part of a reorganization of Montana state government services. The Mine Waste Cleanup Bureau absorbed duties of the former Abandoned Mine Reclamation Bureau and sites from the state Superfund program. The Mine Waste Cleanup Bureau is divided into two sections. The Abandoned Mine Section is responsible for implementation of the state's non-regulatory program to reclaim land affected by abandoned mines. The Federal Superfund Section of the bureau is responsible for overseeing the provisions of the federal Comprehensive Environmental Response and Liability Act (CERCLA or federal Superfund program).

Mine Waste Cleanup Bureau activities focus on two primary site types: 1) inactive mine sites addressed under the Surface Mining Coal and Reclamation Act (SMCRA 1977); these sites are known as abandoned mine sites; and 2) hazardous substance sites addressed under the Federal Comprehensive Environmental Responsibility, Compensation, and Liability Act (CERCLA). These sites are known as Federal Superfund or National Priority List sites. The bureau divides its site-reclamation duties in this way because of distinctions between applicable environmental laws and associated funding mechanisms.

Monitoring and assessment activities and needs of the Abandoned Mine Section are summarized below. Monitoring and assessment activities of the Federal Superfund Section are well defined in federal guidance and are not addressed in this statewide monitoring strategy document.

2.6.1 Abandoned Mines Section

Program Description

The Abandoned Mine Section addresses remediation of sites that resulted from all types of surface and subsurface mining (e.g. sand and gravel, scoria, coal, metals). The section also addresses problems resulting from ore transport, processing and smelting on both public and private lands. Site hazards typically consist of open adits or shafts, waste rock dumps, steep highwalls, mill tailings, dangerous structures, and hazardous materials. Many of these old mine and mill areas seriously degrade surrounding land and water.

Abandoned mine remediation activities also involve interpretation and implementation of the National Historic Preservation Act of 1966 to preserve cultural and historic resources. All mine sites under the purview of the section may be evaluated for cultural or historic features eligible for historical preservation. Historical preservation activities are conducted in cooperation with the State Historical Preservation Office to assess eligibility and to develop and implement mitigation plans.

Monitoring and Assessment Activities and Approach

Water quality monitoring was conducted in 1993-1995 to inventory and rank abandoned mine sites on a statewide basis. Future monitoring may be required to update these assessments but it is not viewed as an immediate priority by the section. Additional water quality monitoring data may be collected to support remediation project engineering designs and this activity is usually performed by contractors. Lastly, monitoring data are needed to evaluate remediation project effectiveness. This latter monitoring activity is usually done by section staff. Project effectiveness evaluations pertaining to water quality are performed by comparing the monitoring data to Montana water quality standards. Monitoring design

usually employs upstream-to-downstream comparisons of water quality before and after remediation.

Data Management, Assessment and Reporting

Most program data are presently managed as hard copy files, which is viewed as a major limitation. One exception is the 1993-1995 site inventory information, including water quality monitoring results, which are available electronically through the Montana State Library Natural Resource Information System.

Needs Analysis

Program data automation, and conversion of paper data to electronic format, is a high priority of the Abandoned Mines Section. An electronic database would improve efficiency within the program, and would facilitate access by other programs to abandoned mine related water quality data. For example, the Water Quality Planning Bureau programs have begun incorporating abandoned mine site assessment information within their watershed and pollution source assessments, and within TMDL water quality restoration plans.

3.0 MONITORING PROGRAM GOALS, OBJECTIVES AND PRIORITIES

Primary goals of the federal Clean Water Act (CWA) and Montana Water Quality Act (MWQA) are to maintain and restore, where necessary, the chemical, biological, and physical integrity of state waters. Water quality monitoring and assessment activities play a pivotal role in overall water quality management. Monitoring and assessment activities provide support for:

- establishing, reviewing and revising water quality standards (CWA Section 303(c));
- evaluating water quality standards attainment (CWA Section 305(b));
- determining statewide water quality status and trends (CWA Section 305(b));
- identification of impaired waters and the causes and sources of impairment (CWA Sections 303(d) and 305(b));
- implementation of water quality management plans and control programs(CWA Sections 303, 314, 319, 402, etc.); and
- evaluation of water quality management program effectiveness (CWA Sections 303, 305, 402, 314,319, etc.).

For Montana, the year 2012 is a significant milestone for the state's water quality management programs because it represents the year by which DEQ anticipates having a strong core monitoring and assessment program in place. Additionally, the state's TMDL program operates under a federal court ordered deadline of 2012 which has been agreed to by the department, EPA and the court. Therefore, the Montana Statewide Water Quality Monitoring and Assessment Strategy has been designed with a goal of establishing a solid baseline program for Montana by 2012. Short term goals and objectives are those leading to the 2012 baseline year and attainment of long-term goals will begin in 2013.

In the short-term, the highest priority monitoring and assessment activity is producing a current and accurate 303(d)/305(b) Water Quality Integrated Report. As straightforward as this task may appear, there is significant work required to achieve this result and significant programmatic gains that will be realized upon its completion. Details of this effort are provided in Section 4.0.

An accurate Water Quality Integrated Report will minimize errors in concluding that a water body is impaired when in fact it is not, or deciding not to declare a water body as impaired when it is. The uncertainty of knowing (with confidence) that 303(d) listings are correct creates a significant inefficiency in water quality management due to its core function and successor dependencies.

Montana TMDL development experience over the past 6-8 years has often demonstrated that the original basis for many of the state's listing decisions was not supported when current data, water quality standards expressions, or water quality standards translations were applied. Further, many impaired waters tangentially encountered during TMDL development were not included on the original 1996 Clean Water Act Section 303(d) list (the court ordered baseline) but should have been included within a holistic watershed based approach to water quality management. These findings would typically call for the state's entire water quality planning and management program to be revamped. However, the hold of the courts on a central component of the water quality management process (TMDL schedule) requires the program to look for a baseline point outside of the court's purview that allows for the reestablishment of a long-term, sustainable and holistic (e.g., wadeable streams, large rivers, lakes, wetlands, etc.) water quality planning and management program envisioned under the Clean Water Act.

The development of the holistic approach leading up to the 2012 baseline program will sequence water bodies on a priority basis, as follows:

- wadeable streams;
- rivers;
- lakes;
- groundwater; and
- wetlands

This priority designation will be applied for resource allocation purposes, recognizing that some work on all water body types is likely to progress concurrently, either internally within DEQ, through other department programs, or other agencies.

4.0 SHORT-TERM MONITORING STRATEGY AND DESIGN

The highest short-term priority for Montana's monitoring strategy is to improve the accuracy of the Montana 303(d)/305(b) Water Quality Integrated Report. Initially, this will focus on wadeable streams and progress towards large rivers, lakes, groundwater, and wetlands, as time and resources allow.

In addition, DEQ plans to conduct work in two additional short-term high priority areas:

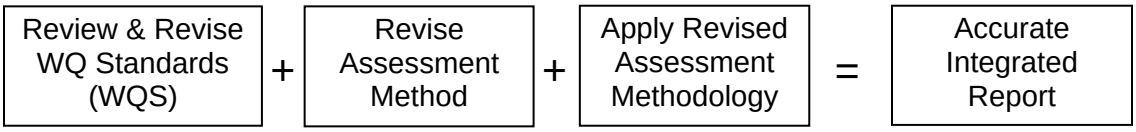
- addressing the individual department programmatic needs identified in Section 2.0 of this document; and
- continuing the existing projects that leverage external resources or otherwise align with DEQ's short-term priorities.

Strategies for implementing the monitoring and assessment activities associated with each of these three highest short-term priorities are described below:

4.1 Monitoring Strategy and Design – Water Quality Integrated Report

The strategy for implementing the short-term goal of creating an accurate Water Quality Integrated Report is outlined graphically in Figure 1and is described in the narrative discussion that follows. This chart identifies the linkages that exist between water quality standards, assessment procedures, and reporting elements that serve as the foundation for Montana's water quality management programs.

Figure 1. ***Strategy for improving the Montana 303(d)/305(b) Integrated Report.***



Step 1: Review and Revise Water Quality Standards

Water quality standards serve as the basis for water quality protection and restoration. In the establishment of water quality standards, the state assigns beneficial uses to specific waters based on their existing and anticipated future uses. Then the state adopts numeric and narrative water quality criteria to protect these uses and develops appropriate implementation methods to ensure the criteria are applied consistently across Clean Water Act programs. Implementation of Montana's water quality standards through the years has highlighted components that could be improved. Examples of these are ensuring that numeric water quality criteria have an expressed magnitude, duration and frequency component, and developing translation methods and implementation guidance for narrative standards.

Step 2: Revise Water Quality Assessment Methodology

The assessment methods are the state's "decision rules" used to develop the Montana 303(d)/305(b) Water Quality Integrated Report and to describe the state's approach for determining monitoring data sufficiency and quality.

The state's assessment methodology was originally developed in 2000 and few changes have been incorporated since that time. Therefore, it is necessary to review and update the methodology to reflect changes resulting from Step 1 above, other recent changes to the assessment process (e.g., consideration of data quality, quantity, age, etc.), and improvements in water quality science and measurement approaches. Revision of the state's assessment method must undergo public review and comment. The 2010 water quality integrated reporting cycle will be used for the public review and comment period.

Step 3: Apply Revised Assessment Methodology

Upon completion of Steps 1 and 2 the application of the assessment methods will become transparent and more consistent which in turn will increase the overall efficiency of the state's water quality management program.

4.2 Monitoring Strategy, Design and Indicators – Addressing Programmatic Needs

The framework outlined in Section 4.1 above is the basic strategy that Montana DEQ will follow to improve the quality of the Montana Water Quality Integrated Report. It is expected that this Statewide Water Quality Monitoring and Assessment Strategy will be updated upon completion of Steps 1 through 3. In the interim, the following discussion describes DEQ's short-term plan for addressing highest priority monitoring and assessment needs of its various water quality management programs.

4.2.1 Water Quality Standards

The short-term high priority is for DEQ to review and identify the suite of water quality standards issues that the state should address. DEQ intends to discuss the results of this evaluation with EPA and present a plan for addressing the high priority issues. Based on the results of this evaluation, DEQ will develop a water quality standards work plan that identifies the priority issues and defines the goals, objectives and general tasks that will be accomplished during the 2010-2012 timeframe and will identify any necessary monitoring and assessment activities needed to support specific objectives. Once the water quality standards work plan is defined, the monitoring strategy will be revised to reflect any newly identified needs.

In the interim, several water quality standards goals have been identified within the State-EPA Performance Partnership Agreement and monitoring and assessment activities to support these areas are underway. These include revisions or refinement to the following parameters:

- metals;
- nutrients;
- reference condition determinations;
- biocriteria; and
- UAA/2B.

In 2010-2011, limited data collection is needed or planned to refine these specific water quality standards issues. The proposed field work focuses on: a) refining nutrient criteria for the Plains region (see Box Elder Sampling and Analysis Plan); b) revisiting a small number of reference sites to evaluate temporal variability; and c) collecting the necessary data to refine uses, as appropriate, to ensure proper designated use classes for certain state waters (e.g., waters classified "I" and those listed in state subcategory 2B in the 2008 Water Quality Integrated Report). The monitoring design and indicators vary for each of these projects and will be highlighted in the project Sampling and Analysis Plans (SAP) to be completed by June 1, 2010.

The bulk of the water quality standards workload to address these priority issues may entail scoping to determine a detailed action plan (i.e., temperature, wetlands,

salinity, ESA fisheries issues), analytical support, and report development to address implementation issues.

As the Water Quality Standards Section develops task level plans, DEQ will provide specific details on tasks, resource needs and timelines for water quality standards projects that will require additional funding. If needed, the monitoring strategy will be updated to reference these items.

4.2.2 Water Quality Monitoring Section

The steps outlined in Section 4.1 provide the framework for improving the planning aspects of water quality management over the long-term. In the short-term, DEQ's Water Quality Monitoring Section will support the development needs required to achieve this framework as well as specific projects related to meeting the 2012 TMDL court deadline.

Possible monitoring and assessment activities identified to date for the federal fiscal year (FFY) 2010 include:

1. Finalize "baselining" of the WARD data system. Baselining entails a thorough review of the individual assessment records to make sure the information is correct and complete in WARD.

2. Revision of the Water Quality Assessment Method (jointly with Water Quality Standards Section staff).

3. Data collection and completion of beneficial use assessments for waters that do not have all uses assessed and for those with low confidence listings (Water Quality Management Section staff).

4. A number of water bodies currently listed in Category 5 of the Water Quality Integrated Report have been identified as meeting water quality standards by the Watershed Management Section (TMDL program). These waters need to have their assessments updated to reflect their current status for reporting during the 2010 or 2012 cycle.

5. Technical assistance and support for TMDL monitoring and assessment activities, specifically sampling design development and data collection (Water Quality Management Section staff and TMDL contractors; see Table 1 in Section 4.2.3).

6. Technical assistance and support for nutrient standards development, with short-term emphasis on the Box Elder Creek nutrient dosing study (Joint effort between Water Quality Standards and Water Quality Monitoring sections and Carter County Conservation District).

7. Technical assistance and support for development of biological indicators, with short-term emphasis on development of periphyton diagnostic tools.

8. Technical assistance and support for UAA/2B assessments, specifically the administration of data collected by Water Quality Standards Section staff.

9. TMDL follow-up monitoring and assessment to support adaptive management/phased approaches, with short-term emphasis on providing technical assistance to the Careless Creek TMDL project in FFY2010.

10. Technical assistance and support for maintenance of the 303(d) list, including new listings and status revisions, with emphasis in FFY2010 on Little Beaver Creek and enforcement related requests.

DEQ will review and prioritize the above list and develop a federal fiscal year 2010 monitoring work plan. This work plan will be provided to EPA by March 30, 2010 and will describe the Water Quality Monitoring Section's specific objectives, timelines, and funding needs for the tasks required to satisfy each activity. Sampling and Analysis Plans will be finalized for each monitoring project by June 1, 2010. By April 30, 2010, the Water Quality Monitoring Section will prepare a detailed analysis of the existing assessment workload and develop a plan to complete the assessments. In addition to the specific tasks identified for completion in FFY 2010-2011, the plan will describe goals, objectives and specific tasks that are anticipated for the foreseeable future (2012-2015.) Once the plan is completed, the monitoring strategy may need to be revised to reflect any newly identified monitoring activities and support needs.

In addition to tasks described above, DEQ has contracted monitoring work to several external organizations (e.g., USGS, University of Montana). These projects are described in detail in Section 4.3 and focus on the evaluation of water quality trends, TMDL related data collection activities, or maintaining a network of reference sites across the state.

4.2.3 Watershed Management Section (TMDL Program)

A preliminary work plan has been developed for Montana's TMDL program including a detailed schedule for addressing and assignment of section responsibility for each water body/pollutant combination in Category 5 of the 2008 Montana Water Quality Integrated Report.

The two highest priority TMDL monitoring and assessment activities that have been identified include: 1) conducting the necessary assessments to de-list water body/pollutant combinations determined to be fully supporting their uses based on work completed through the TMDL process, and 2) monitoring support (e.g., impairment verification and diagnosis, source identification, source load quantification, model calibration, etc.) for the development of TMDLs scheduled for completion in 2010 and beyond.

A preliminary list of the water body/pollutant combinations to be considered for de-listing is presented in Table 1. By April 30, 2010, Table 1 will be thoroughly reviewed and a prioritized schedule and plan will be developed for conducting assessments as part of the Water Quality Monitoring Section's comprehensive evaluation of the assessment workload.

Table 1. ***Montana water bodies scheduled for 303(d) de-listing.***

TMDL_PLANNING_AREA	ID305B	WATERBODYNAME_LOCATION	CAUSE_NAME
Boulder - Big Timber	MT43B004_131	BOULDER RIVER, the mouth (Yellowstone River) five miles upstream	Silver
Boulder - Big Timber	MT43B004_132	BOULDER RIVER, North Fork boundary to 5 miles above the mouth (Yellowstone River)	Chromium (total)
Boulder - Big Timber	MT43B004_132	BOULDER RIVER, North Fork boundary to 5 miles above the mouth (Yellowstone River)	Nickel
Lake Helena	MT41I006_141	TENMILE CREEK, headwaters to the Helena PWS intake above Rimini	Sedimentation/Siltation
Lake Helena	MT41I006_150	SILVER CREEK, headwaters to the mouth (Lake Helena)	DDE
Lake Helena	MT41I006_180	NORTH FORK WARM SPRINGS CREEK, headwaters to mouth (Warm Springs Creek-Prickly Pear)	Organic Enrichment (Sewage) Biological Indicators
Lake Helena	MT41I006_220	SKELLY GULCH tributary of Greenhorn Creek-Sevenmile Creek T10N R5W Sec 2	Arsenic
Lower Blackfoot	MT76F006_010	UNION CREEK, headwaters to mouth (Blackfoot River)	Arsenic
Lower Blackfoot	MT76F006_010	UNION CREEK, headwaters to mouth (Blackfoot River)	Copper
Lower Blackfoot	MT76F006_031	ELK CREEK, headwaters to Stinkwater Creek	Cadmium
Nevada Creek	MT76F003_011	NEVADA CREEK, headwaters to Nevada Lake	Cadmium
Ruby	MT41C002_010	WISCONSIN CREEK, headwaters to mouth (Ruby River)	Arsenic
Ruby	MT41C002_010	WISCONSIN CREEK, headwaters to mouth (Ruby River)	Copper
Ruby	MT41C002_010	WISCONSIN CREEK, headwaters to mouth (Ruby River)	Lead
Ruby	MT41C002_040	ALDER GULCH, headwaters to mouth (Ruby River)	Lead
Tobacco	MT76D004_050	LIME CREEK, headwaters to mouth (Fortine Creek)	Phosphorus (Total)
Tobacco	MT76D004_050	LIME CREEK, headwaters to mouth (Fortine Creek)	Total Kjeldahl Nitrogen (TKN)
Big Springs	MT41S004_052	COTTONWOOD CREEK, county road bridge at T14N R18E Sec18 to mouth (Big Spring Creek)	Sedimentation/Siltation
Bitterroot Headwaters	MT76H002_030	MEADOW CREEK, headwaters to mouth (East Fork Bitterroot River)	Sedimentation/Siltation
Boulder - Big Timber	MT43B004_141	EAST BOULDER RIVER, Elk Creek to the mouth (Boulder River)	Sedimentation/Siltation
Flatwillow - Box Elder	MT40B001_022	FLATWILLOW CREEK, Highway 87 bridge to the mouth (Musselshell River)	Mercury
Flatwillow - Box Elder	MT40B002_040	CHIPPEWA CREEK, headwaters to confluence with Manitoba Gulch	Mercury

Table 1 (Continued). ***Montana water bodies scheduled for 303(d) de-listing.***

TMDL_PLANNING_AREA	ID305B	WATERBODYNAME_LOCATION	CAUSE_NAME
Lake Helena	MT41I006_020	PRICKLY PEAR CREEK, Helena WWTP Discharge Ditch to Lake Helena	Ammonia (Un-ionized)
Lake Helena	MT41I006_020	PRICKLY PEAR CREEK, Helena WWTP Discharge Ditch to Lake Helena	Temperature, water
Lake Helena	MT41I006_030	PRICKLY PEAR CREEK, Highway 433 (Wylie Dr.) Crossing to Helena WWTP Discharge	Ammonia (Un-ionized)
Lake Helena	MT41I006_030	PRICKLY PEAR CREEK, Highway 433 (Wylie Dr.) Crossing to Helena WWTP Discharge	Temperature, water
Lake Helena	MT41I006_050	PRICKLY PEAR CREEK, Spring Creek to Lump Gulch	Arsenic
Lake Helena	MT41I006_050	PRICKLY PEAR CREEK, Spring Creek to Lump Gulch	Copper
Lake Helena	MT41I006_060	PRICKLY PEAR CREEK, headwaters to Spring Creek	Cadmium
Lake Helena	MT41I006_090	CORBIN CREEK, headwaters to the mouth (Spring Creek)	pH
Middle Blackfoot	MT76F001_031	BLACKFOOT RIVER, Nevada Creek to Monture Creek	Temperature, water
Middle Blackfoot	MT76F001_032	BLACKFOOT RIVER, Monture Creek to Belmont Creek	Temperature, water
Middle Blackfoot	MT76F004_110	KLEINSCHMIDT CREEK, mouth 1.5 miles upstream to mouth (North Fork Blackfoot River)	Copper
Nevada Creek	MT76F003_011	NEVADA CREEK, headwaters to Nevada Lake	Mercury
Nevada Creek	MT76F007_020	NEVADA LAKE, reservoir of Nevada Creek, T12N, R9W, Section 13, and 10W, Sections 18 &19	Oxygen, Dissolved
North Fork Big Hole	MT41D004_090	JOSEPH CREEK, headwaters to mouth (Trail Creek-North Fork Big Hole River)	Lead
Prospect Creek	MT76N003_022	COX GULCH headwaters to mouth (Prospect Creek)	Zinc
Upper Big Hole	MT41D004_180	WARM SPRINGS CREEK, headwaters to the mouth (Big Hole River-Near Jackson)	Sedimentation/Siltation
Upper Clark Fork	MT76G002_072	LOST CREEK, the south State Park boundary to the mouth (Clark Fork River)	Sulfates
Upper Gallatin	MT41H005_010	SQUAW CREEK, headwaters to the mouth (Gallatin River)	Phosphorus (Total)

For 2010, the following monitoring and assessment activities will be conducted by the Water Quality Monitoring Section and their contractors to support TMDL development (**Table 2**). This list of TMDL related monitoring needs will be reviewed by DEQ's Water Quality Monitoring Section during the development of their 2010 monitoring work plan. Specific indicators, sampling frequency, and monitoring locations will be summarized in the monitoring work plan or a TMDL Sampling and Analysis Plan that will be finalized no later than June 1, 2010.

Table 2. ***TMDL related monitoring needs by TMDL Planning Area.***

DEQ Monitoring Field Work Lead	TMDL Planning Area	TMDL Project Manager	2010 Monitoring Project Description	Potential Budget ($thous)	Funding Notes	Support Notes
Monitoring Group TPA Project	Canyon Ferry - Holter Tribs	Not Assigned	Nutrient and metals sampling	0	Monitoring Budget	TPA Project
Monitoring Group TPA Project	CF - Drummond Tribs	Kusnierz	Continued metals and nutrient sampling	5	Monitoring Budget	TPA Project
Monitoring Group TPA Project	Red Rock	Not Assigned	Nutrient and metals sampling	0		
Monitoring Group TPA Project	Rock	Kusnierz	Continued metals and nutrient sampling	5	Monitoring Budget	TPA Project
Monitoring Group TPA Project	Upper Jefferson	Kron	Flow monitoring	0		
WMS	Beaverhead	Starr	Sediment and habitat assessments	50	Potential 319	
WMS	Beaverhead	Starr	Tributary temperature modeling field work	20		Consultant or internal; may be low priority TMDL
WMS	Beaverhead	Schade	Water chemistry sampling	6		USGS contract mod
WMS	Beaverhead	Schade	Nutrient and pathogen sampling	25		
WMS	Boulder - Elkhorn	Bond	Sediment and habitat assessments	80		
WMS	Boulder - Elkhorn	Bond	Temperature modeling field work	20		Modeling group or consultant involved with field work lead
WMS	Boulder - Elkhorn	Bond	Temperature data logger deployment - summer season	0		
WMS	Boulder - Elkhorn	Byron	Nutrient and metals sampling	35		

Table 2 (Continued). ***TMDL related monitoring needs by TMDL Planning Area.***

DEQ Monitoring Field Work Lead	TMDL Planning Area	TMDL Project Manager	2010 Monitoring Project Description	Potential Budget ($thous)	Funding Notes	Support Notes
WMS	Lower Gallatin	Schade	Continuation of nutrient and pathogen sampling	0	319	
WMS	Paradise & Shields	Staten	Nutrient sampling	0	319	Staten PM with monitoring assistance
WMS	Upper Jefferson	Kron	Tributary nutrient and metals sampling	33		Contract went out for bid
WMS	Upper Jefferson	Kron	Temperature modeling field work	0	319	
WMS	Upper Jefferson	Kron	Mainstem sediment (TSS) data collection	0	319	

4.2.4 Watershed Protection Section

As indicated in Section 2.2.4, the highest short-term priority for the Watershed Protection Section is the development a program work plan to be completed by March 30, 2010. A component of this work plan will include development of monitoring and assessment goals and objectives and monitoring design and indicators for the program items outlined below:

- TMDL follow-up monitoring and assessment to support adaptive management/phased approaches;
- TMDL 5-year reviews, which may include monitoring to assess water quality standards attainment and/or field inspections of implemented pollution control projects (this will be a growing need as increasing numbers of TMDLs are completed on a statewide basis);
- nonpoint source implementation projects effectiveness monitoring by Section 319 grant recipients (with Watershed Protection Section guidance); and
- continued support for citizen volunteer monitoring activities and mechanisms for incorporating resulting assessment information within the nonpoint source management program.

4.2.5 Wetlands

Although considerable work has been conducted to define the needs and goals for the Montana Wetland Program, monitoring and assessment activities for wetlands are not currently well defined. This is mainly due to the lack of clear direction from the Water Quality Standards Section on the scope, beneficial uses and water quality criteria applicable to wetlands.

Similar to the Watershed Protection Section, the highest priority short-term need for the Wetlands Program is an overall program strategy that begins with the review of existing water quality standards and builds from there to align the program within the current structure of DEQ. This strategy will be prepared by April 2010. Monitoring and assessment activities proposed for 2010 are presented below. The Wetlands Sampling and Analysis Plan details the monitoring objectives, design and indicators for data collection efforts (Montana Wetland Council Mapping, Monitoring and Assessment Workgroup, 2009. In preparation).

The Montana Natural Heritage Program (MTNHP) has initiated a statewide rotating basin wetlands condition assessment. In 2009, they are conducting a three-tiered assessment of wetland condition in the Milk, Marias and St. Mary's River basins. This assessment uses a probabilistic sampling scheme to evaluate 1000 wetlands at a landscape scale using GIS, 100 wetlands at a local scale using ecological integrity assessments adapted for Montana from Faber-Langendoen et al. (2008), and 30 wetlands at a local scale using the intensive assessment approach developed as part of the Rocky Mountain ReMAP project. Pending additional EPA funding, the MTNHP will continue the assessments in the Missouri Headwaters and Lower Pend Oreille River Basins in 2010 and in the Tongue, Powder, Little Missouri and Bighorn River basins in 2011.

4.2.6 *DEQ Cross-Programmatic Activities*

Cross-programmatic activities were recurring themes identified as "needs" during discussions with DEQ's Source Water Protection, Public Water Supply, Permits, Subdivisions and Groundwater Sections. Despite the differing objectives of the programs, several monitoring and assessment needs were repeatedly mentioned and these have been grouped into the following categories:

- site-specific data needs;
- data management needs; and
- improved internal coordination.

Each of the programs highlighted the occasional need to collect site-specific data in response to citizen complaints, to address data gaps and time critical situations (e.g., spills, permit compliance data needs, human health concerns), and to determine the sources and extent of a problem. Currently, a lack of monitoring resources prevents DEQ staff from adequately responding to these situations. While the number and frequency of these events is difficult to predict, having staff allocated to respond to these situations is a common need across programs and would assist with program implementation. In 2010, DEQ management will work to identify possible staff or funding resources to handle "time sensitive" monitoring needs.

Data management needs and universal access to department-wide monitoring data was another topic frequently mentioned. A short-term solution to this request is to provide staff training and education on the use of existing data resources that can be readily accessed within DEQ. Development of a more integrated DEQ data management system is an issue that will be addressed as a long-term goal.

The desire for improved internal communication highlights the long-term goal of program integration across DEQ water quality management programs. This water quality monitoring strategy attempts to highlight some key areas of programmatic overlap and can assist with

communication by encouraging DEQ staff to regularly review program effectiveness and examine opportunities to strengthen core programs.

4.3 Monitoring Strategy and Design – Ongoing Monitoring Projects

DEQ will continue to support several existing monitoring projects because they either leverage external water quality monitoring resources or align with DEQ's short-term priorities. Examples of these projects include:

- Flathead Lake TMDL monitoring and trends analysis;
- Tongue River Basin monitoring;
- Tri-State Water Quality Council Clark Fork River monitoring; and
- monitoring activities to respond to stakeholder petitions to modify the 303(d) list.
-

4.3.1 Flathead Lake Monitoring

A comprehensive monitoring program was developed by Montana DEQ during water years 2007 and 2008 to support watershed and receiving water model development in the Flathead Lake watershed as part of the TMDL program. Efforts have been initiated cooperatively between the U.S. Geological Survey (USGS), Whitefish Lake Institute (WLI), Flathead Lake Biological Station (FLBS), PBS&J, Montana DNRC and the Flathead Basin Commission. General activities completed under the program include: (1) monitoring of rivers and tributaries for watershed model calibration and validation purposes, (2) monitoring of lake and reservoir profiles for characterization of pollutant fate and transport, and (3) water quality assessment to support TMDL analysis in the basin. The data will be used to develop watershed models for support of pollutant reduction decisions and formulation of TMDL implementation plans in the watershed. Details on the monitoring design, including sampling locations, frequency and monitoring indicators can be found in the project Sampling and Analysis Plan (MDEQ 2009a).

4.3.2 Tongue River Monitoring

DEQ provides funding to the U.S. Geological Survey to collect water quality data at several sites on the Tongue and Powder rivers and their tributaries. This sampling effort is part of a larger watershed-scale monitoring effort coordinated by BLM with support from different state and federal agencies. This monitoring is designed to evaluate water quality trends in the Powder and Tongue River Watersheds and to detect water quality changes related to coal bed methane development. This information helps DEQ track water quality trends across the state and to evaluate water quality impacts. EPA 604(b) funds support this project and leverages USGS staff time for field sampling.

4.3.3 Tri-State Water Quality Council Clark Fork River Monitoring

DEQ has partnered with the Tri-State Water Quality Council since 1998 to conduct water quality status and trends monitoring in the Clark Fork-Pend Oreille Watershed. Current monitoring activities focus on sampling to assess basin-wide conditions and trends in water quality and to further characterize water quality problems and sources of pollution. This project assists DEQ with tracking water quality status and trends in the state and is supported with EPA 604(b) funds. Details on the monitoring design, including sampling

locations, frequency and monitoring indicators can be found in the project Sampling and Analysis Plan, which is currently under revision.

4.3.4 Reference Site Sampling

Reference sites representing minimal human disturbance serve as benchmarks for deriving nutrient and biological water quality criteria. DEQ continues to expand the network of reference sites and to fill daps gaps in particular areas. In 2009, DEQ's reference work focused on sampling sites within Level IV ecoregions with limited reference data and revisiting reference sites with existing water quality data but lacking macroinvertebrate data that were collected with uniform methods. Details on the monitoring design, including sampling locations, frequency and monitoring indicators can be found in the project Sampling and Analysis Plan (MDEQ 2009b).

4.3.5 Stakeholder Petitions

The TMDL provisions of the Montana Water Quality Act authorize a petition process where interested parties can request that DEQ to add or remove water bodies from the Montana 303(d) list, or reprioritize a water body on a draft or published 303(d) list, by submitting the necessary data and information to support the request. DEQ staff are required to review and act on these petitions within 60 days of their receipt. DEQ will need to reserve adequate monitoring and assessment resources to review and process 303(d) list petitions in a timely manner.

5.0 LONG-TERM MONITORING STRATEGY AND DESIGN

After achieving the outlined short-term water quality monitoring and assessment related goals, DEQ intends to create a plan to address the longer-term needs. Given the number of longer-term objectives, DEQ will initiate implementation of this portion of the monitoring strategy with a group discussion and reevaluation of current status, needs and available resources. Priority long-term objectives are summarized by program below.

Water Quality Standards Long-term Priorities:

- Nutrient standards development for large rivers
- Nutrient standards development for lakes
- UAAs
- Wetlands classification
- Lakes classification

Water Quality Monitoring and Assessment Long-term Priorities:

- Monitoring Plan to evaluate statewide water quality status and conditions
- Monitoring plan to evaluate statewide trends
- Strategy for monitoring/ assessing lakes
- Strategy for monitoring/ assessing wetlands
- Large river monitoring and assessment strategy

Watershed Management Section Long-term Priorities:

- Monitoring to support phased TMDLs

Watershed Protection Section Long-term Priorities:

- Monitoring to support adaptive management TMDLs
- TMDL 5-year reviews
- Ongoing effectiveness monitoring
- Support for citizen monitoring

Data Management Section Long-term Priorities:

- Access to spatially enabled water quality and facility data
- Improved public access to water quality monitoring data and assessment information
- Improved management of independent datasets compiled by contractors and cooperators
- Incorporation of habitat data into DEQ's data storage system

Source Water Protection Section Long-term Priorities:

- Development of a comprehensive groundwater monitoring plan with articulated monitoring and assessment needs (priority of source water, public water supply and subdivisions)
- Increased groundwater monitoring of contaminant source impacts to public drinking water supplies

Wetlands Program Long-term Priorities:

- Integration into the state's Monitoring and Assessment Program
- Assessment methods for wetlands

Permits Program Long-term Priorities:

- Data characterizing storm-water quality
- Data/information on water quality trends, emerging problems, and cumulative effects to assist with issuance/reissuance of discharge permits

Public Water Supply Long-term Priorities:

- See Source Water Section

Subdivisions Section Long-term Priorities:

- Electronic geographically referenced data that enables evaluation of cumulative impacts and time trends in water quality
- Additional monitoring data to examine watershed conditions/ trends and to calibrate models

6.0 DATA ANALYSIS AND ASSESSMENT

In addition to data collection, data analysis and interpretation informs decisions made as part of the state's water quality management program. Various sections in DEQ are responsible for data analysis depending on the specific question being addressed. A brief summary of some of these analytical activities are highlighted below.

- *New Water Quality Criteria*: Water Quality Standards Section staff and contractors complete the analyses required to derive new water quality criteria and to evaluate the performance of existing criteria.

- *Interpretation of Montana's "Natural" provisions, Site Specific Standards, and UAAs*: DEQ staff collect and interpret localized data to refine listings and existing designated uses or to develop site-specific criteria.
- *Attainment of Water Quality Standards:* DEQ staff apply the expression of water quality goals through the water quality assessment process to identify waters not attaining water quality standards.
- *TMDL development*: DEQ's TMDL program staff and contractors analyze data from a TMDL planning area and calculate waste load allocations for pollutants of concern through the TMDL process.
- *Nonpoint Source Projects*: DEQ funds the collection of water quality data designed to evaluate the performance of nonpoint source pollution control projects or to determine TMDL effectiveness. DEQ staff or consultants are responsible for interpreting these data to determine if water quality improvements have been realized.

The majority of analytical work conducted by DEQ relates to assessment of individual water bodies to determine if the water body is attaining its designated uses or is considered impaired. The Monitoring Section is responsible for this workload with assessments completed continually and reported every two years to generate the state's Water Quality Integrated Report. The state's Assessment Methodology documents the process followed by DEQ staff to reach impairment decisions.

As described in Section 4.0, the state's current Assessment Methodology (available at http://www.deq.state.mt.us/wqinfo/QAProgram/PDF/SOP%20WQPBWQM-001.pdf) was developed in 2000 and few changes have been incorporated since that time. DEQ recognizes the need to review and update the methodology to reflect changes made to water quality standards, advances in water quality sciences, and the resulting changes to the assessment process. DEQ plans to solicit public comments on its revised assessment methodology by mid-2010. DEQ anticipates that updates to its assessment procedures will result in increased data requirements and may employ different monitoring indicators. These changes will likely influence the design and quantity of samples that must be collected for DEQ's various monitoring activities. The revised assessment procedure will highlight areas where additional work may be needed to ensure consistent interpretation of water quality standards, particularly for narrative water quality standards.

As significant changes are incorporated within the state's assessment methodology, the statewide water quality monitoring strategy may need to be revised to reflect any newly identified monitoring and assessment support needs.

7.0 REPORTING

Montana DEQ produces a variety of reports from data generated through internal and external data collection efforts. Many of these reports are required by various sections of the federal Clean Water Act. Table 3 below summarizes some of the required reports that DEQ submits regularly to EPA.

In addition to publishing hard copy documents, DEQ also posts draft and final reports on the department's website thereby allowing public access to all of the reports submitted to EPA. TMDL documents, water quality standards information and nonpoint source reports can be

found on the DEQ website at: http://www.deq.state.mt.us/wqinfo. The department's Clean Water Act Information Center (described in Section 2.2.5 of this document and available at: http://cwaic.mt.gov/) is the public portal to the state's latest EPA approved Water Quality Integrated Report and documentation on DEQ's water body (standards) attainment determinations.

DEQ recognizes the need to refine public access to DEQ documents, data and reports and is committed to continuous improvement and enhancement of existing tools and education of the public about accessing this information.

Table 3 ***Water quality documents produced by Montana DEQ that are required by the federal Clean Water Act.***

Report	Timeframe	Comments
Water Quality Integrated Report - 305(b) Water Quality Report and 303(d) List	Biennial - written report in even numbered years and integrated with the 303(d) list.	Serves as the primary assessment of statewide water quality conditions. The 303(d) list consists of a list of impaired waters not attaining water quality standards, describes the pollutants causing the impairments, and assigns a priority ranking to waters requiring TMDL development.
Water Quality Assessment Methodology	Modified as necessary and included as part of the Water Quality Integrated Report (Appendix A).	Criteria for determining if a water is impaired, using monitoring program data or other sufficient credible data.
TMDL Documents	Ongoing	TMDL program staff prepare reports identifying the cause(s) and source(s) of the impairment, the amount of each pollutant that derives from point sources and nonpoint sources, quantification of the background or natural component of the pollutant, an allocation of required pollutant reductions, and establishment of water quality endpoints.
Montana Nonpoint Source Management Plan	Required every 5 years; last updated in 2007	Presents DEQ's vision for addressing nonpoint source issues across the state, describes primary nonpoint source issues (e.g., forestry, agriculture, urban), and identifies a list of recommended Best Management Practices.
Nonpoint Source Annual Report	Annual Report to EPA	State reports on activities, summary of projects, environmental accomplishments, federal consistency, status of grants, reductions in nonpoint source loadings.
Quality Management Plan	Revised as necessary	See Quality Assurance Section of this document.

8.0 PROGRAM EVALUATION

Montana DEQ has not evaluated or assigned specific roles to each of each of its programs within the context of water quality monitoring with the exception of data quality assurance and quality control. Generally, water quality monitoring program direction has been based on the requirements of the TMDL lawsuit Consent Decree and the 2012 TMDL court deadline. With planning processes predicated by these priorities, the department's Water Quality Monitoring Section's priorities have been limited to internal needs or external requests for monitoring assistance.

During the development of this monitoring strategy, a more complete programmatic review of all water programs and their monitoring and assessment needs was conducted.
The work initiated through development of DEQ's statewide water quality monitoring strategy will provide a basis for conducting regular reviews of the monitoring program. Many of the evaluation points expressed in this strategy are predicated on short-term goals defined in annual DEQ work plans from the various DEQ sections responsible for key aspects of water quality management. This is appropriate for a program emerging from a Consent Decree regarding its core 303(d) monitoring and assessment function and which is still subject to court requirements regarding TMDL development (2012 deadline).

As the program develops work plans, it is envisioned that this monitoring strategy will be reviewed and revised as needed. In the short-term this review and revision will most likely be an annual event with a significant revision foreseen at the 2012 milestone and at five increments thereafter due to factors described in the preceding paragraph.

In the long-term (beyond 2012), DEQ intends to pursue an autonomous state role in the execution of Clean Water Act/Montana Water Quality Act programs including independent evaluation (through the Quality System and other measures) and reporting program progress to EPA through the PPA and other national performance measures.

9.0 GENERAL SUPPORT AND INFRASTRUCTURE

Table 4 below describes Montana DEQ's current capacity to implement the planning, monitoring and assessment, data management and QA/QC components of the federal Clean Water Act.

As identified throughout this water quality monitoring strategy, Montana would require an immediately boost of staffing and funding to fully implement a comprehensive monitoring program in the near term. The addition of staff is not simply a matter of getting more FTE and monies from EPA (current funding level provided in Table 4) but also requires state authority for those positions from the Montana legislature. At present, Montana directs the vast majority of its PPG 106 allotment and all of its 319 NPS staffing grant towards (legislatively authorized) fulltime staff positions and relies heavily on the granting of 106 supplemental funds to perform monitoring and assessment activities.

Table 4. ***Montana DEQ's current level Water Quality Monitoring and Assessment Program resources.***

Funding Source	Amount	FTEs
106 Grant*	$889,000	12 FTE
319 Grant**	$1,638,000	20 FTE
Federal Wetlands Grants	$148,000	2 FTE
Total:	$2,675,000	34 FTE

*106 PPG currently funds positions in Water Quality Standards (4.3 FTE), Watershed Management (TMDL – 3.6 FTE), and Data Management (3.65 FTE). Bureau management and administrative FTE are not included in this total.

**319 staffing grant currently funds positions in Water Quality Monitoring (6.5 FTE), Watershed Protection (3.5 FTE), Watershed Management (TMDL – 5 FTE), Data Management (2.8 FTE), and QA/QC (2 FTE).

Given these financial realities, Montana DEQ has established its short term activities (leading up to 2012) at the current staffing and funding levels with the assumption that approval of this monitoring strategy will allow for the use of 106 supplemental monitoring funds held from FFY2008 ($100,000) and FFY2010 ($170,000). Any disruption or reduction of the amounts from this assumption will delay the short-term plan.

The long-term activities can be implemented faster and more completely with additional resources outlined in Table 5 below.

Table 5. ***Montana DEQ's Monitoring and Assessment Program long-term resource needs.***

Activity Description*	Estimated Program Costs (annual)	FTE (assumption of 1 FTE = $75,000)	Total
Water Quality Status (rotating basin)	$250,000**	2	$400,000
Water Quality Trends (fixed station)	$150,000	1	$225,000
Wetlands - program development and implementation	$150,000	2	$300,000
Lakes – program development and implementation	$175,000	1	$225,000
Large Rivers – program development and implementation	$275,000	1	$325,000

* The activity description "program development and implementation" is inclusive of the additional annual resources necessary for development of WQ standards, monitoring, assessment (or model development), and planning and implementation activities.

**The program cost for status intends that the resources available to Montana DEQ come under the 106 PPG rather than relying upon supplemental 106 PPG.

10. IMPLEMENTATION SCHEDULE

As indicated in Section 4.0 of this strategy, DEQ's short-term monitoring and assessment activities focus heavily on meeting requirements related to the 2012 TMDL court deadline and developing a solid baseline program. The list below summarizes the identified tasks and timelines related to accomplishing these short-term goals.

SHORT-TERM ACTIVITIES

March 30, 2010

- Submit FFY2010 monitoring and assessment work plan to EPA.
- Submit program work plan for the Watershed Protection Section (Nonpoint Source Section).

April 1, 2010

- Submit 2010 Water Quality Integrated Report.
- Solicit public comments on revisions to the water quality Assessment Methodology.

June 30, 2010

- Sampling and Analysis Plans for 2010 monitoring activities will be completed and hyperlinked to DEQ's website.
- DEQ's water quality standards work plan will be finalized and submit to EPA.
- Wetlands Protection Program strategy will be finalized.

Ongoing 2010

- DEQ management will work to identify possible staff or funding resources to handle "emergency" cross-programmatic monitoring needs.
- Provide staff training and education on the existing resources that can be readily accessed within DEQ.

Ongoing Activities (2010-2011)

- UAAs (WQS / underway; ongoing).
- Monitoring to support phased TMDLs (TMDL Section).
- Monitoring to support adaptive management TMDLs (Nonpoint Source Section)
- Support for citizen monitoring (Nonpoint Source Section)

Tentative timelines for long-term activities are highlighted below. Given the number of longer-term objectives, DEQ will initiate implementation of this portion of the monitoring strategy upon program evaluation of current status, needs and available resources at 2012.

LONG-TERM ACTIVITIES

- Develop lakes classification (Water Quality Standards Section).
- Develop a Monitoring Plan to evaluate statewide water quality status and conditions (Monitoring Section).
- Develop nutrient standards for lakes (Water Quality Standards Section).
- Continue nutrient standards development for large rivers (Water Quality Standards Section).

- Evaluate existing wetlands classification and refine if needed (Water Quality Standards Section; initial work starting in 2010).
- Implement a systematic TMDL 5-year review process and the requisite effectiveness monitoring (Nonpoint Source Section).
- Continue support for citizen monitoring (Nonpoint Source Section).
- Continually improve public access to water quality monitoring data and assessment information (Data Management Section).
- Find mechanism to improve access to independent datasets compiled by contractors and cooperators (Data Management Section).
- Develop and implement design for monitoring/evaluating state WQ trends (Water Quality Monitoring Section).
- Develop and implement design for monitoring/assessing lakes (Water Quality Monitoring Section).
- Develop and implement design for large river monitoring and assessment (Water Quality Monitoring Section).
- Develop a comprehensive groundwater monitoring plan (priority of source water, public water supply and subdivisions) (Public Water Supply Section).
- Continue development of spatially enabled water quality and facility data tools (Data Management Section).
- Incorporate habitat data into DEQ's data storage system (Data Management Section).
- Increase groundwater monitoring of contaminant source impacts to public drinking water supplies (Public Water Supply Section).
- Develop strategy for monitoring/ assessing wetlands (Water Quality Monitoring/ Wetlands Protection Sections).
- Identify assessment methods for wetlands (Water Quality Monitoring/ Wetlands Protection Sections).
- Collect data characterizing storm-water quality (Water Quality Discharge Permits/ Water Quality Monitoring Sections).
- Collect data/information on water quality trends, emerging problems, and cumulative effects to assist with issuance/reissuance of discharge permits (Water Quality Discharge Permits/ Water Quality Monitoring Sections).
- Develop capabilities to evaluate cumulative impacts and trends in water quality using geographically referenced data (Subdivision Review Section) .
- Collect additional monitoring data to examine watershed conditions/trends and to calibrate models (Subdivision Review Section).

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