Montana 2014

Final
Water Quality
Integrated Report

Prepared in accordance with the requirements of
Sections 303(d) and 305(b) of the federal Clean Water Act

May 2014

Steve Bullock, Governor
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ACRONYMS

Acronym	Definition
AFO	Animal Feeding Operation
ARM	Administrative Rules of Montana
ARRA	American Reinvestment and Recovery Act
AU	Assessment Unit
BER	Board of Environmental Review (Montana)
BLM	Bureau of Land Management (federal)
BMP	Best Management Practices
CAFO	Concentrated (or Confined) Animal Feed Operations
CECRA	[Montana] Comprehensive Environmental Cleanup and Responsibility Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWAIC	Clean Water Act Information Center (DEQ)
CWS	Community Water System
CWSRF	Clean Water State Revolving Fund
DBP	Disinfection Byproduct Rule
DEQ	Department of Environmental Quality (Montana)
DNRC	Department of Natural Resources & Conservation
DQA	Data Quality Assessment
DWSRF	Drinking Water State Revolving Fund
EPA	Environmental Protection Agency (US)
FY	Fiscal Year
FFY	Federal Fiscal Year
FTE	Full-Time Employee
FWP	Fish, Wildlife, and Parks
FWPCA	Federal Water Pollution Control Act
GIS	Geographic Information System
GMP	Generic Management Plan
GWCP	Ground Water Characterization Program
GWIC	Ground Water Information Center
GWPCS	Montana Ground Water Pollution Control System
GWPP	Ground Water Protection Program
HUC	Hydrologic Unit Code
ILF	In-Lieu-Fee
IMTS	Information Management & Technical Services (DEQ)
IOC	Inorganic Chemicals
LWQD	Local Water Quality District
MAR	Montana Administrative Register
MBMG	Montana Bureau of Mines and Geology
MCA	Montana Codes Annotated
MCL	Maximum Contaminant Level
MCWA	Montana's Clean Water Act
MDA	Montana Department of Agriculture
MGWPCS	Montana Ground Water Pollution Control System
MOU	Memorandum of Understanding

Acronym	Definition
MPDES	Montana Pollutant Discharge Elimination System
MS4	Municipal Separate Storm Sewer Systems
MTNHP	Montana Natural Heritage Program
MWCB	Mine Waste Cleanup Bureau (DEQ)
MWPCS	Montana Ground Water Pollution Control System
MWQA	Montana Water Quality Act
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Nonpoint Source
NRSA	National Rivers and Stream Assessment
NTNC	Non-transient non-community systems
NWCA	National Wetland Condition Assessment
PA	Preliminary Assessment
PCB	PolyChlorinated Biphenyls
PFC	Proper Functioning Condition
PWS	Public Water System (or Supply)
QC	Quality Control
QMP	Quality Management Plan
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SMCL	Secondary Maximum Contamination Level
SRF	State Revolving Fund
SWP	Solid Waste Program (DEQ)
SWPP	Source Water Protection Plans
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TMDL	Total Maximum Daily Load
TNC	Transient non-community systems
TPA	TMDL Planning Area
UM	University of Montana
USACE	U.S. Army Corp of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
VOC	Volatile Organic Chemicals
WARD	Water Quality Assessment, Reporting, and Documentation system
WLA	Wasteload Allocation
WPCAC	Water Pollution Control Advisory Council
WPCSRF	Water Pollution Control State Revolving Fund
WPDG	Wetland Program Development Grants
WPP	Wetland Program Plans
WQBEL	Water quality-based effluent limitations
WQLS	Water Quality Limited Segments
WQPB	Water Quality Planning Bureau (DEQ)
WQS	Water Quality Standards

1.0 INTRODUCTION

The Montana Department of Environmental Quality (DEQ) is the state agency responsible for implementing delegated components of the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act [CWA]) for waters under state jurisdiction. As required under sections 303(d) and 305(b) of CWA, DEQ conducts and/or coordinates ongoing water quality assessments and compiles reports on the status and trends of water quality. To satisfy the requirements of sections 303(d) and 305(b), this report includes the following:

- description of Montana's water resources
- description of Montana's water quality standards
- report on water pollution control programs
- watershed planning priority for waters not meeting water quality standards
- cost-benefit analysis
- description of water quality monitoring programs
- water quality standards attainment (i.e., use support) decisions for assessed waters
- list of waters with completed and approved Total Maximum Daily Loads allowable to meet water quality standards and support beneficial uses
- general assessment of water quality for Montana's waters
- discussion of public health concerns
- description of groundwater and drinking water programs
- description of quality control action and data updates to Montana's **W**ater Quality **A**ssessment, **R**eporting, and **D**ocumentation (WARD) system during this reporting cycle

The Appendices contain the following:

Appendix A: list of the assessed surface waters that have one or more impaired beneficial uses
Appendix B: list of all waters in need of Total Maximum Daily Load (TMDL) development [303(d) list] and TMDL Priority Schedule
Appendix C: waterbodies assessed during the 2014 reporting cycle
Appendix D: pollutant causes removed from the 2012 303(d) List
Appendix E: changes to beneficial-use support
Appendix F: EPA-approved TMDLs
Appendix G: DEQ's monitoring and assessment schedule for 2013-2015

For a list of terms used throughout this report, refer to the **Glossary**.

2.0 BACKGROUND INFORMATION

The Montana Department of Environmental Quality (DEQ) reports on the state's surface waters by hydrologic basins and uses current geographic information systems (GIS) to facilitate spatial analysis, mapping, and reporting on water quality assessments. This section discusses how surface waters are organized for administrative purposes, the types and amount (size) of surface waters, and the size of waterbodies under the state's jurisdiction or management authority.

2.1 STATE OVERVIEW

Montana's headwater streams fall within three major river basins: the Clark Fork, Flathead, and Kootenai rivers in the Columbia basin; the Missouri and Yellowstone rivers in the Mississippi basin; and the St. Mary River in the Saskatchewan–Nelson basin, Canada. For administrative purposes, DEQ groups the state's 16 sub-major basins into 4 administrative basins (**Figure 2-1**):

- **Columbia** – all Montana's waters west of the Continental Divide, including the Clark Fork, Flathead, and Kootenai rivers
- **Upper Missouri** – the Missouri River basin from its headwaters downstream to the confluence with the Marias River
- **Lower Missouri** – the Missouri River basin from the Marias River confluence to the North Dakota border, including the Marias, Musselshell, and Milk rivers; the Montana headwaters of the St. Mary River in the Saskatchewan-Nelson basin
- **Yellowstone** – all waters of the Yellowstone River within Montana; the Little Missouri watershed in southeast Montana

2.2 DESCRIPTION OF SURFACE WATERS

The stream and lake size estimates used in this report come from the National Hydrography Dataset (NHD). Total length of streams, ditches, and canals are calculated from all linear waters in NHD. Due to the substantial variation in estimates of lake number and size between various NHD dataset editions, the total lake area for the state is based on named waters of at least 5 acres (**Table 2-1**).

Because NHD was developed primarily using U.S. Geological Survey (USGS) topographical maps produced throughout many decades, the detail and accuracy varies across the state. The consistency and accuracy of most perennial streams and lakes is considered good; however, the changing environment produces some inherent difficulties in designating intermittent and perennial streams. In addition, channel changes that occur in intermittent and perennial streams cannot be captured in NHD in a timely manner. Because of these potential sources of error, and in order to report these numbers as accurately as possible with the available data, the summary of state waters reported in Montana's 2014 Integrated Report are given in the nearest 100 miles for streams.

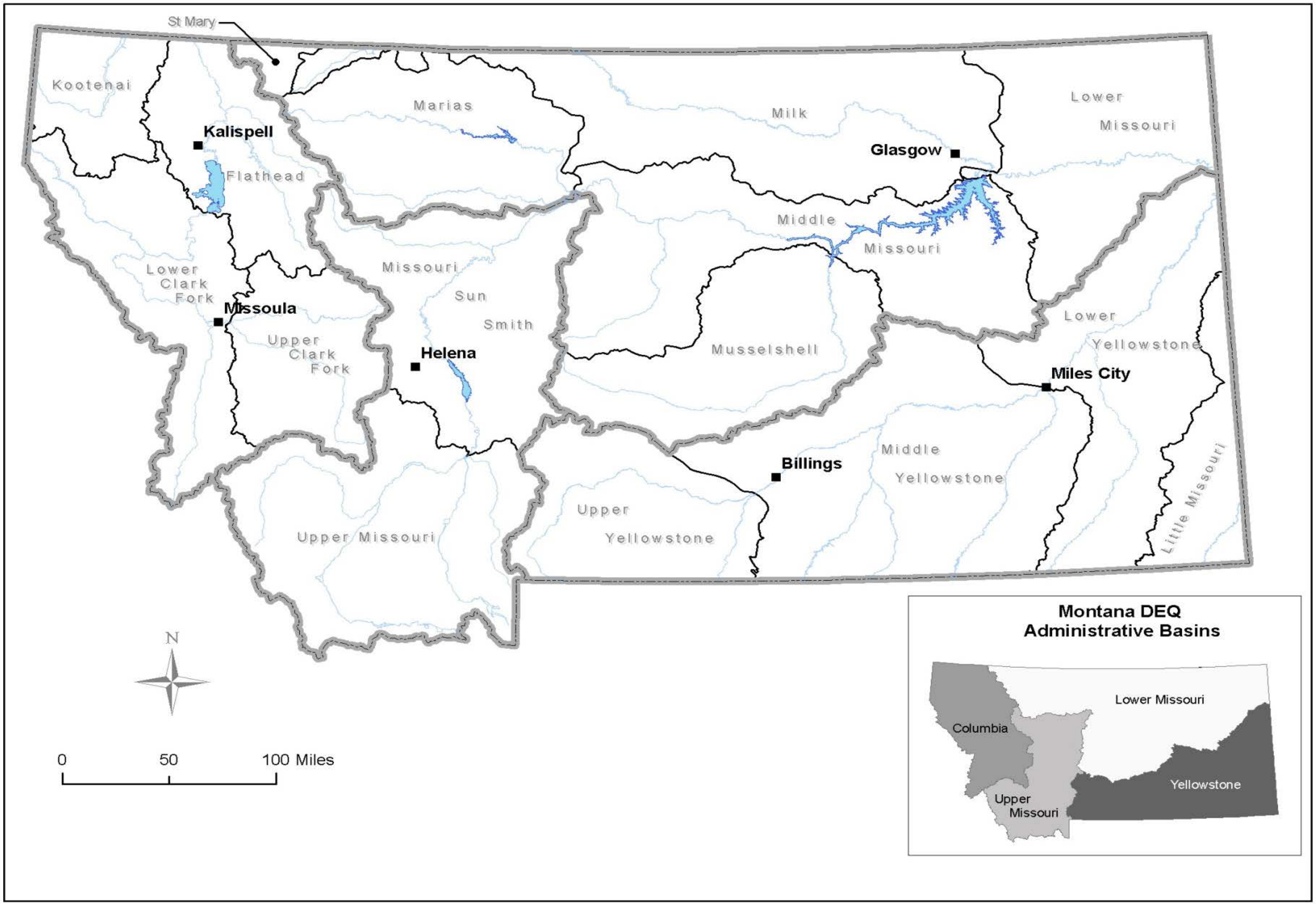

Figure 2-1. Montana's Sub-Major Basins and Montana DEQ Administrative Basins

In 2010, Montana's Assessment Units (AUs) were migrated to the High Resolution NHD, which is based on a more sophisticated data model than previous years. Flow lines in the High Resolution NHD show greater detail in waterbody channels, capturing more twists, turns, and meanders of the streams and canals, thus making the High Resolution NHD more suitable for viewing at a scale of 1:24,000. **Table 2-1** lists the size or area of surface waters based on the High Resolution NHD.

Table 2-1. Montana Surface Waters Based on High Resolution (1:24,000) NHD (Feb. 2011 version)

River Basins	Perennial Streams (Miles)	Intermittent & Ephemeral Streams (Miles)	Ditches & Canals (Miles)	Lakes & Reservoirs* (Acres)
Columbia	18,723	30,007	1,826	232,336
Upper Missouri	15,626	38,048	3,899	95,725
Lower Missouri	10,793	142,408	3,968	347,034
Yellowstone	10,441	96,545	3,474	24,534
Montana Total	**55,583**	**307,008**	**13,167**	**699,629**

*Named waters ≥ 5 acres. Size estimates of all waters derived by DEQ from 1:24,000-scale NHD.

2.2.1 Streams

Streams belong to one of three general categories based on their flow characteristics and relative position of their streambed to the local shallow groundwater table.

1. Ephemeral streams are always above the local shallow groundwater and flow only in response to snowmelt or rainfall. They are dry most of the year and are typically found in the semi-arid and mountain headwater regions of Montana.
2. Intermittent streams are below the local shallow groundwater table during part of the year and flow in response to groundwater recharge and precipitation. Most of the stream miles in Montana are small ephemeral or intermittent streams.
3. Perennial streams are always below the local shallow groundwater table and typically flow on the surface throughout the year.

A stream-ordering technique, like that described by Strahler (1957), categorizes stream reaches by the relative drainage density of the contributing watershed. First-order streams do not have tributaries and are commonly ephemeral or intermittent. Stream orders change at the confluence of two like-order streams (e.g., a second-order stream begins at the confluence of two first-order streams; a third-order stream begins at the confluence of two second-order streams, and so on).

2.2.2 Lakes

All lakes and reservoirs are part of the state's water resources, but most of the assessment emphasis has been focused on significant publicly-owned lakes, which have public access and recreation potential. Unfortunately, NHD does not identify lake ownership, therefore, in this report only named perennial lakes ≥ 5 acres are considered significant publicly-owned lakes.

This subset of the total lake acreage may contain private reservoirs or may exclude some small alpine or pothole lakes on public lands. Until resources are available to undertake a statewide lakes ownership survey, DEQ will identify significant, publicly-owned lakes for section 305(b) reporting as described above.

2.2.3 Waters Under State Jurisdiction and Management

Montana's water quality management program does not have authority over all of the waters described in **Table 2-1**. The U.S. Environmental Protection Agency (EPA) or tribal governments with "treatment as a state" designation for their water quality program are responsible for assessing the condition of waters located within officially recognized tribal reservations. Rivers or lakes that define a reservation boundary (i.e., the state and tribe share the river or lake bottom) are considered within the state's water program authority. In addition, the state has defined a few assessment units within national parks and wilderness areas but, with a few exceptions, is not actively assessing the conditions of these waters. Thus, **Table 2-2** presents a clearer picture of the waters that encompass the primary focus of the state's water quality management program.

Table 2-2. State Waters Exclusive of Tribal Lands, National Parks, and Wilderness Areas

River Basins	Perennial Streams (Miles)	Intermittent & Ephemeral Streams (Miles)	Ditches & Canals (Miles)	Lakes & Reservoirs* (Acres)
Columbia	14,411	23,827	955	138,983
Upper Missouri	14,419	37,169	3,896	95,102
Lower Missouri	9,116	126,815	3,311	315,917
Yellowstone	8,025	84,578	3,224	14,984
Montana Total	**45,971**	**272,389**	**11,386**	**564,986**

*Named waters ≥ 5 acres. Size estimates of all waters derived by DEQ from 1:24,000-scale NHD.

To calculate the total area of waters the state manages, DEQ combined the boundaries of national parks, wilderness areas, and reservations into one set of areas to be excluded. For the best quality, DEQ used 1:24,000-resolution data that represented the actual boundaries of these excluded areas.

3.0 Water Pollution Control Programs

EPA has delegated authority to DEQ to implement several Clean Water Act (CWA) programs in Montana. Collectively, these programs help achieve CWA's broad goal of being fishable and swimmable, i.e., attaining water quality standards. **Section 3** provides an overview of the status of these programs, which include water quality standards, point and nonpoint source controls, the Water Pollution Control State Revolving Fund, Total Maximum Daily Loads (TMDLs), and a cost-benefit analysis of program implementation.

3.1 Water Quality Standards

Water quality standards are a set of pre-established goals for a particular waterbody, or portion thereof, which define: (1) designated uses a waterbody is expected to support, (2) the criteria necessary to protect those uses, and (3) provisions that prevent degradation of quality. States adopt water quality standards to protect public health and welfare, enhance quality, and to comply with CWA.

3.1.1 Standards Review and Rulemaking Process

DEQ reviews Montana's water quality standards continually and updates or modifies existing standards as needed. State law provides authority to DEQ and the Board of Environmental Review (BER) to adopt standards into the Administrative Rules of Montana (ARM). This rule-making process involves the Water Pollution Control Advisory Council (WPCAC), the governor's office, EPA, and the public. Below are the steps in the rule-making process:

1. DEQ develops and drafts a rule proposal, which is reviewed by senior management for agency priority.
2. If the rule is a priority, WPCAC reviews the proposal, which could include discussions with stakeholders to resolve issues. Rule language or concept is part of WPCAC official records (minutes) posted on the Web.
3. Following completion of a satisfactory rule proposal, the governor's office reviews proposals that could be controversial.
4. The draft is modified as necessary and sent back to WPCAC to review at least 30 days before the proposal is published in the Montana Administrative Register (MAR) by the secretary of state.
5. DEQ presents proposal to BER; if approved, the proposed rule is published in MAR within 14 days. The date that it appears in MAR is the proposal's official publication date, beginning a 6-month deadline for final adoption by BER.
6. A public hearing is set for 30 days after publication in MAR. For 3 consecutive weeks a legal ad runs in major newspapers, informing the public of the proposed rule.
7. After the public hearing, DEQ responds to comments and makes necessary changes. DEQ submits a draft response to the comments, including any changes, to BER, who chooses to adopt, not adopt, or adopt with modifications.
8. DEQ completes the final rule and sends it to the secretary of state.
9. Final notice for the rule adoption is published in MAR; DEQ notifies interested parties and enters the final rule on the website.
10. When the secretary of state publishes it in MAR, the new rule takes effect as state law.
11. When a standard changes, Montana submits the rule to EPA for approval. Following EPA approval, the new standard becomes effective under the federal Clean Water Act.

3.1.2 Montana Surface Water Classification System

Montana's water use classifications summarize beneficial uses assigned to each of the state's surface waters.

3.1.2.1 Beneficial Uses

In the 1950s, Montana classified its waterbodies according to the present and future beneficial uses they should be capable of supporting[1]. Montana's water use classification system identifies the following beneficial uses[2]:

- drinking, culinary, and food processing
- aquatic life support for fishes and associated aquatic life, waterfowl, and furbearers
- bathing, swimming, and recreation
- agricultural water supply
- industrial water supply

3.1.2.1.1 Drinking Water, Culinary, and Food Processing

Human health criteria address toxins and carcinogens. Criteria for carcinogens, such as arsenic, are set to a specific level of increased cancer risk resulting from lifelong exposure through drinking contaminated water and consuming fish from the same waters. For all carcinogens except arsenic, the Montana Legislature has determined the acceptable risk level as 1 case of cancer per 100,000 persons exposed. For arsenic, the acceptable level is 1 cancer case per 1,000 persons exposed[3].

3.1.2.1.2 Aquatic Life

Aquatic life support is a broad term intended to protect fish and other aquatic animals and plants normally associated with a healthy ecosystem. Healthy aquatic life depends on an environment free from harmful levels of chemical pollutants, total dissolved solids, and sediments. Aquatic life is also sensitive to temperature changes and other actions that disrupt the naturally occurring hydrological conditions or biological integrity of the waterbody.

Fish are assessed as either coldwater (salmonid) or warmwater (non-salmonid). Mountain, foothill, and intermontane streams and lakes typically support coldwater fish such as trout and associated game and nongame fish. Eastern prairie streams, rivers, and lakes typically support warmwater fish. These naturally warm waters have higher suspended sediment and total dissolved solids than cold waters. Typically, warm waters support a wide variety of non-salmonid game and nongame fish.

3.1.2.1.3 Recreation

Recreation includes primary and secondary contact recreation. Swimming and wading are examples of primary contact recreation, while boating is a secondary contact recreation. Noxious algae growth and *E. Coli* bacteria can both have a negative effect on the recreational use of waterbodies.

[1] 75-5-301, MCA
[2] ARM 17.30.621-629
[3] 75-5-301(2)(a), MCA

3.1.2.1.4 Agriculture and Industry

Generally, if a waterbody supports drinking water, culinary and food processing, recreation, and aquatic life beneficial uses, the state assumes it will also support agricultural and industrial uses. However, additional salinity and toxicity information may be required to determine suitability for agricultural use.

3.1.2.2 Surface Water Use Classes

Montana's surface water use classes are based on the designated uses of a waterbody, which in turn are determined by identifying existing and anticipated beneficial uses of that waterbody. The three main use classes are A, B, and C. Primary and secondary recreation, agriculture, and industry are designated uses under each of these classes. Drinking water is a designated use for the A and B classes but is not a designated use of C classes. The classes are then subdivided to address the aquatic life use. A "1" after the letter indicates growth and full propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers. A "2" after the letter indicates growth and marginal propagation of salmonid fishes and associated aquatic life and wildlife. A "3"after the letter indicates growth and propagation of non-salmonid fishes and associated aquatic life and wildlife (**Tables 3-1 and 3-2**).

Table 3-1. Montana Surface Water Classifications

Classification	Description
A-CLOSED	Suitable for drinking, culinary, and food-processing purposes after simple disinfection. To be maintained suitable for swimming, recreation, growth, and propagation of fishes and associated aquatic life, although these uses may be limited to protect drinking water use.
A-1	Suitable for drinking, culinary, and food-processing purposes after conventional treatment to remove naturally present impurities. Must be maintained suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural/industrial water supply.
B-1	Suitable for drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.
B-2	Suitable for drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.
B-3	Suitable for drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.
C-1	Suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.
C-2	Suitable for bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.
C-3	Suitable for bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. Quality is naturally marginal for drinking, culinary, and food-processing purposes; agricultural/industrial water supply.
D-1	Suitable for agricultural purposes and secondary contact recreation.
D-2	Suitable for agricultural purposes and secondary contact recreation. Because of conditions resulting from flow regulation, ditch maintenance, or geomorphologic and riparian habitat conditions, quality is marginally suitable for aquatic life.
E-1	Suitable for agricultural purposes, secondary contact recreation, and wildlife.
E-2	Suitable for agricultural purposes, secondary contact recreation, and wildlife. Because of habitat, low flow, hydrogeomorphic, and other physical conditions, waters are marginally suitable for aquatic life.
E-3	Suitable for agricultural purposes, secondary contact recreation, and wildlife.

Table 3-1. Montana Surface Water Classifications

Classification	Description
E-4	Suitable for aquatic life, agricultural purposes, secondary contact recreation, and wildlife.
E-5	Suitable for agricultural purposes, secondary contact recreation, saline-tolerant aquatic life, and wildlife.
F-1	Suitable for secondary contact recreation, wildlife, and aquatic life (excluding fish).
I	The goal is for these waters to fully support the following uses: drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers; agricultural/industrial water supply.

Table 3-2. Designated Beneficial Uses by Waterbody Class

Beneficial Uses	Water Use Classification							
	A-Closed	A-1	B-1	B-2	B-3	C-1	C-2	C-3
Aquatic Life	X	X	X	X	X	X	X	X
Fishes (salmonid)	X	X	X	X		X	X	
Fishes (non-salmonid)					X			X
Drinking Water (human health)	X	X	X	X	X			M
Recreation	X	X	X	X	X	X	X	X
Agriculture	X	X	X	X	X	X	X	M
Industry	X	X	X	X	X	X	X	M

X = Beneficial Use M= Marginal Use (may exist)

In addition to A, B, and C classes, Montana has created use classes for specific types of waterbodies. D class waters were created for irrigation ditches, and the E classes were created for ephemeral streams. F-1 waterbodies are to be maintained suitable for secondary contact recreation, wildlife, and aquatic life (excluding fish).

Montana also has an I class, which was created for waterbodies of such poor quality that no beneficial uses exist nor are anticipated in the near future. These waters are slated to eventually meet all uses but are not assigned any designated uses. Montana has three I class waters: Silver Bow Creek (Upper Clark Fork Basin), Muddy Creek (Sun River Basin), and Prickly Pear Creek below East Helena (Upper Missouri Basin). These streams now have existing beneficial uses and are under review for reclassification.

3.1.3 Water Quality Criteria

Montana water quality criteria include both numeric and narrative criteria. Each use class defined in ARM 17.30.6 specifies the water quality criteria that must be met for a particular use class.

3.1.3.1 Numeric Criteria—Circular DEQ-7

Numeric criteria define precise, measurable concentrations of pollutants that are allowable in a waterbody. Most of Montana's numeric water quality criteria are found in Circular DEQ-7. These criteria include pollutants categorized as toxic, carcinogenic, radioactive, and harmful; they also include certain nutrients. DEQ's numeric criteria were developed using guidance from EPA, which includes human health advisories, National Recommended Water Quality Criteria, and drinking water criteria (referred to as Maximum Contaminant Levels). Circular DEQ-7 also contains groundwater criteria for pesticides developed in compliance with the Montana Agricultural Chemical Ground Water Protection Act[4].

[4] 80-15-201, MCA

In addition to the numeric criteria included in Circular DEQ-7, Montana also has numeric criteria for electrical conductivity and sodium adsorption ratio for waters in the Rosebud, Tongue, Powder, and Little Powder River basins[5].

3.1.3.2 Narrative Criteria

Most of Montana's water quality criteria are numeric; however, because specifying numeric criteria for all pollutants is difficult, some pollutants have narrative water quality criteria. Narrative criteria are statements that describe the desired water quality goal and may be expressed as allowable ranges and maximums, such as water pH and temperature, or a specific variation from natural conditions, such as water turbidity and color. Natural condition may be determined by reviewing historical data for a waterbody, if available, or by using a reference stream. Montana's narrative criteria are defined in each use class in ARM 17.30.6.

3.1.4 Nondegradation

Montana's nondegradation policy[6] prohibits degradation of high-quality waters, except in limited circumstances, and ensures that all designated beneficial uses are maintained and protected. Degradation of Outstanding Resource Waters is not allowed under any circumstances.

In order to obtain authorization to degrade a state waterbody, point-source dischargers must first submit an application, which is reviewed to determine the significance of their project[7]. Nonsignificance criteria are outlined in ARM 17.30.715, and the criteria that outline surface water significance are summarized below:

- For a carcinogen, any increase in the concentration of the pollutant in the receiving water is considered significant.
- For toxic parameters and nutrients, if a change exceeds the trigger value listed in Circular DEQ-7, the change is significant if it exceeds 15% of the lowest applicable criteria outside the mixing zone.
- For harmful parameters (e.g., temperature, pH), if the existing water quality level is already greater than or equal to 40% of the numeric criteria, any change is significant. If the existing level is less than 40% of the numeric criteria, and the change would be 10% or greater than the applicable criteria, the change is considered significant.
- For parameters with narrative water quality standards, a measurable effect on any existing or anticipated use, or a measurable change in aquatic life or ecological integrity, is significant.
- A mean monthly flow change of 15% or more is significant, as well as a 7-day 10-year low-flow change of 10% or more.

If DEQ determines that a change is nonsignificant, monitoring may be required to determine compliance with water quality criteria. If DEQ determines the activity will create a significant change in water quality, the discharger must submit an application to degrade state waters.

Degradation of state waters is allowed only under the following conditions:

[5] ARM 17.30.670
[6] ARM 17.30.701 *et seq*.
[7] ARM 17.30.706

- There are no economically, environmentally, and technologically feasible alternatives to the proposed activity that would result in no degradation.
- The proposed activity would result in important economic or social development that exceeds the cost of allowing the water quality change.
- The least degrading water quality protection practices feasible will be used.
- All existing and anticipated uses will be protected.

In a preliminary approval DEQ proposes a mixing zone. The preliminary authorization to degrade must go through the public review process, and public comments are considered in developing the final authorization to degrade. This nondegradation process ensures that Montana's surface waters are protected while considering the socioeconomic welfare of Montanans.

3.2 Point Source Control Programs

Montana's discharge permit program for point source wastewater began in 1968. With the passage of the Federal Water Pollution Control Act (FWPCA) amendments of 1972, the National Pollutant Discharge Elimination System (NPDES) program was created. In 1974, Montana applied for and received EPA authorization to administer the national program in Montana. Since 1972, FWPCA has been amended several times, including the 1977 Clean Water Act (CWA) and the 1987 Water Quality Act, which emphasized controlling toxic pollutants, requiring water quality-based effluent limitations in permits, and clarifying the requirements for stormwater discharges in NPDES permits. The 1972 amendments established a series of goals and policies to protect the nation's waterways, including eliminating the discharge of pollutants, which is implemented through the technology-forcing requirements of the CWA.

Under NPDES regulations, DEQ administers the core program, including issuing individual permits, issuing permits for federal facilities and issuing general permits to categories of dischargers. EPA retains primacy over the pretreatment and municipal biosolids control programs in Montana.

Unlike the federal CWA, which focuses on navigable waters, the Montana Water Quality Act (MWQA) defines "state waters" as both surface and groundwater and directs the Board of Environmental Review (BER) to adopt rules governing the issuance of permits for the discharge of sewage, industrial waste, and other wastes into state waters[8]. In 1982, BER adopted rules requiring that any existing source discharging pollutants into state groundwater file a Montana Ground Water Pollution Control System (MWPCS) permit application by October 29, 1983, or stop the discharge. The 1982 rules also adopt water-use classification for groundwater based on natural specific conductance, groundwater standards to protect those uses, and a nondegradation policy to protect high-quality waters.

3.2.1 Montana Pollutant Discharge Elimination System Program

Regulations under both the federal CWA and Montana Pollutant Discharge Elimination System (MPDES) prohibit the discharge of wastes or pollutants from any point source to state waters without a valid permit. The term "point source" includes any discernible, confined, and discrete conveyance from which pollutants are, or may be, discharged[9]. Typical point sources include publicly-owned treatment works, industrial facilities, storm sewer systems, and concentrated animal feeding operations. Return flows from irrigated agriculture and agricultural stormwater runoff are specifically excluded as point sources.

[8] 75-5-401(1), MCA

[9] as defined by ARM 17.30.1304

Under MPDES permits, pollutant discharge is controlled by imposing water quality-based effluent limits (WQBELs) or technology-based effluent limits (TBELs). TBELs establish a minimum level of treatment of pollutants based on the type of pollutant (conventional, toxic, or nonconventional) and a facility's age. New sources are subject to the more stringent new source performance standards including, when feasible a standard prohibiting the discharge of pollutants. All MPDES permits must, at minimum, include TBELs based on the effluent limitation published by EPA (40 CFR Chapter I, Subchapter N) and per the CWA Section 304(b).

MPDES permits must include WQBELs whenever DEQ determines that the discharge will cause or contribute to levels above any numeric or narrative water quality standard after applying TBELs. WQBELs are based on specific standards in ARM, including Circular DEQ-7 and the general provisions of ARM 17.30.635–646, whenever streamflows equal or exceed the 7-day 10-year flow of the receiving water[10]. When toxicity cannot be controlled or reduced via chemical-specific effluent limits, MPDES permits also enact the narrative prohibitions requiring state water to be "free from" substances that cause chronic or acute toxicity by including whole effluent toxicity testing.

A nondegradation policy in MWQA requires maintaining water quality to protect existing uses of state waters[11] . DEQ may authorize degradation of state water only when it finds that degradation is necessary and will result in important economic or social development and all existing and anticipated (designated) uses are protected. This nondegradation policy is found in the Nondegradation Rules adopted by the BER[12]. These rules apply to all new or increased sources of pollution.

Permits issued to new sources[13] are based on the level of protection given in ARM 17.30.705, which incorporates the three tiers, or levels, of protection identified in federal guidance:

Tier I – Existing and anticipated uses of all state water must be protected.
Tier II – Existing water quality must be maintained for all water considered high quality, unless expressly authorized by DEQ under ARM 17.30.708 or determined to be non-significant under the criteria of ARM 17.30.715.
Tier III – Degradation is prohibited in waters considered an outstanding natural resource.

WQBELs in permits issued to new sources may be based on the criteria of ARM 17.30.715. If the facility's discharge is within these limits, it is considered non-significant and the facility is in compliance with the nondegradation policy and regulations.

MPDES permits also provide a regulatory process for implementing a wasteload allocation (WLA) that has been developed for a point source as part of the TMDL for a watershed or specific waterbody. MPDES permits may be reopened to incorporate the WLA at any time, or the WLA may be incorporated in the next 5-year permit renewal process. In the absence of an approved TMDL for existing discharges into a water quality limited segment, DEQ imposes effluent limitations that prohibit further decline in water quality[14].

[10] ARM 17.30.620–631 and 670
[11] 75-5-303, MCA
[12] ARM 17.30.701 *et seq.*
[13] as defined in ARM 17.30.702(18)
[14] 75-5-703(10), MCA

The Montana Water Quality Act authorizes the BER to adopt rules implementing a fee to cover DEQ's cost of administering the permit programs (MPDES and GWPCS).

In addition to permits issued to individual dischargers, state and federal regulations authorize DEQ to issue general permits to categories of dischargers that affect waters statewide or within a limited geographic range. General permits must conform to all of the criteria and standards applicable to individual discharges, including TBELs and WQBELs. In addition to these minimum requirements, general permits may contain additional provisions that DEQ determines are necessary to implement MWQA goals.

DEQ has issued general permits for 13 different categories of dischargers, including stormwater systems, concentrated animal feeding operations (CAFOs), concentrated aquatic animal feeding operations, suction dredging operations, minor publicly-owned treatment works, petroleum remediation projects, disinfected water operations, construction dewatering projects, produced water operations, and sand and gravel businesses. Stormwater and CAFO discharges are discussed below.

Stormwater – The following are subject to regulation under the MPDES program:

- discharges composed entirely of stormwater runoff from certain industrial activities
- municipal separate storm sewer systems (MS4)
- construction activities
- activities identified as a "significant source of pollutants" by DEQ
- activities that contribute to a violation of water quality standards

Because of the large number of facilities that fall into the stormwater category, DEQ has developed a number of general permits that cover the regulated activities noted above. State and federal regulations generally authorize using best management practices to control or abate pollution in stormwater. Stormwater permits issued to MS4s must include additional measures, such as management practices, control techniques, and system design and engineering methods, to control pollutants to the maximum extent feasible. Stormwater discharges that cannot comply with the requirements of the applicable general permit must obtain an individual MPDES permit.

CAFO – MWQA defines an animal feeding operation (AFO) as any lot or facility in which animals are stabled, confined, and fed or maintained for a total of 45 days or more during any 12-month period. Additionally, no portion of the facility can be used to sustain crops, forage growth, or post-harvest residues during the normal growing season. The following are subject to regulation under the MPDES program:

- AFOs that meet the criteria for a large CAFO, based on the number of animals that are stabled or confined
- AFOs that meet the criteria for a medium CAFO, based on the number of animals and either (a) discharge pollutants through a constructed ditch or similar device or (b) discharge pollutants directly into a state water that originates outside the facility' boundaries

CAFOs are subject to the specific guidelines for federal effluent limits published by EPA (40 CFR 412) and the general requirements of 40 CFR 122.23, which are incorporated into state regulations[15].

[15] ARM 17.30.1330

These CAFOs are required to contain animal wastes and process wastewater on site. The general permit requires these facilities to develop and implement a nutrient management plan that describes how animal wastes will be land-applied at agronomic rates. Facilities must also keep records and submit an annual report as well as provide immediate notification of any discharge.

3.2.2 Montana Ground Water Pollution Control System (MGWPCS) Program

The Board of Environmental Review has adopted rules governing the discharge of wastes into groundwater and established a permit program and water quality standards[16]. The rules define a "source" as any point source or disposal system, including a waste-holding pond, which under normal operating conditions may reasonably be expected to discharge pollutants into groundwater. The water-use classifications and groundwater standards provide a basis for limiting the discharge of pollutants into groundwater[17] . Groundwater standards in Circular DEQ-7 have been established to protect human health and include a nondegradation criteria based on DEQ's nondegradation policy and rules.

Groundwater is classified according to its actual quality and use as of October 1982. Groundwater is broken into four classes: I, II, III, and IV (**Table 3-3**).

The standards recognize the following beneficial uses of Classes I and II groundwater:

- public and private water supply
- culinary and food processing
- irrigation
- livestock and wildlife
- commercial and industrial processes

Classes III and IV groundwater have limited uses because of their naturally high specific conductance. However, discharges to Class III groundwater must comply with human health standards published in Circular DEQ-7, where the specific conductance is less than 7,000 µS/cm.

Table 3-3. Montana Groundwater Classifications

Classification	Description
I	Groundwater has a specific conductance less than 1,000 µS/cm at 25°C and is suitable for public and private water supplies, food processing, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes with little or no treatment required.
II	Groundwater has a specific conductance range of 1,000 to 2,500 µS/cm at 25°C. Public and private water supplies may use Class II groundwater where better quality water is unavailable. The primary uses are irrigation, stock water, and industrial purposes.
III	Groundwater has a specific conductance range of 2,500 to 15,000 µS/cm at 25°C. Its primary use is for stock water and industrial purposes. It is marginally suitable for some salt-tolerant crops.
IV	Groundwater has a specific conductance greater than 15,000 µS/cm at 25°C and is used primarily for industrial purposes.

To avoid duplication, the rule and statute provide for numerous exemptions from the requirement to obtain a groundwater discharge permit; however, sources that are exempt from the permit requirement

[16] ARM 17.30.1001 et seq., the Montana Groundwater Pollution Control System
[17] ARM 17.30.1006

must comply with all applicable water quality standards, including the nondegradation requirements in ARM 17.30.7.

The groundwater rules do not mandate minimum treatment requirements nor do they implement limitations on technology-based effluent. The level of treatment or pollutant control is based on compliance with the applicable water quality standards, including nondegradation, after dilution with a DEQ-approved mixing zone.

3.3 Nonpoint Source Pollution Control Program

The 2014 Integrated Report identifies state waters that need additional actions to control nonpoint sources of pollution (the state's list of impaired waters). Additionally, all state waters benefit from best management practices (BMPs) and programs to control nonpoint sources of water pollution.

Nonpoint source (NPS) pollution, unlike pollution from sewage treatment plants and industrial facilities, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries natural and manmade pollutants into lakes, rivers, wetlands, and groundwater. Nonpoint sources include grazing, logging, farming, mining, land development, and many other activities. In Montana, the majority of water quality problems result from NPS pollution.

Montana's 2012 Integrated Report identified the top *causes* of water quality impairment as sedimentation, alterations to stream and lakeside habitat and physical substrate, nutrients (phosphorus and nitrogen), and metals (lead, copper, arsenic, and cadmium); the top (verified) *sources* of impairment result from riparian or shoreline grazing, irrigated crop production, forest and other roads, flow alterations, abandoned mines (including mine tailings), forestry activities, channelization, and natural sources.

The following is a description of the primary categories of NPS pollution in Montana and the state's processes and programs for reducing the level of pollution from these sources.

3.3.1 Agriculture: Livestock and Crop Production

Ranches and farms cover two-thirds of the state—more than 60 million acres. Approximately 65% is rangeland and pasture and 30% is cropland (U.S. Department of Agriculture, 2011). Agriculture is one of Montana's leading industries, generating 4% of the gross domestic product for the state in 2008 (U.S Department of Commerce, Bureau of Economic Analysis, 2011) and more than $3.5 billion in 2011—$2.1 billion in crops and $1.4 billion in livestock and poultry (USDA, National Agricultural Statistics Service, 2009).

In 2007, harvested cropland covered 9,163,867 acres; irrigated acres comprised 22% (2,013,167 acres) of the total harvested cropland. In 2011, Montana's livestock inventory included 2,500,000 cattle and calves, 225,000 sheep and lambs, 180,000 hogs and pigs, 545,000 ducks and chickens, and 14,000 milk cows (Montana Department of Agriculture and U.S. Department of Agriculture, National Agricultural Statistics Service, 2012).

Pollutants from agricultural nonpoint sources include sediment, nutrients, salinity, temperature, bacteria, and pesticides. Pollution not requiring TMDL development but still impairing beneficial uses includes loss of habitat, flow alteration, and channelization (Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau, 2012).

Montana's agriculture NPS pollution control strategies include

- improving communication on NPS pollution issues among Montana's agricultural community
- facilitating activities to reduce NPS pollution
- evaluating NPS pollution reduction efforts and activities

As a framework for controlling negative water quality effects from agricultural NPS, DEQ adopted "Agricultural BMPs for Control of Nonpoint Source Pollution" based on Montana Conservation Practice Standards from the Natural Resources Conservation Service Field Office Technical Guide (Natural Resources Conservation Service, 2007; Montana Department of Environmental Quality, 2005). Numerous federal and state agencies and programs provide technical assistance and financial incentives to implement these BMPs. Montana has a long history of cooperative programs among various natural resource agencies and many partnerships to address and integrate agricultural NPS pollution issues.

In addition to advocating for agriculture BMPs, DEQ's TMDL Program allocates pollutant load reductions using a watershed approach wherever NPS pollutants impair the beneficial uses of a waterbody. A watershed approach: (a) targets priority water quality problems, (b) promotes stakeholder involvement, (c) integrates solutions to include the expertise and authority of multiple agencies and private experts, and (d) evaluates the implementation of load reductions through monitoring and data analysis. The Water Quality Improvement Plans developed through TMDL planning include an implementation strategy that identifies critical actions necessary to fully restore beneficial uses.

3.3.2 Forestry (Silviculture)

As with farms and ranches, forests cover a large portion of the state. Nearly a quarter of Montana's land area is forested (25.6 million acres). Sales from Montana forest products in 2010 were $325 million, down from 2004 at $1.3 billion. Montana's 2010 timber harvest was 321 million board feet, less than half the 2004 timber harvest of 785 million board feet. In 2010, 54% of the harvest was supplied by private lands, 24% came from national forest lands, and the remaining 22% from other ownerships, including state, Bureau of Land Management, and tribal lands (Menlove et al., 2012).

Montana's forests are also the headwaters for many rivers and streams. These provide some of the West's best fishing as well as water for agriculture, recreation, drinking, and many other uses. Forestry activities, however, can impair beneficial uses such as aquatic life because of increases or changes in sediment, nutrients, temperature, or habitat conditions. Activities such as road building, soil disturbance, and harvest unit management may generate pollutants or harm water quality and aquatic or riparian habitats. The 2012 Integrated Report lists forest roads as the third largest contributing source of confirmed impairments across all assessment units. Timber harvesting is also listed as a confirmed contributing source of impairment.

Montana has specific control programs for reducing NPS pollution resulting from forestry and forestry-related activities. Montana's NPS pollution goal for forestry and forestry-related activities is to reduce the negative effects on water quality associated with forest practices and forest roads and achieve water quality standards. Montana's water quality protection program for forestry and forestry-related activities relies on a combination of regulatory and voluntary approaches.

The 1989 Montana Legislature passed a law to provide forestry BMP information to private forest owners and operators to help protect water quality. This law requires private forest owners to provide the Forestry Division of the Department of Natural Resources and Conservation (DNRC) with their plans before they begin harvesting timber. Since 1989, a BMP Work Group has been reviewing and revising the original BMPs and providing statewide BMP audits on federal, state, and private forestry projects. Montana also has a Streamside Management Law[18], established in 1991, which provides regulatory standards for forest practices in riparian areas.

When developing TMDLs and Water Quality Improvement Plans, DEQ develops allocations for all significant NPS forestry-generated sources of pollution. The Water Quality Improvement Plans also provide implementation and monitoring strategies to encourage restoration of beneficial uses and to track progress toward the load reductions identified in those plans.

3.3.3 Transportation

Montana's transportation system contributes to NPS pollution through contaminated runoff from roads and bridges, atmospheric deposition of nitrogen oxides, floodplain and river channel encroachment, accidental spills, road application of winter traction materials, and construction activities. Sediment, nutrients, dissolved solids, metals, and oil and grease are all NPS pollutants of concern generated by the transportation system. Additionally, physical habitat loss and degradation is associated with the actual location and protection (e.g., levees, riprap) of the transportation system.

Montana's NPS Program focuses on mitigating past transportation-related impairments and reducing future impairments. DEQ collaborates with the Montana Department of Transportation and other appropriate agencies and entities to mitigate and minimize water quality degradation resulting from the state's transportation system. The entities include the US Forest Service, Bureau of Land Management, counties, and railroads. DEQ also coordinates with other regulatory entities, such as the Army Corps of Engineers, Conservation Districts, the US Fish and Wildlife Service, and the Montana Department of Fish, Wildlife & Parks.

Permits for stormwater, Section 404 (aquatic disturbance), and Section 401 (standards certification) for transportation projects are reviewed to ensure that appropriate decisions to "avoid, minimize, and mitigate" are made and that adequate attention is given to BMPs. Through the TMDL planning process DEQ also evaluates transportation system waterbody–pollutant specific concerns to address significant causes of impairment.

3.3.4 Urban and Suburban Pollution

Montana's NPS Program recognizes several sub-categories of diffuse urban and suburban pollution. Under this broad category we have found the following to be useful subcategories: stormwater runoff, alteration of urban and suburban riparian and wetland areas, construction, and residential waste disposal.

3.3.4.1 Stormwater Runoff

Stormwater runoff from urban and industrial areas is a significant source of pollutants such as oil and grease, pesticides, fertilizers, bacteria, and metals (e.g., lead, copper, zinc). In Montana, the NPS

[18] 77-5-307, MCA

pollution effects from stormwater runoff are relatively localized because the number and scale of urban areas is limited. Point-source discharge permits for municipal storm sewer systems are currently required for seven urban areas in Montana: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, and Missoula. Additionally, portions of Cascade, Yellowstone, and Missoula counties; the University of Montana; Montana State University; Malmstrom Air Force Base; and the Montana Department of Transportation (within the designated urban areas that require permits) hold discharge permits requiring six minimum measures. These measures address public education and outreach, public involvement, illicit discharge detection and elimination, construction site runoff controls, post-construction stormwater management, and pollution prevention.

Montana's NPS Program uses TMDL development and Water Quality Improvement Plans to address stormwater concerns. DEQ also encourages and supports local information and education campaigns to reduce the amount of pollutants that homeowners contribute to stormwater.

3.3.4.2 Construction

New home and development construction activities by their very nature disturb the soil and increase the likelihood of erosion. In turn, erosion can increase sediment and nutrient loads to surface waters. Habitat alteration from construction activities (e.g., changing or removing riparian vegetation) can also have significant negative effects upon aquatic life and water quality.

MPDES general discharge permits require contractors to protect water quality from construction activities that disturb more than 1 acre. DEQ provides information and educational materials regarding how construction activities can harm water resources and what efforts and requirements contractors and private citizens can, or must, take to minimize the effects of construction activity.

3.3.4.3 Residential Waste Disposal

Approximately 331,000 Montanans contribute waste to an estimated 124,000 household sewage disposal systems (i.e., on-site septic systems).[19] A well-constructed and maintained septic system in suitable soils does a good job of treating household wastes; however, poorly designed or neglected systems may be sources of excess nutrients and pathogens. Additionally, standard septic systems in many Montana locations do not effectively remove nitrate from wastewater and therefore contribute to high concentrations of nitrate in groundwater. In some areas, septic systems are a significant water quality concern. Landfills, particularly unlined facilities, also pose a threat to surface water and groundwater quality. Harmful and toxic substances can leach into the aquifer or surface waters. Pollutants from land disposal include nutrients, pathogens, pharmaceutical compounds, and personal care products (National Association of Clean Water Agencies, 2005).

DEQ maintains a solid waste disposal program that has regulatory authority to protect water quality from facilities such as landfills and underground storage tanks. The NPS Program addresses the effects of land disposal on a watershed basis. DEQ's NPS Program has funded several water quality protection districts and the activities of watershed groups to address individual sewage disposal problems in the Helena, Bitterroot, Missoula, Flathead Lake, and Gallatin/Big Sky areas. DEQ assists local watershed groups in identifying appropriate BMPs where individual sewage disposal systems have been identified as a water quality concern. DEQ also develops source water protection plans for communities

[19] Estimation based on a state population of 989,415 individuals (2010 Census), of which approximately 658,000 use community sewer systems. For estimation purposes, the state assumes an average of 2.5 persons per household septic system.

throughout the state that have site-specific source water concerns, such as land disposal contaminant issues, and identifies BMPs that can be implemented to address those issues. In 2009, the Montana Legislature enacted a law that bans the retail sale of household cleaning products containing high phosphate levels in areas of the state that exceed surface water phosphorus standards.

3.3.4.4 Alteration of Urban and Suburban Riparian and Wetland Areas

When complex riparian systems are simplified or reduced by changing the vegetation, soils, and/or water-flow patterns, their ability to filter pollutants is greatly diminished. Riparian and wetland areas that have been converted to lawns or small acreage pastures for domestic livestock suffer from higher levels of nutrients, sediment, and bacteria. This can also lead to nuisance or toxic algae blooms, elevated water temperatures, greater channel erosion, and greater damage to property from flooding.

3.3.5 Mining and Contaminated Sediments

Active mines are regulated with federal and state permits, including point-source discharge permits. To obtain a permit, mine operators have to post a bond covering liability for cleanup and restoration. Abandoned and inactive mines, however, are significant sources of pollution in many of Montana's watersheds. Elevated metals concentrations in water and sediment are the most typical cause of NPS pollution associated with mining. Metals can harm aquatic life and impair water for drinking.

DEQ's Mine Waste Cleanup Bureau (MWCB) has designated 300 priority mine sites (Montana Department of Environmental Quality, Remediation Division, 2010). MWCB's activities focus on two primary site types: (1) inactive mine sites addressed under the Surface Mine Reclamation and Coal Act and (2) mining-related sites addressed under the federal Comprehensive Environmental Responsibility, Compensation, and Liability Act (Superfund sites).

Montana has addressed many long-abandoned mine and mill sites; to date 283 projects have been completed. As of 2011, DEQ's Abandoned Mine Program has 13 active reclamation projects located in various parts of the state.

DEQ's program for controlling NPS pollution from mining include mitigating damage from past mining activities and protecting water quality from new mining developments. DEQ's TMDL staff collaborates with MWCB to develop TMDLs and water quality improvement plans for affected watersheds. DEQ and MWCB also coordinate reviewing draft point-source permits for new mines to assure that permits are consistent with the water protection goals of both programs.

3.3.5.1 Contaminated Sediments from Industrial Activities

Metals and long-lived organic pollutants from past mining-related activities, fuel spills, rail yards, wood treatment plants, and other industrial sources often accumulate in streambeds and lake sediments. These pollutants may be directly toxic to aquatic life and humans, or they may be concentrated in tissues of fish and animals that feed on fish or aquatic life. Through this process, known as bioaccumulation, pollutant concentrations can reach levels that are harmful to wildlife and humans.

DEQ's Nonpoint Source Program addresses contaminated sediments on a watershed, or waterbody, basis. Each source of contamination presents its own set of challenges. Removing and disposing of contaminated sediments is often expensive and creates risks and potentially other water quality effects, such as dispersal downstream. As appropriate, the NPS Program relies on resources from DEQ's Remediation Division, as well as other state and federal agencies, to address clean up needs.

3.3.6 Hydrologic Modification

Hydrologic modification (i.e., the alteration of streamflow through human activities) includes channel straightening, widening, deepening, or clearing as well as relocating existing stream channels. Natural hydrology is most often modified by the construction and operation of dams, weirs, and water diversions for irrigation and stock watering; by the installation of undersized culverts; by the building of transportation protection embankments (e.g., rip-rap); or by the construction of off-channel water features such as fishing ponds. Hydrologic modification can affect water temperature, sediment transport, dissolved oxygen, instream flows, and streambank stability. Temperature and flow changes may limit aquatic life and recreational uses.

DEQ's program for controlling NPS pollution from hydrologic modification includes (a) reducing the effects of existing modifications that occur from changes in operations, (b) removing structures that are no longer useful, (c) improving designs for water diversion and conveyance facilities, and (d) reviewing and commenting on proposed new hydrologic modifications to minimize the effects on beneficial uses. Several state and federal laws regulate or otherwise address some of these effects, such as the Montana Stream Protection Act, the Montana Floodplain and Floodway Act, the Montana Natural Streambed and Land Preservation Act, the Montana Water Use Act (defines water rights and appropriations), Section 404 of the federal Clean Water Act, and the doctrine of Federal Reserved Water Rights.

Additionally, DEQ's NPS group focuses on the following:

- Including representatives of hydroelectric interests on local watershed advisory committees.
- Working with local watershed groups to develop implementation goals and objectives and identify appropriate BMPs for flow-related impairments.
- Reviewing permit applications, environmental impact statements, and other relevant documents for compliance with state water quality laws and standards.
- Encouraging approaches that cause the least harm when hydrological modifications are in the public interest.
- Assessing the need for additional BMPs for hydrologic modifications.

3.3.7 Recreation

More than 80% of all Montana residents engage in outdoor recreational activities, 60% of which are water-based (Schweitzer and Montana Department of Fish, Wildlife and Parks, 2008). In addition, tourism brings many recreational visitors to Montana who also enjoy and use the state's aquatic resources. The major water quality NPS pollution concerns associated with recreational activities include increased sediment yield (from roads and trails, and shoreline and streambank trampling); loss of habitat (associated with streambank and bottom disturbance); inappropriate waste disposal; and spills or discharges of gasoline, oil, and other petroleum products. A growing concern is the proliferation of aquatic nuisance species, which can be unknowingly and widely distributed by recreationists (e.g., boaters and fishers).

Montana has identified educational outreach programs as an appropriate strategy for addressing the effects of NPS pollution from recreational activities.

3.3.8 Atmospheric Deposition and Climate Change

The 2012 303(d) List identified atmospheric deposition as a probable source of impairment for three large lakes and reservoirs in Montana: Flathead Lake, Fort Peck Reservoir, and Holter Lake. These lakes total more than 376,500 surface acres. Pollutants attributed to atmospheric deposition include nitrogen, mercury, and chemicals (e.g., PCBs).

Atmospheric deposition and climate change are issues that do not fit within the watershed approach because the sources are generally from outside the affected watershed or waterbody. The challenges with atmospheric deposition and climate change require significant coordination and resources at the state, regional, national, and international level.

The NPS Program's goal is to develop a more complete understanding of the effects of atmospheric deposition and climate change on water quality and recommend appropriate public policies. The Program achieves this goal using a multi-pronged strategy:

- To characterize and quantify contributions of atmospheric deposition to pollution loads as part of source assessments for TMDL planning.
- To work with DEQ's Air Quality Monitoring Section to characterize and describe atmospheric deposition on impaired waterbodies.
- To reduce other load sources of the pollutant to meet TMDL targets in watersheds where atmospheric deposition is a significant source of a pollutant and the specific sources cannot be identified or otherwise included in the plan.
- To report the water quality effects of atmospheric deposition to the Board of Environmental Review, the Environmental Quality Council, EPA, and Montana's Congressional delegation.
- To increase public awareness about the effects and potential threats of atmospheric deposition and climate change on water quality via information and educational activities.

3.4 Water Pollution Control State Revolving Fund

The Water Pollution Control State Revolving Fund program was established in the 1987 amendments to CWA, which gave EPA the authority to make capitalization grants to states. The grants, along with state matching funds, provide financial assistance for constructing water pollution control projects.

Under Title 75, Chapter 5, Part 11, Montana Code Annotated (MCA), the 1989 Montana State Legislature passed the enabling legislation titled "Wastewater Treatment Revolving Fund Act," giving authority to DEQ and DNRC to adopt administrative rules for implementing the program. Legislation also granted these departments with the ability to generate state matching funds through the sale of State General Obligation Bonds. In 1991, 1995, 1997, 1999, 2001, and 2003, the Montana Legislature passed amendments to the Wastewater Treatment Revolving Fund Act. The 1997 amendments changed the title of the act from the Wastewater Treatment Revolving Fund Act to the Water Pollution Control State Revolving Fund (WPCSRF) and added NPS projects to the eligible project definition.

The long-term goal of WPCSRF is to maintain, restore, and enhance the chemical, physical, and biological integrity of Montana's waters for the benefit of the overall environment and the protection of public health, while maintaining a long-term, self-sustaining program.

Each year, the WPCSRF program prepares an Intended Use Plan and Project Priority List. Projects are ranked by priority using several criteria:

- the effects on water quality resulting from the current project situation
- the likelihood of improving water quality (restoring designated uses) after implementing the proposed project
- the pollution prevention efforts of the project sponsor
- the sponsor's readiness to proceed

The result is a relatively realistic priority list of eligible point- and nonpoint source projects to fund.

WPCSRF has an estimated funding capacity of around $12 million per year for the next several years, assuming a consistent federal capitalization effort. To date, the supply of funds exceeds demand; therefore, the program funds all potential projects. Since the program's inception in 1989, it has predominately funded municipal wastewater treatment and collection projects, totaling about $315 million, although other funded projects have included agricultural BMPs, landfills, and stormwater projects, totaling about $52 million.

Using CWA funds established under Section 106, WPCSRF also provides technical assistance to municipal wastewater treatment facilities in Montana. This includes operation and maintenance inspections as well as comprehensive performance evaluations to optimize the facilities' treatment performances. WPCSRF also funds training for wastewater operators and technical assistance to engineers and the public in wastewater treatment.

3.5 Drinking Water State Revolving Fund

With the passage of HB493 in 1995, the Montana Legislature created the Drinking Water State Revolving Fund (DWSRF) loan program. The program offers loans with at- or below-market interest rates to eligible Montana entities wishing to improve the infrastructure of public drinking water facilities. DWSRF also funds other activities related to public health and compliance with the federal Safe Drinking Water Act. Other activities, or set-asides, include administering the DWSRF program; offering technical, financial, and managerial assistance to small communities; supporting source-water protection activities; and certifying operators and assisting them in administering activities in the Public Water Supply Program.

In 1997, HB483 amended the program to make Montana law consistent with the Safe Drinking Water Act, which was amended in 1996. This codified legislation[20] authorizes DEQ and the Department of Natural Resources and Conservation (DNRC) to develop and implement the DWSRF program, which is similar to the Water Pollution Control State Revolving Fund program.

The legislation also established the DWSRF Advisory Committee, comprising one state legislative representative, one state senator, one representative of the Montana League of Cities and Towns, one county commissioner representing the Montana Association of Counties, one DNRC representative, and one DEQ representative. The Committee advises DEQ and DNRC on policy decisions in developing and implementing DWSRF and reviews the program's Intended Use Plan.

[20] 75-6-201 et seq., MCA

EPA approved Montana's DWSRF, which was awarded its first capitalization grant on June 30, 1998 (federal FY 1997). Capitalization grants for federal FY 1998–FY 2013 have also been awarded, and DEQ will likely apply for at least portions of the federal FY 2014 grant later in state FY 2014. The individual capitalization grants and corresponding state match for the fiscal years covered in this report are listed in **Table 3-4**.

Table 3-4. Summary of Drinking Water State Revolving Fund Grants from 2011 to 2012

Federal FY	Federal Grant	State Match
2011	$9,418,000	$1,883,600
2012	$8,975,000	$1,795,000
TOTAL	**$18,393,000**	**$3,678,600**

As the primary agency responsible for implementing the Safe Drinking Water Act, DEQ is also responsible for overseeing the DWSRF program. DEQ's role is largely to provide technical expertise, while DNRC administers the financial aspect, including overseeing loans and the sale of state general obligation bonds. Most of the funds are derived from capitalization grants through EPA, and Montana provides the required 20% matching funds by issuing state general obligation bonds. Interest collected from the loans pays for the general obligation bonds; thus, no state general funds are used to operate the DWSRF program. The repaid principal goes back into the DWSRF loan fund and is also used to pay for future projects. Although the federal capitalization grants were authorized only through federal FY 2004, Congress continues to fund the program. Both federal and state law require DWSRF to be operated in perpetuity.

The 1996 amendments to Safe Drinking Water Act require states to prepare an annual Intended Use Plan for each capitalization grant application. This central component of the capitalization grant application describes how the state will use the DWSRF to meet the act's objectives and protect public health. The Intended Use Plan contains the following elements:

- short- and long-term program goals
- list of priority projects, including description and size of community
- criteria and method used for distributing funds
- description of the financial status of DWSRF program
- amounts of funds transferred between DWSRF and the Wastewater State Revolving Fund
- description of the set-aside activities and percentage of funds that will be used from the DWSRF capitalization grant, including administrative expenses allowance, Public Water Supply Program support, technical assistance, etc.
- description of how the DWSRF program defines a disadvantaged system and the amount of DWSRF funds that will be used for this type of loan assistance

3.5.1 Criteria and Method Used for Distribution of Funds

Projects that address acute risks that pose an immediate threat to public health, such as inadequately treated surface water, are given high scores. Proposals that address lower-risk public health threats, such as chemical contaminants present at low levels, are ranked slightly lower. Proposals addressing existing or future regulatory requirements before noncompliance occurs are also given credit and are ranked lower than projects that address significant health risks.

One of the ranking criteria is the financial effects of the proposed project on water system users. The communities most in need of low-interest loans to fund the project are awarded points under the affordability criterion (Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Drinking Water State Revolving Fund, 2007).

In addition to the limitations on financing for individual projects, DEQ is required annually to use at least 15% of all funds credited to the DWSRF account to provide loans to systems serving fewer than 10,000 people to the extent there are a sufficient number of eligible projects to fund.

3.5.2 Anticipated Funding List

DEQ applied for and was awarded a capitalization grant for federal FY 2013. We anticipate applying for the federal FY 2014 grant later in state FY 2014. **Table 3-5** lists projects that DEQ anticipates funding through the DWSRF program using federal FY 2013 and previous capitalization grants in conjunction with the 20% state match. The list represents projects most likely to proceed, starting from the highest-ranked projects on the comprehensive priority list (Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Drinking Water State Revolving Fund, 2011). Projects that qualify as meeting “green criteria” (i.e., environmentally friendly) are indicated with a “G” beside the proposed project cost. Unless otherwise noted, the expected loan terms are 3% interest over 20 years. If other projects are ready to proceed before those on the list, the projects that are ultimately funded may vary because of the high variability in project schedules, needs, and other funding sources.

Table 3-5. Drinking Water State Revolving Fund Projects Identified for Funding

Priority Rank	Project Name	Population	Project Information	DWSRF Cost
5	South Wind W&SD	225	Make water system improvements. Funding is expected to include federal monies.	**$750,000**
7	Beaverhead-Jackson W&SD	36	Construct arsenic treatment facilities, build new storage, and improve distribution system. Funding is expected to include federal monies.	**$865,000**
13	City of Helena	28,190	Improve backwash water treatment at the Ten Mile water treatment plant. Funding is expected to include federal monies.	**$1,300,000**
14	Dry Prairie Regional Water System	27,829	Next phase of improvements to distribution system. Funding is expected to include federal monies.	**$1,400,000**
17	North Central Regional Water System	16,652	Begin construction of extensive distribution system. Total project cost: approx. $218 million; expected total SRF portion approx. $7,720,000. Funding is expected to include federal monies.	**$500,000**
30	Bozeman	37,280	Continue next phase of new water treatment plant and system improvements. Funding is expected to include only state monies.	**$9,552,000**
36	Elk Meadows W&SD	175	Improve distribution system. Funding is expected to include federal monies.	**$300,000(G)**
40	Dutton	316	Replace transmission main and improve storage. Funding is expected to include federal monies.	**$310,000**
45	Great Falls	58,505	Engineer design of water treatment plant improvements. Funding is expected to include federal monies.	**$3,000,000**

Table 3-5. Drinking Water State Revolving Fund Projects Identified for Funding

Priority Rank	Project Name	Population	Project Information	DWSRF Cost
65	Libby	2,628	Provide interim financing to improve distribution system. Funding is expected to include only state monies.	**$2,500,000(G)**
72	Cascade	685	Improve distribution system. Funding is expected to include federal monies.	**$735,000(G)**
85	Belt	603	Build new storage reservoir. Funding is expected to include federal monies.	**$500,000**
86	Fairfield	659	Improve pump control and make distribution system improvements. Funding is expected to include federal monies.	**$570,000**
92	Polson	4,488	Improve distribution system. Funding is expected to include federal monies.	**$750,000(G)**
102	Town of Nashua	296	Improve distribution system. Funding is expected to include federal monies.	**$150,000(G)**
105	Bigfork Co. W&SD	1,200	Improve source and transmission main. Funding is expected to include federal monies.	**$3,000,000**
107	City of Billings	100,148	Build new water storage reservoir. Funding is expected to include federal monies.	**$4,400,000**
115	Ryegate	245	Build new water storage reservoir. Funding is expected to consist of state monies.	**$430,000**
117	Three Forks	1,869	Rehabilitate town's 2 water storage tanks, install 6,200 linear ft. of water main, replace 300 water meters with radio read units, and upgrade the SCADA system. Funding is expected to consist of only state funds.	**$1,200,000**
126	Broadview	192	Improve water system. Funding is expected to consist of federal monies.	**$100,000**
128	Town of Bainville	153	Refinance existing debt in conjunction with joining Dry Prairie Regional Water System (priority 14 above). Funding is expected to consist of state monies.	**$326,000**
131	Town of Froid	195	Refinance existing debt in conjunction with joining Dry Prairie Regional Water System (priority 14 above). Funding is expected to consist of state monies.	**$326,000**
135	Town of Medicine Lake	269	Refinance existing debt, in conjunction with joining Dry Prairie Regional Water System (priority 14 above). Funding is expected to consist of state monies.	**$250,000**
	Project Total			**$33,108,000**

*(G) identifies the project as "Green" Approximate Green Project Total: $4,435,000

3.6 Total Maximum Daily Load Program (TMDL)

A Total Maximum Daily Load (TMDL) is the maximum amount of a pollutant a waterbody can receive from all combined sources and still meet water quality standards. DEQ develops TMDLs for impaired or threatened waterbodies.

Montana code defines an impaired waterbody as "a water body or stream segment for which sufficient credible data shows that the water body or stream segment is failing to achieve compliance with applicable water quality standards"[21]. A threatened waterbody is defined as "a water body or stream segment for which sufficient credible data and calculated increases in loads show that the water body or stream segment is fully supporting its designated uses but threatened for a particular designated use because of (a) proposed sources that are not subject to pollution prevention or control actions required by a discharge permit, the nondegradation provisions, or reasonable land, soil, and water conservation practices; or (b) documented adverse pollution trends"[22].

3.6.1 TMDL Regulatory Requirements

Montana law[23] directs DEQ to develop TMDLs for impaired or threatened waterbodies. Section 303(d) of the federal Clean Water Act also requires TMDL development for these same waterbodies.

DEQ develops TMDLs for waterbodies impaired or threatened by a pollutant, such as sediment or copper. Because a waterbody can be impaired or threatened from multiple pollutants, an individual waterbody may require multiple TMDLs. For example, if one stream segment is impaired by sediment, copper, and iron, that segment has three waterbody–pollutant combinations that must be addressed via TMDL development.

If impairment includes at least one pollutant for which a TMDL has yet to be developed, the impaired waterbody is reported in Category 5 of Montana's waterbody assessment reporting system. Specifically, the 303(d) list includes the waterbody–pollutant combinations that require TMDL development and that are reported in Category 5. Waterbodies impaired <u>only</u> by non-pollutant causes (e.g., alterations in wetland habitats or physical substrate habitat alterations) are reported in Category 4C.

3.6.2 TMDL Development and Implementation

A technical—and sometimes complex—process, TMDL development includes the following components:

- Determining measurable target values to help evaluate the waterbody's condition in relation to the applicable water quality standards.
- Quantifying the magnitude of pollutant contributions from their sources.
- Determining the TMDL based on the allowable loading limit.
- Allocating the total allowable load (TMDL) into individual loads for each source or source-type aggregate.

In Montana, restoration strategies and monitoring recommendations are also incorporated into TMDL documents to help implement TMDLs.

Basically, developing a TMDL for an impaired waterbody is a problem-solving exercise. The problem is excess pollutant loading that impairs or threatens a designated use. The pollutants can enter a waterbody from both nonpoint sources (e.g., unchanneled sediment runoff or nutrient runoff from agriculture) or through point sources (e.g., pipes and other distinct conveyances). The solution is to identify the total acceptable pollutant load—the TMDL—identify all the significant pollutant-

[21] 75-5-103(14), MCA
[22] 75-5-103(36), MCA
[23] 75-5-703, MCA

contributing sources, and identify where pollutant-loading reductions could be applied to achieve the acceptable load.

TMDLs are not self-executing and often function as information tools. Individual allocations for point sources (referred to as wasteload allocations) are implemented via discharge permits distributed through the Montana Pollutant Discharge Elimination System (MPDES). Allocations for nonpoint sources (referred to as load allocations) are predominately implemented via voluntary actions by landowners and interested citizens who volunteer their time and efforts.

3.6.3 TMDL Program Overview

DEQ believes that water quality restoration and protection is best addressed through integrated efforts within a defined geographic area. Thus, DEQ uses a watershed-based approach to develop multiple TMDLs as one project, where the project area usually corresponds to a pre-defined TMDL Planning Area (TPA), although a TMDL project area sometimes includes multiple TPAs and/or portions of TPAs as a way to increase efficiency. TPAs generally follow USGS Hydrologic Unit Code 4th field (HUC4) boundaries. In a few cases TPAs are subsets within a HUC4, while in other cases TPAs include multiple HUC4 units. Additionally, the Clark Fork, Missouri, and Yellowstone rivers each form their own large river TPA.

Within a project area, TMDLs are developed for each waterbody impaired by the same pollutant category (e.g., metals or nutrients) independent of when a waterbody is first put on the 303(d) list. This approach, referred to as “list neutral,” allows for greater efficiency and also results in a better understanding of impairment causes across the watershed. In addition, it allows for a better understanding of the contributing sources upon which TMDL allocations will be based. Thus, TMDL development supports watershed restoration planning that will wholly and expeditiously improve water quality throughout the watershed.

TMDL documentation generally takes 2 to 5 years to complete for each watershed, depending on the complexity of the system and available data and resources. Each document usually includes multiple TMDLs that address multiple waterbodies in a project area. After TMDL documents are reviewed by stakeholders and the public, they are submitted to EPA for approval. Sometimes the TMDL document will also address non-pollutant causes of impairment via water quality restoration recommendations that often include the same restoration activities needed to satisfy one or more TMDLs contained within the document. Thus, DEQ can identify and recommend improvements to address all impairment causes within a watershed.

During the 2014 reporting cycle a total of 438 TMDLs on 124 waterbodies were approved by EPA. Of these TMDLs a total of 307 addressed pollutants that were included on the 2012 303(d) List (**Table 4-5**).

3.6.4 TMDL Prioritization Process

To rank TMDL development by priority, several factors are considered, with the primary focus being completion of TMDLs in high priority watersheds or TPAs. **Appendix B** includes the TMDL development priority for all waterbody–pollutant combinations on the 303(d) list. The highest priority is assigned to waterbody–pollutant combinations in watersheds with TMDLs scheduled for completion by 2014. Medium priority is assigned to waterbody–pollutant combinations where TMDL development will begin before 2014 and be completed after 2014. All other waterbody–pollutant combinations are low priority.

The selection of high and medium priority watersheds for TMDL development is based on a combination of the factors bulleted below. The result is a significant focus on completing TMDLs within watersheds in Montana's Columbia and Upper Missouri basins.

- **Stakeholder Interest.** TMDL development has historically focused on areas of significant stakeholder interest. There is benefit to completing TMDLs in areas where stakeholders will use the TMDL and water quality restoration planning process to help guide and assist with locally-led water quality implementation activities.
- **Significant New Pollutant Sources.** Many areas have water quality problems or concerns linked to significant population growth. Other new pollutant sources can arise from proposed industrial or energy development activities, such as coalbed methane development. Addressing these concerns through a water quality planning process, such as a TMDL, makes this an important criterion for prioritizing TMDL development.
- **Linkage to MPDES Discharge Permits.** Pollutant levels within an MPDES permit area account for a portion of the TMDL allocation. Therefore, developing a TMDL at a watershed scale is sometimes a critical component in determining appropriate permit requirements. This is particularly true when new permits are proposed or permits are being renewed. This criterion is often linked to the Significant New Pollutant Sources criterion above.
- **Information and Data Availability.** Work is often focused in areas where existing knowledge can help TMDL development and data is readily obtained by access to the waterbody. Existing knowledge includes available reference data, knowledge of aquatic resource and pollutant effects, source loading data, and data about existing conditions and capabilities. Waters that support coldwater fishes typically have more information and available data.
- **Existing Resource Commitments.** Watersheds where significant efforts have already been made to protect the resource and restore water quality tend to take a higher priority. Thus, DEQ can take advantage of the existing information, knowledge, and resource commitments that apply to TMDL development. This is often the case for TMDL development in bull trout watersheds in the Columbia basin, where numerous multi-agency recovery efforts are underway. The priority approach also applies to watersheds where significant efforts are underway to clean up metals problems from mine wastes (e.g., in Landusky and the Judith Mountains).
- **Recreational, Economic, and Aesthetic Considerations.** Watersheds with high recreational, economic, and/or aesthetic value tend to receive higher priority. Economic interests often include protecting important recreational fisheries but can also include protecting water quality for irrigation.
- **Protection and Restoration of Native Fish.** Protection of native fish is an important TMDL development consideration, particularly because aquatic life is a commonly impaired beneficial use, with impairment linked to coldwater or warmwater fish. The high priority watersheds tend to include important native bull trout and/or native cutthroat trout habitat.
- **Legal Requirements.** A recent amended judgment to a TMDL lawsuit originally filed in 1999 requires TMDL development for specific waterbody–pollutant combinations from Montana's 2010 303(d) List by the end of calendar year 2014. The selection of the TMDLs to satisfy the amended judgment was significantly influenced by the above priority factors, with additional weight toward completing all TMDLs within watersheds containing bull trout habitat.

3.7 Cost-Benefit Assessment

Section 305(b) of the federal CWA requires states to "report on the economic and social benefits of actions necessary to achieve the objective of the CWA" (U.S. Environmental Protection Agency, 1997).

Several state, federal, and private entities implement water quality improvements in Montana. Details regarding the expense of these efforts are complex and not readily available for preparing a comprehensive cost-benefit assessment. Furthermore, most benefits are non-monetary and are, thus, hard to calculate.

The following provides a summary of the program costs and benefits associated primarily with DEQ's point-source and nonpoint source (NPS) efforts to achieve CWA objectives. Costs are estimated for state fiscal years 2011 (July 1, 2010 – June 30, 2011) and 2012 (July 1, 2011 – June 30, 2012). Because of how DEQ collects data, benefits are estimated for calendar years 2011 and 2012.

3.7.1 Point Source Program Costs[24]

In fiscal years 2011 and 2012, approximately $94.8 million total was spent in Montana to address point-source pollution, which averages about $47.4 million per year. Most of this was spent on capital improvements of municipal wastewater treatment and collection systems; the remainder was spent on permitting and compliance. This estimate includes money spent by all funding agencies in the state and all major federal programs. In both fiscal years, one of the major federal infrastructure funding programs, USDA–Rural Development, used their American Reinvestment and Recovery Act (ARRA) funds, so the amount spent in this biennium was skewed high, just as it was in the previous biennium. The average amount spent in FY 2009 and FY 2010 was approximately $40 million per year, again in part from an influx of ARRA funds.

The $94.8 million for FY 2011 and FY 2012 included about $45 million from the Water Pollution Control State Revolving Fund (WPCSRF); other state and federal programs funded the remainder. Capitalization grants from EPA (CWA Title VI Federal funds) for WPCSRF, along with state matching funds and recycled loan payments, provide financial assistance for water pollution control projects that target mostly point sources. In addition, WPCSRF provides training for wastewater operators and technical assistance (using CWA Section 106 funds) to operators, engineers, and the public in wastewater treatment.

Since 1991, WPCSRF has funded predominately municipal wastewater treatment and collection projects, totaling about $315 million. This averages about $14 million per year since 1991; again, this figure is somewhat skewed from the recent ARRA influx. WPCSRF funding has generally made up one-half to three-quarters of the total public funding for addressing point-source issues in Montana. If the federal capitalization grant funding remains consistent, WPCSRF will have an estimated funding capacity of around $12 million per year for the next several years, well down from the current biennium.

Other state and federal wastewater infrastructure funding sources contributed about $21.8 million per year in FY 2011 and FY 2012.

The other major portion of point-source expenditures consists of the DEQ discharge permitting and compliance program which supports 29 full-time employees. On average, implementing programs costs about $3.1 million per year and includes MPDES, MGWPCS, CWA's Section 401 certification program, and other state authority permitting. Annually, funding sources include approximately $2.3 million from the regulated community in fees, $400,000 from the EPA Performance Partnership Grant (106), $60,000 from Montana's general fund grant match money, and the remainder through competitive grants. Annually, $47.4 million was spent on point-source costs in Montana during each of the past 2 fiscal years

[24] Paul LaVigne, Montana DEQ, personal communication, 2013

(**Table 3-6**): $22.5 million from WPCSRF, $21.8 million in infrastructure from other sources, and $3.1 million from permitting and compliance. [25]

3.7.2 Nonpoint Source Program Costs[26]

Most of DEQ's Nonpoint Source (NPS) Program budget comes from EPA under CWA Section 319 grant funds. These annual funds pay for 60% of NPS projects in Montana as well as for DEQ's NPS-related program costs. EPA requires a non-federal match of 40% for the grant. The Section319 grants come in two awards: Base or Program funding (staffing and support) and Incremental or Project funding.

In FY 2011, DEQ awarded $1,093,500 to 17 watershed restoration, groundwater, and education projects throughout Montana. In FY 2012, DEQ awarded approximately $903,224 to eight watershed projects, two groundwater projects, and six information and education projects. The annual amount of Section 319 funds that went to planning, restoration, groundwater, and education projects averaged $1 million over FY 2011 and FY 2012. To compare, the average annual amount of Section 319 funds spent in Montana from 1995 to 2007 was about $1.5 million.

As previously stated, EPA requires a non-federal match of 40% for the Section 319 grant program. Usually the match is met by project sponsors through in-kind services, project property owner contributions, and often other state agency grant awards (usually through Department of Natural Resources and Conservation; and Fish, Wildlife & Parks awards). For FY 2011, project sponsors committed about $870,000 in matching funds and in-kind services. For FY 2012, project sponsors committed to providing about $848,700 in non-federal matching funds.

For FY 2011 and FY 2012, Montana's NPS Program project costs, including EPA funding and committed local matches, totaled $3.4 million, or about $1.7 million per year.[27]

In addition to the monies above, for FY 2011 and FY 2012, EPA has awarded DEQ about $1.14 million annually to fund internal program staff and support NPS activities in Montana. When the 40% match requirement is added to this figure (the staffing and support match is derived from the state's general fund), the average total amount spent on internal staffing and support for the NPS Program is $1.9 million per year. Internal department activities supported by Section 319 grants include water quality monitoring and assessment, quality assurance and quality control, data and information management, water quality and watershed modeling, water quality planning and TMDL development, NPS Program development and support, and conditioning permits under the state's CWA 401 authority.

In summary, funding for DEQ's NPS Program over the past 2 years has been about $3.6 million per year. Of this, about half supports internal activities and half goes to competitively funded activities through grant awards to address nonpoint source pollution. Over the past 7 years there has been a general decreasing trend in Section 319 funding and EPA's Montana appropriation. From a high point in Section 319 funding in 2003 of $3.08 million, Section 319 funds to DEQ have been cut in FY 2012 to $2.07 million, or approximately a 34% decrease in 10 years ($100,000 per year).

[25] Paul Skubinna, Montana DEQ, personal communication, 2013
[26] Robert Ray, Montana DEQ, personal communication, 2013
[27] Historically, Section 319 grants were largely awarded to watershed restoration projects rather than TMDL planning projects (Rung, 2007). Recently (2004 – 2012), TMDL planning funding and restoration and education project funding levels were similar. As DEQ works to complete TMDL plans, funding is expected to again shift more toward restoration projects.

In addition to NPS monies so far discussed, since 1996, WPCSRF has also funded NPS projects, including agricultural best management practices, landfills, and stormwater projects. WPCSRF funds for NPS projects averaged approximately $1.9 million per year during FY 2011 and FY 2012. This is substantially down from FY 2009 and FY 2010, which were partially supported by ARRA funds. This amount is beyond the $22.5 million annual average for WPCSRF-funded point-source control projects during the same time period. This leads to a total of $5.5 million spent per year in Montana on nonpoint source pollution (**Table 3-6**).

3.7.3 Other Costs of Protecting Water Quality in Montana[28]

Funding for the Montana Wetland Program is based on federal Wetland Program Development Grants (WPDGs) matched by some general fund money but mostly by monies from the Montana Clean Water State Revolving Fund. Montana must compete for the federal grants with other EPA Region 8 states, tribes, and local governments; thus, grants are becoming harder to obtain each year.

The DEQ Wetland Program, which supports two Full-time employees, costs about $215,000 per year; about $75,000 comes from the Montana Clean Water State Revolving Fund and $25,000 comes from the state's general fund. The remaining costs (about $115,000) have been funded by federal WPDGs. In Montana FY 2012, DEQ received a 2-year WPDG from EPA Region 8 for $200,000, which DEQ will use to support five wetland program development projects.

The federal Safe Drinking Water Act requires the state to conduct source water assessments for new drinking water sources at public water systems. The assessments, conducted by DEQ's Source Water Protection Program, identify point and nonpoint sources of contamination to groundwater. DEQ decides whether to approve proposed development sites based, in part, on these assessments. While this effort helps keep drinking water sources free of contaminants, it does not eliminate contaminant sources. DEQ reviews between 45 and 80 new public drinking water sources per year and requires 0.3 FTE from the Source Water Protection Program at a cost of about $31,400 per year.

3.7.4 Summary of Montana's Clean Water Costs

The average annual cost for Montana's point- and nonpoint source pollution programs from all funding sources, plus wetland and drinking water protection, was approximately $53 million in FY 2011 and FY 2012 (**Table 3-6**). This figure, however, does not include enforcement, permitting, or public drinking water programs, which are quite small expenses compared with the $53 million figure. The $53 million cost is more than double that from FY 2006 and FY 2007 ($23.3 million), mostly because of the one-time injection of ARRA funds into point-source efforts.

Table 3-6. Summary of Average Annual Costs for CWA Programs in Montana (FY 2011 and FY 2012)

Activity	Total (millions of dollars)
NPS Control Programs	**$5.5**
NPS staffing and support	$1.9 ($1.14 +$ 0.76 matching)
NPS restoration, planning, outreach	$1.70
WPCSRF NPS funds	$1.90
Point Source Control Programs (including discharge and permitting/compliance)	**$47.40**
WPCSRF funds	$22.50

[28] Joe Meek, Montana DEQ, personal communication, 2013

Table 3-6. Summary of Average Annual Costs for CWA Programs in Montana (FY 2011 and FY 2012)

Activity	Total (millions of dollars)
Other state and federal funding programs	$21.80
Permitting and compliance	$ 3.10
Other Costs	
Wetlands	$ 0.20
Safe Drinking Water Act	$ 0.03
TOTAL	**$53.10**

3.7.5 Benefits of Complying with CWA in Montana

While the benefits of clean water and a healthy environment may be challenging to quantify in pure economic numbers, their derived benefits and importance to all plants and animals (including humans) cannot be understated. Indeed, several aspects of water quality management programs are simply designed to prevent the deterioration of current conditions (e.g., by preserving water quality standards and controlling point sources of pollutants). Without water quality management, however, the benefits of aesthetics, recreational activities (fishing/swimming), and drinking water supplies, to name a few, would be diminished or lost.

Though DEQ can quantify the many dollars that are spent to maintain the status quo (i.e., existing water quality benefits), putting a dollar amount on aesthetics, recreational opportunities, and benefits to plants and animals is more difficult. Further, many benefits of maintaining water quality indirectly benefit people in ways that are hard to see, such as sustaining natural nutrient cycles, which can benefit ecosystems, sustain wildlife, and reduce drinking water treatment costs.

In general, the benefits of maintaining and improving the quality of Montana's waters and wetlands include the following:

- Preserving or improving the quality and monetary value of Montana's water-related recreational activities, such as fishing, commercial and non-commercial boating, swimming, whitewater rafting and kayaking, river floating, and birding/wildlife viewing. This applies to both in-state and out-of-state recreationists.
- Protecting industrial, commercial, and municipal uses, thereby reducing or eliminating the cost of treatment for protecting human health.
- Protecting agriculture, including keeping irrigation ditches free from nuisance algae and keeping range animals healthy.
- Maintaining property values for homes, businesses, and land where clean water is a major attribute of that value.
- Protecting aquatic wildlife and its associated ecological value, including riparian and wetland species. Regarding state species of concern, 25% of mammals rely on riparian forests or wetlands; 41% of birds rely on wetlands, riparian forest, or streams/rivers/lakes; and 44% of reptiles and 100% of amphibians rely on streams, lakes, rivers, or wetlands for essential habitat (Montana Natural Heritage Program and Montana Fish, Wildlife and Parks, 2009). In addition, 87% of species federally listed as endangered or threatened, or candidates for listing in Montana, rely on wetlands or riparian areas for a critical aspect of their life cycle.[29] Several fish species are federally listed as endangered or threatened, or as a state species of concern.

[29] Of the 82 documented odonates (dragonfly and damselfly species) in Montana, 7 are species of special concern and 27 are potential species of conservation concern; 71% and 85%, respectively, are wetland obligates.

- Protecting aquatic and terrestrial habitats (including natural functions such as nutrient cycling) that require high-quality waters; this may include riparian vegetation. Two of Montana's three federally-listed threatened plants are wetland obligates, meaning they cannot exist without wetland habitats.
- Protecting water for downstream states. As a headwater state, Montana plays a crucial role in preserving or improving the quality of water for states downstream of Montana.
- Maintaining jobs and incomes from water quality efforts beyond what would otherwise exist without these efforts, including consultants, contractors, field crews, and retailers of equipment and supplies.

3.7.5.1 Point Source Program Benefits[30]

The long-term goal (and benefit) of the Water Pollution Control State Revolving Fund (WPCSRF) is to maintain, restore, and enhance the chemical, physical, and biological integrity of the state's waters for the benefit of the overall environment and the protection of public health, while maintaining a long-term, self-sustaining program. With CWA Section 106 funds, the WPCSRF program also provides technical assistance to municipal wastewater treatment facilities in Montana. This assistance includes training, operation, and maintenance inspections and comprehensive performance evaluations to optimize the treatment performance of these facilities.

As an example, in 2012 several operators from various treatment facilities in Montana attended free specialized training funded by WPCSRF. The purpose of the training was to teach how to optimize wastewater treatment without any capital expenditures. As a result, three operators (from Manhattan, Chinook, and Conrad) were able to cut their effluent nitrogen concentrations roughly in half through education and operational changes only. The improved effluent quality remains consistent to date.

The beneficial economic effects of Montana's WPCSRF program on water quality and public health in calendar years 2011 and 2012 were:

- improved quality of various state waters by upgrading, expanding, or replacing six inadequate secondary treatment systems that empty into state waters
- improved water quality and reduced operating expenses of 13 municipal wastewater projects by reducing infiltration and inflow in the collection systems and replacing leaky pipes to prevent stormwater runoff or groundwater from entering the system
- reduced nutrient and other pollutant loading to state waters by funding 17 projects involving advanced treatment processes, such as nutrient removal and disinfection
- protected water quality by funding approximately 28 NPS projects, helping state waters maintain or improve their capacity for designated uses

3.7.5.2 Nonpoint Source Program Benefits

The goal (or benefit) of the state's NPS Program is to manage and reduce nonpoint source pollutants so that waterbodies support their designated beneficial uses. When waterbodies are impaired, the goal is to reduce NPS pollution to a level that allows full support of beneficial uses. During calendar years 2011 and 2012, DEQ activities targeting NPS-related issues included: (1) developing and maintaining the state's water quality standards, (2) monitoring water quality and assessing the attainment of standards,

[30] Paul LaVigne, Montana DEQ, personal communication, 2011

(3) developing and implementing water quality improvement plans containing TMDLs, (4) improving data management and reporting tools, and (5) managing the Section 319 grant program.

Highlights:

- Completed water quality improvement plans (including 328 TMDLs) for seven TMDL Planning Areas:
  - Missouri, Cascade, Belt (metals)
  - Bitterroot (sediment, temperature)
  - Tobacco (sediment)
  - Landusky (metals)
  - Beaverhead (sediment)
  - Flint (metals, sediment)
  - Boulder-Elkhorn (metals)
- Supported development of 22 watershed-based plans (Watershed Restoration Plans, or WRPs). To date DEQ has accepted 11 WRPs.
- Provided $1,962,000 for nonpoint source pollution projects: $1,424,000 for local watershed restoration projects, $275,000 for groundwater projects, and $263,000 for education and outreach projects to 33 conservation districts, watershed groups, and other project sponsors. Benefits from restoration projects include
  - estimated reduction of 4,445 tons of sediment per year from new projects in 2011 and 2012 in streams impaired by sediment
  - estimated reduction of 4,429 pounds of nitrogen per year from new projects in 2011 and 2012 in streams impaired by high nutrient concentrations
  - estimated reduction of 2,712 pounds of phosphorus per year from new projects initiated in 2011 and 2012 in streams impaired by high nutrient concentrations
- Demonstrated and documented improvements in water quality in three waterbody segments (East, West, and mainstem of Swift Creek) through forestry and road BMP implementation.
- Continued development of numeric nutrient standards and implementation strategies.
- Continued development of Montana's Water Quality Assessment, Reporting & Documentation system.
- Completed TMDL implementation evaluations in four watersheds.
- Updated and received EPA approval of Montana's 2012 Nonpoint Source Management Plan.
- Reported on the status of water quality in Montana and provided an updated list of impaired waters in the 2012 Water Quality Integrated Report.

3.7.5.3 Source Water Protection Benefits

Source water protection can help communities avoid costs related to contamination, including the costs of

- treating and/or remediating
- finding and developing new water supplies and/or providing emergency replacement water
- abandoning a drinking water supply because of contamination
- paying for consulting services and staff time
- litigating against responsible parties
- conducting public information campaigns when incidents arouse public and media interest in source water pollution

- meeting the regulations of the Safe Drinking Water Act, such as the Disinfection Byproducts Rule and monitoring requirements
- impairing health

Costs not so easily quantified include
- lost production of individuals and businesses, interruption of fire protection, and loss of economic development opportunities
- lack of community acceptance of treated drinking water

Communities with effective programs to prevent drinking water contamination may enjoy substantial savings in the costs of complying with the federal Safe Drinking Water Act or similar state regulations. For example, water purveyors that minimize algae growth by preventing nutrients from entering water supply reservoirs will have lower costs for treating the water to remove total organic carbon (in compliance with the Disinfection Byproducts Rule). Finally, water suppliers with programs to prevent contamination of drinking water may also be eligible for waivers from some monitoring requirements, thereby reducing monitoring costs.

4.0 Surface Water Monitoring and Assessment

Under authority of Montana's Water Quality Act[31], and as delegated under the federal Clean Water Act[32], DEQ directly monitors the state's surface waters and works with other agencies and organizations to collect water quality data. DEQ conducts assessments of the state's surface water quality and makes determinations about whether waters are supporting their beneficial uses and meeting water quality standards.

This section includes the status of Montana's surface waters and related monitoring programs.

4.1 Monitoring and Assessment Program

DEQ is responsible for assuring that Montana's surface water quality is maintained and improved so that state waters can support all their beneficial uses, including drinking water, aquatic life, recreation, agriculture, and industrial uses. To monitor water quality status, data must be collected to characterize the physical, chemical, and/or biological integrity of surface waters. Monitoring supports an identification process that is scientifically informed about water quality, which could spur watershed restoration or protection activities. Montana's water quality standards form the basis for comparing data and making judgments about water quality conditions that are likely to support all beneficial uses.

The following objectives have been established to meet the requirements and goals of DEQ's ambient water quality monitoring and assessment program:

- Determine the water quality status of Montana's waterbodies and whether they exceed water quality standards.
- Identify threatened or impaired waterbodies and the potential causes and sources of impairment.
- Document the status and trends of state waters.

Specifically, DEQ's monitoring and assessment program conducts or assists with:

- collecting and analyzing physical, chemical, and biological data to:
  - assess and document whether state waters are supporting their beneficial uses and meeting water quality standards (WQS)
  - support the development and refinement of water quality standards and water quality models, and the development of TMDLs and watershed plans
  - assess the effectiveness of pollution control and restoration activities
  - assess statewide water quality status and trends
- developing and implementing water quality assessment methods

4.1.1 Purpose of the Monitoring Program

The Monitoring and Assessment Section implements monitoring strategies per its statewide monitoring strategy (Montana Department of Environmental Quality, 2009). The document outlines short-term (5-year) and long-term (10-year) monitoring objectives as well as ongoing monitoring projects.

[31] 75-5-702(1)(2), MCA
[32] 40CFR 130.4(a)

4.1.1.1 Monitoring Goals
The monitoring goals for 2011–2012 were to:

- continue and expand a baseline reference stream monitoring program
- continue beneficial use and standards attainment monitoring and assessment
- support TMDL development and watershed planning
- continue and expand fixed-station monitoring for assessing water quality status and trends
- continue and expand biological monitoring to refine biological indicators
- continue to support the development and refinement of water quality standards
- continue to support a variety of special studies and assessments (e.g., addressing public requests to add or remove waters from the 303(d) list, etc.)

4.1.1.2 Monitoring Objectives and Design
To more effectively meet the program's goals, DEQ initiated a rotating basin approach in 2012 for fixed-station monitoring. DEQ also developed a strategy for using 4th code USGS watersheds as a sampling framework for monitoring and assessing beneficial-use support and standards attainment. DEQ believes that these sampling frameworks will improve monitoring efficiency and maximize limited resources. DEQ will conduct future waterbody assessments using a rotating watershed approach to promote

- scientifically based watershed-wide beneficial-use and water quality standards assessments for guiding TMDL development and watershed planning
- the use of watershed risk assessments
- travel and budget efficiency

DEQ designs each monitoring project to ensure that it meets its objectives. At present, the majority of the monitoring projects use a design approach that focuses on a specific objective or set of objectives. **Section 4.1.3** provides a brief summary of each project.

4.1.2 Coordination and Collaboration
Coordination and collaboration with other entities is essential for implementing Montana's Statewide Water Quality Monitoring and Assessment Strategy. Thus, DEQ develops and maintains partnerships and cooperative agreements with the Bureau of Land Management, U.S. Forest Service, University of Montana, and U.S. Geological Survey. Additionally, DEQ has agreements with several conservation districts, watershed groups, and nonprofit organizations. A brief discussion of these agreements follows in **Sections 4.1.2.1–4.1.2.6**.

4.1.2.1 Bureau of Land Management (BLM)
A new memorandum of understanding (MOU) was established by DEQ and BLM for 2012 to 2017. The MOU consists of five projects to assess the water quality or riparian habitat conditions of stream segments on BLM lands or in watersheds containing significant amounts of BLM-managed lands. The five projects are: 1) to continue supporting the efforts on maintaining reference sites (2012–2017) across the state; 2) to collect data in support of nutrient standards refinement in prairie streams; 3) to assist 303(d) assessments where impairment verification (TMDL support) is combined with targeted assessments on new waters; 4) to collect baseline data where oil and gas development is, or might be, present; and 5) to support the 5-year review on those watersheds where TMDLs have been implemented.

4.1.2.2 United States Forest Service (USFS)

USFS monitors waters within national forest lands. DEQ uses USFS data in water quality assessments and for developing watershed restoration plans and TMDLs.

4.1.2.3 United States Geological Survey (USGS)

Through joint funding agreements, DEQ partners with USGS on several surface water monitoring projects. USGS provides technical staff and equipment to conduct streamflow (discharge) monitoring, water quality monitoring and analysis, data management, and hydrological research and analysis where DEQ does not have the resources to conduct them. DEQ is working with USGS in the Flathead, Powder, Tongue, Yellowstone, and Missouri river basins. USGS data is available to the public online via their National Water Information System at http://waterdata.usgs.gov/nwis.

4.1.2.4 University of Montana (UM)

The Watershed Health Clinic of the Environmental Studies Program at the UM, Missoula, provides support via DEQ contract for the state's reference project **(see section 4.1.3.1)**. Under this contract, graduate students collect field samples and analyze them in UM's laboratory. DEQ provides funds, training, and most of the necessary field equipment for UM field crews.

4.1.2.5 Tri-State Water Quality Council

Because the Tri-State Water Quality Council disbanded in 2012, the Clark Fork River Water Quality Monitoring Committee has assumed the council's monitoring responsibilities. Clark Fork Committee members include Montana DEQ, Idaho DEQ, Avista Utilities, the city of Missoula, and UM.

Montana DEQ has stepped forward to keep banded together the former members of Tri-State who were involved in monitoring within Montana; thus, Clark Fork River nutrient monitoring continues through partnerships. DEQ appreciates the ongoing support from partners.

4.1.2.6 Conservation Districts, Watershed Groups, and Other Nonprofit Organizations

DEQ's partnership agreements vary with conservation districts, local watershed groups, water quality districts, and nonprofit organizations with an interest in water quality issues. Some simply ask to be informed of monitoring events in their area, while others assist with stream access on private lands. Others are fully involved in actual sampling efforts. These partnerships often continue from initial monitoring efforts through TMDL development and implementation projects, which are funded by contracts or grants administered by DEQ.

4.1.3 Monitoring Networks and Projects

DEQ undertook several monitoring projects during 2011–2012, which we present briefly in **Sections 4.1.3.1–4.1.3.5**. Projects included

- monitoring reference sites
- monitoring within rotating watersheds using a risk-based water quality assessment approach
- assessing water quality in TMDL watersheds and waterbodies
- monitoring fixed-station water quality networks
- monitoring targeted oil and gas sites
- monitoring other sites

4.1.3.1 Reference Site Monitoring Project

Montana's narrative water quality standards are based on reference conditions which requires evaluating current conditions compared with a waterbody's reference condition. To begin establishing reference conditions for Montana's waters, DEQ initiated a project in the early 1990s to define the water quality and biological characteristics of minimally disturbed streams, with the focus on wadeable streams. The objectives of the project were to establish a network of reference sites and define reference conditions to guide water quality assessment decisions. DEQ established a network of monitoring locations on sites that resource managers had deemed minimally disturbed by humans (Bahls et al., 1992). Water column and biological samples were collected along with field parameters of water quality. In 2000, DEQ began a second phase of the study, using more refined and rigorous screening methods than previous efforts (Suplee et al., 2005). At present, we have 185 established reference sites across the state. The reference site project directly supports DEQ's interpretation of narrative water quality standards, 303(d) listing decisions, and TMDL development, which requires maintaining an accurate reference site dataset. In 2012, we revisited and sampled 30 of the established reference sites.

4.1.3.2 Rotating Watershed – Water Quality Assessment

DEQ has continued a risk-based water quality assessment approach in the Madison watershed during 2012 and 2013 **(Figure 4-1)**. We conducted sediment, temperature, nutrients, metals, and *E. Coli* monitoring for streams and a reservoir within the watershed that had previously been listed or had an identified risk of contamination.

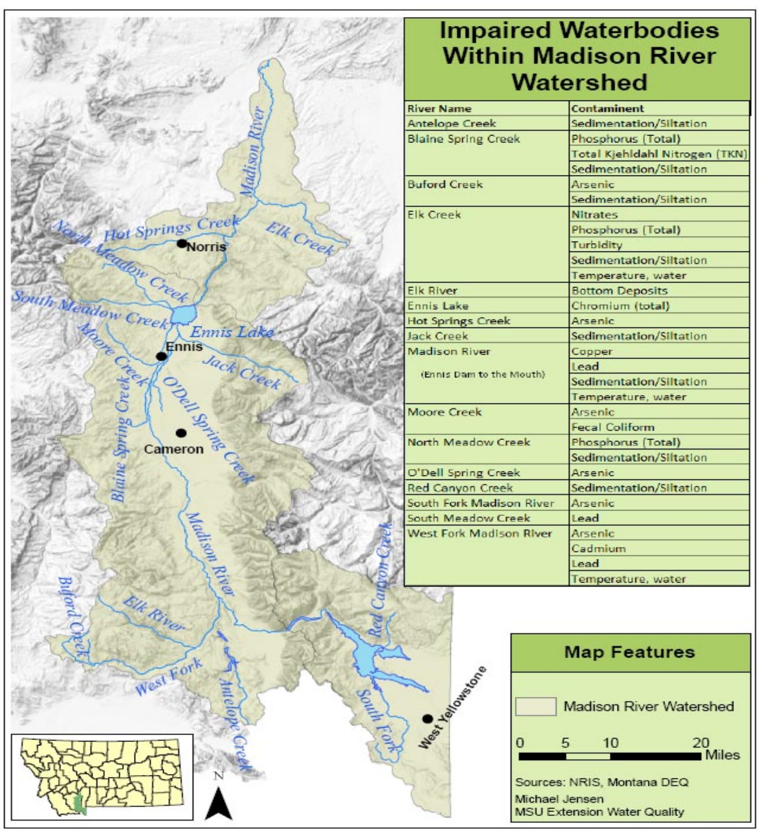

Figure 4-1. Madison River Watershed

During 2013, DEQ began prioritizing new watersheds for future water quality efforts using guidance provided in Montana's law.

4.1.3.3 Water Quality Assessment – TMDL Program Support

The objective of these monitoring projects is to collect data in support of TMDL development. In 2013, DEQ collected data in priority TMDL planning areas, which included sampling in the Flathead watershed. DEQ is also planning for further sediment and nutrient sampling on the lower Flathead River to support TMDL development. We saw progress in beneficial-use and standards attainment assessments to support the TMDL program in most watersheds in the Upper Missouri and Columbia river basins. Ultimately, this included more than 800 updates for pollutant–assessment unit combinations for Montana's 2014 Integrated Water Quality Report.

4.1.3.4 Fixed-Station Monitoring Network

The statewide monitoring program was interrupted in 2005 because of Montana's focus on intensive water quality monitoring programs such as TMDLs and beneficial-use assessments. A balanced water quality monitoring program consists of a combination of fixed-station networks and intensive surveys in specific watersheds; therefore, Montana's fixed-station water quality monitoring network was reinitiated using a rotating basin approach. Montana's fixed-station monitoring was initiated in the Lower Missouri basin in 2012; the Yellowstone watershed was added during 2013. The primary objective of this project is to monitor fixed stations across the state, with an overall fixed-station design to monitor large basins on a rotating basis. Future fixed-station monitoring efforts will include the Upper Missouri and Columbia basins. The design will facilitate a long-term approach for assessing trends, identify future focus areas for assessing watershed beneficial-use standards and the TMDL program, and provide assessment data for beneficial-use status on medium and large rivers.

4.1.3.5 Targeted Oil and Gas Monitoring

Oil and natural gas production in Montana may have adverse consequences on water quality. This monitoring supports an assessment program in eastern Montana that investigates baseline water quality and potential water quality contamination that may occur with new oil and gas extraction techniques. This monitoring effort was continued during 2013 to collect baseline surface water quality data in watersheds where oil and natural gas development has occurred and will likely continue.

Because pollutants associated with oil and gas development likely disperse to low levels in surface waters, DEQ targeted areas of heavy development. Because DEQ lacked field personnel to sample more sites, we chose to sample for more parameters at fewer targeted sites located where pollutants associated with oil and natural gas development have the highest probability of detection. At each site, DEQ will monitor and analyze pollutants associated with hydraulic fracturing fluids, industrial activities, flaring, oil, and increased local population. The objectives are to assess

- baseline conditions in areas of previous conventional oil and gas development
- pollutants associated with hydrologic fracturing fluids or oil and gas byproducts
- pollutants associated with increased population and industrial activities

4.1.3.6 Other Monitoring

DEQ monitored a number of other projects focused on limited geographic areas and/or with specific program objectives.

- **Missouri River Nutrient Model**
  The objective of this project was to collect hydrologic and water quality data to support the development of numeric nutrient criteria for a large river segment of the upper Missouri River using a water-quality model. DEQ and USGS collected data that included chemical, biological, and field parameters. This project began in 2010 and ended in 2013.

- **Yellowstone River Nutrient Model**
  The objective of this project was to collect hydrologic and water quality data to support the development of numeric nutrient criteria for a large river segment of the upper Yellowstone River using a water-quality model. DEQ and USGS collected data that included chemical, biological, and field parameters. This project began in 2011 and continued through 2012.

- **Clark Fork–Pend Oreille Basin Monitoring**
  The objectives of this monitoring project are: (1) to monitor long-term trends in water quality in the Montana portion of the Clark Fork–Pend Oreille basin and (2) to monitor nutrient loading into Lake Pend Oreille (Idaho), with explicit partitioning of loads to Montana and Idaho. The monitoring project is currently being implemented through a partnership between Montana DEQ, Idaho DEQ, Avista Utilities, the city of Missoula, and UM.

  The monitoring project currently consists of measuring field parameters and collecting nutrient and algae samples at monitoring locations on the Clark Fork River, at Lake Pend Oreille, and on the Pend Oreille River within the Clark Fork–Pend Oreille watershed of western Montana, northern Idaho, and northeastern Washington. Responsibility for the monitoring project is divided among multiple organizations and agencies. In 2011 and 2012, monitoring occurred at 13 monitoring stations on the Clark Fork River and selected tributaries, at 8 monitoring stations on Lake Pend Oreille, and at 2 monitoring stations on the Pend Oreille River.

4.2 Assessment Methodology

The Montana Water Quality Act requires "a comprehensive program for the prevention, abatement, and control of water pollution" and directs "the department to monitor state waters to accurately assess their quality and, when required, to develop total maximum daily loads for those water bodies identified as threatened or impaired.[33]" It further states "[t]he department shall use the monitoring results to revise the list of water bodies that are identified as threatened or impaired and to establish a priority ranking for TMDL development for those waters"[34].

The Montana Water Quality Act also requires DEQ to "[d]evelop and maintain a data management system that can be used to assess the validity and reliability of the data used in the listing and priority ranking process[35]". This section also satisfies the federal CWA requirements in 40 CFR Part 130.4(b) and 40 CFR Part 130.7(b)(5) that "[t]he state's water monitoring program shall include collection and analysis of physical, chemical, and biological data, and quality assurance and control programs to assure scientifically valid data" and "[e]ach state shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list." DEQ's data management system permits

[33] 75-5-701, MCA
[34] 75-5-702, MCA
[35] 75-5-702(5), MCA

assessors to document all the measures of data rigor. This assessment record allows users to understand the assessors' bases (i.e., level of underlying information) for their use-support decisions.

Once the state determines that sufficient credible data exists for a waterbody, beneficial-use support may be assessed using DEQ's Water Quality Assessment Method (Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau, 2011), which is a structured and consistent process to assess Montana's waters.

4.2.1 Identification of Available Water Quality Data

To prepare Montana's Water Quality Integrated Report, DEQ solicits outside data and information from other local, state, and federal agencies; volunteer monitoring groups; private entities; nonprofit organizations; and individuals involved in water quality monitoring and management. The data and information obtained are combined with the results of DEQ's ongoing monitoring efforts to provide the basis for water quality assessments. Data submitted from outside sources must be defensible and the quality of that data known before it is considered for use in assessments. DEQ may decide not to use particular data or information that does not meet the data quality requirements identified in the assessment methods and Montana's Call for Existing and Readily Available Data.

4.2.2 Data Quality Evaluation

The Montana Water Quality Act (MWQA) directs DEQ to conduct a data quality evaluation to determine where it has sufficient credible data for an assessment. MWQA defines sufficient credible data as "chemical, physical, or biological monitoring data, alone or in combination with narrative information that supports a finding as to whether a water body is achieving compliance with applicable water quality standards[36]." The data evaluation is simply a quality assessment that considers the technical, representativeness, quality, and currency components of data and information that is available.

During a data quality assessment (DQA), DEQ reviews chemical, biological, and physical/habitat data to determine whether it has adequate rigor for decision-making about use support. The technical, spatial/temporal, and quality aspects, as well as age, of the data are considered. In addition, data must represent the ambient water quality conditions in order to be useful for assessing the waterbody. If data are of sufficient quality, they are incorporated into the water quality assessments. Data quality assessments are conducted individually for each waterbody per each beneficial use and pollutant group (e.g., aquatic life, nutrients). The process allows DEQ to make use-support decisions for individual beneficial uses when sufficient data is available for specific pollutants.

The pollutant-based assessment methods have minimum data requirements, including data independence, which must be met before applying the decision-making criteria.

4.2.3 Beneficial-Use Support

DEQ has developed assessment methods for nutrients, sediment, and metals pollutant groups, which represent the most common pollutants impairing Montana's surface waters. Each pollutant method provides the framework for conducting sound and consistent water quality assessments, which allows DEQ to make reproducible and defensible beneficial use-support decisions. Each pollutant group is evaluated independently in order to determine support of beneficial uses.

[36] 75-5-103(35), MCA

The assessment methods are designed to assess for the most sensitive beneficial use. Industrial uses are considered the least sensitive use since standards for aquatic life and drinking water uses are more protective. Therefore, if a waterbody supports aquatic life, drinking water, and recreation beneficial uses, the state assumes it will also support agricultural and industrial uses. However, additional salinity and toxicity information may be required to determine suitability for agricultural use.

Decisions are recorded in the waterbody's assessment record and into DEQ's Water Quality Assessment, Reporting and Documentation (WARD) system, which is used to report assessment unit information and decisions, and support the various tables and appendices included in this report.

4.2.4 Waterbody Assessment Records in WARD Data System

Each waterbody assessment record consists of the following parts:

1. Water Quality Assessment Records for each assessment unit – DEQ documents the assessment of each waterbody in the WARD system. A Water Quality Assessment Record is created for each unit, detailing the unit, data sources, data quality evaluation, use-support decisions, impairment information, cause and source information, delisting information, and how the data was used to reach an assessment decision. An electronic copy of the assessment record is available on Montana's Clean Water Act Information Center (CWAIC) website (http://cwaic.mt.gov).

2. Hard copy data files for each assessment unit evaluated – These files may contain water quality data, maps, photographs, references to relevant documents, and references to electronic information sources. Assessment record files may be reviewed in person at DEQ in Helena.

3. Geospatial data – All assessment units are indexed on the 1:24,000 High Resolution National Hydrography Dataset (NHD) for display and mapping, using Geographic Information Systems.

DEQ reports water quality assessment information and decisions in the biennial Integrated Report to EPA electronically via EPA's Exchange Network. After EPA has approved the state's submission and has performed its own QC review, it publishes Montana's Integrated Report information, along with other states and territories, on its national WATERS website (http://www.epa.gov/waters/ir/).

Access to all electronic assessment reports, information, and maps is available on DEQ's CWAIC website at http://cwaic.mt.gov. Visitors to the site can run interactive queries of the state's water quality assessment records for the current and two previous reporting cycles. CWAIC also provides access to Montana's Water Quality Integrated Report documents and online mapping tools.

4.2.5 Quality Assurance and Quality Control Program

Within DEQ, the Water Quality Planning Bureau operates under an EPA-approved Quality Management Plan (QMP) (Montana Department of Environmental Quality, 2008b). The QMP establishes a quality system for all bureau activities, including, but not limited to, monitoring state surface waters and producing this report.

The QMP requires the bureau to plan projects, document the planning, and provide for independent assessment and oversight to assure that scientifically valid processes and data were used for decision-making. For water quality monitoring, the bureau plans and documents proposed activities in Quality Assurance Project Plans, or equivalent planning documents, and Sampling and Analysis Plans.

4.3 Assessment Results

The Montana Water Quality Act directs the department "[to] monitor state waters to monitor and assess the quality of waters and identify surface water bodies or segments of surface water bodies that are threatened or impaired[37]." DEQ also follows federal reporting guidance provided by EPA. Assessment results, and an explanation of federal reporting categories, are provided in this section.

4.3.1 Water Quality Reporting Categories

For integrated reporting purposes, waterbodies (referred to as Assessment Units or AUs), included in the WARD database are assigned to categories. There are five core reporting categories, one of which has three subcategories (Category 4). Also, the state has added a custom subcategory (user defined) to Category 5.[38] The categories are

- Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.
- Category 2: Available data and/or information indicate that some, but not all, of the beneficial uses are supported.
  - Category 2A: dropped in 2014 cycle. All 2A assessment units are now listed in EPA category 2.
  - Category 2B: changed in 2014 cycle to category 5N. All 2B assessment units are now listed in state defined category 5N which is the same definition for 2B.
- Category 3: Waters for which there is insufficient data to assess the use support of any applicable beneficial use; no use-support determinations have been made.
- Category 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved.
- Category 4B: Waterbodies are on lands where "other pollution control requirements required by local, state, or federal authority"[39] are in place, are expected to address all waterbody–pollutant combinations, and attain all WQS in a reasonable period of time. These control requirements act in lieu of a TMDL, thus no actual TMDLs are required.
- Category 4C: Identified threats or impairments result from pollution categories such as dewatering or habitat modification; thus, a TMDL is not required.
- Category 5: Waters where one or more applicable beneficial uses are impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
- Category 5N: Available data and/or information indicate that a water quality standard is exceeded because of an apparent natural absent any identified manmade sources

The majority of the 1,047 AUs whose water quality status have been assessed are listed in Category 5, impaired, and are in need of a TMDL (**Table 4-1**). **Table 4-2** lists all waters in subcategory 5N.

[37] 75-5-702(1), MCA
[38] From the 2006 through 2012 reporting cycles, we used two user-defined categories attached to Category 2: 2A and 2B. In 2014, we dropped these user categories. 2A assessment units reverted back to EPA category 2, and all 2B assessment units were moved to category 5N. The 5N category definition is the same as category 2B.
[39] See 40 CFR 130.7(b)(1)(iii)

Table 4-1. Size and Count of Assessment Units Assigned to Reporting Categories

Category	2012					2014				
	River		Lake / Reservoir		Count Total	River		Lake / Reservoir		Total Count
	Miles	Count	Acres	Count		Miles	Count	Acres	Count	
1	2,303	121	58,675	15	136	2,318	123	60,360	15	138
2						802	42	9,407	11	53
2, 2A	585	29	10,843	11	40					
2, 2B	134	4			4					
3	2,088	100	30,067	15	115	2,142	109	24,994	16	125
4A	2,438	173	4,580	3	176	3,440	275	5,799	3	278
4B		0		0	0		0		0	0
4C	1,843	93	9,902	3	96	1,940	95	11,446	3	98
4C, 2B	25	1			1					
5	12,270	541	481,530	24	565	11,025	435	406,224	24	459
5, 2B	688	19			19					
5, 5N						754	21			21
Total	22,373	1,081	595,597	71	1,152	22,420	1,100	518,231	72	1,172

Table 4-2. Category 5N Assessment Units

2014 305B AU ID	Location	Size (mi.)
MT39F001_010	THOMPSON CREEK, Wyoming border to mouth (Little Missouri River)	41.2
MT40J005_020	COTTONWOOD CREEK, Black Coulee to mouth (Milk River)	57.4
MT40M002_020	LARB CREEK, headwaters to mouth (Beaver Creek)	76.7
MT40Q001_011	POPLAR RIVER, Confluence of East & Middle Forks to Fort Peck Reservation boundary, T33N R48E S12	29.9
MT40Q001_012	MIDDLE FORK POPLAR RIVER, headwater (confluence of Lost Child & Goose Creeks) to the mouth (Poplar River)	36.5
MT40Q002_020	EAST FORK POPLAR RIVER, Canada border to mouth (Poplar River)	21.6
MT41I001_011	MISSOURI RIVER, headwaters to Toston Dam	22.0
MT41L001_010	OLD MAIDS COULEE, headwaters to mouth (Cutbank Creek)	17.6
MT41M002_110	DUPUYER CREEK, confluence of South Fork Dupuyer Creek and Middle Fork Dupuyer Creek to the mouth (Birch Creek)	39.3
MT41Q001_021	MISSOURI RIVER, Little Prickly Pear Creek to Sheep Creek	20.9
MT41R001_020	ARROW CREEK, Surprise Creek to mouth (Missouri River)	69.7
MT42B002_031	HANGING WOMAN CREEK, Stroud Creek to mouth (Tongue River)	18.3
MT42B002_032	HANGING WOMAN CREEK, Wyoming border to Stroud Creek	31.4
MT42C002_020	OTTER CREEK, headwaters to mouth (Tongue River)	108.1
MT42J004_010	STUMP CREEK, headwaters to mouth (Powder River)	29.8
MT42M002_142	CEDAR CREEK, tributary confluence at 12N 57E S35 to tributary confluence at 13N 56E S27	20.1
MT43D002_010	ELBOW CREEK, headwaters to mouth (Clarks Fork)	38.6
MT43D002_140	COTTONWOOD CREEK, headwaters to the mouth (Clarks Fork of Yellowstone), T3S R24E S24	19.6
MT43F001_010	YELLOWSTONE RIVER, City of Billings PWS to Huntley Diversion Dam	10.6
MT43F002_022	CANYON CREEK, headwaters to highway 532	29.7
MT43F002_040	VALLEY CREEK, headwaters to mouth (Yellowstone River)	14.8

4.3.2 Summary of Water Quality Assessments

DEQ has defined 1,172 Assessment Units in its database, which consists of 1,100 rivers and streams and 72 lakes and reservoirs. DEQ reports all waters that do not meet water quality standards (WQS) as impaired, whether the impairment includes pollutants (listed in Category 5), impairment only from pollution (listed in Category 4C), or those with all necessary TMDLs completed (listed in Category 4A). A total of 3,418 AU/cause combinations are identified as impairing Montana's surface waters (**Appendix A**). Montana's 2014 303(d) List (**Appendix B**) includes 1,171 specific pollutant listings on 480 assessment units that need a TMDL.

Impaired waters are listed with identified causes and their sources (**Appendix A**). Of the 73 specific causes listed in 2014, the two most common were sediment-related (pollutant) and alterations of streamside vegetative covers (pollution). The top 10 most common causes include sediment, nutrients, and metals-related pollutants and habitat or streamflow-related pollution listings (**Table 4-3**).

Table 4-3. Top 10 Causes of Impairment – All Assessment Units

Cause Name	# of AUs
Sedimentation/Siltation	459
Alteration in streamside or littoral vegetative covers[1]	411
Low flow alterations[1]	238
Phosphorus (Total)	235
Nitrogen (Total)	206
Lead	178
Physical substrate habitat alterations[1]	159
Copper	150
Arsenic	128
Cadmium	119

[1] These causes are pollution, or non-pollutants, and thus TMDLs cannot be developed.

Grazing in riparian or shoreline zones is the most common confirmed source associated with impairments (**Table 4-4**). Other confirmed common sources include irrigated crop production, road-related, water management, mines and mining-related, silviculture, channelization, and natural sources. Of the 2,968 identified AU–source combinations listed, only 633 (21%) have been confirmed at the time of the assessment decision.

Table 4-4. Top 10 Confirmed Sources of Impairment – All Assessment Units

Source Name	# of AUs
Grazing in Riparian or Shoreline Zones	136
Irrigated Crop Production	52
Forest Roads (Road Construction and Use)	36
Effects of Abandoned Mine Lands (Inactive)	35
Unspecified Unpaved Road or Trail	30
Flow Alterations from Water Diversions	26
Natural Sources	23
Mine Tailings	23
Silviculture Harvesting	22
Channelization	19

4.3.2.1 Category 5 Pollutant Delistings

During the 2014 reporting cycle 496 pollutant causes were delisted from the 2012 303(d) List (**Table 4-5)**. Of these, 307 were for approved TMDLs (4A) but are still impairing a water's beneficial use; 173 were delisted for achieving water quality standards; and 16 were delisted using EPA's reason of "the original basis for listing was incorrect," 13 of these were subsequently relisted for the preferred pollutant cause for TMDL development (see **Table 6-4**).

Table 4-5. Pollutant Causes Delisted from 2012 303(d) List (Category 5)

2014 Category	Delisting reason		Total
1	Applicable WQS attained according to new assessment method	113	
	Applicable WQS attained as a result of restoration activities	7	
	Applicable WQS attained but reason for recovery unspecified	51	
	Applicable WQS attained because original basis for listing was incorrect	2	
			173
3	Data and/or information lacking to determine water quality status; original basis for listing was incorrect	16	
			16
4	TMDL approved or established by EPA	307	
			307
	Total Pollutant Causes Delisted		**496**

4.3.3 Beneficial-Use Support Summaries

All waters are assigned a use class and designated beneficial uses (refer to **Section 3.1.2.2 & Table 3-1**). When a water quality assessment is conducted, each beneficial use is evaluated to determine whether water quality standards are attained and the use is supported.

4.3.3.1 Assessments of Rivers and Streams

To date, the state's water quality program has defined more than 22,000 miles of rivers and streams as unique assessment units in its WARD database. The majority of the rivers and streams assessed are not supporting the aquatic life use, which reflects the prominence of sediment and flow-related impairment listings. Conversely, most waters assessed do support their drinking water, recreation, agriculture, and industrial uses (**Table 4-6**).

Table 4-6. Beneficial-Use Support Summary – Rivers and Streams ONLY

CWA Goals	Beneficial Use	Total [a]	Fully Supporting	Fully Supporting & Threatened	Not Supporting [b]	Not Assessed	Insufficient Info
		(Miles)	(Miles)	(Miles)	(Miles)	(Miles)	(Miles)
Protect & Enhance Ecosystem	Aquatic Life (includes fish)	22,421	3,127	0	15,901	2,985	408
Protect & Enhance Public Health	Drinking Water	16,039	8,416	0	3,495	3,654	474
	Primary Contact Recreation	22,420	9,492	0	6,001	5,722	1,205
Social & Economic	Agricultural	16,761	11,451	0	1,912	3,157	241

[a] Total size (miles) of rivers or streams defined in the WARD database with this assigned beneficial use.
[b] Includes waters that are partially supporting their beneficial uses.

Montana's rivers and streams have 69 identified causes of impairment; the most common are sediment-related (pollutant) and alterations of streamside vegetative covers (pollution). The top 10 most common include sediment, nutrients, and metals-related pollutants and habitat or streamflow related pollution listings (**Table 4-7**).

Table 4-7. Top 10 Causes of Impairment – Rivers and Streams ONLY

Cause Name	# of AUs
Sedimentation/Siltation	453
Alteration in streamside or littoral vegetative covers[1]	410
Low flow alterations[1]	237
Phosphorus (Total)	228
Nitrogen (Total)	201
Lead	174
Physical substrate habitat alterations[1]	157
Copper	149
Arsenic	124
Cadmium	118

[1] These causes are pollution, or non-pollutants, and thus TMDLs cannot be developed.

Montana Rivers and streams had 56 confirmed sources of impairment; the most common confirmed source was riparian, or shoreline, grazing (**Table 4-8**). Other sources are related to irrigated crop production, roads, water management, mining, silviculture, channelization, and natural sources.

Table 4-8. Top 10 Confirmed Sources of Impairment – Rivers and Streams ONLY

Source Name	# of AUs
Grazing in Riparian or Shoreline Zones	136
Irrigated Crop Production	50
Forest Roads (Road Construction and Use)	36
Effects of Abandoned Mine Lands (Inactive)	35
Unspecified Unpaved Road or Trail	30
Flow Alterations from Water Diversions	26
Natural Sources	23
Mine Tailings	23
Silviculture Harvesting	22
Channelization	19

4.3.3.2 Assessments of Lakes and Reservoirs

To date, the state's water quality program has defined almost 600,000 acres of lakes and reservoirs as unique assessment units in its WARD database. The majority of the lakes and reservoirs assessed are not supporting the aquatic life or drinking water but are supporting recreational uses (**Table 4-9**).

Table 4-9. Beneficial-Use Support Summary – Lakes and Reservoirs ONLY

CWA Goals	Beneficial Use	Total [a] (Acres)	Fully Supporting (Acres)	Fully Supporting & Threatened (Acres)	Not Supporting [b] (Acres)	Not Assessed (Acres)	Insufficient Info (Acres)
Protect & Enhance Ecosystem	Aquatic Life (includes fish)	518,230	106,637	8,108	378,193	25,292	0
Protect & Enhance Public Health	Drinking Water	503,207	154,454	0	293,308	53,286	2,159
	Primary Contact Recreation	518,231	411,818	0	64,281	39,973	2,159
Social & Economic	Agricultural	503,207	180,003	0	50,965	270,080	2,159

[a] Total size (acres) of lakes or reservoirs defined in the WARD database with this assigned beneficial use.
[b] Includes waters that are partially supporting their beneficial uses.

Montana's lakes and reservoirs have 35 identified causes of impairment; the most common causes are phosphorus (pollutant), other flow regime alterations (pollution), and salinity (pollutant). The remaining top 10 causes include sediment, nutrients, and metals-related pollutant listings (**Table 4-10**).

Table 4-10. Top 10 Causes of Impairment – Lakes and Reservoirs ONLY

Cause Name	# of AUs
Phosphorus (Total)	7
Other flow regime alterations[1]	7
Salinity	7
Mercury	6
Sedimentation/Siltation	6
Selenium	6
Nitrogen (Total)	5
Lead	4
Arsenic	4
Oxygen, Dissolved	3
Sulfates	3

[1] These causes are "pollution" or non-pollutants and thus TMDLs cannot be developed

Of 37 identified impairment sources identified for Montana's lakes and reservoirs, 8 are confirmed (**Table 4-11**); these include agricultural, point-source/urban, and climate-related sources.

Table 4-11. Confirmed Sources of Impairment – Lakes and Reservoirs ONLY

Source Name	# of AUs
Irrigated crop production	2
Agriculture	1
Municipal point-source discharges	1
Unspecified urban stormwater	1
Atmospheric deposition – nitrogen	1
Drought-related effects	1
Sources outside state jurisdiction or boarders	1

DEQ has limited data to evaluate lakes in the state. Nonetheless, some assessments of lake trophic status and water quality trends have been conducted. Of the 72 lake assessment units (518,231 acres), 59 have been assessed for trophic status (**Table 4-12**). Similarly, of these 59 lakes, only 6 have been assessed for trends (**Table 4-13**).

Table 4-12. Trophic Status of Lakes and Reservoirs

Trophic Status	Number of Lakes	Total Size (Acres)
Dystrophic	0	0
Eutrophic	10	31,473
Hypereutrophic	0	0
Mesotrophic	16	303,507
Oligotrophic	10	137,285
Unknown	23	39,461
Total Assessed for Trophic Status	**59**	**511,726**

Table 4-13. Water Quality Trends for Lakes and Reservoirs

Trend	Number of Lakes	Total Size (Acres)
Stable	4	24,016
Degrading	2	30,392
Unknown	53	457,318
Total Assessed for Trends	**59**	**511,726**

4.3.4 Montana Rivers and Streams Assessment

Under the Clean Water Act (CWA), the EPA and states must periodically report on the condition of the nation's water resources. In 2008–2009, EPA randomly sampled the nation's rivers and streams as part of its National River and Stream Assessment (U.S. Environmental Protection Agency, 2013). In 2013, DEQ had the data that EPA collected from 62 rivers and streams analyzed. The data were used to estimate the extent to which rivers and streams in Montana support a healthy biological condition and to evaluate how physical habitat stressors (riparian disturbance, riparian vegetation cover, instream fish habitat, and streambed sediment) and water quality stressors (total phosphorus, total nitrogen, salinity, and acidification) may be limiting attainment of healthy periphyton, macroinvertebrate, and fish biological conditions.

Below are results from this analysis (see (Teply, 2013) for additional results and discussion). The data was analyzed to estimate the water quality conditions of streams and rivers for the entire state and for the following stream groupings:

- coldwater rivers and streams located within the Western Mountain Ecoregion
- coldwater rivers and streams located within the Northern Plains Ecoregion
- warmwater rivers and streams located within the Northern Plains Ecoregion

The analysis used EPA's assessment protocols, which allow for comparison of water quality conditions across the nation. Be aware that DEQ does not use EPA's assessment protocols for conducting beneficial-use assessments. This is because EPA's assessment protocols use generalizations that accommodate national programmatic guidelines that may not apply well in certain areas of Montana.

4.3.4.1 Findings

The analysis showed that total phosphorus, riparian disturbance, and riparian cover have the greatest extent of poor conditions throughout Montana (**Figure 4-2**). Meaningful differences between ecoregions were also found. In the Western Mountain Ecoregion, the relative extent of poor total phosphorus conditions is greater than the relative extent of physical habitat stressors. In the Northern Plains Ecoregion, the relative extent of riparian disturbance and low riparian vegetation cover is greater than in the other ecoregions. Notably, the extent of poor conditions in warmwater streams in the Northern Plains is greater than that found nationwide, especially the high levels of riparian disturbance and poor riparian vegetation cover. The extent of poor stream conditions in the other stream groups is more or less comparable to the extent of poor conditions found nationally.

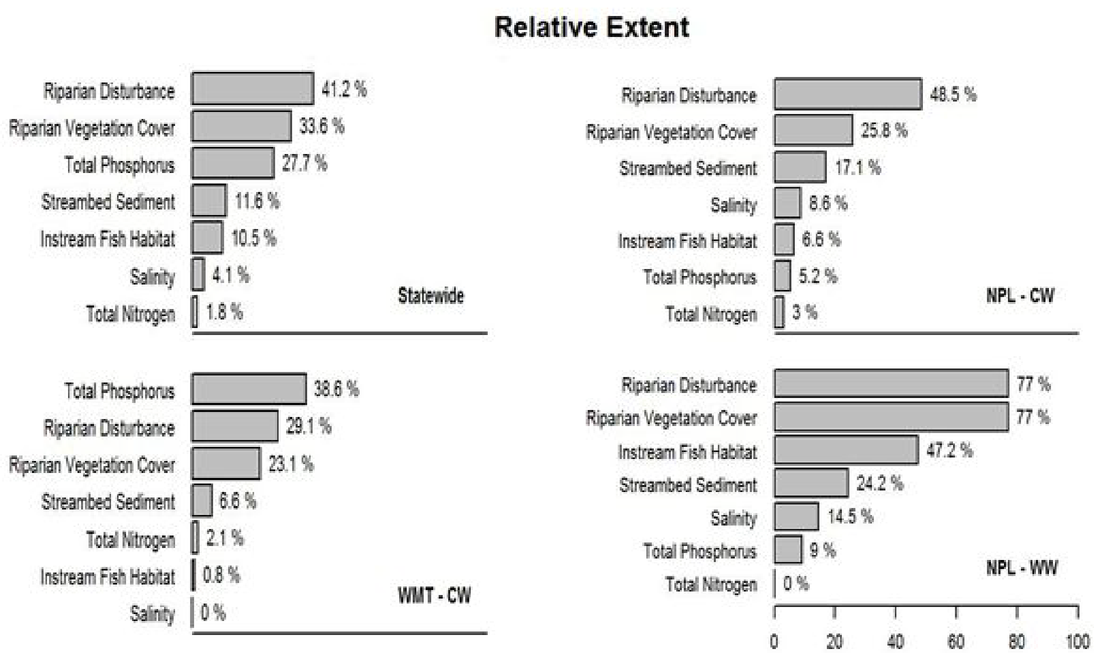

Figure 4-2. Relative extent of stressors in Montana's rivers and streams (EPA/NRSA).
Stream groupings represent a combination of geographic location within an aggregated Omernik (2013) Level III ecoregion and stream designations according to the Administrative Rules of Montana 17.30.600: WMT-CW = Western Mountains-Coldwater; NPL-CW = Northern Plains-Coldwater; NPL-WW = Northern Plains-Warmwater.

The analysis used relative risk to evaluate the severity of the effect when a stressor occurs, that is, to determine how stressor conditions affect biological conditions. Relative risk is the ratio of the likelihood of finding poor biological conditions in a river or stream when stressor conditions are poor to the likelihood of poor biological conditions when stressor conditions are good. Calculation of relative risk was used specifically to identify situations where poor stressor condition led to an increased likelihood of poor biological condition. The following are rankings of the strongest linkages found between poor biological conditions and environmental stressors. Environmental stressors are listed in order of how they affect the specific biological conditions (e.g., periphyton, macroinvertebrates, and fish) from highest relative risk to lowest relative risk greater than 1 (meaning these environmental stressors were found to have a significant effect).

- Western Mountains – Coldwater Streams

  - Periphyton: 1) total nitrogen
  - Macroinvertebrates: 1) streambed sediment, 2) riparian vegetation cover, 3) total nitrogen
  - Fish: 1) streambed sediment, 2) riparian vegetation cover
- Northern Plains – Coldwater Streams
  - Periphyton: 1) total nitrogen, 2) total phosphorus, 3) streambed sediment
  - Macroinvertebrates: 1) total nitrogen, 2) total phosphorus, 3) riparian disturbance
  - Fish: 1) riparian vegetation cover, 2) riparian disturbance
- Northern Plains – Warmwater Streams
  - Periphyton: 1) salinity, 2) total phosphorus
  - Macroinvertebrates: 1) salinity, 2) streambed sediment
  - Fish: 1) instream fish habitat

4.4 Wetlands Program

DEQ's Wetland Program provides state leadership to conserve wetlands for the benefits they provide, including filtering pollutants (improving water quality), maintaining water quantity, providing important habitat, and reducing the detrimental effects of flooding. The Wetlands Program is guided by a state wetland plan titled "Priceless Resources – A Strategic Framework for Wetland and Riparian Area Conservation and Restoration in Montana, 2013-2017" (Montana Department of Environmental Quality and Montana Wetland Council, 2013). The framework is endorsed by the governor and directors of the Department of Environmental Quality; Fish, Wildlife & Parks; and the Department of Natural Resources and Conservation.

The current framework updates the previous one published with the same title but for the years spanning 2008–2012 (Montana Wetland Council, 2008). The Montana Wetland Council assessed accomplishments for the 2008–2012 strategy, which are reported in the 2013–2017 update. The Montana Wetlands Council is an active network of diverse interests working to conserve and restore Montana's wetland and riparian ecosystems.

Numerous entities were involved in updating the framework, including representatives from local, state, federal, and tribal agencies; the agricultural community; biological and environmental conservation groups, consultants, and scientists; land trusts; industry representatives (e.g., mining, wood products); members of the real estate and land development community; recreationists and sportspersons; educational institutions; and other water- and wetland-related groups.

4.4.1 Montana Wetlands Program Overview

Montana's overarching wetland goal is no net loss of the state's remaining wetland resource base (as of 1989) and an overall increase in the quality and quantity of wetlands. Working groups help implement the 5-year framework, which contains seven strategic directions to guide wetland protection for DEQ and the Montana Wetland Council. These strategies are listed below; more detailed directions can be found at http://deq.mt.gov/wqinfo/wetlands/wetlandscouncil.mcpx:

1. restoring, protecting, and managing wetlands
2. mapping wetland locations
3. monitoring and assessing wetland condition
4. planning and developing protective policies

5. focusing on vulnerable and affected wetlands
6. communicating with and educating the public
7. developing the Montana Wetland Council

In 2009, EPA's Wetland Division encouraged states to develop Wetland Program Plans (WPPs) based on EPA's four core elements for state wetlands programs. WPPs outline goals, actions, and implementation schedules for each of these core elements:

1. monitoring and assessment
2. regulation, including Section 401 certification
3. voluntary restoration and protection
4. water quality standards for wetlands

DEQ developed Montana's WPP in 2011 that included the full range of planned program development actions, which were identified in the Strategic Framework. EPA Region 8 approved DEQ's plan in January 2012. Based on actions identified in the final WPP, DEQ will submit future proposals to EPA Region 8 for funding under the Wetland Program Development Grant.

4.4.2 Monitoring and Assessment

To fulfill EPA's CWA Section 106(e)(1) grant requirements, DEQ submitted a report to EPA Region 8 titled "Montana Statewide Water Quality Monitoring and Assessment Strategy, 2009–2019" (Montana Department of Environmental Quality, 2009). **Section 10** of the report includes an implementation schedule identifying several activities to accomplish short-term goals. DEQ has prepared an in-house draft document, "Recommended Strategies for Achieving Montana Water Quality Act Objectives for Montana's Wetlands" (Apfelbeck, 2010), which addresses one of the listed short-term activities.

DEQ received a Wetland Program Development Grant for federal fiscal year 2011 to develop an initial wetland monitoring and assessment plan, which will help in decision-making in DEQ's aquatic program. Monitoring and assessment priorities for the 2013–2017 Strategic Framework include

- developing a network of statewide reference standards
- creating reporting protocols for the 2016 Integrated Report
- evaluating the ecologic effectiveness of restoration, management, and compensatory mitigation
- developing an approach to track wetland losses and gains in both quantity and quality
- expanding the Water Monitoring Work Group of the Montana Watershed Coordination Council to include wetlands and further the above priorities

In 2013, DEQ and the Montana Department of Agriculture (MDA) launched a pilot project to determine whether using pesticides adversely affects wetlands. Under the Montana Agriculture Chemical Ground Water Protection Act, MDA is responsible for tracking this information (and similarly in the state's groundwaters and surface waters). DEQ prepared a Sampling and Analysis Plan to collect surface water samples. Both MDA and DEQ are taking samples from the same locations at the same time then independently analyzing the samples. In 2013, 18 sites were sampled across Montana. MDA expects this special project to become a routine component of their Ground Water Protection Program and will coordinate with DEQ during winter to assess the data collected. The pilot project will be used to develop a program for 2014 and beyond.

From 2002 to 2006, the Montana Natural Heritage Program (MTNHP) contracted with DEQ to monitor and assess wetlands. In 2006, MTNHP took the lead on wetland monitoring and assessment, receiving Wetland Program Development Grants (and other EPA funding) to (1) develop GIS-based rapid and intensive assessment methods; (2) initiate a rotating-basin approach to report on wetland condition; and (3) develop reference standards for wetland condition assessments and other tools for reporting on the condition of Montana's wetlands.

MTNHP prepared a draft report titled "Development Plan for a Statewide Wetland and Riparian Mapping, Assessment and Monitoring Program" (Montana Natural Heritage Program, 2010) and has an EPA-approved Wetland Program Plan for monitoring and assessment activities. DEQ contracted with MTNHP for the field portion of the 2011 National Wetland Condition Assessment (NWCA) for Montana. MTNHP sampled 13 sites and revisited 2 sites. Two additional sites and one site revisit occurred on tribal lands. DEQ's Wetland Program staff participated in the field training and field work associated with the NWCA contract. EPA has not yet released data from the 2011 NWCA.

4.4.3 Voluntary Restoration and Protection

Formed in 2000, the Montana Wetlands Legacy Partnership (Legacy) is a voluntary incentive-based partnership that focuses on wetland restoration and conservation on private land. The Montana Department of Fish, Wildlife & Parks (FWP) had been managing Legacy and was the contact for landowners interested in technical and financial assistance for wetland restoration until June 2013, when Legacy's coordinator retired. DEQ and FWP held a wetland summit on October 22, 2013, to determine options for providing Legacy services. This priority was identified in the Strategic Framework.

With funding from a Wetland Program Development Grant for federal FY 2009, DEQ partnered with Legacy to integrate wetland restoration into watershed restoration plans in order to address water quality and quantity impairments identified through the TMDL process. This pilot project was conducted in the Big Hole and Gallatin watersheds and involved both of the watershed committee's and DEQ's Watershed Protection staff. The goal was to demonstrate how wetlands can help address water quality and quantity impairments. An additional goal was to further integrate wetlands with other DEQ water quality management programs

From 2004 to 2006 Legacy also administered the In-Lieu-Fee (ILF) Aquatic Resource Mitigation Program with funds managed by FWP; however, FWP decided to end the program because not enough funds were generated to ensure long-term monitoring and protection of the sites. Further, EPA and the U.S. Army Corp of Engineers (USACE) published a draft rules proposal to discontinue ILF programs. During the 2.5 years that the program operated, it generated $500,000 from unavoidable wetland damage; the funds were used to mitigate affected wetlands, including an ILF project on the Granger Ranches. In 2008, EPA and USACE issued the final Mitigation Rule, which guides the development of improved ILF programs.

In addition, the Montana Army Corps of Engineers has begun to require mitigation for unavoidable damage to streams, which they estimate to comprise about 80% of the aquatic degradation in Montana. DEQ was awarded an EPA Region 8 Wetland Program Development Grant for federal FY 2010 to develop an ILF Aquatic Resource Mitigation Program for Montana to satisfy CWA Section 404 mitigation requirements for damages to streams, wetlands, and other aquatic resources. That project resulted in the development of a USACE-approved ILF program in Montana. The ILF administrator is Montana

Aquatic Resource Services Inc., a new nonprofit developed to provide ILF services in addition to other aquatic restoration services. DEQ is a member of USACE's Interagency Review Team.

4.4.4 Water Quality Standards and Regulation

DEQ received a Wetland Program Development Grant for federal FY 2009 to enhance wetland protection by strengthening Section 401 (Water Quality Certification program) of Montana's Water Quality Act (MWQA) for Section 404 permits. Additionally, DEQ aims to increase coordination and integration of MWQA programs to improve the protection of the state's wetlands and streams. Montana certified the USACE Nationwide Permit program, including a provision to track Section 404 permits and Section 401 certifications to determine the potential affect these actions were having on Montana waters.

4.5 Public Health Issues

This section provides information regarding public health issues in the state during 2011–2012, including protecting public water supplies, ensuring safe drinking waters, and being aware of other problems that may harm the state's residents (e.g., fish kills).

4.5.1 Spill Reports

During 2011–2012, a total of 277 spills affecting water quality were reported to DEQ's Enforcement Division. These included (a) multiple reports of vehicle accidents releasing gasoline, diesel fuel, hydraulic fluid and oil into various waterways; (b) a tailing line failure resulting in a release of 1,675 gallons of water and mine tailings into Thickett Creek; (c) a ruptured line in an oil field in northwestern Montana, sending an estimated 840 gallons of oil down a steep ravine and into Cut Bank Creek; (d) a semi-trailer accident that released 7,000 gallons of magnesium chloride into the Big Hole River; (e) a discharge of thousands of gallons of wastewater from a sewage lagoon; and (f) the pipeline rupture under the Yellowstone River that released nearly 63,000 gallons of crude oil into the river during record high flows. All incidents were investigated, and their reports are available from DEQ's Enforcement Division.

4.5.2 Fish Kills

During 2011–2012, three fish kills were reported to the Montana Department of Fish, Wildlife & Parks:

- April 4, 2011 – Winter-killed perch were reported at the north end of Plumbers Lake
- July 1, 2011 – More than 80 fish were found dead as a result of the Yellowstone Pipeline oil spill. It is likely, however, given the very high flows and long interval between the spill and the time fish recovery began, that many more fish, which were not found, died as a result of the spill.
- January 2012 – Approximately two dozen trout were killed as a result of anoxic conditions on Jette Lake.

4.5.3 Fish Consumption Advisories

In 2007, the Montana Department of Public Health and Human Services issued fish consumption advisories for certain Montana waters where testing confirmed elevated levels of contaminants, specifically mercury and polychlorinated biphenyls (PCBs), which are harmful to human health.

Most waters in the state, however, have not been tested for contaminants (Montana Department of Health and Human Services and Montana Department of Fish, Wildlife and Parks, 2007). **Table 4-14** lists waterbodies, which, according to the 2013 Montana Fishing Regulations, contain fish species with consumption advisories for 2013. More detailed information is available online at http://fwpiis.mt.gov/content/getItem.aspx?id=28187.

Table 4-14. Montana Waters with Fish Consumption Advisories 2012-2013*

Alder Gulch	Bair Reservoir	Big Spring Creek
Bighorn Lake and Afterbay Reservoir	Blacktail Creek	Boulder River
Browns Gulch	Bynum Reservoir	Cabinet Gorge Reservoir
Canyon Ferry Reservoir	Castlerock Lake	Cataract Creek
Chrome Lake	Clark Canyon Reservoir	Clark Fork River
Clear Lake	Cooney Reservoir	Crystal Lake East
Firehole River Fork Reservoir	Flathead Lake	Flint Creek
Fort Peck Reservoir	Fred Burr Creek	Fresno Reservoir
Georgetown Lake	Gibbon River	Hauser Reservoir
Hebgen Reservoir	Holter Reservoir	Island Lake
Lake Elwell (Tiber Reservoir)	Lake Frances	Lake Koocanusa
Lake Marlin	Lake Mary Ronan	Lake McDonald
Lee Metcalf Pond NWR	Leigh Lake	Lower Stillwater Lake
Madison River	Martinsdale Reservoir	Medicine Lake NWR
Missouri River	Mountain View Lake	Mystic Lake
Nelson Reservoir	Ninepipes Pond NWR	Noxon Rapids Reservoir
Petrolia Reservoir	Prickly Pear Creek	Seeley Lake
Silver Creek	South Sandstone Reservoir	St. Mary Lake
Swan Lake	Thompson Falls Reservoir	Tongue River Reservoir
Upper Two Medicine	Waterton Lakes	Whitefish Lake
Yellowstone River near Powder River		

*2013 Montana Fishing Regulations located at fwp.mt.gov/fwpDoc.html?id=26334

4.5.4 Public Water Supplies

In 1974, Congress passed the Safe Drinking Water Act (SDWA), the first national legislation for drinking water. SDWA, and subsequent revisions, require EPA to adopt regulations establishing minimum requirements for drinking water quality and treatment. Primary standards protect public health by limiting the levels of contaminants in drinking water by setting maximum contaminant levels (MCLs). Public water systems must meet these requirements before water supplies can be used for public consumption. SDWA also requires owners of public water systems to notify their customers when violations of the regulations occur.

In 1986, in response to the growing concern over contamination of drinking water, Congress amended SDWA to significantly increase monitoring and treatment requirements. Although the 1986 amendments resolved many shortcomings in the original legislation, additional revisions were required to better prioritize and address health risks associated with drinking water. In August 1996, Congress again amended SDWA to address these issues. Included in the 1996 amendments is a requirement that states prepare an annual compliance report that describes the status of compliance of public water systems with SDWA. DEQ implements these requirements under an agreement with EPA.

DEQ's Public Water Supply Section regulates approximately 2,137 public water systems in Montana. DEQ has completed the compliance report for calendar year 2011, which lists and explains the number of SDWA requirement violations according to drinking water standards, water treatment requirements, or a water quality monitoring/reporting requirement. DEQ also lists violations according to the violated rule.

4.5.4.1 Public Water Systems in Montana

SDWA defines a public water system as one that provides drinking water to at least 15 service connections or serves at least 25 people for at least 60 days of the calendar year. As SDWA requires, DEQ regulates three types of public water systems:

- **Community (CWS) systems**. Public water systems that serve at least 25 year-round residents, such as in cities, towns, subdivisions, and trailer courts.
- **Non-transient non-community (NTNC) systems**. Public water systems that serve at least 25 of the same nonresident population for at least 6 months of the calendar year, such as schools and places of business.
- **Transient non-community (TNC) systems**. Public water systems that do not regularly serve at least 25 of the same persons for at least 6 months a year, such as restaurants, taverns, and campgrounds.

As of December 2012, there were 700 active CWS, 279 NTNCs, and 1,158 TNCs in Montana. They serve drinking water to approximately 1 million people daily. Since 1967, the Montana Water and Wastewater Operator Certification Law has required that community public water supply systems retain at least one individual that is fully certified and in compliance with state regulations. Similar requirements apply to operators of public wastewater treatment systems. The 1997 Montana Legislature amended this law, which took effect in July 1998, generally requiring operators of NTNC public water systems to be certified. In order to remain fully certified, Montana's water and wastewater system operators must have appropriate experience, pass specialized examinations, and obtain continuing education credits.

4.5.4.2 Drinking Water Quality in Montana

Most Montana residents have safe, potable drinking water. Many springs, wells, streams, and lakes that supply public drinking water receive flow from naturally protected mountain watersheds. Federal and state laws further protect surface water and groundwater sources against significant degradation. Some surface water sources serving the public are so pristine that disinfection is the only required treatment before consumption. Most groundwater sources are naturally protected against contamination and do not require treatment before use.

Because sight or smell cannot detect most contaminants in drinking water, owners of public water systems regularly submit water samples for extensive testing by certified laboratories. DEQ requires public water system owners to treat their water when they detect natural or manmade contaminants in water samples or when natural barriers do not adequately protect sources.

Since the establishment of SDWA in 1974, Montana residents have experienced a dramatic improvement in the quality of their drinking water. Further, the 1986 and 1996 amendments required increasingly stringent monitoring and treatment, resulting in drinking water that is much safer than in 1974. The public's increased awareness of water contamination, and its associated health effects, has helped to focus attention on public water supply issues.

4.5.4.2.1 Drinking Water Contaminants

Using MCLs, EPA regulates the presence of both chemical and natural contaminants in drinking water. The Chemical Phase Rules define regulations for three contaminant groups: inorganic chemicals, synthetic organic chemicals, and volatile organic chemicals. The presence of microbes, certain metals, radionuclides, and other factors are each regulated by their respective rules (discussed beginning in **Section 4.5.4.4.1**). The Four general categories of contaminants are found in drinking water are described below.

1. **Microbes**. These contaminants are primarily disease-causing microorganisms or microorganisms that indicate that other disease-causing organisms are present. Contaminated drinking water can transmit certain disease-causing organisms, such as viruses, bacteria, and protozoa, to humans. Although such problems are relatively rare, serious water-borne disease outbreaks still occur in the United States from improper disposal of human or animal wastes and from inadequate treatment of drinking water. All public water systems must sample regularly for coliform bacteria. Although coliform bacteria are not always a health risk, their presence in drinking water indicates that disease-causing microorganisms may be present. Public water systems must treat surface water sources before the water is suitable for human consumption. They may also treat groundwater sources for microbiological contaminants when lack of natural protection, or improper disposal of human or animal wastes, compromises the water sources.

2. **Inorganic chemicals (IOCs).** IOCs contain no carbon. Examples of regulated IOCs are arsenic, fluoride, lead, and nitrate. Inorganic contaminants can cause a wide variety of health effects, depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. High nitrate levels in drinking water can impair the transfer of oxygen to the blood in infants. High lead levels can impair intellectual development in children. Most of the inorganic (MCL violations in Montana are fluoride and nitrate violations.

3. **Organic chemicals.** Organic chemicals contain carbon. They fall into two broad categories: volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). Aerating or heating water can remove VOCs from water. Examples of VOCs are solvents such as perchloroethylene, toluene, and xylene. More complex technologies involving filtration or adsorption typically remove SOCs. Examples of SOCs are insecticides, herbicides, and polychlorinated bi-phenyls (PCBs). Organic contaminants can cause a wide variety of health effects, depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. Fortunately, DEQ has found few MCL violations for VOCs and SOCs.

4. **Radionuclides.** Radionuclides are radioactive contaminants found in drinking water, soils, and rocks as trace elements. These contaminants, such as radium, may occur naturally. Radionuclides in drinking water can cause cancer or toxic effects, depending upon the concentration and time of exposure. In 2012, there were 11 MCL violations for radionuclides in Montana, representing 3 public water supplies.

4.5.4.2.2 Surface Water Systems

Since 1974, filtration and disinfection of surface waters have been the most dramatic drinking water treatment improvements. Surface water is generally more susceptible to contamination than groundwater. Historically, public water suppliers inadequately treated many surface water sources because they lacked awareness of water-borne diseases, chemical contaminants, and contaminant health effects. The study of water-borne disease outbreaks, such as giardiasis and cryptosporidiosis, improved the collective knowledge and ultimately resulted in technological improvements for surface water treatment.

The primary objective in treating surface water is to remove or inactivate microbiological contaminants (e.g., viruses, bacteria, and protozoa) that can cause disease. Water contaminated with animal or human waste can transmit diseases to humans; therefore, adequate treatment of microbiological contaminants is essential in order to avoid acute health effects. People with compromised immune systems, such as infants, the elderly, the ill, and HIV-positive individuals, may be especially vulnerable to water-borne diseases.

Montana has 228 public water systems that use surface water as a primary or secondary source (**Figure 4-3**); groundwater under direct Influence of surface water (GWUDISW) is the source for 15 of these systems. For regulatory purposes, SDWA considers GWUDISW systems as surface waters. Of the 228 systems, 163 are “purchased,” meaning they rely on other water systems for their primary, or supplemental, water supply. Although relatively few, the largest public water systems in Montana use surface water and serve 450,991 people daily.

4.5.4.2.3 Groundwater Systems

Regular prescriptive sampling of groundwater sources serving the public in Montana has occasionally detected unacceptable levels of microbiological, inorganic, organic, and radiological contaminants. Natural flushing of contaminants through a groundwater aquifer can take many decades or hundreds of years. Microbiological contaminants can enter groundwater from leaking sewers and poorly constructed sewage lagoons or septic systems. Some inorganic and radiological contaminants (e.g., arsenic and radium) are naturally occurring. Most organic contaminants (e.g., solvents and pesticides) are manmade. Usually, organic contaminants in groundwater result from the improper use or disposal of chemicals.

Most public water systems in Montana use groundwater as a primary or secondary source; 1,909 public water systems in Montana use groundwater as their primary source **(Figure 4-3)**. These groundwater sources serve 575,554 people daily, which is about 58% of Montana’s population (989,415 per the 2010 Census). For this reason it is important that this critical groundwater resource be allocated and managed properly to conserve and protect it for current and future generations.

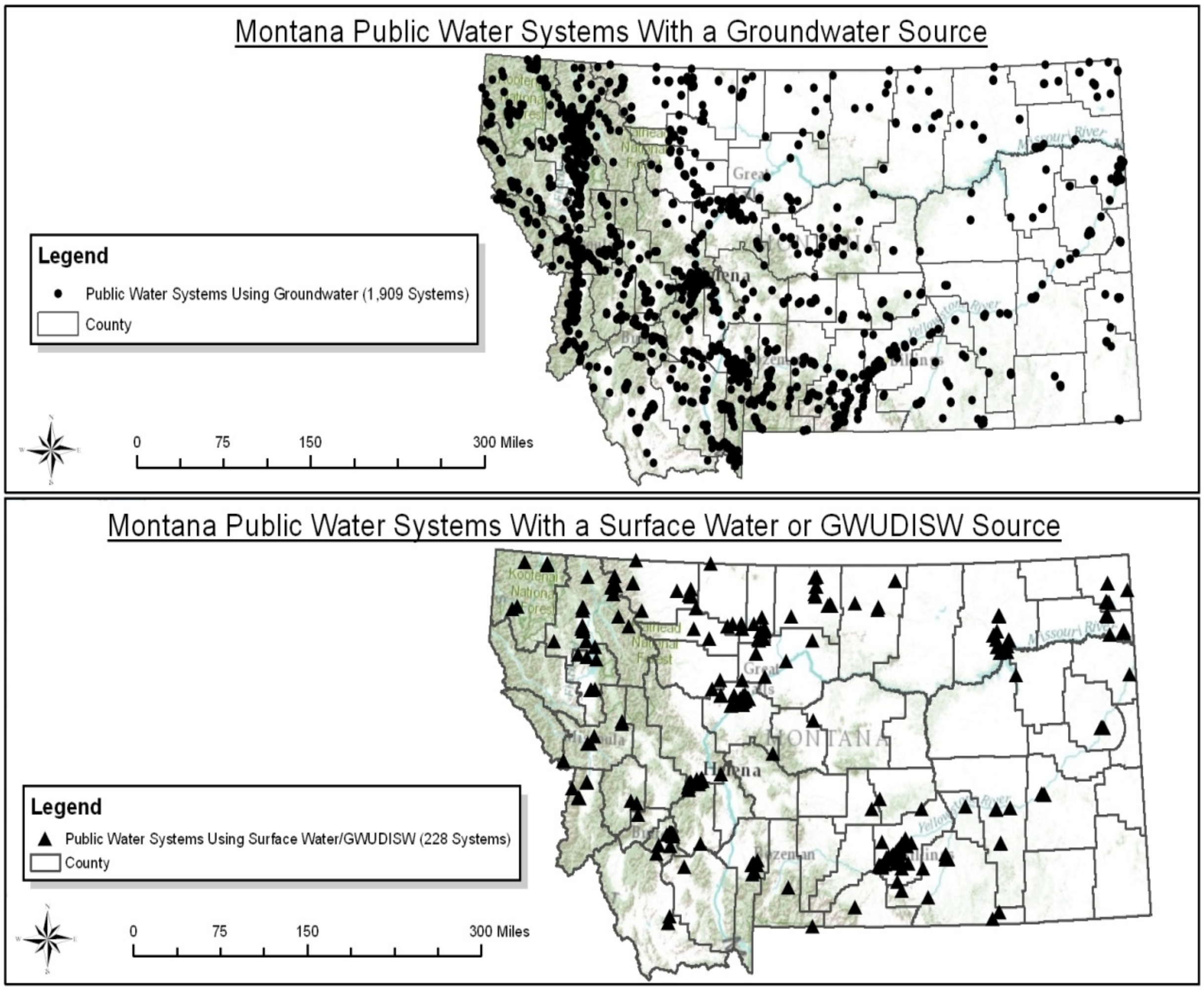

Figure 4-3. Distribution of Public Water Supply Sources in Montana

4.5.4.2.4 Regulations and Enforcement

Most water system owners are willing to comply with EPA and DEQ water quality monitoring regulations. Unfortunately, the complexity and comprehensiveness of the regulations have often confused water system owners. Since 1989, monitoring and treatment requirements have increased significantly. In 1993, several regulations imposed complex new requirements, which became effective nearly simultaneously. Many monitoring violations resulted, often simply because the regulations were difficult to understand. Since 2006, several new regulations have been implemented (e.g., Long Term Enhanced Surface Water Treatment Rule (LTESWTR), Stage 1 Disinfection Byproduct Rule (DBP Stage 1), Lead and Copper revisions, Ground Water Rule, Long Term 2 (LT2) and Stage 2 Disinfection Byproduct Rule (DBP Stage 2)). LTESWTR and LT2 have positive effects on drinking water quality by strengthening the filtered water requirements and increasing source water protection from cryptosporidium.

When public water system owners detect contaminants at unacceptable levels, or when they find their water treatment methods to be inadequate, they must notify the public. DEQ then requires appropriate corrective action to treat or abandon the affected water source(s). Owners must also notify the public when they don’t take required water samples.

When possible, DEQ or its contractors resolve violations informally; this could involve making phone calls or field visits, or offering on-site technical and compliance assistance. In these situations, the Montana Rural Water Systems or the Rural Community Assistance Corporation also provide technical assistance. DEQ resolves most violations informally by the willing cooperation of the water system owner. When violations are irresolvable, DEQ may initiate formal enforcement actions, such as administrative orders, to ensure public health protection.

Most water systems are in compliance with regulations, and typically violations result from late or missed water samples. In 2011 and 2012, these accounted for the most significant public water system violations, along with coliform bacteria contamination. In addition, the complexity of the consumer notice for lead in the lead and copper rule short-term revisions was problematic for water system owners.

All community water systems are required to provide consumer confidence reports to the state and their users annually by July 1. These reports contain water system data for the previous calendar year. The information must reflect general system logistics; any MCLs, exceedances, or contaminant detections; variances or exemptions; violations incurred; compliance actions taken; system updating (e.g., to treatment plants or service lines); and information on staying aware of drinking water quality.

4.5.4.3 Violations in 2011 and 2012

Section 1413 of the amended SDWA requires states to prepare annual compliance reports for public water systems. DEQ prepared its first compliance report for calendar year 1996. Subsequent compliance reports are due annually on July 1. Included in the report are the following violation types for national primary drinking water regulations:

- **MCLs.** MCLs are maximum levels of contaminants that are permitted in drinking water. According to federal and state regulations, drinking water containing contaminants at levels below the MCLs are safe for human consumption.
- **Treatment Requirements.** DEQ imposes treatment requirements when a public water system exceeds MCLs or when natural protection against contamination is inadequate to ensure safe drinking water without treatment.
- **Variances and Exemptions.** DEQ may issue variances when a public water system owner has installed treatment but those technologies are not effective in meeting MCLs. Variances impose further requirements for meeting MCLs or for installing alternative treatment. DEQ issues exemptions to allow additional time for the system to meet an MCL or treatment requirement. Public health effects and affordability are considered with variances and exemptions. In addition to imposing deadlines for system improvements, variances and exemptions require public notification. DEQ did not record any violations of variances or exemptions in 2012 and no variances or exemptions were issued.
- **Monitoring Requirements**. As previously discussed, regulatory requirements include extensive water sampling and testing. When public water system owners do not sample the water or do not submit test results to DEQ, a violation is issued. Most monitoring violations are resolved when sampling resumes, or when a public notice is posted, or when reports are finally submitted.
- **Reporting Requirements.** All community water system owners are required to provide a consumer confidence report to the state and its users each year. The owner remains in violation until he appropriately distributes the report.

4.5.4.3.1 Chemical Phase II and Phase V Rules

EPA's Chemical Phase II and Phase V Rules identified an additional 38 and 23 (respectively) problem chemical contaminants to the list and also included additional requirements for monitoring, reporting, and public notification. Monitoring frequency for VOCs, IOCs, SOCs, and nitrates/nitrites for community and non-transient non-community public water systems varies widely. Owners of all public water systems were required to sample for nitrate in 2011 and 2012. No systems reported MCL violations for VOCs or SOCs (**Tables 4-15** and **4-16**); 15 systems had MCL violations for IOCs in 2011 (**Table 4-15**), with 14 systems in 2012 (**Table 4-16**). Twelve systems in 2011 (**Table 4-15**) and 14 in 2012 violated the MCL for nitrate/nitrite (**Table 4-16**). Some of these were associated with naturally occurring contaminants, but most of the nitrate violations are likely the result of contamination from improper sewage disposal or agricultural practices.

In 2011, 27 water systems were in violation of monitoring requirements for VOCs, 32 for SOCs, 45 for IOCs, and 108 for nitrate/nitrite (**Table 4-15**). In 2012, 8 water systems were in violation of the monitoring requirements for VOCs, 26 for SOCs, 9 for IOCs, and 122 for nitrate/nitrite (**Table 4-16**). VOC and IOC monitoring violations included monitoring requirements due by the end of calendar year but were not reported by the due date. Monitoring violations resulted from late samples, missed samples, improper sampling procedures, reporting issues by the certified laboratories, or confusion over complex monitoring requirements. The lack of a certified operator for transient systems may have also lead to the failure for systems to monitor or report properly.

Table 4-15. Violations of Phase II and Phase V Rules 2011

Phase II and Phase V	MCL (mg/l)	MCLs		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
VOCs	Varies	0	0	34	27
SOCs	Varies	0	0	41	32
IOCs	Varies	33	14	81	45
NO_3/NO_2	10	19	12	121	108
Subtotal		**52**	**26**	**277**	**149**

Table 4-16. Violations of Phase II and Phase V Rules 2012

Phase II and Phase V	MCL (mg/l)	MCLs		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
VOCs	Varies	0	0	8	8
SOCs	Varies	2	1	38	25
IOCs	Varies	38	14	15	9
NO_3/NO_2	10	23	14	148	123
Subtotal		**63**	**28**	**209**	**152**

4.5.4.3.2 Total Coliform Rule

In 2012, 134 public water systems exceeded the MCL violations for total coliforms (**Table 4-18**), down from 173 in 2011 (**Table 4-17**). In 2011 and 2012, 11 and 7 MCL violations (respectively) resulted when a routine, or a repeat, sample showed the presence of fecal coliform bacteria (**Tables 4-17** and **4-18**). Fecal coliforms are a specific subgroup of total coliforms that grow only at the body temperature of warm-blooded mammals. They indicate whether fecal contamination of water is more likely to have recently occurred.

The Total Coliform Rule has two types of MCL violations:

1) A boil order (acute) is issued when coliform bacteria with fecal contamination is present.
2) A health advisory (non-acute) is issued when coliform bacteria is present but without fecal contamination. The system's routine and repeat samples provide the basis for MCLs. Common MCL violations include inadequately protected water sources or bacteria growth.

In 2012, 497 water systems were in violation of the routine monitoring requirements (**Table 4-18**), up from 341 systems in 2011 (**Table 4-17**). The violations resulted when owners did not submit monthly or quarterly samples.

Table 4-17. Violations of the Total Coliform Rule 2011

SDWIS Codes	Total Coliform Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
21	Acute MCL Violation	Fecal Coliform Bacteria Present	15	11		
22	Non-Acute MCL Violation	No Fecal Coliform Bacteria Present	236	167		
23, 25	Routine Monitoring				507	341
	Subtotal		**251**	**173**	**507**	**341**

Table 4-18. Violations of the Total Coliform Rule 2012

SDWIS Codes	Total Coliform Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
21	Acute MCL Violation	Fecal Coliform Bacteria Present	8	7		
22	Non-Acute MCL Violation	No Fecal Coliform Bacteria Present	183	251		
23, 25	Routine Monitoring				780	497
	Subtotal		**191**	**134**	**780**	**497**

4.5.4.3.3 Surface Water Treatment Rule

In 2011, two water systems failed to meet treatment technique requirements (filtration and disinfection), and two failed to install filtration treatment as DEQ requires (**Table 4-19**). In 2012, one water system failed to meet treatment technique requirements (filtration and disinfection), and all installed filtration treatment as DEQ requires (**Table 4-20)**. Treatment technique violations are typically the result of inadequate filtration or disinfection during times of high demand for water.

Table 4-19. Violations of the Surface Water Treatment Rule 2011

SDWIS Codes	Surface Water Treatment Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
	Filtered Systems				
36,38	Monitoring, Routine/Repeat			12	3
41, 43, 44	Treatment Techniques	3	2		
	Unfiltered Systems				
01	Turbidity MCL Single				
02	Turbidity MCL Average				
03	Turbidity Significant M/R				
31	Monitoring, Routine/Repeat			0	0
42	Failure To Filter	2	2		
	Subtotal	**5**	**4**	**12**	**3**

Table 4-20. Violations of the Surface Water Treatment Rule 2012

SDWIS Codes	Surface Water Treatment Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
	Filtered Systems				
36,38	Monitoring, Routine/Repeat			55	3
41, 43, 44	Treatment Techniques	1	1		
	Unfiltered Systems				
01	Turbidity MCL Single	0	0		
02	Turbidity MCL Average				
03	Turbidity Significant M/R				
31	Monitoring, Routine/Repeat				
42	Failure To Filter	3	3		
	Subtotal	**5**	**4**	**55**	**3**

4.5.4.3.4 Disinfection Byproducts Rule

The Stage 1 Disinfection Byproducts Rule went into effect on January 1, 2002, for surface water systems and groundwater systems that are under the direct influence of surface water serving populations ≥10,000. All surface and groundwater systems, including groundwater systems under the direct influence of surface water, that serve <10,000 people must comply with this rule effective January 1, 2006. In 2011 and 2012, nine and five water systems (respectively) exceeded the MCL for disinfection byproduct formations (DBPs) (**Tables 4-21** and **4-22**). DBPs result from source water conditions, DBP precursor removal, and operational conditions of the systems' water treatment plant. In 2012, 29 water systems violated monitoring requirements for DBPs (**Table 4-21**).

Table 4-21. Violations of the Disinfection Byproducts Rule 2011

SDWIS codes	Disinfection Byproducts Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
27	Monitoring, Routine/Repeat				14	7
11	Chlorine (0999) or Chloramines (1006) MRDL	4.0 mg/l			0	0
11	Chlorine Dioxide M&R		NA	NA	NA	NA
02	DBP MCL Average (Total TTHMs 2950)	0.08 ug/l	11	4		
02	DBP MCL Average (Total HAA5s, 2456)	0.06 ug/l	17	8		
	Subtotal		**28**	**9**	**14**	**7**

Table 4-22. Violations of the Disinfection Byproducts Rule 2012

SDWIS codes	Disinfection Byproducts Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
27	Monitoring, Routine/Repeat				44	29
11	Chlorine (0999) or Chloramines (1006) MRDL	4.0 mg/l			0	0
11	Chlorine Dioxide M&R		NA	NA	NA	NA
02	DBP MCL Average (Total TTHMs 2950)	0.08 ug/l	9	3		
02	DBP MCL Average (Total HAA5s, 2456)	0.06 ug/l	12	5		
	Subtotal		**21**	**5**	**44**	**29**

4.5.4.3.5 Lead and Copper Rule

In 2011, 155 water systems violated the Lead and Copper Rule monitoring requirements (**Table 4-23**); in 2012, 114 were in violation **(Table 4-24)**. Most of the violations were the result of late or missed samples or confusion over complex monitoring requirements. In 2011, 130 systems failed to provide required educational materials to the public about lead exceedances; 2012 had 66 such violations.

Table 4-23. Violations of the Lead and Copper Rule 2011

SDWIS Codes	Lead and Copper Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
51	Initial lead and copper tap M/R			6	4
52	Follow-up or routine lead and copper tap M/R			18	18
53	Follow-up or routine corrosion parameter M/R			57	6
57	Submit Treatment Plan	2	2		
58, 62	Treatment Installation	1	1		
65	Public Education	0	0		
66	Lead Consumer Notice			130	130
	Subtotal	**3**	**2**	**211**	**155**

Table 4-24. Violations of the Lead and Copper Rule 2012

SDWIS Codes	Lead and Copper Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
51	Initial lead and copper tap M/R	0	0	6	6
52	Follow-up or routine lead and copper tap M/R	0	0	43	43
53	Follow-up or routine corrosion parameter M/R	0	0	20	2
57	Submit Treatment Plan	8	8		
58, 62	Treatment Installation	1	1		
65	Public Education	0	0		
66	Lead Consumer Notice			67	66
	Subtotal	**9**	**9**	**136**	**114**

4.5.4.3.6 Radionuclide Rule

Only community water systems were required to sample for radionuclides every 4 years until changes to the rule took effect on December 7, 2003. At that time, DEQ adjusted schedules according to 3-, 6-, or 9-year compliance periods based on the historical data and/or the results received during the initial monitoring period. In both 2011 and 2012, three water systems exceeded the MCL each year (**Tables 4-25** and **4-26**).

Table 4-25. Violations of the Radionuclide Rule 2011

SDWIS Codes	Radionuclide MCLs	MCL (pCi/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
4010	Combined Radium 226/228	5 pCi/l	0	0	17	11
4000	Gross Alpha	15 pCi/l	2	1	14	10
4006	Uranium	30 mg/l	6	2	2	2
	Subtotal		**8**	**3**	**33**	**14**

Table 4-26. Violations of the Radionuclide Rule 2012

SDWIS Codes	Radionuclide MCLs	MCL (pCi/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
4010	Combined Radium 226/228	5 pCi/l	4	1	28	18
4000	Gross Alpha	15 pCi/l	0	0	30	19
4006	Uranium	30 mg/l	7	2	0	0
	Subtotal		**11**	**3**	**58**	**20**

4.5.4.3.7 Consumer Confidence Report Rule

Only community water systems must comply with the Consumer Confidence Report Rule. During 2011, 85 systems failed to meet the requirements of this rule, or they had open violations from previous years (**Table 4-27**). In 2012, 104 systems failed to meet the requirements (**Table 4-28**).

Table 4-27. Violations of the Consumer Confidence Report Rule (Violations for 2011 Consumer Confidence Report Rule, determined in 2012)

SDWIS codes	Consumer Confidence Report Rule	Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations
71, 72	Consumer Notification	112	85
	Subtotal	**112**	**85**

Table 4-28. Violations of the Consumer Confidence Report Rule (Violations of 2012 Consumer Confidence Report Rule, determined in 2013)

SDWIS codes	Consumer Confidence Report Rule	Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations
71, 72	Consumer Notification	153	104
	Subtotal	**153**	**104**

4.5.4.4 Summary and Conclusions

The violations referenced in the previous sections occurred during the period between January 1, 2011, and December 31, 2012. DEQ may have followed with enforcement or assistance actions. Typical enforcement actions include follow-up phone calls, technical assistance with compliance, violation notification letters, administrative orders, and/or violation and closure/resolution actions. There are currently no variances or exemptions (as defined by SDWA) in effect in Montana.

In 2000, DEQ adopted EPA's Safe Drinking Water Information System (SDWIS) for maintaining regulatory and compliance monitoring data. Since then, SDWIS modernization has improved DEQ's ability to detect and respond to violations, a trend that has resulted in improved compliance over time.

A significant portion of violations were a result of an incomplete understanding of the requirements or were technical violations that did not result in public health risks. However, a significant drop in violations has been recorded.

DEQ's Public Water Supply Section continually coordinates efforts with owners of public water systems to address the most significant violations. The most serious public health risks receive the highest priority. DEQ notifies owners when violations occur and informs them of corrective measures necessary for compliance. Through formal enforcement actions, the Public Water Supply Section and DEQ's Enforcement Division work together when necessary to return difficult violators to compliance.

In 1997, DEQ's Planning, Prevention, and Assistance Division implemented a program that offers low-interest loans to owners in need of water system improvements. Many systems have taken advantage of this funding program, and DEQ anticipates that these loans will assist in addressing many noncompliance issues. Interested parties may direct questions to DEQ's Technical and Financial Assistance Bureau.

4.5.5 Source Water Protection Program

Under the 1996 federal Safe Drinking Water Act (SDWA), Montana is required to carry out a Source Water Assessment Program. Montana's program is implemented by DEQ's Source Water Protection Section, which is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination. The major components are delineation and assessment, which apply to both existing and new public water supply sources.

Delineation is the process of evaluating geologic and hydrologic conditions to identify areas that contribute water to aquifers or to surface waters used for drinking water. Delineation creates source water protection areas.

Assessment is the process of identifying businesses, activities, or land uses that generate, use, store, transport, or dispose of certain contaminants in source water protection areas. The susceptibility to contamination from these sources is then estimated.

Delineation and assessment identify significant threats to drinking water supplies and provide suppliers of public water with the information they need to protect their water sources.

4.5.5.1 Authority

SDWA requires the state to conduct source water assessments for all public water systems. Additionally, the Montana Source Water Protection Program adopted the goals stated in the Montana Constitution and Montana's Water Quality Act (MWQA). The Constitution states: "The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations... [including] the protection of the environmental life support system from degradation..." (Article IX, Section 1). Further, MWQA states: "It is the policy of this state to conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies..."[40]

4.5.5.2 Funding

The program is funded by set-asides from the Drinking Water State Revolving Fund specifically earmarked for wellhead and source water protection.

4.5.5.3 Program Requirements

Section 1453 of SDWA[41] requires the state program to:

- **Identify the source(s) of water used by public water suppliers**

[40] 75-5-101, MCA
[41] 42 U.S.C. Section 300j-13

This process delineates capture zones for wells or stream buffer areas for surface water sources (i.e., the source water protection areas).

- **Identify and inventory potential contaminant sources**
  DEQ identifies potential significant contaminant sources within the source water protection area. Contaminants of concern generally include nitrate, microbes, solvents, pesticides, and metals—contaminants for which EPA has established MCLs. Potential sources of these contaminants include septic systems, animal feeding operations, underground storage tanks, floor drains, sumps, and certain land-use activities.
- **Assess the susceptibility of public water supplies to those identified as potential contaminant sources**
  A susceptibility assessment considers the hazard rating of a potential contaminant source against potential barriers between the contaminant source and the well or intake. The susceptibility assessment provides a rating of the likelihood that the drinking water source will become contaminated. DEQ estimates susceptibility for each identified potential contaminant source within a source water protection area.
- **Make the results of the delineation and assessment available to the public**
  DEQ maintains a source water delineation and assessment report for each public water supply, the availability of which should be described in the public water suppliers' consumer confidence reports. Also, the delineation and assessment reports are posted on DEQ's website and are available through each individual public water supply. Source water delineation and assessment reports help in developing local source water protection plans (SWPPs).

4.5.5.4 Source Water Assessment Implementation

Source water assessment reports were completed by DEQ staff, contractors, and volunteers from 1999 to 2006. Student interns completed non-community system assessment reports under the direction of a hydrogeologist from DEQ's Source Water Protection Section.

In addition to supporting other DEQ programs with projects that protect drinking water sources, the Source Water Protection Section continues to assess new systems and supports local source water protection. Implementing source water protection can range from recognizing public water suppliers' protection strategies to formally certifying SWPPs.

Substantial implementation of a source water protection strategy begins when a public water supply formally, or by default, concurs with its source water delineation and assessment report. That is, the public water supplier acknowledges the assessed level of susceptibility of its water source(s) and takes responsibility for managing the actions needed to maintain moderate or low susceptibility. Where susceptibility to contamination is moderate or low, water suppliers may not need to take additional protective action; DEQ considers them to have a protection strategy in place. Where a water supplier should act to reduce high susceptibility, that supplier acknowledges the need to develop one or more barriers to reduce susceptibility to contamination. When susceptibility to all significant potential contaminant sources identified in the source water assessment is moderate or low, DEQ considers that public water supplier to be "substantially" implementing a protection strategy.

DEQ's Source Water Protection Section developed these implementation definitions because they relate directly to susceptibility assessments (i.e., hazard ratings of potential contaminant sources tempered by barriers to an actual contamination event). Implementation is measurable and reportable through a database query. Using these definitions, DEQ may consider a public water supplier to be implementing a protection strategy without that supplier taking additional action. For example, this is appropriate when a well field location or aquifer conditions are adequate to protect the public water supply when the well is constructed. The Source Water Protection Program requests a 5-year inventory update from public water suppliers to address changing conditions that might affect susceptibility.

Additionally, public water suppliers may elect to complete a SWPP and ask DEQ to certify it. This increases the scope of the source water delineation and assessment report and incorporates elements such as emergency and contingency planning. Because the program is voluntary, and considerable time and expense is required to complete a plan, DEQ has certified relatively few SWPPs. In response to real and perceived threats to their water sources, several communities have become interested in SWPPs. Thus, a SWPP can be a planning step for communities in helping to protect their water sources.

5.0 Groundwater Monitoring and Assessment

Several state and federal agencies monitor and assess Montana's groundwater, including the Montana Bureau of Mines and Geology; Montana's departments of Environmental Quality, Agriculture and Natural Resources and Conservation; and the United States Geological Survey. **Section 5.1** contains results from the Montana Bureau of Mines and Geology's monitoring and assessment work, **Sections 5.2** and **5.3** report on other state and locally-managed groundwater protection programs in place under state law or federally delegated authorities.

5.1 Groundwater Resources in Montana

The quality and availability of groundwater varies greatly across Montana. Aquifers in western Montana are typically within unconsolidated valley-fill materials that coincide with stream valleys and intermontane valleys. Intermontane valley aquifers often yield relatively large quantities of high-quality water to relatively shallow wells. Because many wells are being constructed in intermontane basins, and development is encroaching on the basin margins of consolidated rock, fractured bedrock aquifers surrounding intermontane valleys have become important sources of domestic water.

Residents in eastern Montana commonly get groundwater from aquifers within unconsolidated alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations. The most used consolidated sandstone aquifers in eastern Montana include the Fort Union, Hell Creek, Fox Hills, Judith River, and Eagle formations. In some areas east of the Rocky Mountains, near-surface thick shale deposits, such as the Colorado Group and Bearpaw (Pierre) Shale, severely limit the economic availability of water to wells or provide water that is of too poor quality for most uses. Compared with aquifers in western Montana, aquifers in eastern Montana typically yield less water, and the water is more mineralized. In addition, the water in some eastern aquifers is suitable only for livestock consumption.

5.1.1 Groundwater Use

Montana's population relies heavily on groundwater. About 61% of the state's population get their drinking water from groundwater; about 32% get their drinking water from private wells. The Montana Ground Water Information Center (GWIC) database contains more than 213,000 water-well records. Since 1975, Montanans have constructed more than 104,500 domestic wells, 11,900 livestock wells, and about 5,900 irrigation wells.

Groundwater sources provide 2% to 3% (about 283 million gallons per day (mgpd)) of the 10,111 mgpd of fresh-water withdrawals in Montana (U.S Geological Survey: Estimated Use of Water in the United States in 2005, http://water.usgs.gov/watuse/[42]).

The largest withdrawals of groundwater are for:

- drinking – 89 mgpd
- irrigation – 140 mgpd
- industrial – 37 mgpd
- livestock – 12 mgpd

[42] Accessed 9/1/2013

Groundwater use is highest in western Montana, where the predominant uses are domestic and irrigation supported by high-yield aquifers. Use for livestock is common throughout Montana but is most prevalent in eastern counties, where ranching is an important industry.

5.1.2 Groundwater Assessment, Investigations, and Monitoring

The 1991 Montana Legislature established the Montana Ground Water Assessment Program, directing the Montana Bureau of Mines and Geology (MBMG) to characterize Montana's hydrogeology and to monitor long-term water level conditions and water chemistry. The characterization and monitoring programs allow MBMG to systematically evaluate Montana's aquifers and collect long-term water level and water quality data. In 2009, the Montana Legislature established the Ground Water Investigation Program within the MBMG to conduct detailed groundwater investigations in areas with the most serious concerns. The GWIC database (http://mbmggwic.mtech.edu) maintains and distributes data generated by the assessment, investigations, and monitoring programs as well as data generated by many other groundwater projects.

5.1.3 Groundwater Contaminants and Contamination Sources

The water chemistry data evaluated for this report were collected between July 1, 2010, and June 30, 2013, by the groundwater monitoring, assessment, and investigations programs (663 samples) and other MBMG programs (143 samples) within specific study areas (**Figure 5-1**). Of the 806 samples evaluated for this report, 56% came from unconsolidated aquifers (**Figure 5-2**).

To be included in the dataset, the water quality sample must

- have been collected between July 1, 2010, and June 30, 2013
- have an identifiable geologic source and represent "ambient" water quality (i.e., not collected as part of an effort to determine the extent of contamination by the evaluated parameter)
- have come from a well or spring

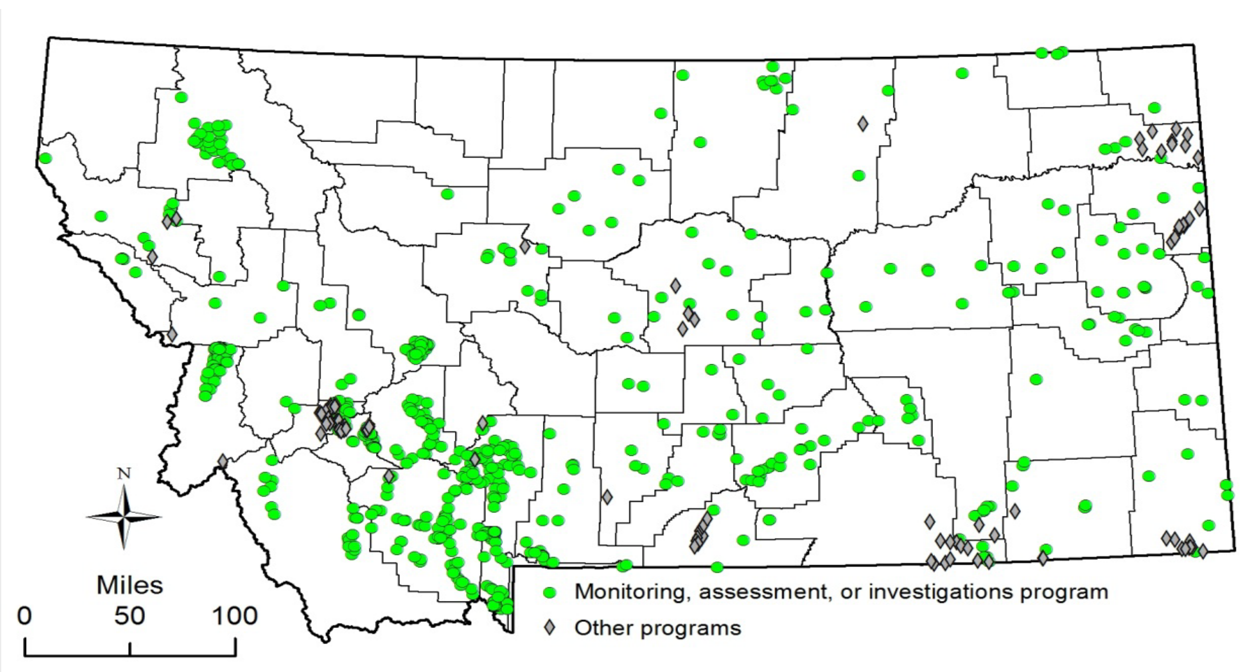

Figure 5-1. Groundwater monitoring well and spring locations by data source

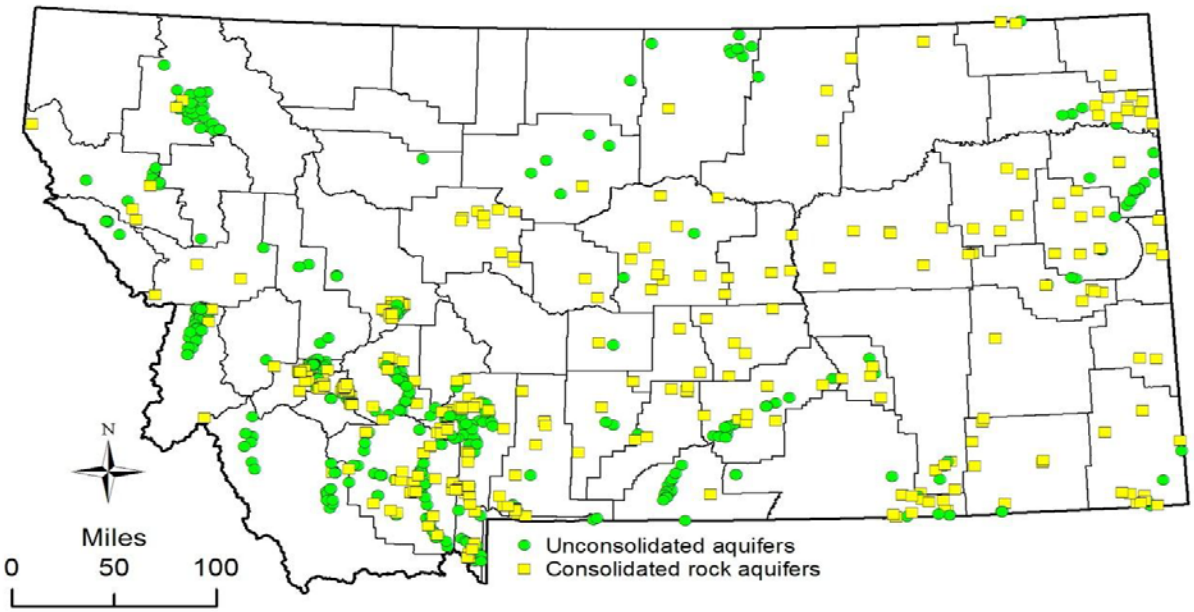

Figure 5-2. Distribution of samples from wells and springs completed in unconsolidated and consolidated aquifers

If a well or spring was sampled more than once between July 2010 and June 2013, data were included either from the most recent or the most complete analysis. For example, if a well was sampled for common ions (including nitrate) and trace metals but later sampled only for nitrate, the complete analysis was retained and the single nitrate result was not used. Numerous samples collected from closely spaced wells also received special treatment. If more than four samples in the same quarter-section from wells completed in the same aquifer were found in the database, the sample with the median total dissolved solids was selected.

The final number of analytical results available depended on the parameter. There were 770 complete analyses for which total dissolved solids could be calculated and trace metal data extracted; however, there were 806 samples available for nitrate.

Below we cite various parameters for maximum contaminant levels (MCLs), secondary maximum contaminant levels (SMCLs), or Montana Department of Environmental Quality adopted standards (Circular DEQ-7). MCLs refer to the maximum level of a constituent allowed in public drinking water supplies as established by EPA (2009)[43] and are set to ensure that the contaminant does not pose significant risk to public health. MCLs are legally enforceable standards that apply to public water systems. SMCLs are non-enforceable guidelines for contaminants that may cause unpleasant cosmetic effects (e.g., skin or tooth discoloration) or affect the aesthetics of drinking water (e.g., taste, odor, or color). Adopted by DEQ for the parameters discussed below, Circular DEQ-7 standards mostly, but not always, match each parameter's MCL or SMCL. If a numeric DEQ-7 value is available, but it differs from a parameter's MCL or SMCL, the DEQ-7 value is compared with concentrations in the sample sets.

Total Dissolved Solids: About one-third of the 770 samples for which total dissolved solids were reported contained concentrations greater than 500 mg/L. One hundred fifty-nine of these samples

[43] Website accessed November 29, 2011.

were from consolidated rock aquifers located east of the Rocky Mountains and around the edges of intermontane valleys in western Montana; 97 samples were from unconsolidated aquifers in western Montana valleys and along major drainages in eastern Montana. More than 75% of samples from unconsolidated aquifers contained less than 500 mg/L, but 6% contained more than 2,000 mg/L total dissolved solids. In contrast, only about 54% of the samples from consolidated rock aquifers contained less than 500 mg/L total dissolved solids. Eleven percent of samples from consolidated aquifers with total dissolved solids had concentrations greater than 2,000 mg/L.

Nitrate: The nitrate (as N, nitrate-nitrogen) data represents results from 806 water samples (**Table 5-1**). About 43% of all samples contained nitrate concentrations of less than 0.25 mg/L; about 80% of all samples contained concentrations of less than 2 mg/L. About 93% of all samples contained less than 5 mg/L; however, 2% of the samples contained concentrations greater than 10 mg/L. The median nitrate concentration for all samples was 0.4 mg/L. The median concentration in samples from unconsolidated aquifers was 0.7 mg/L; the median concentration for samples from consolidated aquifers was 0.2 mg/L.

Table 5-1. Nitrate-nitrogen concentrations in 868 samples

Nitrate-nitrogen mg/L	Unconsolidated aquifers	%	Consolidated aquifers	%	All aquifers	%
<0.25	151	33	193	55	344	43
≥ 0.25 and < 2.0	200	44	101	29	301	37
≥ 2.0 and < 5.0	71	16	35	10	106	13
≥ 5.0 and < 10.0	18	4	17	5	35	4
≥ 10.0	13	3	7	2	20	2
Total	453	100	353	100	806	100

*Percentages do not sum to 100 because of rounding.

There were 453 nitrate-nitrogen results available for samples from unconsolidated aquifers and 353 results from consolidated rock aquifers. Unconsolidated and consolidated aquifers differed little in the percentages of samples at specific nitrate concentrations.

Fluoride: Analytical results for fluoride in 770 samples showed concentrations between 0.1 and 2.0 mg/L in about 80% of the samples. However, at concentrations greater than 2 mg/L (50% of the 4 mg/L DEQ-7 and MCL standards), water from consolidated rock aquifers generally contained more fluoride than did water from unconsolidated aquifers. Sixteen percent of the samples from consolidated rock aquifers exceeded 2.0 mg/L; only about 7% of the water samples from unconsolidated aquifers contained similar concentrations. Exceeding the MCL were 3% of the samples from unconsolidated aquifers and 5% of the samples from consolidated rock aquifers.

Sulfate: Sulfate is rarely absent in groundwater, and only about 2% of the samples did not contain detectable concentrations. About 19% of the 770 samples contained sulfate concentrations greater than the secondary drinking water standard of 250 mg/L. Sixty-seven percent of the samples contained sulfate concentrations of less than 125 mg/L (50% of the secondary standard).

Water samples from unconsolidated aquifers had slightly lower sulfate concentrations than samples from consolidated rock aquifers. Seventy-seven percent of the samples from unconsolidated aquifers contained sulfate concentrations of less than 125 mg/L; only 57% of the water samples from consolidated rock aquifers contained sulfate concentrations below that level. Fourteen percent of the samples from unconsolidated aquifers contained sulfate concentrations greater than 250 mg/L, but 25% of the samples from consolidated aquifers exceeded the secondary standard.

Chloride: In about 91% of the 770 samples, chloride concentrations were less than 63 mg/L (25% of the secondary standard of 250 mg/L). Only 0.5% of the samples from unconsolidated aquifers and 1.4% of the samples from consolidated rock aquifers contained greater than 250 mg/L chloride. Chloride is commonly present at low concentrations in natural water, and the secondary standard is high compared with chloride concentrations in most of the samples.

About 54% of samples contained chloride concentrations of less than 10 mg/L. About 37% of the samples contained more than 10 mg/L but less than 63 mg/L. The median concentration of chloride for all the samples was 8.3 mg/L. The median concentration in unconsolidated aquifers was 7.7 mg/L; the median concentration in consolidated rock aquifers was 9.0 mg/L.

Metals: Analytical results for trace metals for 770 samples are available for the July 2010 – June 2013 period. The distribution of trace-metal concentration relative to Circular DEQ-7 standards and primary or secondary MCLs (**Table 5-2**) shows that aluminum, antimony, barium, beryllium, cadmium, lead, nickel, selenium, thallium, uranium, and zinc were present in concentrations above their standards but in only 0.1% to 4% of samples. Arsenic was the exception, where about 11% of samples contained >10 µg/L. The percentage of samples that contained concentrations of any metal between the detection limit and 50% of its standard ranged from 78% for arsenic to 100% for chromium and silver.

Table 5-2. Distribution of trace-metal sample concentrations based on DEQ-7 standards and MCLs or SMCLs established for public drinking water supplies

	DEQ-7, MCL, or SMCL standard (µg/L)	Total Samples	Samples with either a reported value or a non-detect ≤ the standard	Percent samples below 50% of the standard	Percent >50% and <100% of the standard	Percent >100% of the standard
Aluminum*	50 (s)	770	741	87.8	8.4	3.8
Antimony	6 (p, d)	770	765	99.4	0.0	0.6
Arsenic	10 (p, d)	770	685	78.1	10.9	11.0
Barium	1,000 (d)	770	769	99.9	0.9	0.1
Beryllium	4 (p, d)	770	770	99.1	0.9	0.0
Cadmium	5 (p, d)	770	768	99.7	0.0	0.3
Chromium	100 (p, d)	770	770	100.0	0.0	0.0
Copper	1,300 (d)	770	770	99.9	0.0	0.0
Lead	15 (d)	770	769	99.7	0.1	0.1
Nickel	100(d)	770	769	99.9	0.0	0.1
Selenium	50 (p, d)	770	762	98.4	0.5	1.0
Silver	100 (s, d)	770	770	100.0	0.0	0.0
Thallium	2 (p, d)	770	764	96.9	2.3	0.8
Uranium	30 (p, d)	770	741	88.4	7.8	3.8
Zinc	2,000 (d)	770	768	99.2	0.5	0.3

*Aluminum has been associated with discoloration of drinking water following treatment, and the SMCL is sometimes given as a range between 50 and 200 µg/L to allow states to address local conditions. The 50 µg/L minimum was used here for comparison. (p) = primary drinking water standard. (s) = secondary drinking water standard. (d) = DEQ-7 standard. Detection limits were as follows (µg/L): Al = 0.1-79.0, Sb = 0.05-5.4, As = 0.1-6.4, Ba = 0.1-1.3, Be = 0.1-2.1, Cd = 0.1-4.5, Cr = 0.04-6.6, Cu = 0.04-16.2, Pb = 0.05-7.3, Ni = 0.08-7.1, Se = 0.05-8.3, Ag = 0.04-10.0, Tl = 0.02-2.0, U = 0.01-6.9, and Zn = 0.04-36.4. For any parameter, non-detect results with detection limits above the MCL or SMCL were not included.

Arsenic: Based on 770 samples, almost all of Montana's groundwater contains arsenic, but 89% of the samples contained arsenic concentrations of less than 10 µg/L. The distribution of arsenic concentration does not vary widely between consolidated and unconsolidated aquifers **(Table 5-3)**. Additionally, 31% of the samples from unconsolidated aquifers and 31% of the samples from consolidated aquifers contained concentrations >3 µg/L.

Table 5-3. Arsenic concentrations in 815 samples

Arsenic µg/L	Unconsolidated aquifers	%	Consolidated aquifers	%	All aquifers	%
< 1	176	42	155	44	331	43
≥ 1 and < 3	111	26	90	26	201	26
≥ 3 and < 10	83	20	70	20	153	20
≥ 10 and < 25	30	7	20	6	50	6
≥ 25 and < 50	14	3	10	3	24	3
≥ 50	5	1	6	2	11	1
Total	419	*100	351	*100	770	*100

*Percentages do not sum to 100 because of rounding.

Radon: Analytical results from samples collected between August 1992 and July 2013 provide data for radon concentrations in groundwater. Since July 1, 2010, 105 of the 783 samples were collected. About 82% of samples contained radon at concentrations exceeding the DEQ-7 standard of 300 pCi/L for groundwater. The frequency distribution did not vary widely between consolidated rock and unconsolidated aquifers, although highest radon concentrations were in water from igneous intrusive rock aquifers, such as the Boulder Batholith in southwestern Montana. **Table 5-4** lists the frequency distribution of radon concentrations compared with the DEQ-7 standard of 300 pCi/L.

Table 5-4. Radon concentration distribution in 744 samples based on the DEQ-7 standard of 300 pCi/L

Radon pCi/L	Unconsolidated aquifers	%	Consolidated aquifers	%	All aquifers	%
< 50	5	1	12	4	17	2
≥ 50 and < 150	13	3	24	8	37	5
≥ 150 and < 300	42	9	45	14	87	11
≥ 300	404	87	238	75	642	82
Total	464	*100	319	*100	783	*100

*Percentages do not sum to 100 because of rounding.

5.2 Groundwater Management Strategy

DEQ allocates fewer resources for groundwater protection through public awareness and education than it does for surface water and wetlands. This is a concern because groundwater supplies drinking water for most public and private users in Montana and because contaminated groundwater is difficult to clean up. The rate and scale of groundwater degradation is increasing for several reasons, including the increasing use of septic systems associated with growth and development, and increased agricultural use of groundwater for irrigation and livestock watering as a result of basin closures for surface water rights. Increased groundwater use for irrigation and livestock can potentially reduce recharge and increase the negative effects of fertilizers, pesticides, and animal wastes to groundwater, since these pollutants move through the soil and ultimately end up in groundwater.

5.2.1 Protection Strategy

As part of their daily business, several DEQ bureaus and other state agencies address many of the protection strategies laid out in the Montana Groundwater Plan (Montana Department of Natural Resources and Conservation, 1998). As of 2010, there is no overall coordination of groundwater stewardship and protection activities within Montana. Multiple agencies are responsible for implementing various groundwater protection strategies. In 2005, DNRC began efforts to identify stakeholders, update the groundwater plan, and coordinate a strategy. The process is ongoing.

5.2.2 Remediation Strategy

The DEQ Remediation Division is responsible for overseeing investigation and cleanup activities at state and federal Superfund sites; reclaiming abandoned mine lands; implementing corrective actions at sites with leaking underground storage tanks; and overseeing groundwater remediation at sites where agricultural and industrial chemicals have caused groundwater contamination. These activities are intended to protect human health and the environment; to prevent exposure to hazardous or harmful substances that these sites release to soil, sediment, surface water, or groundwater; and to ensure compliance with applicable state and federal regulations.

Under MWQA, the Groundwater Remediation Program regulates sites with groundwater contamination not otherwise addressed by the Leaking Underground Storage Tank Program, the Comprehensive Environmental Cleanup and Responsibility Act (CECRA) Program, the Permitting and Compliance Division, or other state authorities. These sites typically require long-term soil, surface water, and/or groundwater remediation and monitoring.

The program oversees remediation at sites contaminated with petroleum, pesticides, metals, nutrients, salts, and solvents. These sites range in scale from small (not on National Priority List (NPL)) to large (on NPL). The program ranks them as maximum, high, medium, or low priority sites or as operation and maintenance sites (Montana Department of Environmental Quality, 1996). Currently, the Groundwater Remediation Program is actively working on 89 sites, coordinating remediation activities with the Montana Department of Agriculture when pesticides affect groundwater.

5.2.3 Local Water Quality Districts

Communities establish Local Water Quality Districts (LWQD) to protect, preserve, and improve the quality of surface water and groundwater within their districts. Currently, there are four in Montana. Lewis and Clark County established the state's first LWQD in 1992 covering the Helena valley watershed. A year later, Missoula County set up an LWQD covering the Missoula Valley Sole Source Aquifer. Butte/Silver Bow established an LWQD in 1995. Gallatin County formed an LWQD covering the Gallatin Valley at Bozeman in 1997, which was expanded in 2010 to the west, south, and north.

LWQDs are formed by county governments under 7-13-4501 *et. seq.*, MCA. This legislation describes district organization and specifies local-level authorities. DEQ provides support to LWQD programs and oversight to ensure they meet the intent of the authorizing code but does not have an active management role in their activities. These groups serve as local government districts with a governing board. They are funded by fees collected annually with county taxes, similar to funding mechanisms for other county districts.

Each district must prepare a report to summarize yearly activities. Reports describe district activities and allow for DEQ assessment of each LWQD in meeting their program objectives. The DEQ Source Water Protection Program reviews the annual reports.

A significant opportunity to LWQDs is the ability to participate in enforcement of MWQA and related rules. Districts may develop and implement local water quality protection ordinances, and may request enforcement authority for MWQA in conjunction with DEQ's Enforcement Division.

DEQ works with the districts to support implementation of a source water protection program at public water systems within district boundaries. All the districts meet annually to review programs and activities and generally share ideas about how each district approaches and manages local water quality related issues. DEQ participates in planning for these meetings.

5.2.4 Prevention of Agriculture Chemical Pollution

In 1989, the Montana Agricultural Chemical Ground Water Protection Act was passed[44]. Section 103 states that it is the policy of the state to: protect groundwater and the environment from impairment or degradation resulting from the use of agricultural chemicals including all pesticides and nitrogen fertilizers; allow for the proper and correct use of agricultural chemicals; provide for the management of agricultural chemicals to prevent, minimize, and mitigate their presence in groundwater; and provide for education and training of agricultural chemical applicators and the public on groundwater protection, agricultural chemical use, and the use of alternative agricultural chemicals. Under the act, the Ground Water Protection Program of the Technical Services Bureau of the Montana Department of Agriculture (MDA) must monitor the occurrence and concentration of agricultural chemicals in Montana's waters.

MDA is also responsible for the state's Generic Management Plan (GMP), which provides guidance for the state to prevent groundwater impairment from agricultural chemicals, including pesticides and fertilizers not directly related to agriculture (Montana Department of Agriculture, 1998).

5.2.4.1 Groundwater Monitoring & Education

MDA conducts ambient groundwater monitoring for agricultural chemicals. The program determines whether residues of agricultural chemicals are present in groundwater and assesses the likelihood of an agricultural chemical entering groundwater. If MDA finds agricultural chemicals in groundwater, they will verify, investigate, and determine an appropriate response.

The program has a permanent network of 42 monitoring wells. In addition, investigative and special projects are conducted in vulnerable areas, watersheds, and urban environments. Permanent monitoring wells serve as the foundation from which MDA looks for current and new agricultural chemicals. MDA selects sites to represent agricultural crops and cropping as well as their associated pesticide use. Monitoring wells are located in 31 of Montana's 56 counties. The department also evaluates new chemicals when labeled for use in Montana as analytical methods are established.

MDA has an education program which conducts initial and re-certification training for applicators of commercial and government pesticides. The program staff is available to provide or assist in training and education for the public regarding pesticides.

[44] 80-15-101 et seq., MCA

5.2.4.2 Statewide Groundwater/Pesticide Projects

The MDA Groundwater Program has prioritized watersheds around the state for conducting 1-year monitoring projects. Sites are selected based on agricultural setting, soil type, groundwater table, and sampling availability of the wells. These projects provide a snapshot of pesticide and nitrate levels in the groundwater, usually associated with a surface water source, such as a river system. From 2010 through 2012, MDA investigated groundwater in Billings, Kalispell, the Summit valley, the Missoula aquifer, the Clear Lake aquifer, the upper Musselshell basin, terrace gravels along the Rocky Mountain Front, and the Flaxville Formation.

5.2.4.3 Groundwater Enforcement Program

MDA is responsible for primary enforcement of the Montana Agriculture Chemical Ground Water Protection Act, while DEQ is responsible for adopting water quality standards for agricultural chemicals (pesticides and fertilizers). MDA ensures compliance by conducting statewide comprehensive inspections of agricultural chemical users, dealers, and manufacturers; by collecting groundwater and soil samples; and by investigating and monitoring incidents and spills that could impair groundwaters. Where necessary, MDA implements compliance actions and orders to prevent or remediate agricultural chemical groundwater problems.

5.3 Groundwater – Surface Water Interactions

The 1986 provisions of the Safe Drinking Water Act introduced the Surface Water Treatment Rule (SWTR). The rule requires the application of filtration and treatment techniques for public water systems that use surface water or groundwater under the direct influence of surface water (GWUDISW). SWTR requires each state to assess all public water suppliers that use groundwater to determine whether their sources are GWUDISW. DEQ performs these assessments under the GWUDISW program.

SWTR defines surface water under the influence of groundwater as

- significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or Cryptosporidium, or
- significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH that closely correlates to climatological or surface water conditions.

The initial step in the GWUDISW program is completion of a preliminary assessment (PA) per DEQ Circular PWS-5 (Montana Department of Environmental Quality, 2008a). The PA evaluates and assigns a score to the source based on the location of the source relative to surface water and information on the driller's log. Consequently, sources often fail the PA (scores ≥ 40) because of substandard or unknown well construction. DEQ completes a further assessment of the source after it has failed the PA. In some cases DEQ has exercised the option of contracting MBMG to perform a detailed hydrogeologic assessment, which is often associated with spring sources or complex hydrogeologic situations.

6.0 Review of Montana's Assessment Process and Assessment Data

The DEQ Water Quality Planning Bureau is constantly working to improve its assessment, data management, and reporting abilities and systems. The following sections describe the current state of program improvements; in addition, we report cases where errant data was discovered and corrected.

6.1 Water Quality Assessment Method – Quality Assurance Program Review

DEQ has developed assessment methods for nutrients, sediment, and metals pollutant groups, which represent the most common pollutants impairing Montana's surface waters. Each pollutant method provides the framework for conducting sound and consistent water quality assessments, which will allow DEQ to make reproducible and defensible beneficial-use support (i.e., 303(d) listing) decisions.

The pollutant-based assessment methods have specific objectives and decision-making criteria for assessing the validity and reliability of data. The methods use a Data Quality Assessment (DQA) process to evaluate data for use in assessments. The DQA process considers the technical, representativeness, currency, quality, and spatial and temporal components of readily available data and information for each of the data types (biological, chemical, and physical/habitat) and is conducted individually per beneficial use and pollutant group (e.g., Aquatic Life – Nutrients).

DEQ's assessment method documentation can be accessed from the Water Quality Planning Bureau's Quality Assurance web page at: http://deq.mt.gov/wqinfo/QAProgram/default.mcpx. This site includes the most current assessment methods being applied as well as the older method applied to assessments conducted between 2000 and 2008 that have yet to be updated.

6.2 Data Management Activities

As a result of our improved data management system for Clean Water Act section 305(b) reporting, the program is better able to visualize assessment data and their relationships. The program has identified inconsistencies or data entry errors that were resolved or corrected to better represent water quality assessment decisions. The program goal is to improve reporting abilities, clarify assessment data and related information, and make transparent the assessment process for stakeholders and interested parties.

6.2.1 Assessment Unit (AU) Metadata and Data Entry Errors Corrected

During data management activities and 2014 report development, we discovered and corrected some basic data entry and GIS indexing errors. In addition, we revised some Assessment Unit (AU) location descriptions, either to improve clarity or to ensure that all descriptions run upstream to downstream (**Table 6-1**).

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT39G002_010	Lamesteer National Wildlife Refuge	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 80 acres to 73.6 acres based on NHD
MT40A005_010	Deadmans Basin Reservoir	Size	Changed size from 1,903 acres to 1,849.1 acres based on NHD.
MT40A005_020	Lebo Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 314.1 acres to 310.9 acres based on NHD
MT40A005_030	Martinsdale Reservoir	Size	Changed size from 984.9 acres to 951.6 acres based on NHD.
MT40A005_040	Bair Reservoir	Size	Changed size from 228.3 acres to 221.2 acres based on NHD.
MT40B002_020	Chicago Gulch	Name & Location Description	Changed from CHICAGO GULCH, headwaters to mouth (Fords Creek) to FORDS CREEK, headwaters in Chicago Gulch to East Fork Fords Creek
MT40B002_030	Collar Gulch	Name	Changed from COLLAR GULCH to COLLAR GULCH CREEK
MT40B004_010	War Horse Lake	Size	Changed size from 1,440 acres to 1,337.8 acres based on NHD.
MT40B004_020	Wild Horse Lake	Size	Changed size from 1,600 acres to 1,422.3 acres based on NHD.
MT40E004_010	Fort Peck Reservoir	Size	Changed size from 245,000 acres to 233,295.8 acres based on NHD.
MT40F003_010	Milk River	Location Description	Revised to: MILK RIVER, Canada border to Fresno Reservoir
MT40G001_011	Sage Creek	Endpoints	Changed downstream endpoint to 48.84/-110.579
MT40G001_012	Sage Creek	Location Description & Endpoint	Revised to: SAGE CREEK, Confluence of Russell Creek T36N R9E S32 to mouth (Big Sandy Creek). Moved upstream endpoint to 48.84/-110.579,
MT40I001_030	Big Horn Creek	Name	Changed to SOUTH BIG HORN CREEK
MT40J001_012	Milk River	Location Description	Revised to: MILK RIVER, Thirtymile Creek to Dobson Creek
MT40J001_013	Milk River	Location Description	Revised to: MILK RIVER, Dobson Creek to Whitewater Creek
MT40M001_020	Beaver Creek	Location Description	Revised to: BEAVER CREEK, Un-named tributary at T30N R32E S32 to mouth (Milk River)
MT40M003_010	Lake Bowdoin	Size	Changed size from 3,500 acres to 3,932.2 acres based on NHD.
MT40M003_020	Nelson Reservoir	Size	Changed size from 3,901.7 acres to 4,112.5 acres based on NHD.
MT40O002_032	Halfpint Reservoir	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 34 acres to 30.4 acres based on NHD
MT40Q001_011	Poplar River	Location Description	Revised to: POPLAR RIVER, confluence of East & Middle Fork to Fort Peck Reservation boundary, T33N R48E S12
MT40Q001_012	Middle Fork Poplar River	Location Description	Revised to: MIDDLE FORK POPLAR RIVER, headwaters (confluence of Lost Child & Goose Creeks) to the mouth (Poplar River)

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT40Q002_030	West Fork Poplar River	Location Description	Revised to: WEST FORK POPLAR RIVER, Canadian border to Fort Peck Reservation boundary
MT40R003_010	Medicine Lake	Size	Changed size from 8,599 acres to 9,726.1 acres based on NHD.
MT40R003_020	Homestead Lake	Size	Changed size from 1,280 acres to 1,183.6 acres based on NHD.
MT41A002_010	Clark Canyon Reservoir	Size	Changed size from 4,888 acres to 4922.1 acres based on NHD.
MT41A005_020	Lower Red Rock Lake	Size	Changed size from 1,126 acres to 2,217.5 acres based on NHD.
MT41A005_030	Upper Red Rock Lake	Size	Changed size from 2,206.1 acres to 2,947 acres based on NHD.
MT41B002_131	Stone Creek	Location Description	Revised to: STONE CREEK, Un-named tributary at T6S R7W S34 to Staudaher Bishop Ditch
MT41B002_132	Stone Creek	Location Description	Revised to: STONE CREEK, Left and Middle Fork to un-named tributary, T6S R7W S34
MT41B002_160	Steel Creek	Location Description & Endpoint	Revised to: STEEL CREEK, headwaters to mouth (Driscoll Creek), T6S R12W S18. Moved downstream endpoint to 45.309/-113.112
MT41C004_010	Ruby River Reservoir	Size	Changed size from 970.1 acres to 949.1 acres based on NHD.
MT41D001_020	Big Hole River	Location Description	Revised to: BIG HOLE RIVER, Pintlar Creek to Divide Creek
MT41D003_090	Sixmile	Name	Revised to: Sixmile Creek
MT41D005_080	Lake Agnes	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 98.8 acres to 108.7 acres based on NHD
MT41E002_110	McCarthy Creek	Name	Revised to: McCarty Creek
MT41F002_030	Hot Springs Creek	Endpoints & Length	Moved upstream endpoint to 45.555/ -111.807, changing length to 14 mi.
MT41F004_020	O'Dell Spring Creek	Endpoint & Length	Moved upstream endpoint to 45.2605/-111.7322 changing length to 13.19 mi.
MT41F004_050	Jack Creek	Location Description	Revised to: JACK CREEK, headwaters to mouth (Madison River, T5S R1W S23)
MT41F005_010	Hebgen Lake	Size	Changed size from 12,667.9 acres to 12,407 acres based on NHD.
MT41F005_020	Quake Lake	Size	Changed size from 600 acres to 614.3 acres based on NHD.
MT41F005_030	Ennis Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 3,780.8 acres to 3,757.8 acres based on NHD
MT41G002_160	Fitz Creek	Location Description	Revised to: FITZ CREEK, headwaters to mouth (Whitetail Deer Creek)
MT41G002_180	Pony Creek	Location Description	Revised to: PONY CREEK, Headwaters to mouth (Whitetail Deer Creek)
MT41H001_021	Gallatin River	Location Description	Revised to: GALLATIN RIVER, Yellowstone National Park Boundary to Spanish Creek
MT41H001_022	Gallatin River	Location Description	Revised to: GALLATIN RIVER, Wyoming border to Yellowstone National Park

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT41H006_010	Hyalite Reservoir	Size	Changed size from 250 acres to 221 acres based on NHD.
MT41I002_100	Indian Creek	Location Description	Corrected to: INDIAN CREEK, headwaters to mouth (Missouri River)
MT41I007_010	Lake Helena	Size	Changed size from 1,600 acres to 2,078.9 acres based on NHD.
MT41I007_020	Holter Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size to 73.6 acres base on NHD
MT41J002_013	Lake Sutherlin	Size	Changed size from 372.4 acres to 377.1 acres based on NHD.
MT41K002_020	Ford creek	Name	Corrected to Ford Creek
MT41K004_010	Gibson Reservoir	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 1,281.9 acres to 1,290.4 acres based on NHD
MT41K004_020	Willow Creek Reservoir	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 1,355.6 acres to 1,323.2 acres based on NHD
MT41K004_030	Freezeout Lake	Size	Changed size from 3,500 acres to 3,013.2 acres based on NHD.
MT41M002_081	Birch Creek	Location Description	Revised to: BIRCH CREEK, Swift Dam to Blacktail Creek
MT41O003_010	Bynum Reservoir	Size	Changed size from 4,120 acres to 2,819.2 acres based on NHD.
MT41O003_020	Eureka Reservoir	Size	Changed size from 400.3 acres to 420.1 acres based on NHD.
MT41O004_020	Priest Butte Lake	Size	Changed size from 300 acres to 446.5 acres based on NHD.
MT41P001_010	Marias River	Location Description	Revised to: MARIAS RIVER, Two Medicine River-Cut Bank Creek confluence to Lake Elwell (Tiber Reservoir)
MT41P003_010	Tiber Reservoir (Lake Elwell)	Name, Size	Changed to: Lake Elwell (Tiber Reservoir), Changed size from 12,536 acres to 15,041.3 acres based on NHD
MT41P003_020	Lake Frances (Francis)	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 5,536 acres to 5,251.7 acres based on NHD
MT41P004_010	Willow Creek	Location Description	Revised to: WILLOW CREEK, headwaters to mouth at Lake Elwell (Tiber Reservoir)
MT41P004_020	Eagle Creek	Location Description	Revised to: EAGLE CREEK, headwaters to mouth at Lake Elwell (Tiber Reservoir)
MT41P005_010	Oilmont Wetland	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 9 acres to 21 acres based on NHD
MT41Q005_020	Benton Lake	Size	Changed size from 5,600 acres to 5,345.1 acres based on NHD.
MT41R001_010	Coffee Creek	Endpoints & Length	Moved upstream endpoint to 47.311/-110.200 increasing length to 52.13 mi.
MT42A001_011	Rosebud Creek	Location Description, Endpoints & Length	Revised to: ROSEBUD CREEK, boundary at S28/29 T6N R42E to mouth (Yellowstone River). Moved upstream endpoint to 46.2385/-106.4875, changing length to 4.28 mi.

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT42A001_012	Rosebud Creek	Location Description, Endpoints & Length	Revised to: ROSEBUD CREEK, Northern Cheyenne Reservation boundary to boundary at S28/29 T6N R42E. Moved downstream endpoint to 46.2385/-106.4875, changing length to 111.77 mi.
MT42B002_010	Squirrel Creek	Location Description, Endpoint & Length	Revised to: SQUIRREL CREEK, Crow Indian Reservation Boundary to mouth (Tongue River). Moved downstream endpoint to 45.004/-106.853, changing length to 16.17 mi.
MT42B003_010	Tongue River Reservoir	Size	Changed size from 3,500 acres to 2,158.5 acres based on NHD.
MT42I001_010	Little Powder River	Location Description	Revised to: LITTLE POWDER RIVER, Wyoming border to mouth (Powder River)
MT42L001_032	O'Fallon Creek	Location Description	Revised to: O'FALLON CREEK, Fallon/Carter County border to Mildred
MT42M002_060	O'Brien Creek	Location Description	Revised to: O'BRIEN CREEK, North Dakota border to mouth (Yellowstone River)
MT42M002_070	Crane Creek	Location Description	Revised to: CRANE CREEK, headwaters to mouth (Yellowstone River, T21N R58E S23)
MT42M002_090	Shadwell Creek	Location Description	Revised to: SHADWELL CREEK, North Dakota border to mouth (Yellowstone River)
MT42M002_142	Cedar Creek	Location Description	Revised to: CEDAR CREEK, tributary confluence at 12N 57E S35 to tributary confluence at 13N 56E S27
MT43B001_011	Yellowstone River	Location Description	Revised to: YELLOWSTONE RIVER, Wyoming border to Yellowstone National Park Boundary
MT43B002_010	Reese Creek	Location Description	Revised to: REESE CREEK, Wyoming border to mouth (Yellowstone River)
MT43B002_031	Soda Butte Creek	Location Description	Revised to: SODA BUTTE CREEK, McLaren Tailings to Wyoming Border
MT43B004_072	Mill Creek	Location Description	Revised to: MILL CREEK, Absaroka-Beartooth Wilderness boundary to National Forest boundary
MT43B004_131	Boulder River	Location Description	Revised to: BOULDER RIVER, Clayton Ditch to mouth (Yellowstone River)
MT43B004_132	Boulder River	Location Description	Revised to: BOULDER RIVER, Natural Bridge and Falls (T3S R12E S26) to Clayton Ditch (T1N R14E S34)
MT43B004_142	East Boulder River	Location Description	Revised to: EAST BOULDER RIVER, National Forest boundary to Elk Creek
MT43B006_020	Granite Lake	Size	Changed size from 13.8 acres to 14.8 acres based on NHD.
MT43B0T4_133	Boulder River	Location Description	Revised to: BOULDER RIVER, confluence of the East Fork Boulder River to Natural bridge and Falls (T3S R12E S26)
MT43D001_011	Clarks Fork Yellowstone River	Endpoint & Length	Moved downstream endpoint to 45.6510/-108.7145 changing length to 43.32 mi.
MT43D001_012	Clarks Fork Yellowstone River	Location Description,	Revised to: CLARKS FORK YELLOWSTONE RIVER, Wyoming border to Bridger Creek
MT43D002_031	Bluewater Creek	Location Description	Revised to: BLUEWATER CREEK, unnamed tributary at T6N R24E S7 NWNE to mouth (Clarks Fork Yellowstone River)
MT43D002_032	Bluewater Creek	Location Description	Revised to: BLUEWATER CREEK, headwaters to unnamed tributary at T6N R24E S7 NWNE

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT43D002_090	Wyoming Creek	Location Description	Revised to: WYOMING CREEK, Wyoming border to mouth (Rock Creek)
MT43D002_100	Silvertip Creek	Location Description	Revised to: SILVERTIP CREEK, Wyoming border to mouth (Clarks Fork Yellowstone River)
MT43D002_132	Rock Creek	Location Description	Revised to: ROCK CREEK, Wyoming border to West Fork Rock Creek
MT43D002_180	South Fork Bridger Creek	Location Description	Revised to: SOUTH FORK BRIDGER CREEK, Headwaters to mouth (Bridger Creek)
MT43D003_010	Cooney Reservoir	Size	Changed size from 815.4 acres to 768.9 acres based on NHD.
MT43D003_100	Basin Creek Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 7.4 acres to 6.2 acres based on NHD
MT43D003_110	Big Moose Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 15 acres to 81.5 acres based on NHD[45]
MT43D003_120	Black Canyon Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 82.3 acres to 79.4 acres based on NHD
MT43D003_130	Elpestrine Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 10 acres to 8.4 acres based on NHD
MT43F001_011	Yellowstone River	Length	Corrected reach length to 19.4 miles
MT43F001_012	Yellowstone River	Length	Corrected reach length to 56.31 miles
MT43F002_010	Duck Creek	Endpoint & Length	Moved downstream endpoint to 45.6871/-108.6458 changing length to 13.68 mi.
MT43F003_010	Big Lake	Size	Changed size from 2,806 acres to 2,583 acres based on NHD.
MT43F003_020	Hailstone Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 538 acres to 114.7 acres based on NHD
MT43F003_030	Halfbreed Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 278 acres to 211 acres based on NHD
MT43P001_012[46]	Bighorn Lake Afterbay	Size	Changed size from 192 acres to 155.9 acres based on NHD.
MT43Q001_011	Yellowstone River	Length	Corrected reach length to 58.31 mi.
MT43Q003_010	Spidel Waterfowl Production Area	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 2.3 acres to 659.8 acres based on NHD
MT43R001_010	Bighorn River	Endpoint & Length	Moved downstream endpoint to 46.1631/-107.4641, changing length to 40.02 mi

[45] Subsequently reduced to 30 acres (see **section 7.4.2(7)** and **Table 7-2**)
[46] Removed from 305(b) list of assessed waters due to public comment

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT43R001_020[47]	Bighorn River	Location Description & Endpoint	Revised to: BIGHORN RIVER, Yellowtail Afterbay Dam to Crow Indian Reservation boundary at 4S 32E Sec 34/27 boundary. Moved downstream endpoint to 45.446/-107.754.
MT76A001_010	Kootenai River	HUC	Changed HUC from Upper to Lower Kootenai (in cycles 2006-2014)
MT76B001_020	Yaak River	Location Description	Revised to: YAAK RIVER, Canadian border to confluence of East Fork Yaak River
MT76C001_050	Little Wolf Creek	Endpoint	Moved upstream endpoint to 48.276/-114.825
MT76D002_010	Stanley Creek	Location Description, Endpoint & Length	Revised to: STANLEY CREEK, headwaters to mouth (Lake Creek). Moved downstream endpoint to 48.281/-115.893 adding 2.35 mi.
MT76D002_061	Libby Creek	Location Description	Revised to: LIBBY CREEK, from 1 mi above Howard Creek to Highway 2 bridge
MT76D002_071	Falls Creek	Location Description & Endpoints	Revised to: FALLS CREEK, Cabinet Mountains Wilderness boundary to mouth (Lake Creek). Moved upstream endpoint to 48.418/-115.794
MT76D003_010	Lake Koocanusa	Size	Changed size from 28888 acres to 28874.5 acres based on NHD.
MT76E002_150	Cornish Gulch	Location Description	Revised to: CORNISH GULCH, forks to 55 yards below Upper Rock Creek Road
MT76F003_040	Braziel Creek	Location Description, Endpoint & Length	Revised to: BRAZIEL CREEK, headwaters to mouth (Nevada Creek). Moved upstream endpoint to 46.7625/-112.8578 changing length to 3.95 mi.
MT76F004_090	Rock Creek	Endpoints & Length	Moved downstream endpoint to 46.999/-113.035 changing length to 11.61 miles
MT76F004_110	Kleinschmidt Creek	Location Description, Endpoints & Length	Revised to: KLEINSCHMIDT CREEK, Ward Creek to mouth (Rock Creek). Moved upstream endpoint to 46.990/-113.010 and downstream endpoint to 46.999/-113.036 changing length to 4.67 mi.
MT76F006_050	East Fork Ashby Creek	Location Description	Revised to: EAST FORK ASHBY CREEK, headwaters to mouth (Ashby Creek)
MT76F007_010	Seeley Lake	Size	Changed size from 1,047.7 acres to 1,033.4 acres based on NHD.
MT76F007_020	Nevada Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 352.6 acres to 350.9 acres based on NHD
MT76F007_030	Salmon Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 613 acres to 632.1 acres based on NHD
MT76F007_040	Lake Alva	Size	Changed size from 303 acres to 298 acres based on NHD.
MT76G001_010	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Little Blackfoot River to Flint Creek

[47] ibid

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT76G001_030	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Cottonwood Creek to Little Blackfoot River
MT76G001_040	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Warm Springs Creek to Cottonwood Creek
MT76G002_072	Lost Creek	Location Description	Revised to: LOST CREEK, south boundary of Lost Creek State Park to mouth (Clark Fork River)
MT76G002_110	Tin Cup Joe Creek	Location Description, Endpoint, & Length	Revised to: TIN CUP JOE CREEK, Tin Cup Lake outlet to mouth (Clark Fork River). Moved upstream endpoint to 46.389/-112.854 modifying length to 6.5 mi.
MT76G003_020	Silver Bow Creek	Location Description	Revised to: SILVER BOW CREEK, Blacktail Creek to Warm Springs Creek (Clark Fork River)
MT76G006_010	Un-Named Creek	Water Type & Length	Changed water type from Freshwater Lake to River and length to 0.8 miles
MT76H003_011	Painted Rocks Lake	Location Description & Size	Removed location description as unnecessary for lake AUs, changed size from 365 acres to 564.9 acres based on NHD.
MT76J002_010	Hungry Horse Reservoir	Size	Changed size from 21,999 acres to 23,595.6 acres based on NHD.
MT76K001_010	Swan River	Location Description	Revised to: SWAN RIVER, Swan Lake to mouth (Flathead Lake)
MT76K002_010	Swan Lake	Size	Changed size from 2,680 acres to 3,273.6 acres based on NHD.
MT76K004_010	Lindbergh Lake	Size	Changed size from 831.9 acres to 816.4 acres based on NHD.
MT76K004_020	Holland Lake	Size	Changed size from 423.1 acres to 413.9 acres based on NHD.
MT76M001_010	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Fish Creek to Flathead River
MT76M001_020	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Rattlesnake Creek to Fish Creek
MT76M001_030	Clark Fork River	Location Description	Revised to: CLARK FORK RIVER, Blackfoot River to Rattlesnake Creek
MT76M002_097	Printers Creek	Endpoints	Changed upstream endpoint to 46.899/-114.391
MT76M002_130	Grant Creek	Length	Corrected reach length to 18.86 mi.
MT76N001_010	Clark Fork River	Location Description, Endpoint, & Length	Revised to: CLARK FORK RIVER, Flathead River to Thompson Falls Reservoir. Moved downstream endpoint to 47.587/ -115.329, modifying length to 36.3 mi.
MT76N001_020	Clark Fork River	Location Description, Endpoints & Length	Revised to: CLARK FORK RIVER, Noxon Dam to Noxon Bridge. Moved downstream endpoint to 47.994/-115.765, modifying length to 2.85 mi.
MT76N002_010	Noxon Reservoir	Size	Changed size from 8,800 acres to 7,848.4 acres based on NHD.
MT76N003_010	Lynch Creek	Ecoregion	Changed ecoregion to Northern Rockies

Table 6-1. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT76N003_022	Cox Gulch	Location Description	Revised to: COX GULCH, headwaters to mouth (Prospect Creek)
MT76N003_100	Pilgrim Creek	Location Description	Revised to: PILGRIM CREEK, headwaters to mouth (Clark Fork River)
MT76N005_030	McGregor Creek	Location Description	Revised to: MCGREGOR CREEK, McGregor Lake to mouth (Thompson River)
MT76N005_040	Little Thompson River	Ecoregion	Changed ecoregion to Northern Rockies
MT76O004_010	Ashley Lake	Location Description & Size	Removed location description as unnecessary for lake AU. Changed size from 3,244.1 acres to 2,852.3 acres based on NHD
MT76O004_020	Lake Mary Ronan	Size	Changed size from 6.8 acres to 1,517.2 acres based on NHD
MT76P001_030	Logan Creek	Location Description	Revised to: LOGAN CREEK, headwaters to Tally Lake
MT76P001_050	Sheppard Creek	Location Description	Revised to: SHEPPARD CREEK, headwaters to confluence with Griffin Creek
MT76P001_070	Stillwater Slough	Location Description	Revised to: STILLWATER SLOUGH, headwaters (Woodland Park) to mouth (Stillwater River)
MT76P003_050	Chicken Creek	Location Description	Revised to: CHICKEN CREEK, headwaters to mouth (Swift Creek)
MT76P004_010	Whitefish Lake	Size	Changed size from 3,349 acres to 3,317.4 acres based on NHD
MT76Q002_050	Big Creek	Location Description	Revised to: BIG CREEK, headwaters to mouth (North Fork of the Flathead River)

6.2.2 Assessment Unit Changes

During the 2014 reporting cycle we added or modified 25 waterbodies for assessment purposes, including designating 23 new AUs and modifying two existing AUs by merging them into a single new unit (**Table 6-2**).

Table 6-2. Assessment Unit Changes During the 2014 Reporting Cycle

2012 305(b) ID	2014 305(b) ID	Current Waterbody Description	Type	Comments
MT39F001_021	MT39F001_020	LITTLE MISSOURI RIVER, Highway 323 bridge to South Dakota border	Retire	Merged with MT39F001_022 into MT39F001_020
MT39F001_022	MT39F001_020	LITTLE MISSOURI RIVER, Wyoming border to the Highway 323 bridge	Retire	Merged with MT39F001_021 into MT39F001_020
	MT39F001_020	LITTLE MISSOURI RIVER, Wyoming border to South Dakota border	New	Added
	MT41G002_180	PONY CREEK, Headwaters to mouth (Whitetail Deer Creek)	New	Added
	MT41H003_021	MANDEVILLE CREEK, headwater to mouth (East Gallatin River)	New	Added
	MT42B001_011	TONGUE RIVER, Wyoming border to Wyoming border	New	Added

Table 6-2. Assessment Unit Changes During the 2014 Reporting Cycle

2012 305(b) ID	2014 305(b) ID	Current Waterbody Description	Type	Comments
	MT76C001_040	RICHARDS CREEK, headwaters to mouth (Wolf Creek)	New	Added
	MT76C001_050	CALX CREEK, headwaters to mouth (Wolf Creek)	New	Added
	MT76C001_060	LITTLE WOLF CREEK, headwaters to mouth (Wolf Creek)	New	Added
	MT76C001_070	DRY FORK CREEK, headwaters to mouth (Wolf Creek)	New	Added
	MT76C001_080	BRUSH CREEK, headwaters to mouth (Wolf Creek)	New	Added
	MT76D002_011	FAIRWAY CREEK, headwaters to mouth (Stanley Creek)	New	Added
	MT76D002_060	GRANITE CREEK, Granite Lake to mouth (Big Cherry Creek)	New	Added
	MT76D002_063	BEAR CREEK, headwaters to mouth (Libby Creek)	New	Added
	MT76D002_071	FALLS CREEK, headwaters to mouth (Lake Creek)	New	Added
	MT76D004_100	MEADOW CREEK, headwaters to mouth (Fortine Creek)	New	Added
	MT76G003_040	BROWNS GULCH CREEK, headwaters to the mouth (Silver Bow Creek)	New	Added
	MT76M002_093	RESERVOIR CREEK, headwaters to mouth (Petty Creek)	New	Added
	MT76M002_094	MADISON GULCH CREEK, headwaters to mouth (Petty Creek)	New	Added
	MT76M002_095	EDS CREEK, headwaters to mouth (Petty Creek)	New	Added
	MT76M002_096	JOHNS CREEK, headwaters to mouth (Petty Creek)	New	Added
	MT76M002_097	PRINTERS CREEK, headwaters to mouth (Petty Creek)	New	Added
	MT76N002_020	THOMPSON FALLS RESERVOIR	New	Added
	MT76N002_030	CABINET GORGE RESERVOIR, to Idaho border	New	Added
	MT76N003_011	CLARK CREEK, headwaters to mouth (Lynch Creek)	New	Added
	MT76N003_013	CEDAR CREEK, headwaters to mouth (Lynch Creek)	New	Added

6.2.3 Changes to AU Use Class Assignments

While managing the data and generating the 2014 Integrated Report, we discovered and corrected errors and made changes in Use Class Assignments **(Table 6-3)**.

Table 6-3. TPA Assignment and Use Class Changes

305(b) ID	Waterbody Name	Data Corrected	Correction
MT41K004_030	Freezeout Lake	Use Class	Changed Use Class from B-1 to B-2

Table 6-3. TPA Assignment and Use Class Changes

305(b) ID	Waterbody Name	Data Corrected	Correction
MT41C003_120	Basin Creek	Use Class	Changed Use Class from B-1 to A-1
MT41I006_142	Tenmile Creek	Use Class	Changed Use Class from B-1 to A-1
MT42B001_011	Tongue River	Use Class	Changed Use Class from C-3 to B-2

6.2.4 Changes to Causes Associated with Assessment Units

Data entry errors were identified during the data quality control process. After a review of the errors the corrections were applied to the database in preparation for the 2014 Integrated Report. These changes corrected impairment causes and sources in order to improve the accuracy of the cause and source description or to correct data entry errors. For cases where a cause name was changed, the errant cause from previous 303(d) lists were delisted as a result of flaws in the original listing (**Appendix D**) and the correct cause added, retaining the cycle first listed date of the delisted cause **(Table 6-4)**.

Table 6-4. Changes to Causes Associated with Assessment Units

305(b) ID	Waterbody Name	Correction
MT42C001_011	Tongue River	Changed Low Flow to Solids(Suspended/Bedload) on Drinking Water
MT40E002_100	Mill Gulch	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT40J001_020	Milk River	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41B002_132	Stone Creek	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41F002_020	Elk Creek	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41I002_041	Confederate Gulch	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41I002_042	Confederate Gulch	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41U002_050	Big Otter Creek	Delisted Nitrates, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT40B001_022	Flatwillow Creek	Delisted Nitrogen & Nitrate, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT40D001_010	Big Dry Creek	Delisted Nitrogen & Nitrate, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41I007_040	Hauser Lake	Delisted Nitrogen & Nitrate, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41S002_010	Dry Wolf Creek	Delisted Nitrogen & Nitrate, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT41S002_030	Warm Spring Creek	Delisted Nitrogen & Nitrate, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT76D002_010	Stanley Creek	Delisted Nutrient/Eutrophication Biological Indicators, listed Nitrate/Nitrite (Nitrite + Nitrate as N)
MT40E004_010	Fort Peck Reservoir	revised Cycle First Listed for “Aquatic Plants – Native” to 1996 from 2002

6.2.5 AU Category Changes

Table 6-5 identifies those waterbodies that have changed water quality reporting category during the 2014 cycle. These changes were the result of the change from the 2B user-defined category to the user-defined 5N category. The application of the user-defined category 5N is identical to 2B and provides a better representation of the use-support assessment since the pollutant identified driving a 5N listing is exceeding a state water quality standard listed in Circular DEQ-7 (Montana Department of Environmental Quality, 2012), but no human-caused sources have been identified.

Table 6-5. AU Category changes

305(b) ID	Waterbody Name	Correction
MT39F001_010	Thompson Creek	Changed user-defined category from 2B to 5N
MT40A002_020	Antelope Creek	Removed 2B category
MT40J005_020	Cottonwood Creek	Changed user-defined category from 2B to 5N
MT40M002_020	Larb Creek	Changed user-defined category from 2B to 5N
MT40Q001_011	Poplar River	Added user-defined category 5N

Table 6-5. AU Category changes

305(b) ID	Waterbody Name	Correction
MT40Q001_012	Middle Fork Poplar River	Added user-defined category 5N
MT40Q002_020	East Fork Poplar River	Changed user- defined category from 2B to 5N
MT41I001_011	Missouri River	Changed user- defined category from 2B to 5N
MT41L001_010	Old Maids Coulee	Changed user-defined category from 2B to 5N
MT41M001_010	Two Medicine	Removed 2B category
MT41M002_110	Dupuyer Creek	Changed user-defined category from 2B to 5N
MT41P001_022	Marias River	Removed 2B category
MT41Q001_021	Missouri River	Changed user-defined category from 2B to 5N
MT41R001_020	Arrow Creek	Changed user-defined category from 2B to 5N
MT42B002_031	Hanging Woman Creek	Changed user-defined category from 2B to 5N
MT42B002_032	Hanging Woman Creek	Changed user-defined category from 2B to 5N
MT42C002_020	Otter Creek	Changed user-defined category from 2B to 5N
MT42J004_010	Stump Creek	Changed user-defined category from 2B to 5N
MT42K002_170	East Fork Armells Creek	Changed from 4C,2B to 4C
MT42M002_142	Cedar Creek	Changed user-defined category from 2B to 5N
MT43D002_010	Elbow Creek	Changed user-defined category from 2B to 5N
MT43D002_140	Cottonwood Creek	Changed user-defined category from 2B to 5N
MT43F001_010	Yellowstone River	Changed user-defined category from 2B to 5N
MT43F002_022	Canyon Creek	Changed user-defined category from 2B to 5N
MT43F002_030	Keyser Creek	Removed 2B category
MT43F002_040	Valley Creek	Changed user-defined category from 2B to 5N

7.0 Public Participation

State and federal laws require managing agencies to consult with the public when developing procedures or processes for assessing water quality and setting priorities for TMDL planning. Additionally, state law requires a 60-day public comment period for its draft 303(d) list mandated by CWA. This section describes DEQ's communication with the public.

7.1 Public Consultation for 2014 303(d) List Development

In both MCA 75-5-701(2) and 40 CFR part 130.7(5), the Montana Legislature and US Congress, respectively, recognized the challenge of determining the extent of nonpoint source water quality impairments. That is, both state and federal law require DEQ to assemble and evaluate all existing and readily available water quality data and information as an efficient means of augmenting the data collected under DEQ's monitoring program for ambient water quality.

To comply with this requirement, on October 1, 2012, DEQ e-mailed 52 stakeholders (local watershed groups; federal, state, and local agencies; state university programs; private groups; and individuals with water quality interests) requesting water quality information they might have that could be useful for updating water quality assessments noted in this report. Further, we sent letters to state agencies and posted a notice on DEQ's website. Follow-up e-mails and letters were sent January 4, 2013. DEQ received no direct responses to this call for data.

7.2 Public Comment for the 2014 Integrated Report

Publication of the Draft 2014 Water Quality Integrated Report initiated a 60-day comment period beginning February 24, 2014, and ending April 25, 2014, allowing the public to review DEQ's updated listing decisions and planning schedule.

DEQ placed Legal notices in major Montana newspapers, giving formal notice of the comment period. The comment period was also made public via press releases issued to Montana's media outlets; posts on our website; and e-mails to members of the Integrated Report listserv.

DEQ submitted materials for the 2014 Integrated Report to EPA via electronic database, document text, Geographic Information System (GIS) map files, and an electronic version of assessment files. To accommodate members of the public without sophisticated computer software, the files are available on DEQ's Clean Water Act Information Center (CWAIC) found online at http://www.cwaic.mt.gov. Through the CWAIC site, the public was able to submit comments electronically; they could also send comments via mail.

All announcements during the comment period identified both the standard mailing address (below) and the CWAIC URL (http://www.cwaic.mt.gov) for submitting comments to DEQ.

Department of Environmental Quality
2014 Integrated Report Comments
WQPB, IMTS
PO Box 200901
Helena, MT 59620-0901

Comments received within the comment period were copied, filed internally, reviewed by the Integrated Report Coordinator, and distributed to appropriate staff or managers to address and respond to.

During the 2014 comment, DEQ received a total of three comments either electronically (via CWAIC) or via standard mail. To protect privacy, we removed individual names but included agency or organization information where feasible. **Table 7-1** lists each commenter and date received.

Table 7-1. List of comments

Commenter	Date
Avista Corp	3/20/14
Cottonwood Environmental Law Center	4/24/14
Crow Tribe of Indians	4/25/14

Comments received after the close of the comment period, 5:00 pm April 25, 2014, will be taken into consideration and addressed appropriately during the next reporting cycle.

7.3 DEQ Responses to Public Comments

Commenter: Avista Corp

Received: March 20, 2014

Comment Text

MT76N001_010 You list this as impaired due to Fish-Passage Barrier, which I must question. Bull trout have been being passed above TFalls Dam annually since 2007 through Avista's mitigation program. In 2011, PPL-MT began operations of the TFalls Fish Ladder, passing almost all species.

DEQ Response

Installation of the fish ladder on Thompson Fall Dam in 2011 has addressed the upper fish-passage barrier for this reach. However, Cabinet Gorge Dam is a downstream fish-passage barrier for this reach and the downstream reach. The assessment records will be changed to reflect this. DEQ acknowledges that Avista is planning to address the fish-passage for Cabinet Gorge Dam in the near future, which will likely address this impairment listing.

Comment Text

MT76N001_020 You list this section of the Lower Clark Fork River impaired due to Dissolved Gas Supersaturation, which I do not agree with. Based upon Avista's annual TDG monitoring program, 1996 to date, Noxon Rapids Dam is benign when it comes to TDG production. Exceedances to the 110% standard are from upstream sources (i.e. TFalls Dam). Therefore, if this section of river remains listed for TDG, it makes logical sense that you should also list the section of river below TFalls Dam as impaired due to TDG. You also list this section of the Lower Clark Fork River impaired due to alterations in streamside or littoral vegetative covers, which I do not agree with. Noxon Rapids Dam came “online” in 1959. Vegetative cover is now well established to the river’s edge. Therefore, if this section of river remains listed for this purpose, it makes logical sense that you should also list the section of river below TFalls Dam for the same reason.

DEQ Response

The total dissolved gas production is primarily from the Thomson Falls Dam and a natural falls. Therefore, DEQ will also list the river reach below Thompson Falls Dam as impaired by total dissolved gas. NOTE: MCA 75-5-306 ("Conditions resulting from the reasonable operation of dams at July 1, 1971 are 'natural'") may apply, and the above listed impairments may be considered "natural" upon further evaluation. Vegetation cover is now well established to the river's edge; therefore, alteration in streamside or littoral vegetation cover will be de-listed as a cause of impairment.

Comment Text

MT76N003_130 For the Vermilion River, you should also list ongoing gold mining activities in your Source Name leading to "alterations in streamside or littoral vegetative covers".

DEQ Response

DEQ will add mining activities as a source.

Commenter: Cottonwood Environmental Law Center

Received: April 24, 2014

Comment Text

Several segments of streams and rivers were delisted in **Appendix D**. The reasoning "Data and/or information lacking to determine water quality status; original basis for listing was incorrect" is not sufficient to delist these waterbody segments. If data is missing, the DEQ should collect the missing information, use the lack of information as a reason for delisting. These segments of rivers and streams should remain on the 303(d) list until the DEQ has collected sufficient information to demonstrate to the public that they are not impaired.

DEQ Response

The commenter identified 16 cause delistings. These cause listings were replaced with a "Nitrate/Nitrite (Nitrite + Nitrate as N)" cause listing that more accurately identifies the pollutant of concern for TMDL development. There was no reduction of cause listings for these assessment units.

The pick list in EPA's assessment system (ATTAINS) provides 10 delisting reasons for state water quality programs to use in managing their assessment decisions. DEQ uses #10 to describe the refinement of a listing to a more accurate one:

1. TMDL approved or established by EPA (4A)
2. TMDL Alternative (4B)
3. Not caused by a pollutant (4C)
4. Applicable WQS attained; due to restoration activities
5. Applicable WQS attained; due to change in WQS
6. Applicable WQS attained; according to new assessment method
7. Applicable WQS attained; threatened water no longer threatened
8. Applicable WQS attained; reason for recovery unspecified
9. Applicable WQS attained; original basis for listing was incorrect
10. Data and/or information lacking to determine water quality status; original basis for listing was incorrect (Category 3)

Commenter: Crow Tribe of Indians

Received: April 25, 2014

Comment Text

As Chairman of the Crow Tribe of Indians, I am writing in regards to the Montana Department of Environmental Quality's 2014 Draft Integrated Report. The Report lists an Assessment Unit in **Appendix A** that is not "waters of the state." The Assessment Unit of concern for the Crow Tribe is MT43R001_020 and is described in the Report as 14.6 miles in length along the "Bighom River, [from] the Yellowtail Afterbay Dam to the Crow Indian Reservation Boundary at 4S 32E Sec 34/27."

As the attached maps illustrate, that stretch of river described in Assessment Unit MT43R001_020 is entirely within the Crow Tribe Reservation boundaries. In addition, Chief Ranger of the Bighorn Canyon National Recreation Area concurs that the 14.6 mile stretch of river in the Report's Assessment Unit is within the jurisdiction of the Crow Tribe (see attached e-mail).

Please let me know if you have any questions regarding the Crow Tribe's concern about the Montana Department of Environmental Quality's inclusion of this Assessment Unit within its Integrated Report.

DEQ Response

We appreciate the Crow Tribe pointing out their concern with this assessment unit. DEQ used the USGS 1:100,000 scale topographic map[48] (via web services) in setting the endpoints of the Bighorn River assessment unit MT43R001_020. The USGS web service is the standard source used for seamless topographic and surface management map content provided on the Internet or via GIS software. That map delineates a non-Indian river corridor extending downstream 14.6 miles from the Bighorn Lake Afterbay dam with the boundary line annotated as "Crow Indian Reservation Boundary." This is why we defined the assessment unit as such. After discovery of a more current map[49] that section of river was reviewed again. The 2010 BLM quadrangle map <u>does not</u> show the 1980 boundary line and the river corridor is presented as within the Crow Tribe Reservation boundary. DEQ is not the authority to determine jurisdiction, however it does not appear to be the state of Montana.

We will remove the Bighorn River assessment unit (MT43R001_020) from our list of 305(b) assessment waters. In addition, based on the most current surface management maps[50] of the area, we modified our Big Horn Lake (Yellowtail Reservoir) assessment unit (MT43R001_011) removing the lake section from the north half of Section PB13 in T7S R29E, principal meridian, to the Yellowtail Dam and removed the Bighorn Lake Afterbay (MT43R001_012) from our list of 305(b) assessment waters.

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[48] Lodge Grass 30x60 minute (1:100,000 scale) Topographic Map, USGS (1980)
[49] Lodge Grass 30x60 minute (1:100,000 scale) Surface Management Status Map, BLM (2010)
[50] Bridger 30x60 minute (1:100,000 scale) Surface Management Status Map, BLM (2010) and Lodge Grass 30x60 minute (1:100,000 scale) Surface Management Status Map, BLM (2010)

7.4.1 Data Edits in Response to Public Comments

1) **Appendix A** Impaired Waters was modified to
    a. remove “alteration in streamside or littoral vegetation cover” as a cause of impairment from CLARK FORK RIVER, Noxon Dam to Noxon Bridge MT76N001_020.
    b. add “Fish-Passage Barrier” as a cause of impairment to CLARK FORK RIVER, Noxon Dam to Noxon Bridge MT76N001_020.
    c. add “Total Dissolved Gas” as a cause of impairment to CLARK FORK RIVER, Flathead River to Thompson Falls Reservoir MT76N001_010. This will change the category of this AU from 4C to 5 and add this AU/cause combination to the 303(d) list of impaired waters.
    d. add “Placer Mining” as a source of the “alteration in streamside or littoral vegetative covers” impairment to VERMILION RIVER, headwaters to mouth (Noxon Reservoir) MT76N003_130.
    e. remove MT43R001_020 "BIGHORN RIVER, [from] the Yellowtail Afterbay Dam to the Crow Indian Reservation Boundary at 4S 32E Sec 34/27" as this water is not within state jurisdiction. This water is impaired for Nitrogen (Total). This AU was also removed from the list of 305(b) assessment waters.
2) **Appendix B** Waters in Need of TMDLs [303(d) List] and TMDL Priority Schedule was modified to
    a. "BIGHORN RIVER, [from] the Yellowtail Afterbay Dam to the Crow Indian Reservation Boundary at 4S 32E Sec 34/27." MT43R001_020. The Nitrogen (Total) impairment cause was removed from the 303(d) list as this water is not within state jurisdiction.
    b. add “CLARK FORK RIVER, Flathead River to Thompson Falls Reservoir” MT76N001_010 with “total dissolved gas” as the cause.
3) Bighorn Lake (Yellowtail Reservoir) MT43P001_011 was reduced in size to 2,619 acres to reflect the removal of acres that lie within the Crow Tribe Reservation boundary[51].
4) Bighorn Lake Afterbay, MT43R001_012 was removed from the list of 305(b) assessment waters as it lies within the Crow Tribe Reservation boundary[52].
5) **Table 2-2** State Waters Exclusive of Tribal Lands, National Parks, and Wilderness Areas was modified to reflect change in jurisdiction of waters found to be on tribal land.
6) **Table 4-1** Size and Count of Assessment Units Assigned to Reporting Categories was modified to reflect change in listing category of MT76N001_010; MT43R001_020 and MT43R001_012 were removed from category 5 and category 3 respectively as they were removed from 305(b) list of assessment waters.
7) **Table 4-6** Beneficial-Use Support Summary – Rivers and Streams Only was modified to reflect the removal of MT43R001_020.
8) **Table 4-9** Beneficial-Use Support Summary – Lake and Reservoirs Only was modified to reflect category change of MT76N001_010, the removal of MT43R001_012, and the reduction in acres of MT43P001_011.
9) **Table 4-5** Pollutant Causes Delisted from 2012 303(d) List (Category 5) was modified to reflect delisting changes

7.4.2 Data Edits Made in Response to DEQ QC Activities

1) **Table 4-6** Beneficial-Use Support Summary – Rivers and Streams Only: Primary Contact Recreation was edited to reflect that the 3-mile-long Lolo Creek was moved from “Not

[51] Bridger, MT 30x60 minute (1:100,000 scale) Surface Management Status Map, BLM (2010)
[52] Ibid.

Supporting" to "Not Assessed." This changed the total miles of "Not Supporting" to 6,001 and "Not Assessed" to 5,736.

2) **Table 4-7** Top 10 Causes of Impairment: Corrected total number on the following 4 impairments

Sedimentation/Siltation	from 451 to 453
Low Flow Alterations	from 236 to 237
Nitrogen (Total)	from 208 to 201
Arsenic	from 123 to 124

3) **Table 4-9** Beneficial-Use Support Summary – Lakes and Reservoirs Only: Aquatic Life was edited to reflect that Swan Lake, Lake Mary Ronan, and Whitefish Lake are all fully supporting but threatened for the Aquatic Life beneficial use. This changed to total acres of "Fully Supporting & Threatened" to 8,108 and "Fully Supporting" to 106,637.
4) The size in acres of MT76N002_030 Cabinet Gorge Reservoir was reduced to 2,756 to correctly identify the waters under state jurisdiction. The remaining 36 acres is the part of the waterbody is located in Idaho.
5) The size in acres of MT76O003_010 Flathead Lake was reduced to 57,305 to correctly identify the waters under state jurisdiction. The remaining acres of the waterbody are located within the Confederated Salish & Kootenai Tribe Reservation.
6) MT76F006_020 West Fork Ashby Creek had its location description changed during the 2014 cycle, but this change was omitted from **Table 6-1**.
7) The size of MT43D003_110 Big Moose Lake was changed to 81.5 acres as reflected in **Table 6-1.** It was subsequently changed to 30 acres as 51.5 acres of the waterbody is located in Wyoming.
8) The Excess Algal Growth impairment on Ashley Creek MT76O003_030 was originally delisted due to "applicable WQS being attained; according to new assessment method," this has been correct to "data and/or information lacking to determine water quality status; original basis for listing was incorrect(Category 3)". This cause was replaced with Chlorophyll-*a.*
9) Corrected **Table 6-1** to add Assessment Units per **Table 7-2.**
10) Corrected **Table 4.1** and **Appendix B** to reflect the move of AUs MT41B002_180 and MT76F003_081 from category 4A to category 5.
11) Corrected **Appendix D** to remove iron from MT76F006_010, iron, copper and lead from MT76F003_011, and Nitrogen (Total) from MT41S004_020 as these causes were not included on the 2012 303(b) list.
12) Edited **Section 6.1** to include a link the Water Quality Assessment Methods
13) Before 1994, Whitetail Creek was defined on the USGS 30x60 minute quadrangle map[53] as originating at Whitetail Reservoir and flowing SE to Jefferson Slough. Little Whitetail Creek was defined as originating in the Deerlodge National Forest and flowing south to its confluence with Whitetail Creek about 5 miles above the mouth. Because of a name change requested by the Montana Department of Natural Resources and Conservation, and approved by the United States Board on Geographic Names in 1994, Whitetail Creek was renamed Little Whitetail Creek, and its downstream end point (mouth) moved to the confluence with the former Little Whitetail Creek. Little Whitetail Creek was renamed Whitetail Deer Creek and was applied to the stream down to the Jefferson Slough (**Figure 7-1**). The 30x60 minute quadrangle maps have not been updated to reflect the new stream names, even though they have both been revised twice (by the BLM) since their original publications.

[53] Butte South, MT 30x60 minute (1:100,000 scale) Topographic Map, USGS (1975); Butte North, MT 30x60 minute (1:100,000 scale) Topographic Map, USGS (1994)

During the 2014 cycle, DEQ updated the two Assessment Units to match the Geographic Names Information System (GNIS), which is the source of water names in the National Hydrography Dataset. The entire Little Whitetail Creek, MT41G002_141, as well as the lower segment of Whitetail Creek, MT41G002_140, (from the confluence with Little Whitetail Creek to Jefferson Slough) were renamed Whitetail Deer Creek, MT41G002_141. The upper segment of Whitetail Creek, MT41G002_140 (from Whitetail Reservoir to the confluence with Whitetail Deer Creek) was renamed Little Whitetail Creek, MT41G002_140. Previous cycles maintain the pre-1994 nomenclatures and Assessment Unit IDs.

Before these changes, MT41G002_141 was not assessed. Because of these changes, all of the causes formerly associated with MT41G002_140 were transferred to MT41G002_141 because they were associated with the lower segment of the stream, which is now designated as MT41G02_141. A sediment TMDL approved in 2009 for MT41G002_140 was also re-assigned to MT41G002_141. MT41G002_140 was assessed during the 2014 cycle.

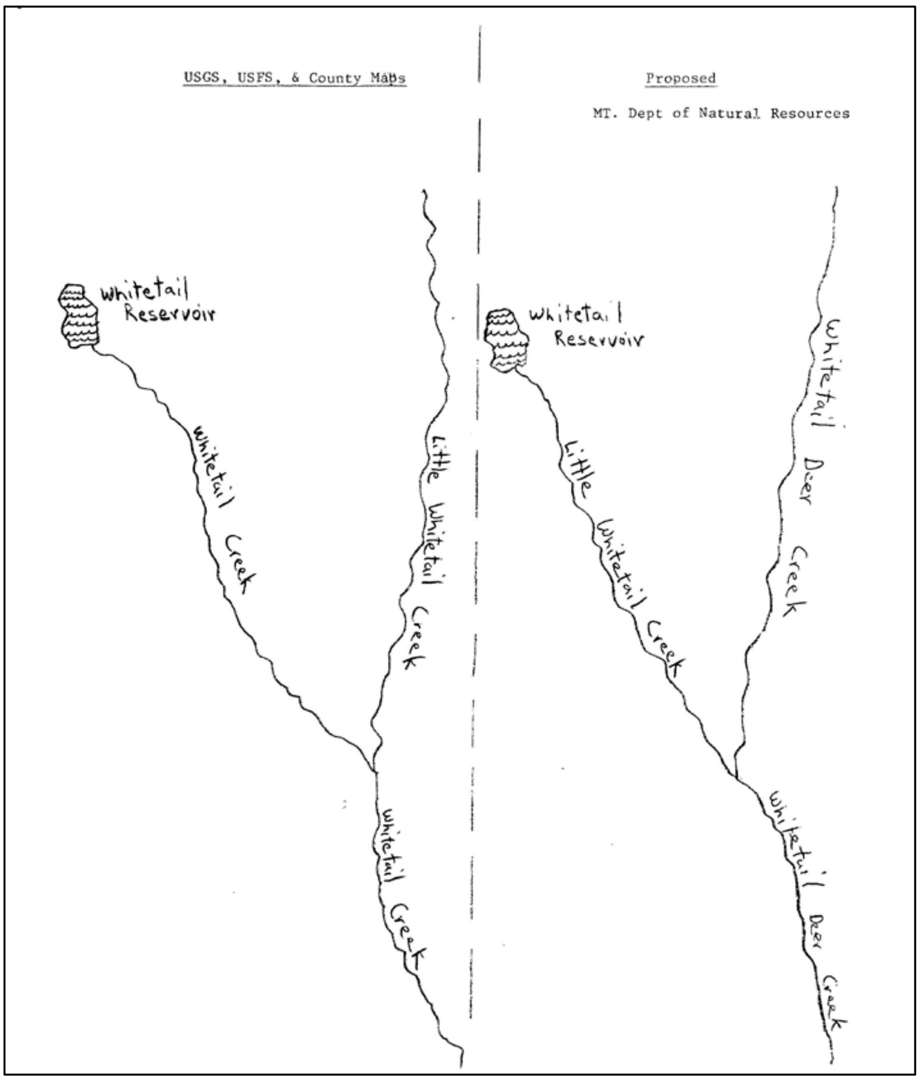

Figure 7-1. Map submitted by MT DNRC to US Board of Geographic Names in 1992 requesting a name change for Whitetail Creek and Little Whitetail Creek.

Table 7-2. General Data QC and Corrections for 2014 Cycle

305(b) ID	Waterbody Name	Data Corrected	Correction
MT41G002_140	Whitetail Creek	Name	Little Whitetail Creek
MT41G002_141	Little Whitetail Creek	Name	Whitetail Creek
MT76C001_030	Raven Creek	Location Description	RAVEN CREEK, headwaters to mouth (Pleasant Valley Fisher River)
MT40J001_012	Milk River	Location Description	Revised to: MILK RIVER, Thirtymile Creek to Dodson Creek
MT40J001_013	Milk River	Location Description	Revised to: MILK RIVER, Dodson Creek to Whitewater Creek
MT76N002_030	Cabinet Gorge Reservoir	Size	Reduced from 2,789 acres to 2,756 acres
MT76O003_010	Flathead Lake	Size	Reduced from 122,252 acres to 57,305 acres
MT43D003_140	Lower Basin Creek Lake	Size	Corrected to 3.2 acres based on NHD
MT76F006_020	West Fork Ashby Creek	Location Description	Revised to: WEST FORK ASHBY CREEK, headwaters to mouth (Ashby Creek)
MT43D003_110	Big Moose Lake	Size	Changed size to 30 acres as 51.5 acres is located in Wyoming and are therefore outside state jurisdiction

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9.0 GLOSSARY

303(d) list	A compilation of impaired and threatened waterbodies in need of water quality restoration, which is prepared by DEQ and submitted to EPA for approval. This list is commonly referred to as the “303(d) list” because it is prepared in accordance with the requirements of Section 303(d) of the federal Clean Water Act of 1972. In the integrated reporting format, category 5 is considered the “303(d) list” by EPA. DEQ develops Water Quality Improvement Plans for all category 4C waters in addition to the TMDLs required for category 5 waters.
305(b) report	A general overview report of state water quality conditions, which DEQ prepares and submits to EPA per the requirements of section 305(b) of the federal Clean Water Act of 1972. The integrated reporting format of this document encourages the combination of 305(b) requirements with 303(d) requirements in a single document.
assessment	A complete review of waterbody conditions using chemical, physical, or biological monitoring data alone or in combination with narrative information, that supports a finding as to whether a waterbody is achieving compliance with applicable WQS.
basins	For water quality planning purposes, Montana is divided into four hydrologic basins or regions: the Columbia Basin (west slope waters draining to the Columbia River), the Upper Missouri Basin (all Missouri River drainages above the Marias River confluence), the Lower Missouri Basin (Missouri River drainages including and downstream of the Marias River, and a segment of the Saskatchewan drainage in Glacier National Park), and the Yellowstone Basin (waters draining into the Yellowstone and the Little Missouri rivers).
beneficial uses	The uses that a waterbody is capable of supporting when all applicable WQS are met. Which standards apply to a particular waterbody depend on its classification under the Montana Water-Use Classification System.
best management practices (BMPs)	Activities, prohibitions, maintenance procedures, or other management practices used to protect and improve water quality. BMPs may or may not be sufficient to achieve WQS and protect beneficial uses.
biological data	Chlorophyll-*a* data, aquatic biology community information (including fish, macroinvertebrates, and algae), and wildlife community characteristics.
degradation	A change in water quality that lowers the quality of high quality waters for a parameter. The term does not include those changes in water quality determined to be non-significant pursuant to 75-5-301(5)(c). [75-5-103(7), MCA]
full support	A beneficial-use determination based on sufficient credible data that a waterbody is achieving all the WQS for the use in question.
Hydrologic Unit Code (HUC)	A standardized mapping system devised by the US Geologic Survey for the hydrology of the United States. The system employs four basic levels of designation or mapping: regions, sub-regions, accounting units, and cataloging units. Each level is assigned a two-digit code so that a cataloging unit has an eight-digit unique identifier, or code. In Montana, there are 100 “8-digit” or “4th code” HUCs.

impaired waterbody	A waterbody or stream segment for which sufficient credible data shows that the waterbody or stream segment is failing to achieve compliance with applicable WQS (nonsupport or partial support of beneficial uses). [75-5-103(14) MCA]
macroinvertebrates	Animals without backbones that are visible to the human eye (insects, worms, clams, and snails).
Montana Water-Use Classification System	Montana state regulations [ARM 17.30.606 - 658] assigning state surface waters to one of nine use classes. The class to which a waterbody is assigned defines the beneficial uses that it should support.
naturally occurring	Water conditions or material present from runoff or percolation over which humans have no control or from developed land where all reasonable land, soil, and water conservation practices have been applied. [75-5-306(2), MCA]
nonpoint source (NPS)	A source of pollution that originates from diffuse runoff, seepage, drainage, or infiltration. [ARM 17.30.602(18)] NPS pollution is generally managed through BMPs or a water quality restoration plan.
parameter	A physical, biological, or chemical property of a waterbody that can be measured to determine the quality of that waterbody. [75-5-103(27), MCA]
partial support	A beneficial-use determination based on sufficient credible data that a waterbody is not achieving all of its WQS for the use in question, the degree of impairment is not severe.
pathogens	Bacteria or other disease-causing agents that may be present in water.
point source	A discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, or vessel or other floating craft, from which pollutants are or may be discharged. [75-5-103(29), MCA]
pollutant	As defined in the federal Clean Water Act, a dredged spoil; solid waste; incinerator residue; sewage; garbage; sewage sludge; munitions; chemical wastes; biological materials; radioactive materials; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water [CWA Section 502(6)]
pollution	Defined by Montana law [75-5-103(30), MCA] as: 1. Contamination or other alteration of the physical, chemical, or biological properties of state waters that exceed that permitted by Montana WQS, including but not limited to standards relating to changes in temperature, taste, color, turbidity or odor; or, 2. the discharge, seepage, drainage, infiltration, or flow of liquid, gaseous, solid, radioactive, or other substance into state water that will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, or welfare, to livestock, or to wild animals, bird, fish or other wildlife. The term does not include: (a) discharge, seepage, drainage, infiltration, or flow that is authorized under the pollution discharge permit rules of the board is not pollution under this chapter. (b) Activities conducted under the conditions imposed by the department in short term authorizations pursuant to 75 5 308, MCA are not considered pollution under this chapter.

prioritization	DEQ's ranking of impaired waterbodies determined in consultation with the statewide advisory group using established criteria to rank waterbodies as high, moderate, or low priority for preparing Water Quality Improvement Plans (specifically TMDL plans).
reference condition	The condition of a waterbody capable of supporting its present and future beneficial uses when all reasonable land, soil, and water conservation practices have been applied. Reference conditions include natural variations in biological communities, water chemistry, soils, hydrology, and other natural physiochemical variations.
riparian area	Plant communities contiguous to and affected by surface and subsurface hydrologic features of natural waterbodies. Riparian areas are usually transitional between streams and upland areas.
segment	A defined portion of a waterbody.
state water	A body of water, irrigation system, or drainage system, either surface or underground (excludes water treatment lagoons or irrigation waters, which do not return to state waters) and which are under the management authority of the state of Montana.
sub-major basin	The aggregation of several watersheds or HUCs into a larger drainage system. The US Geological Survey has defined 16 sub-major basins (sub-regions) in Montana with at least two in each of the Montana basins (regions).
sufficient credible data	Chemical, physical, or biological monitoring data, alone or in combination with narrative information, that supports a finding as to whether a waterbody is achieving compliance with applicable WQS. [75-5-103(35) MCA]
suspended solids	Materials such as silt that may be contained in water and do not dissolve.
threatened waterbody	A waterbody for which sufficient credible data and calculated increases in loads show that the waterbody or stream segment is fully supporting its designated uses but threatened for a particular designated use because of: (a) proposed sources that are not subject to pollution prevention or control actions required by a discharge permit, the nondegradation provisions, or reasonable land, soil, and water conservation practices; or (b) documented adverse pollution trends. [75-5-103(36) MCA]
Total Maximum Daily Load (TMDL)	The maximum amount of a pollutant that a waterbody can receive while still meeting water quality standards. TMDLs include the sum of the individual wasteload allocations for point sources and load allocations for both nonpoint sources and natural background. [75-5-103(37) MCA] In practice, TMDLs are water quality restoration targets for both point and nonpoint sources that are contained in a water quality restoration plan or in a permit.
toxicant	Any manmade poison introduced into the environment by human activity.
waterbody	A lake, reservoir, river, stream, creek, pond, marsh, wetland, or other body of water above the ground surface.
Water Quality Integrated Report (or Integrated Report)	A written document required by EPA and providing an overview of the status of state water quality monitoring and planning programs in the state. It combines in one document the information previously submitted to EPA in separate 303(d) list and 305(b) report documents.

water quality limited segment (WQLS)	A body of water that is not fully supporting its beneficial uses (an impaired waterbody). If there is no water quality restoration plan with an approved TMDL for a waterbody, it is included on the 303(d) list of impaired waters.
water quality restoration plan (WRP)	A written plan to improve water quality to achieve state WQS. It may also be referred to as a "TMDL plan" if it addresses the eight criteria used by the EPA to approve TMDL plans.
water quality standards (WQS)	The standards adopted in ARM 17.30.601 *et seq*. and Circular DEQ-7 to conserve water by protecting, maintaining, and improving suitability and usability of water for public water supplies, wildlife, fish and aquatic life, agriculture, industry, contact recreation, and other beneficial uses.