Montana 2020

Final
Water Quality
Integrated Report

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

February 2021

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ERRATUM FOR THE MONTANA 2020 FINAL WATER QUALITY INTEGRATED REPORT

The Montana 2020 Final Water Quality Integrated Report was approved by EPA on April 23, 2021. The original version had minor errors that are explained and corrected in this erratum sheet.

Appropriate corrections have already been made in the downloadable version of the 2020 IR document located on our website at: https://deq.mt.gov/water/, select Lakes, Streams & Wetlands, then select Clean Water Act Information Center, scroll midway down the page and select Water Quality Integrated Report.

The following table contains the corrections made to the 2020 IR document. The first column cites the page and paragraph where there is a text error. The second column contains the original text that was in error. The third column contains the new, corrected text. The text in error and the correct text are underlined.

Location in the Document	Original Text	Corrected Text
Page 28, Section 6.2.1, line 4	Three hundred seventy-two	One thousand four hundred fifteen

ADDENDUM TO THE MONTANA 2020 FINAL WATER QUALITY INTEGRATED REPORT

This Montana 2020 Integrated Water Quality Report (2020 IR) was addended in April 2023. The addendum document (Montana 2020 Addendum to the 2020 Water Quality Integrated Report) presents the 2020 assessment of the Gallatin River, Yellowstone National Park Boundary to Spanish Creek (MT41H001_021). The addendum document is available at Water Resources | Montana DEQ (mt.gov) or How's My Waterway at https://mywaterway.epa.gov/state/MT/water-quality-overview. Assessment of sufficient credible data indicates this segment of the Gallatin River is impaired due to excessive algal growth due to exceeding the prohibition in ARM 17.30.637(1)(e). Also included in the addendum is an update with added content to **Section 6** of the 2020 IR and any appendices that were updated to include the Gallatin River. **Section 6** was the only section in the 2020IR affected by adding the Gallatin River to the impaired waters list. Updates to **Appendices A, B, C, E, G** and **H** are included in the addendum document. **Addendum Appendix K**, containing public comments and responses to the proposed addition of the excess algal growth cause to the Gallatin River, is included in the addendum document.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS

ALUS	Aquatic Life Use Support
AML	Abandoned Mine Lands
AQB	Air Quality Bureau
ARM	Administrative Rules of Montana
AU	Assessment Unit
BER	Board of Environmental Review
BLM	Bureau of Land Management
BMP	Best Management Practice
BPJ	Best Professional Judgment
CFL	Cycle First Listed
CFR	Code of Federal Regulations
CW	Coldwater (fisheries)
CWA	Clean Water Act
CWAIC	Clean Water Act Information Center
DEQ	Department of Environmental Quality
DEQ-7	Circular DEQ-7, Montana Water Quality Standards
DNRC	Department of Natural Resources and Conservation
DPHHS	Montana Department of Public Health and Human Services
DQA	Data Quality Assessment
DQO	Data Quality Objectives
DW	Drinking Water
DWSRF	Drinking Water State Revolving Fund
EA	Environmental Assessment
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
EQC	Montana Environmental Quality Council
FBC	Flathead Basin Commission
FERC	Federal Energy Regulation Commission
FLBS	Flathead Lake Biological Station
FNF	Flathead National Forest
FWP	Montana Department of Fish, Wildlife, and Parks
FY	Fiscal Year
GIS	Geographic Information System
GWAP	Groundwater Assessment Program
GWIC	Groundwater Information Center
GWUDISW	Groundwater Under Direct Influence of Surface Water

HA	Health Advisory
HHS	Human Health Standard
HUC	Hydrologic Unit Code
ILF	In-Lieu-Fee
IOC's	Inorganic Chemicals
IR	Integrated Report
ISA	Intensive Site Assessment
IUP	Intended Use Plan
LUSTs	Leaking Underground Storage Tanks
LWQD	Local Water Quality District
MBMG	Montana Bureau of Mines and Geology
MCA	Montana Code Annotated
MCL	Maximum Contaminated Levels
MDT	Montana Department of Transportation
MOU	Memorandum of Understanding
MPDES	Montana Pollutant Discharge Elimination System
MTNHP	Montana Natural Heritage Program
MWCB	Mine Waste Clean-up Bureau
MWQA	Montana Water Quality Act
NHD	National Hydrography Dataset
NPDES	National Pollution Discharge Elimination System
NPS	Non-Point Source pollution
NRWQC	National Recommended Water Quality Criteria
NTNC	Non-transient non-community systems
NWIS	National Water Information System
PCBs	Polychlorinated biphenyls
POR	Period of Record
PPL	Project Priority List
PS	Point Source “pollution or pollutant”
PWS	Public Water Supply
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
SAR	Sodium Absorption Ratio
SCD	Sufficient Credible Data
SDWA	Safe Drinking Water Act
SOC	Synthetic Organic Chemicals
SOP	Standard Operating Procedure
STAG	State TMDL Advisory Group
SWAP	Source Water Assessment Program
SWDAR	Source Water Delineation and Assessment Report

SWM	Statewide Fixed Station Monitoring
SWP	Source Water Protection
SWPP	Source Water Protection Plan
SWTR	Surface Water Treatment Rule
TKN	Total Kjehldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TNC	Transient non-community systems
TP	Total Phosphorus
TPA	TMDL Planning Area
TSS	Total suspended solids
UM	University of Montana
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USGS	United States Geological Survey
VOC's	Volatile Organic Chemicals
WARD	Water Quality Assessment, Reporting, and Documentation
WQMAS	Water Quality Monitoring and Assessment Section (DEQ)
WPS	Watershed Protection Section (DEQ)
WPCAC	Water Pollution Control Advisory Council
WPCSRF	Water Pollution Control State Recovery Fund
WQPB	Water Quality Planning Bureau (DEQ)
WQRP	Water Quality Restoration Plan
WQS	Water Quality Standards
WQSA	Water Quality Standards Attainment
WW	Warmwater (fisheries)

1.0 INTRODUCTION

Montana Department of Environmental Quality (DEQ) presents this integrated report (IR) to comply with Sections 305(b), 303(d), and 314 of the Federal Water Pollution Control Act, also known as the Clean Water Act (CWA). It provides an analysis of the condition and trends of Montana's streams and lakes, contaminants found in groundwater, and the safety of drinking water and the degree to which waters support their designated uses.

This document contains an overview of Montana's waters and a discussion of water quality, pollution control, protection programs and restoration progress, and special concerns affecting water quality. The main focus is Montana's surface water. An analysis of the extent to which designated beneficial uses are supported is provided.

DEQ assesses surface water quality of waterbodies under state jurisdiction (waters not located on federally recognized Indian reservations). In addition, it does not actively assess outstanding resource waters (ORWs) as most ORWs are located in national parks or wilderness areas. Assessment focuses primarily on perennial rivers and streams and named lakes greater than 5 acres. DEQ has assessed the water quality of 20,832 miles of streams (42% of perennial streams under state jurisdiction and not located in ORW areas) and 493,343 acres of lakes and reservoirs (82% of named lake acreage greater than 5 acres under state jurisdiction and not located in ORW areas).

During the 2020 integrated reporting cycle, DEQ assessed 34 AUs located mainly in the Missouri Headwaters watershed. Fifty-three pollutant causes on a total of 19 assessment units (AUs) were added to the 303(d) list and 29 AU-pollutant combinations were removed from the 2018 303(d) list. DEQ received approval on one TMDL and confirmed restored or improved water quality on four waterbodies due to restoration activities in 2019.

1.1 WHAT DO THE STATE'S WATER QUALITY PROGRAMS DO FOR MONTANANS?

DEQ's programs support and implement measures that ensure clean rivers, streams, and lakes remain part of Montana's natural heritage as provided for in the state's constitution. The programs complete steps to ensure Montana's waters stay healthy, or help to improve water quality in those that don't currently support all uses.

Water Quality Standards (Goals)	Montana's water quality standards (standards) help protect and maintain water quality. Standards form the legal basis for controls on the amount of pollution entering Montana waters from sources such as industrial facilities, wastewater treatment plants and storm sewers. Standards also form the technical basis for reducing runoff from rural and urban areas. https://deq.mt.gov/water/Surfacewater/standards
Surface Water Monitoring and Assessment	DEQ works with federal, state and other organizations in assessing Montana's surface water to identify pollutants and their sources that impair beneficial uses. This information is shared with resource managers and the public. https://deq.mt.gov/Water/SurfaceWater/Monitoring
Groundwater Monitoring and Assessment	The Montana Bureau of Mines and Geology and the Montana Department of Agriculture monitor groundwater water levels and water chemistry. https://www.mbmg.mtech.edu/gwap/grw-assessment.html
TMDL Development	The Total Maximum Daily Load (TMDL) program identifies sources of pollution and determines how much pollution a water can sustain while fully supporting all designated uses. DEQ then writes plans to reduce pollution to those waters and partners with local communities to find solutions to restore and maintain clean water. https://deq.mt.gov/water/surfacewater/TMDL
319 Nonpoint Source Project Program	The State of Montana receives annual grant funds from the EPA through Section 319 of the CWA. The 319 Project Program funds on-the-ground projects that reduce or prevent nonpoint source pollution. To improve the long-term sustainability of nonpoint source reductions, projects should focus on restoring natural processes (e.g., channel migration, floodplain connectivity, and native riparian revegetation). A limited amount of funding may also be used to pay for local outreach and education activities. http://deq.mt.gov/Water/SurfaceWater/319Projects
Restoration Plan Development	DEQ works with local watershed groups to develop and implement Watershed Restoration Plans (WRP) that serve as a path to improved water quality. All 319-funded projects must implement practices identified in a DEQ-accepted Watershed Restoration Plan. https://deq.mt.gov/Water/SurfaceWater/WatershedRestoration

Pollution Discharge Permits	DEQ's Water Protection Bureau issues pollution discharge permits under the Montana Pollution Discharge Elimination System (MPDES) and Montana Groundwater Pollution Control System (MGWPCS) programs. These permits act as a control measure on pollution. Other activities include public education, application review, setting site-specific effluent limits, best management practices determinations, data review and management, regulation and guidance preparation, and field inspections. https://deq.mt.gov/Water/permits
Community Assistance & Support	The Water Quality Division encourages businesses, local governments and citizens to adopt new technologies and practices that limit environmental damage to state waters caused by point source pollution. Towards that end, DEQ provides financial and technical assistance to overcome market and institutional barriers hindering the implementation of cleaner business and public works practices and the installation of infrastructural equipment.
Public Water Supplies	Working together, the Public Water Supply and Engineering Bureaus work to assure that public health is maintained through a safe and adequate supply of drinking water and that applications for proposed subdivisions are reviewed to ensure compliance with the Sanitation in Subdivisions Act. These goals are achieved through technical and engineering reviews, licensing, certifications, compliance monitoring, training, and technical assistance. Included in these reviews are evaluations of water quality impacts from wastewater disposal systems in accordance with Montana's nondegradation and mixing zone rules. http://deq.mt.gov/water/drinkingwater
Source Water Protection	DEQ performs source water assessments to provide water utilities, community governments, and others with information needed to protect drinking water sources. Source water assessment information tells residents exactly where their water supply comes from and what conditions and/or practices may pose threats to its quality. http://deq.mt.gov/water/drinkingwater/sourcewater
State Revolving Funds	The Montana Legislature established two State Revolving Fund (SRF) Loan Programs - one for water pollution control projects (wastewater and nonpoint source projects) and the other for drinking water projects. Both programs provide at or below market interest rate loans to eligible Montana entities. These programs are funded with capitalization grants from the EPA and are matched 20 percent with state-issued general obligation bonds. Combined, these two sources of funds create the "state revolving fund" from which loans are made and borrower repayments revolve to provide loans for future infrastructure projects. Through the Engineering Bureau, DEQ is the administering agency of these funds and assures that the technical and programmatic requirements of the program are met. The Department of Natural Resources and Conservation (DNRC) issues the state's general obligation bonds and makes loans to the project borrowers. Cooperatively, DEQ and DNRC administer the State Revolving Fund Loan Programs. http://deq.mt.gov/Water/SurfaceWater/DesignApprovals#collapseThree

2.0 MONTANA'S WATER RESOURCES

2.1 BASINS IN MONTANA

DEQ organizes its report on surface water quality by basins and watersheds where the waters are located. DEQ uses geographic information systems (GIS) to help with spatial analysis, mapping, and water quality assessments.

For program management purposes, the state's waters are grouped into four major basins containing 16 sub-major basins delineated by the U.S. Geological Survey's hydrologic unit code system (**Figure 1**). The four major basins are:

- Columbia – all waters west of the Continental Divide, including the Clark Fork, Flathead, and Kootenai rivers
- Lower Missouri – Missouri River basin from the Marias River confluence to the North Dakota border, including Montana headwaters of the St. Mary River in the Upper South Saskatchewan River basin
- Upper Missouri – Missouri River basin from the headwaters downstream to the confluence with the Marias River
- Yellowstone – all waters of the Yellowstone River within Montana and the Little Missouri/Belle Fourche watershed in southeast Montana

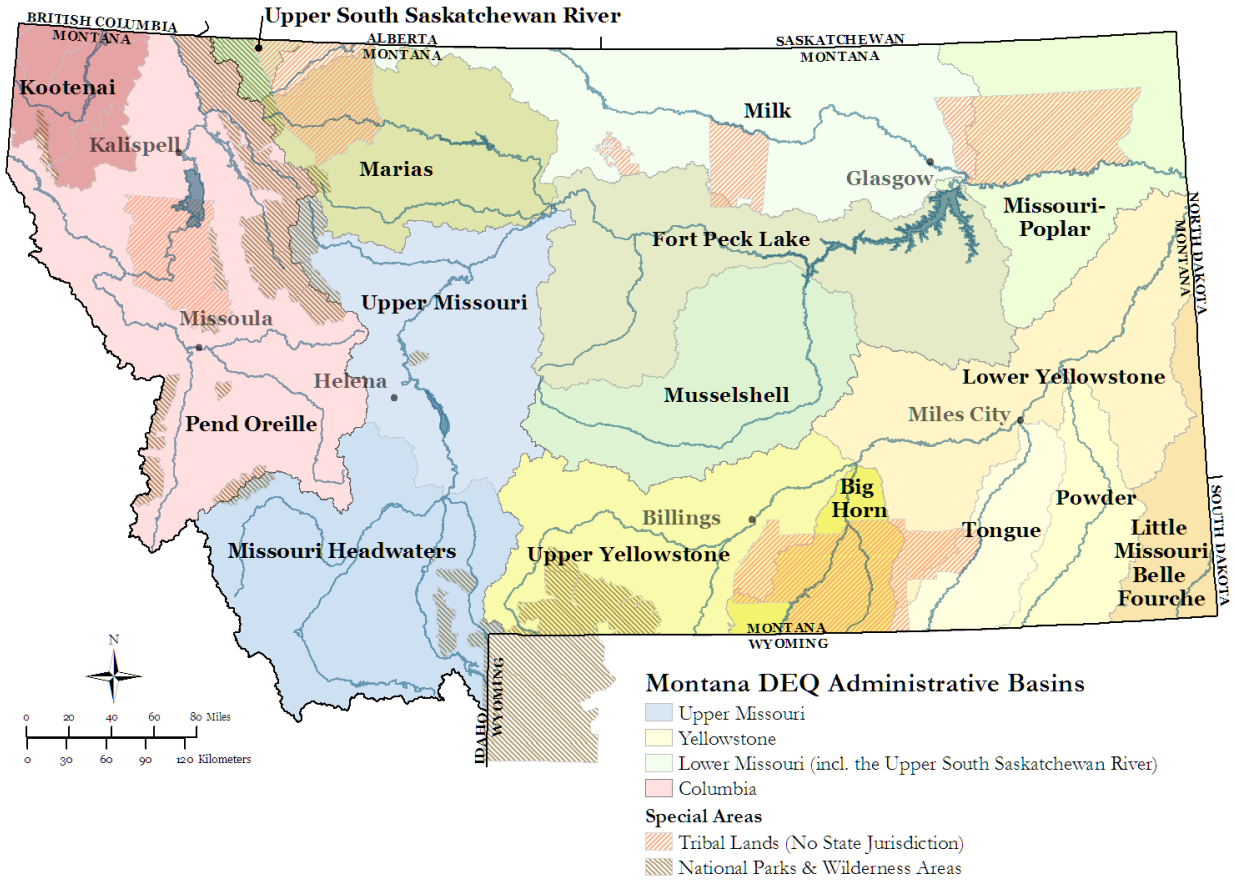


Figure 1. Basins of Montana

2.2 MONTANA PERENNIAL SURFACE WATER

DEQ does not have delegated authority over all the waters in the state. The tribal governments and/or the U.S. Environmental Protection Agency (EPA) are responsible for managing the quality of waters located within the reservations of federally-recognized tribes. In addition, the state has established a few assessment areas within national parks and wilderness areas, but since these areas are managed under federal laws restricting activities, it does not actively monitor or assess their conditions for this report. Waters within national parks and wilderness areas are designated Outstanding Resource Waters (ORWs).[1] **Figures 2** and **3** present a picture of the waters in the state by their location in DEQ's administrative basins as well as tribal waters and ORWs.

The statewide stream miles and lake size estimates shown in **Figures 2** and **3** and used for calculations in this report come from the high resolution NHDPlus, version 2.[2] Water size for the assessment units are based on high resolution NHD version 2.2.1.[3] The total length of streams is calculated from all perennial waters in the dataset. Because of potential sources of error, and in order to report these numbers as accurately as possible with the available data, the summary of state waters the total stream mileage is rounded to the nearest 100 miles, while the total lake area is based on named waters of at least 5 acres in size.

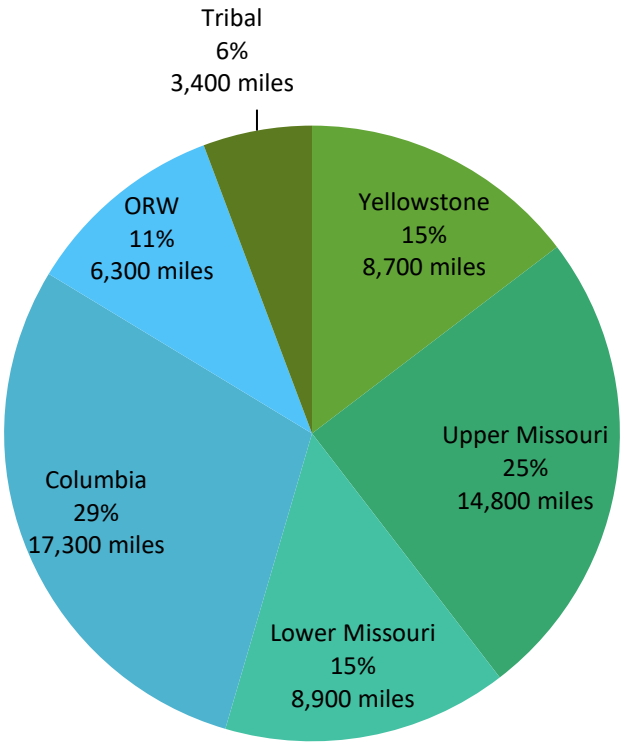


Figure 2. Perennial Rivers & Streams: 59,400 Miles

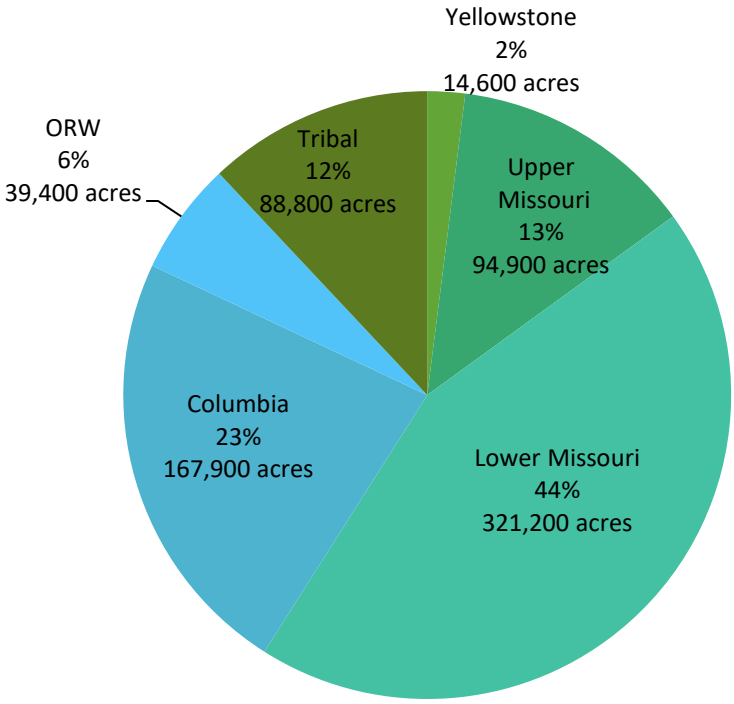


Figure 3. Lakes & Reservoirs: 726,800 Acres

2.3 SURFACE WATERS

Surface waters include rivers, streams, lakes, reservoirs, and wetlands.

2.3.1 Streams

Streams belong to one of three general categories based on their flow characteristics and relative position of their streambed to the local shallow ground water table: perennial, intermittent and ephemeral. Perennial (continually flowing) streams total approximately 59,400 stream miles, and the 307,000 miles of intermittent or ephemeral streams account for most of Montana's stream miles. Of the 59,400 miles of perennial streams, 49,700 miles are within the State's jurisdiction and not in ORW areas. Jurisdictional waters are those waters over which the state has management authority, i.e., all waters excluding tribal waters.

2.3.2 Lakes and Reservoirs

Montana has 1,417 named lakes, reservoirs, and ponds that are 5 acres or greater covering about 730,000 acres, of which 598,600 acres are under state jurisdiction and not in ORW areas. These waterbodies include various natural lakes as well as large reclamation and/or hydropower reservoirs. Of Montana's five largest lakes (i.e., listed in order of descending size, For Peck Reservoir, the portion of Flathead Lake under state jurisdiction, Canyon Ferry Reservoir, the portion of Lake Koocanusa located in the U.S., and Hungry Horse Reservoir), four are man-made reservoirs. Montana's largest lake, Fort Peck Reservoir, is located in northeastern Montana and is the fifth largest man-made lake by volume in the U.S. Montana's second largest lake, Flathead Lake, is the largest natural (i.e., not man-made) freshwater lake west of the Mississippi. Montana shares jurisdiction of Flathead Lake with the Confederated Salish and Kootenai Tribes.

2.3.3 **Wetlands**

Wetlands are valuable for providing flood and erosion control, enhancing water quality, and providing wildlife and fish habitat. Wetlands continue to be impacted and lost as roads are expanded, land is developed, and due to cumulative impacts from numerous activities such as draining, changes in land management, and landowner preference for open water ponds. DEQ's Water Quality Planning Bureau is responsible for coordinating and providing leadership to wetland conservation activities statewide. These projects range from an evaluation of wetland impacts in the State of Montana, to developing education and information about Montana wetlands, to a local partnership composed of local government, wetland ecologist, and community volunteers to inventory wetlands for restoration and management needs.

For wetland mapping and evaluation, DEQ used the following functional definition:

"*Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered in shallow water. For purposes of this definition, wetlands must have one or more of the following attributes:*

- *At least periodically the land supports predominantly hydrophytes;*
- *The substrate is predominantly undrained hydric soil; and*
- *The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year."*

Currently 100% of the state has wetland mapping; however, 14% of the mapping is outdated digital mapping created from 1980s-era aerial imagery. As of fall 2019, 2,530,053 acres of wetlands and 670,221 acres of riparian areas have been mapped in Montana. Since 2007, 83% of the state has been mapped or updated with modern wetland and riparian mapping using aerial imagery from 2005-2017. Fresh water emergent, freshwater ponds and freshwater scrub/shrub wetlands predominate in Montana (**Table 1**).

Table 1. Montana Wetland Types

Wetland Type	Number of Mapped Wetlands	Average Size (Acres)	Total Acres (Statewide)
Freshwater Emergent Wetland	573,798	1.9	1,078,639
Freshwater Pond	193,822	0.8	161,627
Freshwater Scrub-Shrub Wetland	109,198	1.9	207,268
Freshwater Forested Wetland	16,647	2.8	47,444
Lacustrine Fringe	3,711	25.7	95,239

2.4 **GROUND WATER**

Ground water is any water that flows or seeps downward or is stored below the ground in rock crevices or other pores of geologic materials. Ground water feeds springs and wells, and the upper surface of the saturated zone is the water table. The quality and availability of ground water varies greatly across the state. A map of Montana aquifers is presented in **Figure 4**.

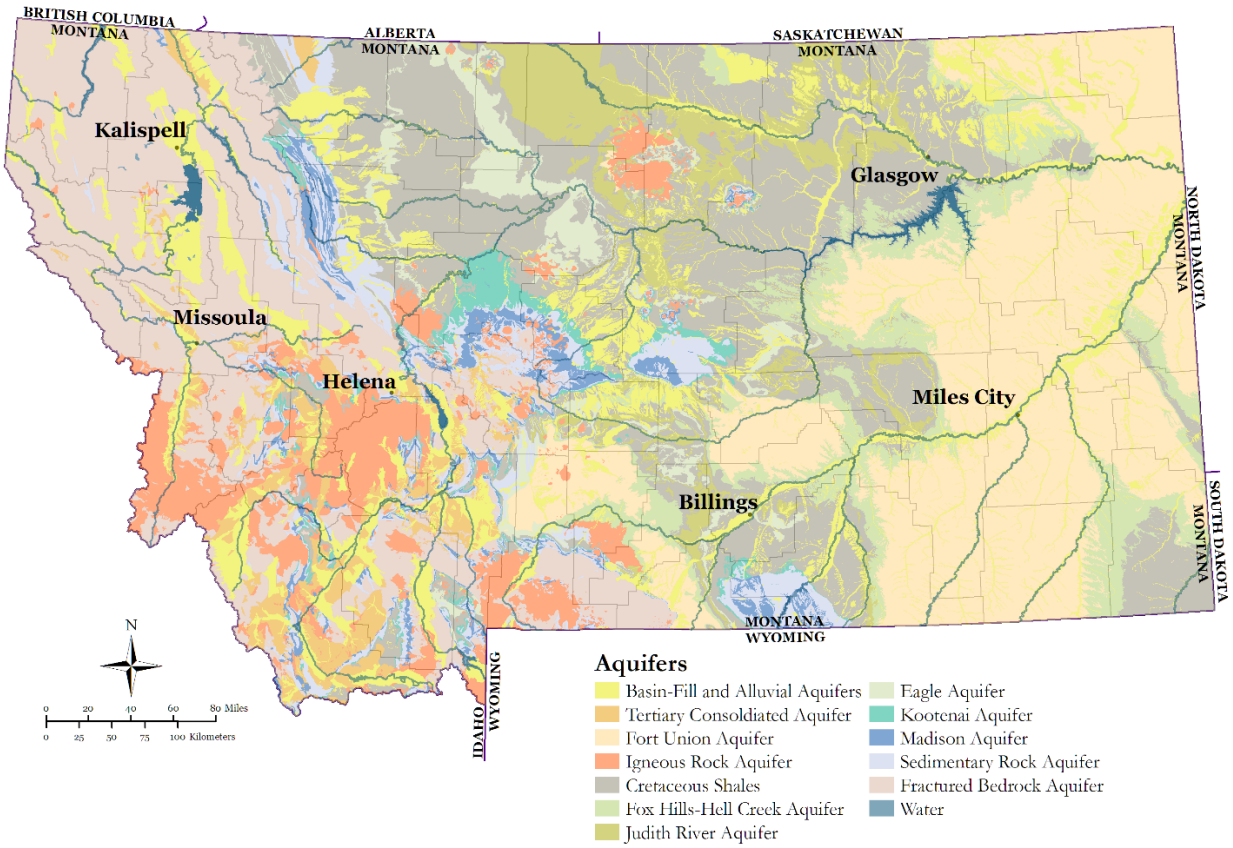


Figure 4. Montana Aquifers[4]

2.4.1.1 *Alluvial and Basin Fill Aquifers*

Typical of western Montana, alluvial and basin-fill aquifers are shallow, typically less than 50 feet (15 meters) thick consisting of permeable unconsolidated (loose) deposits like sand and gravel. Most alluvium is geologically quaternary (less than 2.5 million years) in age. The aquifers are replenished by streams and from precipitation. They can vary in volume considerably as the water table fluctuates. Therefore, the temperature and flow from water-table springs vary. Being shallow, they are susceptible to contamination by fuel spills, industrial discharge, landfills, and saltwater. The ground water continuously moves along the hydraulic gradient from areas of recharge to streams and other places of discharge. They provide a high level of water storage.

2.4.1.2 *Bedrock Aquifers*

Found mainly in eastern Montana, bedrock aquifers are where water is confined within hard bedrock layers. Bedrock is the hard rock that lies below all the sand, gravel and soil near the ground surface. Water can travel through porous bedrock, or through cracks, fractures and crevasses in the hard bedrock. In some areas of eastern Montana, thick shale formations near the surface make access to water difficult or produce poor-quality water. Also, aquifers in the east typically yield less water than those in western Montana. To reach higher-quality water, wells have to be drilled deeper, which is more costly. Bedrock aquifers in Montana are found in formations as old as 540 million years (Paleozoic).

3.0 POLLUTION CONTROL

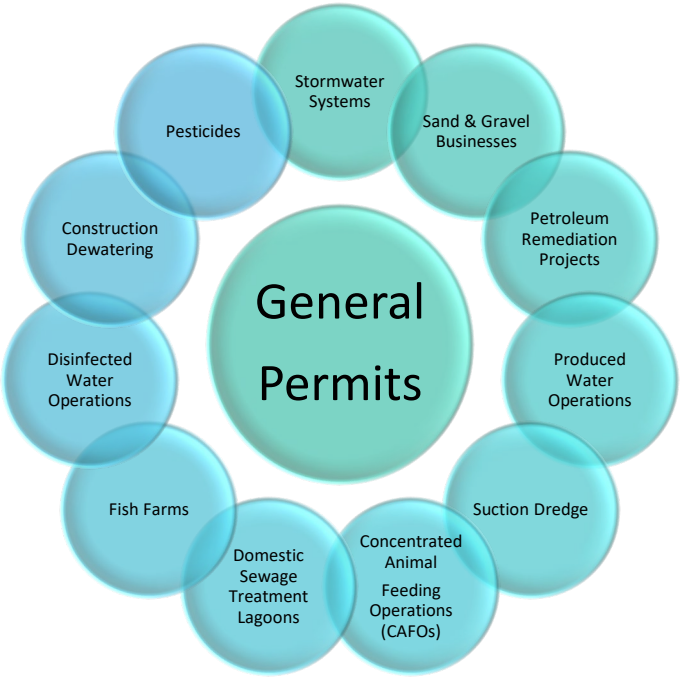
DEQ programs help reduce pollution from both point and nonpoint sources. This section describes activities that reduce pollution from entering Montana's waterways.

3.1 POINT SOURCE CONTROL PROGRAM

Pollutants can arise from different source types, one of which is called a point source; that is, pollutants arising as a result of human activities from a specific location, such as discharges from an industrial facility, and via an identifiable conveyance, such as a pipe. Point sources are regulated, meaning that facilities must have a permit to discharge pollutants from point sources into waterbodies. Montana administers a point source discharge program. In Montana, the Board of Environmental Review adopts rules governing all issues related to the state's permitting process, while EPA governs the pretreatment and municipal bio-solids control programs.

3.2 MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM PROGRAM

State and federal regulations require industries or works (e.g., construction sites, wastewater treatment plants, etc.) to have a permit before they can discharge wastes or pollutants from any point source into state waters. Montana's Pollutant Discharge Elimination System (MPDES) is the permitting program that controls point source discharges of wastewater.



Discharge permits provide a regulatory process for defining limitations of pollutant amounts. Additionally, TMDLs may be developed and provide further guidance for permitting cumulative point and nonpoint sources. If a waterbody doesn't have an approved TMDL for existing pollutant discharges, DEQ imposes effluent limitations that will protect water quality.

In addition to permits issued to individual dischargers, general permits are issued for categories of discharges that affect waters statewide or within a limited geographic range. General permits must conform to all the criteria applicable to individual discharges. Further, general permits may contain additional provisions that DEQ deems necessary to protect water quality.

In addition to controlling the discharge of pollutants from point sources into surface waters, DEQ controls pollutant discharges into ground water through the Montana Ground Water Pollution Control System (MGWPCS) permitting process. The Montana Board of Environmental Review has adopted rules governing such discharges, which define a "source" as any point source or disposal system, including a waste-holding pond that under normal operating conditions may reasonably be expected to discharge pollutants into ground water.

Typical permitted facilities include residential wastewater treatment systems, metal ore mills, lumber mills, wood product manufacturers, breweries, and community water treatment plants.
Pollution control standards for ground water in Circular DEQ-7 are set to protect human health and include an insignificance number based on DEQ's nondegradation policy.[5, 6] The rules include a water-use classification system for ground water based on natural specific conductance and ground water standards to protect those uses.

Ground water rules do not require minimum treatment standards for discharge from mechanical treatment. The level of treatment or pollutant control is based on compliance with the applicable water quality standards after dilution within a DEQ-approved mixing zone (i.e., an area of ground water allowed to mix with effluent before compliance is measured).

3.3 NONPOINT SOURCE PROGRAM

The Montana 2017 Nonpoint Source Management Plan may be viewed at:
http://deq.mt.gov/Portals/112/Water/WPB/Nonpoint/Publications/Annual%20Reports/2017NPSManagementPlanFinal.pdf

In Montana, nonpoint source (NPS) pollution is primarily addressed via application of voluntary management practices pursued by landowners and other citizens within the state. Watershed groups, conservation districts, water quality districts and nonprofits around the state actively engage local landowners and partners to address nonpoint source pollution in socially acceptable and economically beneficial projects and programs. DEQ supports local and regional programs implementing these activities.

3.3.1 Primary Categories of Nonpoint Source Pollution

Seven major land uses contribute significantly to NPS pollution and water quality impairment: agriculture, forestry, hydrologic modification, mining and industry, recreation, transportation, and urban and suburban development. In addition, DEQ's NPS Program works to reduce negative water quality impacts from aquatic invasive species, atmospheric deposition, and climate change.

3.3.1.1 *Agriculture*

Agriculture is Montana's leading industry, with an estimated $4.6 billion dollar impact on the economy.[7] Farmers and ranchers are the primary day-to-day stewards of millions of acres of public and private lands in Montana. Common pollutants associated with agricultural operations include sediment, nitrogen, phosphorus, salinity, and pathogens. Certain agricultural practices can also lead to significant changes in water temperature, a loss of riparian and aquatic habitat, and other problems. Yet, in most situations, agricultural impacts are usually more easily remedied than many other sources.

Montana supports voluntary implementation of site-specific best management practices (BMPs) as an effective method of addressing NPS pollution from agriculture-related sources. DEQ's NPS Program focuses on four strategies to promote, facilitate, and create reductions in NPS pollution from agricultural sources:

- Strategy 1: Improve communication on NPS pollution issues among Montana's agricultural community.
- Strategy 2: Connect agricultural producers with the technical and financial resources necessary to reduce nonpoint source pollution from farming and livestock operations.
- Strategy 3: Evaluation and adaptive management.
- Strategy 4: Maintain existing programs that address contamination of groundwater from improper application of pesticides.

3.3.1.2 *Forestry*

Forest lands cover 22.5 million acres in Montana, nearly a quarter of the state's total lands. The forest products industry accounts for approximately 32% of the total manufacturing jobs in Montana, which contribute $1.1 billion in labor earnings and $14 billion in sales to the state's economy.[8] For forestry and forestry-related activities, the NPS Program relies on a combination of regulatory and voluntary approaches. Pollution from forestry and silviculture operations can include nutrients, sediment, and temperature (pollutants), or streamside (riparian) habitat alterations and flow alterations (non-pollutants). Riparian functions threatened by indiscriminate streamside harvesting include shading (affecting water temperature), large woody debris recruitment, nutrient cycling, streambank stability, sediment filtration, and flood-flow attenuation.

DEQ's NPS Program is focusing on three strategies to promote, facilitate, and create reductions in NPS pollution from forestry sources:

- Strategy 1: Maintain and improve Montana's Forestry Best Management Practices program;
- Strategy 2: Support implementation of best management practices and actions to restore and maintain water quality conditions;
- Strategy 3: Improve collaboration to implement and monitor BMPs.

3.3.1.3 *Hydrologic Modification*

Dams, reservoirs, stock ponds, diversions, etc. are vital and integral to Montana's economy and way of life. This infrastructure provides water for hydroelectric power, crops and livestock, domestic water supplies, industrial applications, recreational opportunities, and flood protection. Activities leading to hydrologic modification include water storage, water withdrawal, water transfer, and physical alterations in floodplain, riparian, wetland and channel structure. Some of the negative water quality impacts from hydrologic modification include:

- Reduction in riparian vegetation along streams that can lead to increased bank erosion, increased channel migration, increased water temperature and habitat loss
- Increased water temperature from reduced streamflow
- Increased bank erosion rates from water transfers that result in unnaturally high stream flows
- Increased sediment deposition from a lack of stream flushing flows
- Reduction in pollutant dilution capacity

DEQ is addressing the negative water quality impacts of hydrologic modifications through a combination of the following strategies:

- Strategy 1: Support efforts to minimize or avoid development within floodplains, along streambanks, within wetlands and adjacent to lakes.
- Strategy 2: Support efforts to restore natural hydrologic conditions
- Strategy 3: Promote practices and activities that help minimize the impacts of hydrologic modifications
- Strategy 4: Mitigate hydrologic modifications where possible

3.3.1.4 *Mining and Industry*

Mining activities in Montana involve the removal of hard rock minerals, ore, coal, sand and gravel. Industry includes activities associated with the manufacturing of tangible products, and extraction and refinement of oil and gas. Frequently, state and federal regulatory programs that address pollution from mining also address pollution from industrial sources. Examples of these programs include:

- State Superfund (CECRA)
- Federal Superfund (CERCLA and SARA)
- Montana Hazardous Waste Act

3.3.1.4.1 Contribution to Nonpoint Source Pollution from Mining

NPS pollution from mining is typically the result of one or more of the following processes:

- stormwater runoff (sediment, metals, salts, petrochemicals)
- acid mine drainage (acid, lead, copper, zinc, cadmium, other heavy metals)
- direct additions of waste rock, spoil piles, or placer piles (riparian and wetland habitat loss, sediment, metals)

Discharges from active mine sites are considered point-source discharges and are controlled by the permit conditions issued under the Montana Pollutant Discharge Elimination System (MPDES).

Abandoned mines often include point sources and nonpoint sources of pollution. Discharges from abandoned mines are not typically covered under MPDES permits, leaving their control and abatement up to non-regulatory programs and the efforts of various agencies, private organizations, and individuals often in collaboration with DEQ. DEQ's strategy for addressing discharges from abandoned mines includes improving collaboration between the DEQ Watershed Protection Section (WPS) and the DEQ Abandoned Mine Lands (AML) program to address non-permitted pollution from mining-related pollutant sources.

As funding for mine reclamation becomes increasingly scarce, agencies and organizations face an ever-increasing need to pool technical and financial resources in order to complete mine reclamation projects. DEQ may use Section 319 funds to pay for abandoned mine site reclamation projects designed to protect water quality if those activities meet both of the following conditions: (1) the activities are not specifically required by a draft or final NPDES/MPDES permit and (2) the activities do not directly implement a draft or final NPDES/MPDES permit. DEQ will:

- Strategy 1: Design, fund, implement, and monitor on-the-ground projects to remediate water pollution from abandoned mines or portions of abandoned mines
- Strategy 2: Educate landowners, land managers, conservation districts, watershed groups, and others seeking to address pollution from abandoned mines

3.3.1.4.2 Contribution to Nonpoint Source Pollution from Industry

Pollution from industrial sources (manufacturing, oil refining, chemical production) is typically the result of direct discharge, stormwater runoff, seepage of chemicals into groundwater (which may come into contact with surface water), or erosion of contaminated sediments. Pollution from active, industrial facilities is typically regulated under a point source discharge permit. Pollution from inactive facilities, and in rare cases pollution from some active facilities, is addressed through application of the site remediation programs.

Montana will use the following regulatory and voluntary methods to address nonpoint source pollution from industrial sources:

- Strategy 1: Using the authorities described above, DEQ's Waste Management and Remediation Division investigates and remediates NPS pollution from industrial sources.
- Strategy 2: DEQ's Waste Management and Remediation Division collaborates, where appropriate, with EPA to investigate and remediate pollution from federal Superfund sites.
- Strategy 3: DEQ collaborates with other state and federal agencies and stakeholder groups to address pollution from industry-related sources.

3.3.1.5 *Recreation*

According to the Outdoor Industry Association, outdoor recreation generates $1.5 billion in wages and salaries, $403 million in state and local tax revenue, and 64,000 direct jobs in Montana.[9] Many recreational activities in Montana are directly related to surface water, and those activities can contribute to nonpoint source pollution and negatively affect water quality. There is a high potential for water quality degradation associated with boating activities from aquatic invasive species, contaminated bilge water, petroleum products, trash, and solvents being released into state waters. In addition, boat wakes can increase bank erosion. If improperly designed, marinas can cause water quality problems by destroying habitat and restricting water flows. In addition to water-based recreational activities, activities on upland areas can also contribute to NPS pollution. Repeated and unauthorized travel off designated roads by vehicles, ATVs, motorcycles, and mountain bikes contribute to riparian damage and excess sediment runoff into nearby streams and lakes.

DEQ's NPS Program employs the following strategies to increase implementation of BMPs for recreational activities:

- Strategy 1: Coordinate with other agencies to educate and engage Montana's recreation community to promote stewardship and sustainability
- Strategy 2: Promote and support responsible water-based recreation.
- Strategy 3: Support off-highway travel planning and promote responsible off highway vehicle use.

3.3.1.6 *Transportation*

Many of the transportation routes in Montana are located in floodplains adjacent to lakes, wetlands, rivers, and streams and can be a significant source of NPS pollution. Litter from vehicles, oils and gasoline, and traction sand and road salt all accumulate in transportation corridors, potentially ending up in surface waters. Transportation routes that travel directly along streams and rivers can further limit lateral migration and floodplain function, affecting sediment transport and bank erosion.

There are a variety of programs and practices that limit the potential effects of NPS pollution from transportation sources, including stormwater permitting and construction BMPs, the MS4 Program, wetland and stream mitigation procedures, corridor planning, and the Adopt-A-Highway program. The Montana NPS Program works to increase collaborative efforts to manage NPS pollution from transportation sources and to educate road maintenance personnel about nonpoint source pollution.

3.3.1.7 *Urban and Suburban Development*

NPS pollution from urban and suburban sources is generated by a broad range of activities associated with domestic, municipal, industrial, and commercial land development and uses. Stormwater runoff, residential waste disposal, and alterations of riparian areas are major sources of nonpoint source pollution in Montana's urban and suburban areas.

3.3.1.7.1 Stormwater

Urban stormwater pollutants include nutrients (e.g., fertilizers), sediment, increased water temperature, oil and grease, PCBs, metals, bacteria, and viruses. Suspended sediments tend to be the largest pollutant loads to receiving waters in urban and suburban areas.

DEQ issues a Montana Pollutant Discharge Elimination System (MPDES) general permit for stormwater discharges associated with small municipal separate storm sewer systems (small MS4s), construction activity, and industrial activity. MS4 permits apply to Montana's seven largest cities - Billings, Missoula, Great Falls, Bozeman, Helena, Butte, and Kalispell. Montana also addresses stormwater through the state's subdivision permitting process and local government development regulations. Stormwater that is not addressed by an MPDES or subdivision permit can be managed through voluntary BMPs.

3.3.1.7.2 Waste Disposal

Residential and commercial waste disposal includes a variety of pollutant sources, such as septic systems, pet wastes, solid waste disposed in landfills, and hazardous chemicals and materials. Sources are addressed mainly through DEQ's solid waste program. The subdivision program oversees septic systems. DEQ strives to maintain and improve programs that address residential septic systems, solid waste disposal, land-applied bio-solids, and hazardous household wastes by implementing the following strategies:

- Strategy 1: Continue to assess contributions of septic systems to surface water-quality impairments, develop TMDLs that address pollutant loading from septic systems, and provide technical and financial assistance for projects that focus on specific septic system issues
- Strategy 2: Increase monitoring at closed landfills to detect groundwater contamination
- Strategy 3: Continue to provide technical assistance to solid waste professionals

3.3.1.7.3 Alteration of Urban and Suburban Riparian and Wetland Areas

Three types of alteration to urban and suburban riparian areas are currently of greatest concern to the NPS Program:

- The alteration of native vegetation, soils, and/or hydrology of riparian areas
- Residential and commercial development within riparian areas, floodplains, and/or channel migration zones
- The cumulative effects on watersheds by heavy riparian area usage from domesticated animals on suburban small acreages. Encourage the adoption of local regulations that protect the functions of floodplains, riparian, and wetland areas to address the cumulative effects of NPS pollution from urban and suburban development on water quality

3.3.1.8 *Atmospheric Contributions*

Five lakes and six rivers are listed in Montana for probable causes associated with potential atmospheric deposition (mercury and other metal, nutrients and PCBs). Information regarding mercury and PCBs in Montana fish populations can be found in the Montana Sport Fish Consumption Guidelines published by the Montana Department of Fish, Wildlife and Parks.[10]

Given the resource constraints of DEQ's NPS Program, and the large-scale, often remote and/or diffuse nature of the sources of atmospheric contributions, DEQ has not yet prioritized actions from this source.

Montana's NPS pollution control strategy for atmospheric deposition is to:

- Assess sources of water quality pollution in the state
- Collaborate with DEQ's Air Quality Bureau (AQB) to identify atmospheric sources of NPS pollution in Montana and recommend actions to reduce sources where possible
- Support EPA's nation-wide air quality monitoring efforts, which include long-term monitoring sites in Montana
- Increase public awareness of atmospheric deposition on water quality using educational and outreach activities through work with DEQ's AQB

3.3.1.9 *Climate Change Contributions*

Cold water temperatures are critical to aquatic ecosystems in western Montana. Changing water temperatures affect cold water fish and aquatic insect communities directly by influencing metabolism. Increased water temperatures may degrade the aesthetic quality of waters by encouraging the growth of nuisance and toxic algae which harms recreation and swimming uses. In addition, a rise in water temperature correlates with higher growth and persistence of pathogens that pose risks to human health and aquatic species. Water temperature also affects the solubility of gases in water, especially dissolved oxygen, which is critical to aquatic organisms. In recent decades, stream temperature records have become more readily available due to advancements in technologies that can monitor hourly, daily, annual and seasonal fluctuations in stream temperatures.

Since the 1930's western Montana has seen a decline in its annual winter snow pack, and most of the state's glaciers are receding. This is the result of fewer days below freezing, which has led to less snow at mid to lower elevations and more precipitation. Warmer air temperatures, increased precipitation, and decreased snowpack creates earlier and more rapid peak runoff events from rivers and streams. Reduced snowpack and increased air temperatures in Northern Rocky Mountain streams have resulted in earlier onset (≈ 2-3 weeks) of spring warming and peak runoff events with declining summer baseflows (0.2%/year). Lower summer flows contribute to increases in summer stream temperatures. Temperatures in Pacific Northwest streams and rivers are increasing by 0.31-0.40 ^{o}F per decade.[11]

Increases in summer air and water temperatures will continue to impact aquatic ecosystems. As Montana stream temperatures rise, cool water aquatic habitat will become more restricted. Ways to limit the effects of climate change on these streams include maintaining or restoring instream flows, enhancing riparian habitat to increase shading, and removal of instream barriers to increase fish access to more habitat. Continued temperature monitoring of streams in Western Montana is important to inform future land and water conservation decisions.

4.0 WATER QUALITY STANDARDS

Water quality standards are the fundamental regulatory and policy foundation to protect and restore water quality in Montana. They consist of three elements:

- Designating beneficial uses;
- Establishing narrative and numeric standards to protect those uses; and
- Implementing regulations to prevent water quality degradation.

Water quality standards and use classification systems for surface water and groundwater are defined in the Administrative Rules of Montana, Title 17, Chapter 30 and in Department Circulars DEQ-7.

Additional information regarding water quality standards may be found at:
http://deq.mt.gov/water/Surfacewater/standards

4.1 BENEFICIAL USE CLASSIFICATION

Montana classifies its waterbodies according to present and future beneficial uses they are expected to support (§ 75-5-301, MCA). Montana's water-use classification identify the following five main beneficial use categories (agriculture and industry are separate uses but are shown grouped together). Most waterbodies are capable of supporting multiple uses (**Table 2)**.

Table 2. Beneficial Uses

Aquatic Life and Fish	Growth and propagation of fishes (either salmonid or non-salmonid) and associated aquatic life, waterfowl and furbearers
Recreation	Bathing, swimming, and recreation
Human Health	Drinking, culinary, and food processing (after treatment) and fish consumption
Agriculture & Industry	Agricultural and Industrial water supplies

4.1.1 Use Classes for Surface Waters

Montana's surface waters are grouped into water use classifications based on designated uses. A correlation exists between water use classifications and geographical area. Classes are notated with letters A, B, and C and are further subdivided using numbers 1, 2, and 3 (**Table 3**).

Table 3. Designated Beneficial Uses by Waterbody Class

Beneficial Use	Water Use Classification								
	A-Closed	**A-1**	**B-1**	**B-2**	**B-3**	**C-1**	**C-2**	**C-3**	**I**
Aquatic Life/Fishes (salmonid)		X	X	M		X	M		
Aquatic Life/Fishes (non-salmonid)					X			X	
Aquatic Life/Fishes	X								X
Drinking Water (human health)	Xst	XcNI	Xc	Xc	Xc			M	
Recreation	X	X	X	X	X	X	X	X	X
Agriculture	X	X	X	X	X	X	X	M	X
Industry	X	X	X	X	X	X	X	M	X

X = Supports beneficial use; M = Marginal support for beneficial use; Xst = Supports beneficial use with simple water treatment; XcNI = Supports beneficial use with conventional water treatment for naturally occurring impurities; Xc = Supports beneficial use after conventional treatment

4.1.2 Use Classes for Groundwater

Groundwater has four use classes defined by specific conductance levels (**Table 4**). State water quality standards are associated with the specific uses.

Table 4. Groundwater Classifications

Beneficial Uses	Water Use Classification			
	Class I **<= 1,000 µS/cm***	**Class II** **>1,000 µS/cm - <=2,500 µS/cm***	**Class III** **>2,500 µS/cm - <=15,000 µS/cm***	**Class IV** **>15,000 µS/cm***
Public & Private Water Supply	X	M	<7,000 µS/cm*	
Food Processing	X	M		
Irrigation	X	X	M	
Stock Water	X	X	X	
Commercial & Industrial Use	X	X	X	X

X = Supports Beneficial Use; M= Marginal Support for Beneficial Use (i.e., may exist)

* Specific Conductance @ 25°C

4.2 WATER QUALITY CRITERIA (WATER QUALITY STANDARDS)

Water quality criteria (in Montana, these are usually referred to as water quality standards) are established to support the beneficial uses outlined above. These standards can be expressed as pollutant concentrations or narrative statements, and when the standards are met in a water body, the beneficial uses are considered protected.

4.2.1 Numeric Standards

Numeric standards represent the maximum amounts of specific pollutants allowed in a body of water that still protects that waterbody's beneficial uses. But numeric standards are more than simple expressions of the maximum allowable concentration (i.e., magnitude) of a pollutant. They also take into account the duration of exposure to the pollutant (whether that be a day, a month, a year, etc.; it varies by pollutant), as well as the allowable excursion frequency—that is, how often the standard's magnitude can be exceeded while still remaining in compliance. States may adopt numeric standards based upon EPA's federal guidance values or develop state- or site-specific values. If site-specific standards are adopted for a waterbody or segment, these site-specific standards must be used for assessment of the waterbody or segment.

Montana established numeric standards for:

- Five categories of pollutants affecting aquatic life, human health, or both: toxic, carcinogenic, radioactive, nutrients, and harmful (DEQ-7)
- Human health risks from *Escherichia coli* levels (ARM 17.30.620-629)
- Recreational impacts from excess algal biomass and nutrient levels in the Clark Fork River (ARM 17.30.631)
- Risks to agriculture and soils from excessive dissolved salts and types of salts—expressed as electrical conductivity and sodium absorption ratio—in the Powder, Tongue, Rosebud, and Little Powder rivers (ARM 17.30.670)

Pollutants with numeric standards may have acute aquatic life values, chronic aquatic life values, and/or human health values. Acute aquatic life standards are based on a one-hour exposure event and can only be exceeded once, on average, in a three-year period. Chronic aquatic life criteria are based on a 96-hour exposure and can only be exceeded, on average, once in a three-year period. Human health standards in DEQ-7 have a frequency and duration of zero and are expressed as "may not exceed". For human health standards, two routes of exposure are considered: water consumption and fish consumption. Human health standards applicable to groundwater generally only account for water consumption.

4.2.2 Narrative Standards

Narrative standards are statements (instead of specific quantities) that describe the desired conditions of a waterbody.[12] Narrative criteria are adopted when a pollutant is not suited to a numeric standard or if there is insufficient information to do so. Some narrative standards specify that waters must be "free from substances" that will create objectionable or nuisance conditions. Some narrative standards restrict allowable change from natural conditions, and other narrative standards specify acceptable ranges or degrees of change.

4.3 NONDEGRADATION POLICY

Montana's nondegradation policy[13] establishes that existing uses of state waters and the level of water quality necessary to protect those uses must be maintained and protected and, unless authorized, the quality of high-quality waters must be maintained. The requirements for what constitutes non-significant degradation and the conditions under which authorizations to degrade are allowed are described in ARM 17.30.701–718. Montana's nondegredation policy provides three levels of protection for surface waters (**Figure 5**).

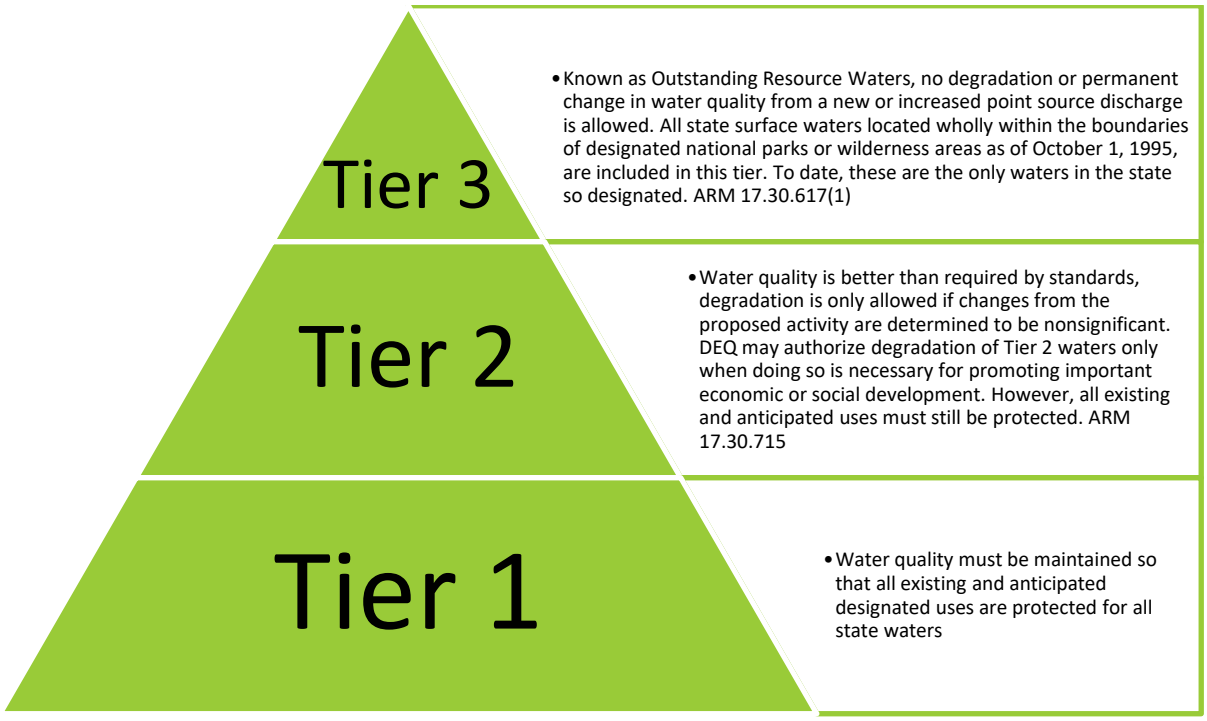


Figure 5. Montana's Non-degradation Policy

5.0 SURFACE WATER MONITORING

DEQ's monitoring objectives include studies to develop appropriate standards, identify impairments, find and quantify sources for TMDLs, track change when improvements are made or new sources are developed, and report successful restoration of water quality conditions. We support monitoring across the state to identify problems, further identify specific sources so they can be addressed, determine effectiveness of restoration or remediation activities, and track local trends. DEQ's Monitoring and Assessment, Standards and Modelling, TMDL, Nonpoint Source and other programs, as well as many partners, collect data.

5.1 MONITORING TO SUPPORT WATERSHED PLANNING

DEQ conducts or supports water quality monitoring activities to achieve various objectives with the goal of protecting and improving water quality. Ambient surface water quality data collected or funded by DEQ is managed in DEQ's water quality data system (MT-eWQX) and submitted to the National Water Quality Portal where it is publicly accessible. When DEQ funds projects via partnerships we ensure that it can be used for multiple purposes. DEQ will also use available data from other sources if it meets certain data quality objectives.

DEQ selects 303(d) assessment, TMDL, and success story projects via input from other DEQ programs, the Statewide TMDL Advisory Group and through solicitation of external partners. Considerations for prioritizing many of the projects that need water quality data are provided in MCA 75-5-702(7).

Surface water monitoring projects undertaken by DEQ in 2017 and 2018 include:

- **Red Rock River watershed:** assess beneficial uses associated with nutrients, metals, *E. coli*, sediment, and habitat
- **Armells Creek**: track conditions in salinity, metal and nutrients
- **Yellowstone River:** assess beneficial uses associated with nutrient and metals conditions
- **Clark Fork River**: analyze long-term nutrient trends
- **Soda Butte Creek and streams in the New World Mine District**: reassess uses associated with metals following mine cleanups
- **Smith River**: investigate nuisance algae conditions, assess uses associated with nutrients and metals, and identify tributary loading
- **Taylor Fork of the West Gallatin River**: assess beneficial uses associated with sediment following restoration work
- **Lake Koocanusa**: evaluate effects of coal mining on water quality
- **Clark Canyon Reservoir**: evaluate influence on internal turbidity production and effects to the Beaverhead River downstream
- **Canyon Ferry Reservoir**: determine nutrient standards that would prevent nuisance and harmful algal blooms and to assess beneficial uses associated with nutrients
- **Yellowstone River and Missouri River:** evaluate sources and concentrations of arsenic
- **Reference sites on minimally disturbed streams**: expand data used to define reference conditions used, for example, when interpreting narrative water quality standards

5.1.1 **Monitoring Partnerships**

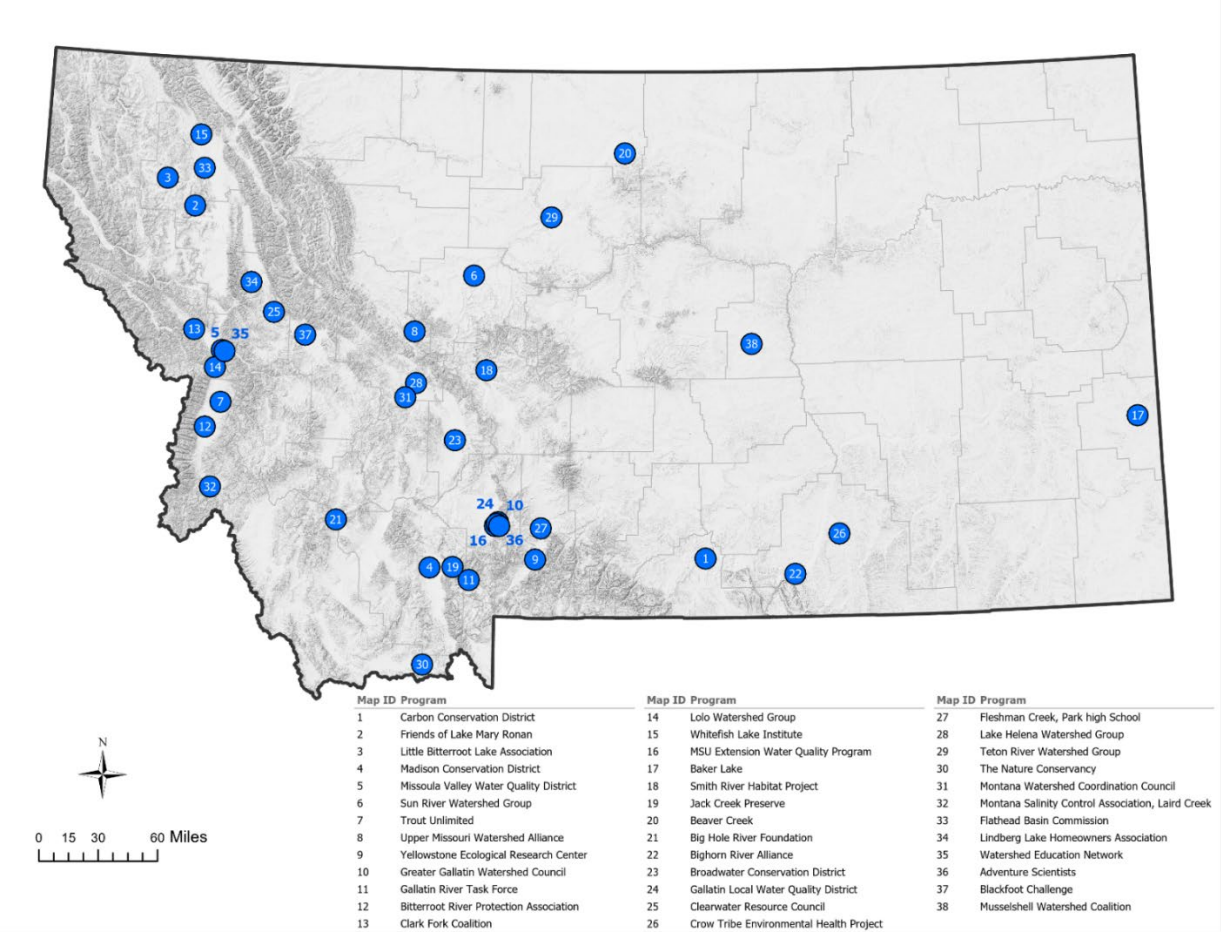
Monitoring partnerships increase the amount of high quality data available for making informed decisions. Partnerships can also heighten efficiency, help leverage technical and financial resources, and enable stakeholders to engage directly in water resource management. For example, when assessing beneficial use support and making impairment decisions, DEQ considers data submitted from secondary sources if the data meets DEQ's data quality requirements. **Table 5** shows examples of recent, successful monitoring partnerships.

Table 5. Monitoring Partnership Examples

Watershed	Objective	Partner(s)
Deep Creek	National Water Quality Initiative	Natural Resources Conservation Service and Broadwater Conservation District
Camp and Godfrey Creeks	National Water Quality Initiative	Natural Resources Conservation Service and Gallatin Local Water Quality District
Bitterroot River	Nutrient trends	Clark Fork Coalition and others
Clark Fork River	Nutrient trends	Clark Fork Coalition and AVISTA
Upper Gallatin River	Nutrient and algae study	Gallatin River Task Force
Smith River	Nutrient and algae study	Montana Fish, Wildlife & Parks
Lake Koocanusa	Study of coal mining impacts	U.S. Army Corps of Engineers, U.S. EPA. and Montana Fish, Wildlife & Parks
Clark Canyon Reservoir	Turbidity study	U.S. Bureau of Reclamation, Montana Fish, Wildlife & Parks
Red Rock watershed	Beneficial use assessment relating to nutrient, *E. coli*, sediment and metals conditions	The Nature Conservancy
Taylor Fork	Aquatic life use sediment assessment	Gallatin River Task Force
East Fork Armells Creek	Salinity, metals and nutrient trends	DEQ Coal Program
Reference Stream Project	Reference conditions	University of Montana, Bureau of Land Management
Smith River	Algae and nutrient conditions	U.S. Geological Survey, Montana Fish, Wildlife & Parks

5.1.2 **Volunteer Monitoring Support**

DEQ values volunteer monitoring efforts because they provide hands-on opportunities for people to learn about water quality and can produce high quality data. DEQ supports volunteer monitoring efforts across Montana by providing trainings, technical support, financial support for lab analyses, guidance resources, and lending monitoring equipment. **Figure 6** shows many of the volunteer monitoring programs that DEQ has supported in the past ten years.



Map ID	Program
1	Carbon Conservation District
2	Friends of Lake Mary Ronan
3	Little Bitterroot Lake Association
4	Madison Conservation District
5	Missoula Valley Water Quality District
6	Sun River Watershed Group
7	Trout Unlimited
8	Upper Missouri Watershed Alliance
9	Yellowstone Ecological Research Center
10	Greater Gallatin Watershed Council
11	Gallatin River Task Force
12	Bitterroot River Protection Association
13	Clark Fork Coalition

Map ID	Program
14	Lolo Watershed Group
15	Whitefish Lake Institute
16	MSU Extension Water Quality Program
17	Baker Lake
18	Smith River Habitat Project
19	Jack Creek Preserve
20	Beaver Creek
21	Big Hole River Foundation
22	Bighorn River Alliance
23	Broadwater Conservation District
24	Gallatin Local Water Quality District
25	Clearwater Resource Council
26	Crow Tribe Environmental Health Project

Map ID	Program
27	Fleshman Creek, Park high School
28	Lake Helena Watershed Group
29	Teton River Watershed Group
30	The Nature Conservancy
31	Montana Watershed Coordination Council
32	Montana Salinity Control Association, Laird Creek
33	Flathead Basin Commission
34	Lindberg Lake Homeowners Association
35	Watershed Education Network
36	Adventure Scientists
37	Blackfoot Challenge
38	Musselshell Watershed Coalition

Figure 6. Volunteer Monitoring and Monitoring Partnership Support

6.0 BENEFICIAL USE ASSESSMENT AND IMPAIRMENT LISTING

Note: This section was addended in April 2023 with the addition of an assessment of the Gallatin River, from the Yellowstone National Park Boundary to Spanish Creek (MT41H001_021). Assessment of sufficient credible data indicates this segment of the Gallatin River is impaired by excess algal growth due to exceeding the prohibition in ARM 17.30.637(1)(e). Please see the addendum document available at Water Resources | Montana DEQ (mt.gov) or How's My Waterway at https://mywaterway.epa.gov/state/MT/water-quality-overview for details.

Water quality assessment involves evaluating whether water quality standards are met and determining whether waters are fully supporting their designated beneficial uses (see **Section 4.1.1** for a description of beneficial uses).

Any waterbody for which sufficient credible data show it is failing to achieve compliance with one or more applicable water quality standard is considered "impaired".[14] For each impaired waterbody, DEQ identifies the probable pollutant or non-pollutant cause(s) of impairment as well as the probable sources contributing to the impairment of a specific use. Impairment listings may be changed when sufficient credible data become available to support the modification.[15] DEQ develops TMDLs for each waterbody-pollutant impairment and recommends pollution reduction strategies (see **Section 7** for more information on TMDLs).

If a waterbody is deemed "impaired," it means one or more of its beneficial uses are limited or harmed to some extent. Based on the impairment listing outcome, each designated use for a waterbody is considered either:

- **Fully Supporting**: the waterbody meets all water quality standards and supports all assessed beneficial uses
- **Not Supporting**: one or more water quality standard is exceeded, limiting to some extent the assessed beneficial use
- **Threatened**: the waterbody currently meets water quality standards but will likely exceed a standard if current trends continue.

Probable sources are identified in the IR to help assist the TMDL program during TMDL development and are not always verified as providing loads to the assessment unit. Additionally, not all sources are always identified in the IR because groundwater source pathways may not be apparent. As the next step in the water quality planning process, TMDLs identify all significant sources, quantify them, and provide allocations to reduce pollutant levels. A full and quantified source assessment will be completed during TMDL development.

6.1.1 Assessment Process

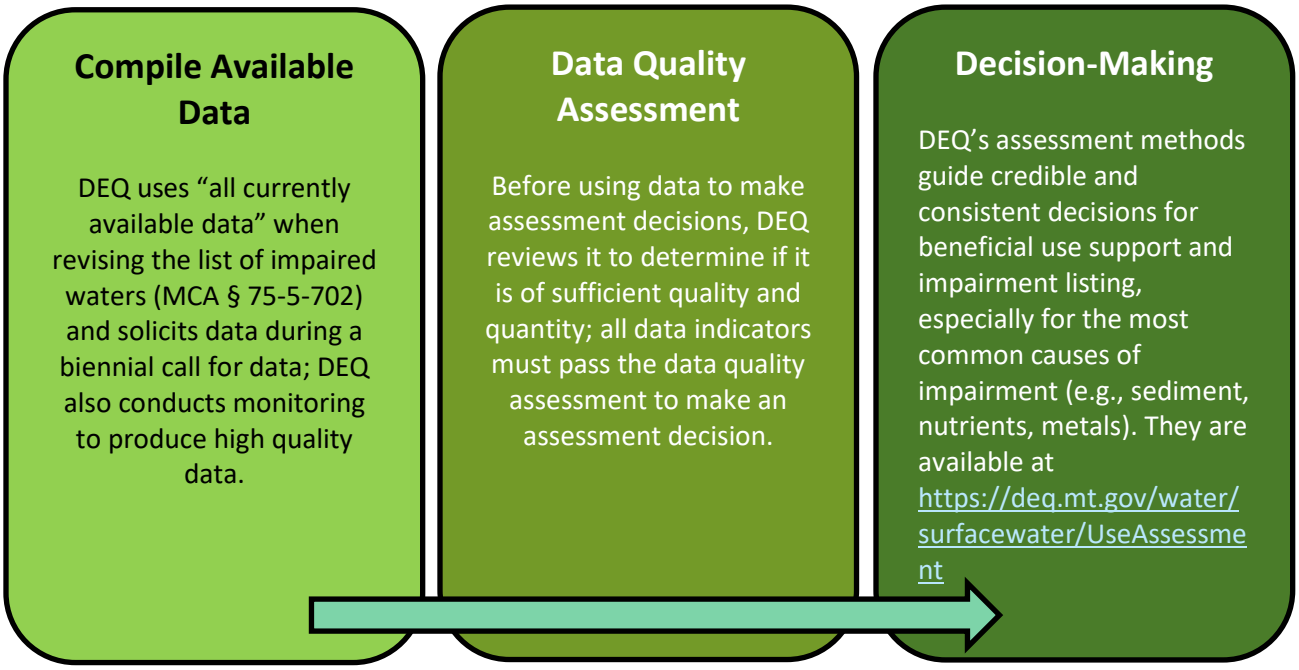


Figure 7. The Assessment Process

6.1.2 Assessment Priorities

DEQ prioritizes beneficial use assessment monitoring projects based on TMDL development priorities.[16] After monitoring projects are selected we may use a targeted, risk-based watershed approach to systematically prioritize waterbodies for data collection within a project area. Targeted monitoring is used to reduce overall program costs and focus on watersheds that will likely benefit from restoration plans and TMDLs. Because the monitoring is targeted, overall statistical results about this program do not represent the average conditions across Montana. Additional areas may have readily available data from other programs. Requests for assessment of other data sources occurs during the biennial call for data in preparation for this report.

6.1.3 Assessment Units

Assessment units (AUs) are delineations of surface waters used to track water quality assessment results. AUs are the smallest unit for which a determination of water quality impairment is made. AUs may be an entire waterbody or a segment of a waterbody (e.g., a stream may be split into two or more segments such as headwaters to a tributary confluence and tributary confluence to mouth). One thousand two hundred AUs exist in the 2020 cycle, including 1,129 river and stream AUs and 71 lake and reservoir AUs.

6.1.4 Water Quality Reporting Categories

Montana uses a system of reporting categories to summarize each assessment unit's impairment status:

Table 6. Water Quality Reporting Categories

Category	Description
1	All designated uses are supported, and no use is threatened.
2	Available data and/or information indicate that some, but not all, of the designated uses are supported.
3	There is insufficient available data/information to make a use support determination.
4A	Available data and/or information indicate that at least one designated use us not being supported or is threatened, but a TMDL has been completed for the water-pollutant combination.
4C	Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed because the impairment or threat is not caused by a pollutant
5	One or more applicable beneficial uses are impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
5N	Natural conditions may be higher than the water quality standards but further source assessment is needed to fully determine this condition. The TMDL program completes more thorough source assessments for all pollutants identified as limiting a beneficial use. If natural sources are determined to be a sole cause of water quality standards exceedance during TMDL development, a natural conditions analysis may be pursued.

6.1.5 Assessment Records

For each waterbody assessment unit, DEQ maintains an electronic assessment record, which summarizes data and information as well as beneficial use support and impairment listing decisions. Assessment records, online mapping tools, and Montana's Water Quality Integrated Report documents can be accessed on the Clean Water Act Information Center (CWAIC) website at http://deq.mt.gov/Water/Resources/cwaic. Here, you can run queries of the state's water quality assessment records. Water quality data may also be found at the EPA's How's My Waterway webpage at https://mywaterway.epa.gov/state.

6.2 SUMMARY OF 2020 WATER QUALITY ASSESSMENTS

Montana selects watersheds or large river systems across the state for implementing beneficial use assessment projects to help frame and inform TMDLs (**Section 7.1**). In addition to TMDL-based project areas, projects are implemented in more specific waterbodies where water quality threats or improvements are occurring. Other waters are assessed on a case by case basis depending on responses during our biennial call for data. As of the 2020 cycle, Montana has assessed the water quality of 20,832 miles of streams and 493,343 acres of lakes, which account for 42% of the total length of Montana's perennial streams excluding streams on tribal lands and ORWs and 82% of lake acreage excluding lakes on tribal lands and ORWs (**Figure 8**). Because the monitoring is targeted, overall statistical results about this program do not represent the average conditions across Montana.

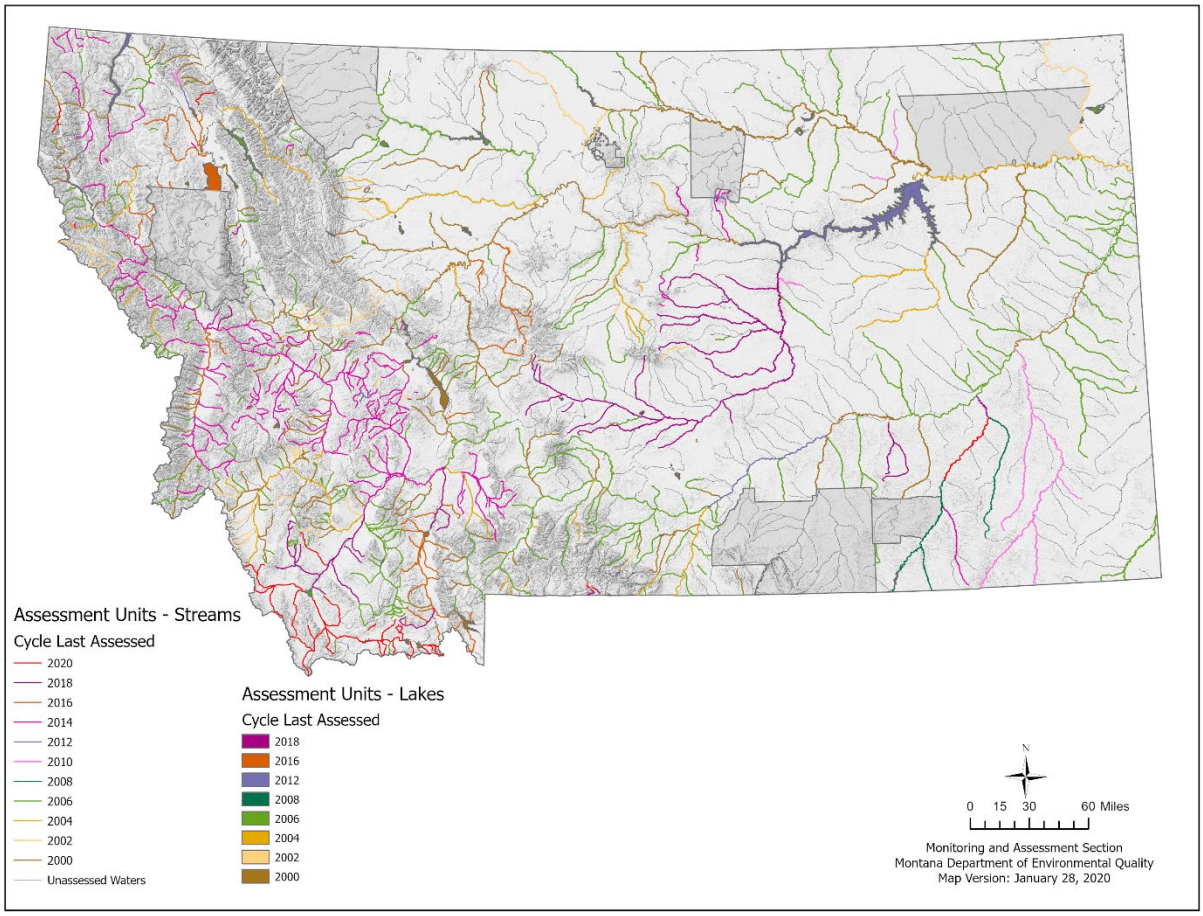


Figure 8. Integrated Reporting Cycle that Assessment Units were Last Assessed

6.2.1 **Overview of Cause Groups and AU-Cause Listings**

Sediment, habitat, metals and nutrients are the most common cause groups impacting rivers (**Table 7**). Impaired lakes are overwhelmingly impacted by metals, particularly mercury.

Table 7. Common Causes and Cause Groups

Cause or Cause Group	Total River Mileage Impaired by Cause	% of River Miles that have been Assessed that are Listed as Impaired by Cause*	% of Perennial Rivers Excluding ORW and Tribal Waters that are Listed as Impaired by Cause*	Total Lake Acreage Impaired by Cause	% of Lake Acres that have been Assessed that are Listed as Impaired by Cause*	% of Named Lakes 5 Acres or Larger Excluding ORW and Tribal Waters that are Listed as Impaired by Cause*
Habitat (4C)	10,226	49%	21%	9,446	2%	2%
Metals	7,524	36%	15%	392,132	78%	66%
Mercury	1,663	8%	3%	311,192	62%	52%
Nutrients	7,231	35%	15%	111,479	22%	19%
PCBs	75	0.36%	0.15%	60,622	12%	10%
Salinity	2,919	14%	6%	16,191	3%	3%
Sediment	8,220	40%	17%	10,948	2%	2%
Temperature	2,717	13%	5%	0	0%	0%

*An assessed AU is an AU with at least one use support determination.

A total of 3,440 AU-cause combinations have been identified as impairing Montana's surface waters (Appendix A) as of the 2020 cycle. This includes both pollutants and non-pollutants. One thousand four hundred fifteen of the AU-pollutant combinations have TMDLs completed. An AU-cause combination is a specific waterbody segment and its associated impairment cause listing. A waterbody may have multiple causes harming its uses and not all causes require a TMDL. Montana's waters are impacted by 66 unique causes and 91 unique sources.

6.2.2 **AU Categories**

Of the 20,832 miles of streams and rivers with use support determinations, 53% of miles or 379 AUs are listed as impaired (category 5 or category 5,5N), 23% of miles or 372 AUs are listed as impaired but with a completed TMDL (category 4A), 4% of miles or 49 AUs are fully supporting assessed uses (some uses not assessed; category 2) and 11% of miles or 119 AUs are fully supporting all beneficial uses (category 1). (See **Section 6.1.4** for category definitions; see **Figure 9** for details regarding all categories).

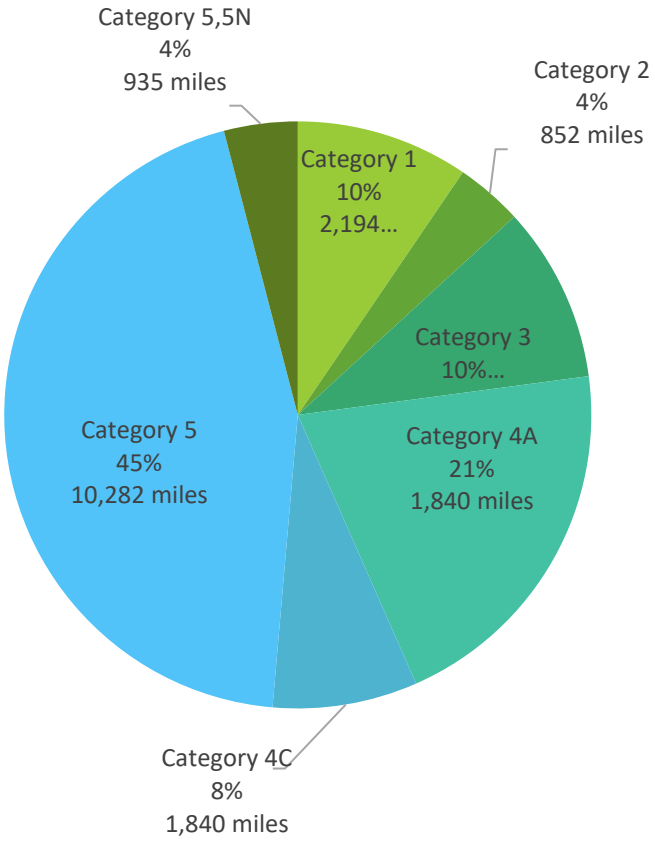


Figure 9. River Categories

Of the 480,914 acres of lakes with use support determinations, 78% of acres or 19 AUs are listed as impaired (category 5 or category 5,5N), 1% of acres or 4 AUs are listed as impaired – TMDL completed (category 4A), and 12% of acres or 14 AUs are fully supporting all beneficial uses (category 1). (See **Section 6.1.4** for category definitions; see **Figure 10** for details regarding all categories.)

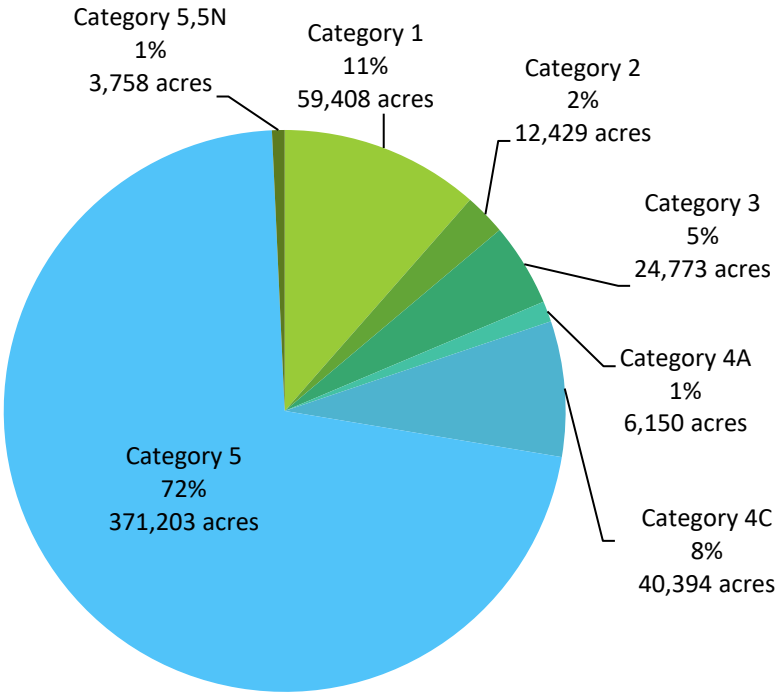


Figure 10. Lake Categories

6.2.3 River and Stream Water Quality Assessment

Many of the most common impairments in Montana affect aquatic life. The following river and stream beneficial uses are fully supported: 92% of agriculture, 72% of human health, 65% primary contact recreation and 16% of aquatic life based on the number of AUs. DEQ has assessed 1,011 river and stream AUs, for a total of 20,832 miles. One hundred nineteen river and stream AUs, or 2,193 miles, support all of their uses. Because the monitoring is targeted, overall statistical results about this program do not represent the average conditions across Montana.

Alteration in stream-side or littoral vegetative cover, sedimentation/siltation and flow regime modification are the most common causes impacting stream beneficial uses (see **Table 8** for a list of the 10 most common causes impacting rivers and streams based on mileage). Agriculture (mainly grazing in riparian or shoreline zones and irrigated crop production), silviculture and mining are the leading sources for these three causes.

Table 8. Ten Most Common Causes for Perennial Rivers and Streams Based on Mileage

CAUSE (RIVERS and Streams)	# of Impacted AUs	Total Miles of Impacted Rivers and Streams	% of Assessed River and Stream Miles	% of Total Perennial River and Stream Milles Excluding ORW and Tribal Waters
Alteration in stream-side or littoral vegetative covers	417	8,526	41%	15%
Sedimentation/Siltation	452	6,802	33%	12%
Flow Regime Modification	299	6,367	31%	11%
Phosphorus, Total	247	5,299	26%	9%
Nitrogen, Total	213	5,023	24%	9%
Iron	126	3,745	18%	6%
Lead	169	3,228	16%	6%
Physical substrate habitat alterations	146	2,909	14%	5%
Temperature	105	2,699	13%	5%
Copper	147	2,691	13%	5%

6.2.4 Lake Water Quality Assessment

To date, of the 598,600 acres of lakes and reservoirs under state jurisdiction (i.e., excluding waters located on tribal lands) and ORWs, DEQ has defined 71 assessment units consisting of 518,116 acres. DEQ has assessed 493,343 acres of lakes (56 AUs) for use support. The following lake beneficial uses are fully supported: 88% primary contact recreation, 78% of agriculture, 64% of human health, and 52% of aquatic life, by number of AUs. Fourteen assessed lakes, for a total of 59,408 acres, fully support all uses. The five largest lakes (Fort Peck Reservoir, the portion of Flathead Lake under state jurisdiction, Canyon Ferry Reservoir, the portion of Lake Koocanusa located in the U.S., and Hungry Horse Reservoir) account for 76% of the assessed lakes acreage in Montana. Montana's lakes are generally in good condition, with the lakes in the western mountainous region generally less disturbed than those in the northern plains. The overall water quality of the state's lakes is better than the national average.[17]

As of 2020, 30 identified causes and 35 identified sources impact Montana's lakes and reservoirs. Mercury, lead and phosphorus are the most common causes by number of acres impacted. (See **Table 9** for a list of the 10 most common causes impacting lakes.) Of the 311,192 acres listed for mercury, Fort Peck Reservoir accounts for 233,296 acres, or 75% of acres. Although lead is the second most common cause, it only impacts three known lakes: Lake Helena, Medicine Lake, and Fort Peck Reservoir. Historic mining is a major source of lead contamination in these three lakes. The third most common pollutant is total phosphorus, which impacts 73,324 acres of assessed lakes. Agriculture and municipal point source discharges are the most common sources of total phosphorus in Montana's lakes. Excess phosphorus can cause algae growth. DEQ's harmful algal bloom program is discussed in **Section 15.6**.

Table 9. Ten Most Common Causes for Lakes

CAUSE (Lakes)	# of Impacted AUs	Total Impacted Acres	% of Assessed Acres	% of Total Named Lake Acres 5 Acres or Larger Excluding ORW and Tribal Waters
Mercury	6	311,192	62%	43%
Lead	3	245,101	48%	34%
Phosphorus, Total	7	73,324	14%	10%
Nitrogen, Total	5	68,354	14%	9%
Polychlorinated Biphenyls (PCBs)	2	60,622	12%	8%
Flow Regime Modification	8	51,859	10%	7%
Selenium	6	42,271	8%	6%
Arsenic	5	41,858	8%	6%
Algae	2	38,155	8%	5%
Ammonia, Un-ionized	1	32,810	6%	4%

6.2.4.1 *Tropic Status*

Although DEQ has limited data to evaluate the trophic status of lakes in the state, we have evaluated 57 lakes (505,750 acres). See **Figure 11** for details.

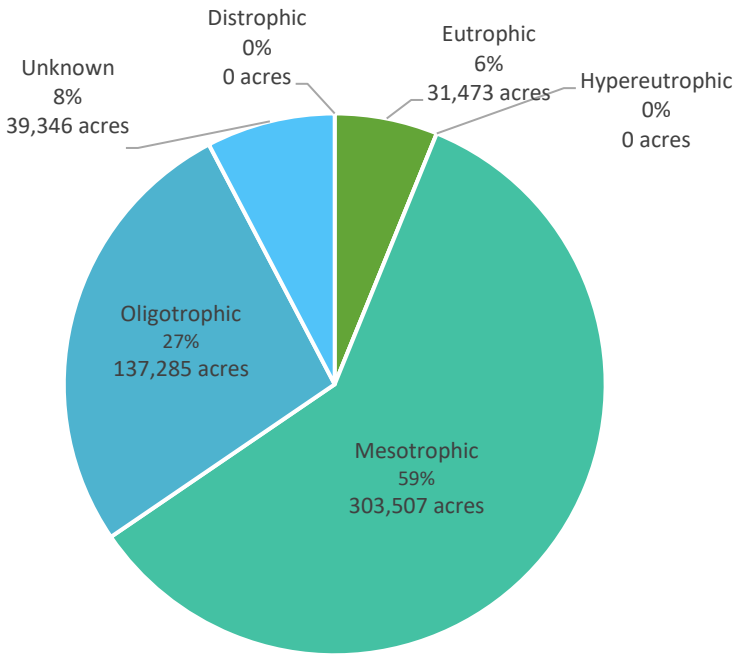


Figure 11. Nutrient Status of Lakes by Percentage of Total AU Acres

6.2.5 2020 Monitoring and Assessment Results

The 2020 IR provides an update to the 2018 IR. Not all waters are reassessed every reporting cycle. DEQ assessed 34 rivers and stream segments during the 2020 cycle. A summary of the assessed waters is listed in **Table 10.**

Table 10. Summary of Streams Assessed during the 2020 Cycle

TMDL PLANNING AREA	WATERSHED	AUs ASSESSED	MILES ASSESSED
Beaverhead	Missouri Headwaters	2	27
Big Creek (Columbia)	Pend Oreille	1	17
Cooke City	Upper Yellowstone	3	9
Kootenai	Kootenai	2	24
Red Rock	Missouri Headwaters	25	495
Tongue	Tongue	1	72

6.2.5.1 *Category 5 Pollutant Listings and Delistings*

During the 2020 cycle, 29 pollutant causes on 14 waterbodies were delisted (i.e., removed) from the 2018 303(d) List (**Table 11**). For the complete list, see Appendix D. Of these, 16 were delisted due to an approved TMDL (4A), ten were delisted for achieving water quality standards, and three causes were delisted due to refinement of terminology of listing cause. The three causes delisted due to a refinement of terminology were turbidity listings that were replaced with sedimentation/siltation listings. The sediment-related turbidity impairment is more accurately captured via the sedimentation/siltation cause. Four causes were delisted from category 4A to category 1. See **Section 9.1** for success story details.

Table 11. Number of Pollutant Causes Delisted from 2018 303(d) List (Category 5)

2020 Delisting Category	Delisting Reason	# of Delistings
Category 1 Delistings	Applicable WQS attained, according to new assessment method	1
	Applicable WQS attained, due to change in WQS	2
	Applicable WQS attained; based on new data	7
	Refinement of terminology of listing cause	3
	Total category 1 pollutant delistings	**13**
Category 4A Pollutant Delistings	TMDL approved or established by EPA (4A)	16
Total Delisted Pollutant Causes		**29**

Fifty-four causes were listed on 19 rivers and streams during the 2020 cycle (**Table 12**). Three of the seven sediment listings are replacements for turbidity listings (see previous paragraph). All new cause listings were in the Red Rock or Tongue watersheds.

Table 12. Pollutant Causes Listed during the 2020 Cycle

	TMDL Planning Area	
Cause	**Red Rock**	**Tongue**
Alteration in stream-side or littoral vegetative covers	6	
Aluminum	4	
Arsenic	4	
Cadmium	1	
Copper	1	
Escherichia coli (*E. coli*)	4	
Habitat Alterations	1	
Iron	3	
Lead	1	
Nitrogen, Total	8	
Phosphorus, Total	13	
Sedimentation/Siltation	7	
Specific Conductivity		1
Total Causes Listed during the 2020 Cycle	**53**	**1**

* These causes are listed on 19 AUs

7.0 TMDL

The DEQ TMDL website is located at: http://deq.mt.gov/water/surfacewater/TMDL

7.1 WHAT IS A TMDL

DEQ develops TMDLs for impaired and threatened waterbodies. A total maximum daily load (TMDL) is a calculation of the maximum amount of a pollutant a waterbody can receive from all sources combined and still meet its water quality standards (i.e., support its beneficial uses). The formula for calculating a TMDL allocates the allowable load of the pollutant among both point and nonpoint sources, while also accounting for naturally-occurring conditions that can diminish water quality. In addition, TMDLs must consider the uncertainty in predicting how well reducing a pollutant will result in meeting water quality standards. The TMDL calculation also considers seasonal variations, such as water temperature and water flow, which can affect how waterbodies respond to certain pollutants. In addition to containing calculations, a TMDL document contains a plan to restore and protect water quality.

The TMDL program developed a strategic plan in 2019, in conjunction with DEQ's closely aligned Monitoring and Assessment and Nonpoint Source programs. These plans outline the objectives and strategies for each program and describe how the programs collaborate throughout the water quality planning process. The plans can be viewed at http://mtwaterqualityprojects.pbworks.com.

7.2 TMDL DEVELOPMENT

Developing a TMDL for an impaired waterbody is a problem-solving exercise. The problem is excess pollutants entering a waterbody and impairing or threatening designated beneficial uses. The solution is to identify three factors:

- the total acceptable pollutant loading (amounts)
- all the significant pollutant-contributing sources (where it comes from)
- where pollutant-loadings can be reduced to achieve an acceptable load (reductions to attain water quality goals)

A single waterbody can be impaired or threatened from multiple pollutants, which means it 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 by three separate TMDLs. DEQ uses a watershed approach to develop TMDLs so that rivers, streams, and lakes within a watershed can be efficiently addressed in a single TMDL document containing multiple TMDLs. TMDLs set water quality targets for watersheds and therefore provide both a way to measure water quality and a plan for improving it.

DEQ works with watershed stakeholders during TMDL development so that local watershed groups and/or other interested parties can use completed TMDLs as tools to help guide local activities for improving water quality.

Benefits of a "watershed approach" for TMDLs:

- Targets priority water quality problems
- Promotes stakeholder involvement
- Integrates knowledge and authority of multiple agencies and experts

Developing a TMDL document generally takes 2 to 3 years for each project area, depending on the complexity of the watershed and available data and resources. DEQ has several project areas in TMDL development simultaneously (see **Figure 12**). After local stakeholders and the public have the opportunity to provide comment, TMDL documents are submitted to the U.S. EPA for approval.

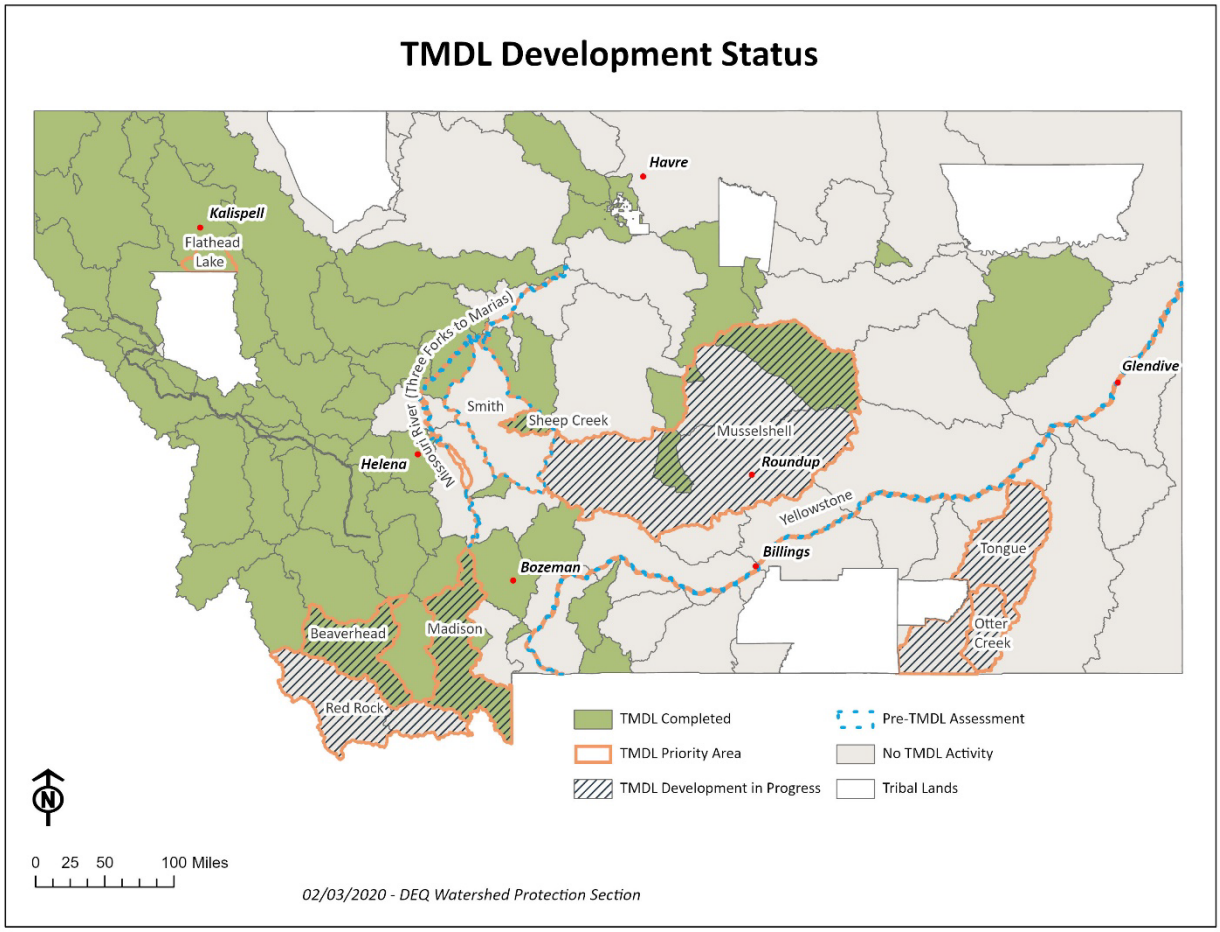


Figure 12. TMDL Development Status and Priority Areas

7.3 TMDL PRIORITIES

To determine a watershed's TMDL development priority, DEQ applies factors defined in state law[18] and consults with the Statewide TMDL Advisory Group and local stakeholders.

- **High Priority:** Watersheds with TMDL completion anticipated within the next two years
- **Medium Priority:** Watersheds where TMDL completion anticipated within 2-6 years
- **Low Priority:** All other watersheds that require TMDLs or waters that have TMDL alternative restoration approach(s) in place

Factors that most influence prioritization:

- Is a TMDL needed to support new individual discharge permit applications?
- How great is the potential for ready implementation?
- Is there a great ability to improve coordination among water quality programs?
- Do the waters have a high resource value?
- Do the pollutants have high potential to harm a beneficial use or uses?

As part of TMDL public outreach, DEQ has created a TMDL project website that identifies current TMDL priority areas (**See Figure 4**) and provides a rationale on how these priorities were determined. The website also includes DEQ's method for setting TMDL priorities. Because of the large number of existing TMDL documents, in addition to working on new TMDL development in priority areas, it is anticipated that a significant amount of future work will address updates and improvements to these documents, with regard to local stakeholder implementation.

7.4 TMDL IMPLEMENTATION

TMDLs are implemented by people, and TMDL documents often function as information tools. Individual pollutant allocations for point sources (referred to as wasteload allocations) are managed using discharge permits, which DEQ issues through the Montana Pollutant Discharge Elimination System (MPDES). Pollutant allocations for nonpoint sources (referred to as load allocations) are managed voluntarily by land management agencies, watershed groups, conservation districts, landowners, and interested citizens. DEQ assists locally led restoration and protection efforts with funding and technical assistance to improve water quality through the Nonpoint Source Program. DEQ will revisit areas with completed TMDLs to document progress made toward meeting TMDL objectives, also known as a TMDL Implementation Evaluations (TIEs) (**Figure 13**). The purpose of the TIE is to:

- Recognize and document implementation of reasonable land, soil, and water conservation practices
- Assist in determining the effectiveness of those practices on water quality improvement
- Assess progress towards meeting water quality standards
- Provide recommendations for changes in implementation activities, monitoring, or address changes in the watershed that are likely to impact water quality
- Promote TMDL implementation and beneficial use support

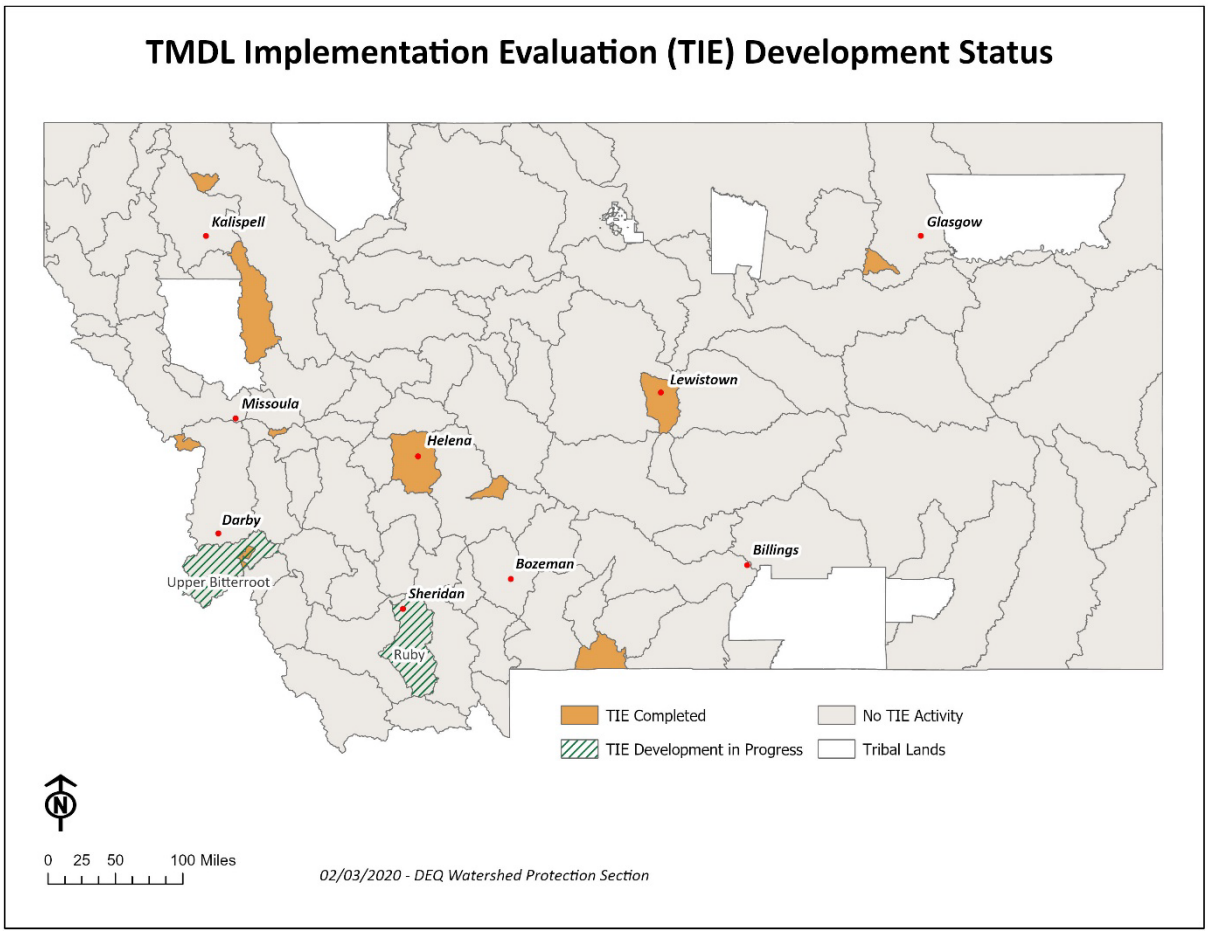


Figure 13. TMDL Implementation Evaluation Development Status

8.0 WATERSHED PROTECTION AND RESTORATION (NONPOINT SOURCE PROGRAM)

The Nonpoint Source Program focuses on protecting water quality from nonpoint sources of pollution throughout the state, by implementing the Nonpoint Source Management Plan. Montana submitted an updated plan in December of 2017, which EPA Region VIII approved in February 2018. This plan discusses the development of a 20-year strategic vision that articulates a process for identifying and supporting Focus Watersheds. In conjunction with DEQ's closely aligned Monitoring and Assessment and Total Maximum Daily Load programs, the Water Quality Division finalized strategic visions for these three programs in August 2019. These documents can be viewed at http://mtwaterqualityprojects.pbworks.com

The Nonpoint Source Program Strategic Plan to Improve Water Quality identifies four objectives:

1. Implement a tiered approach to tailor technical and financial support to the needs and capacities of watersheds
2. Demonstrate water quality improvements;
3. Build local capacity and partnerships
4. Improve stewardship and highlight achievements. The tiered approach recognizes three priority levels: Focus watersheds; Watersheds with Watershed Restoration Plans (WQRPs); and Watersheds without WRPs (**Figure 14**). Focus watershed (1-2 active at any point in time) attributes include:

    - Locally-developed Watershed Restoration Plans (WRPs) in place
    - Stakeholder interest
    - Opportunities to track changes in water quality and other indicators
    - Cost-effective BMPs can remedy most NPS pollution
    - Existing partnership with DEQ and ability to increase momentum
    - Potential to reduce a community's point source treatment costs
    - Coinciding priorities with programs internal and external to DEQ

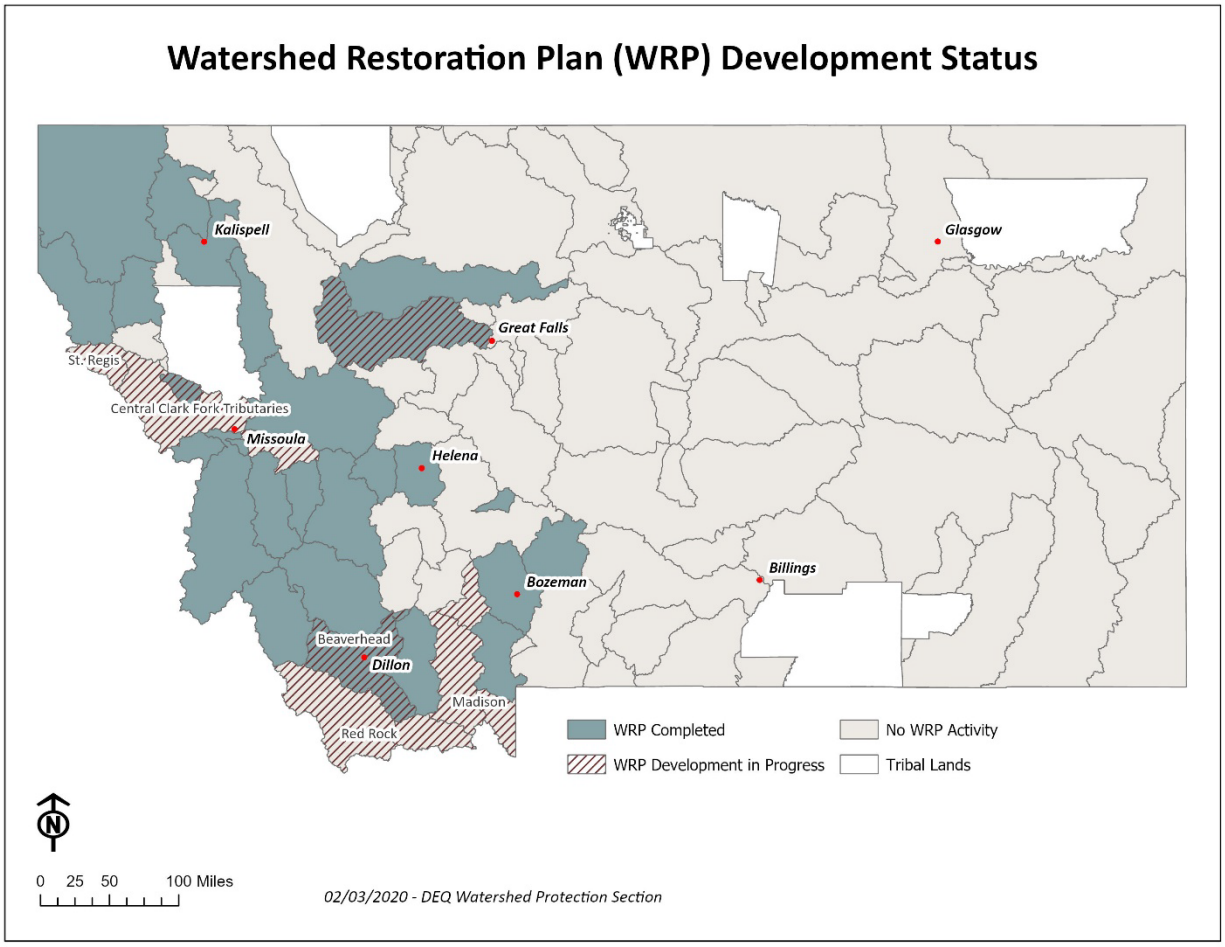


Figure 14. Watershed Restoration Plan Development Status

The NPS program's objective is to build capacity in those watersheds with Watershed Restoration Plans, such that they will at some point become a focus watershed, and , to support those watersheds without WRPs in meeting their NPS interests through assistance with WRP development, identifying other agency funding opportunities, and support for education and outreach including mini-grant opportunities, etc.

The Bitterroot watershed was selected as the pilot watershed for implementation of the strategic plan in 2019. A second watershed, the lower Gallatin River, that had also been selected by the Montana Natural Resources Conservation Service as a National Water Quality Initiative watershed, is currently the second active focus watershed. These two watersheds have the potential to receive a substantial amount of 319 project funding, along with substantial NPS staffing resources for the next several (1-3) years (**Figure 14**).

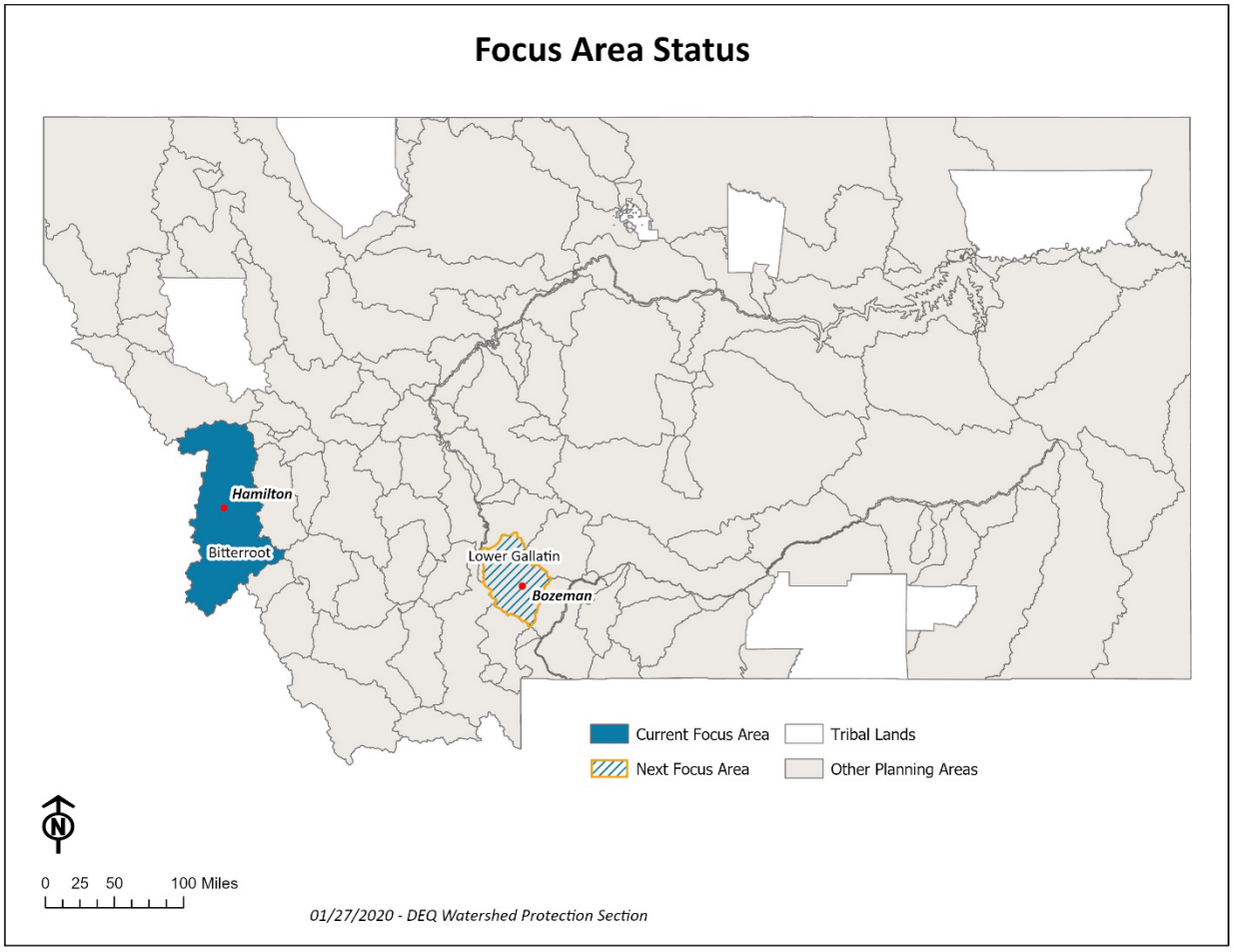


Figure 14. Focus Watershed Status

8.1 SUCCESSES: POLLUTANT RESTORATIONS

During the 2020 cycle, DEQ confirmed restored or improved water quality on four waterbodies due to restoration activities. Big Creek, tributary to the North Fork Flathead River is managed by the Flathead National Forest and was previously de-listed for sediment, but continued to be listed for "other habitat alterations" based on historic riparian timber harvest. DEQ determined that aquatic life is now fully supported and no longer impaired based on a site-specific assessment of current conditions in the watershed. Daisy Creek, the upper Stillwater River, and upper Fisher Creek, in the Cooke City/New World mining district, were previously listed as impaired by sediment and did not fully support aquatic life. Gallatin National Forest over the past 20 years has engaged in large-scale mine reclamation in this area, reducing sediment in these streams to the point where DEQ has determined that these three streams are no longer impaired by sediment.

DEQ works in coordination with local groups in planning and completing restoration work. Pollutant causes delisted due to restoration activity are listed in **Table 14.**

Table 14. Causes Delisted Due to Restoration Activity

ID305B	AU LOCATION	CAUSE	DELISTING DATE
MT40A002_050	CARELESS CREEK, confluence with Swimming Woman Creek to mouth (Musselshell River)	Sedimentation/Siltation	12/7/2017
MT41G001_011	JEFFERSON RIVER, headwaters to confluence of Jefferson Slough	Copper	12/6/2013
MT41I002_070	DEEP CREEK, National Forest boundary to mouth (Missouri River)	Sedimentation/Siltation	1/5/2016
MT43B002_031	SODA BUTTE CREEK, McLaren Tailings to Wyoming Border	Copper	11/16/2017
MT43B002_031	SODA BUTTE CREEK, McLaren Tailings to Wyoming Border	Iron	11/16/2017
MT43B002_031	SODA BUTTE CREEK, McLaren Tailings to Wyoming Border	Lead	11/16/2017
MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	Aluminum	11/20/2017
MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	Cadmium	11/20/2017
MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	Iron	11/20/2017
MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	Lead	11/20/2017
MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	Zinc	11/20/2017
MT43C001_010	STILLWATER RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Iron	11/20/2017
MT43C001_010	STILLWATER RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Sedimentation/Siltation	6/11/2019
MT43C002_140	DAISY CREEK, headwaters to mouth (Stillwater River)	Sedimentation/Siltation	6/11/2019
MT43D001_020	CLARKS FORK YELLOWSTONE RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Cadmium	11/20/2017
MT43D001_020	CLARKS FORK YELLOWSTONE RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Lead	11/20/2017
MT43D001_020	CLARKS FORK YELLOWSTONE RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Silver	12/18/2017
MT43D001_020	CLARKS FORK YELLOWSTONE RIVER, headwaters to Absaroka-Beartooth Wilderness boundary	Zinc	11/20/2017
MT43D002_110	FISHER CREEK, headwaters to mouth (Clarks Fork Yellowstone River)	Sedimentation/Siltation	6/11/2019
MT43D002_110	FISHER CREEK, headwaters to mouth (Clarks Fork Yellowstone River)	Silver	12/18/2017
MT76E004_020	CRAMER CREEK, headwaters to mouth (Clark Fork River)	Arsenic	41605
MT76E004_020	CRAMER CREEK, headwaters to mouth (Clark Fork River)	Copper	41605

Table 14. Causes Delisted Due to Restoration Activity (cont.)

ID305B	AU LOCATION	CAUSE	DELISTING DATE
MT76E004_020	CRAMER CREEK, headwaters to mouth (Clark Fork River)	Mercury	41605
MT76H002_030	MEADOW CREEK, headwaters to mouth (East Fork Bitteroot River)	Alteration in stream-side or littoral vegetative covers	12/31/2013
MT76K003_010	JIM CREEK, Mission Mountains Wilderness boundary to mouth (Swan River)	Sedimentation/Siltation	12/12/2017
MT76P003_020	SWIFT CREEK, headwaters (East and West Forks) to mouth (Whitefish Lake)	Solids (Suspended/Bedload)	8/7/2009
MT76P003_040	WEST FORK SWIFT CREEK, headwaters to mouth (Swift Creek)	Sedimentation/Siltation	8/10/2009
MT76Q002_050	BIG CREEK, headwaters to mouth (North Fork of the Flathead River)	Alteration in stream-side or littoral vegetative covers	6/13/2019
MT76Q002_050	BIG CREEK, headwaters to mouth (North Fork of the Flathead River)	Sedimentation/Siltation	11/2/2011

9.0 WETLANDS

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. To assist in that goal, DEQ's Wetland Program provides state leadership to the Montana Wetland Council whose participants work to conserve wetlands and riparian areas for the benefits they provide, including improving water quality by filtering pollutants, maintaining water quantity, providing important habitat, and reducing the detrimental effects of flooding. The Wetland Program is dedicated to integrating wetlands into the water quality planning process, understanding wetland losses and gains in both quantity and quality, increasing the protections afforded wetlands and riparian areas, and evaluating the effectiveness of ongoing restoration and management.

The 2011 – 2018 Montana DEQ Wetland Program Plan may be viewed at:
http://deq.mt.gov/Water/SurfaceWater/Wetlands

9.1 WHAT THE WETLAND PROGRAM DOES FOR MONTANA

- Organizes and chairs the Montana Wetland Council
- Works to integrate wetlands into the water quality planning process
- Participates in state working group to ensure compensatory mitigation for impacts to aquatic resources
- Conducts assessments to understand the affect land-use/water practices have on the benefits wetlands provide

9.2 PRIORITIES (2019)

- Restructure and revitalization of the Montana Wetland Council
- Analysis and reporting on the Red Rock Watershed Wetland Assessments
- Updating DEQ's Wetland Program Plan to incorporate 20-year strategic plans from NPS, Water Quality Monitoring and Assessment (WQMAS) and TMDL programs; Montana Wetland Council goals and objectives, and EPA's Core Elements of on effective wetland program.

9.3 ACHIEVEMENTS

- Developed a story map and dashboard of Musselshell wetland assessments to promote wetland best management practices
- Led the Montana Wetland Council through the Strategic Planning process for updating the State Wetland and Riparian Areas Plan for 2020 – 2030.
- Led the Montana Wetland Council Steering Committee through a restructuring process designed to increase participation in the Montana Wetland Council.

10.0 GROUNDWATER

Montana's population relies heavily on groundwater. About 61% of the state's population gets their drinking water from groundwater; of that, 32% get their drinking water from private wells. In addition to DEQ, other state and federal agencies that monitor and assess Montana's groundwater include:

- Montana Bureau of Mines and Geology (MBMG)
- Montana Department of Agriculture (MDA)
- Montana Department of Natural Resources & Conservation (DNRC)
- United States Geological Survey (USGS)

10.1 GROUNDWATER USES

Montanans wiithdraw approximately 9,810 million gallons per day (mgpd) of groundwater.[19] The groundwater withdrawals by category are:

- irrigation – 9,450 mgpd
- drinking – 153 mgpd
- thermoelectric – 76 mgpd
- livestock – 42 mgpd
- mining – 38 mgpd
- domestic - 24
- aquaculture – 17
- industrial – 10 mgpd

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.

Between July 1, 2017 and June 30, 2019, 4,405 domestic wells, 808 livestock wells and 247 irrigation wells were drilled.[20] Since 1975, Montanans have constructed more than 119,720 domestic wells, 14,864 livestock wells, and about 6,956 irrigation wells.[21]

10.2 GROUNDWATER MONITORING & ASSESSMENT

The 1991 Montana Legislature established the Montana Groundwater Assessment Program (GWAP),[22] 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. In 2009, the Montana Legislature established the Groundwater Investigation Program (GWIP) within MBMG to conduct detailed groundwater investigations in areas with the most serious concerns.[23] The Groundwater Information Center (GWIC) 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.

10.2.1 **Contaminants & Sources**[24]

The water chemistry data evaluated for this report were collected by the groundwater monitoring, assessment, and investigation program and other MBMG programs within specific study areas (491 samples). Of the 491 samples evaluated for this report, 40 % came from unconsolidated aquifers (**Figure 15**).

To be included in the dataset for this report, the water quality sample must:

- have been collected between July 1, 2017, and June 30, 2019
- 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

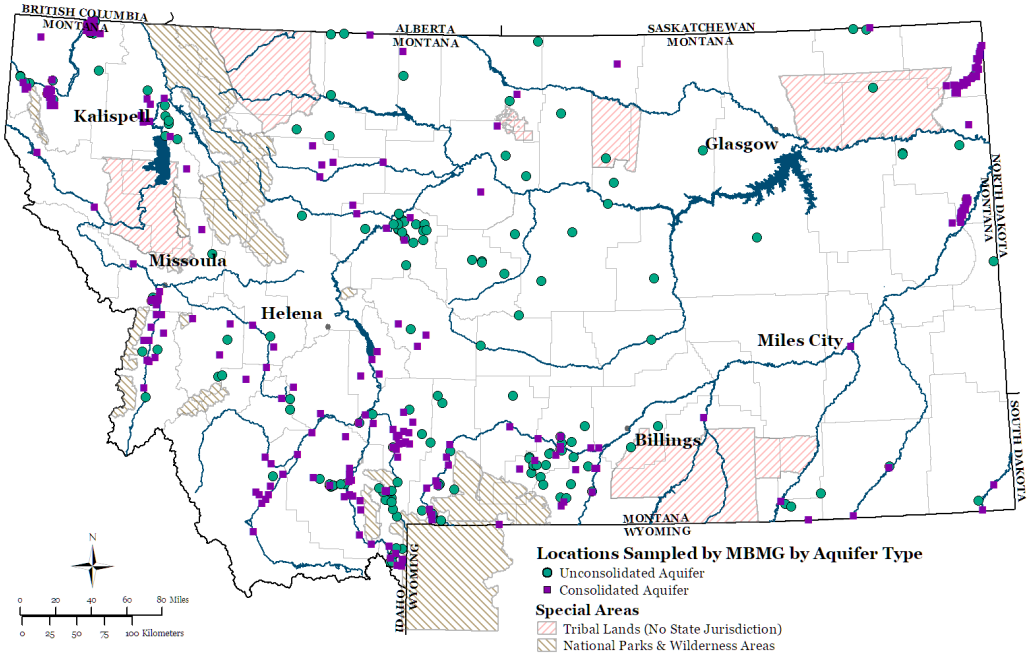


Figure 15. MBMG Sampling Locations by Aquifer Type

Montana Bureau of Mines and Geology evaluates groundwater quality for various parameters using established maximum contaminant levels (MCLs), secondary maximum contaminant levels (SMCLs), or DEQ adopted standards (Circular DEQ-7). Groundwater is tested by aquifer type for the contaminants listed in **Table 13**.

Table 13. Groundwater Contaminants

Pollutant	Number of Samples	Standard	Source	% of Samples over Standard	% Unconsolidated Aquifer	% Consolidated Aquifer
TDS	491	500 mg/L	SMCL	32%	28%	38%
Nitrate	491	10 mg/L	MCL	2%	2%	3%
Fluoride	491	4 mg/L	MCL	3%	1%	6%
Sulfate	491	250 mg/L	SMCL	15%	13%	20%
Chloride	491	250 mg/L	SMCL	1%	0%	2%
Aluminum	491	50 ug/L	SMCL	1%	1%	2%
Antimony	491	6 ug/L	MCL	0%	0%	0%
Arsenic	491	10 ug/L	MCL	8%	8%	9%
Barium	491	1000 ug/L	DEQ-7	1%	0%	3%
Beryllium	491	4 ug/L	MCL	0%	0%	0%
Cadmium	491	5 ug/L	MCL	0%	0%	0%
Chromium	491	100 ug/L	MCL	0%	0%	0%
Cooper	491	1300 ug/L	MCL	0%	0%	0%
Lead	491	15 ug/L	MCL	0%	0%	0%
Nickel	491	100 ug/L	DEQ-7	0%	0%	1%
Selenium	491	50 ug/L	MCL	1%	0%	1%
Silver	491	100 ug/L	DEQ-7	0%	0%	0%
Strontium	491	4000 ug/L	DEQ-7	2%	1%	4%
Thallium	491	2 ug/L	MCL	0%	0%	0%
Uranium	491	30 ug/L	MCL	1%	1%	2%
Zinc	491	2000 ug/L	DEQ-7	0%	0%	0%
Iron	491	0.3 mg/L	SMCL	12%	14%	10%
Manganese	491	0.05 mg/L	SMCL	22%	26%	15%

10.3 GROUNDWATER MANAGEMENT STRATEGY

DEQ educates the public and raises awareness about groundwater protection. Groundwater supplies the drinking water for most public and private users in Montana. Contaminated groundwater is difficult to remediate. The rate and scale of groundwater degradation is increasing due to increased septic system use and increased agricultural groundwater use. Irrigation can potentially reduce groundwater recharge, while causing fertilizers, pesticides, and animal wastes to leach into the groundwater.

10.3.1 **Protection**

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.[25] Multiple agencies are responsible for implementing various groundwater protection strategies.

The 1989 Montana Agricultural Chemical Groundwater Protection Act[26] identifies the Montana Department of Agriculture (MDA) as responsible for the preparation, implementation, and enforcement of agricultural chemical groundwater management plans, providing public education, and conducting groundwater monitoring.

10.3.2 **Groundwater Monitoring & Education**

MDA conducts ambient groundwater monitoring for agricultural chemicals through a state-wide permanent monitoring network. If agricultural chemicals are found in groundwater, they will verify, investigate, and determine an appropriate response. Their education program offers initial and re-certification training for applicators of commercial and government pesticides. They also provide or assist in training and educating the public about pesticides.

10.3.3 **Statewide Groundwater–Pesticide Projects**

MDA's Groundwater Protection Program conducts both statewide monitoring and regional-scaled special projects. Statewide monitoring is conducted at established permanent monitoring well locations while special projects sites are selected based on agricultural setting, soil type, groundwater table, and sampling access of the wells. These projects provide a snapshot of pesticide and nitrate levels in groundwater and are used to correlate land use patterns with groundwater pesticide and nitrate concentrations.

10.3.4 **Groundwater Enforcement Program**

MDA is responsible for primary enforcement of the Montana Agriculture Chemical Groundwater 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 harm groundwater. When necessary, MDA implements compliance actions and orders to prevent or remediate problems in groundwater associated with agricultural chemicals

10.3.5 **Remediation**

In order to protect human health and the environment; prevent exposure to hazardous or harmful substances released into soil, sediment, surface water, or groundwater; and to ensure compliance with applicable state and federal regulations, DEQs Remediation Program oversees

- investigation and cleanup of groundwater at state and federal Superfund sites
- implementation of corrective actions for leaking underground storage tanks
- reclamation of abandoned mines
- remediation of groundwater contaminated by agricultural and industrial chemicals

Currently, the Groundwater Remediation Program is actively working on 91 sites,[27] coordinating pesticide remediation activities with the Montana Department of Agriculture.

11.0 PUBLIC WATER SUPPLY

DEQ regulates approximately 2,198 public water systems in Montana. Public water systems can be community (e.g., towns), non-transient non-community (e.g., schools, camps, or other businesses), or transient non-community systems (e.g., rest stops or parks). The total population served by Community and Non-Transient Non-Community systems is 716,534. Collectively all public water supplies serve a population of 1,050,036.

Most water systems comply with regulations. Typically, violations are a result of facility owners being late to report required water sampling or failing to conduct required sampling. During 2017 and 2018, such incidences accounted for most significant public water system violations, along with occurrences of coliform bacteria, disinfectant and disinfection by-products, and nitrate contamination.[32] Ninety-eight percent of Montana's population is served compliant water. Only 1% of systems in violation of regulations required enforcement action. This number has remained relatively low over the past years. Overall there has been a decrease in monitoring and reporting violations partly due to the implementation of an automated phone and email reminder service. Public health concerns and contamination are addressed through technical assistance and, if needed, formal enforcement actions. Compliance assistance is provided through on-site visits, phone and/or email. Information on sampling requirements and many other guidance is available to systems and the public on the DEQ website.

An annual compliance report lists and explains the number of Safe Drinking Water Act requirement violations according to drinking water standards, water treatment requirements, or a water quality monitoring/reporting requirement and is available at: http://deq.mt.gov/Portals/112/Water/PWSUB/Documents/MT_ACR2018.pdf.

11.1 SURFACE WATER SYSTEMS

Montana has 239 public water systems that use surface water as a primary or secondary source (**Figure 16**). Of these systems, 176 are purchased; that is, they rely on other water systems for their primary or supplemental supply of water. For regulatory purposes, groundwater under direct influence of surface water (GWUDISW) systems are considered surface waters.[28] Montana has seven such systems. Two of Montana's large public water systems use surface water as a source.

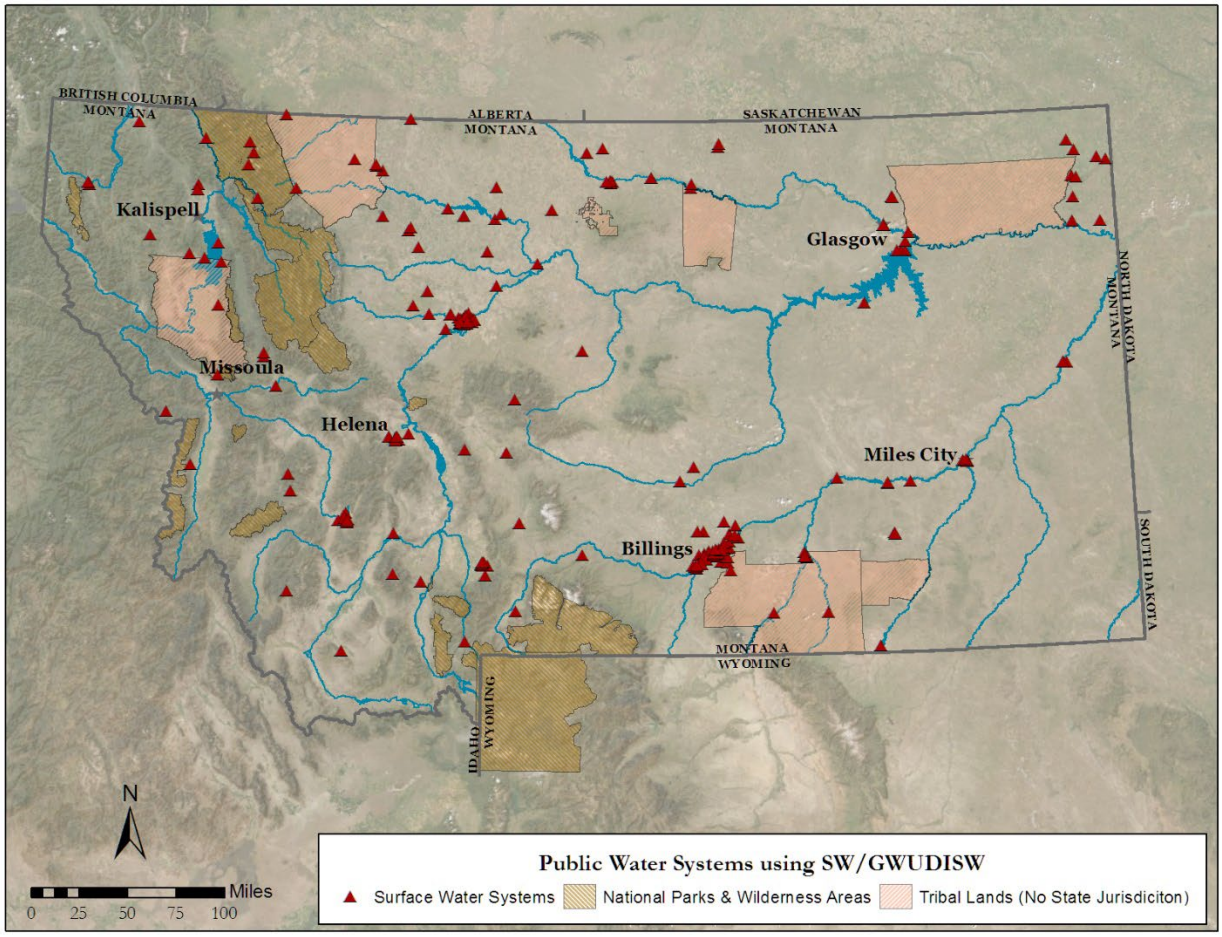


Figure 16. Public Water Systems using Surface Water/Groundwater under the Direct Influence of Surface Water

11.2 GROUNDWATER SYSTEMS

Groundwater is a primary or secondary source for 1,956 public water systems, serving 598,047 people daily (**Figure 17**).

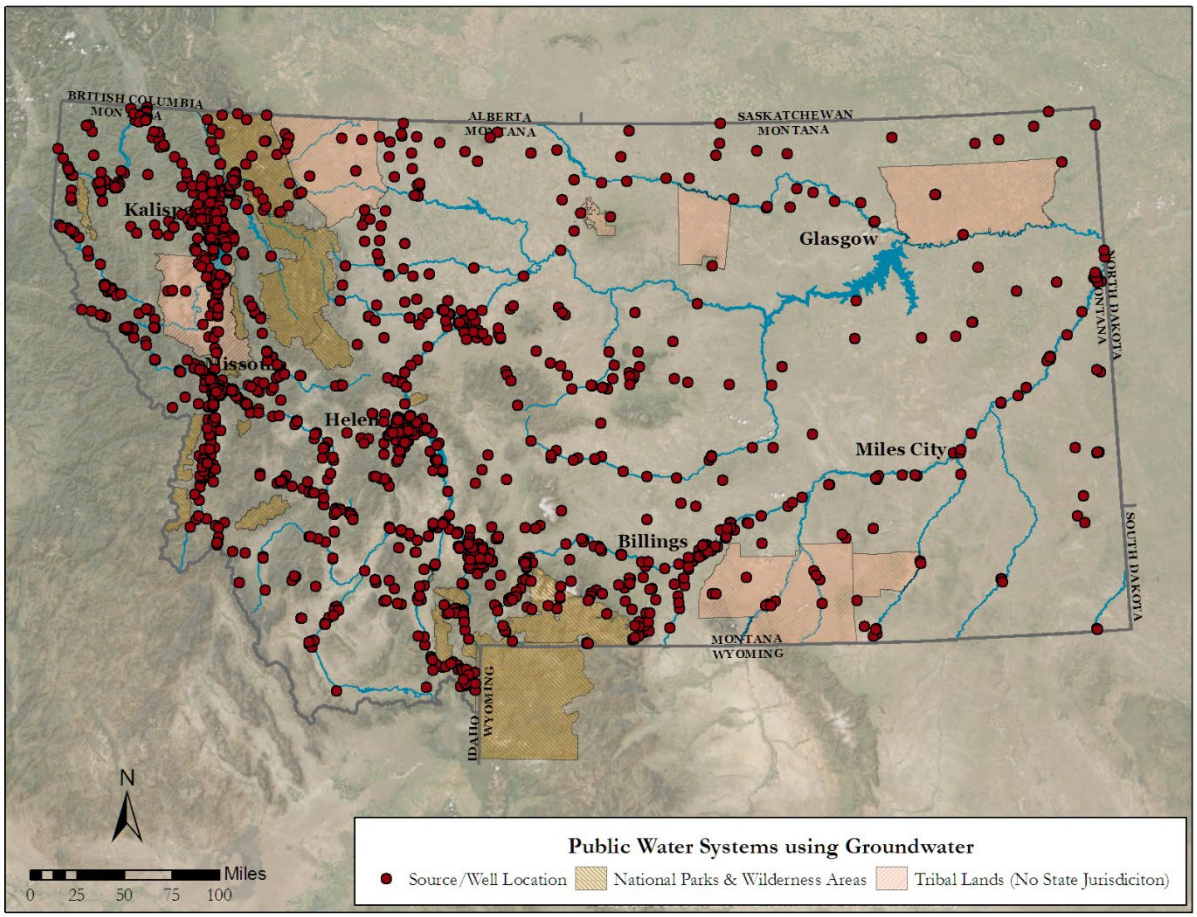


Figure 17. Public Water Systems using Groundwater

12.0 COMMUNITY SUPPORT PROGRAMS

The Water Quality Division supports numerous community support programs designed to help rural Montana communities maintain and/or restore the quality of their waters for future generations. 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 prevent pollutants from entering water supply reservoirs will have lower costs for treating the water. Further, they may also be eligible for waivers from some monitoring requirements, thereby reducing costs.

12.1 SOURCE WATER PROTECTION PROGRAM

Under the 1996 federal Safe Drinking Water Act, the state is required to implement a source water assessment program. The aim is to delineate areas that provide a source for public drinking water, which applies to both existing and new supply sources. There is no state or federal regulatory protection assigned to these identified source water protection areas. However, the 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. Source Water Assessment Reports are available at: https://deq.mt.gov/water/drinkingwater/sourcewater.

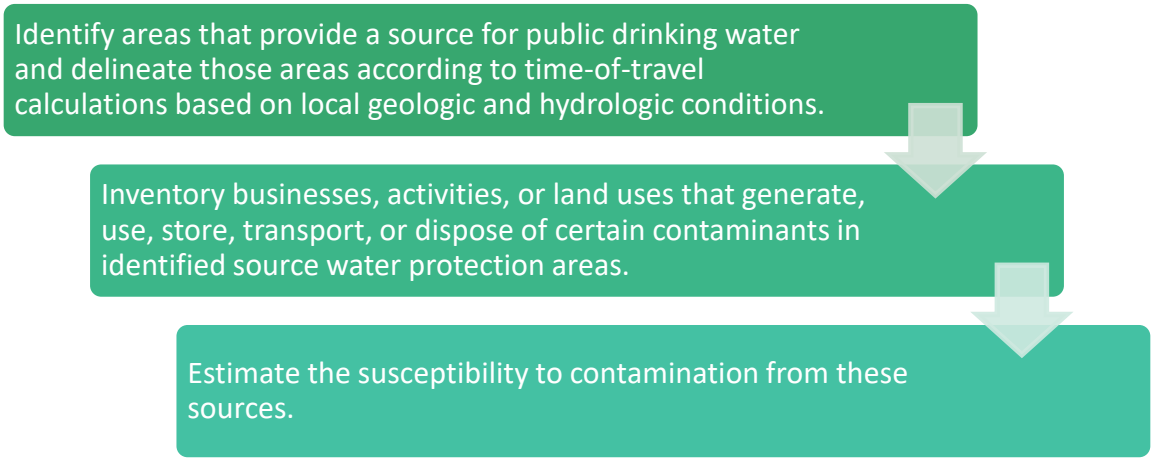


Figure 18. Steps for Completing a Source Water Delineation and Assessment Report (SWDAR)

Montana considers public water supplies with no susceptibility ratings higher than "moderate" to be substantially implementing source water protection. There are 624 community water systems in Montana meeting this criterion, providing drinking water to 59% of community water system users. DEQ completed 26 source water assessments for new public water sources during the last biennium. Thoughtful site selection and review by DEQ's Source Water Protection Program can help communities avoid costs related to contamination, which may include:

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

12.2 DRINKING WATER AND WATER POLLUTION CONTROL STATE REVOLVING FUND

Details of Montana's drinking water and water pollution control revolving funds may be found at: https://deq.mt.gov/Water/drinkingWater/DesignApprovals

The Montana Legislature established two State Revolving Fund (SRF) Loan Programs - one for wastewater and nonpoint source projects and the other for drinking water projects. Both programs provide at or below market interest rate direct loans or refinancing of existing debt to eligible Montana entities. The yearly Intended Use Plan and Project Priorities List for each of the SRF loan programs is available on the website. DEQ oversees the program by providing technical expertise and preparing an annual plan for intended use for each capitalization grant application, while DNRC administers the financial aspect, including overseeing loans and the sale of state general obligation bonds.

12.2.1 Water Pollution Control State Revolving Fund

The Water Pollution Control State Revolving Fund (WPCSRF) Program was established for wastewater and nonpoint source pollution control projects. 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 to protect public health, while maintaining a long-term, self-sustaining program. Examples of eligible water quality projects includes wastewater treatment plant improvements, agricultural BMPs, urban storm water/construction runoff, wetlands/stream bank restoration, underground storage tanks and septic system removal or upgrade.

12.2.2 Drinking Water State Revolving Fund

The Drinking Water State Revolving Fund (DWSRF) program is a federal-state partnership to help ensure safe drinking water. The program provides financial support to water systems and to state safe water programs and is designed to provide a perpetual source of financial assistance to Montana communities. Funds may be used to improve the infrastructure of public drinking water facilities or support other activities related to public health and compliance under the federal Safe Drinking Water Act. Examples of projects include acquisition of land that is integral to the project, engineering, new sources, treatment, source water protection, storage and distribution.

13.0 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). 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 2017 (July 1, 2016 – June 30, 2017) and 2018 (July 1, 2017 – June 30, 2018). Because of how DEQ collects data, benefits are estimated for calendar years 2017 and 2018. Furthermore, most benefits are non-monetary and are, thus, hard to calculate quantitatively.

13.1 POINT SOURCE PROGRAM COSTS[29]

In fiscal years 2017 and 2018, approximately $123 million total was spent in Montana to address point-source pollution, which averages about $61.5 million per year (**Table 12**). Of this total annual amount, $38.3 million was funded annually from the Water Pollution Control State Revolving Fund (WPCSRF), and $23.2 million was funded annually from other state and federal wastewater infrastructure. WPCSRF funding generally makes up one-half to three-quarters of the total public funding for addressing point-source issues in Montana, although within the last few years, the USDA Rural Development program has been able to acquire additional funds from the USDA Rural Development program national pool to increase their loan and grant funds for Montana communities.

Most of the $61.5 million per year 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. Capitalization grants from EPA (CWA Title VI Federal funds) for the 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 and CWSRF non-program fee funds) to operators, engineers, and the public in wastewater treatment.

The other major portion of point-source expenditures consists of DEQ's discharge permitting and compliance program, which supports 22 full-time employees. On average, implementing programs costs about $2.2 million per year and includes MPDES, MGWPCS, CWA's Section 401 certification program, and other state authority permitting.[30] This brings the total to $63.7 million per year.

13.2 NONPOINT SOURCE PROGRAM COSTS

Most of DEQ's Nonpoint Source (NPS) Program budget comes from EPA under CWA Section 319 grant funds and general funds appropriated by the state legislature. These annual funds pay for about 60% of NPS projects in Montana as well as for DEQ's NPS-related program costs. Internal department activities supported by Section 319 grants include standards development, 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.

EPA requires a non-federal match of 40% for the Section 319 grants. The Section 319 grants come in two awards: Base or Program funding (staffing and support) and Incremental or Project funding. Match for

the state program is met with state general funds. Match for project activities (implementation of watershed-based plans) is met by project sponsors through in-kind services, project property owner contributions, and other state agency grant awards (usually through Department of Natural Resources and Conservation and Fish, Wildlife & Parks awards).

The 319 funding amounts over the past two fiscal years are shown on **Table 14**.

Table 14. Section 319 Grant Funding Amounts

State Fiscal Year	2017	2018
Program Grant (staffing and support)		
319 funds	$ 1,064,500	$ 1,028,500
State match	$ 709,667	$ 685,667
Total	**$ 1,774,167**	**$ 1,714,167**
Projects Grant		
319 funds	$ 1,064,500	$ 1,051,500
State match	$ 709,667	$ 701,000
Total	**$ 1,774,167**	**$ 1,752,500**

For SFY 2017 and 2018, Montana's NPS Program project costs, including EPA funding and committed local matches, averaged $3.5 million per year. Of this, about half supports internal activities and half goes to competitively funded activities through contracts 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.

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 $1.0 million per year during FY 2017 and FY 2018. This amount is beyond the WPCSRF-funded point-source control projects during the same time period. This, along with the $3.5 million per year from EPA and matching funds, leads to a total of about $4.5 million spent per year in Montana on nonpoint source pollution (**Table 15**).

13.3 OTHER COSTS OF PROTECTING WATER QUALITY IN MONTANA

DEQ's Wetland Program, which supports two full-time employees, costs approximately $300,000 per year, composed of $225,000 in federal funding with a state match of $75,015 (SRF and State general fund). This supported a full time FTE as well as time for two techs for 5 months each year. There was no contracting in this grant.[31]

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 $28,900 per year.[32]

13.4 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 $68.5 million in FY 2017 and FY 2018 (**Table 16**).

Table 15. Summary of Average Annual Costs for CWA Programs in Montana (FY 2017 and FY 2018)

Activity	Total (millions of dollars)
NPS Control Programs	**$4.5**
NPS staffing and support	$1.74
NPS projects grant	$1.76
WPCSRF NPS funds	$1.0
Point Source Control Programs (including discharge and permitting/compliance)	**$63.7**
WPCSRF funds	$38.3
Other state and federal funding programs	$23.2
Permitting and compliance	$ 2.2
Other Costs	**$0.33**
Wetlands	$ 0.3
Safe Drinking Water Act	$ 0.03
TOTAL	**$68.5**

13.5 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 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, the benefits of aesthetics, recreational activities (fishing/swimming), and drinking water supplies, to name a few, would be diminished or lost in Montana and downriver states.

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. Several fish species are federally listed as endangered or threatened, or as state species of concern.
- Protecting aquatic and terrestrial habitats (including natural functions such as nutrient cycling) that require high-quality waters; this may include riparian vegetation.
- Protecting water for downstream states. As a headwater state (for the Missouri River), 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.

13.5.1 Water Quality Standards and Modeling and Monitoring and Assessment Program Benefits

- As of the release of this IR, Montana's stringent numeric standards for total nitrogen and total phosphorus (previously contained in Circular DEQ-12A) have been voided from state law and have been replaced with the narrative water quality standards at ARM 17.30.637. Because of the stringent nature of the Circular DEQ-12A standards, the Montana Legislature required the use of a general nutrient standards variance for certain dischargers and this general variance was available from 2014 through early 2020. However, federal court rulings and subsequent action by EPA caused the general variance to become unavailable for use and voided Circular DEQ-12A.
- DEQ completed the data collection for the dissolved oxygen project in 2017. This multi-agency and stakeholder process involved four counties in Eastern MT over 5 years. The aim of this long-term project is to evaluate if the current Δ DO threshold of ≥5.3 mg/L is adequate for most of the wadeable prairie streams in Montana, and to modify if necessary the current DO numeric standard in prairie streams.
- DEQ continues to work in the reference site project. In 2017, 27 reference sites were sampled and 30 in 2018.
- The Montana DEQ Water Quality Monitoring and Assessment Section (WQMAS) wrapped up monitoring efforts and is in the reporting phase of the Musselshell project. Nutrient trend monitoring in the Clark Fork Basin continued this year through state, federal, private and local partnerships.

- In 2017, staff worked on the following projects: post restoration Jim Creek sediment assessment, post remediation New World Mining Area metals remediation and pre-restoration nutrient and *E. coli* Camp Creek NRCS NWQI efforts.
- In 2018, WQMAS focused monitoring efforts on evaluating water quality throughout the Red Rock River watershed, nutrients and metals in the Yellowstone River (from the national park boundary to the North Dakota border), nutrients in the Smith River, nutrients and turbidity in Clark Canyon Reservoir and the Beaverhead River, sediment in the Taylor Fork of the Gallatin River, selenium and other parameters in Lake Koocanusa, and sediment in streams near Cooke City. For the 2018 Integrated Reporting cycle, WQMAS completed 303(d)/305(b) assessments for 60 waterbody segments, including approximately 500 individual waterbody-pollutant combinations in the following project areas: Musselshell, Beaverhead, Madison, Tongue River, Armells Creek, Kootenai, and the New World Mining District.
- In April 2017, the Board of Environmental Review adopted updates to Montana's water quality standards as part of the triennial review. These updates included adoption of 82 new and updated National Recommended Water Quality Criteria for the protection of human health and aquatic life, 67 updated pesticide human health advisories, and adoption of five new pesticide human health advisories.

13.5.2 **Point Source Program Benefits**

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. The WPCSRF program also provides technical assistance to municipal wastewater treatment facilities in Montana. This assistance includes training, troubleshooting, operation and maintenance inspections and comprehensive performance evaluations to optimize the treatment performance of these facilities. The beneficial economic effects of Montana's WPCSRF program on water quality and public health in calendar years 2017 and 2018 were:

- Improved quality of various state waters by providing 11 loans for upgrading, expanding, or replacing inadequate secondary treatment systems that empty into state waters
- Improved water quality and reduced operating expenses by providing three loans for municipal wastewater projects for 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 providing nine loans for projects involving advanced treatment processes, such as nutrient removal and disinfection
- Protected water quality by funding approximately 20 projects, helping state waters maintain or improve their capacity for designated uses

13.5.3 **Montana Pollutant Discharge Elimination System (MPDES)**

Nitrogen

Prior to the first optimization training class in mid-2012, the concentration of nitrogen discharged from treatment plants not designed for nutrient removal averaged 17 mg/L in discharges. Today, after nearly 7 years of consistent messaging and support from DEQ, the same facilities – without facility upgrades – are discharging an average of 11 mg/L of total-nitrogen (**Figure 19**).

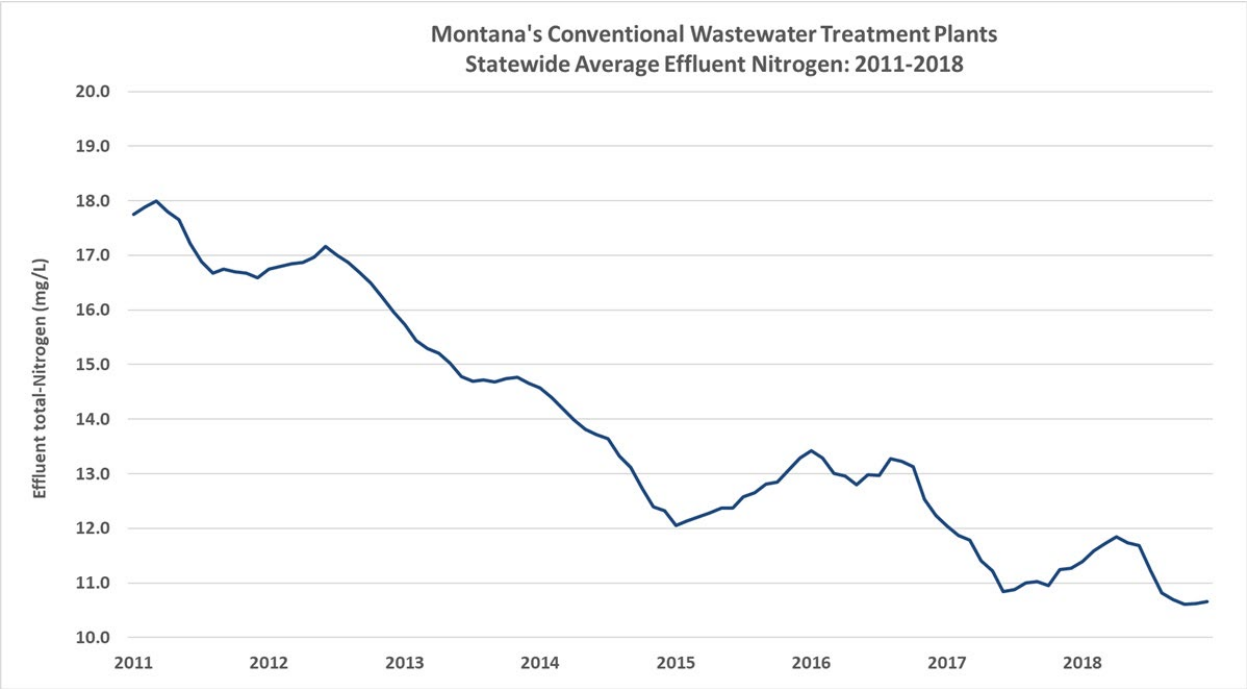


Figure 19. Conventional Wastewater Treatment Plants Average Effluent Nitrogen: 2011 – 2018

Note: *The graph is a 12-month rolling averages using data from January 2010 through December 2018.*

Phosphorus

Prior to the first optimization training class in mid-2012, the concentration of phosphorus discharged from treatment plants not designed for nutrient removal averaged over 2.5 mg/L. Today, after nearly 7 years of consistent messaging and technical support from DEQ, the same facilities – without facility upgrades – are discharging an average of just over 1.5 mg/L of total-phosphorus (**Figure 20**).

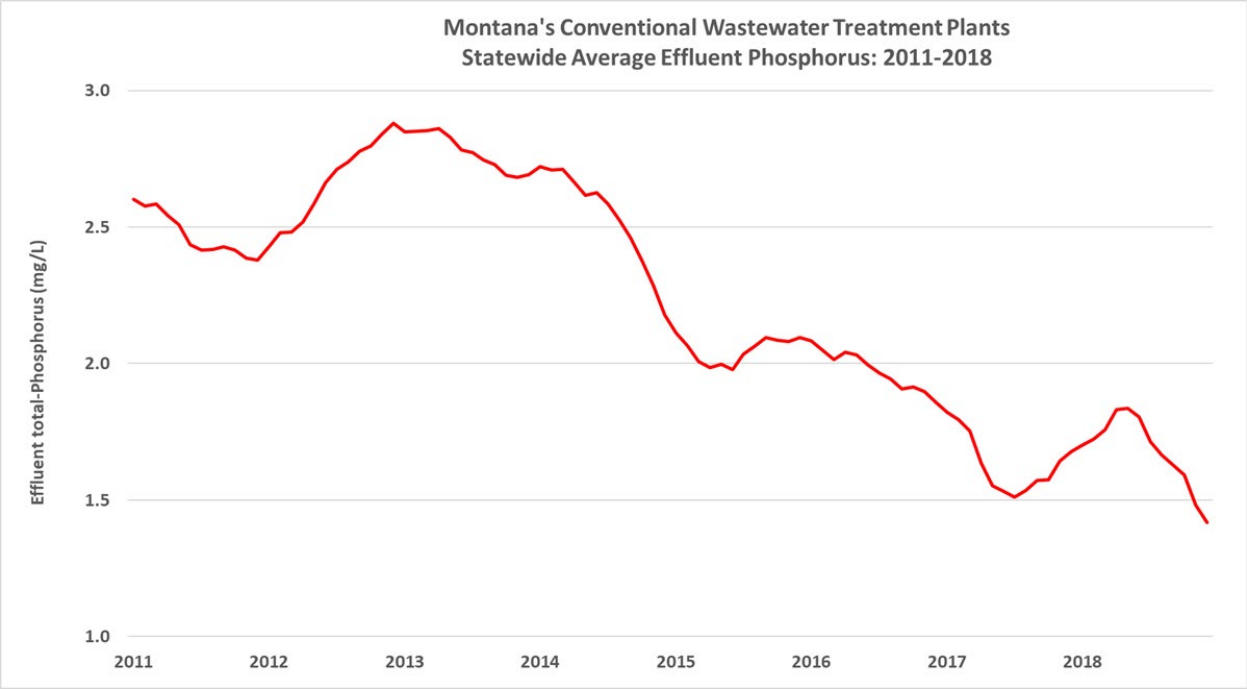


Figure 20. Conventional Wastewater Treatment Plants Average Effluent Phosphorous: 2011 - 2018
Note: *The graph is a 12-month rolling averages using data from January 2010 through December 2018.*

13.5.4 Montana Groundwater Pollution Control System (MGWPCS)

MGWPCS-permitted facilities remove 3,998 pounds of total nitrogen per year, an 81% reduction overall. The average performance is a 32% reduction.

13.5.5 Nonpoint Source Program Benefits

The goal of DEQ's NPS Program is to provide a clean and healthy environment by protecting and restoring water quality from the harmful effects of NPS pollution. When waterbodies are impaired, the goal is to reduce NPS pollution to a level that allows full support of beneficial uses.

- In 2017, $1,023,558 was awarded to ten projects. Contractors committed to $1,091,983 in non-federal match for these projects, exceeding the minimum 40% match requirement set by EPA. During 2017, NPS program staff managed 33 open 319-funded contracts, closing four by the end of the year. NPS program staff continues to improve the efficiency and management of the 319 grant program. In 2018, $892,250 was awarded to ten projects. Contractors committed to $1,073,592 (55%) in non-federal match, exceeding the 40% match requirement set by the EPA. Throughout 2018, NPS Program staff managed 35 Section 319-funded contracts and closed 13 by the end of the year.

- In 2017, DEQ accepted a Watershed Restoration Plan (WRP) for the Flathead River watershed and supported development of six additional WRPs in Rock Creek, Thompson River, Miller Creek, Beaverhead River, St Regis River, and Madison River watersheds. In support of these efforts, DEQ helped publish an introductory guide to watershed restoration planning completed by the Madison Conservation District. In 2018, DEQ accepted WRPs for the Flathead-Stillwater, Miller Creek, Rock Creek, and Thompson River watersheds. In 2018, staff provided feedback and support for WRPs in the Beaverhead, Central Clark Fork, Lower Clark Fork, Madison, and St. Regis River watersheds.
- In 2017, $800,000 in 319 funding was awarded to watershed groups for implementing restoration projects and providing education and outreach efforts, furthering goals outlined in the NPS Management Plan. Continued support was provided to Montana Watershed Coordination Council (MWCC), whose mission is to unite and support Montana's watershed communities. In 2018, the NPS Program awarded $890,000 of Section 319 project funding to the same end.
- DEQ completed TMDL Implementation Evaluations (TIE) for the Swan Lake watershed and Lone Tree Creek. These TIEs resulted in updated recommendations for actions to address existing impairments and may serve as the impetus for conducting future impairment assessments. TIE found that aquatic life beneficial uses are no longer impaired by sediment in Jim Creek.
- The TMDL Program submitted the Madison Nutrient, *E.coli*, and Metals TMDLs and Water Quality Improvement Plan to the EPA for approval. TMDL development has begun for nutrients in the Musselshell watershed, aluminum in Sheep Creek, and nutrients and metals in the Beaverhead watershed. TMDL development continues for salinity in the lower Tongue River.
- DEQ is continuing to work on the development of site-specific selenium standards for Lake Koocanusa.
- Detailed sampling continued this year to study the eutrophication and turbidity in Clark Canyon Reservoir and the Beaverhead River, where recreational and associated economics have been diminished from turbid conditions.
- In 2018, NPS Program formalized a long-term Section 319 project effectiveness review (PER) process. The goals of PERs are to revisit Section 319-funded project sites at least 5 years after implementation, determine if projects are still achieving their intended goals, learn from project successes and failures, identify maintenance needs, and increase awareness of water quality improvement projects throughout watersheds.

13.5.6 **Wetland Benefits**

2017

- Conducted 68 wetland assessments in the Red Rock watershed as part of MDEQs watershed planning process.
- Contracted with the Montana Natural Heritage Program to assign coefficient of Conservatism values to 315 wetland vascular plant species.
- Developed a MDEQ rapid field assessment for calculating wetland Floristic Quality Index. Conducted 80 wetland recon assessments in the Red Rock watershed as part of a joint Risk Assessment project with MDEQ's Monitoring and Assessment Program.

2018

- Conducted 58 wetland assessments in the Red Rock watershed as part of DEQs watershed planning process.
- Developed a DEQ rapid wetland vegetation assessment methods for calculating wetland Floristic Quality Index.
- Developed an electronic data collection system and protocol for collecting and disseminating rapid wetland assessment data.

13.5.7 **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, impairing health

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.

14.0 PUBLIC HEALTH ISSUES

14.1 LEAD IN SCHOOL DRINKING WATER

DEQ, Montana Department of Public Health and Human Services (DPHHS), and the Montana Office of Public Instruction (OPI) are collaborating to provide sampling and remediation technical assistance and guidance to schools for the Lead Reduction in Schools Drinking Water Rule. The Lead Reduction in Schools Drinking Water Rule was enacted to protect schoolchildren by minimizing lead levels in drinking water provided at Montana's schools. Sampling began in 2020 for all schools accredited by the Montana Board of Public Education at all drinking water fountains, kitchen fixtures that can be used for human consumption, and a representative subset of the remaining fixtures. Schools will have two years to complete the sampling. Other considerations for this rule include creation of an inventory of plumbing materials, all fixtures, and those that are used for human consumption as well as implementation of a water flushing plan. Results then will require follow-up activities and DEQ will provide assistance and guidance documents to help schools with these requirements. All sample results will be available to the public on DEQ's website.

14.2 SPILL REPORTS

During 2017, 2018, and 2019, a total of 37, 40, and 55 spills affecting surface water quality were reported to DEQ respectively.[33] Most were regarding fuel or automotive fluids spilled in result of passenger vehicles entering the water from accidents. All incidents were investigated, cleanup actions were required if necessary, and their reports are available from the DEQ Enforcement Program.

14.3 FISH KILLS

The following fish kills occurred in Montana in between 2017 and 2019:

- Parasitic-caused proliferative kidney disease continued to be detected in fish populations in the Yellowstone River during 2017. Approximately 80 whitefish died of the disease outside of Livingston, Montana in September of that year. Additional dead whitefish were found between Mallard's Rest and Pine Creek.[34]

- A noticeable fish kill at Lake Josephine near Billings was reported in March, 2018. The deaths were attributed to the harsh winter. Ice and snow on the surface of the lake prevented light from reaching the dense bottom vegetation, causing the vegetation to die. The decomposing vegetation led to low dissolved oxygen levels, which in turn contributed to the fish kills.[35]

- Several hundred fish were killed over the 2018 Labor Day Weekend in Beaver Creek near Havre. Algae growing in Bear Paw Lake clogged the outlet of Bear Paw Dam, preventing water from flowing into Beaver Creek. The fish kill may have been caused when FWP personnel increased the outflows from the dam to Beaver Creek in order to flush out the algae, in the process releasing large amounts of algae and warm, poorly oxygenated water into the creek.[36]

- In early April 2019, more than 2,000 fish died in Kremlin Pond and approximately 100 fish died in Reser Reservoir, both near Havre. The deaths were attributed to the harsh winter and the same process as described for the Lake Josephine fish kill.[37]

- On September 8, 2019, more than 40 brown trout, mountain whitefish and suckerfish were killed in the Clark Fork River when significant rain events washed un-remediated slickens into the river.[38]

14.4 Fish Consumption Advisories

Every year, DEQ works with Montana Department of Public Health and Human Services and Montana FWP to issue fish consumption advisories for certain Montana waters where testing confirmed elevated levels of contaminants, specifically mercury and polychlorinated biphenyls (PCBs). More detailed information is available online at http://fwp.mt.gov/doingBusiness/reference/brochures/fish.html.

14.5 Aquatic Invasive Species

Aquatic Invasive Species (AIS) include non-native fish, mussels, clams, plants, and disease-causing pathogens. Several state agencies collectively implement the Montana Aquatic Invasive Species Management Plan. The goal of this plan is to minimize the harmful impacts of AIS by limiting or preventing the spread of AIS into, within, and out of Montana. This goal is achieved through coordination and collaboration between partner agencies and stakeholder groups; prevention of new AIS introductions; early detection and monitoring; control and eradication of new and established AIS populations; and outreach and education efforts. Montana developed the "Montana Invasive Species Strategic Framework" in January 2017 (http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/misac-resources-docs).

14.6 Harmful Algal Bloom Program

Harmful algae blooms (HABs), also known as "blue green algae" and "cyanobacteria", are native constituents of Montana's freshwater ecosystems. Under certain conditions, cyanobacteria can bloom into a large, nuisance algal mass. HABs can produce toxins that can cause illness in humans and illness or death in animals.

The State Harmful Algal Bloom Program (HAB Program) is the result of collaboration between the Department of Environmental Quality, Department of Public Health and Human Services, and Fish, Wildlife, and Parks. The HAB Program officially began in 2017 and provides guidance to local, state, federal, and private landowners to protect people, pets, and livestock from the effects of HABs in Montana. Citizens can visit HAB.mt.gov to submit reports and photos of suspected cyanobacterial blooms to the HAB Program. The HAB Program uses photos to distinguish between green algae blooms or potentially harmful cyanobacteria blooms. If a HAB is suspected from this visual assessment, the HAB Program works with the local managing jurisdiction, such as county health officials or regional fisheries biologists, to distribute cyanotoxin monitoring resources, provide advice on issuing advisories, and draft a press release to alert the public.

In 2018 and 2019, a total of 110 citizen reports of suspected HABs were submitted (visit HAB.mt.gov to view a map of reports). Of these reports, 76 were confirmed to be HABs (see **Table 16**). Unconfirmed citizen reports were either reports of green algae, or insufficient information was provided. In 2019, White Sandy beach on Hauser Lake (Lewis and Clark County) and Cow Creek Reservoir (Blaine County) had microcystin levels above EPA's recreational guidelines (8 µg/L). The State HAB Program wrote press releases and helped issue recreation advisories at these locations. Other waterways with confirmed cyanobacteria blooms, though not necessarily with toxins present, in 2018 and 2019 include*:

- BearPaw Lake (Hill County; 2019)
- Beaver Creek Reservoir (Hill County; 2018, 2019)
- Canyon Ferry (Lewis & Clark County; 2018, 2019)
- Clark Canyon Reservoir (Beaverhead County; 2018, 2019)
- Cooney Reservoir (Carbon County; 2018)
- Cow Creek Reservoir (Hill County; 2019)
- Delmoe Lake (Jefferson County; 2018)
- Harrison Lake (Gallatin County; 2019)
- Hauser Lake (Lewis & Clark County; 2018, 2019)
- Hebgen Lake (Gallatin County; 2018, 2019)
- Holter Lake (Lewis & Clark County; 2018, 2019)
- Hyalite Reservoir (Gallatin County; 2018, 2019)
- Lake Elmo (Yellowstone County; 2019)
- Lake Helena Lewis & Clark County; (2018)
- Medicine Lake (Sheridan; 2019)
- Nelson Reservoir (Phillips County; 2019)
- Nilan Reservoir (Lewis & Clark County; 2018)
- Nevada Reservoir (Powell County; 2018, 2019)
- Noxon Reservoir (Sanders County; 2019)

Table 16. Confirmed Cyanobacteria Reports

Year	Total Reports	Confirmed Cyanobacteria
2019	47	26
2018	63	50
2017	46	Unknown

*These figures represent citizen reports and are not a comprehensive list of all possible cyanotoxin blooms in Montana.

15.0 CHANGES IN RESPONSE TO PUBLIC COMMENTS

In response to public comment, DEQ changed some information in the detailed assessment records for the West Fork Armells Creek (MT42K002_110 and MT42K002_170) and the Tongue River (MT42C001_014). Public comments and responses may be found in Appendix J.

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 Restoration 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 in accordance with 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.
Anthropogenic impacts	Human caused changes leading to reductions in water quality.
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 water quality standard.
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. What standards apply to a particular waterbody depend on its classification under the Montana Water-Use Classification System.
Beneficial Use Support Determination	A finding, based on sufficient credible data, that a state's water is – or is not – achieving compliance with the WQS for its applicable beneficial uses.
Best Management Practices (BMPs)	Those 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.
Chemistry and toxicity data	Includes bioassay, temperature and total suspended sediment data and information relating to such factors as toxicants, nutrients, and dissolved oxygen.
Communities	Organisms of a biologically related group (i.e., fish, wildlife, macroinvertebrates or algae).
Data categories	Chemistry/physical, habitat, and biological data used for assessing the availability of sufficient credible data for making aquatic life and fisheries beneficial use support determinations.
Data Quality Objectives	Data quality objectives are systematic planning tools based on the scientific method. They are used to develop data collection designs and to establish specific criteria for the quality of data to be collected. This process documents the criteria for defensible decision-making before an environmental data collection activity begins with consideration given to the implication of the decision, schedule for completion, and available resources.
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(5) 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.
Habitat data	See physical and habitat data.
Hydrogeomorphology	The science relating to the geographical, geological, and hydrological aspects of waterbodies, and to changes to these aspects in response to flow variations and to natural and human-caused events, such a heavy rainfall or channel straightening.
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(11) MCA]
Independent evidence	An approach used to make aquatic life use support determinations when a limited array of chemistry/physical, habitat or biological data provide clear evidence that is sufficient to make a beneficial use support determination.
Integrated Water Quality Report (or Integrated Report)	A report providing an overview of the status of state water quality monitoring and planning programs. It combines in one document the information previously submitted to the EPA in separate 303(d) List and 305(b) Report documents.
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	Source of pollution, which 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.
Nonsupport	A beneficial use determination, based on sufficient credible data, that a waterbody is not achieving all the WQS for the use in question, and the degree of water quality impairment is relatively severe.
Overwhelming evidence	Information or data from only one data category that, by itself, constitutes sufficient credible data for making an aquatic life use support determination.
Parameter	A physical, biological, or chemical property of state water when a value of that property affects the quality of the state water. [75-5-103(22) MCA]
Partial support	A beneficial use determination, based on sufficient credible data, that a waterbody is not achieving all the WQS for the use in question, but the degree of impairment is not severe.
Pathogens	Bacteria or other disease causing agents that may be contained in water.

Physical and habitat data	Narrative and photo documentation of habitat conditions, habitat surveys and function rankings, direct measurements of riparian or aquatic vegetation communities, and other measures of hydrogeomorphic characteristics and function.
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(24) MCA]
Pollutant	As defined in the federal Clean Water Act, pollutant means 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(25) 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, or 3. Discharge, seepage, drainage, infiltration, or flow that is authorized under the pollution discharge permit rules of the board is not pollution under this chapter. 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	A ranking of impaired waterbodies conducted by DEQ in consultation with the statewide advisory group using established criteria to rank waterbodies as high, moderate, or low priority for preparing Water Quality Restoration Plans (specifically TMDL plans).
Reasonable land, soils, and water conservation practices	Methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and nonstructural controls and operation, and maintenance procedures. Appropriate practices may be applied before, during, or after pollution producing activities. [ARM 17.30.602(21)]
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.
Region	See Basin.
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.
Segment	A defined portion of a waterbody.
Slickens	A thin layer of extremely fine silt sometimes deposited by floodwaters of a stream.
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).
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-region) 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(30) 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 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. [75-5-103(31) MCA]
Total Maximum Daily Load (TMDL)	The sum of the individual waste load allocations for point sources and load allocations for both nonpoint sources and natural background sources established at a level necessary to achieve compliance with applicable WQS. [75-5-103(32) 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	A toxic agent
Waterbody	A lake, reservoir, river, stream, creek, pond, marsh, wetland, or other body of water above the ground surface.
Water Quality Assessment Categories	A system defined by EPA guidance for classifying the water quality status based on the waters' assessment status. The five categories included in this system are: Category 1, Category 2 (2, 2A and 2B), Category 3, Category 4 (4A, 4B, and 4C), and Category 5. Category 1: Waters for which all applicable beneficial uses have been assessed and all uses have been determined to be fully supported. Category 2: Waters for which available data and/or information indicate that some, but not all of the beneficial uses are supported. Subcategory 2A: Available data and/or information indicate that some, but not all of the beneficial uses are supported. Subcategory 2B: Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the absence of any identified anthropogenic sources. Category 3: Waters for which there is insufficient data to assess the use support of any applicable beneficial use, so no use support determinations have been made. Category 4: Waters where one or more beneficial uses have been assessed as being impaired or threatened, however, either all necessary TMDLs have been completed or are not required: Subcategory 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved. Subcategory 4B: Waterbodies are on lands where "other pollution control requirements required by local, State, or Federal authority" [see 40 CFR 130.7(b)(1)(iii)] 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. Subcategory 4C: Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, the calculation of a Total Maximum Daily Load (TMDL) is not required. Category 5: Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
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 listed on the 303 (d) List of impaired waters.
Water quality restoration plan	A plan to improve water quality to achieve state WQS. Such a plan 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	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.
Weight of evidence	An approach used to make aquatic life use support determinations when there are high levels of information from all three data categories (chemistry/physical, habitat and biological), including two biological communities.

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[12] ARM 17.30.620 through 17.30.670
[13] MCA § 75-5-303
[14] MCA 75-5-103(14)
[15] MCA § 75-5-702
[16] MCA 75-5-702(7)
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[32] Eric Sivers, Montana DEQ, personal communication, 2019
[33] Shasta Steinweden, Montana DEQ, personal communication, 2/13/2020
[34] https://yellowstoneinsider.com/2017/09/05/
[35] https://billingsgazette.com/lifestyles/recreation/winter-fish-kill-hits-riverfront-park-s-lake-josephine/article_42605734-4e6f-58b9-b669-503c7202deaf.html
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