2006 Integrated 303(d)/305(b) Water Quality Report for Montana

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Acronyms

ACR	Annual Compliance Report
ADB	Assessment Database
ALUS	Aquatic Life Use Support
ARM	Administrative Rules of Montana
BER	Board of Environmental Review
BMP	Best Management Practice
BPJ	Best Professional Judgment
CAFO	Concentrated Animal Feeding Operations
CASRN	Chemical Abstracts Service Registry Number
CBM	Coal Bed Methane
CERCA	Comprehensive Environmental Cleanup and Responsibility Act
CW	Cold Water (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
DFWP	Montana Department of Fish, Wildlife, and Parks
DNRC	Department of Natural Resources
DPHHS	Montana Department of Public Health and Human Services
DQO	Data Quality Objectives
DW	Drinking Water
DWSRF	Drinking Water State Revolving Fund
EA	Environmental Assessment
EC	Electrical Conductivity
EIS	Environmental Impact Statement
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 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
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
MWCB	Mine Waste Clean-up Bureau
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 bi-phenyls
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
STORET	EPA's storage and retrieval database
SWDAR	Source Water Delineation and Assessment Report
SWM	Statewide Fixed Station Monitoring
SWTR	Surface Water Treatment Rule
TMDL	Total Maximum Daily Load
TNC	Transient non-community systems
TPA	TMDL Planning Area
USGS	United States Geological Survey

VOC's	Volatile Organic Chemicals
WMS	Watershed Management Section
WPCAC	Water Pollution Control Advisory Council
WPCSRF	Water Pollution Control State Recovery Fund
WQMS	Water Quality Monitoring Section
WQPB	Water Quality Planning Bureau (DEQ)
WQS	Water Quality Standards
WQSA	Water Quality Standards Attainment
WW	Warm Water (fisheries)

PART A. INTRODUCTION

As part of a process intended to protect and improve the quality of the Nation's rivers, streams, and lakes, the federal Clean Water Act (CWA) requires ongoing water quality assessment and reporting programs for each State. While the United States Environmental Protection Agency (EPA) is responsible for the overall administration of the CWA, the Act "recognizes, preserves, and protects," a State's responsibility for water quality protection and planning.

The CWA Sections 303(d) and 305(b) require each State submit a biennial report to the United States Congress though the EPA. Specifically, under section 303(d), States are required to:

- Identify waterbodies that are water quality limited;
- Prioritize and target those waterbodies that are water quality limited;
- Determine the Total Maximum Daily Load (TMDL) allowable to meet water quality standards.

The resulting section 303(d) list provides the basis for systematically tracking State waters that do not meet State water quality standards. The approach states use to develop the 303(d) list accounts for nonpoint and point sources of pollution, and naturally occurring background levels in a watershed.

Under CWA, Section 305(b), States must provide:

- An assessment on the overall water quality of the State;
- An analysis of the extent to which State waters protect their designated uses (e.g., aquatic life and recreation in and on the water);
- A report on water pollution control programs;
- A description of ground and drinking water programs.

States have submitted these reports to EPA as separate documents until 2002 when the EPA provided guidance to states for integration into the 303(d) and 305(b) reports into a single Integrated Report. This report satisfies the reporting requirements for the 2004-2006 reporting cycle.

A.1 Clean Water Act Reporting in Montana

Data Management Systems: 1980s to 2006

From the mid-1980s to 1996 water quality reporting and data management was delegated to the Montana Department of Health and Environmental Sciences (DHES). The 1997 Montana Legislature re-organized state government structure. As a result of this reorganization, the environmental science programs of DHES, which included water quality reporting and data management, were moved to a new Department of Environmental Quality (DEQ).

Montana's Water Quality program in the mid-1980s used the Environmental Protection Agency's (EPA) Waterbody System (WBS) for tracking water quality assessment information. The WBS application was maintained as an annually updated DOS-based computer system, which used hand recorded information on a hardcopy WBS data input forms for data entry. This data entry form provided the sole record of background or supporting information regarding decisions for the state's 303(d) lists from 1990 to 1998. The WBS application was enhanced prior to 1998 to a relational database management system built in FoxPro v. 2.6. Although the core data management system used by the Water Quality program was now in a more robust relational database, the program still relied on the limited data entry form for recording and documenting water quality assessments and 303(d) listing decisions.

After the 1998 303(d)/305(b) reporting cycle, the EPA released a new water quality data management application referred to as the Assessment Data Base (ADB). The ADB was developed in both Microsoft Access and Oracle platforms and DEQ's Water Quality program selected to implement the MS Access platform version. The program migrated its water quality assessment data into the new application and used the ADB version 1.4 for its 2000, 2002, and 2004 303(d) list submittals to EPA. Simultaneously, the 1997 Montana legislature passed amendments to the state's water quality act requiring the DEQ to develop and implement a data management system that would document and demonstrate that it had "sufficient and credible" data to support water quality standards attainment decisions and 303(d) listing of impaired waters. The legislative amendments also required the DEQ to "develop and maintain a data management system that can be used to assess the validity and reliability of the data used in the listing and priority ranking process" (MCA 75-5-702(5)).

Pursuant to this new legislation the Water Quality program developed a data review system using spreadsheets. These assessment record sheets (ARS) document each waterbody assessment. The program currently manages 1,102 individual ARS spreadsheet files and associated hard copy assessment files. These files represent the official assessment record from which water quality standards attainment decisions are then also entered into the ADB system for reporting to EPA. The program has used this system for the 2000 to 2006 reporting cycles. The one change that occurred at the beginning of the current 2006 Integrated Report cycle was the program migrated its version of the ADB to a newer version (i.e., 1.4 to 2.2).

Migrating to the newer database resulted in some modifications to the state's impairment listings as broader listing causes, such as nutrients or metals, were no longer used. Rather these cause listings were replaced by more refined specific nutrient "species" or metals, such as ammonia or cadmium. As a result, the list of impairment causes expanded from 51 total causes comprised of 21 major categories and 19 sub-categories in version 1.4 to 494 total cause listings that can be filtered by 25 broad categorical groups for selecting purposes in version 2.2. The list of sources expanded from 101 total sources in 34 major categories with 54 second tier and 11 third tier sub-listings in version 1.4 to 183 total source listings organized into 26 broad categorical groups in version 2.2.

The other significant change in the new ADB data structure was the enforced linkage between a beneficial use and its associated impairment cause and probable source. While this requirement of the new system added beneficial information to the impairment decision record, it impacted the design of the ARS files and also the overall size of the printed 303(d) list. All ARS files had to be modified to incorporate the new cause and source listing codes and to capture the linkages between the beneficial use and impairment causes and sources.

Data Management Issues for the 2006 Integrated Report

As mentioned, DEQ used ADB version 2.2 for the 2006 reporting cycle. Thus, data from the previous version of the ADB needed to be moved into the new database version. This was done via a migration and "porting" project conducted in December 2004 with the assistance of EPA. All existing impairment causes and sources were mapped to their equivalent listing in the ADB v. 2.2. Listings without obvious translations were migrated by program staff after a review of historical listing data and information in the ARS files. To ensure tracking of potential impairments previously identified, waterbodies with previously identified impairments that could not be readily mapped into the new system were listed as impairment cause unknown and/or source unknown. The 2006 Integrated Report's 303(d) List has 16 waterbodies (assessment units) where the available data and information was insufficient to identify a specific cause and, of these, 12 have source listed as unknown as well.

Additionally, the ARS files used to document water quality assessments were developed to specifically relate to how the ADB system catalogs impairment causes and sources. Because the new ADB system changed both the cause and source lists, as well as enforcing "cause-source" linkages, the existing ARS files needed modification. During the course of the 2006 reporting cycle all 1,102 ARS files were updated to new data recording requirements. From this set of files, 483 waterbody assessment units were updated using the program's water quality standards attainment assessment process.[15] The remaining 619 ARS files

[15] Montana Department of Environmental Quality (US) [DEQ]. Standard Operating Procedures Water Quality Assessment Process and Methods (formerly Appendix A to 303(d) 2000-2004) WQPBWQM-001.

had been previously assessed during the 2000, 2002, or 2004 reporting cycles and were only updated to link beneficial uses with impairment causes and sources. These 619 waterbody assessments will be more rigorously evaluated when those waterbody assessments are updated and before any TMDL decisions are made.

Data Management System: The Next Evolution

Beginning with the 2008 reporting cycle the DEQ Water Quality program will be using a newly developed integrated data management and assessment system. The DEQ developed the Water Quality Assessment, Reporting, and Documentation (WARD) System to integrate the EPA Assessment Database (v. 2.2) with new relational databases for the program's ARS files, and the bureau's library. This system eliminates redundant data entry; enforces new data entry standards for library citations; links data sources and data summaries; and enforces business validation rules where appropriate to reduce data entry errors and improve overall assessment quality assurance and quality control processes. Additionally, the WARD system provides greatly enhanced reporting functionality to assist in the development of the Integrated Report, and more importantly, provides cleaner and more easily interpreted water quality assessment reports for the public. These reports will be available via the program's newly enhanced public reporting web site, the Clean Water Act Information Center (CWAIC) available through the Montana State Library's Natural Resources Information Service at the following URL: www.cwaic.mt.gov.

Rev#:01 [online document]. Helena, MT: DEQ; 2004. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf.

PART B. BACKGROUND INFORMATION

B.1 Scope of Waters in the Integrated Report

State Overview

Montana is the fourth largest State in the Union with 145,552 square miles of land area. Its population of 902,195 produces a sparse population density of 6.2 persons per square mile.[16] Populations, and population growth, are concentrated in the valleys of the western and southwestern portion of the State. During the 1990s, Montana's population increased by 12.9%.[17]

Montana contains headwater streams of the Clark Fork-Pend Oreille-Columbia, Missouri-Yellowstone-Mississippi, and St. Mary-Saskatchewan-Nelson watersheds. For administrative purposes, the Montana Department of Environmental Quality (DEQ) has grouped the State's 16 sub-major basins into four administrative basins (Figure 1):

1. Columbia – all Montana's west-draining waters, including the Clark Fork, Flathead, and Kootenai Rivers.
2. Upper Missouri – the Missouri River drainage downstream to the confluence with the Marias River.
3. Lower Missouri – the remaining Missouri River drainage in the State, including the Marias, Musselshell, and Milk rivers. The Montana headwaters of the St. Mary drainage are also included in this basin.
4. Yellowstone – all waters of the Yellowstone River in Montana. Waters of the Little Missouri drainage in southeast Montana are also included.

Efforts to improve the accuracy of the inventory of waters of the United States have been continuing for a number of years. The United States Geological Survey (USGS) and Environmental Protection Agency (EPA), with assistance from other federal and State entities, produced the River Reach File (RF) and then, in the last few of years, the National Hydrography Dataset (NHD). The NHD is the source of the stream and lake size estimates used in this report. Because the primary data source used to develop the RF3 and NHD were USGS topographical maps produced over a period of decades, the coverage detail and accuracy varies across the State. The consistency and accuracy of the coverage for perennial streams and the larger lakes is good, but there is variability with respect to ephemeral and intermittent streams and the small ponds and wetlands. Fortunately, the perennial streams and the larger lakes and reservoirs are the focus of water quality issues and management in the State. Montana's water quality assessment effort concentrates on these larger waterbodies unless specific factors, such as the presence of likely causes of pollution, draws attention to particular intermittent or ephemeral streams or to individual ponds or wetlands.

The total size estimates for streams are 49,643, 117,065, and 7,094 miles for perennial streams, intermittent streams, and ditches and canals, respectively (Table 1). Similarly, the total size estimate for lakes, reservoirs, and wetlands is 691,826 acres (Table 1). The lengths shown for streams, ditches, and canals include all linear waters in the NHD. The size estimates for perennial streams, ditches and canals are good estimates, while those for intermittent and ephemeral streams are more tenuous. Review of the various dataset editions intended to list all lakes, reservoirs, ponds, and wetlands in the State revealed substantial variation in their waterbody number and total size estimates. For this reason, named waters having an area of at least 5 acres form the basis of the size estimates presented in the table.

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[16] DP-1. Profile of General Demographic Characteristics: 2000 for the State of Montana [online database]. Washington, DC: Census Bureau (US), US Fact Finder. 2000. Available from: http://factfinder.census.gov/servlet/QTTable?_bm=y&-geo_id=04000US30&-qr_name=DEC_2000_SF1_U_DP1&-ds_name=DEC_2000_SF1_U&-redoLog=false. Accessed 2005 March 3.
[17] Ibid.

Table 1. Montana Surface Waters

RIVER BASINS	Perennial Streams (Miles)	Intermittent & Ephemeral Streams (Miles)	Ditches & Canals (Miles)	Lakes, Reservoirs & Wetlands* (Acres)
Columbia	16,997	12,522	1,022	226,986
Upper Missouri	14,603	17,858	2,504	101,613
Lower Missouri	8,872	47,713	1,637	344,163
Yellowstone	9,171	38,972	1,951	22,064
Montana Total	**49,643**	**117,065**	**7,094**	**691,826**

* Named Waters at least 5 acres in area. Size estimates of all waters derived by DEQ staff from 1:100,000 scale NHD.

The State of Montana's water quality management program does not have authority over all of the waters in Table 1. The EPA is responsible for developing Total Maximum Daily Loads (TMDLs) for all waters located entirely within Indian Reservations. In addition, waters that are within National Parks and Wilderness Areas are not subject to State management activities. For that reason, subtracting those waters from the totals presented in Table 1 provides a clearer picture of the waters that the Montana water quality management program has as its primary focus (Table 2). However, with the sole exception of waters on Tribal lands, the Montana water quality management program takes a direct and vested interest in the quality of all waters in the State.

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

RIVER BASINS	Perennial Streams (Miles)	Intermittent & Ephemeral Streams (Miles)	Ditches & Canals (Miles)	Lakes, Reservoirs & Wetlands* (Acres)
Columbia	13,389	977	548	193,449
Upper Missouri	13,686	17,532	2,504	100,185
Lower Missouri	6,973	41,999	1,223	318,904
Yellowstone	6,778	35,342	1,812	26,928
Montana Total	**40,826**	**95,850**	**6,087**	**639,466**

* Named Waters at least 5 acres in area. Size estimates of all waters derived by DEQ staff from 1:100,000 scale NHD.

Ecoregions

Ecoregions are geographic areas that have similar ecosystems and type, quality, and quantity of natural resources.[18] They provide a spatial framework for the research, assessment, management, and monitoring of ecosystems and their components. Montana has seven major ecoregions designated as the: Northern Rockies, Idaho Batholith, Middle Rockies, Wyoming Basin, Canadian Rockies, Northwestern Glaciated Plains, and Northwestern Great Plains (Figure 2). The Northwestern Glaciated Plains and Northwestern Great Plains ecoregions characterize the eastern portion of the State. These give way to the Canadian Rockies region along the Rocky Mountain Front. The western third of the State lies within the Idaho Batholith, Middle, and Northern Rocky Mountain ecoregions. Each ecoregion has a general description of its climate, land surface, natural vegetation, and land use (Table 3)[19,20,21].

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[18] 2002. Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States (April 2002 DRAFT). Available from: ftp://ftp.epa.gov/wed/ecoregions/us/useco_desc.doc. Accessed 2005 April 1, 2005.

[19] Woods, Alan J., Omernik, James, M., Nesser, John A., Shelden, J., and Azevedo, Sandra H., 1999, Ecoregions of Montana (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

[20] Ecoregions Descriptions. (n.d.). Available from: http://nhp.nris.state.mt.us/Community/Eco_sections_describe.htm. Accessed 2005 April 1, 2005.

[21] Ecoregions. (n.d.). Available from: http://www.fs.fed.us/land/pubs/ecoregions/toc.html. Accessed 2005 April 1.

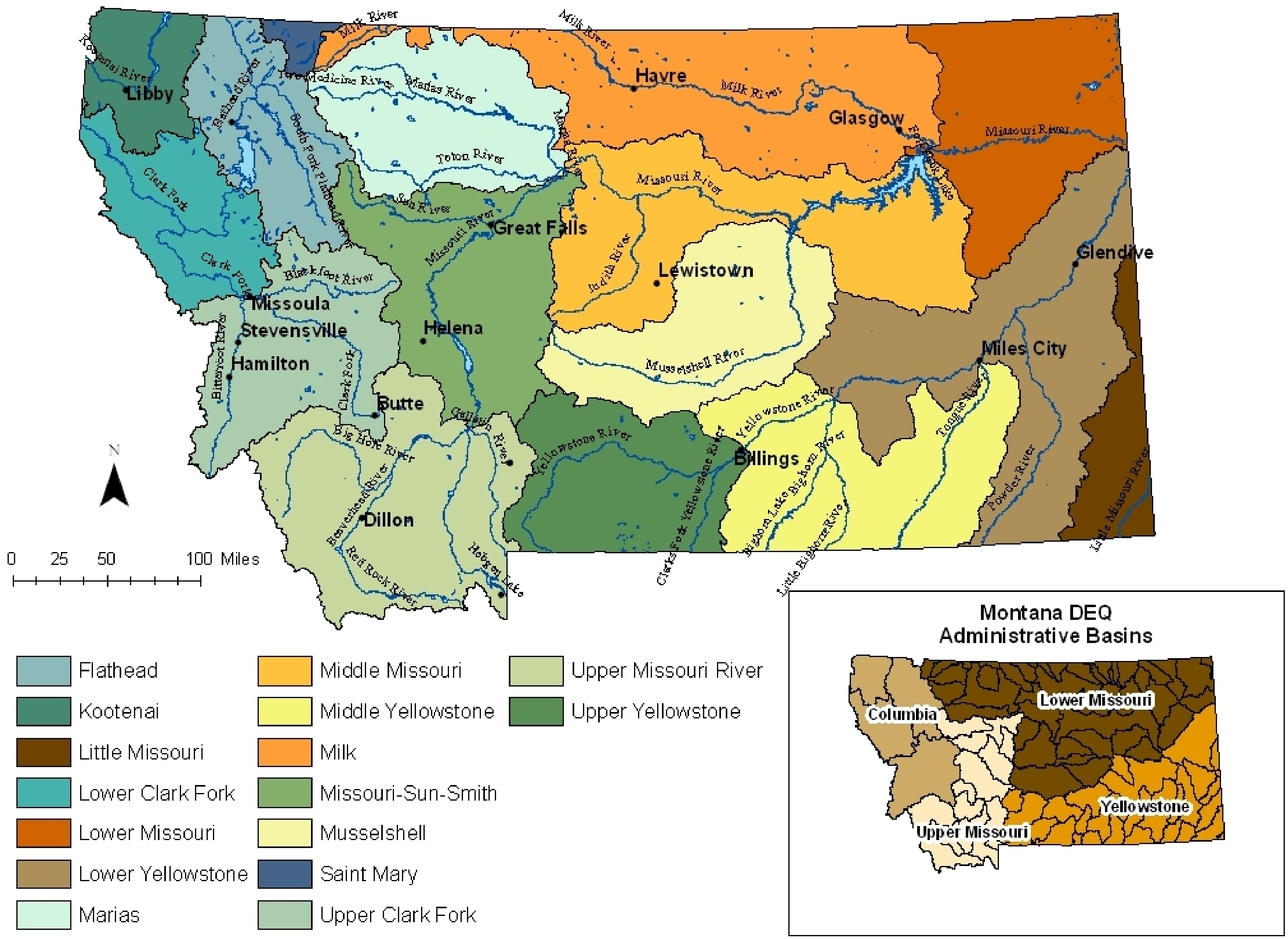

Figure 1. Montana's Major Drainage Basins and Montana DEQ Administrative Basins

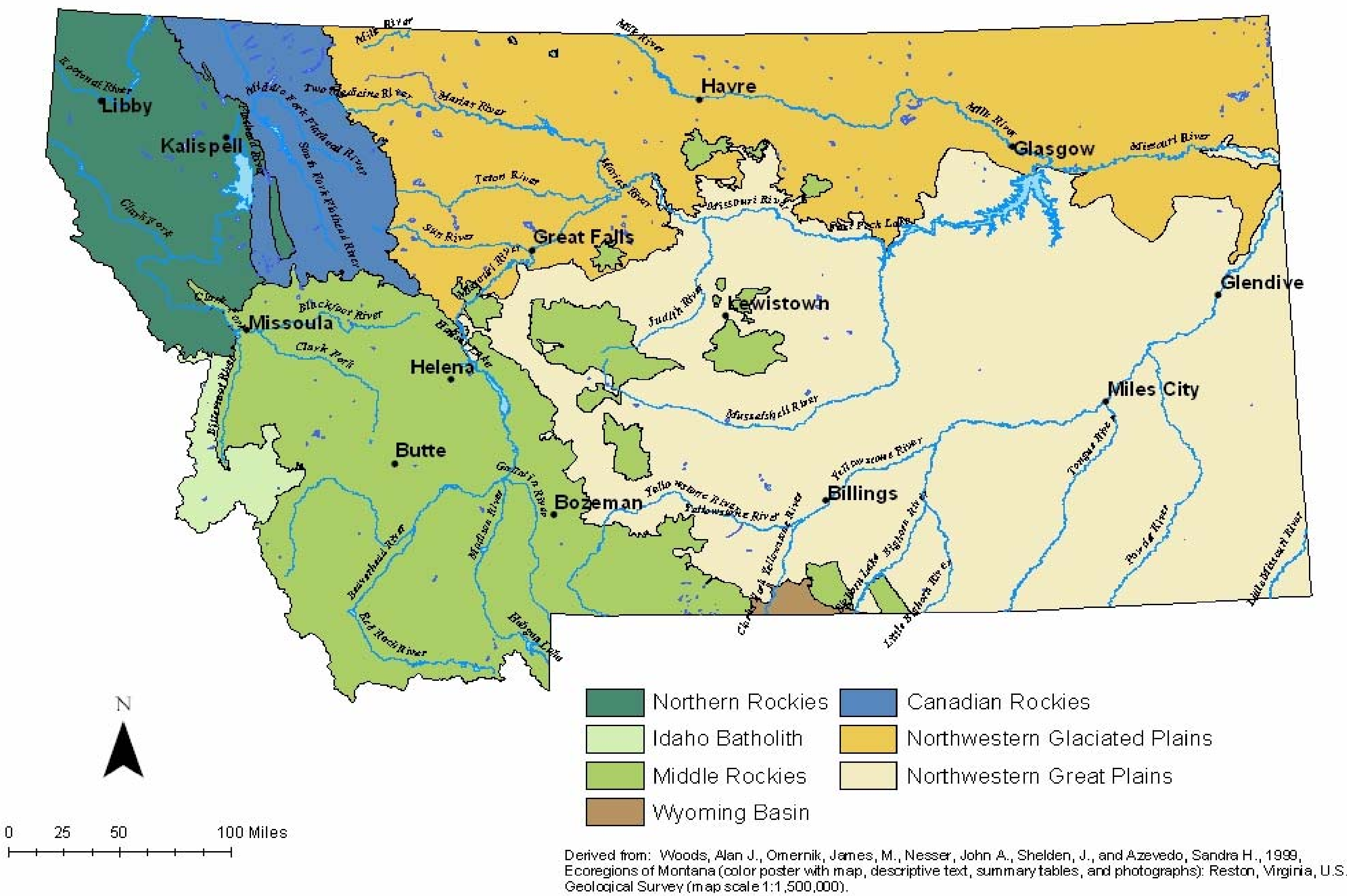

Figure 2. Ecoregions of Montana

Table 3. Characteristics of Montana's Ecoregions[22,23,24]

	Ecoregion	Climate	Land Surface	Natural Vegetation	Land Use
15	Northern Rockies	Precipitation ranges from 16 to over 100 in; most of the precipitation in fall, winter, and spring is snow. Climate is cool and temperate with minor maritime influence; summers are dry. Temperature ranges for January and July vary from 8 to 30 °F and 44 to 90 °F, respectively. The growing season ranges from 30-115 days (frost-free days).	There are steep glaciated overthrust mountains with sharp alpine ridges and cirques at higher elevations. Some areas of glacial deposition also occur. Elevation generally ranges from 3,000 to 9,500 ft. Some alpine areas range from 8,000 to 10,000 ft.	Douglas fir, subalpine fir, Englemann spruce, and ponderosa pine and Pacific indicators such as western red cedar, western hemlock, and grand fir are found in the ecoregion.	Land uses include: Logging, mining (e.g., copper, zinc, lead, silver, gold, and tungsten), watershed, recreation, and wildlife habitat.
16	Idaho Batholith	Precipitation ranges from 20 to 80 in. Most occurs during fall, winter, and spring as snow. Storms are cyclonic from the Pacific Ocean. Climate is maritime-influenced, cool temperate with dry summers. Temperature ranges for January and July vary from 0 to 36 °F and 40 to 88 °F, respectively. The growing season lasts 30 to 150 days (frost-free days).	Partially glaciated, mountainous plateau. Many perennial streams originate here and water quality can be high if basins are undisturbed. Deeply weathered, acidic, intrusive igneous rock is common and is far more extensive than in the Northern Rockies or the Middle Rockies. Soils are sensitive to disturbance especially when stabilizing vegetation is removed.	Grand fir, Douglas fir and, at higher elevations, Engelmann spruce, and subalpine fir occur; ponderosa pine, shrubs, and grasses grow in very deep canyons.	Land uses include logging, grazing, and recreation. Mining and related damage to aquatic habitat was widespread.
17	Middle Rockies	The climate of the Middle Rockies lacks the strong maritime influence of the Northern Rockies. Precipitation varies widely from 12 to 100 in. Temperature ranges for January and July vary from 0 to 34 °F and 38 to 90 °F, respectively. The growing season lasts 15 to 115 days (frost-free days).	Mountains, foothills, and intermontane valleys. Elevation ranges from 3300 to 12,800 feet.	Mountains have Douglas fir, subalpine fir, and Engelmann spruce forests and alpine areas; Pacific tree species are never dominant. Forests can be open. Foothills are partly wooded or shrub- and grass-covered. Intermontane valleys are grass- and/or shrub-covered and contain a mosaic of terrestrial and aquatic fauna that is distinct from the nearby mountains.	Recreation, logging, mining, and summer livestock grazing are common land uses.

[22] Woods, Alan J., Omernik, James, M., Nesser, John A., Shelden, J., and Azevedo, Sandra H., 1999, Ecoregions of Montana (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).
[23] Ecoregions Descriptions. (n.d.). Available from: http://nhp.nris.state.mt.us/Community/Eco_sections_describe.htm. Accessed 2005 April 1, 2005.
[24] Ecoregions. (n.d.). Available from: http://www.fs.fed.us/land/pubs/ecoregions/toc.html. Accessed 2005 April 1.

Ecoregion		Climate	Land Surface	Natural Vegetation	Land Use
18	Wyoming Basin	Precipitation ranges from 6 to 12 in per year. Temperature ranges for January and July vary from 12 to 34 °F and 54 to 90 °F, respectively. The growing season lasts 100 to 130 days (frost-free days).	Plains with hills or low mountains. Elevation ranges from 3700 to 5200 feet.	Potential vegetation includes: sagebrush, wheatgrass, needlegrass, saltbush, greasewood, juniper, and pinyon.	Much of the region is used for livestock grazing, although many areas lack sufficient vegetation to support this activity. The region contains major producing natural gas and petroleum fields.
41	Canadian Rockies	Precipitation ranges from 20 to 100+ in per year. Temperature ranges for January and July vary from 12 to 34 °F and 54 to 90 °F, respectively. The growing season lasts 25 to 70 days.	The region is generally higher and more ice-covered than the Northern Rockies. The elevation of the Canadian Rockies varies from 3500 to 10,500 feet.	Vegetation is mostly Douglas fir, Englemann spruce and subalpine fir. The higher elevations are treeless alpine.	A large part of the region is in national parks where tourism is the major land use. Forestry and mining occur on the non-Park lands.
42	Northwestern Glaciated Plains	Precipitation averages 10 to 15 in, with maximum occurring in spring and early summer. Winters are extremely, cold with desiccating winds and snow. Climate is cold continental, with dry winters and warm summers. Temperature averages 37 to 45 °F. The growing season lasts 100 to 130 days (frost-free days).	This region includes level to gently rolling continental glacial till plains and rolling hills on the Missouri Plateau. Steep slopes border some of the larger rivers. Elevation ranges from 2,500 to 5,000 ft. This Section is within the Great Plains physiographic province.	Kocher mapped vegetation as grama-needlegrass-wheatgrass. Common species include blue grama, blue bunch wheatgrass, green needlegrass, needle-and-thread, western wheatgrass, and basin wild rye.	Most of the area is in cropland or is grazed by livestock.
43	Northwestern Great Plains	Precipitation ranges from 10 to 20 in, with more than half falling during the growing season. Winters are extremely cold with desiccating winds. Precipitation is snow. Climate is cold continental. Temperature averages 37 to 48 °F. The growing season lasts 110 to 160 days (frost-free days).	Rolling shale and sandstone plains, punctuated by occasional buttes. Elevation ranges from 1500 to 3900 feet.	Grasslands primarily persist in rangelands with broke topography. Native grasses largely replaced by spring wheat and alfalfa on level ground.	Dry land farming and livestock grazing occur on about 85 percent of the area. Some commercial timber harvests also occur.

Descriptions of Surface Waters

Streams

Streams are separated into three general categories depending on their relative position of their stream bed to the local shallow groundwater table and flow characteristics.

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

A stream ordering technique, like that described by Strahler (1957), [25] can be used to categorize any stream reach by the relative size of the contributing watershed. First order streams do not have tributaries and are commonly ephemeral or intermittent. The order of a stream changes at the confluence of two like order streams (i.e., a second order stream begins at the confluence of two first order streams, a third order stream begins at the confluence of two second order streams, and so on).

Lakes

All lakes and reservoirs are part of the State's water resources, but most of the assessment emphasis has been focused on "significant publicly owned" lakes. These lakes have public access and recreation potential. Unfortunately, the NHD does not identify those lakes. Therefore, for this report, the DEQ considers named perennial lakes greater than or equal to five acres as significant publicly owned lakes.

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

Wetlands

Recent monitoring and assessment of more than 80 wetlands throughout the State indicates that wetlands are far more diverse than anticipated. Montana’s wetland water chemistry varies from water with very low dissolved solids, similar to high mountain streams and lakes, to those with marine-quality water chemistry. The amount of water associated with wetlands is equally varied. Some have large open-water areas, while others are wet meadows.

On a broad scale, wetlands can be divided into three categories: little or no open water; open water is prevalent; and riverine. Water chemistry, vegetation, connection to groundwater, presence of an inlet, outlet, or both, and persistence of wetness can vary widely within each category.

At this time, accurate maps do not exist for Montana's wetlands as they do for streams and lakes. As a result, only estimates of their aerial extents exist (Table 1).

B.2 Water Pollution Control Program

Water Quality Standards

The Water Quality Standards Section is primarily responsible for updating, modifying, and developing state water quality standards and classifications through rulemaking. In addition to updating or adopting standards that are developed by EPA at the national level, the section is actively working on scientific studies to develop standards that

[25] Strahler, A.N. Quantitative analysis of watershed geomorphology. Amer. Geophys. Union Trans. 1957; 38:913 920.

naturally vary as a function of local conditions (e.g., nutrient standards). However, the section does not have the authority to give final approval to changes in water quality standards and classifications. This authority lies with the Board of Environmental Review (BER), which is the final state authorizing authority on standards rulemaking. Generally, a complete review of standards occurs every three years, but changes to the standards can occur at any time as needed. During legislative sessions, the section is frequently called upon to provide comment on proposed changes to the Montana Water Quality Act.

The section is responsible for the state's water quality certification (401certification) of hydro facilities that require a license from the Federal Energy Regulatory Commission (FERC). In addition to new FERC licenses, the section monitors and reviews activities required of in-place licenses, such as long-term monitoring of water quality below dam sites. The section also provides guidance and interpretation of narrative standards to the Department, as well as to the general public.

Standards Review and Rulemaking Process

The DEQ periodically reviews, updates, and modifies Montana's water quality standards as necessary. State law provides the authority to the DEQ and the BER to adopt proposed water quality standards into the Administrative Rules of Montana (ARM). The rulemaking process also involves the Water Pollution Control Advisory Council (WPCAC), the Governor's Office, the EPA, and the public. This summary will cover the public review process for developing water quality standards, and how proposed standards become finalized into rules.

Once a draft rule is developed, DEQ typically starts public review with informal outreach that includes posting the proposed rule on the DEQ website to allow interested persons early involvement. This provides the public and the rulemaking team additional time to become involved and address issues that may arise. Once the Department is satisfied with the draft proposed rule, a copy is sent to the Governor's Office for review and comment.

The rule is then submitted to the WPCAC at least 30 days before the proposed rule is published. Following WPCAC review and potential modification, the proposed rule is presented to the BER.

The BER decides whether to initiate rulemaking on the proposed rule. If BER gives the approval to move ahead, the proposed rule is published in the Administrative Register approximately 14 days after the BER meeting. The date that it appears in the Administrative Register is the official publication date, which starts a 6-month deadline for final adoption by the BER.

Meanwhile, a public hearing is set to occur about 30 days after publication in the Administrative Register. During this time a legal add is run for three consecutive weeks in major newspapers to inform the public of the proposed rule.

The public hearing is held and comments are recorded. The DEQ staff responds to the comments, and any necessary changes to the rule are made. The draft response to comments and any changes to the rule are submitted to the BER. The BER then chooses to adopt, not adopt, or adopt the rule with modification.

Final notices are prepared for the adoption of the rulemaking, and then published in the Montana Administrative Register. A notice of the rule passing is sent to any interested parties.

The Department completes the final rule and forwards it to the Secretary of State. The Department then enters the final rule on the website. The new rule takes effect under state law when it is published in the Montana Administrative Register.

Finally, Montana submits the standards change to EPA for approval. Following EPA approval the new standard becomes effective under the Federal Clean Water Act.

Numeric and Narrative Standards

Montana water quality standards include both use-specific components and general provisions. Standards may be either narrative or numeric, and be specific to human health, aquatic life or for beneficial uses such as agriculture. Some numeric water quality standards can be classified in terms such as "acute" or "chronic."

Narrative standards provide a minimum level of protection to state waters and may be used to limit the discharge of pollutants, or the concentration of pollutants in waters not covered under numeric standards. Montana narrative water quality standards prohibit activities which would result in nuisance aquatic life (ARM 17.30.637). Some standards, such as pH, temperature, and sediment, are defined in terms of change from what would naturally exist. These standards provide that "no increase above naturally occurring condition" shall occur.

Montana's numeric water quality standards published in DEQ-7 were developed using guidance from the EPA. EPA's guidance for water quality criteria include: human health advisories, National Recommended Water Quality Criteria (NRWQC), and drinking water criteria referred to as Maximum Contaminant Levels (MCL). Examples of numeric water standards include the electrical conductivity standards and the numeric standards for nutrients.

Circular DEQ-7

The name of the Circular WQB-7 was changed to Circular DEQ-7. The Circular contains numeric water quality standards for Montana's surface and groundwaters. The standards were developed in compliance with Section 75-5-301, MCA of the Montana Water Quality Act and Section 303(c) of the Federal Clean Water Act (CWA). Together, those provisions of state and federal law require the adoption of standards that will protect the designated beneficial uses of state waters, such as the support of aquatic life, public water supplies, recreation, or agriculture.

The numeric water quality standards in the Circular have been established for parameters (i.e., "pollutants") that are categorized as toxic, carcinogenic, bioconcentrating, radioactive, nutrient, or harmful. In addition, the Circular contains groundwater standards for pesticides developed in compliance with the Montana Agricultural Chemical Ground Water Protection Act (80-15-201, MCA).

In addition to providing the numeric water quality standards for each parameter, the Circular also contains the primary synonyms of each parameter, the Chemical Abstracts Service Registry Number (CASRN) for each chemical, the categorization of each parameter according to the type of pollutant, the bioconcentration factor if known, trigger values used to determine "significance" under Montana's nondegradation policy, and required reporting values.

Standards have been revised for various substances to reflect current EPA 304(a) criteria. Human health standards have now been changed from fecal coliform to *E. coli*. Also, the Circular was revised to reflect the State's current human health standard for arsenic from 18 to 10 µg/L.

Montana Water Classification System

Montana waterbodies are classified according to the present and future beneficial uses that they should be capable of supporting (75-5-301 MCA). The state Water-Use Classification System (ARM 17.30.604-629) identifies the following beneficial uses:

- Drinking, culinary use, and food processing
- Aquatic life support for fishes and associated aquatic life, waterfowl, and furbearers
- Bathing, swimming, recreation, and aesthetics
- Agriculture water supply
- Industrial water supply

Surface Water Classification System

Montana's surface water use classification system employs categories which are based primarily on water temperature, fish, and associated aquatic life (Table 4). Each of the classes has associated beneficial uses (Table 5). The three most common categories are A, B and C. The "I" classification is another category, but it is seldom used, and only three streams in Montana are listed with this classification. Four additional water categories were added to the classification system in August 2003; D, E, F, and G. These categories are for ephemeral streams, seasonal, and semi-permanent lakes, ponds and ditches.

Table 4. Surface Water Classification

Classification	Description
A-CLOSED	Waters classified A-Closed, are suitable for drinking, culinary and food processing purposes after simple disinfection.
A-1	Waters classified A-1, are suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities.
B-1	Waters classified B-1, are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
B-2	Waters classified B-2, are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
B-3	Waters classified B-3, are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
C-1	Waters classified C-1, are suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
C-2	Waters classified C-2, are suitable for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
C-3	Waters classified C-3, are suitable for bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture, and industrial water supply. Degradation which will impact existing or established uses is not allowed.
I	The goal of the State of Montana is to have these waters fully support the following uses: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

Table 5. Designated beneficial uses by waterbody class

Beneficial Uses	Water Use Classification						
	A-Closed	A-1	B-1	B-2	B-3	C-1	C-2	C-3
Aquatic Life	X	X	X	X	X	X	X	X
Fisheries (Salmonid)	X	X	X	X		X	X	
Fisheries (Non-Salmonid)					X			X

Beneficial Uses	Water Use Classification							
	A-Closed	A-1	B-1	B-2	B-3	C-1	C-2	C-3
Agriculture	X	X	X	X	X	X	X	M
Industry	X	X	X	X	X	X	X	M
Drinking Water (Human Health)	X	X	X	X	X			M
Recreation	X	X	X	X	X	X	X	X

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

A waterbody is considered to support its beneficial uses when it meets the water quality standards established to protect those uses. A waterbody is considered to be impaired when there is a violation of the water quality standards established to protect any of the applicable beneficial uses. In some cases the violation of a standard will result in the impairment of only a single use; in other situations the violation of one or more standards may result in the impairment of all uses for the applicable classification

The A-Closed and A-1 waters are high quality, and the principal beneficial use is public water supply. A-Closed classification may authorize watershed protection and use restrictions to protect the drinking water use.

Montana divides B and C classifications based on cold-water or warm-water aquatic life. B- (1 or 2) and C- (1 or 2) support cold-water aquatic life, while B-3 and C-3 waterbody classes support warm water aquatic life. B and C waters have identical use classifications, except that B waters include drinking water as a beneficial use, and C waters do not. The B- (1, 2 and 3) classifications are multiple use waters suitable for domestic use after conventional treatment, growth and propagation of fish (cold water, B-1 and B-2, warm water, B-3), associated aquatic life and wildlife, and agricultural and industrial uses. Most streams in Montana have a B- (1, 2, or 3) classification.

Four stream segments listed here are intended to be B-1 waters but due to existing degradation at the time of Use Classification they were not meeting B-1 standards and are therefore classified as C-1 or C-2:

1. Rainy Creek (C-1), Mainstem from the W.R. Grace Company water supply intake to the Kootenai River
2. Clark Fork River (C-2), from Warm Springs Creek to Cottonwood Creek
3. Clark Fork River (C-1), from Cottonwood Creek to the Little Blackfoot River
4. Ashley Creek (C-2), Mainstem from bridge crossing on airport road to the Flathead River

C-3 streams are suitable for warm water (non-salmonid) fisheries and associated aquatic life, and recreation activities. Because these streams often contain naturally high total dissolved solids (salinity), their quality is marginal for drinking water, agricultural and industrial uses.

Streams with an “I” classification were impacted by an activity which would not allow the stream to fully support drinking, recreation or fishery uses at the time the first stream classifications were determined (1955). The State's goal is to improve the quality of these waterbodies so that they will fully support all appropriate beneficial uses.

There are three stream segments, in Montana, designated as I – class waters:

1. Prickly Pear Creek below East Helena (Upper Missouri Basin)
2. Silver Bow Creek (Upper Clark Fork Basin)
3. Muddy Creek (Sun River Basin).

Lastly, effective August 2003, four additional water categories were added to the classification system; D, E, F, and G. No waters are currently placed in these classifications; rather they are placeholders for future use. The categories include ephemeral stream classes (E-1 and E-2); ditch classes (D-1 and D-2); seasonal or semi-permanent lake and pond classes (E-3, E-4 and E-5; and one low or sporadic flow class (F-1). Waters classified G-1 are to be maintained suitable for watering wildlife and livestock, aquatic life not including fish, secondary contact recreation, and marginally suitable for irrigation after treatment or with mitigation measures. Hold water that is produced from coal bed methane development are classified as G-1 waters.

Groundwater Classification System

Montana classifies its groundwater according to the actual quality and use as of October 1982. The classifications are I, II, III, and IV.

- Class I - groundwater has a specific conductance less than 1,000 µSiemens/cm at 25°C and is suitable for public and private water supplies, food processing, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes, with little or no treatment required.

- Class II - groundwater has a specific conductance range of 1,000 to 2,500 µSiemens/cm at 25°C and may be used for public and private water supplies where better quality water is not available. The primary use of Class II groundwater is for irrigation, stock water, and industrial purposes.

- Class III - groundwater has a specific conductance range of 2,500 to 15,000 µSiemens/cm at 25°C. Its primary use is for stock water and industrial purposes. It is also marginally suitable for some salt tolerant crops.

- Class IV - groundwater has a specific conductance greater than 15,000 µSiemens/cm at 25°C. Class IV groundwater is used primarily for industrial purposes.

Designated Uses and Use Support

Montana classified its waterbodies in the 1950's according to existing and future beneficial uses that they should be capable of supporting (75-5-301 MCA). The State Water-Use Classification System (ARM 17.30.606-629) identifies the following beneficial uses:

- Drinking, culinary use, and food processing
- Aquatic life support for fish and associated aquatic life, waterfowl, and furbearers
- Bathing, swimming, and recreation
- Agriculture water supply
- Industrial water supply

Aquatic life, fisheries, recreation, and drinking water, culinary and food processing are designated uses that have the highest water quality requirements. When a waterbody supports these beneficial uses, a waterbody should support all other existing and future designated uses (i.e., agricultural and industrial).

Aquatic Life

Aquatic life support is a broad use descriptor intended to protect fish and other aquatic animals and plants normally associated with a high quality ecosystem. Chemical pollutants, sediment, temperature modification, riparian habitat degradation, stream channel modifications, excessive water withdrawal, irrigation return flows, and other actions that disrupt the biological integrity of the waterbody can impair aquatic life.

Fisheries

In Montana, fisheries consist of cold (salmonid) and warm water (non-salmonid) fisheries. Mountain or foothill streams and lakes typically support cold-water fisheries such as trout and associated game and non-game fish. The eastern prairie streams and lakes and the lower Missouri and Yellowstone rivers typically support warm water fisheries. These waterbodies are naturally warm and have higher suspended sediment and total dissolved solids. They typically support sauger, catfish, and a wide variety of non-game fish. Fisheries fall under the more general aquatic life support use. The State considers a water that has a fisheries impairment, also has an aquatic life impairment.

Recreation

Recreation includes primary and secondary contact recreation. Swimming and wading are examples of primary contact recreation, while boating is a type of secondary contact recreation. Noxious algae growth or health concerns such as fecal coliform or *E. coli* bacteria can impair the use of a waterbody for swimming.

Drinking Water, Culinary and Food Processing

Water is suitable for drinking if it falls below MCL for all health-threatening contaminants. The MCL for a pollutant is the maximum concentration that EPA has found to be safe for human consumption. The EPA derived MCL numbers from cancer and toxicity studies, and the availability of technology to treat the water before consumption to reduce or remove contaminants.

Human health criteria refer to the concentration of a carcinogen such as arsenic or a pesticide that correlated to a specific level of increased cancer risk resulting from life-long exposure to the carcinogen through drinking the contaminated water and/or consuming fish from the same waters. The Montana Legislature has legislated the acceptable risk level to be one case of cancer per 100,000 persons exposed for all carcinogens except arsenic, for which the acceptable level is one cancer per 1,000 persons exposed (MCA 75-5-301(2)(b)).

Agriculture and Industry

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

All Montana use classifications support multiple uses. Therefore, the level to which water quality supports each designated use must be assessed. The beneficial use support decision for each use is independent of the other designated uses (e.g., a waterbody may partially support aquatic life because of excess nutrients, not support drinking water because of arsenic, but fully support agriculture and industrial uses).

Reference Condition

Identifying reference sites is an outgrowth of the reference condition concept. The reference condition concept asserts that there exist for any group of waterbodies relatively undisturbed examples that can represent the natural biological, physical, and chemical integrity of a region; therefore, reference stream sites are those that represent the reference condition. The DEQ is interested in reference sites because they help the Department interpret narrative water-quality standards. A number of Montana's narrative standards require that water quality be compared to "naturally occurring", and the DEQ uses reference sites to help interpret what naturally occurring is.

In 2000, DEQ re-initiated a Reference Stream Project and began to collect data at existing reference sites as well as at new sites that were identified around the state.[26] In addition to conducting field sampling, in 2004 the DEQ began to assemble a comprehensive list of potential reference stream sites and their associated data. This list included not only the sites from the DEQ Reference Stream Project, but also sites from a variety of other statewide water-quality sampling projects (e.g., the USGS Hydrologic Benchmark Network).

An evaluation process was developed and used to assess each candidate reference site in a consistent way. (Some established reference sites that had already been thoroughly reviewed using similar techniques did not go through this process, and were automatically classified as final reference sites.) The process consisted of performing quantitative watershed and water-quality analyses for each site, as well as qualitative assessments of stream health and condition using a set of criteria and best professional judgment (BPJ). Each quantitative analysis or BPJ criterion evaluated some aspect of stream or watershed condition that could potentially impact water quality and aquatic life. Sixteen BPJ criteria (e.g., bank erosion, sediment deposition, grazing impacts) were tailored for cold-water streams (mountainous regions), and were slightly different from thirteen BPJ criteria tailored for warm-water streams (prairie regions). A series of seven tests, or "screens," was then used to create the final list of reference sites. The screens were constructed from the qualitative BPJ assessments and also from numeric values identified as impact thresholds in the quantitative analyses, and addressed factors operating at the watershed-scale, site-specific scale and, in many cases, both. The seven screening tests were: cumulative impacts from multiple causes; site-

[26] Ibid.

specific data sufficiency; impacts from land-use based on the proportion of agriculture; numeric water-quality standards exceedences for heavy metals; impacts from mines; road density; and timber-harvest intensity (the later two applicable to cold-water streams only). To make the final list, a site had to pass each applicable screen. Sites that passed all applicable screens were considered general-purpose reference sites, since their condition was not found to be impacted for any categories.

Using the process described above, a group of Montana reference stream sites has been identified. However, there remains the need to assure that the reference sites are sufficiently similar to the stream sites against which they are compared. In general, Omernik level-III ecoregions have shown themselves to be an excellent tool for the initial partitioning of Montana reference streams.[27] However, in certain cases more specific geospatial characteristics than level III ecoregions alone may need to be determined for the reference site and the comparison site. What those geospatial characteristics will be varies according to the parameter of interest. For example, elevation is important when considering aquatic insect (macroinvertebrate) populations, watershed area is important when considering prairie stream fish populations, and nutrient concentrations are best explained by level IV (fine-scale) ecoregions. It is likely that some water quality parameters and biological assessment metrics can be "referenced" at a fairly coarse scale (e.g. level III ecoregions), while others cannot. The reader should refer to specific reports (many cited in this report) and their associated stream assessment "tools" to decide how to best apply the reference sites provided here. And there are limitations to the use of the reference stream data. Most of the sites are located in lower Strahler stream orders — mainly 1st through 4th but including a few 5th order sites — and the data are most applicable to streams of that size range (the so-called "wadeable" streams). Therefore, the extension of these data to sites from much larger waterbodies (e.g., Yellowstone River, 6th order) should be undertaken with caution.

Point Source Control Programs

Montana's Point Source Program (PS) was established as a result of the 1972 amendments to the CWA that established the National Pollutant Discharge Elimination System (NPDES) authorizing EPA to issue discharge permits and to delegate to States "many of the permitting, administrative, and enforcement aspects of the NPDES program."[28] The goal of the NPDES program was to control point source pollutant discharges and subsequently protect water quality in the nation's waters. Point sources as defined in 40CFR, Part 122 include the following: concentrated animal feeding operations as defined in §122.23; concentrated aquatic animal production facilities as defined in §122.24; discharges into aquaculture projects as in §122.25; discharges of stormwater as set forth in §122.26; and silvicultural PS as defined in §122.27. In 1974, 1981, and 1983, EPA authorized the state to implement the NPDES Program, regulate federal facilities, and the General Permits Program, respectively.[29] Currently these duties are the responsibility of DEQ and Water Protection Bureau.

As of 2005, DEQ is backlogged on permit issuance. A summary of permit issuance status for the state of Montana is shown in Table 6.

Table 6. Permit Status Report for Major and Minor Facilities Covered by General Non-Stormwater Permits[30]

	Issuance Goal	Actual for August 2005			Permit Deficit
		Total Facilities	Current Facilities	Current %	
MT	90%	379	222	58.6%	119
MT (EPA)*	90%	17	17	100%	0

*Indicates EPA is the permitting authority

[27] Omernik, J. M. 2000. Level III ecoregions of the continental United States (map). Revised November 2000. National Health and Environmental Effects Research Laboratory, U.S. Environmental Protection Agency, Corvallis, OR.
[28] 2005. *Clean Water Act - National Pollutant Discharge Elimination System (NPDES)* [online document] (United States Environmental Protection Agency. Available from: http://cfpub1.epa.gov/npdes/cwa.cfm?program_id=45. Accessed 2005 August 24.
[29] 2005. *NPDES Permit Program Results for Montana* [online document] (United States Environmental Protection Agency, [cited 08/24/05]) Available atcfpub.epa.gov/npdes/stateinfo.cfm?&view=state&state_id=27&state=MT.
[30] 2005. Personal Communication. Association of State and Interstate Water Pollution Control Administrators (ASIWPCA), Washington D.C. 20002.

Discharge Permit System Program

The goal of the Montana Pollutant Discharge Elimination system (MPDES) program is to control point source discharges of wastewater and subsequently protect water quality in receiving streams. The State's Water Quality Standards (WQS) establish the levels of water quality required to maintain the designated beneficial uses of the receiving streams[31,32].

All point sources of wastewater discharge are required to obtain and comply with MPDES permits. The effluent limitations and other conditions contained in MPDES permits are based upon preservation of the WQS, with certain categories of wastewaters requiring treatment to a federally-specified minimum level (technology-based treatment) in addition to WQS requirements. The State calculates WQS requirements for pollutant levels in the discharge at the average design wastewater flow and the seven-day, ten-year low stream flow (7Q10) in the receiving stream. At streamflows below the 7Q10, the WQS and MPDES do not give further protection from pollutant discharges.

The Nondegradation Rules are a part of the WQS that apply to new or increased sources of pollution. These rules prohibit increases in the discharge of toxic and deleterious materials to state waters, unless a permit applicant demonstrates to the DEQ that a change is justifiable because of necessary economic or social development, and that it will not preclude present and anticipated use of these waters.

Some common pollutants that are limited under Nondegradation are nutrients, heavy metals, and toxic organic pollutants. These same pollutants could also be limited under the WQS in existing discharger's permits. The difference would be that the WQS levels would be calculated to achieve less than chronic toxicity levels instream at the 7Q10, whereas nondegradation limits in new or enlarged point source discharges would be set at baseline instream concentrations plus a "trigger level" amount which would define the "significance" threshold.

Each MPDES permit issued is designed to protect the receiving stream quality at the point of discharge. In addition, recognizing the dynamic nature of streams and the potential additive or cumulative effects of pollutants, MPDES permits also address stream reach or basin-wide pollution problems. A calculation process called TMDL is used to apportion allowable pollutant discharge levels among the various dischargers. If the State finds that reductions of a given pollutant in a stream reach or basin are necessary to meet WQS, the State uses the TMDL to apportion the reductions among the dischargers in that reach or basin.

Application and annual permit fees fund the State's MPDES program. Activities of program staff include public education, reviewing applications, determining effluent limits and best management practices, environmental assessments, public participation and information retrieval, effluent and instream data review and management, field inspections, enforcement, regulation and guidance preparation, program planning and administration.

Stormwater Program

Stormwater is defined as stormwater runoff; including snow melt runoff, and surface runoff and drainage. Stormwater runoff may carry high levels of pollutants such as sediment, oil and grease, suspended solids, nutrients, heavy metals, pathogens, toxins, and trash. Industry, mining, construction, municipalities, and other regulated facilities or activities can introduce these pollutants into stormwater and ultimately into state waters potentially threatening the environment or public health.

The DEQ has broad statutory and regulatory authority to address stormwater discharges under the Montana Water Quality Act (75-5-101 et seq. MCA) and the Administrative rules of Montana (17.30, Subchapters 11, 12, and 13). Stormwater discharges, as defined in 17.30.1102, are permitted through the use of MPDES permits. The purpose of the stormwater program is to reduce the amounts of pollutants entering state waters as a result of runoff from residential, commercial, and industrial sources through permit compliance, technical assistance, and training.

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[31] Montana Department of Environmental Quality (US) [DEQ]. Montana Numeric Water Quality Standards (DEQ-7) [online document]. Helena, MT: DEQ; 2006 Feb. 40 p. Available from: http://www.DEQ.state.mt.us/wqinfo/Circulars/WQB-7.PDF.

[32] Administrative Rules of Montana. ARM 17.30.606 – 629 (2006)

Concentrated Animal Feeding Operations (CAFOs)

Confined livestock can be a source of pollutants to state waters and are, therefore, subject to the provisions of Montana's water quality laws. The Montana Water Quality Act (75-5-101 et seq. MCA) governs the discharge of pollutants to state waters. Section 605 of the Act states that it is unlawful to cause pollution of any state waters, or to place wastes in a location where they will cause pollution (75-5-605 (1) (a) MCA). It is also unlawful to discharge sewage, industrial waste, or other wastes into any state waters without a current permit from the DEQ (75-5-605 (2) (c) MCA). State waters are defined as a body of water, irrigation system, or drainage system, either surface or underground (75-5-103(25) MCA).[33] Surface waters that flow periodically in ephemeral and intermittent channels are also considered state waters. The definition excludes non-discharging, waste containment or treatment ponds and irrigation or land application systems having no return flow to state waters.

Animal feeding operations are regulated by the MPDES permit program administered by the DEQ. An animal feeding operation has both of the following conditions:
Animals are stabled, confined, and fed or maintained for a total of 45 days or more in any 12-month period;
Crops, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the facility.

Animal feeding operations that discharge, or have the potential to discharge, stormwater or process wastewater to any state water are defined as CAFOs and must obtain a discharge permit from DEQ. A CAFO is defined in the federal code of regulations (40CFR, Part 122, Appendix B) as an animal feeding operation that:

- Contains more than 1,000 animal units;
- Contains between 301 and 1,000 animal units and a discharge occurs through a man-made conveyance; or pollutants are discharged directly into state waters, which originate outside of the facility and pass over, across, or through the facility; or,
- Is designated as a CAFO by DEQ.

An "Animal unit" is calculated by adding the numbers of:

- Slaughter and feeder cattle multiplied by 1.0,
- Mature dairy cattle multiplied by 1.4;
- Swine, weighing 55 pounds or more, multiplied by 0.4
- Sheep multiplied by 0.1;
- Horses multiplied by 2.0.

The DEQ must conduct a site inspection prior to designating an operation with less than 301 animal units as a CAFO and requiring a permit (ARM 17.30.1330(5)). The DEQ must consider details regarding size, runoff volume, distance to surface or groundwater, slope, and ground cover conditions in assessing the likelihood and frequency of a discharge and making a case-by-case designation. Other relevant factors may include proximity to public water supplies, or public complaints. A CAFO operator applies for the permit by completing Short Form B and paying a $600.00 annual application fee. The application form requests information on facility ownership, location, size, physical surroundings, and waste control and land application practices.

Industrial Pretreatment

The EPA implements this program. It has not been delegated to the State.

Bio-solids Program

The EPA implements this program. It has not been delegated to the State.

Nonpoint Source Pollution Control Program

Montana's Nonpoint Source Pollution (NPS) Program was established shortly after Section 319, "Management of Nonpoint Sources of Pollution," was added to the CWA in 1987. Under Section 319, the State receives grant money for supporting a wide variety of activities including technical and financial assistance, education, training,

[33] The term "state waters" serves only to identify what is protected under the law. The term conveys no right of ownership.

technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. In order to receive 319 funding the State must complete an assessment report of their nonpoint sources (updated biennially as part of the State's 305(b) report) and develop a management program to address the problems identified in the assessment report.

In May 1996, the EPA provided major new guidance for States in developing their nonpoint source management programs. This guidance required States to reflect nine key elements in their programs.[34] Montana incorporated those nine key elements in its 2001 Nonpoint Source Management Plan. Currently the DEQ is reviewing the existing Plan with intent of updating the document in 2007.

Nonpoint Source Pollution and Montana

Nonpoint source pollution is human-induced pollution generated from diffuse sources such as grazing, logging, farming, mining, land development, and many other activities. In 2000, nonpoint source pollution accounted for 90 percent of the stream and 80 percent of the lake impairments in Montana.[35] The current Nonpoint Source Management Plan, approved by EPA in June 2001, ranked the five leading sources of water quality impairments in Montana for rivers and streams, and lakes, based on the 2000 303(d) list, as follows (Table 7):

Table 7. Top Five Impairment Sources Cited in 2000 (by number of listings)

Rank	Rivers and Streams	Lakes
1	Agriculture	Atmospheric Deposition
2	Hydrologic Modification	Agriculture
3	Resource Extraction	Resource Extraction
4	Habitat Modification	Debris and Bottom deposits*
5	Construction	Hydrologic Modification

* Debris and bottom deposits are the result of a variety of different human activities related to agriculture, resource extraction, construction, etc. As such, the State addresses debris and bottom deposits in several of its NPS Strategies.

Below is a description of the primary nonpoint sources of pollution within the State of Montana and the State's strategy for mitigation.

Agriculture & Forestry

Farms and ranches cover two-thirds of the state – nearly 60 million acres.[36] Thirty percent of this is cropland and sixty-five percent is range and pasture land. Agriculture is Montana's leading industry, generating nearly 2 billion dollars in 2002: ~ $767 million in crops and ~ $1 billion in livestock.[37] In 2000, 2002, and 2004 agricultural activities impaired more than 6,000 miles of streams and approximately 60 percent of assessed impaired streams were impaired by agricultural sources[38,39,40]. In addition, during these reporting cycles, farming and ranching

[34] Environmental Protection Agency (US) [EPA]. Office of Water. Nonpoint Source Program and Grants Guidance for Fiscal Year 1997 and Future Years [online document]. Washington, DC: EPA; 1997. Available from: http://www.epa.gov/owowwtr1/nps/npsguid.html. Accessed 2006 November 14.
[35] Montana Department of Environmental Quality (US) [DEQ]. Water Quality Planning Bureau. 2000 Montana Water Quality Assessment Database [database online]. Helena (MT): DEQ; 2000. Available from: http://www.CWAIC.mt.gov. Accessed 2005 June 30.
[36] 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, US - State Data [online database]. Washington (DC): Department of Agriculture (US), National Agriculture Statistics Service. 2002. Available from: http://www.nass.usda.gov/Census/Create_Census_US.jsp.
[37] *2004 Montana Agricultural Statistics* [online document] (Montana Department of Agriculture, Issn: 1095-7278, Vol. XLI. Available from: http://www.nass.usda.gov/mt/. Accessed 2005 June 30
[38] Montana Department of Environmental Quality (US) [DEQ]. Water Quality Planning Bureau. 2000 Montana Water Quality Assessment Database [database online]. Helena (MT): DEQ; 2000. Available from: http://www.CWAIC.mt.gov. Accessed 2005 June 30.
[39] Montana Department of Environmental Quality (US) [DEQ]. Water Quality Planning Bureau. 2002 Montana Water Quality Assessment Database [database online]. Helena (MT): DEQ; 2000. Available from: http://www.CWAIC.mt.gov. Accessed 2006 November 17.

activities impacted about 300,000 acres of lakes.[41] Pollutants from agricultural nonpoint sources include sediment, nutrients, salinity, thermal impacts, bacteria, and pesticides.

As with farms and ranches, forests cover a large portion of the State. Nearly a quarter of Montana's land area is forestlands (22.5 million acres).[42] In 2002, the forest products industry contributed $970 million to the State's economy.[43] The forestlands of Montana are also the headwaters for many rivers and streams. These provide some the West's best fishing as well as water for agriculture, recreation, drinking water, and many other uses. Forestry activities, however can lead to impairment of beneficial uses, such as aquatic life, because of increases or changes in sediment, nutrients, temperature, or habitat conditions. Activities such as road building, soil disturbance, and harvest unit management may generate pollutants or cause deleterious changes to water quality or aquatic or riparian habitats.

NPS Agriculture & Forestry Strategy

Montana's agriculture NPS pollution mitigation goals include: increasing implementation of agricultural Best Management Practices (BMPs); improving irrigation water management; and increasing BMP implementation on rangeland. Montana adopted "Agricultural BMPs for Control of Nonpoint Source Pollution" based on Montana Conservation Practice Standards from the Natural Resources Conservation Service's Technical Guide as a framework for implementing this strategy.[44, 45] Numerous federal and state agencies and programs provide technical assistance and financial incentives to implement these BMPs.

In addition to advocating agriculture BMPs, DEQ's TMDL Program allocates pollutant loads using a watershed approach wherever NPS pollutants impair a waterbody's beneficial uses. A watershed approach focuses on targeting priority water quality problems, promoting stakeholder involvement, integrating solutions that make use of the expertise and authority of multiple agencies, and measuring success through monitoring and data gathering. The Water Quality Restoration Plans developed as a result of the TMDL Planning efforts include an implementation strategy, which identifies critical steps toward restoring full support to beneficial uses.

Montana also has specific strategies for reducing NPS pollution resulting from forestry and forestry-related activities. Montana's NPS goal for forestry and forestry-related activities is to reduce water quality impacts associated with forest practices. Montana's water quality protection program for forestry and forestry-related activities relies on a combination of regulatory and voluntary approaches. The 1989 Montana legislature passed a law to provide forestry BMP information to private forest owners and operators to help protect water quality in Montana. This law requires private forest owners to provide the Forestry Division of the Department of Natural Resources and Conservation (DNRC) with their plans before they begin operations on a timber harvest. Since that time, a BMP Work Group has been reviewing and revising the original BMPs and providing statewide BMP audits on federal, state, and private forestry projects. Montana also has a Streamside Management Law (MCA 77-5-301 – 307), established in 1991, which provides regulatory standards for forest practices in riparian areas.

In the development of Water Quality Restoration Plans and TMDLs, DEQ develops allocations for all significant nonpoint, forestry-generated sources of pollution. The Water Quality Restoration Plans also provide implementation and monitoring strategies to encourage restoration of beneficial uses and tracking progress towards that goal.

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[40] Montana Department of Environmental Quality (US) [DEQ]. Water Quality Planning Bureau. 2004 Montana Water Quality Assessment Database [database online]. Helena (MT): DEQ; 2000. Available from: http://www.CWAIC.mt.gov. Accessed 2006 November 17.
[41] Ibid.
[42] Roger C. Connor and Renee A. O'Brien, *Montana's Forest Resources* (Ogden: Intermountain Research Station, USDA Forest Service Intermountain Research Station Resource Bulletin INT-81, 1993).
[43] *2004 Montana Agricultural Statistics* [online document] (Montana Department of Agriculture, Issn: 1095-7278, Vol. XLI). Available from: http://www.nass.usda.gov/mt/.
[44] 2005 electronic Field Office Technical Guide [online documents] (Natural Resource Conservation Service [cited 11/02/05]. Available from: http://efotg.nrcs.usda.gov/treemenuFS.aspx?Fips=30049&MenuName=menuMT.zip
[45] Montana Department of Environmental Quality (US) [DEQ]. 2004 Annual Report of Montana's Nonpoint Source Management Program [online document]. Helena, MT: DEQ; 2004. Available from: http://www.DEQ.mt.gov/wqinfo/nonpoint/2004AnnualReport.pdf. Accessed 2005 Nov. 02.

Hydrologic Modification

Hydrologic modification includes flow modification, and channel straightening, widening, deepening, clearing, or relocating existing stream channels. Flow regulation modification affects water temperature, sediment transport, dissolved oxygen, instream flows, and streambank stability. Temperature and flow changes may limit aquatic life and recreational uses downstream. Sources of flow modification include dams, weirs for irrigation and stock watering, undersized culverts, transportation embankments (rip rap), and off-channel constructed "water features" such as fishing ponds.

NPS Hydrologic Modification Strategy

The DEQ's goals for mitigating NPS pollution caused by hydrologic modification include: reducing the impacts of existing hydrologic modifications and assuring that new hydrologic modifications do not impair beneficial uses. Several state and federal laws regulate or otherwise address some of these impacts, such as the Montana Stream Protection Act, the Montana Floodplain and Floodway Act, the Montana Natural Streambed and Land Preservation Act, Montana Water Use Act (defines water rights and appropriations), Section 404 of the federal Clean Water Act, and Federal Reserved Water Rights. The NPS group within DEQ also focuses on:

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

Resource Extraction

Working mines are regulated with federal and state permits including point source discharge permits. In order to obtain a permit, mine operators have to post a bond covering liability for cleanup and restoration. However, abandoned and inactive mines are significant sources of nonpoint source pollution in many of Montana's watersheds. DEQ's Mine Waste Cleanup Bureau (MWCB) has designated 300 Priority Mine Sites.[46] The MWCB's activities focus on two primary site types: 1) inactive mine sites addressed under the Surface Mining Coal and Reclamation Act and 2) mining-related sites addressed under the federal Comprehensive Environmental Responsibility, Compensation, and Liability Act (Superfund sites). NPS impacts associated with resources extraction are related to excessive metals and/ or sediment, which can harm aquatic life and impair drinking water use. Montana has addressed many long-abandoned mine and mill sites; to date 283 projects have been completed.[47]

Much of eastern Montana lies atop coal beds that are potential sources of methane. Coal bed methane (CBM) extraction may impact water quality in several ways. These include increased flows from surface water discharges of groundwater, and changes in water chemistry including salinity, sodium absorption ratio, and total suspended solids. Salinity is a particular concern, as too much salt in irrigation water can inhibit plant growth and destroy soil productivity and even limit its use as stock water.

NPS Resource Extraction Strategy

The goals of the NPS Program are to mitigate damage from past mining activities and protect water quality from new mining developments. In addition, the NPS staff collaborate closely with the MWCB in developing TMDLs and water quality restoration plans for impacted watersheds. NPS and MWCB staff also coordinate review of draft point source permits for new mines to assure that the new permit is consistent with the water protection goals of both programs.

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[46] 2005 Montana Priority Mine Sites [database online]. Helena, MT: Montana Department of Environmental Quality (US), Abandoned Mine Program. Available from: http://www.DEQ.state.mt.us/abandonedmines/priority.asp. Accessed 2005 June 30.
[47] Ibid.

The DEQ develops water quality standards to protect all appropriate beneficial uses. The standards include general prohibitions that require state waters to be "free from substances attributable to municipal, industrial, agricultural practices, or other discharges that will create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life" (ARM 17.30.637(1)). The DEQ has developed electrical conductivity and sodium absorption ratio standards for the Tongue, Powder, and Rosebud watersheds where most of the state's CBM resources are located. These standards are designed to protect existing and future beneficial uses from impacts associated with the discharge of high SAR and EC waters.

Other Sources of Nonpoint Source Pollution

Construction

Construction activities by their very nature disturb soils and create opportunities for erosion that can in turn increase sediment and nutrient loads to surface waters. Additionally, habitat alteration from construction activities (e.g. alteration or removal of riparian vegetation) can have significant negative impacts upon aquatic systems and life.

NPS Construction Strategy

The NPS Program's goal is to reduce water quality impacts of construction activities. MPDES general discharge permits require contractors to take measures to protect water quality of construction activities that disturb more than five acres of land. Construction activities that disturb more than one acre of ground within 100 feet of a river, lake, and stream must be permitted and engage in water quality protection actions. DEQ provides information and educational materials regarding both how construction activities can harm water resources, and what efforts and requirements contractors or private citizens can or must take to minimize impacts from this type of activity.

Urban Runoff/Storm Sewers

Stormwater runoff from urban and industrial areas is a significant source of pollutants such as oil and grease, pesticides and fertilizers, bacteria, and metals (e.g. lead, copper, zinc). In Montana, pollution from stormwater runoff is relatively localized due to the relatively low population density. Point source discharge permits for municipal storm sewer systems are currently required for seven urbanized areas and cities in Montana: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, and Missoula. Additionally, portions of Cascade, Yellowstone and Missoula Counties, the University of Montana, Montana State University, Malmstrom Air Force Base, and the Montana Department of Transportation, (within designated urbanized area that require permits) will receive discharge permits requiring six "Minimum Measures."

NPS Urban Runoff/Storm Sewer Strategy

Montana's NPS Program goal is to reduce stormwater impacts on water quality. In addition to storm sewer permits, the NPS Program uses watershed-based Water Quality Restoration Plans and TMDL development to address stormwater concerns. Additionally, DEQ encourages and supports local information and education campaigns to reduce the amount of pollutants that homeowners contribute to stormwater.

Land Disposal

Approximately 302,000 Montanans contribute waste to an estimated 121,000 household sewage disposal systems (i.e., on-site septic systems).[48] A well-constructed and maintained septic system in suitable soils does a good job of treating household wastes. However, poorly designed, or neglected systems may be sources of excess nutrients (especially nitrate) and pathogens. In some areas, septic systems are a significant water quality concern. Landfills, particularly unlined facilities, also pose a threat to surface and groundwater quality. Harmful and toxic substances may leach into the aquifer or surface waters.

[48] Estimation based on a State population size of 902,195 (2000 Census) individuals, of which approximately 600,000 use community-based sewer systems. For estimation purposes, the State assumes an average of 2.5 persons per household septic system.

NPS Land Disposal Strategy

The NPS Program addresses land disposal impacts on a watershed basis. Several water quality protection districts and watershed groups are confronting the individual sewage disposal problem, notably in the Helena, Bitterroot, Missoula, Flathead Lake, and Gallatin/Big Sky areas. DEQ assists local watershed groups identify appropriate BMPs where individual sewage disposal systems have been identified as a water quality concern. DEQ also develops source water protection plans for communities throughout the state that have site-specific source water concerns, such as land disposal contaminant issues and identifies BMPs that can be implemented to address those issues.

Transportation

The State's transportation system contributes to nonpoint source pollution through runoff, atmospheric deposition of nitrogen oxides, flood plain and river channel encroachment, and construction activities. Sediment, nutrients, dissolved solids, metals, oil and grease, and habitat loss and degradation are all potential causes of NPS pollution related to transportation.

NPS Transportation Strategy

The NPS Program focuses on mitigating past transportation related impairments and reducing future impacts. DEQ collaborates with the Montana Department of Transportation (MDT) to mitigate and minimize water quality impacts resulting from the State's transportation system. Stormwater and 401 (wetland disturbance) permits for MDT-led projects are reviewed to ensure appropriate "avoid, minimize, mitigate" decisions and adequate attention to BMPs. Through the Water Quality Restoration/TMDL Planning process DEQ also evaluates transportation system pollutant –waterbody specific concerns to address significant causes of impairment.

Atmospheric Deposition

The 2000, 303(d) list identifies atmospheric deposition as a probable source of impairment for three large lakes and reservoirs in Montana: Flathead Lake, Fort Peck Reservoir, and Holter Lake. These lakes total over 376,500 surface acres. Pollutants attributed to atmospheric deposition include nitrogen, phosphorus, mercury, and chemicals such as PCBs. Atmospheric deposition is a source that does not fit well in the watershed approach since sources are most likely removed from the affected waterbody. It is a state, regional, national, and international challenge that will require significant coordination beyond the state DEQ to resolve.

NPS Atmospheric Deposition Strategy

The NPS Program's goal is to develop a more complete understanding of atmospheric deposition impacts on water quality and recommend appropriate public policies. The NPS Program's strategy is to:

1. Characterize and quantify contributions of atmospheric deposition to pollution loads as part of source assessments for TMDL planning.
2. Work with DEQ Air Quality Monitoring Section to characterize and describe atmospheric deposition on impaired waterbodies.
3. In watersheds where atmospheric deposition is a significant source of a pollutant, and the specific sources cannot be identified or otherwise included in the plan, other load sources of the pollutant may be reduced to meet TMDL targets.
4. Report water quality impacts of atmospheric deposition to the Board of Environmental Review, the Environmental Quality Council, Environmental Protection Agency, and Montana's Congressional delegation.
5. Increase public awareness of the water quality impact and threat of atmospheric deposition through information/education activities.

Contaminated Sediments from Industrial Activities

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

NPS Contaminated Sediments Strategy

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

Water Pollution Control Revolving Fund

The Water Pollution Control State Revolving Fund (WPCSRF) program was established as a result of the 1987 Amendments to the Federal Clean Water Act that provided the authority for EPA to make capitalization grants to states. The grants, along with state matching funds, provide financial assistance for the construction of water pollution control projects.

The 1989 Montana State Legislature, under Title 75, Chapter 5, Part 11, Montana Code Annotated, passed the enabling legislation, entitled "Wastewater Treatment Revolving Fund Act," giving authority to the Montana DEQ and the DNRC to adopt administrative rules for implementing the program. Legislation also provided these Departments the ability to generate state match funds, through the sale of State General Obligation Bonds. In 1991, 1995, 1997, 1999, 2001, and 2003, the Montana legislature passed amendments to the Wastewater Treatment Revolving Fund Act. The 1997 amendments changed the title of the act from "Wastewater Treatment Revolving Fund Act" to the "WPCSRF" and added Nonpoint source projects to the eligible project definition.

The long-term goal of the 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.

Each year, the WPCSRF program prepares an Intended Use Plan (IUP)and Project Priority List (PPL). Projects are ranked for the PPL using several criteria including: impacts to water quality resulting from the current project situation, the likelihood of improving water quality (restoring designated uses) as a result of implementing the proposed project, pollution prevention efforts of the project sponsor, and readiness to proceed. The result is a relatively realistic prioritized list of eligible point and Nonpoint projects for which to use the funds.

The WPCSRF program has an estimated funding capacity of approximately $11 million per year for the next several years assuming a consistent federal capitalization effort. At this time, the supply of funds exceeds the demand for the funds. Therefore, the program funds all potential projects. The WPCSRF program has predominately funded municipal wastewater treatment and collection projects totaling approximately $155 million since the inception of the program in 1989. However, the program has also funded many Nonpoint source projects including agricultural BMPs, landfills, and stormwater projects totaling approximately $32 million throughout the program's history.

The WPCSRF program, with the use of EPA Sect.106 funds, also provides technical assistance to municipal wastewater treatment facilities around Montana. This assistance includes operation and maintenance inspections, as well as comprehensive performance evaluations to optimize treatment performance of these facilities. In addition, the program provides training of wastewater operators and technical assistance to engineers and the public in the area of wastewater treatment.

Total Maximum Daily Load Program

TMDL Definition and Regulatory Requirements

TMDL is the allowable loading from all sources (point, nonpoint and natural background) established at a level necessary to achieve compliance with applicable surface water quality standards (75-5-103 (32)). Montana State Law (MCA 75-5-703) directs the DEQ to develop TMDLs for impaired or threatened waterbodies[49], and TMDL development is also required for these waterbodies under the CWA. Montana Code specifically defines an impaired waterbody at MCA 75-5-103 (11) as, "…a waterbody or stream segment for which sufficient credible data shows that the waterbody or stream segment is failing to achieve compliance with applicable water quality standards." A threatened waterbody is defined at MCA 75-5-103 (31) as, "…a waterbody or stream segment for which sufficient credible data and calculated increases in loads show that the waterbody or stream segment is fully supporting its designated uses but threatened for a particular designated use because of (a) proposed sources that are not subject to pollution prevention or control actions required by a discharge permit, the nondegradation provisions, or reasonable land, soil, and water conservation practices; or (b) documented adverse pollution trends."

In a 2001 letter regarding the Big Creek TMDL, EPA described the distinction between "pollutants" and "pollution" within the TMDL process. In this letter, EPA noted that it only approves or disapproves TMDLs addressing *pollutant* impaired or threatened waterbodies. *Pollution* impairment or threats may be addressed within the TMDL document but are not considered in EPA's approval of the TMDL for a specific waterbody - pollutant combination. This EPA policy is reflected in the integrated reporting format which places pollutant impaired waterbodies in category 5; which EPA considers the 303(d) list. Waterbodies impaired or threatened <u>only</u> by *pollution* are placed in category 4C in the integrated reporting format. Examples of pollutants are metals such as arsenic and lead, nutrients such as total phosphorus and total nitrogen, sediment/siltation, and temperature. Examples of pollution are "alteration in stream-side or littoral vegetative covers", "low flow alterations", and "fish barriers (fish passage)."

Program Overview

The Watershed Management Section (WMS) within the Water Quality Planning Bureau is responsible for TMDL development for the state. The goals for the section include the development of TMDLs that are consistent in the application and interpretation of state water quality standards and state law, and the development of TMDLs at a pace consistent with court ordered schedules. The WMS also provides a linkage to TMDL implementation by including implementation strategies and recommendations in TMDL documents, thus facilitating the transition from TMDL development to TMDL implementation.

In Montana, TMDLs and watershed restoration plans are developed using a "watershed" approach. In this approach, TMDLs are developed for all streams impaired by a given pollutant or set of pollutants within a given watershed. The scale of the watershed used for TMDL development is based on USGS Hydrologic Unit Code (HUC - 4th code) boundaries where practical. These "watersheds" are called TMDL Planning Areas (TPAs) to distinguish the areas from USGS 4th code HUC watersheds.

A large percentage of waters within Montana have impairments that fall within the "pollution" category. WMS staff develop water quality plans that include TMDLs for waterbodies impaired by *pollutants* and additional restoration goals and objectives for waterbodies impaired by *pollution.* This allows staff to identify and pursue water quality improvements via a comprehensive planning process that typically addresses all situations where water quality standards are not attained within a watershed. The comprehensive document is often referred to as a watershed or water quality restoration plan that includes required TMDLs within its scope.

TMDL Prioritization Process

In response to a June 21, 2000 order from the United States District Court of Montana, DEQ and EPA published a schedule for the completion of all necessary TMDLs (published October 27, 2000). At the time of publication, the court mandated deadline for completion of all necessary TMDLs was May 5, 2007. A Settlement Agreement, dated November 18, 2004 resulted in an updated schedule whereby EPA and DEQ have until 2012 to complete all TMDLs described in the original suit with the exception of eight TPAs where TMDLs must be completed by 2007.

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[49] The Clean Water Act refers to threatened and impaired waterbodies as "Water Quality Limited Segments".

While there are many factors that contribute to the prioritization for TMDL development, the overriding concern Montana faces is satisfying the terms of the court imposed schedule with critical dates in 2007 and 2012. Appendix illustrates the TMDL prioritization schedule on a TPA basis. At present, high priority is assigned exclusively to the TPAs required to be completed by 2007 under the Settlement Agreement. As shown in the list below, all but three of the high priority TMDLs have already been completed and approved. The remaining three (St. Regis, Middle Blackfoot, and Yaak) are scheduled for completion in 2006/2007

- Blackfoot Headwaters
    - Metals approved in 2003
    - Sediment approved in 2004
- Flathead Headwaters
    - Approved in 2005
- Ninemile
    - Approved in 2005
- Bitterroot Headwaters
    - Approved in 2006
- Swan
    - Approved in 2004
- St. Regis
    - Scheduled for 2007
- Middle Blackfoot
    - Scheduled for 2006/2007
- Yaak
    - Scheduled for 2007

Medium priority is assigned to those waterbody – pollutant combinations originally listed in 1996 that are still in need of TMDL development, and must be completed by 2012 in accordance with the Settlement Agreement. A low priority is assigned to those waterbody – pollutant combinations that have been added to Montana's 303(d) list since 1996.

The TMDL schedule depicted in Appendix F is based on DEQ's most recent annual TMDL work planning session that is typically conducted in January. Each year, a revised TMDL schedule is prepared, presenting target completion dates for the current year and subsequent two years. Prioritization factors considered during DEQ's annual TMDL work planning session include:

- <u>Stakeholder Interest.</u> TMDL development has historically focused on areas where there is significant stakeholder interest. DEQ recognizes that there is a benefit to having TMDLs completed in areas where stakeholders will use the TMDL and water quality restoration planning process to help guide and assist with locally led water quality implementation activities.

- <u>Funding Availability.</u> Section 319 NPS program funds from EPA have been a major source of funding for TMDL development, and TMDL development has focused on TPAs where 319 funding can be used. These areas tend to have high stakeholder interest as defined above.

- <u>Significant New Pollutant Sources.</u> There are many areas with water quality problems or concerns linked to significant population growth or proposed development such as CBM. The opportunity to address these water quality problems or concerns through a water quality planning process such as TMDL development makes this an important criterion for scheduling TPAs.

- <u>Linkage to Discharge Permits.</u> Pollutant levels within a MPDES permit comprise a portion of the TMDL allocation. Therefore, TMDL development at a watershed scale is a critical component to help determine appropriate permit requirements. This is particularly true when new permits are proposed or permits are being renewed. This criterion is often linked to the New Pollutant Sources criterion above.

- Upstream to Downstream Staging. Upstream watershed TMDL development often is necessary to facilitate TMDL development within downstream watersheds. Therefore, TPAs in headwaters areas are often scheduled in advance of downstream areas.

- Data Availability. Work is often focused in areas where there is existing knowledge to help facilitate TMDL development and where data can be readily obtained via waterbody access. Existing knowledge includes available reference data, knowledge of aquatic resource and pollutant impacts, source loading data, and data about existing waterbody conditions and capabilities. For this reason, TMDL development is currently focused more in the western part of Montana and/or for the TPAs where waterbodies have cold water fish classifications.

- Existing Resource Commitments. TPAs with significant effort already completed toward TMDL development tend to have higher priority over areas where very little TMDL development has yet occurred.

- Additional Factors. Additional Factors apply when the above criteria either do~~es~~ not apply or have similar applicability to a given TPA. These additional factors include the number of TMDLs within the watershed, the ability to correct existing problems, the importance of water quality to local economies, and the ability to positively impact native species.

Looking Forward

The WQPB is committed to a system of continuous process improvement. Bureau staff are working with EPA to develop, refine, and implement programmatic foundational elements. These foundational elements, once implemented, will expedite bureau function and efficiency, increasing the overall quality and production rate of TMDLs and related water quality planning elements. The second phase of foundational element implementation will be complete at the beginning of 2008.

Examples of these foundational elements include

- Improved data management, analysis, and reporting systems,
- Improved water quality standards interpretations,
- Consistent stream monitoring procedures,
- Improved biological metrics,
- Expansion of reference data sets,
- Consistent source assessment methods including expanded modeling applications,
- Increased use of templates and standardized document language, and
- Improved planning process focused on implementation of applicable quality assurance components.

The current pace for EPA approved TMDLs is approximately 50 to 100 waterbody - pollutant combinations per year, within three to five TPAs. This pace is expected to significantly increase following implementation of the second phase of programmatic foundational elements.

B.3 Cost/Benefit Assessment

Section 305(b) of the CWA "requires states to report on the economic and social benefits of actions necessary to achieve the objective of the CWA."[50] Several State, Federal, and private entities implement water quality, improvement efforts in the State. As such, the information on the costs associated with these efforts is complex and not readily available for preparing a comprehensive cost-benefit assessment. The following provides a summary of the program costs and benefits associated primarily with the DEQ's Point and Nonpoint source efforts.

Montana Point Source Costs

From 2001 to 2004, the State of Montana spent roughly $137.7 million on municipal wastewater treatment and collection system construction. This translates to an average of $34.4 million spent per year over this four-year

[50] U.S. EPA. 1997. Guidelines for the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates. U.S. Environmental Protection Agency, Washington D.C.

period for addressing point source pollution.[51] This figure includes money spent by all funding agencies in the state and some federal programs.

Included in this $34.4 million is money spent within the WPCSRF administered by DEQ. Capitalization grants the State receives from the EPA (CWA Section 106 federal funds) for the WPCSRF, along with state matching funds provide financial assistance for water-pollution-control projects that mostly target point sources. In addition, the program provides training of wastewater operators and technical assistance to engineers and the public in the area of wastewater treatment.

Since 1991, the WPCSRF program has predominately funded municipal wastewater treatment and collection projects totaling approximately $155 million. This averages to about $11 million per year, which is a part of the $34.4 million annual figure for all point source costs. Thus, WPCSRF funding makes up about a third of the total funding for addressing point sources in the state. The WPCSRF program will have an estimated funding capacity of approximately $11 million per year for the next several years if EPA 106 funding remains consistent.[52]

Costs of Montana's Nonpoint Source Program

Most of Montana's NPS program budget comes from the federal government. CWA Section 319 federal funds, provided by the EPA as a grant to the State, pay 60 percent of NPS project grants and DEQ's NPS program cost. During the 2004 grant cycle, DEQ received proposals totaling $4.7 million dollars. Out of this amount, the DEQ awarded $1.85 million to 19 watershed projects and four information and education projects. In the 2005 grant cycle, DEQ received requests for $2.9 million of which DEQ was able to award $1.4 million to 20 projects throughout Montana. The average annual amount of 319 funds spent in Montana from 1995 to 2004 was about $1.75 million.

In the past, 319 grants were largely awarded to watershed restoration projects rather than TMDL or watershed planning projects.[53] For example, between 1995 and 2001, about 80% of all 319 money went to implementation and only 10% went to TMDL. Today, the DEQ takes a more directed management approach to awarding 319 grants. The DEQ now emphasizes the development of plans that will clearly identify causes and sources of impairments and potential strategies for mitigating these impacts on affected State waters prior to funding their restoration. As a result, a majority of the money currently awarded from these funds is for TMDL or watershed restoration planning projects. In fact, from 2002 through 2004 the DEQ awarded about 80% of their 319 money to TMDL development. Since 2002, about half of all TMDL projects that were funded are complete.[54]

In addition to an average of $1.75 million a year for project grants, DEQ receives about $1.3 million per year for staffing and support for an average yearly 319 fund total of $3.1 million. Over the past three years, the DEQ has been receiving between $2.6 and $3.0 million per year in 319 funds for staffing and support and projects grants. When DEQ's 40% share is added to this figure, the average total amount of money spent on the NPS program over the last 3 years has been about $4.5 million per year. In state FY05, DEQ received $2,655,700 in total 319 funds, and with DEQ's share spent about $4,426,200 total on NPS programs. Compared to recent years, approximately $500,000 has been cut from EPA's Montana appropriation for FY05. The DEQ expects funds in FY06 to be about the same as in FY05, although the U.S. Congress has yet to approve a specific amount.

The WPCSRF program mentioned above has also funded many Nonpoint source projects including agricultural BMP, landfills, and storm water projects totaling approximately $32 million since 1991 or about $2.3 million per year on average.

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[51] Lavigne, P. 2005. Personal communication. Montana Department of Environmental Quality, Helena, MT.
[52] Lavigne, P. 2005. Personal communication. Montana Department of Environmental Quality, Helena, MT.
[53] Rung, R. 2005. NPS/319 Funds Breakout 1990-2004. Montana Department of Environmental Quality, Helena, MT.
[54] Yashan, D. 2005. Personal communication. Estimates on TMDL funding and status. Montana Department of Environmental Quality, Helena, MT.

Summary of Montana's Clean Water Costs

The average annual cost for Montana's Point and NPS pollution programs is approximately $41.2 million (Table 8). This figure, however, does not include the costs associated with the State's enforcement, permitting, or public drinking water programs, which are quite small compared to the total costs.

Table 8. Summary of Average Annual Costs for CWA Programs (1991 – 2004)

Activity	Total (Millions of Dollars)
Nonpoint source control programs	**6.8**
NPS Program	
Staffing and Support	1.3
Restoration, Planning, and Information/Education Projects	3.2
WPCSRF NPS funds	2.3
Point Source control programs	**34.4**
WPCSRF	11.0
Other State and Federal Agency Programs	23.4

Benefits of Complying with the CWA in Montana

The benefits of maintaining and improving the quality of the state's waters through the CWA include the following:

- Preserving or improving the quality of the state's water-related recreational activities including both commercial and non-commercial boating, water skiing, swimming, whitewater rafting, and river floating. In addition, one of the most popular and income generating water-related activities in Montana is fishing. The state waters of Montana include several Blue Ribbon Trout Rivers and streams, which benefit from high-level water quality;
- The ecological value of protecting aquatic wildlife including several species of fish that are listed as endangered or threatened;
- The ecological and economic values of protecting aquatic and associated terrestrial habitats that rely on high-quality waters;
- Protecting the quality of water for industrial, commercial, and municipal uses thereby reducing or eliminating the cost of treatment;
- Preserving or improving the quality of water for states downstream of Montana river flows.

Point Source Benefits

The long-term goal (or benefit) of the 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, with the use of EPA 106 funds, also provides technical assistance to municipal wastewater treatment facilities around Montana. This assistance includes operation and maintenance inspections and comprehensive performance evaluations to optimize treatment performance of these facilities.[55]

The beneficial economic impacts of Montana's WPCSRF loan program on water quality and public health (since its inception in 1991) can be summarized as follows:

- Upgraded, expanded, or replaced 40 inadequate wastewater treatment lagoon systems for the benefit of better water quality in the various state waters those lagoons empty into
- Upgraded, expanded, or replaced nine public wastewater plants

[55] LaVigne, P. 2005. Personal Communication. Montana Department of Environmental Quality, Helena, MT.

- Improved water quality and reduced operating expenses at 21 projects related to municipal wastewater plants by reducing infiltration and inflow in the collection systems and by replacing leaky pipes that allow stormwater runoff or groundwater to enter the system
- Improved groundwater quality and addressed potential public health hazards by eliminating septic systems with community collection and treatment systems on 25 projects. Improved groundwater quality leads to better quality well water that can be used for various activities such as municipal water supply and irrigation
- Reduced nutrient loading to state waters by constructing eight nutrient removal treatment systems helping to maintain or improve those waters for their beneficial designated uses
- Protected water quality by funding approximately 315 nonpoint source projects helping state waters maintain or improve their capacity for designated uses.

Havre in Northern Montana is one city that has benefited from the State's point source programs. Havre is using Drinking Water State Revolving Fund money to (1) identify and manage water quality issues (e.g., turbidity) related to the city's drinking water sources and (2) upgrade its treatment plant. The upgrade will help address Havre's source water turbidity problems and will protect the investment in the plant upgrade.[56]

Nonpoint Source Benefits

In 2004, the DEQ Water Quality Planning Bureau, Watershed Management Section focused on implementing the State's NPS Pollution Management Plan and approved TMDLs. The Watershed Management Section also continued working on TMDL/water quality restoration plans on a watershed basis. Highlights of work completed to date include:

- During 2004, water quality restoration plans (including 27 TMDLs) were submitted to EPA for approval for three TMDL planning areas:
  - Blackfoot Headwaters
  - Swan
  - Sun
- As of 2003, water quality restoration plans were completed and approved by EPA for the following TMDL Planning Areas (# of TMDLs in parenthesis):
  - Deep Creek (1)
  - Elk Creek (1)
  - Lone Tree Creek (1)
  - Careless Creek (1)
  - Flathead Lake (2)
  - Big Sandy Creek (3)
  - Sage Creek (6)
  - Cooke City (39)
  - Big Creek in the Columbia Basin (1)
  - Blackfoot Headwaters (29)
  - Teton River (11)
- Two watersheds did not require a TMDL, but water quality restoration plans were prepared to address pollution issues:
  - Lower Musselshell

[56] Source: City of Havre Public Water System, Source Water Delineation and Assessment Report, September 13, 2000. Available from: http://www.DEQ.state.mt.us/ppa/swp/nrisreports/MT0000524.htm.

  - Big Creek in the Yellowstone

- DEQ and EPA have completely addressed about 220 individual, waterbody – pollutant combinations via the TMDL and associated data collection and review process through 2004.
- The Water Quality Monitoring Section finished field sampling of 193 waterbody segments and completed beneficial use support assessments for 20% of the waterbody segments on the 2000 reassessment list.
- The Board of Environmental Review (BER) adopted new classifications and standards for waterbodies that are dry during a significant portion of the year and low flow streams. The BER also adopted new standards for pathogens (*E. coli*) and Arsenic
- The National Center for Appropriate Technology (NCAT) completed a NPS 319 project: *A Watershed Approach to Better Irrigation Management.* The NCAT 319 project addressed two objectives of the NPS Management Plan: 1) improve irrigation water management and 2) increase application of BMPs for irrigated agriculture. The NCAT project targeted the Jefferson, Big Hole, and Blackfoot watersheds. The project helped local watershed groups develop and run their own low cost irrigation management programs. The project also provided a way to reliably monitor irrigation efficiency so that water and energy savings could be quantified. Using the Environmental Quality Incentives Program to provide technical and financial assistance, the landowners within the upper Big Hole River watershed planned and implemented conservation practices that will decrease the amount of water diverted from the river. Fifteen agricultural producers will implement the following practices on 15,848 acres: Irrigation will be shut off during the summer using a staggered schedule and twelve off-site watering facilities will provide an alternative source to watering stock on the Big Hole River. This successful program may soon add three additional landowners.
- The Forestry BMP Audit, with an audit team, coordinated by the Montana Department of Natural Resources and Conservation's Forestry Division, evaluated thirty-nine timber harvest sites on public and private lands. Audit results showed that across all ownerships, BMPs were properly applied 97 percent of the time. Audit results also showed that across all ownerships, BMPs were effective in protecting resources 99 percent of the time.
- Specific examples of benefits from water quality restoration and TMDL development are:
  - The Middle Blackfoot Watershed. This watershed, as a result of its Habitat and Water Quality Restoration Project, experienced an estimated load reduction of 16.8-lbs/year nitrogen, 5.7-lbs/year phosphorus, and 7,235-lbs/year sediment. These numbers are based on STEPL modeling and in-stream source reduction estimates.[57]
  - The annual load reduction achieved by the implementation of the Middle Milk River Demonstration Project is estimated 540 lbs/year nitrogen, 200-lbs/year phosphorus, and 5.5-tons/year sediment. To achieve this load reduction, a filter strip was installed adjacent to cropland, while a CAFO had to install a diversion and filter strip.[58]
  - The Goat Creek TMDL is a 33% reduction in suspended sediment during peak runoff.
  - The Jim Creek TMDL is a 10% reduction in fine sediment in gravels where fish spawn.
- The Swan Lake TMDL calls for no increase in particulate organic carbon and nutrients. These substances have a direct effect on oxygen levels in the lower levels of the lake and can eventually affect overall water quality in the lake.

[57] Middle Blackfoot River Load Reduction Report-March 2, 2005
[58] Flynn, K.F. and Smith, J., 2005. Middle Milk River Load Reduction Report-Draft Jan 20, 2005. Montana Department of Environmental Quality, Data Management Section, Water Quality Planning Bureau. Helena, MT.

PART C. SURFACE WATER MONITORING AND ASSESSMENT

C.1 Monitoring Program

Purpose of the Monitoring Program

The Water Quality Planning Bureau (WQPB) is responsible for:

- The collection and analysis of physical, chemical, and biological data to develop abatement and control priorities, including assessment of beneficial use support of state waters, and report this information to the public through this integrated water quality report[59].
- The development and review of water quality standards, total maximum daily loads, and implementation strategies for those waters that required a TMDL.

To satisfy the purpose and intent of the CWA, the WQPB established a general monitoring strategy that considered CWA requirements along with constraints as a result of the 2002 Settlement Agreement.

For the period 2002-2006, the WQPB strategy to satisfy its responsibility under the CWA was greatly influenced by the 2002 Settlement Agreement. The Settlement Agreement required that waters de-listed in 2000[60] due to the Montana Water Quality Act (MWQA) sufficient credible data provisions [MCA 75-5-702(6)] are completed for the publication of this 2006 integrated 303(d)/305(b) water quality report.

The court schedule, coupled with the state requirement to achieve sufficient and credible data for listing decisions, and the large number of waterbodies (497) on the reassessment list, required a focusing of WQPB resources toward the reassessment project. However, other monitoring projects were necessary to continue, requiring alternate resources to be identified and applied.

Therefore the monitoring strategy for the period 2002-2006 was to focus the Water Quality Monitoring Section (WQMS) staff on reassessment project (CWA section 303(d) monitoring) using a predefined targeted sampling design, and to coordinate and collaborate with alternate resources to continue non-reassessment monitoring

Monitoring Goals

The 2004 - 2006 monitoring strategy was implemented by establishing goals that provided coordination and collaboration between the different projects. The goals were:

- To complete the reassessment project by 2006 with assistance from EPA Region 8
- To continue and expand a baseline lake monitoring program in collaboration with the University of Montana
- To continue and expand a baseline reference sites monitoring in collaboration with the University of Montana
- To complete sampling for the Environmental Monitoring and Assessment program (EMAP)
- To develop a strategy for monitoring large rivers in collaboration with EPA local office
- To complete the Fixed Station Monitoring Project with assistance of student interns and USGS
- To develop a process to determine wetland gain and losses in collaboration with other DEQ programs

Monitoring Objectives and Design

Each monitoring project is designed to ensure that project objectives are met, thus satisfying the monitoring goals listed previously. The majority of the monitoring designs are targeted designs. The single exception is the Environmental Monitoring and Assessment Program (EMAP) program, which is based on a probabilistic design.

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[59] Code of Federal Regulations, Title 40, Part 130.4, Water Quality Monitoring.

[60] Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: http://deq.mt.gov/CWAIC/default.aspx.

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Details regarding the specific monitoring objectives and designs for each monitoring project are discussed later in this section.

Coordination and Collaboration

As noted in the 2002 - 2006 strategy, the need to coordinate and collaborate with other entities to continue non-reassessment projects was critical. Coordinating and collaborating with other agencies and stakeholders is implicit in CWA programs. Through this collaboration and coordination, the WQPB developed partnerships and cooperative agreements. Among the entities that have cooperative agreements are: the Bureau of Land Management, the U.S. Forest Service, the University of Montana, and its Flathead Biological Station facility, Conservation Districts, and Local Watershed Groups such as the Tri-State Water Council. Brief discussions of each of each partner's roles are provided below.

Bureau of Land Management (BLM)

The objective of the BLM's water quality monitoring program is to determine if water quality standards are met for waters that flow through BLM administered land. To achieve this goal, the WQMS and BLM established a Memorandum of Understanding (MOU). For the last six years, ten reference sites (3 times per year) have been sampled within BLM land to assess their condition. BLM provides a portion of the funds for this monitoring effort.

Forest Service (USFS)

The USFS monitors waters within National Forest lands. The WQPB uses data provided by USFS in its water quality assessment process, for the development of watershed restoration plans, and for total maximum daily loads (TMDLs) for waters listed in categories 4C and 5 of this integrated water quality report.

Tri-State Water Council

The non-profit Tri-State Water Quality Council is a partnership of diverse community interests including citizens, business, industry, tribes, government, and environmental groups working together to improve and protect water quality throughout the 26,000 square mile Clark Fork-Pend Oreille watershed. The watershed includes the Clark Fork River in western Montana, Pend Oreille Lake in northern Idaho, and the Pend Oreille River in eastern Washington. The Tri-state's long term monitoring program tracks the effectiveness of the Clark Fork-Pend Oreille Basin water quality management plan in addressing interstate nutrient and eutrophication problems. DEQ as part of the council provides financial support for components of the sampling effort.

United States Geological Survey (USGS)

Data collected by USGS is made publicly available through a USGS website in its water quality assessments. The WQPB provides financial support for several surface water sampling projects conducted by the USGS. The majority of these efforts are located in the Powder-Tongue River Basin, Bitterroot Basin, and Blackfoot River. The USGS also collected and analyzed a portion of the physical and chemical data in support of the five year fixed station monitoring project. At the end of the five year effort, the USGS produced a final report summarizing the findings.[61]

Montana and Canada have an agreement to sample the Poplar River and East Fork of the Poplar River in northeast Montana. As part of this international committee, the USGS and DEQ have worked together to sample the extents of these rivers that are within the jurisdiction of the United States.

University of Montana (UM)

The WQPB contracts with the Watershed Health Clinic of the Environmental Studies Program at the University of Montana (UM) to continue the State's reference and lake projects. Under these contracts, UM provides graduate students to perform field sampling and laboratory analysis. The WQPB provides financial support, training, and most of the necessary field supplies to conduct the monitoring. Additionally, the WQPB contracts with the Flathead Lake Biological Station facility of UM to sample one station in Flathead Lake 15 times per year.

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[61] Lambing, J H and T. E Cleasby. 2006. Water-Quality Characteristics of Montana streams in a Statewide Monitoring Network, 1999-2003, USGS.

Conservation Districts (CDs), Watershed Groups and Non-Profit Organizations

Partnerships with CDs, local watershed groups, and non-profit organizations with an interest in water quality issues vary from simply informing them when sampling occurs in their area, to obtaining assistance with land access, to full participation on the sampling events. These partnerships and community involvement continue through TMDL development and on to restoration and TMDL implementation programs funded by CWA section 319 grants administered by the WQPB.

Laboratory Analytical Support

The WQPB contracted with numerous analytical and biological laboratories for chemical and biological analyses used in its monitoring projects. The following list details the major laboratory facilities used, their institutional status, the type of analyses performed, and the projects these data supported:

Name	Institution	Type of Analysis	Projects
USGS Water Lab, Denver, CO and Madison, WI	Federal Government	General Chemistry, Heavy Metals, Nutrients	Reassessment, Lakes, Fixed
EPA Region 8 Lab, Denver, CO	Federal Government	Pesticides	Reassessment
DPHHS Environmental Lab, Helena, MT	State Government	General Chemistry, Heavy Metals, Nutrients, Chlorophyll-a	Reassessment, Fixed, Reference, Lakes
University of Montana, Watershed Health Clinic	State University	Chlorophyll-a	Reference, Lakes
University of Montana, Flathead Lake Biological Station	State University	Nutrients	Reference, Lakes
Energy Laboratories, Helena, MT	Private	General Chemistry, Nutrients, Chlorophyll-a	Reassessment, Large Rivers
Energy Laboratories, Billings, MT	Private	Heavy Metals	Reassessment, Large Rivers
ACZ Laboratories, Steamboat Springs, CO	Private	Heavy Metals	Reassessment (QA Lab)
Rhithron Associates, Missoula, MT	Private	Macroinvertebrate Taxonomy and Ecology	Reassessment, Fixed, Reference, Biological Monitoring
National Academy of Sciences, Philadelphia, PA	University	Periphyton Diatom Taxonomy and Ecology	Reassessment
Hannaea, Helena, MT	Private	Periphyton Diatom Taxonomy and Ecology	Reference

Networks and Projects
The WQPB Monitoring Program consists of eight monitoring projects:

1. Reassessment Monitoring,
2. Reference Site Monitoring,
3. Environmental Monitoring and Assessment Program (EMAP) w/ EPA,
4. Lakes and Reservoirs Monitoring,
5. Large Rivers Monitoring,
6. Fixed Station,
7. Biological Monitoring, and
8. Wetlands.

Each of these projects is briefly described below.

Reassessment Monitoring Project

Objective
The objective of the reassessment monitoring project was to obtain sufficient credible data to make beneficial use support determinations for those waters placed in the 2000 303(d) Reassessment List.[62]

Design
This project uses a targeted design. The smallest units for which individual beneficial use support determinations are made are based on the waterbody segments defined in the Assessment Database (ADB).

Spatially, waterbody segments are subdivided into homogeneous reaches with reach breaks inserted where changes in geomorphology, land-use, or where significant peripheral influences such as major tributaries, known point sources, abandoned mines, roads, bridges, dams or other structures could influence beneficial use support . The maximum reach length is limited to 20 miles. Each reach is represented by a minimum of two sampling sites, except where a waterbody is <5.5 miles in length and is a single homogeneous reach. These short segments may be represented by a single sampling site. Sites inaccessible due to remote locations and private property are recognized as a constraint to spatial distribution and may result in a fewer number of sampling sites.

Temporally, the sampling design was constrained by the schedule for completion, number of waterbody segments, as well as funding and available staff resources. Thus, the majority of the waterbodies were sampled only once by DEQ during the 2006 reassessment period. However, the DEQ used multiple lines of additional data from various entities. The monitoring design relies upon the ability of the core indicators to expand the window of temporal coverage. For example, impacts to a waterbody's habitat may be observed for years or even decades and can be assessed from data collected in habitat surveys. Biological communities may take months to recover from an acute event and are expected to reflect chronic conditions that may not be picked up with point-in-time measurements such as chemistry samples. A complete description of the sampling process design used for the reassessment project can be found in the reassessment project Quality Assurance Project Plan (QAPP).[63]

Project Description

[62] Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: http://deq.mt.gov/CWAIC/default.aspx.
[63] Montana Department of Environmental Quality (US) [DEQ]. 2005. Quality Assurance Project Plan. Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005. WQPBQAP-02. Rev. 03. [online document] Helena, MT: DEQ; 2005. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/WQPBQAP-02.pdf.

The protocol to establish if there is sufficient credible data to make a beneficial use support determination was developed in 2000. Pursuant to Montana Law, DEQ implemented the Sufficient and Credible Data Process. [64] This process requires sufficient credible data before making a beneficial use support determination. Physical, habitat, chemical, and biological sampling is conducted at each site. A description of the field procedures can be found in the 2005 Field Procedures Manual. [65]

DEQ's primary focus was to assess all of the waters listed on the 2000 303(d) Reassessment list. [66] These waters were removed from the 1998 303(d) list of impaired waters due to a lack of sufficient credible data. In 2000, the reassessment list consisted of 486 waters. Because of segment splits, 493 waters were subsequently listed on the Appendix B of the 2004 Water Quality Integrated Report[67], whereas in 2006, further segment splits and merges resulted on 497 waters (Appendix A, Figure 3, Figure 4, Figure 5, and Figure 6). However, 23 of those waters were not assessed due to the following circumstances: access denied (2), dry (3), included in the Tongue-Powder-Rosebud TMDLs (12), clerical errors resulting in erroneous 1996 listings (2), or were simply missed by the reassessment effort (4). Thus, of the 497 waters on the 2000 303(d) Reassessment list, 474 waters were evaluated via the Reassessment Monitoring Project.

[64] Montana Department of Environmental Quality (US) [DEQ]. 2004. Standard Operating Procedures Water Quality Assessment Process and Methods (formerly Appendix A to 303(d) 2000-2004) WQPBWQM-001. Rev#:01 [online document]. Helena, MT: DEQ; 2004. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf.

[65] Montana Department of Environmental Quality (US) [DEQ]. 2005. Field procedures Manual. [online document]. Helena, MT: DEQ, WQPB; 2005. Available from: http://www.deq.state.mt.us/wqinfo/QAProgram/index.asp.

[66] Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: http://deq.mt.gov/CWAIC/default.aspx.

[67] Montana Department of Environmental Quality (US) [DEQ]. 2004 Water Quality Integrated Report for MT 2004. Appendix B [online document]. Helena, MT: DEQ; 2004. Available from: http://deq.mt.gov/CWAIC/default.aspx.

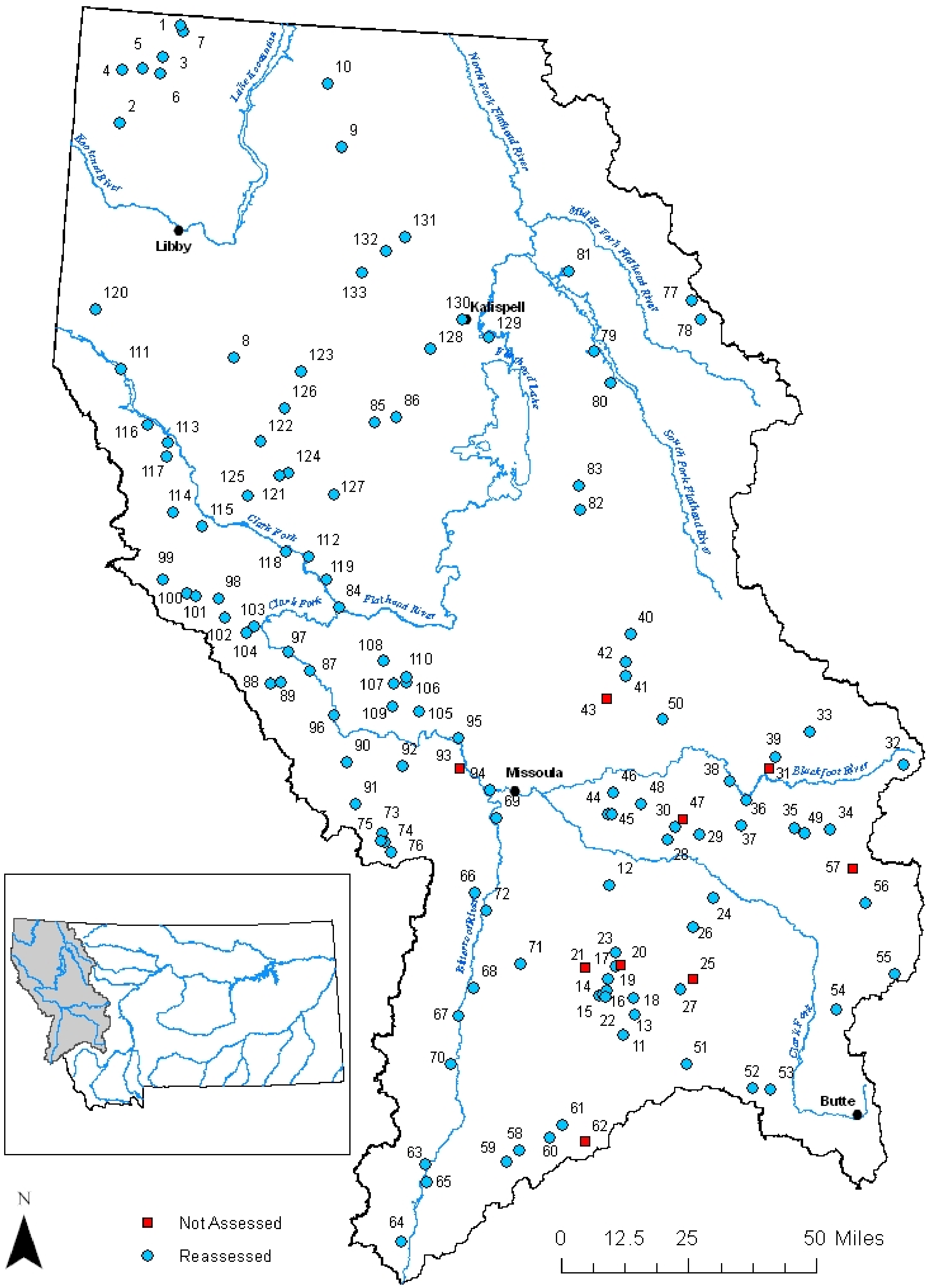

Figure 3. Columbia Basin-Reassessment Waters

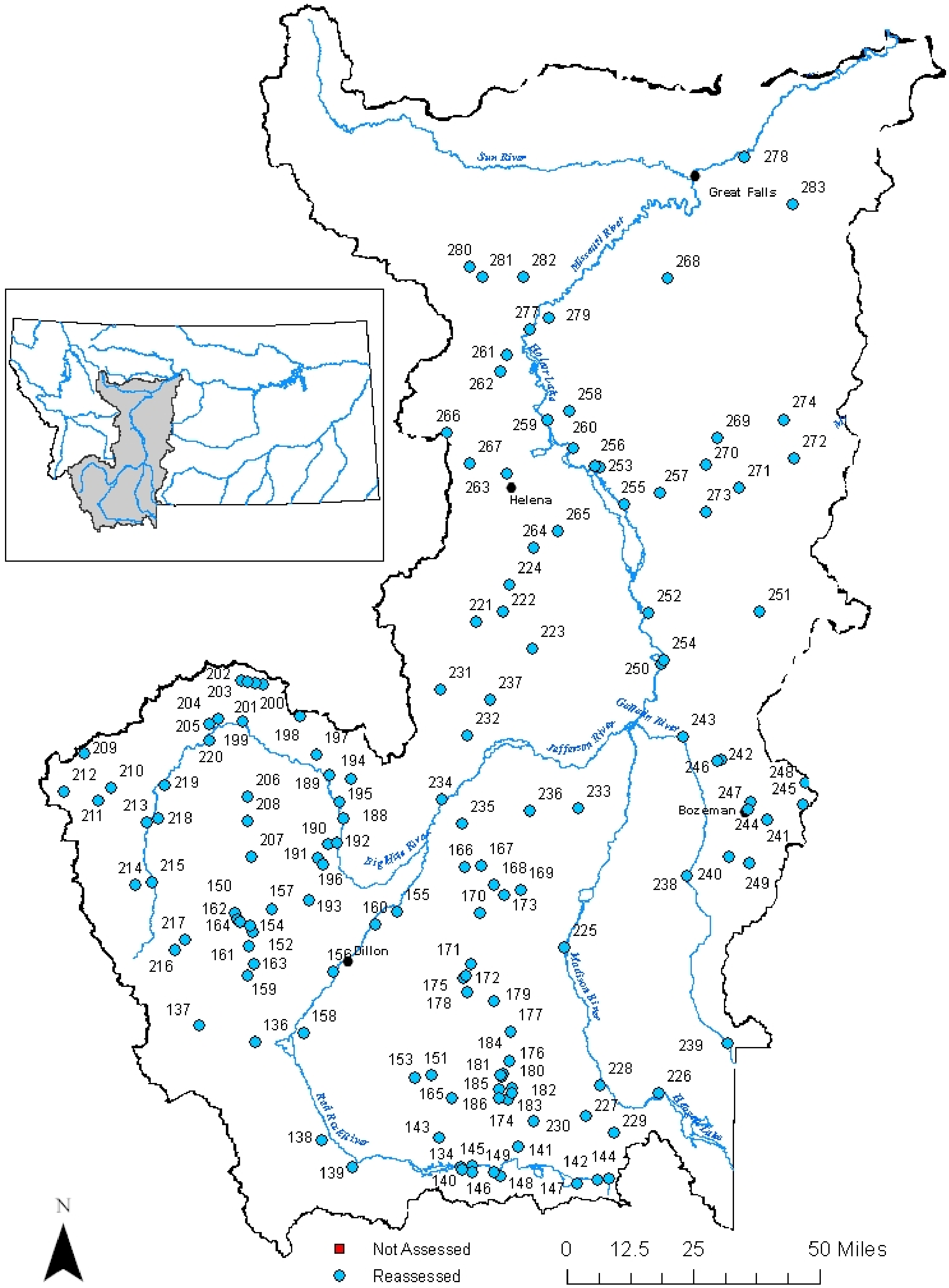

Figure 4. Upper Missouri Basin-Reassessment Waters

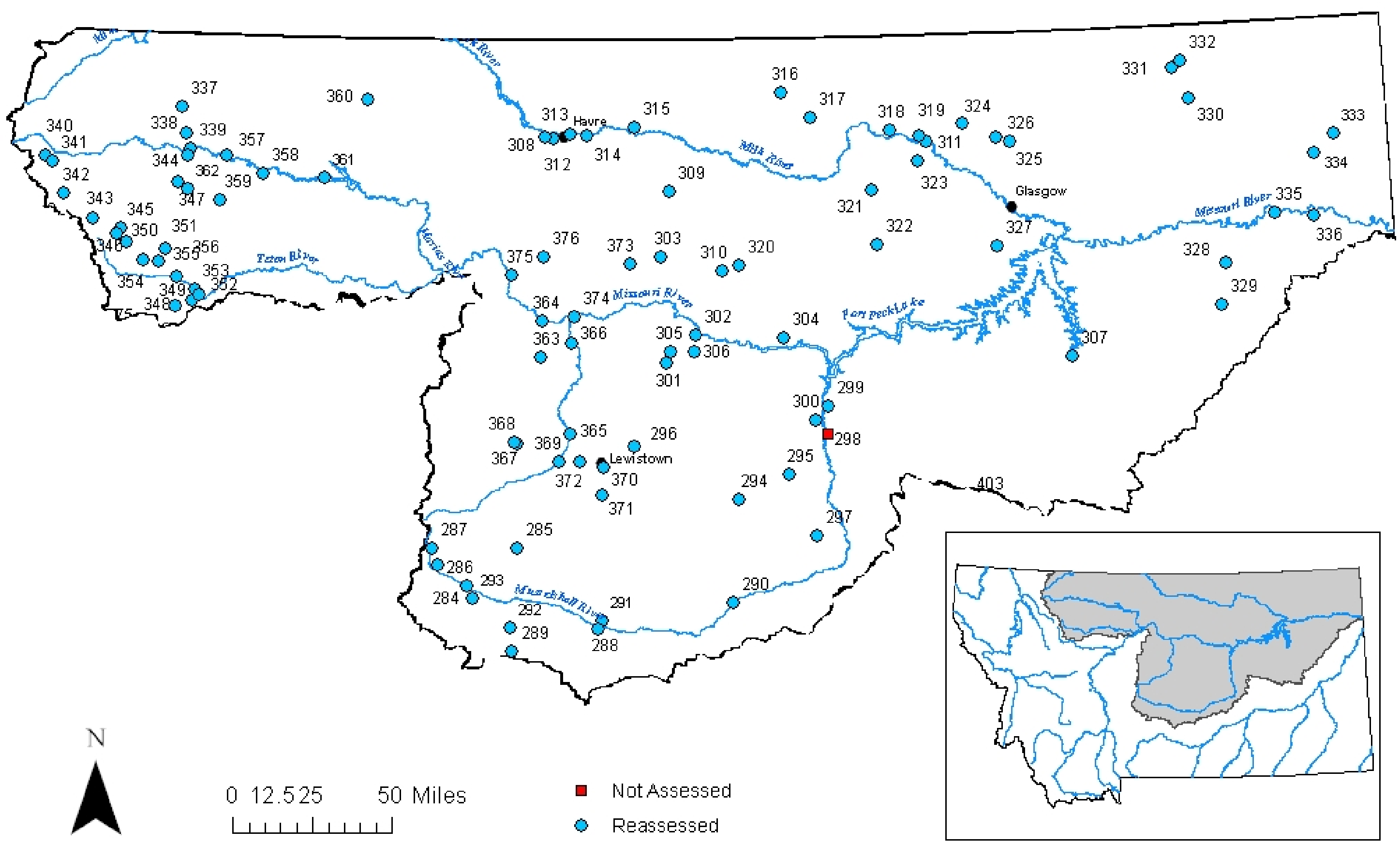

Figure 5. Lower Missouri Basin-Reassessment Waters

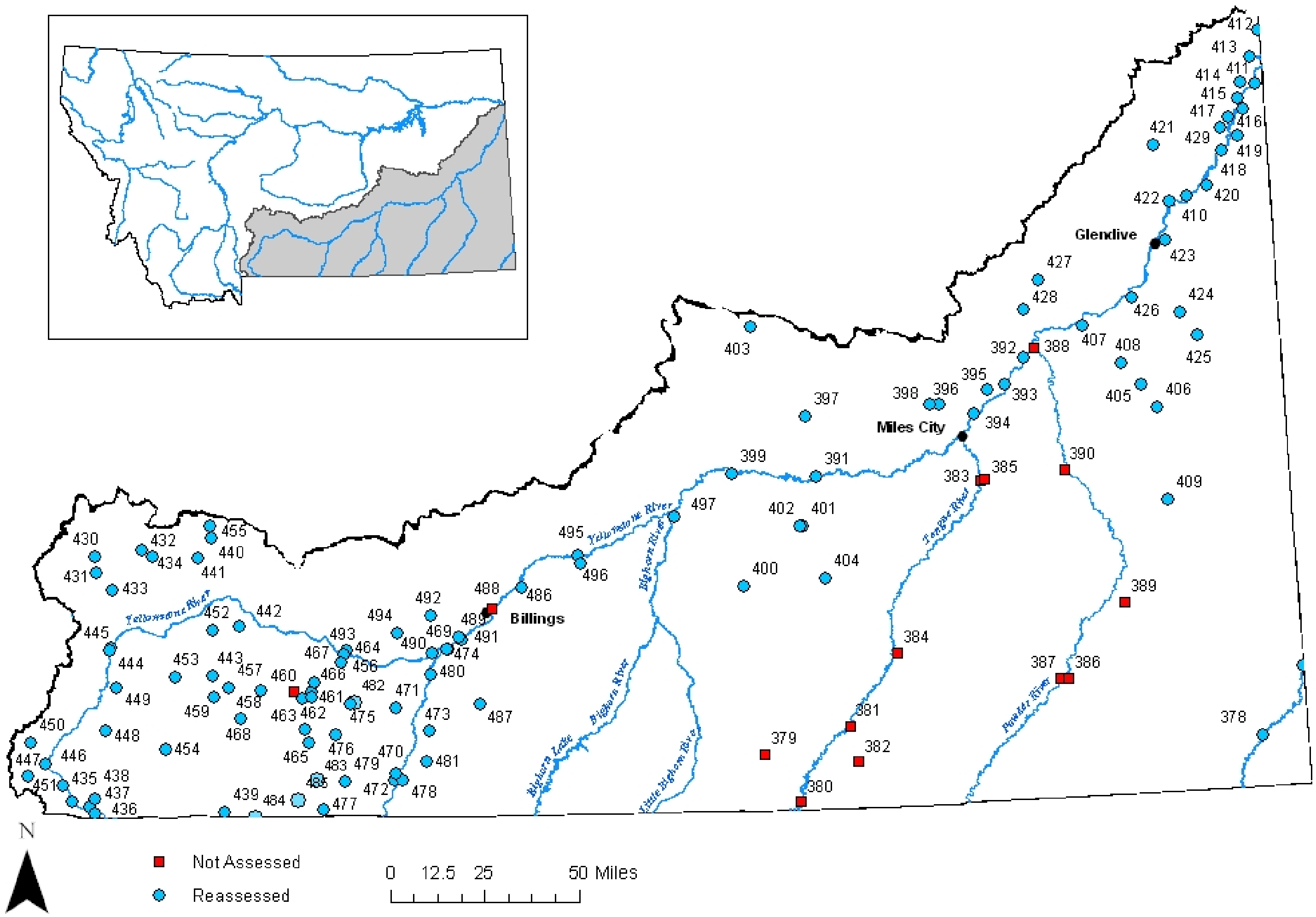

Figure 6. Yellowstone Basin-Reassessment Waters

The new ADB, implemented for the 2006 cycle has different cause names available in comparison with the 1996 list. Table 9 maps the 1996 and 2006 causes for the development of Appendix C. This appendix reflects the impairment causes de-listed from the 2000 303(d) Reassessment List. Dewatering, other Inorganics, taste and odor, and unknown toxicity causes in 1996 could not be mapped in the 2006 list.

Table 9. 1996 versus 2006 Cause Listings

1996 Causes	2006 Causes
NA[1]	Benthic-Macroinvertebrate Bioassessments (Streams)
	BOD, Biochemical oxygen demand
	Combined Biota/Habitat Bioassessments (Streams)
	Dissolved Gas Supersaturation
	Habitat Assessment (Streams)
	Impairment Unknown
	Nonnative Fish, Shellfish, or Zooplankton
	Other
	Oxygen, Dissolved
	Sulfates
Flow Alteration	Fish-Passage Barrier
	High Flow Regime
	Low flow alterations
	Other flow regime alterations
Metals	Aluminum
	Antimony
	Arsenic
	Barium
	Beryllium
	Cadmium
	Chromium (total)
	Cobalt
	Copper
	Cyanide
	Iron
	Lead
	Manganese
	Mercury
	Mercury in Water Column
	Nickel
	Selenium
	Silver
	Thallium
	Uranium
	Zinc
Non-priority organics	Pentachlorobenzene
Noxious aquatic plants	Aquatic Plants - Native
	Chlorophyll-a
	Excess Algal Growth
Nutrients[2]	Ammonia (Total)
	Ammonia (Un-ionized)
	Nitrate/Nitrite (Nitrite + Nitrate as N)
	Nitrates
	Nitrogen (Total)

1996 Causes	2006 Causes
	Nitrogen, Nitrate
	Nutrient/Eutrophication Biological Indicators
	Organic Enrichment (Sewage) Biological Indicators
	Phosphate
	Phosphorus (Total)
	Phosphorus, Elemental
	Total Kjehldahl Nitrogen (TKN)
Oil & Grease	Oil and Grease
Other habitat alterations	Alteration in stream-side or littoral vegetative covers
	Alterations in wetland habitats
	Other anthropogenic substrate alterations
	Physical substrate habitat alterations
Pathogens	*Escherichia coli*
	Fecal Coliform
pH	pH
Priority organics	DDE
	DDT
	Endosulfan
	Endrin aldehyde
	PCB in Water Column
	Polychlorinated biphenyls
Salinity/TDS/Chlorides	Chloride
	Salinity
	Specific Conductance
	Total Dissolved Solids
Siltation[3]	Bottom Deposits[4]
	Sedimentation/Siltation[4]
Suspended Solids[3]	Solids (Suspended/Bedload)[4]
	Total Suspended Solids (TSS)
Thermal Modifications	Temperature, water
Turbitity[3]	Turbidity[4]

[1]The 2006 causes of impairment that could not be directly linked with any 1996 causes of impairment, and therefore were not used in developing Appendix C.
[2]The following 1996 causes of impairments were grouped into a nutrients category for the development of Appendix C: Nutrients, Organic enrichment/DO, Organic enrichment/Low DO, and Unionized Ammonia.
[3] The following 1996 causes of impairments were grouped into a sedimentation/siltation category for Appendix C: Siltation, Suspended Solids, and Turbidity.
[4] The following 2006 causes of impairments were grouped into a sedimentation/siltation category for Appendix C: Siltation, Suspended Solids, and Turbidity.

Reference Site Monitoring Project

Objectives

- ❑ To establish a network of reference sites
- ❑ To define reference conditions for use in assessments
- ❑ To help in the establishment of TMDL endpoints
- ❑ To aide in the development of water quality standards

Design

This project uses a targeted design for areas lacking reference sites and areas within BLM lands.

Project Description

In 1990, Bahls et al.[68] conducted a study of 38 reference sites throughout Montana. These sites were selected using Best Professional Judgment (BPJ). Biological, chemical, and habitat sampling was conducted at each site. Beginning in 2000 and continuing through 2001, WQPB revisited the wadeable sites from Bahls' study and identified additional sites using BPJ. Sites were sampled using EMAP protocols[69], and visited twice a year to examine seasonal variability. No reference sites were sampled in 2002, but 17 sites were sampled in 2003. Sites in 2003 were sampled multiple times during the summer for biological, chemical and habitat parameters. In 2004 and 2005, a total of 30 reference sites (both existing ones and candidates) were sampled three times per summer in southwestern, southeastern, and northeastern MT (Figure 7). Protocols used in the reference project are described in the Quality Assurance Plan Reference Addendum[70].

In 2005, a screening process was developed that uses both watershed and site-specific data to assess overall quality of the reference sites. In this screening process, a balance is made between the relative importance of site-specific impacts (e.g., heavily grazed riparian area) and watershed-level impacts (e.g., extensive timber harvest upstream of the site). Sites that pass through the screening process are considered final reference sites. The process and the reference site descriptions are described in detail in Suplee et al. (2005)[71] .

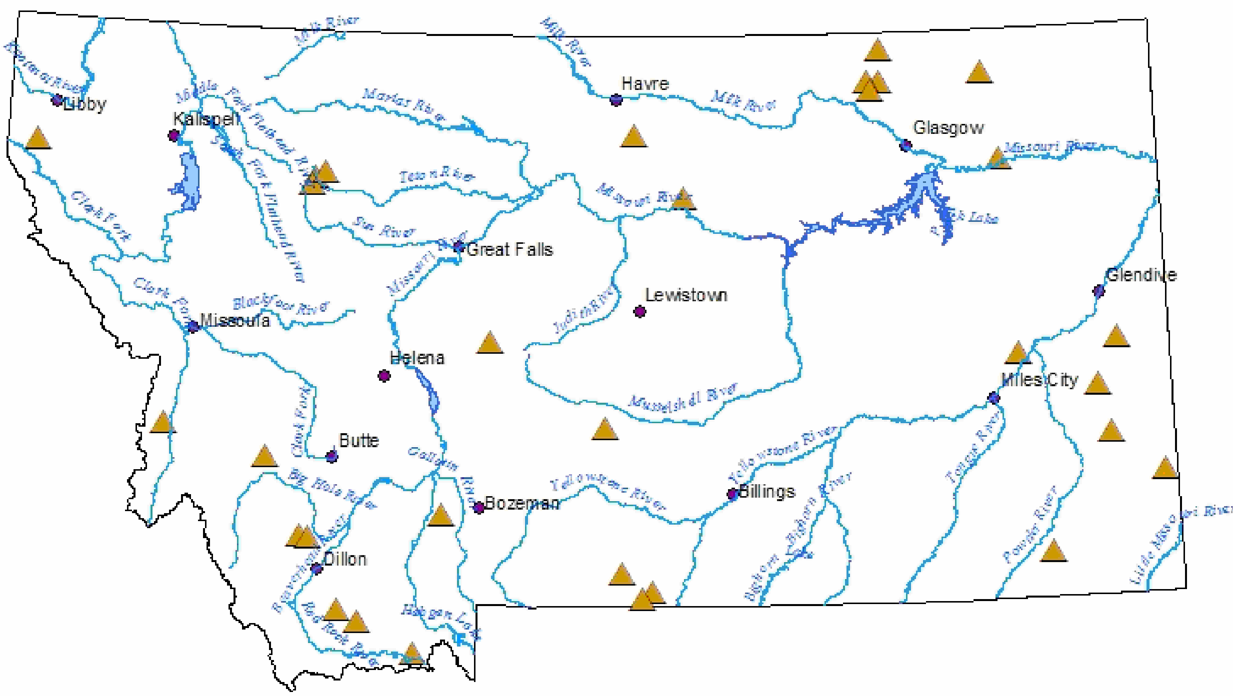

Figure 7. Reference Sites sampled in 2004-2005

[68] Bahls, L.I., Bukantis, B., and S. Trelles. 1992. Benchmark biology of Montana Reference Streams. Montana Department of Health and Environmental Science, Helena.
[69] Peck, D.V., Lazorchak, J L., Klemm, DJ. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Non-Wadeable Streams. U.S. Environmental protection Agency.
[70] Montana Department of Environmental Quality (US) [DEQ]. Reference Addendum on the Quality Assurance Project Plan: sampling and Water Quality Assessment of Streams and Rivers in MT 2005 [online document]. Helena, MT; [DEQ]; 2005. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/Reference%20Project%2005_SAP.pdf.
[71] Suplee, M., Sada de Suplee., Feldman, D., and Laidlaw, T. 2005. Identification and Assessment of Montana Reference Streams: a Follow-Up and Expansion of the 1992 Benchmark Biology Study. Montana Department of Environmental Quality. Helena, MT.

Lakes/Reservoirs Monitoring

Objectives

- To refine water quality standards for lakes, including the development of a lake and reservoir classification system
- To assess beneficial use attainment of lakes
- To provide data for analysis of trends and monitor effectiveness of any TMDL efforts

Project Description

The main objective of this project is to collect baseline nutrient and chlorophyll *a* data to identify lake characteristics that can be used to predict appropriate trophic status for lakes on a regional scale. The data-collection effort has been constant since 2003. The WQPB works cooperatively with UM to conduct the field sampling. The UM hires a field crew comprised of 2-3 graduate students and the WQPB supplies the boat and field gear. In 2005, the WQPB directly hired the field crew leader. The sampling effort focused on collecting data from "reference" lakes (approximately 15 annually) in 2003 and 2005. However, in 2004, the lakes and reservoirs selected for sampling came mainly from the Reassessment list[72]. Standard lake sampling is as follows: One mid-lake site is sampled, with the exception of larger reservoirs where two sites are sampled. Three sampling events occur between June and September. The lakes are sampled using depth-integrating techniques (epilimnion only) for nutrients, common water quality parameters, and phytoplankton Chlorophyll *a*. A surface-to-bottom profile of dissolved oxygen, temperature, conductivity, and pH is also made during each visit using a YSI 6600 sonde, and the lake shoreline is assessed using EMAP methods. Further details on the protocols can be found in the Quality Assurance Plan Lakes Addendum[73]. These data are used to make beneficial use support determinations based on DEQ's SOP[74], and as a baseline for future lake classification.

Environmental Monitoring Assessment Program (EMAP) Project

Objective

To assess perennial streams and rivers statewide for aquatic life use, and to evaluate applications of the probabilistic design.

Design

This project uses a probabilistic random design.

Project Description

Sites were selected randomly across the State according to protocols developed by EMAP Western Pilot Project. During 2000-2004, 120 sites were visited and in 91 of those sites (Figure 6), biological, chemical, and physical habitat parameters were collected on wadeable streams according to EMAP protocols for wadeable streams[75]. EPA contractors completed the sampling on the 15 non-wadeable sites according to EMAP protocols for non-wadeable

[72] Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: http://deq.mt.gov/CWAIC/default.aspx.
[73] Montana Department of Environmental Quality (US) [DEQ]. Lakes Addendum on the Quality Assurance Project Plan: sampling and Water Quality Assessment of Streams and Rivers in MT 2005. [online document]. Helena, MT: DEQ; 2005. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/2005LakesSAP.pdf.
[74] Montana Department of Environmental Quality (US) [DEQ]. 2004. Standard Operating Procedures Water Quality Assessment Process and Methods (formerly Appendix A to 303(d) 2000-2004) WQPBWQM-001. Rev#:01 [online document]. Helena, MT: DEQ; 2004. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf.
[75] Peck, D.V., Lazorchak, J L., Klemm, Dj. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Wadeable Streams. U.S. Environmental Protection Agency.

streams[76]. Currently, biological data are still being processed. The WQPB is in the process of analyzing the available chemical and habitat data.

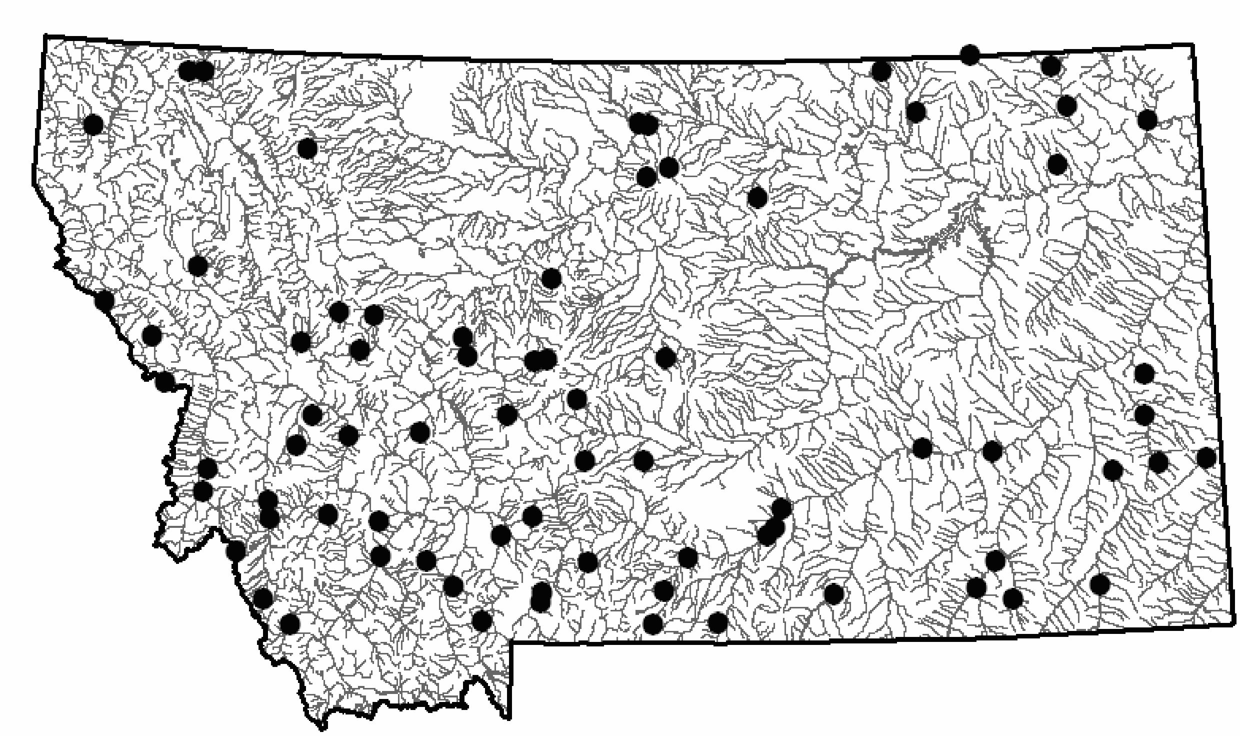

Figure 8. EMAP Sites 2000-2004

Large Rivers Monitoring

Objective

The objective of the Large Rivers Monitoring Project is to examine current protocols for the assessment of large rivers and to evaluate the approaches used nationwide.

Design

This will be determined after evaluation of current protocols and approaches.

Project Description

Nutrients, sediment, and temperature are among the most common pollutants causing water quality impairment in Montana's streams and rivers. At this point, Montana's water quality standards for these three pollutants are narrative. To interpret and apply the narrative standards, one must understand the "natural" or "reference" condition. Reference data for the large rivers in Montana (i.e., larger than 6th Order) is limited, and the natural condition relative to many of the indicators typically applied to interpret these narrative standards is poorly understood. This is further complicated by the fact that most of Montana's large rivers are dammed and Montana Code Annotated 75-5-306 states that "*conditions resulting from the reasonable operation of dams at July 1, 1971 are "natural*." To define "natural" under 75-5-306, the reasonableness of dam operation must be evaluated.

For these reasons, Montana began reexamining their protocols for the assessment of large rivers in late 2004. EPA's Montana field office and DEQ, with contractor support, are evaluating the approaches being used nationally to interpret large river data such as literature values, reference reach approach, exposure-response, and modeled

[76] Peck, D.V., Averill, DK., Lazorchak, J L., Klemm, DJ. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Non-Wadeable Streams. U.S. Environmental Protection Agency.

expectations relative to nutrients, sediment, temperature, and aquatic life. A consistent definition for large rivers (e.g., Strahler order, watershed size, etc) and a recommended approach will be developed. A small-scale pilot study will then be implemented for validation and testing purposes for statewide application.

In the interim, the approach for large rivers that has been applied for the 2006 Integrated 303(d)/305(b) Water Quality Report is to conservatively assume that the 1996 listed impairments, and causes/sources of impairment, persist at present. The exceptions to this approach would be for cases where new data definitively suggest good cause. In these cases, causes of impairment may be de-listed or added. Montana's large river segments will be reassessed following completion of the large river protocols.

Fixed Station Project

Objectives

- Document stream and river baseline water-quality conditions
- Track the status of annual variations in water quality and biological conditions
- Establish a reference dataset that could be used to eventually detect long-term water quality trends
- Assess attainment of water quality standards
- Identify locations in need of additional attention
- Provide background data for planning and evaluating stream classification, standards, and assessment methods.

Design

The fixed station project is a network designed to provide a systematic measure of water quality and biological condition that would allow for characterization of current conditions across the State, as well as provide a reference to assess change overtime. Sites were selected to represent the upper and lower mainstem segments of the three major river basins in Montana —Missouri, Yellowstone, and Columbia—and major tributaries to these rivers (Figure 9). Sites were monitored by USGS at locations that had active USGS streamflow gaging stations that provided quantitative streamflow information to enhance the ability to understand how water quality varies in response to changing flow. These fixed-station sites are considered to be integrator sites, which were chosen to reflect the cumulative condition of the entire watershed. DEQ added several supplementary sites to the SWM network in 2002 and 2003 that were either at ungaged locations or were upstream from an integrator site to help determine how water quality and biological conditions changed from upstream to downstream locations. Biological sampling occurred at most of the sites within the SWM network.

Project Description

A total of 53 fixed-station sites were monitored by the SWM network (Table 10). The USGS was partially funded by DEQ to monitor water quality and flow at 38 integrator sites at least three times per year during spring runoff and once during the summer when the stream was at or near baseflow conditions. The USGS analyzed the water quality samples for common ions, nutrients, and trace metals. They also collected continuous water temperature data at 26 sites from April through September. Most of the integrator sites and fifteen additional sites were also monitored by DEQ to assess biological conditions and to collect additional water quality data.

Figure 9. Fixed Station Monitoring Sites

Table 10. Data Collected by the Fixed Station Network

Basins	Site#	STORET / USGS Station ID	Waterbody	Parameters
Missouri River Basin	1	M02BVHDR01	Beaverhead River near Dillon	B, C, M, P, WQ2
	2	M08BEAVR01	Beaverhead River at Twin Bridges	B, C, M, P, T, WQ2
	3	M03BGHLR01	Big Hole River near Wise River	B, C, M, P, WQ2
	4	M03BGHLR02	Big Hole River near Twin Bridges	B, C, M, P, WQ2
	5	M08JEFFR01	Jefferson River near Three Forks	B, C, M, P, S, T, WQ1, WQ2
	6	M06MADNR01	Madison River near Three Forks	B, C, M, P, WQ2
	7	M05GALLR01	Gallatin River at Logan	C, M, P, S, T, WQ1 X
	8	M05GALLR02	Gallatin River near Three Forks	B, C, M, P, WQ2
	9	M09MISSR01	Missouri River near Toston	T, WQ1, X
	10	M09PRPEC01	Prickly Pear Creek near Clancy	B, C, M, P, S, WQ1, WQ2
	11	M12DRBNR01	Dearborn River at Craig	B, C, M, P, S, T, WQ1, WQ2
	12	M10SMTHR01	Smith River at Eden Bridge	B, C, M, P, WQ2
	13a	M13SUNR01	Sun River at Sun River	B, C, M, P, WQ2
	13b	USGS06089000	Sun River near Vaughn	T, WQ1
		M14TETOR01	Teton River near Loma	C, M, P, S, X
	14	M14TETOR02	Teton River near Loma - 1/4 mi upstream from rec site	B, C, M, P, S, T, WQ1, WQ2
	15	M22JUDR01	Judith River 2 mi u/s confluence w/ Missouri R	B, C, M, P, T, WQ1, WQ2
	16	M24MUSSR01	Musselshell River at Harlowton	B, C, M, P, WQ2
	17	M28MUSSR01	Musselshell River near Mosby	B, C, M, P, S, T, WQ1, WQ2
	18	M37PEOPC01	Peoples Creek near Dodson	C, M, P, WQ1, X
	19	M45MILKR02	Milk River at Bjornberg Bridge	C, M, P
	20	M45MILKR01	Milk River at Nashua	B, C, M, P, S, T, WQ1, WQ2
	21a	M47POPR01	Poplar River near Scoby	B, C, M, P, S, WQ2
	21b	USGS06181000	Poplar River at Poplar	T, WQ1
	22	M50BMDYC01	Big Muddy Creek near Culbertson	C, M, P, X
	23	M51MISSR01	Missouri River near Culbertson	P, T, WQ1, X
Yellowstone River Basin	24	Y03YELLR01	Yellowstone River near Livingston	C, M, P, T, WQ1, X
	25	Y03SHIER01	Shields River near Livingston	B, C, M, P, S, T, WQ1, WQ2
	26	Y03BOULR01	Boulder River at Big Timber	B, C, M, P, S, T, WQ1, WQ2
	27	Y04STILR01	Stillwater River near Absarokee	B, C, M, P, S, T, WQ1, WQ2
	28	Y05CLFYR01	Clarks Fork of Yellowstone at Edgar	B, C, M, P, S, T,

Basins	Site#	STORET / USGS Station ID	Waterbody	Parameters
				WQ1, WQ2
	29	Y11BGHNR01	Bighorn River near Hardin	B, C, M, P, WQ2
	30	Y17BIGH01	Bighorn River at Bighorn	B, C, M, P, S, T, WQ1, WQ2
	31	Y17ROSEC01	Rosebud Creek at Rosebud	B, C, M, P, S, WQ1, WQ2
	32	Y15TONGR01	Tongue River near Stateline	C, M, P, X
	33	Y16TONGR01	Tongue River near Brandenburg	B, C, M, P, WQ2
	34	Y17TONGR01	Tongue River at Miles City	B, C, M, P, S, T, WQ1, WQ2
	35	Y18POWDR01	Powder River near Moorhead	B, C, M, P, WQ2
	36	Y21POWDR01	Powder River near Locate	B, C, M, P, S, WQ1, WQ2
	37	Y23YELLR01	Yellowstone River at Sidney	C, M, P, WQ1, X
Columbia River Basin	38	K01KOOTR01	Kootenai River near Libby Dam	C, M, P, T, WQ1, X
	39	K02FISHR01	Fisher River near Libby	B, C, M, P, S, WQ1, WQ2
	40	K01YAAKR01	Yaak River near Troy	B, C, M, P, S, T, WQ1, WQ2
	41	C01LTBLR01	Little Blackfoot River at Garrison	B, C, M, P, S, T, WQ1, WQ2
	42	C02ROCKC01	Rock Creek near Clinton	B, C, M, P, S, WQ1, WQ2
	43	C02CKFKR02	Clark Fork River at Turah Fishing Access	B, C, M, P, S, WQ1, WQ2
	44	C03BLACR01	Blackfoot River near Bonner	B, C, M, P, S, T, WQ1, WQ2
	45	C05BITRR01	Bitterroot River near Darby	B, C, M, P, WQ2
	46	C05BITTR01	Bitterroot R near Missoula abv bridge on N Ave	B, C, M, P, S, T, WQ1, WQ2
	47	C04CKFKR01	Clark Fork River at St Regis	B, C, M, P, S, WQ1, WQ2
	48	C06NFKFR01	NF Flathead River near Columbia Falls	B, C, M, P, S, WQ1, WQ2
	49	C07MFKFR01	MF Flathead River near West Glacier	B, C, M, P, S, WQ1, WQ2
	50	C08FRSFK01	SF Flathead River near Spotted Bear	B, C, M, P, WQ2
	51	C09WHTFR01	Whitefish River near Kalispell	B, C, M, P, S, WQ1, WQ2
	52	C10SWANR01	Swan River near Bigfork	B, C, M, P, S, T, WQ1, WQ2
	53	C12FLATR01	Flathead River near Perma	C, M, P, T, WQ1, X

B = 2003-2005 Bacteria data collected by DEQ one time per year.
C = 2001-2005 Chlorophyll data collected by DEQ one time per year
P = 2001-2003 Periphyton data collected by USGS one time per year.
M = 2001-2005 Macroinvertebrate data collected by DEQ one time per year.
S = 2001 Sediment metals data collected one time per year.
T = 1999-2003 Continuous temperature data collected during the summer by USGS.
WQ1 = 1999-2003 Water quality data collected by USGS four times per year.

WQ2 = 2004-2005 Water quality data collected by DEQ one time per year
X = Biological monitoring abandoned

The data from SWM network locations were used in WQSA decisions. Data summaries and analytical results for the fixed station network can be found in "Water Quality and Biological Characteristics of Montana Streams in a Statewide Monitoring Network, 1999-2005 Comprehensive Report."[77]

Biological Monitoring

Objectives

- ❑ To develop metrics and assessment tools for interpreting biological data
- ❑ To assess beneficial use attainment
- ❑ To establish TMDL endpoints

Design

This project uses targeted sampling in areas where biological data are not available.

Project Description

DEQ uses biological assemblages to make beneficial use support determinations as part of the process. A detailed explanation of the process can be found in the field manual procedures and in the QAPP.

1. Macroinvertebrates: A review of DEQ's current macroinvertebrate assessment tools was contracted in 2004. Based on this review, two new metrics were adopted as part of DEQ's procedures. The metrics are a new Ecoregional Multimetric indexes (MMI's)'s, and a predictive model (RIVPAC) as another option[78].

   Also, two comparability studies were conducted in 2004 to evaluate any impacts of mesh size or sampling protocols on metrics performance. Approximately 30 sites were sampled for both studies with duplicates taken at least 10% of the sites. The results of the study indicated no difference between the two mesh sizes. Results have not been published yet.

2. Periphyton: A study to refine periphyton metrics is currently funded to evaluate metrics used by DEQ and their possible refinement. As a result of this effort, new metrics have been developed for the Middle Rockies Ecoregion[79]. A Standard Operating Procedure to use these metrics will be available by late Fall 2006, whereas for the other ecoregions, it will be available in late 2007.

Wetlands Monitoring

Objectives

- ❑ Coordinate with state, tribal, and federal agencies, and nonprofit groups to develop wetland assessment procedures that have widespread application in Montana

- ❑ Develop a wetland assessment program that provides valuable information about wetland loss or gain and condition to land management agencies and land owners:

    - Determine the status and trends of wetland quantity and quality in Montana

    - Identify wetlands that are at risk and need restoration or protection

[77] Apfelbeck, R. 2006. Water Quality and Biological Characteristics of Montana Streams in a Statewide Monitoring Network, 1999-2005 Comprehensive-Draft August 2006. Montana Department of Environmental Quality, Water Quality Standards Section, Water Quality Planning Bureau. Helena, MT.
[78] Montana Department of Environmental Quality. Macroinvertebrates SOP. 2006. Draft.
[79] Teply,M and L. Bahls. 2006. Diatom Biocriteria for MT Streams Middle Rockies Ecoregion SOP. DRAFT

- .Identify the stressors that threaten our wetlands resources
- Map Montana's wetland resources

Project Description

Montana currently lacks a comprehensive wetland monitoring and assessment program. As a result, the State is unable to evaluate the status and trends of wetland quantity and quality, which would allow managers to assess our needs for, and implementation of, wetland restoration and protection. The U.S. EPA has identified the development of a comprehensive wetland monitoring and assessment program as a top priority to determine the causes, effects, and extent of pollution to wetland resources and to improve pollution prevention, reduction, and elimination strategies. For this reason, the U.S. EPA has provided funding to the DEQ for developing wetland assessment procedures and a wetland monitoring and assessment strategy. In addition, DEQ recognizes that the protection of Montana's wetlands is becoming increasingly complicated and that we would greatly benefit from a well-coordinated effort between researchers, state, tribal, and federal agencies, nonprofit groups, and landowners.

In order for Montana to develop a comprehensive wetland monitoring and assessment program we first need to develop the assessment protocols that we can use to accurately assess wetland conditions (i.e., ecological integrity). EPA has identified three assessment Levels for evaluating wetland ecological conditions. These include:

- **Level 1**- Landscape assessments rely almost entirely on Geographic Information Systems (GIS) and remote sensing data to obtain relatively coarse information about wetland and watershed conditions and the distribution and abundance of wetland types in a watershed.
- **Level 2**- Rapid field assessments that use relatively simple methods to collect at specific wetland sites. The method uses stressor indicators to help define the nature of site disturbance (e.g., browse indicators, trampling, invasive weeds, dead or dying cottonwood or willow, water diversions, noxious algae, siltation, adjacent land uses, etc.)
- **Level 3**- Intensive site assessments (ISA) provide higher resolution information on the condition of wetlands within an assessment area. Wetland bioassessments are a type of ISA that directly measures aquatic life beneficial uses. Hydrogeomorphic (HGM)-based assessment methods are another type of ISA. The detailed information from HGM assessments help refine landscape and rapid field assessments by providing reference condition characterization, helping diagnose the causes of wetland degradation, and developing design and performance standards for wetland restoration, including compensatory wetland mitigation.

The DEQ is developing Level 1, 2 and 3 wetland assessment procedures that compliment one another. For example, rapid field assessment methods (Level 2), which are developed using best professional judgment, can be tested and refined using results from more intensive wetland monitoring activity (Level 3), and results from both Level 2 and Level 3 assessments can be used to enhance the utility, or test the efficacy, of landscape scale (Level 1) assessments. For more information please visit the DEQ Wetland Conservation website at: http://www.deq.mt.gov/wqinfo/Wetlands/Index.asp

Programmatic Evaluation

Updates of Monitoring Strategy and QA Plans

In October 2005, the WQPB submitted to EPA headquarters their draft Monitoring Strategy Plan. Comments were provided by EPA in January 2006. During fall 2006, comments will be addressed, and will be incorporated if necessary into the Monitoring Strategy Plan.

C.2 Assessment Methodology

Overview

At 40 CFR Part 130.4(b) the CWA requires that, "[t]he State's water monitoring program shall include collection and analysis of physical, chemical, and biological data, and quality assurance and control programs to assure scientifically valid data." At 40 CFR Part 130.7(b)(5) the CWA requires that, "[e]ach State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list."

In following with the CWA, the Montana Water Quality Act [MCA 75-5-702(5)] requires, "…the department shall develop and maintain a data management system that can be used to assess the validity and reliability of the data used in the listing and priority ranking process."

The following is a synopsis of DEQ's assessment methodology that is used to satisfy both the CWA and Montana Water Quality Act. The entire method is available online as a WQPB Standard Operating Procedure[80] through the link referenced in footnote 2.

DEQ's Water Quality Assessment is used to assess the validity and reliability of data, as well as the process for performing a beneficial use support determination. This two-step assessment process was adapted by DEQ from a model presented by EPA in a 1997 publication, "Guidelines for the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement."[81] Using these guidelines as the basic framework for an assessment process, DEQ adapted it to address the sufficient credible data requirements in the Montana Water Quality Act [MCA 75-5-702] beginning with the year 2000 listing cycle.

Identification of Available Water Quality Data

For each reporting cycle, DEQ mails requests for information to several hundred individuals, organizations, and agencies that have an interest in water quality monitoring and management. As a result, DEQ receives numerous data and information from cooperative parties and catalogs the submitted material into its Water Quality Library. DEQ monitoring staff are informed of the existence of new data and information when reviewing newly catalogued entries for the waterbodies they are assessing.

In addition to data and information received in the call for all readily available data, DEQ uses data collected from its own monitoring efforts and data collected by other organizations that operate monitoring programs and store their data in publicly accessible databases. Data collected by (or for) DEQ ambient water quality programs is required to be housed in the EPA STORET (storage and retrieval) database. STORET is the single largest source of chemistry data for DEQ's water quality assessments. In addition to STORET, databases operated by the United States Geological Survey's (USGS - NWIS Web database) and the Montana Bureau of Mines and Geology's (MBMG - GWIC database) contribute a significant data to water quality assessments.

The result of all these combined data sources is a collection of data and information of varying technical rigor, specificity to the DEQ waterbody segment, overall quality, and currency. The first step in the Water Quality Assessment method is to categorize this data into data types so that each type can be reviewed as an assemblage to determine whether sufficient credible data exists to proceed with the assessment.

Sufficient Credible Data

Montana law defines sufficient credible data (SCD) as "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 standards" (MCA 75-5-103). A SCD evaluation is simply a data quality assessment procedure that considers the technical, representativeness, quality, and time components of data and information that is available. It establishes a measure of each assemblage's rigor, which, in turn translates to a qualitative statement of confidence for the ensuing beneficial use assessment.

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[80] Montana Department of Environmental Quality (US) [DEQ]. Water Quality Assessment Process and Methods - SOP WQPBMQM-001 [online document]. Helena, MT: DEQ, WQPB; 2006. Available from: http://www.DEQ.state.mt.us/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf.

[81] Environmental Protection Agency (US) [EPA]. 1997 USEPA Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement. Washington, DC: EPA; 1997. EPA-841-B-97-0025.

As noted in the overview of this section, DEQ used an EPA model for its SCD evaluation tools. However, the overall acceptance level (e.g., SCD Score) required to achieve SCD was a decision made by DEQ based on comments received from stakeholders during a public outreach and participation period (1999).

To assist with the determination of SCD Score, a table was constructed with text statements representing various levels of technical, spatial/temporal coverage, data quality, and data currency for each of the data assemblages (biology, chemical/physical, and habitat). These statements are grouped by numbers from 1 to 4 as follows:

- Statements representing poor data rigor are grouped with the number 1
- Statements representing fair data rigor are grouped with the number 2,
- Statements representing good data rigor are grouped with the number 3,
- Statements representing excellent data rigor are grouped with the number 4.

The assessor places a checkmark next to statements that are "true" regarding the assemblage being reviewed. When all relevant statements are checked, the assessor reviews the general consensus of where the checkmarks fall. Next the assessor reviews each data quality component (technical, spatial/temporal, quality, and currency, and determines the *most limiting factor of the assemblage*. If the general consensus of where the checkmarks are placed is negated by the most limiting factor, the score of the most limiting factor is selected. Otherwise, the general consensus is used as the score. This exercise is performed for each data assemblage. Assemblages scoring 1 are considered too limited to be used for water quality assessment decisions. The total of all assemblages scoring 2 or more are summed

The minimum score for proceeding with a beneficial use support determination for aquatic life and fisheries was set at 6. Other uses which rely upon one data type, such as drinking water, agriculture, and industry, are simply judged as either sufficient or insufficient depending on the rigor of associated chemistry data. The recreation use is also determined to be either sufficient or insufficient but is based on the existence and rigor of bacteriological, algae, and data pertaining to the aesthetic qualities of the waterbody. All measures of data rigor are documented in an assessment record, allowing users to understand the assessor's basis (i.e., level of underlying information) supporting the use support decisions.

Beneficial Use Support

Once the State determines that sufficient credible data exists for a waterbody, the assessment process proceeds to an evaluation of beneficial use support. A beneficial use support determination assigns degrees of use support for each beneficial use based on the waterbody's attainment or non-attainment of state water quality standards. These decisions are recorded in the waterbody's assessment record and into the EPA's water quality assessment program (Assessment Database – ADB version 2.2), which is used to manage assessment unit information, decisions, and produce the various tables in this report.

Levels of Use Support

There are six levels of use support used in beneficial use support determinations, these are:

1. Full Support – A beneficial use is fully supported if it is at its natural condition or best practical condition and water quality standards are attained.

2. Full Support (Threatened) – A beneficial use is considered threatened when it fully supports its uses, but observed trends, or proposed new sources of pollution not subject to permitting indicate a high probability of future impairment.

3. Partial Support – One or more data types indicate impairment. The State may list a beneficial use as partially supporting uses based on the nature and rigor of the data, as well as site-specific conditions.

4. Non-Support - One or more water quality standards for the beneficial use are not attained.

5. Insufficient Information – Data are insufficient in technical, spatial/temporal, quality, or currency rigor to represent conditions or are not comparable to state water quality standards, preventing the beneficial use to be assessed.

6. Not Assessed – A beneficial use support determination has not been initiated.

Aquatic Life and Fisheries – Making aquatic life and fisheries use support determinations can be a complex process because of the amount and variety of information that may be needed to make the decision. In some cases, the assessor will evaluate, compare, and weigh many bits of physical, biological, chemical, and habitat data in reaching the aquatic life and fisheries use support determinations for a waterbody. In other cases, only one or two of the aquatic life data categories (habitat/physical, biology, or chemistry) provide clear evidence of use support or impairment. For the aquatic life and fisheries uses there are three means to assess beneficial use support: Overwhelming Evidence, Independent Evidence, and Weight-of-Evidence.

Overwhelming evidence is clear evidence, often from a single data type, that the beneficial use is, or is not, being supported. Examples of overwhelming evidence for *non-support* determinations are documented fish kills, fish consumption closures (e.g., Silver creek), and swimming restrictions due to bacteria. Although rarely used, an example of overwhelming evidence of *full support* can be made. Examples of these would include a waterbody being in wilderness area. Because these overwhelming evidence determinations represent extreme and obvious conditions, the overwhelming evidence approach overrides the need to achieve a set SCD score. This allows extreme conditions to be identified for the public and control and corrective actions to begin without the waterbody having to wait its turn in the monitoring schedule or DEQ constantly shifting its monitoring schedule to address obvious issues.

When overwhelming evidence is not a clear choice, a beneficial use support determination can be made using independent evidence. Independent evidence can be used when there are less than or equal to three data types (biology, habitat, chemical) available or less than two biological assemblages represented. This occurs frequently where external data submitted to DEQ comes from one or two focused studies and there is little other types of data, but the SCD score still achieves 6 or higher. This "independent evidence" may not cover all aspects of the beneficial use but is singularly rigorous to make a determination of non-, partial, or full use support. Independent evidence is used exclusively for aquatic life and fisheries use support determinations.

The weight-of-evidence approach is used when there are three data types (biology, habitat, chemical) and greater than or equal to two biological assemblages. With multiple lines of evidence, there are often conflicting results and conclusions presented to the assessor. Rather than having conflicting data cancel out, the assessor views the weight of the evidence presented as a whole and selects the use support decision from the most rigorous, prevalent indicator. To use weight of evidence, the SCD score must be 6 or higher and is only applied to the aquatic life and fisheries uses.

Beneficial use support determination (Drinking Water, Agricultural, Industry, and Recreation Uses) – These remaining uses are assessed using an "independent[82]" type approach. Because the water quality standards for these uses are primarily numeric, once data is determined to be sufficient, they are assessed based upon direct data comparison to water quality standards.

When all beneficial uses (or as many as the data allows) are assessed, the assessment decisions are recorded in an assessment record to document the assessment.

Assessment Record

For the period 2000 to 2006, assessments are documented in an electronic spreadsheet in MS Excel. Once completed, a hardcopy is printed and placed in the waterbody's assessment record. The hardcopy assessment record is catalogued and retained in the WQPB Water Quality Library.

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[82] Although not technically an "Independent Evidence" approach as is used for aquatic life and fisheries, these other assessments have similarities because there is typically only one relevant data type, which is compared against numeric standards (DEQ-7) or numeric recommendations presented in reference condition data.

The full record of DEQ's water quality assessments consists of four parts:

1. The Water Quality Assessment Determinations section of this report, as it appears on the "Clean Water Act Information Center" (CWAIC) Internet site http://deq.mt.gov/CWAIC/Default.aspx. This site is Montana's "official" report of state water quality status. Because it would require more than 1,000 pages to print the information provided on the website, any hardcopy version of this report reflects at least some condensation and abridgement of the version posted on the CWAIC site.

2. Water Quality Assessment Records for each Assessment Unit. The State documents the assessment of each waterbody in an Excel spreadsheet designed for Montana's water quality assessment method. These assessment record sheets (ARS) display the data sources used in the assessment, the data quality evaluation performed (SCD), and how the State used these data to reach the beneficial use support determinations. Electronic copies of these ARSs are linked to the CWAIC interactive database "full report" pages. A hard copy of the record sheet for each waterbody segment is included in the segment files described below.

3. Hardcopy data files for each Assessment Unit evaluated. These files may contain water quality data, maps, photographs, references to relevant documents, and references to electronic information sources. Individuals may review these files at the DEQ, Water Quality Planning Bureau.

4. Assessment Database (ADBv2.2). DEQ staff enters the use support decisions recorded in DEQ's Water Quality Assessment Records into the EPA's Assessment Database. This software program produces the majority of the tables and reports comprising this Integrated Water Quality Report. As required by law, the State is required to submit a copy of this database, along with the supporting assessment records to the EPA for approval.

Assessment Unit Changes (New, Split, Merge, and Corrections)

During the 2006 reporting cycle DEQ added or modified 31 waterbodies for assessment purposes (Table 11).

Table 11. Assessment Unit Changes during the 2006 Reporting Cycle

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT40B002_040	MT40B002_040	Chippewa Creek	CHIPPEWA CREEK, headwaters to confluence with Manitoba Gulch.	Correction	The previous segment (MT40B002_040) description was unclear.
MT41D003_010	MT41D003_010	Charcoal Creek	CHARCOAL CREEK, headwaters to mouth (Big Hole River)	Correction	This stream was incorrectly named Charcoal Gulch Creek in EnviroNet. Charcoal Gulch Creek is a tributary of Charcoal Creek. Charcoal Creek is a tributary of the Big Hole River.
MT42M002_040	MT42M002_040	Lone Tree Creek	LONE TREE CREEK, North Fork confluence downstream to the mouth	Correction	Segment correction: previous segment description was from the north and south forks to the mouth; however, there is no confluence of north and south forks.
MT43A002_031	MT43A002_031	Cottonwood Creek	COTTONWOOD CREEK, from the Confluence of Trespass Creek to the mouth (Shields River)	Correction	Change in land use (i.e., beginning of irrigation withdraws, primitive to developed conditions).
MT43A002_032	MT43A002_032	Cottonwood Creek	COTTONWOOD CREEK, headwaters downstream to the confluence with Trespass Creek, approximately 17 stream miles upstream from the confluence with the Shields River.	Correction	Change in land use (i.e., primitive to developed conditions).
MT43A002_051	MT43A002_051	Rock Creek	ROCK CREEK, headwaters downstream to USFS boundary at NW1/4, SW1/4, Sec9,T2N, R11E	Correction	Change in land use (i.e., primitive to developed conditions).
MT43A002_052	MT43A002_052	Rock Creek	ROCK CREEK, USFS boundary at NW1/4, SW1/4, Sec9,T2N, R11E downstream to the mouth of the Shields River	Correction	Change in land use (i.e., beginning of irrigation withdraws, primitive to developed conditions).
MT43B004_051	MT43B004_051	Billman Creek	BILLMAN CREEK, 1.31 miles downstream to mouth (Yellowstone River)	Correction	Merged and split MT43B004_051 and MT43B004_052 to reflect different land uses.

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT43B004_052	MT43B004_052	Billman Creek	BILLMAN CREEK, headwaters to 1.3 miles from mouth (Yellowstone River)	Correction	Merged and split MT43B004_051 and MT43B004_052 to reflect different land uses.
MT76J008 4	MT76O003_021	Unnamed Creek	UNNAMED CREEK, headwaters to mouth (Spring Creek). This creek is locally referred to as "Kid's Creek"	Correction	This request is to re-establish a segment ID that was mistakenly given to another Spring Creek in 1999. The original ID was MT76J0084.
MT41P002_020	MT41P002_020	Dry Fork Marias River	DRY FORK MARIAS RIVER, headwaters to Big Flat Coulee	Merge	Added section from Big Spring Creek to Big Flat Coulee (MT41P002_010). Segment merged to keep use class consistent.
MT43B004_062	MT43B004_062	Tom Minor Creek	TOM MINER CREEK, headwaters downstream to the confluence with Tepee Creek	Merge	Merged MT43B004_062 and MT43B004_063
MT43B004_112	MT43B004_112	Big Creek	BIG CREEK, headwaters downstream to confluence with Hyalite Creek.	Merge	Merged MT43B004_112 and MT43B004_113
NA	MT41H003_081	Bear Creek	BEAR CREEK, headwaters to the mouth (Rocky Creek MT41H003_080)	New	NA
NA	MT43B005_060	West Fork Mill Creek	WEST FORK MILL CREEK, Absaroka-Beartooth Wilderness boundary to mouth (Mill Creek)	New	Data discovered that may lead to an impairment decision
NA	MT43B006_020	Granite Lake	GRANITE LAKE, Entire lake	New	Data discovered indicates that a priority abandoned mine along a tributary to Granite lake is a source of metals.
NA	MT43D003_140	Lower Basin Creek Lake	LOWER BASIN CREEK LAKE, entire lake located in TS8 R19E S8	New	NA
NA	MT76F003_010	Mike Horse Creek	MIKE HORSE CREEK, headwaters to mouth (Beartrap Creek)	New	NA
NA	MT76N003_140	Swamp Creek	SWAMP CREEK, Cabinet Mountains Wilderness boundary to the mouth (Noxon Reservoir)	New	NA
MT43B004_063	NA	Tom Minor Creek		Removed	Merged MT43B004_062 and MT43B004_064
MT43B004_113	NA	Big Creek		Removed	Merged MT43B004_112 and MT43B004_114

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT41B002_090	MT41B002_090	Rattlesnake	RATTLESNAKE CREEK, from the Dillon PWS off-channel well located in T7S R10W S11 o the mouth at the Beaverhead River	Split	This waterbody has two State use classifications: A1 from the headwaters to the point near the Dillon PWS off-channel well, and B1 from that point to the mouth at the Beaverhead R.
MT41B002_090	MT41B002_091	Rattlesnake	RATTLESNAKE CREEK, headwaters to the Dillon PWS off-channel well located in T7S R10W S11	Split	This waterbody has two State use classifications: A1 from the headwaters to the point near the Dillon PWS off-channel well, and B1 from that point to the mouth at the Beaverhead R.
MT41P002_010	MT41P002_010	Dry Fork Marias River	DRY FORK MARIAS RIVER, Big Flat Coulee to the mouth (Marias River)	Split	Remove section from Big Spring Creek to Big Flat Coulee (MT41P002_010). Segment split to keep use class consistent.
MT43B001_010	MT43B001_010	Yellowstone River	YELLOWSTONE RIVER, Yellowstone Park boundary to Reese Creek	Split	The original pre-2006 segment was comprised of two waterbody classes (A-1, B-1). The splits were made in order to place each classified segment into its own reach.
MT43B001_010	MT43B001_011	Yellowstone River	YELLOWSTONE RIVER, Montana State border to Yellowstone Park boundary	Split	The original pre-2006 segment was comprised of two waterbody classes (A-1, B-1). The splits were made in order to place each classified segment into its own reach.
MT43E001_010	MT43E001_010	Pryor Creek	PRYOR CREEK, I-90 to the mouth of the Yellowstone River	Split	The original segment (MT43E001_010) has two water-use classifications B-1 and C-3. The water use classifications change at the I-90 bridge and the current waterbody segment includes both water-use classifications. For ~ 2.8 miles from the Crow Reservation Boundary to I-90 the classification is B-1 (MT43E001_011). From I-90 to the mouth of the Yellowstone River (~13.7 miles) the Classification is C-3 (MT43E001_010).

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT43E001_010	MT43E001_011	Pryor Creek	PRYOR CREEK, For 2.75 miles from the Crow Reservation to I-90	Split	The original segment (MT43E001_010) has two water-use classifications B-1 and C-3. The water use classifications change at the I-90 bridge and the current waterbody segment includes both water-use classifications. For ~ 2.8 miles from the Crow Reservation Boundary to I-90 the classification is B-1 (MT43E001_011). From I-90 to the mouth of the Yellowstone River (~13.7 miles) the Classification is C-3 (MT43E001_010).
MT43F001_010	MT43F001_010	Yellowstone River	YELLOWSTONE RIVER, City of Billings PWS to Alkali Creek	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.
MT43F001_010	MT43F001_011	Yellowstone River	YELLOWSTONE RIVER, City of Laurel PWS to City of Billings PWS	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.
MT43F001_010	MT43F001_012	Yellowstone River	YELLOWSTONE RIVER, Bridger Creek to City of Laurel PWS	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.

*AU Correction = AUs are “corrected” if they were reach indexed incorrectly or if their related information (waterbody descriptions and/or location information) was unclear or incorrect

Quality Assurance and Quality Control Program

Within DEQ, the Water Quality Planning Bureau (WQPB) operates under an EPA-approved Quality Management Plan (QMP - WQPBQMP-001, Rev. 1, 05/06/2004). This QMP establishes a quality system for all bureau activities including, but not limited to, the monitoring of state surface waters and the production of this Integrated Water Quality Report.

The QMP requires the bureau to plan projects, document this planning, and to provide for independent assessment and oversight activities to assure scientifically valid processes and data used for decision-making. For water quality monitoring, the bureau plans and documents proposed activities in a Quality Assurance Project Plan (QAPP). The DEQ approved QAPP for water quality monitoring is available for review at the DEQ Quality Assurance webpage[83].

The water quality assessment process used for the production of this Integrated Report has been incorporated into the quality system as a Standard Operating Procedure (SOP) and is available online through the QA Program webpage.

Under the auspices of the bureau's QA program a two tiered system of review was initiated for water quality assessments beginning with the 2004 Integrated Report cycle. The bureau SOP WQPBDMS-002[84] describes the review process used during the 2006 listing cycle.

The two tiered review of assessment records begins with an administrative review checklist, completed for all assessments. A DEQ assessor completes the administrative review checklist at the end of an assessment to verify that all information necessary for a complete and valid entry to the ADB is included.

From the completed assessments submitted for ADB entry, a minimum of 10 percent are randomly selected for technical review. Technical reviews are performed by technically qualified staff in the Water Quality Standards Section.

C.3 Assessment Results

Five-Part Categorization of Surface Waters

As of 2004, the EPA has requested that states adopt a five-part scheme for categorizing the assessment status of all waters in each state's water quality monitoring and assessment system. In 2004, these five categories were used as follows:

1. Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.

2. Category 2: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.

3. 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.

4. Category 4: Waters where one or more beneficial uses have been assessed as being impaired, fully supporting but threatened, all TMDLs are completed but impaired beneficial uses have not yet achieved fully supporting status, or impaired and TMDLs are not required:

    a. Subcategory 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved.

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[83] Quality Assurance Program DEQ [Internet]. Helena, MT: DEQ. Available from: http://www.deq.state.mt.us/wqinfo/datamgmt/Index.asp.

[84] Montana Department of Environmental Quality (US) [DEQ]. Standard Operating Procedure WQPBDMS-002, Rev. 2, 04/15/05 [online document]. Helena, MT: DEQ; 2006. Available from: http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBDMS-002.pdf.

b. 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 water quality standards in a reasonable period of time. These control requirements act "in lieu of" a TMDL, thus no actual TMDLs are required.

c. 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.

5. 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.

In 2006 EPA revised the definition of Category 2 waters as follows:

2004 Definition - Category 2: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.

2006 Definition - Category 2: Available data and/or information indicate that some, but not all of the beneficial uses are supported.

With EPA's revised definition for 2006, the underlying theme for Category 2 changed from a category for partially completed assessments, to one that could, by definition, also contain waters with water quality standards exceedences due solely to natural sources.

For the 2006, the Category 2 definition from EPA's 2006 Guidance document is applied to a new sub-Category 2A. A new Category 2B is used to categorize waters determined to have a water quality standard exceedence due solely to natural sources in the absence of any identified anthropogenic sources. The full definitions for these categories are as follows:

2006 – Category 2A: Available data and/or information indicate that some, but not all of the beneficial uses are supported.

2006 – Category 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.

Out of the 20,549 miles of streams documented in the ADB to date, 10, 3, 12, 4, 0, 8, and 62 percent are in categories 1, 2, 3, 4A, 4B, 4C, and 5, respectively (Table 12). Similarly, out of the 606,291 acres of lakes documented in the ADB to date, 10, 2, 4, 0, 0, 6, and 77 percent are in categories 1, 2, 3, 4A, 4B, 4C, and 5, respectively (Table 12). Category 5 is the predominant category for both lakes and streams. For streams and rivers, category 2A and 2B waters represent 3 and 4 percent of the total stream miles documented in the ADB to date, respectively. For lakes, ponds, and wetlands, category 2A and 2B waters represent 2 and 0 percent of the total lake acres documented in the ADB to date, respectively. A list of all category 2B waters is available in Table 13.

Table 12. Size of Surface Waters Assigned to Reporting Categories

	Streams and Rivers		Lakes and Wetlands	
Category	Total Size (Miles)	Number of Assessment Units	Total Size (Acres)	Number of Assessment Units
1	2,122	122	63,640	15
2	666	32	10,843	11
2A	542	29	10,843	11
2B	799	26	0	0
3	2,547	84	26,483	9

Category	Streams and Rivers		Lakes and Wetlands	
	Total Size (Miles)	Number of Assessment Units	Total Size (Acres)	Number of Assessment Units
4A	801	49	2,980	2
4B	0	0	0	0
4C	1,731	98	37,738	3
5	12,683	651	464,607	26
Total Waters	**20,549**	**1,036**	**606,291**	**66**

*Category 2A waters are a subset of category 2 waters.
**Category 2B waters can be a subset of category 2, 3, 4A, 4B, 4C, or 5 waters.

Table 13. Category 2B waters

Watershed	HUC #	ID305B	Name, Location Description
Little Missouri	10110201	MT39F001_010	THOMPSON CREEK, State line to mouth
Lower Missouri	10060003	MT40Q001_010	POPLAR RIVER & MIDDLE FORK POPLAR RIVER, Canada to the Fort Peck Reservation
Lower Missouri	10060003	MT40Q002_010	BUTTE CREEK, headwaters to the mouth (Poplar River)
Lower Missouri	10060003	MT40Q002_020	EAST FORK POPLAR RIVER, international border to the mouth (Poplar River)
Lower Yellowstone	10100004	MT42M002_142	CEDAR CREEK, 26 to 45 miles above the mouth
Marias	10030201	MT41M002_110	DUPUYER CREEK, North & South Forks to the mouth (Birch Creek)
Marias	10030202	MT41L001_010	OLD MAIDS COULEE, headwaters to the mouth (Cutbank Creek)
Marias	10030203	MT41P001_022	MARIAS RIVER, county road crossing in T29N R6E Sec17 to mouth (Missouri River)
Middle Missouri	10040102	MT41R001_020	ARROW CREEK, Surprise Creek to the mouth (Missouri River)
Middle Yellowstone	10100001	MT42K002_170	EAST FORK ARMELLS CREEK, headwaters to Colstrip
Milk	10050010	MT40J005_020	COTTONWOOD CREEK, Black Coulee to the mouth (Milk River)
Milk	10050012	MT40O002_010	CHERRY CREEK, headwaters to the mouth (Milk River)
Milk	10050012	MT40O002_040	BEAVER CREEK, confluence of Little Beaver Creek and South Fork Beaver Creek (headwaters) to mouth (Willow Creek) south of Glasgow
Milk	10050014	MT40M002_020	LARB CREEK, headwaters to mouth (Beaver Creek)
Missouri-Sun-Smith	10030101	MT41I001_011	MISSOURI RIVER, headwaters to Toston Dam
Missouri-Sun-Smith	10030102	MT41Q001_021	MISSOURI RIVER, Little Prickly Pear Creek to Sheep Creek
Musselshell	10040201	MT40A002_020	ANTELOPE CREEK, headwaters to the mouth (Musselshell River)
Musselshell	10040205	MT40C004_020	LODGEPOLE CREEK, North & Middle Fork Lodgepole Creeks to the mouth (Musselshell River)
Upper Missouri Tribs.	10020004	MT41D004_230	SAWLOG CREEK, headwaters to mouth (Big Hole River)
Upper Yellowstone	10070004	MT43F002_022	CANYON CREEK, headwaters to highway 532
Upper Yellowstone	10070004	MT43F002_030	KEYSER CREEK, headwaters to the mouth (Yellowstone River)
Upper Yellowstone	10070004	MT43F002_040	VALLEY CREEK, headwaters to the mouth (Yellowstone River)

Watershed	HUC #	ID305B	Name, Location Description
Upper Yellowstone	10070006	MT43D002_010	ELBOW CREEK, headwaters to the mouth (Clarks Fork)
Upper Yellowstone	10070006	MT43D002_100	SILVERTIP CREEK, state line to the mouth (Clarks Fork)
Upper Yellowstone	10070006	MT43D002_140	COTTONWOOD CREEK, headwaters to the mouth (Clarks Fork of Yellowstone)
Upper Yellowstone	10070006	MT43D002_180	SOUTH FORK BRIDGER CREEK, tributary to Bridger Creek

Results of Probability-based Surveys

Section 303(d) List

Montana's 303(d) list includes 651 stream AUs, 26 lake AUs, and 13,450 AU/Beneficial Use/Cause/Source combinations (Appendix H, Section 3). This list includes all Category 5 impaired waters. Please refer to Appendix F for the most current TMDL development schedule that includes these waters. A list of category 4A and 4C impaired waters is located in Appendix H, Sections 1 and 2, respectively. Between the 2004 and 2006 integrated reporting cycle there were 57 de-listings (Table 14)[85].

[85] EPA and DEQ use "de-listing" to refer to a change in water quality category from 5 to 4a or 4b, 5 to 1 or 2 or removal of a cause from an impaired water.

Table 14. AU/Pollutant combinations removed from the State's Year 2004 Section 303(d) List

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
Flathead	17010206	MT76Q002_020	RED MEADOW CREEK, headwaters to mouth (North Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_030	WHALE CREEK, headwaters to mouth (North Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_040	SOUTH FORK COAL CREEK, headwaters to mouth (Coal Creek)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_070	COAL CREEK, headwaters to South Fork	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_080	COAL CREEK, South Fork to mouth (North Fork Flathead)	Sedimentation/Siltation	EPA approval of TMDL (4A)	24-May-05
	17010207	MT76I002_010	GRANITE CREEK, Confluence of Dodge Creek & Challenge Creek to mouth (Middle Fork Flathead)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76I002_050	MORRISON CREEK, headwaters to mouth (Middle Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
	17010211	MT76K002_010	SWAN LAKE	Sedimentation/Siltation	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_010	JIM CREEK, West Fork to mouth (Swan River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_031	GOAT CREEK, headwaters to Squeezer Creek	Nitrate/Nitrite (Nitrite + Nitrate as N)	State Determines water quality standard is being met	31-Aug-04
				Nitrogen (Total)	State Determines water quality standard is being met	31-Aug-04
				Phosphorus (Total)	State Determines water quality standard is being met	31-Aug-04
				Total Suspended Solids (TSS)	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_032	GOAT CREEK, Squeezer Creek to mouth (Swan River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Aug-04
		MT76K003_062	PIPER CREEK, Moore Creek to mouth (Swan River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Aug-04
Kootenai	17010101	MT76D002_080	BOBTAIL CREEK, headwaters to mouth (Kootenai River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	27-Apr-05
				Turbidity	EPA approval of TMDL (4A)	27-Apr-05
		MT76D004_060	GRAVE CREEK, Foundation Creek to the mouth (Fortine Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	10-May-05
Lower Clark Fork	17010204	MT76M004_010	NINEMILE CREEK, headwaters to the mouth (Clark Fork River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
		MT76M004_040	JOSEPHINE CREEK, headwaters to the mouth (Ninemile Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
		MT76M004_060	CEDAR CREEK, headwaters to the mouth (Ninemile Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
Lower Clark Fork	17010204	MT76M004_070	KENNEDY CREEK, headwaters to the mouth (Ninemile Creek)	Copper	EPA approval of TMDL (4A)	26-Jul-05
				Lead	EPA approval of TMDL (4A)	26-Jul-05
				Mercury	EPA approval of TMDL (4A)	26-Jul-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
				Zinc	EPA approval of TMDL (4A)	26-Jul-05
Marias	10030104	MT41K004_030	FREEZEOUT LAKE	Selenium	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	EPA approval of TMDL (4A)	23-Feb-05
				Total Dissolved Solids	EPA approval of TMDL (4A)	23-Feb-05
Middle Missouri	10040103	MT41S004_010	BIG SPRING CREEK, East Fork Big Spring Creek to Casino Creek	Polychlorinated biphenyls	EPA approval of TMDL (4A)	29-Sep-05
		MT41S004_020	BIG SPRING CREEK, East Fork to mouth (Judith River)	Phosphorus (Total)	EPA approval of TMDL (4A)	29-Sep-05
				Polychlorinated biphenyls	EPA approval of TMDL (4A)	25-Sep-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	29-Sep-05
Missouri-Sun-Smith	10030102	MT41Q003_020	MIDDLE FORK OF THE DEARBORN RIVER, headwaters to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
		MT41Q003_030	SOUTH FORK OF THE DEARBORN RIVER, headwaters to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
		MT41Q003_040	FLAT CREEK, Henry Creek to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
	10030104	MT41K001_010	SUN RIVER, Gibson Dam to Muddy Creek	Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Temperature, water	EPA approval of TMDL (4A)	23-Feb-05
		MT41K001_020	SUN RIVER, Muddy Creek to the mouth (Missouri River)	Nitrogen (Total)	EPA approval of TMDL (4A)	23-Feb-05

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
				Phosphorus (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Salinity	State Determines water quality standard is being met	23-Feb-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	State Determines water quality standard is being met	23-Feb-05
Missouri-Sun-Smith	10030104	MT41K001_020	SUN RIVER, Muddy Creek to the mouth (Missouri River)	Total Dissolved Solids	State Determines water quality standard is being met	23-Feb-05
				Total Suspended Solids (TSS)	EPA approval of TMDL (4A)	23-Feb-05
		MT41K002_010	MUDDY CREEK, headwaters to the mouth (Sun River)	Nitrogen (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Phosphorus (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Salinity	EPA approval of TMDL (4A)	23-Feb-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Selenium	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	EPA approval of TMDL (4A)	23-Feb-05
				Temperature, water	EPA approval of TMDL (4A)	23-Feb-05
				Total Dissolved Solids	EPA approval of TMDL (4A)	23-Feb-05
		MT41K002_020	FORD CREEK, from mouth 2 miles upstream (Smith Creek-Elk Creek-Sun River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
Upper Clark Fork	17010203	MT76F001_020	BLACKFOOT RIVER, Landers Fork to Nevada Creek	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04
		MT76F002_030	POORMAN CREEK, headwaters to the mouth (Blackfoot River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04
		MT76F002_070	ARRASTRA CREEK, headwaters to mouth (Blackfoot River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04

Designated Use Support Summaries

Streams and Rivers

To date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial stream beneficial uses that are fully supported are 15, 14, 13, 53, 44, 75, and 76 percent, respectively (Table 15). Similarly, to date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial stream beneficial uses that are not supported are 67, 73, 60, 23, 27, 9, and 9 percent, respectively (Table 15).

Table 15. Rivers and Streams Designated Use Support Summary

Clean Water Act Goals	Use	Total Size (Miles)	Size Assessed (Miles)	Size Fully Supporting (Miles)	Size Fully Supporting and Threatened (Miles)	Size Not Supporting (Miles)	Size Not Assessed (Miles)	Size with Insufficient Info (Miles)
Protect & Enhance Ecosystem	Aquatic Life	20,549	16,922	3,145	0	13,776	3,242	385
	Cold Water Fishery	11,824	10,246	1,658	0	8,588	1,085	493
	Warm Water Fishery	8,925	6,486	1,150	0	5,336	2,014	425
Protect & Enhance Public Health	Drinking Water	14,717	11,191	7,759	0	3,432	3,228	298
	Primary Contact Recreation	20,549	14,803	9,034	136	5,632	4,925	822
Social & Economic	Agricultural	14,765	12,450	11,124	0	1,326	2,091	224
	Industrial	14,765	12,599	11,227	0	1,372	1,961	206

*Includes waters that are partially supporting their beneficial uses.

The top 10 percent of causes of stream impairment represented in the State's ADB, based on percent total impaired stream miles are copper, lead, phosphorus (Total), sedimentation/siltation, water temperature, and Total Kjehldahl Nitrogen (TKN) (Table 16). Sedimentation/siltation is the leading cause of stream impairment the DEQ has identified to date. Approximately 42 percent of the percent total impaired stream miles are impaired by this pollutant. Montana's second leading cause of stream impairment is Phosphorous (Total). It affects 29 percent or 4,472 miles of impaired streams. Lead, Total Kjehldahl Nitrogen, copper, and water temperature effect approximately 20, 18, 18, and 15 percent of impaired streams, respectively.

Table 16. Causes of Stream Impairment in Montana

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Alterations in wetland habitats	1	0.13	12	0.08
Aluminum	21	2.63	290	1.90
Ammonia (Total)	3	0.38	63	0.41
Ammonia (Un-ionized)	7	0.88	228	1.50
Antimony	6	0.75	71	0.46
Arsenic	102	12.78	1,383	9.09
Barium	1	0.13	11	0.07

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Benthic-Macroinvertebrate Bioassessments (Streams)	4	0.50	65	0.42
Beryllium	1	0.13	5	0.03
BOD, Biochemical oxygen demand	1	0.13	51	0.34
Bottom Deposits	3	0.38	29	0.19
Cadmium	95	11.90	1,500	9.86
Chloride	1	0.13	16	0.11
Chlorophyll-a	77	9.65	1,475	9.69
Chromium (total)	10	1.25	301	1.98
Cobalt	1	0.13	11	0.07
Combined Biota/Habitat Bioassessments (Streams)	1	0.13	12	0.08
Copper	140	17.54	2,783	18.29
Cyanide	5	0.63	72	0.47
DDE	1	0.13	22	0.14
Dissolved Gas Supersaturation	1	0.13	3	0.02
Escherichia coli	3	0.38	75	0.49
Excess Algal Growth	20	2.51	308	2.02
Fecal Coliform	14	1.75	434	2.85
Habitat Assessment (Streams)	1	0.13	87	0.57
Iron	65	8.15	1,714	11.26
Lead	154	19.30	3,024	19.88
Manganese	14	1.75	143	0.94
Mercury	65	8.15	1,761	11.58
Mercury in Water Column	1	0.13	18	0.12
Nickel	8	1.00	167	1.10
Nitrate/Nitrite (Nitrite + Nitrate as N)	92	11.53	2,065	13.57
Nitrates	13	1.63	307	2.01
Nitrogen (Total)	71	8.90	1,628	10.70
Nitrogen, Nitrate	12	1.50	223	1.46
Nonnative Fish, Shellfish, or Zooplankton	1	0.13	10	0.06
Nutrient/Eutrophication Biological Indicators	3	0.38	26	0.17
Oil and Grease	1	0.13	24	0.16
Organic Enrichment (Sewage) Biological Indicators	4	0.50	182	1.19
Other	1	0.13	106	0.70
Oxygen, Dissolved	14	1.75	448	2.94
PCB in Water Column	1	0.13	24	0.16
Pentachlorobenzene	2	0.25	18	0.12
pH	20	2.51	344	2.26
Phosphate	1	0.13	10	0.07
Phosphorus (Total)	210	26.32	4,472	29.39
Polychlorinated biphenyls	2	0.25	31	0.20
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	1	0.13	18	0.12
Salinity	17	2.13	766	5.04
Sedimentation/Siltation	411	51.50	6,362	41.82
Selenium	18	2.26	321	2.11
Silver	12	1.50	141	0.92
Sodium	1	0.13	37	0.24

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Solids (Suspended/Bedload)	41	5.14	983	6.46
Specific Conductance	9	1.13	392	2.57
Sulfates	12	1.50	595	3.91
Temperature, water	92	11.53	2,243	14.74
Thallium	1	0.13	5	0.04
Total Dissolved Solids	23	2.88	1,177	7.74
Total Kjehldahl Nitrogen (TKN)	111	13.91	2,729	17.94
Total Suspended Solids (TSS)	5	0.63	99	0.65
Turbidity	14	1.75	156	1.02
Uranium	1	0.13	81	0.53
Zinc	92	11.53	1,564	10.28
Total Impaired*	**798**		**15,215**	

*These totals represent the total number and size of segments impaired by one or more causes.

The top 10 percent of sources of stream impairment represented in the State's ADB, based on percent total impaired stream miles are agriculture, grazing in riparian or shoreline zones, source unknown, irrigated crop production, natural sources, streambank modifications/destabilization, and rangeland grazing, (Table 17). Agriculture is the leading source of stream impairment the DEQ has identified to date. Approximately 35 percent of the percent total impaired stream miles are impaired from this source. Montana's second leading source of stream impairment is Grazing in Riparian or Shoreline Zones. It affects 34 percent or 5,198 miles of impaired streams. Source unknown, irrigated crop production, natural sources, streambank modification/destabilization, and impacts from hydrostructure flow regulation/modification are the source of impairment for approximately 28, 26, 22, 15, and 14 percent of impaired streams, respectively.

Table 17. Size of Rivers and Streams Impaired by Sources

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Above Ground Storage Tank Leaks (Tank Farms)	1	0.13	105	0.69
Acid Mine Drainage	59	7.39	649	4.26
Agriculture	189	23.68	5,349	35.15
Animal Feeding Operations (NPS)	18	2.26	405	2.66
Aquaculture (Permitted)	4	0.50	50	0.33
Atmospheric Deposition - Nitrogen	1	0.13	37	0.24
Atmospheric Deposition - Toxics	6	0.75	42	0.27
Baseflow Depletion from Groundwater Withdrawals	1	0.13	5	0.03
Channel Erosion/Incision from Upstream Hydromodifications	3	0.38	49	0.32
Channelization	93	11.65	1,857	12.20
Coal Mining	2	0.25	62	0.41
Construction Stormwater Discharge (Permitted)	1	0.13	14	0.09
Contaminated Sediments	25	3.13	309	2.03

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Crop Production (Crop Land or Dry Land)	20	2.51	579	3.81
Crop Production with Subsurface Drainage	1	0.13	45	0.29
Dam Construction (Other than Upstream Flood Control Projects)	15	1.88	557	3.66
Dam or Impoundment	27	3.38	1,356	8.91
Discharges from Municipal Separate Storm Sewer Systems (MS4)	1	0.13	12	0.08
Dredge Mining	14	1.75	133	0.88
Drought-related Impacts	5	0.63	109	0.71
Erosion from Derelict Land (Barren Land)	1	0.13	2	0.01
Flow Alterations from Water Diversions	72	9.02	1,401	9.21
Forest Roads (Road Construction and Use)	95	11.90	953	6.27
Freshettes or Major Flooding	1	0.13	11	0.07
Golf Courses	3	0.38	168	1.10
Grazing in Riparian or Shoreline Zones	299	37.47	5,198	34.16
Habitat Modification - other than Hydromodification	30	3.76	498	3.27
Hardrock Mining Discharges (Permitted)	1	0.13	36	0.24
Heap-leach Extraction Mining	2	0.25	5	0.03
Highway/Road/Bridge Runoff (Non-construction Related)	45	5.64	694	4.56
Highways, Roads, Bridges, Infrastructure (New Construction)	52	6.52	1,050	6.90
Hydrostructure Impacts on Fish Passage	7	0.88	125	0.82
Impacts from Abandoned Mine Lands (Inactive)	152	19.05	1,890	12.42
Impacts from Hydrostructure Flow Regulation/modification	77	9.65	2,061	13.54
Impacts from Resort Areas (Winter and Non-winter Resorts)	2	0.25	93	0.61
Industrial Point Source Discharge	10	1.25	249	1.64
Industrial/Commercial Site Stormwater Discharge (Permitted)	1	0.13	8	0.05
Irrigated Crop Production	188	23.56	3,920	25.76
Livestock (Grazing or Feeding Operations)	8	1.00	125	0.82
Loss of Riparian Habitat	73	9.15	1,711	11.24

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Low Water Crossing	2	0.25	47	0.31
Managed Pasture Grazing	4	0.50	90	0.59
Mill Tailings	26	3.26	403	2.65
Mine Tailings	57	7.14	505	3.32
Municipal (Urbanized High Density Area)	1	0.13	7	0.05
Municipal Point Source Discharges	22	2.76	735	4.83
Natural Sources	116	14.54	3,301	21.69
Non-irrigated Crop Production	14	1.75	642	4.22
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	10	1.25	97	0.63
Open Pit Mining	3	0.38	7	0.05
Other Recreational Pollution Sources	2	0.25	21	0.14
Permitted Runoff from Confined Animal Feeding Operations (CAFOs)	1	0.13	51	0.34
Petroleum/natural Gas Production Activities (Permitted)	1	0.13	18	0.12
Pipeline Breaks	1	0.13	18	0.12
Placer Mining	33	4.14	277	1.82
Post-development Erosion and Sedimentation	3	0.38	116	0.76
Rangeland Grazing	86	10.78	2,102	13.81
Residential Districts	4	0.50	185	1.22
Sediment Resuspension (Clean Sediment)	2	0.25	31	0.20
Sediment Resuspension (Contaminated Sediment)	1	0.13	23	0.15
Septage Disposal	2	0.25	9	0.06
Silviculture Activities	79	9.90	880	5.78
Silviculture Harvesting	47	5.89	492	3.24
Site Clearance (Land Development or Redevelopment)	20	2.51	465	3.06
Source Unknown	161	20.18	4,206	27.65
Sources Outside State Jurisdiction or Borders	1	0.13	3	0.02
Spills from Trucks or Trains	1	0.13	26	0.17
Streambank Modifications/destabilization	100	12.53	2,308	15.17

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Subsurface (Hardrock) Mining	31	3.88	309	2.03
Surface Mining	15	1.88	142	0.94
Transfer of Water from an Outside Watershed	8	1.00	180	1.18
Unspecified Unpaved Road or Trail	49	6.14	558	3.67
Unspecified Urban Stormwater	1	0.13	29	0.19
Upstream Impoundments (e.g., Pl-566 NRCS Structures)	7	0.88	129	0.85
Upstream Source	7	0.88	73	0.48
Watershed Runoff following Forest Fire	5	0.63	90	0.59
Wet Weather Discharges (Non-Point Source)	1	0.13	15	0.10
Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)	3	0.38	84	0.55
Yard Maintenance	3	0.38	26	0.17
Total Impaired*	**798**		**15,215**	

*These totals represent the total number and size of segments impaired by one or more sources.

Lakes

To date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial lake beneficial uses that are fully supported are 19, 40, 47, 38, 41, 43, and 51 percent, respectively (Table 18). Similarly, to date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial beneficial uses that are not supported are 35, 9, 47, 51, 52, 9, and 1 percent, respectively (Table 18).

Table 18. Lakes Designated Use Support Summary

Clean Water Act Goals	Use	Total Size (Acres)	Size Assessed (Acres)	Size Fully Supporting (Acres)	Size Fully Supporting and Threatened (Acres)	Size Not Supporting (Acres)	Size Not Assessed (Acres)	Size with Insufficient Info (Acres)
Protect & Enhance Ecosystem	Aquatic Life	606,291	332,905	114,860	6,030	212,015	273,386	0
	Cold Water Fishery	550,861	273,300	219,815	6,030	47,456	277,561	0
	Warm Water Fishery	55,430	51,921	25,940	0	25,981	3,509	0
Protect & Enhance Public Health	Drinking Water	596,332	532,204	227,239	0	304,965	64,128	0
	Primary Contact Recreation	606,291	565,744	250,889	0	314,855	40,547	0
Social & Economic	Agricultural	594,723	308,809	254,234	0	54,575	285,914	0
	Industrial	594,723	312,914	305,217	0	7,697	281,810	0

*Includes waters that are partially supporting their beneficial uses.

The top 10 percent of causes of lake impairment represented in the State's ADB, based on percent total acres impaired are lead and mercury (Table 19). Mercury is the leading cause of lake impairment the DEQ has identified to date. Approximately 78 percent (392,276 acres) of the total impaired lake acres are impaired by this pollutant. Montana's second leading cause of lake impairment, based on percent total acres impaired is lead. It affects 51percent (257,122 acres) of the total impaired lake acres.

Table 19. Size of Lakes Impaired by Causes

Cause	Waterbodies Impaired	% of Total Waterbodies Impaired	Acres Impaired	% Total Acres Impaired
Ammonia (Un-ionized)	1	3.23	35,180	6.96
Arsenic	4	12.90	36,809	7.28
Cadmium	2	6.45	8,619	1.71
Chlorophyll-a	2	6.45	5,020	0.99
Chromium (total)	1	3.23	3,781	0.75
Copper	2	6.45	1,923	0.38
DDT	1	3.23	3,800	0.75
Endosulfan	1	3.23	3,800	0.75
Endrin aldehyde	1	3.23	3,800	0.75
Excess Algal Growth	2	6.45	40,780	8.07
Iron	1	3.23	1,903	0.38
Lead	5	16.13	257,122	50.88
Mercury	7	22.58	392,276	77.63
Nitrogen (Total)	2	6.45	131,607	26.04
Other	1	3.23	80	0.02
Oxygen, Dissolved	2	6.45	4,153	0.82
pH	1	3.23	20	0.00
Phosphorus (Total)	4	12.90	133,761	26.47
Polychlorinated biphenyls	2	6.45	129,357	25.60
Salinity	7	22.58	13,972	2.76
Sedimentation/Siltation	6	19.35	135,722	26.86
Selenium	5	16.13	13,575	2.69
Sulfates	3	9.68	9,400	1.86
Thallium	1	3.23	35,180	6.96
Total Dissolved Solids	2	6.45	3,800	0.75
Total Kjehldahl Nitrogen (TKN)	1	3.23	353	0.07
Zinc	1	3.23	20	0.00
Total Impaired*	**31**		**505,325**	

*These totals represent the total number and size of waterbodies impaired by one or more causes.

The top 10 percent of sources of lake impairment represented in the State's ADB, based on percent total impaired lake acres are agriculture, atmospheric deposition – toxics, and impacts from abandoned mine lands (Inactive) (Table 20). Agriculture is the leading source of lake impairment the DEQ has identified to date. Approximately 61 percent of the percent total impaired lake acres are impaired from this source. Montana's second leading source of lake impairment is impacts from abandoned mine lands (Inactive). It affects 58 percent or 291,081 acres of impaired lakes. Montana's third leading source of lake impairment is from atmospheric deposition – toxics. It affects 51 percent or 259,099 acres of impaired lakes.

Table 20: Size of Lakes Impaired by Sources

Source	Waterbodies Impaired	% of Total Waterbodies Impaired	Acres Impaired	% of Total Acres Impaired
Acid Mine Drainage	3	9.68	40,561	8.03
Agriculture	15	48.39	309,209	61.19
Atmospheric Deposition - Nitrogen	1	3.23	126,007	24.94
Atmospheric Deposition - Toxics	3	9.68	259,099	51.27
Dam or Impoundment	2	6.45	32,350	6.40
Drought-related Impacts	1	3.23	4,888	0.97
Forest Roads (Road Construction and Use)	2	6.45	6,030	1.19
Grazing in Riparian or Shoreline Zones	3	9.68	4,852	0.96
Habitat Modification - other than Hydromodification	1	3.23	3,781	0.75
Highway/Road/Bridge Runoff (Non-construction Related)	1	3.23	3,800	0.75
Highways, Roads, Bridges, Infrastructure (New Construction)	3	9.68	3,364	0.67
Historic Bottom Deposits (Not Sediment)	2	6.45	250,500	49.57
Impacts from Abandoned Mine Lands (Inactive)	6	19.35	291,081	57.60
Impacts from Hydrostructure Flow Regulation/modification	7	22.58	143,389	28.38
Inappropriate Waste Disposal	1	3.23	5,500	1.09
Internal Nutrient Recycling	1	3.23	35,180	6.96
Irrigated Crop Production	7	22.58	23,290	4.61
Low Water Crossing	1	3.23	1,126	0.22
Municipal Point Source Discharges	3	9.68	164,687	32.59
Natural Sources	5	16.13	46,264	9.16
Non-irrigated Crop Production	1	3.23	675	0.13
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	1	3.23	35,180	6.96
Petroleum/natural Gas Activities	1	3.23	9	0.00
Placer Mining	1	3.23	5,500	1.09
Rangeland Grazing	2	6.45	3,332	0.66
Silviculture Activities	3	9.68	8,670	1.72
Silviculture Harvesting	1	3.23	126,007	24.94
Site Clearance (Land Development or Redevelopment)	1	3.23	35,180	6.96
Source Unknown	9	29.03	156,792	31.03
Unspecified Urban Stormwater	1	3.23	126,007	24.94
Upstream Impoundments (e.g., Pl-566 NRCS Structures)	1	3.23	126,007	24.94
Upstream Source	2	6.45	3,332	0.66
Upstream/Downstream Source	1	3.23	353	0.07
Total Impaired*	**31**		**505,325**	

*These totals represent the total number and size of waterbodies impaired by one or more sources.

CWA Section 314 (Clean Lakes Program)

The last year DEQ received federal CWA Section 314 funds for the Clean Lakes Program was in 1994. Since 1998, when this grant was closed, Montana has been unable to support the Clean Lakes Program due to lack of funding. Table 21 and Table 22 represent the limited information DEQ has on lake trophic status and water quality trends.

Trophic Status and Tend Analysis

The DEQ has limited data to evaluate lakes in the state, nonetheless, some assessment of lake trophic status (Table 21) and water quality trend (Table 22) were entered into DEQ's ADB. Out of the 62 (604,579 acres) lakes represented in the ADB, 60 have been assessed for trophic status. Fifty-three percent of the assessed lakes in Montana are Mesotrophic, 34 percent are Oligotrophic, and 6 percent are Eutrophic. Similarly, out of the 62 lakes represented in the ADB, only 11 have been assessed for trends, 4 of these lakes have been characterized as stable and 7 as unknown.

Table 21: Trophic Status of Significant Publicly Owned Lakes

Trophic Status	Number of Lakes	Total Size (Acres)
Dystrophic	0	0
Eutrophic	10	38,546
Hypereutrophic	0	0
Mesotrophic	16	319,106
Oligotrophic	10	207,428
Unknown	24	39,483

Table 22: Trends in Lake Quality

Trend	Number	Acres
Stable	4	22,410.1
Unknown	7	269,844.4
Total Assessed for Trends	**11**	**292,255**

C.4. Wetlands Program

Please refer to section C.1 Monitoring Program for material related to the State's Wetland Program.

C.5 Trend Analysis for Surface Waters

Please refer to section C.3 Assessment Results for material related to surface water trends.

C.6 Public Health Issues

This sub-section provides information on fish kills, fish consumption advisories, the state's public water supplies, public health issues, and information on Montana's programs related to regulated drinking water supplies.

Fish Kills

Three fish kills were reported to the Montana Department of Fish Wildlife and Parks (FWP) from 2004 and 2006[86]:

1. Clark Fork River near Deer Lodge, July 17 - 28, 2004. A FWP employee reported approximately 7 - 9 dead fish (unidentified species). The cause of the fish kill is not known.
2. Boulder River near Boulder, October 28, 2004. An individual reported six fish (unidentified species) that were killed in one eddy of the river. The cause of the fish kill is not known.
3. Lake Koocanusa near Five Mile Creek, August 15, 2005. A MTFWP employee reported over 10,000 dead Kokanee. The cause of the fish kill is not known.

[86] Skaar, D. RE: Request for Information related to fish kills, dewatered streams, and fish consumption advisories 2006 June 29, 9:49 am [cited 2006 June 29].

Fish Consumption Advisories

The Montana Department of Public Health and Human Services (DPHHS) issues sport fishing consumption guidelines each year. During 2005, the DPHHS issued fish consumption advisories for fish from lakes and rivers that have been tested for mercury and PCBs from over 20 locations in Montana (Table 23)[87].

Table 23. Laboratory Test Results: Mercury and PCBs in Fish in Montana (Concentration Expressed in Micrograms per Gram of Fish)[88]

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
Bighorn Lake Bighorn County	Walleye	9.8 - 15.1	0.20	nd2
		19.2 - 20.7	0.58	nd
		27.0 - 27.5	1.40	nd
Big Spring Creek Fergus County	Rainbow Trout	6.9 - 11.9	nd	0.07
		12.7 - 14.0	nd	0.16
		14.2 - 16.3	nd	0.24
Bynum Reservoir Teton County	Walleye	7.7 - 11.0	0.38	nd
		14.2 - 16.9	0.56	nd
		17.5 - 19.0	0.37	nd
Canyon Ferry Reservoir Broadwater & Lewis & Clark County	Rainbow Trout	8.9 - 12.5	0.11	nd
		14.7 - 17.4	0.11	nd
		18.2 - 19.7	0.14	nd
	Yellow Perch	5.2 - 6.9	0.10	nd
		7.0 - 9.3	0.11	nd
		9.4 - 11.6	0.20	nd

[87] Montana Department of Public Health and Human Services (US) [DPHHS]. 2005 Montana Sport Fish Consumption Guidelines [online document]. Helena, MT: DPHHS, Communicable Disease Control & Prevention Bureau Food & Consumer Safety Section; 2005. Available from: http://www.dphhs.mt.gov/fish2005.pdf.
[88] Ibid

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
	Burbot	14.8 - 17.7	0.18	nd
	Walleye	8.8 - 16.9	0.17	nd
		17.3 - 22.2	0.34	nd
		24.6 - 27.8	0.50	nd
Clark Canyon Reservoir Beaverhead County	Rainbow Trout	11.6 - 15.9	0.08	nd
		17.0 - 19.4	0.12	nd
		20.2 - 22.8	0.16	nd
	Burbot	26.2 - 27.1	0.07	nd
Cooney Reservoir Carbon County	Rainbow Trout	7.6 - 9.2	0.07	nd2
		11.7 - 12.9	nd	nd
		12.9 - 13.7	nd	nd
	Walleye	8.8 - 13.1	0.30	nd
		16.7 - 22.2	0.39	nd
		25.6 - 27.4	0.37	nd
Crystal Lake Fergus County	Cutthroat Trout	6.0 - 10.0	0.13	nd
		10.0 - 4.0	0.16	nd
		14.0 - 18.0	0.16	nd
Flathead Lake Flathead County & Lake County	Lake Trout	18.0 - 26.7	0.33	0.08
		27.6 - 32.1	0.70	0.16
		32.2 - 38.8	0.91	0.38

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
	Lake Whitefish	11.4 - 14.1	0.12	nd
		15.2 - 17.7	0.18	nd
		17.9 - 18.9	0.22	nd
Fort Peck Reservoir Valley, Garfield and Phillips County	Walleye	8.8 - 14.9	0.28	nd
		15.1 - 20.8	0.35	nd
		21.7 - 27.3	0.58	nd
	Northern Pike	20.8 - 24.9	0.03	nd
		26.8 - 32.8	0.41	nd
		34.3 - 36.0	0.57	nd
	Lake Trout	24.7 - 28.5	0.28	nd
		28.9 - 32.0	0.53	nd
	Chinook Salmon	28.5 - 33.6	0.49	nd
Fresno Reservoir Hill County	Walleye	9.1 - 14.0	0.16	nd2
		14.5 - 17.3	0.27	nd
		>17.3	0.75	nd
Georgetown Lake Granite & Deer Lodge Counties	Brook Trout	10.7 - 12.5	0.10	nd2
		12.8 - 15.0	nd	nd
		15.8 - 15.9	nd	nd
	Kokanee	11.7 - 13.3	0.05	nd
Hauser Reservoir Lewis & Clark County	Kokanee	6.3 - 7.1	0.05	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
		11.5 - 13.0	0.05	nd
		16.9 - 20.6	0.19	nd
	Rainbow Trout	10.4 - 12.1	0.10	nd
		15.9 - 17.6	nd	nd
	Yellow Perch	5.3 - 7.7	nd	nd
		8.1 - 10.1	nd	nd
		11.1 - 14.4	0.14	nd
Hebgen Lake Gallatin County	Brown Trout	11.2 - 13.8	0.17	nd
		14.7 - 17.7	0.26	nd
		19.2 - 25.6	0.60	nd
Holter Lake Lewis & Clark County	Kokanee	10.5 - 14.0	0.09	nd
		15.8 - 16.6	0.09	nd
		19.5 - 22.1	0.38	nd
	Rainbow Trout	12.6 - 13.5	0.08	nd
		14.0 - 17.5	0.07	nd
		17.7 - 19.5	nd	nd
	Walleye	12.0 - 19.5	0.25	nd
		19.7 - 24.1	0.32	0.08
		25.0 - 26.7	0.40	0.05
	Yellow Perch	8.2 - 10.0	0.19	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
		10.4 - 11.9	0.26	nd
Island Lake Lincoln County	Yellow Perch	6.0 - 10.0	0.22	nd
Lake Frances Pondera County	Walleye	12.4 - 14.0	0.45	nd
		16.0 - 17.8	0.75	nd
		18.4 - 20.8	0.91	nd
Lake Koocanusa Lincoln County	Burbot	14.2 - 16.1	0.10	nd
		19.1 - 21.3	0.25	nd
	Kokanee	9.3 - 11.9	0.13	nd
		12.8 - 14.0	0.11	nd
		14.1 - 15.2	0.11	nd
Lake Mary Ronan Lake County	Rainbow Trout	13.2 - 15.2	nd	nd
		15.5 - 16.6	nd	nd
	Kokanee	8.7 - 9.7	0.22	nd
		9.9 - 10.9	0.13	nd
		10.7 - 12.0	0.13	nd
Martinsdale Reservoir Meagher & Wheatland Counties	Brown Trout	20.4 - 30.4	0.26	nd
	Rainbow Trout	9.6 - 12.2	0.11	nd
		14.8 - 16.2	0.13	nd
		16.6 - 17.0	0.12	nd
Milltown Reservoir Missoula County	Northern Pike	4.0 - 18.0	0.04	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
		18.0 - 22.0	0.04	nd
		22.0 - 26.0	0.04	nd
Nelson Reservoir Phillips County	Walleye	14.0 - 17.5	0.13	nd
		19.0 - 20.6	0.16	nd
		22.1 - 23.2	0.64	nd
		24.5 - 26.0	0.67	nd
	Northern Pike	24.0 - 26.1	0.15	nd
Park Lake Jefferson County	Arctic Grayling	6.0 - 10.0	0.01	nd
	Cutthroat Trout	6.0 - 10.0	0.01	nd
		10.0 -14.0	0.01	nd
Seeley Lake Missoula County	Rainbow Trout	18.2 - 20.1	nd2	0.06
	Mountain Whitefish	9.3 - 10.4	nd	nd
		10.6 - 11.1	0.08	nd
		11.2 - 11.6	0.10	nd
Silver Creek4 (near Helena)	Cutthroat Trout Catch & Release)	12.7	1.6	_3
		17.1	3.1	_
		18.7	3.0	_
Swan Lake County	Kokanee	7.5 - 11.2	0.06	nd
		12.2 - 12.9	0.07	nd
		14.3 - 17.7	0.08	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg[1]	PCB
	Bull Trout	11.3 - 17.0	0.10	nd
		17.8 - 19.5	0.12	nd
		19.6 - 23.2	0.10	nd
	Northern Pike	22.0 - 25.6	0.22	nd
		38.3	0.53	nd
Tiber Reservoir (Lake Elwell) Liberty Co.	Walleye	9.5 - 10.7	0.23	nd2
		10.9 - 14.4	0.54	nd
		16.9 - 19.7	0.78	nd
Tongue River Reservoir Bighorn County	Walleye	10.2 - 12.9	0.13	nd
		16.1 - 22.5	0.26	nd
		25.0 - 26.4	0.46	nd
	Northern Pike	24.9 - 26.2	0.17	nd
		28.2 - 30.0	0.30	nd
Willow Creek Reservoir (Harrison Lake) Madison County	Rainbow Trout	8.1 - 13.4	0.06	nd
		15.2 - 17.7	0.06	nd
		17.9 - 19.3	0.08	nd
Whitefish Lake Flathead County	Lake Trout	14.8 - 18.2	0.24	nd
		19.4 - 22.7	0.32	nd
		24.0 - 26.6	0.42	0.069
	Northern Pike	26.2 - 30.1	0.32	nd2

[1]Hg is the scientific abbreviation for mercury.

[2]"nd" means None Detected.
[3]Indicates that no fish were collected. Data are not available, and no consumption advice is issued.
[4]Closed to harvest; catch & release only.

In 2005, catch-and release fishing regulations were in affect for Silver Creek because of mercury contamination. Meal guidance for fish with the level of contamination found in Silver Creek is to not eat any of the fish in Silver Creek. The source of mercury in Silver Creek is probably from the historic use of mercury to recover gold from ore taken from mines in the upper part of the drainage. Current fishing regulations do not allow fish from this stream to be harvested or eaten. This is the only fish consumption related closure in the state.

Public Water Supplies

Introduction

In 1974, Congress passed the Safe Drinking Water Act (SDWA), the first national legislation regarding drinking water. The Act, and its revisions, required the EPA to adopt regulations establishing minimum requirements for drinking water quality and treatment. Public water systems must meet these requirements before water can be served to the public for consumption. The Act also required owners of public water systems to notify their customers when violations of the regulations occur.

In response to growing concern over contamination of drinking water, Congress amended the SDWA in 1986 to significantly increase monitoring and treatment requirements. Although the 1986 amendments resolved many shortcomings in the original legislation, it became apparent that additional revisions were needed to better prioritize and address health risks associated with drinking water. In August 1996, Congress again amended the SDWA to address these issues.

Included in the 1996 amendments was a requirement that states prepare an annual compliance report (Acres) that describe the status of compliance of public water systems with the SDWA. In Montana, the DEQ implements the requirements of the SDWA under an agreement with EPA. The Public Water Supply (PWS) Section in DEQ regulates approximately 2,046 public water systems in Montana. DEQ has completed the ACR for calendar year 2004 that describes the status of compliance with the SDWA in Montana. The report lists and explains the number of violations of the requirements of the SDWA according to whether the violation was related to a drinking water standard, a water treatment requirement, or a water quality monitoring/reporting requirement. Violations are further listed according to the rule violated.

Public Water Systems in Montana

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

1. Community (CWS) systems. Public water systems that serve the same resident population every day such as cities, towns, subdivisions and trailer courts;
2. Non-transient non-community (NTNC) systems. Public water systems serving the same nonresident population for at least six months of the calendar year such as schools and places of business; and
3. Transient non-community (TNC) systems. Public water systems serving a transient population such as restaurants, campgrounds, and taverns).

There are 675 active community water systems, 225 NTNC systems, and 1,163 TNC systems in Montana as of June 2005 in Montana. They serve drinking water to approximately one million people daily.

Since 1967, the Montana Water and Wastewater Operator Certification Law has required that every community public water system retain at least one individual that is fully certified and in compliance with state regulations. Similar requirements apply to operators of public wastewater treatment systems. The 1997 Montana Legislature amended this law requiring the certification of operators of NTNC public water systems beginning in July of 1998. Montana's water and wastewater system operators must have appropriate experience, pass specialized examinations, and obtain continuing education credits in order to remain fully certified.

Drinking Water Quality in Montana

Most Montana residents are privileged to have safe, potable drinking water. Many springs, wells, streams and lakes used to supply drinking water to the public receive flow from naturally protected mountain watersheds. Surface water and ground water sources are further protected against significant degradation by federal or state laws. Some surface water sources serving the public are so pristine that disinfection is the only required treatment prior to consumption. Most groundwater sources are naturally protected against contamination and used without treatment.

Because most contaminants in drinking water cannot be detected by sight or smell, owners of public water systems regularly submit water samples for extensive testing by certified laboratories. Treatment is required when natural or man-made contaminants are detected in water samples, or when sources are not adequately protected by natural barriers.

Since the original SDWA was passed in 1974, the quality of drinking water has improved dramatically in Montana and across the United States. Increasing awareness of water contamination, and the associated health effects, has often focused the public's attention on drinking water. The 1986 and 1996 amendments to the SDWA have required increasingly stringent monitoring and treatment of drinking water supplied to the public. As a result, Montana residents are supplied with drinking water from public water systems that is much safer than when the original SDWA was passed in 1974.

Drinking Water Contaminants

Contaminants found in drinking water can be grouped into four general categories:

1. **Microbiological** - contaminants are primarily disease-causing microorganisms, or microorganisms that indicate that other disease-causing organisms are present. Certain viruses, bacteria, and protozoa are disease-causing organisms that can be transmitted to humans from contaminated drinking water. Although such problems are relatively rare, serious water-borne disease outbreaks still occur in the United States from improper disposal of human or animal wastes and from inadequate treatment of drinking water. All public water systems must sample regularly for coliform bacteria. Although coliform bacteria are not always a health risk, their presence in drinking water indicates that disease-causing microorganisms may be present. Surface water sources must be carefully treated before they can be used for human consumption. Some groundwater sources are also treated for microbiological contaminants because they have been compromised by a lack of natural protection or by improper disposal of human or animal wastes.
2. **Inorganic chemicals (IOCs)** - chemicals that contain no carbon. Examples of regulated IOCs are arsenic, fluoride, lead, and nitrate. Inorganic contaminants can cause a wide variety of health effects depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. High nitrate levels in drinking water can impair the transfer of oxygen to the blood in infants. High lead levels can impair intellectual development in children. Most of the inorganic Maximum Contaminant Level (MCL) violations in Montana are fluoride and nitrate violations.
3. **Organic chemicals** – chemical that contain carbon. Organic chemicals are grouped into two broad categories: volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). VOCs can be removed from water simply by aerating or heating the water. Examples of VOCs are solvents like perchloroethylene, toluene, and xylene. SOCs must typically be removed by more complex technologies involving filtration or adsorption. Examples of SOCs are insecticides, herbicides, and polychlorinated bi-phenyls (PCBs). Organic contaminants can cause a wide variety of health effects depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. Fortunately, very few MCL violations for VOCs and SOCs have been found in Montana.
4. **Radionuclides** - such as Radium, usually occur naturally. Radionuclides in drinking water can cause cancer or toxic effects, again depending upon the concentration and time of exposure. There are no current MCL violations for radionuclides in Montana.

<u>Surface water systems</u>

The most dramatic improvements in the treatment of drinking water since 1974 have been in the filtration and disinfection of surface water. Surface water is generally more susceptible to contamination than groundwater. Many surface water sources have historically been inadequately treated because of a lack of awareness regarding water-borne diseases, chemical contaminants, and the health effects associated with these contaminants. In response to outbreaks of water-borne disease, such as giardiasis and cryptosporidiosis, knowledge and technology related to treatment of surface water have been greatly enhanced.

The primary objective in treating surface water is to remove or inactivate microbiological contaminants that can cause disease, i.e. viruses, bacteria, and protozoa. Diseases can be transmitted to humans by consuming water that has been contaminated with animal or human wastes. Adequate treatment of microbiological contaminants is essential because they can cause acute health effects. People with compromised immune systems, such as infants, the elderly, the very ill, and HIV-positive individuals, may be especially vulnerable to water-borne disease.

There are 233 public water systems in Montana that use surface water as a primary or secondary source (Figure 10). These systems include 31 systems that are served by Groundwater under Direct Influence of Surface Water (GWUDISW). These GWUDISW systems are considered to be surface water systems for the purpose of regulation. Of the 233 systems, 146 are “purchased systems,” meaning they rely on other water systems for their primary, or supplemental water supply. Although relatively few in number, the largest public water systems in Montana use surface water and they serve over 400,000 people on a daily basis.

Groundwater systems

Regular, prescriptive sampling of groundwater (GW) sources serving the public in Montana has occasionally detected unacceptable levels of microbiological, inorganic, organic, and radiological contaminants. Unfortunately, natural purification of contaminated groundwater is usually much slower than surface water. Natural "flushing" of contaminants through a groundwater aquifer can take many tens or hundreds of years. Microbiological contaminants can enter groundwater from leaking sewers and poorly constructed sewage lagoons or septic systems. Some inorganic and radiological contaminants, e.g. arsenic and radium, are naturally occurring. Most organic contaminants, e.g. solvents and pesticides, are man-made. Organic contaminants that are found in groundwater are usually the result of improper use or disposal of chemicals.

Most public water systems in Montana use groundwater as a primary or secondary source. There are 1,829 public water systems in Montana that use groundwater as their primary source (Figure 10). These groundwater sources serve over 500,000 people on a daily basis.

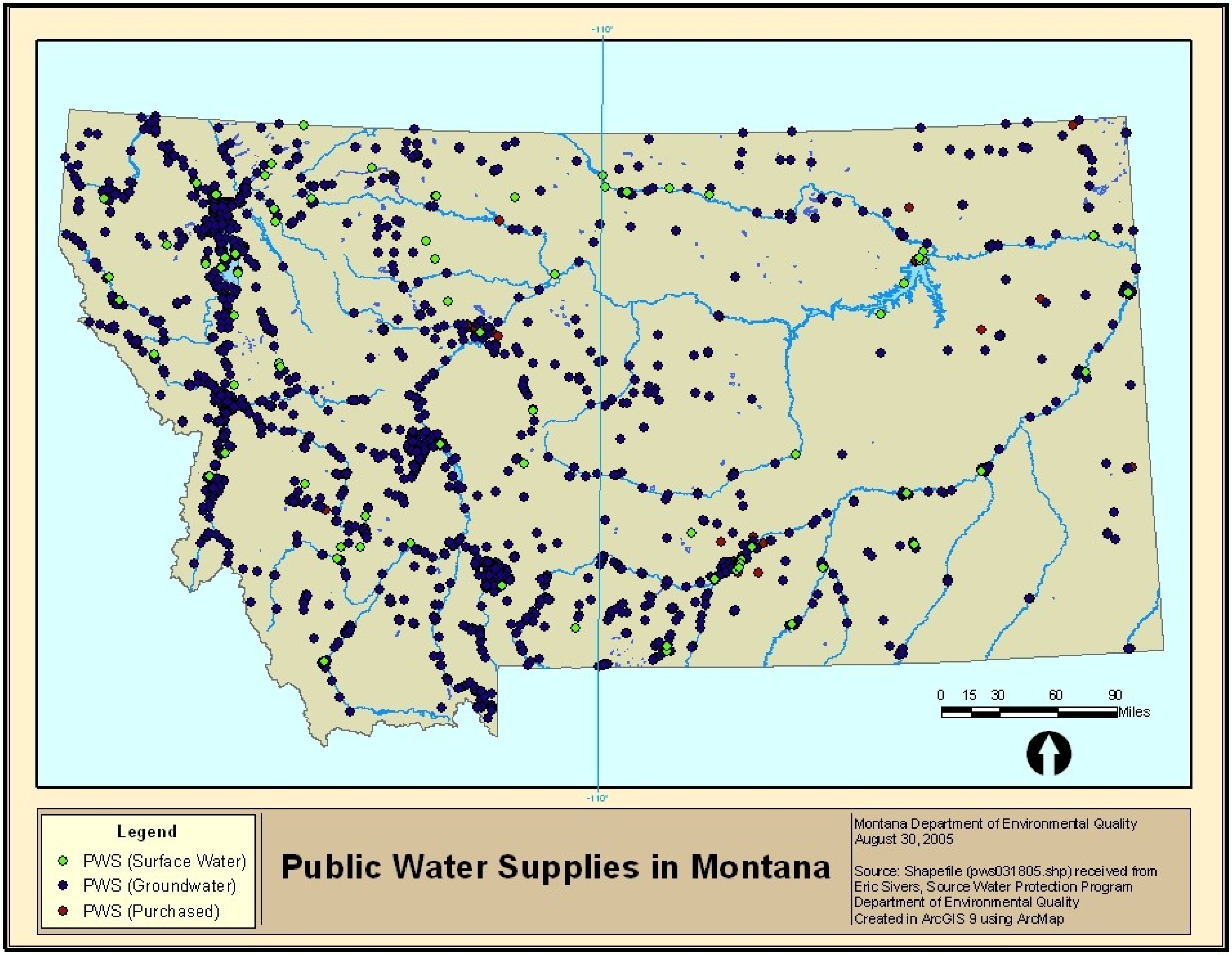

Figure 10. Distribution of Public Water Supply Sources in Montana

Regulations and Enforcement

EPA and DEQ regulations regarding water quality monitoring and water treatment have become very comprehensive and complex. Most water system owners are willing to comply with EPA and DEQ water quality monitoring regulations, but are sometimes confused by the complex nature of these regulations. Since 1989, monitoring and treatment requirements have increased significantly. In 1993, several regulations almost simultaneously became effective that imposed complex new requirements. Many monitoring violations resulted, often simply due to a lack of understanding of the regulations. In 2004, a few more regulations became effective, imposing even more requirements upon water systems.

When contaminants are detected at unacceptable levels, or when water treatment methods are found to be inadequate, owners of public water systems are required to notify the public. Appropriate corrective action is then required by DEQ to treat or abandon the affected water source(s). The public must also be notified when water samples are not taken as required.

When possible, PWS Section staff or DEQ contractors resolve violations informally with the water system. This may involve phone calls, field visits, or on-site technical assistance. Technical assistance is also often provided by Montana Rural Water Systems or the Midwest Assistance Program. Most violations are resolved informally by the willing cooperation of the water system. When violations are difficult to resolve, DEQ may initiate formal enforcement actions such as administrative orders to ensure public health protection.

Most water systems are in substantial compliance with the regulations. The largest numbers of violations were the result of late or missed water samples. The most significant public water system violations in 2004 are regarded as those resulting from inadequately treated surface water, coliform bacteria contamination, and corrosive water conditions that accelerate the leaching of lead from brass and solder in home plumbing.

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

Violations in 2004

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

Maximum contaminant levels (MCLs). MCLs are maximum levels of contaminants that may be present in drinking water. Federal and state regulations regard drinking water that contains contaminants at levels below the MCLs as safe for human consumption.

- Treatment requirements. Treatment requirements are imposed when MCLs are exceeded, or when natural protection against contamination is inadequate to ensure safe drinking water without treatment.
- Variances and exemptions. Variances may be issued by DEQ when treatment has been installed, but has not been effective in meeting MCLs. Variances impose further requirements for meeting the MCL, or for installing alternative treatment. Exemptions are issued to simply allow additional time to meet an MCL or treatment requirement. DEQ must consider public health impacts and affordability when variances and exemptions are issued. In addition to imposing deadlines for making system improvements, variances and exemptions impose requirements for public notification. No violations of variances or exemptions were recorded in 2004.
- Monitoring requirements. As previously discussed, new regulatory requirements include extensive water sampling and testing requirements. Violations are created when water is not sampled or when results of tests are not submitted. Most monitoring violations are resolved when sampling is resumed and public notice is posted, or when late reports are submitted.

- Reporting requirements. All community water systems are required to provide a consumer confidence report to the State and its users each year. The supplier remains in violation until they appropriately distribute the report.

Below are tables that include the above violation information for the specific regulations adopted by EPA for 2004. These regulations are the Phase 2 and Phase 5 (Phase 2/5) Rules, the Total Coliform Rule (TCR), the Surface Water Treatment Rule (SWTR), the Disinfection Byproducts Rule (DBP), the Lead and Copper Rule (LCR), the Radionuclides Rule, and the Consumer Confidence Report Rule.

Phase 2/5 Rule

Table 24 shows the violations of MCLs and monitoring requirements for synthetic organic chemicals (SOCs), volatile organic chemicals (VOCs), inorganic chemicals (IOCs), and for nitrate/nitrite in calendar year 2004. Monitoring frequency for VOCs, IOCs, SOCs, and nitrates/nitrites for community and non-transient non-community public water systems varied widely in calendar year 2004. Owners of all public water systems were required to sample for nitrate in 2004.

There were no systems with MCL violations for VOCs and one system with a violation for SOCs. Three systems had MCL violations for IOCs. Twelve systems violated the MCL for nitrate. Most of these violations are associated with naturally occurring contaminants, but some of the nitrate violations may be the result of contamination from improper sewage disposal or agricultural practices.

Three water systems were in violation of the monitoring requirements for VOCs, 138 for SOCs, 96 for IOCs, and 307 for nitrate. VOC and IOC monitoring violations included monitoring requirements due by the end of calendar year 2004. Monitoring violations resulted from late samples, missed samples, improper sampling procedures, or confusion over complex monitoring requirements. Most of the PWS that received nitrate-monitoring violations simply failed to mail their sample results to DEQ.

Table 24. Violations of the Phase 2 and Phase 5 Rules

SDWIS Codes	Phase II and Phase V	MCL (mg/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
	VOCs		0	0	63*	3
	SOCs		1	1	862*	138
	IOCs		4	3	101*	96
	NO_3/NO_2	10	19	12	347	307
	Subtotal		**24**	**16**	**1373**	**544**

* Individual violations, per analyte. Many analytes are in the VOC, SOC, and IOC monitoring groups. There may also be many violations per year because there are up to four quarters in which violations could occur. Therefore, the numbers of violations are multiplied by the number of analytes in the monitoring groups and/or the number of monitoring periods per year.

Total Coliform Rule

Table 25 shows the violations of the MCLs and monitoring requirements for TCR. In 2003, 149 public water systems exceeded the Maximum Contaminant Level (MCL violations) for total coliforms. Ten MCL violations resulted when a routine or one of the repeat samples showed the presence of fecal coliform bacteria. Fecal coliforms are a specific subgroup of total coliforms that grow only at body temperature of warm-blood animals. They are used to indicate if fecal contamination of water is more likely to have recently occurred.

There are two types of TCR MCL violations: (1) a Boil Water Order is an acute MCL violation and is issued if there are coliform bacteria with fecal contamination, and (2) a Health Advisory is a non-acute MCL violation that is issued when a system has coliform bacteria but no fecal contamination is found. The MCLs are based on a system's routine and repeat samples. Inadequately protected water sources, or growths of bacteria are common reasons for MCL violations.

Four hundred thirty three water systems were in violation of the routine monitoring requirements in 2004. The violations that occurred resulted from systems not submitting monthly or quarterly samples.

Table 25. Violations of the Total Coliform Rule

SDWIS Codes	Total Coliform Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
21	Acute MCL Violation	Fecal Coliform Bacteria Present	10	10		
22	Non-Acute MCL Violation	No Fecal Coliform Bacteria Present	168	142		
23, 24	Routine Monitoring				947	433
	Subtotal		**178**	**149**	**947**	**433**

Surface Water Treatment Rule

Table 26 shows the violations of the treatment technique requirements (filtration and disinfection) and of the monitoring requirements of the SWTR. Four water systems failed to meet treatment technique requirements, and three failed to install filtration treatment as required by DEQ. Treatment technique violations are typically the result of inadequate filtration or disinfection when water quality or water demands are extreme.

Table 26. Violations of the Surface Water Treatment Rule

SDWIS Codes	Surface Water Treatment Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
	Filtered Systems				
36	Monitoring, Routine/Repeat			19	11
41	Treatment Techniques	18	5		
	Unfiltered Systems				
01	Turbidity MCL Single			0	0
02	Turbidity MCL Average			0	0
03	Turbidity Significant M/R			0	0
31	Monitoring, Routine/Repeat			3	1
42	Failure To Filter	4	3		
	Subtotal	**22**	**8**	**22**	**12**

Disinfection Byproducts Rule

Stage 1 Disinfections Byproducts Rule went into effect on January 1, 2002 for surface water systems and groundwater systems under the direct influence of surface water serving populations equal to or greater than 10,000. Surface water systems and groundwater systems under the direct influence of surface water serving less than 10,000 people, and all groundwater systems, must comply with this rule effective January 1, 2004. There are currently 363 systems monitoring under this rule 96 of which violated the monitoring and reporting requirement in 2004 (Table 27).

Table 27. Violations of the Disinfection Byproducts Rule

SDWIS codes	Disinfection Byproducts Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
27	Monitoring, Routine/Repeat				439	96
11	Chlorine (0999) or Chloramines (1006) MRDL	4.0 mg/l	0	0		
11	Chlorine Dioxide M&R				0	0
02	DBP MCL Average (Total TTHMs. 2950)	0.50 ug/l	0	0		
02	DBP MCL Average (Total HAA5s, 2456)	0.10 ug/l	0	0		
	Subtotal		**0**	**0**	**439**	**96**

Lead and Copper Rule

Table 28 shows monitoring and treatment technique violations of the LCR. No water systems violated the treatment technique requirements in 2004. Two Hundred Ninety-Nine water systems violated the LCR monitoring requirements in 2004. Most of the violations resulted from late or missed samples or from confusion over complex monitoring requirements. No systems failed to provide required educational materials to the public regarding lead exceedences, or failed to notify DEQ that they had provided the required public education materials.

Table 28. Violations of the Lead and Copper Rule

SDWIS Codes	Lead and Copper Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
51	Initial lead and copper tap M/R			436*	150
52	Follow-up or routine lead and copper tap M/R			276	162
58, 62	Treatment Installation	0	0		
65	Public Education	0	0		
	Subtotal	**0**	**0**	**712**	**299**

* Individual violations, per analyte. Code 51 violations could include two violations per year because there are two 6-month periods in which violations could occur. Therefore, the number of violations is multiplied by the number of monitoring periods per year.

Radionuclide Rule

Only community water systems must sample for radionuclides every four years until changes to the rule take effect on December 7, 2003. At that time schedules were adjusted accordingly to three, six, or nine-year compliance periods based on the historical data and/or the results received during the initial monitoring period. No water systems exceeded the MCL during 2004 (Table 29).

Table 29. Violations of the Radionuclide Rule

SDWIS Codes	Radionuclide MCLs	MCL (pci/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
4000	Gross Alpha	15 pCi/l	0	0	0	0
	Subtotal		**0**	**0**	**0**	**0**

Consumer Confidence Report Rule

Only community water systems must comply with the Consumer Confidence Report Rule. Fifty-three systems did not meet the requirements of this rule for the compliance year of 2003 nor had open violations from previous years (Table 30).

Table 30. Violations of the Consumer Confidence Report Rule

SDWIS codes	Consumer Confidence Report Rule	Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations
71	Consumer Notification	53	33
	Subtotal	**53**	**33**

Summary and Conclusions

The violations referenced in the previous sections occurred during the period between 1/1/2004 and 12/31/2004 and may have been followed with enforcement or assistance actions by DEQ. Typical enforcement actions include follow-up phone calls, violation notification letters, administrative orders, violation, and closure/resolution actions. There are currently no Variances or Exemptions (as defined by the Act) in effect in Montana.

Montana DEQ adopted the EPA's Safe Drinking Water Information System (SDWIS) for maintaining regulatory and compliance monitoring data in a modernized format in 2000. Since then, SDWIS modernization has positively affected DEQ's ability to detect and respond to violations. The improvement in DEQ's ability to detect violations also improves DEQ's ability to respond to violations. This trend will result in improved compliance over time.

A significant portion of the violations were a result of an incomplete understanding of the requirements, or were technical violations that did not result in public health risks. However, more attention must be devoted to reducing the number of violations.

The Public Water Supply Section in DEQ continuously coordinates efforts with owners of public water systems to address the most significant violations. The most serious public health risks receive the highest priority. The DEQ notifies water systems when violations occur, and are informed of corrective measures necessary to return to compliance. The PWS Section works with DEQ's Enforcement Division when necessary to return difficult violators to compliance through formal enforcement actions.

The Planning and Prevention Division at DEQ implemented a new program in 1997 to make low interest loans to owners in need of water system improvements. Many systems have taken advantage of this funding program, and the DEQ anticipates that many noncompliance issues will be addressed using these loans. Questions regarding this program may be directed to the Technical and Financial Assistance Bureau, Planning and Prevention Division, DEQ, P.O. Box 200901, Helena, MT 59620-0901, phone (406) 444-6697.

Source Water Protection Program

Introduction

Montana is required under provisions of the 1996 federal Safe Drinking Water Act to carry out a Source Water Assessment Program (SWAP). The U.S. Environmental Protection Agency formally approved the Montana program in November 1999. The program was developed to the greatest extent possible using public participation and input from public water supplies (PWS) and other stakeholders interested in SWP issues.

The Montana SWP Program is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination. The major components of the Montana SWP Program are the processes of delineation and assessment. Delineation is a process of identifying areas that contribute water to aquifers or surface waters used for drinking water, called SWP areas. Geologic and hydrologic conditions are evaluated in order to delineate SWP areas. Assessment involves identifying businesses, activities, or land uses in SWP areas where certain contaminants are generated, used, stored, transported, or disposed, and then determining the potential for contamination from these sources.

The emphasis of delineation and assessment is identifying significant threats to drinking water supplies and providing public water supplies with the information they need to protect their source(s) of water. In Montana, implementation of the source water assessment program is based on a watershed approach that: 1) identifies SWAP implementation priorities within each major watershed, 2) assigns oversight responsibilities to program staff for source water assessments within each of the major watersheds, 3) tracks program implementation within each watershed.

Authority, Funding, and Program Requirements

<u>Authority</u>

The federal Safe Drinking Water Act requires that each state with primacy to assess the source water of every public water system. Additionally, the Montana Source Water Protection Program adopted the goals stated in the Montana Constitution and the Montana Water Quality Act. The constitution states: "The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations... [including] the protection of the environmental life support system from degradation..."(Article IX, Section 1). Further, the Montana Water Quality Act states: "It is the policy of this state to conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies..."(Montana Code Annotated (MCA) 75-5-101).

<u>Funding</u>

A one-time set-aside from the State Revolving Fund (SRF) initially funded much of the SWAP. This set-aside was approximately $1.5 million dollars (10% of the FY1997 capitalization grant dollars). Drinking Water State Revolving Fund (DWSRF) set-asides earmarked specifically for wellhead and source water protection have provided subsequent funding to the program.

<u>Program requirements</u>

Section 1453 of the Safe Drinking Water Act (42 U.S.C. § 300j-13) requires the state program to:

- ❑ Identify the source(s) of water used by PWSs. This process delineates capture zones for wells, or a stream buffer area for surface water sources called the SWP area.
- ❑ Identify and Inventory Potential Contaminant Sources. Regulated contaminants of concern in Montana generally include nitrate, microbial contaminants, solvents, herbicides, pesticides, and metals. Potential sources of these types of contaminants include septic systems, animal feeding operations, underground storage tanks, floor drains, sumps, and certain land use activities.
- ❑ Assess the susceptibility of the PWS to those identified potential contaminant sources. A susceptibility assessment considers the hazard rating of a potential contaminant source and potential barriers to evaluate the likelihood that a spill or release would reach the well or intake. A determination of susceptibility is made for each identified potential contaminant source within the SWP area.
- ❑ Make the results of the delineation and assessment available to the public. Source water assessments must be made available to the public. Different resources will be used to bring this information to the public including consumer confidence reports, SWP Internet site, posting at public libraries, posting at local health department, and others.

Source Water Assessment Implementation

Beginning in 1999, the Source Water Protection section staff of hydrogeologists assigned priority ratings to PWSs based on source water sensitivity. The assessment process was biased towards completion of high priority community systems, followed by the moderate, and then the low priority systems. The watershed approach allowed the SWP section to use student interns to complete non-community system assessment reports. Student interns completed reports in a given watershed, using the hydrogeologic model provided by a SWP hydrogeologist.

Montana has over 2,200 PWSs, and the EPA granted an extension to the period allotted for the assessment program. The SWP Section anticipates effective completion of assessments by the end of FY2006. Completion is qualified as 'effective' as the PWS roster is dynamic. New systems will come online, and inactive systems may be reactivated.

As of August 2005, source water assessments in Montana are 81.6% completed. Assessments in the Lower Missouri watershed are effectively complete (99.5%). Assessments in the Yellowstone watershed are nearly complete (94.4%). The Upper Missouri watershed is 87.7% complete. The westslope watershed includes the largest fraction of Montana's PWSs, and assessment in this watershed is 70.3% complete as of August 2005. Staff assigned to completed watersheds have begun to both share the workload in the other watersheds, and transition to SWP implementation.

Drinking Water State Revolving Fund

Introduction

The 1995 Montana Legislature created the Drinking Water State Revolving Fund (DWSRF) with the passage of HB493. In 1997, the Legislature amended the program with HB483 to make Montana law consistent with the reauthorization of the Safe Drinking Water Act passed in 1996. This legislation, now codified as MCA 75-6-201, et seq., authorizes the DEQ and the Department of Natural Resources and Conservation (DNRC) to develop and implement the program, and it established the DWSRF Advisory Committee.

The Advisory Committee consists of one state representative, one state senator, one member representing the Montana League of Cities and Towns, one county commissioner representing the Montana Association of Counties, one representative from DNRC, and one representative from DEQ. The Committee advises DEQ and DNRC on policy decisions that arise in developing and implementing the DWSRF and it reviews the program's Intended Use Plan (IUP). The DEQ and DNRC administer the DWSRF, which is similar to the Water Pollution Control SRF.

The EPA approved and awarded the DWSRF Program its first capitalization grant on June 30, 1998 for the 1997 fiscal year (FY). Since awarding its first capitalization grant to DEQ in 1998, the EPA has awarded the DEQ capitalization grants through the FY2005.

The program offers below-market loans for construction of public health-related infrastructure improvements as well as provides funding for other activities related to public health and compliance with the Safe Drinking Water Act (SDWA). These other activities, or set-asides, include administration of the DWSRF program, technical assistance to small communities, as well as financial and managerial assistance, source water assessment and delineation, operator certification and assistance with administration of activities in the Public Water Supply Program (PWSP).

As the primacy agency responsible for implementation of the SWDA, DEQ is also responsible for the oversight of the SRF Program. This role consists primarily of providing technical expertise, while DNRC provides financial administration of project loans and oversees the sale of state general obligation bonds. The majority of the funds for this program come to Montana in the form of capitalization grants through the EPA. Montana provides the required twenty-percent matching funds by issuing state general obligation bonds. The program uses the interest on the project loans to pay the general obligation bonds, thus using no state general funds to operate the program. The program uses repaid principal on the project loans for rebuilding the DWSRF fund and to fund additional projects in the future. The federal capitalization grants were only authorized through federal fiscal year 2003; however, congress continues to appropriate funding for the program. Federal and state law requires the DWSRF to be operated by the state in perpetuity.

The 1996 Amendments to SDWA include requirements for each state to prepare an annual Intended Use Plan (IUP) for each capitalization grant application. This is the central component of the capitalization grant application, and describes how the state will use the DWSRF to meet SDWA objectives and further the protection of public health. The IUP contains the following elements:

- Priority list of projects, including description and size of community.
- Criteria and method used for distribution of funds.
- Description of the financial status of the DWSRF Program.
- Short- and long-term goals of the Program.
- Amounts of funds transferred between the DWSRF and the Wastewater SRF.
- Description of the set-aside activities and percentage of funds, that will be used from the DWSRF capitalization grant, including DWSRF administrative expenses allowance, PWSP support and technical assistance.
- Description of how the program defines a disadvantaged system and the amount of DWSRF funds that will be used for this type of loan assistance.

Anticipated Funding List

DEQ became eligible to apply for the fiscal year (FY) 2005 federal capitalization grant on October 1, 2004, and applied for this grant and the balance of the FY04 grant. The DEQ anticipates that we will also apply for the federal FY06 capitalization grant

The DWSRF program anticipates 20 projects will be funded with in federal FY04 and 05, and previous capitalization grants, in conjunction with the 20 % state match (Table 31). This list represents those projects most likely to proceed, starting from the highest ranked projects on the state's comprehensive priority list. It is possible that, if other projects are ready to proceed before those on this list, the actual projects that the DWSRF program ultimately funds may vary from those indicated on this list. This did occur during calendar years 1998, 1999, 2000, 2001, 2003, and 2004. The DEQ expects this to happen again due to the high variability in project schedules, needs, and other funding sources.

Table 31. DWSRF Anticipated Funding List for FY2004 - 2005

Project	Population	Project Cost	Project Type
1. Thompson Falls	1,321	$1,500,000	Water treatment plant improvements - refinance.
2. Upper/Lower River Road WD	1,075	$938,000	Distribution system and connection to City of Great Falls water system.
3. Three Forks	1,728	$220,000	Water treatment plant facilities.
4. Worden-Ballentine	852	$946,000	New well, pump-house, disinfection, and telemetry controls.
5. Dry Prairie Reg. Water System	35,551	$230,000,000	Continue construction of extensive distribution system (expected SRF portion approx. $10 million; SFY06 amount: $400,000).
6. Helena	25,780	$3,100,000	Water system/distribution system improvements, meters.
7. Lockwood W&SD	6,500	$1,000,000	Water treatment improvements (pre-sedimentation basins.
8. Billings	89,847	$11,300,000	Water treatment plant improvements.
9. Miles City	8,487	$1,000,000	Storage reservoir replacement.
10. Charlo WD	350	$100,000	New well and transmission main.
11. Power-Teton W&SD	167	$370,000	New storage reservoir, pre-sedimentation basin, distribution improvements, appurtenances, controls.
12. Livingston	6,851	$744,000	Distribution system improvements.
13. Froid	195	$250,000	Refinance existing debt.
14. Medicine Lake	269	$250,000	Refinance existing debt.
15. Plentywood	2,061	$870,000	Distribution system improvements.

Criteria and Method Used for Distribution of Funds

The SDWA amendments of 1986 and 1996 imposed many new regulatory requirements upon public water suppliers. Public health and compliance problems related to these requirements, affordability, consolidation of two or more systems, and readiness to proceed all were considered in developing Montana's project ranking criteria.

DEQ initially proposed balancing these factors, with slightly more emphasis placed on health and compliance and less on affordability and readiness to proceed. In discussions with EPA and with our state's Drinking Water SRF Advisory Committee, it became clear that health risks and compliance issues needed to be given even more emphasis, and that readiness to proceed could be eliminated and handled through by-pass procedures.

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

The DWSRF program also considers the financial impact of the proposed project on the system users as one of the ranking criteria. The DWSRF awards points under affordability criterion to communities most in need of low interest loans to fund the project.

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

Financial Status

The discussion and tables on the following pages summarize the DWSRF expenditures to date and outline financial projections and assumptions for the future. The individual capitalization grants and corresponding state match for each fiscal year are listed below (Table 32).

Table 32. Summary of DWSRF Grants from 1997 - 2005

Federal FY	Federal Grant	State Match
1997	$14,826,200	$2,965,240
1998	$7,121,300	$1,424,260
1999	$7,463,800	$1,492,760
2000	$7,757,000	$1,551,400
2001	$7,789,100	$1,557,820
2002	$8,052,500	$1,610,500
2003	$8,004,100	$1,600,820
2004	$8,303,100	$1,660,620
2005	$8,285,500	$1,657,100
TOTAL	**$77,602,600**	**$15,520,520**

A financial overview of the DWSRF through state fiscal year 2007 shows the actual income and expenses (or inflows and outflows), by broad category, to the DWSRF through state fiscal year 2004 and the projected inflows and outflows through state fiscal year 2007 (Table 33). The first column lists broad categories of inflows and outflows and the second column lists actual amounts for those categories through state fiscal year 2004, including projected amounts through 2005. The third column lists projected amounts for state fiscal year 2006.

Table 33. Drinking Water Revolving Fund Program Status

Source of Funds	Projected thru SFY 2005	Projected for SFY 2006	Total
Federal Capitalization Grants	$77,602,600	$8,285,500*	

Source of Funds	Projected thru SFY 2005	Projected for SFY 2006	Total
Set-Asides	{$9,632,220}	{$1,311,420}	
Total to Loan Fund	$67,970,380	$6,974,080	$74,944,460
State Match			
Bond Proceeds	$15,520,520	$1,657,100	$17,177,620
Loan Loss Reserve Sweeps	$1,192,053	$400,000	$1,592,053
Loan Repayments	$6,000,000	$2,500,000	$8,500,000
Interest on Fund Investments	~$2,500,000	~$100,000	$2,600,000
Transfers from CWSRF	$8,782,486		$8,782,486
TOTAL SOURCE OF FUNDS			$113,596,619
Use of Funds			
Loans Executed			
Direct Loans	$64,851,604		$64,851,604
Transfer to CWSRF	$6,130,213	$5,000,000	$11,130,213
TOTAL USES			$75,981,817
Funds Available for Loan			$37,614,802
Projected IUP Loans			
Direct Loans (SFY06)		$26,288,000	$26,288,000
Future Potential Projects (SFY07)			$15,492,775
PROJECTED BALANCE REMAINING			($4,165,973)

*FFY06 capitalization grant estimated amount

PART D. GROUNDWATER MONITORING AND ASSESSMENT

D.1 Groundwater Resources in Montana

The quality and availability of groundwater varies greatly across Montana. Aquifers in western Montana are typically in unconsolidated, alluvial valley-fill materials within intermontane valleys. The intermontane valley aquifers often yield relatively large quantities of high-quality water to relatively shallow wells. Fractured bedrock aquifers surrounding the intermontane valleys are becoming important because many wells are being constructed in these aquifers as development encroaches on the edges of the major valleys.

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

Groundwater Use

Montana's population relies heavily on groundwater. More than 196,000 wells are documented by records at the Montana Ground Water Information Center (GWIC) application. Since 1975, Montanans have constructed 84,500 wells claiming domestic use, 13,100 wells claiming stockwater use, and about 6,500 wells claiming irrigation use. About 75 percent of Montana's population uses ground-water for drinking; about 26 percent of the population obtains drinking water from private wells.

Groundwater sources provide 2-3 percent (about 188 million gallons per day [mgpd]) of the 8,290 total mgpd of the water used in Montana.[89] The largest uses of groundwater are:

- drinking water supplies – 73.4 mgpd
- irrigation – 83.0 mgpd and
- industrial – 31 mgpd.

Groundwater is also extensively used to water stock. The intensity of water use is heaviest in the west where most wells for domestic purposes are drilled and high-yield aquifers will support irrigation. Stockwater use is common throughout Montana but is prevalent in eastern counties where ranching is an important industry.

Groundwater Characterization and Monitoring

The 1991 Montana Legislature established the Montana Ground Water Assessment Program (GWAP). Through this program it directed the Montana Bureau of Mines and Geology (MBMG) to characterize Montana's hydrogeology and to monitor long term water-level conditions and water chemistry. The **Characterization Program** is designed to systematically evaluate Montana's aquifers. The **Monitoring Program** is designed to collect long term water-level and water-quality data. The **GWIC** (http://mbmggwic.mtech.edu) holds and distributes data generated by the Characterization and Monitoring programs, and also data generated by many other groundwater projects.

Ground Water Characterization (GWC) has visited more than 6,000 wells in 18 Montana counties. The site visits provide high-quality inventory information about the ground-water resource within each study area. GWC atlases for the **Lower Yellowstone River** (Dawson, Fallon, Prairie, Richland, and Wibaux counties) and the **Flathead Lake** (Lake and Flathead counties) areas have been released. The atlases include descriptive overviews of aquifers and 21 maps describing the ground-water resources. Fifteen maps are in preparation or review for the **Middle Yellowstone River Area** (Treasure and Yellowstone counties outside of the Crow Reservation) and the **Lolo-Bitterroot Area** (Mineral, Missoula, and Ravalli counties). Field work has been completed in the **Upper Clark Fork River** (Deer Lodge, Granite, Powell, and Silver Bow counties) and **Clark's Fork of the Yellowstone River** (Carbon and

[89] Hutton, S., Barber, N., Kenny, J., Linsey, K., Lumia, D., and Maupin, M., 2000, Estimated Use of Water in the United States in 2000, U.S. Geological Survey Circular 1268, 46p.

Stillwater counties) areas and begun in the **Giant Springs** area (Cascade and Teton counties). The Ground-Water Assessment Steering Committee has scheduled the **Missouri Headwaters** (Gallatin and Madison counties) and the **Upper Yellowstone River** (Sweet Grass and Park counties) areas for future work. The Ground-Water Assessment program expects to begin work in the **Missouri Headwaters** area (Gallatin and Madison Counties) in the spring of 2008.

The Monitoring program's statewide network contains 883 wells in which static-water levels are measured at least quarterly. Within the network there are 98 water-level recorders that provide hourly to daily water-level records. New water-level data for any well in the network are generally available from GWIC about 10 days after they were collected.

Groundwater Contaminants/Contamination Sources

Even with activity of the Characterization and Monitoring Programs, there is no comprehensive state-wide set of water chemistry data collected between July of 2001 and June of 2005. Ground- Water Assessment accounted for almost half (557 of 1,156) samples evaluated for this report. A little more than 300 samples came from Ground-Water Characterization studies in the Upper Clark Fork River area in Deer Lodge, Granite, Powell, and Silver Bow Counties and the Clark's Fork of the Yellowstone River area in Carbon and Stillwater Counties. About 260 samples were collected by the Monitoring Program from statewide monitoring network wells. MBMG projects around the perimeter of Flathead Lake, in northern Park County, and in the Musselshell River basin, among others, added more than 600 samples to the data set bringing the total number of sites to 1,156. Figure 11 shows the locations of the sampled sites and whether the samples were collected by the statewide monitoring program, the ground-water characterization projects, or other MBMG projects. Whether the well or spring was completed in an unconsolidated or consolidated aquifer is shown on Figure 12.

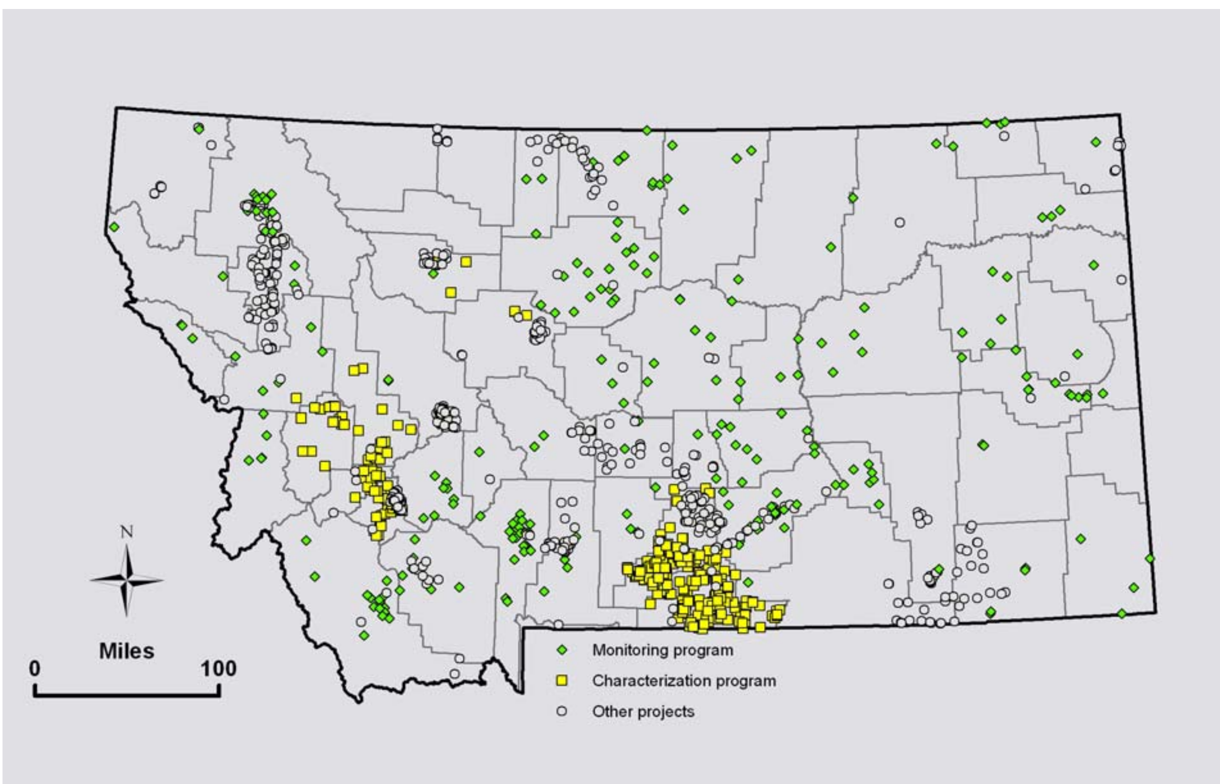

Figure 11. About 50 percent of the samples evaluated for this report were collected by the Ground-Water Assessment Program

To be included in the data set the water-quality analysis must have met these criteria:

- ❑ The sample must have been collected between July 1, 2001, and June 30, 2005

- ❑ The sample must represent "ambient" water quality (i.e. not collected as part of an effort to determine the extent of contamination by a parameter being evaluated here) and have an identifiable geologic source.
- ❑ The sample must have come from a well or spring.

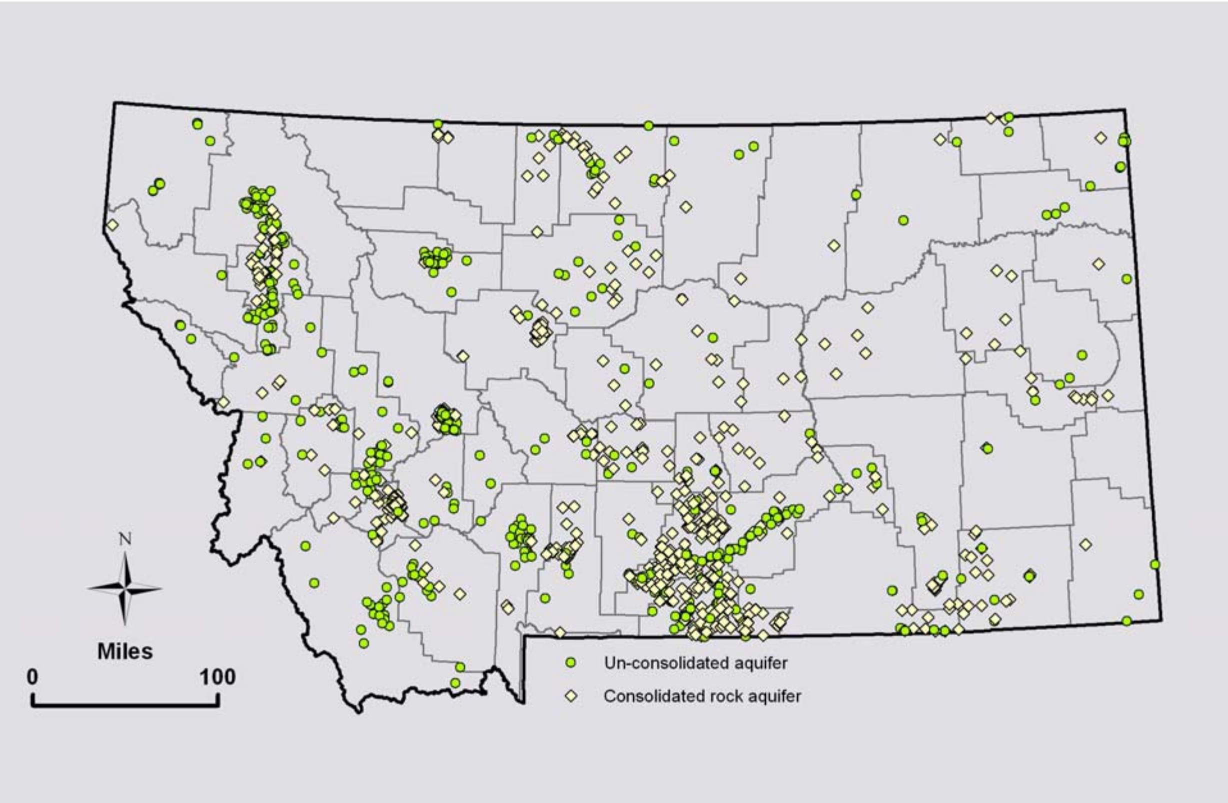

Figure 12. About 40 percent of the samples evaluated for this report came from unconsolidated aquifers.

If a well or spring was sampled more than once between July 1, 2001 and June 30, 2005, data either from the most recent or the most complete analysis were evaluated. For example, if a well was sampled for common ions (including nitrate) and trace metals, but later sampled for nitrate only, the complete analysis was retained and the single nitrate result discarded. Numerous samples collected from closely spaced wells also received special treatment. For example, 172 sites from an alluvial aquifer at the Montana Pole Site in Butte, Montana were sampled for common ions and trace metals. The Pole Site covers an area of less than two square miles and the number of samples over-represents the area in the unconsolidated aquifer group. The data were sorted by location and then by total dissolved solids. The analysis containing the median dissolved solids for the group located in section 23 and the analysis containing the median dissolved solids for the group located in section 24 of Township 3 north, Range 8 west were selected to represent the area.

The actual number of analytical results available depended on the parameter. For example, there were 1,036 complete analyses for which total dissolved solids could be calculated and trace metal data extracted. However there were 1,151 samples collected for nitrate and about 1,070 samples for chloride. Parameters were often reported as "less than detection" at various detection limits and 50 percent of the reported detection limit was used in data evaluation.

Maximum contaminant levels (MCLs) or secondary maximum contaminant levels (SMCLs) are cited for various parameters below. MCLs refer to the maximum level of a constituent allowed in public drinking water supplies as established by EPA (see http://www.epa.gov/safewater/mcl.html) and are set to ensure that the contaminant does not pose significant risk to public health. MCLs are legally enforceable standards that apply to public water systems.

SMCLs are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.

Total Dissolved Solids: About 50 percent of the 1,036 samples for which total dissolved solids were reported contained concentrations greater than 500 mg/L. More than 470 of these samples were from consolidated rock aquifers located east of the Rocky Mountains and around the edges of intermontane valleys in western Montana; 340 of these samples were from unconsolidated aquifers in the valleys of western Montana and along major drainages in eastern Montana. More than 90 percent of samples from unconsolidated aquifers contained less than 500 mg/L dissolved solids and none contained more than 2,000 mg/L. In contrast, only about 20 percent of the samples from consolidated rock aquifers contained less than 500 mg/L dissolved solids but 24 percent contained more than 2,000 mg/L.

Nitrate: The nitrate (as N, nitrate-nitrogen) data represents results from 1,151 water samples. About 15 percent of all samples contained nitrate concentrations of less than 0.25 mg/L, and about 80 percent of all samples contained concentrations of less than 2 mg/L. About 90 percent of all samples contained less than 5 mg/L. However, 4 percent of the samples contained concentrations greater than 10 mg/L. The median nitrate concentration for all samples was 0.26 mg/L. The median concentration in samples from unconsolidated aquifers was 0.51 mg/L and the median concentration for samples from consolidated aquifers was 0.25 mg/L. Table 34 summarizes the nitrate data.

Table 34. Nitrate-nitrogen concentrations in 1,151 samples

Nitrate-nitrogen mg/L	Unconsolidated aquifers	Percent	Consolidated aquifers	Percent	All aquifers	Percent
<0.25	72	13	96	16	168	15
>=0.25 and <2.0	338	63	417	68	755	66
>=2.0 and <5.0	69	13	52	8	121	11
>=5.0 and <10.0	35	7	28	5	63	5
>=10.0	24	4	20	3	44	4
Totals	**538**	**100**	**613**	**100**	**1151**	**101***

*Rounding causes total to be greater than 100 percent

There were 538 nitrate-nitrogen results available for samples from unconsolidated aquifers and 613 results from consolidated rock aquifers. There was little difference between unconsolidated and consolidated aquifers in the numbers of samples that had nitrate concentrations of less than 2 mg/L. More samples from unconsolidated aquifers had concentrations greater than 2 mg/L than did from consolidated aquifers. The numbers of samples containing 10 mg/L or more of nitrate from unconsolidated and consolidated aquifers were about equal.

Fluoride: Analytical results for fluoride in 1,033 samples showed that concentrations were between 0.1 and 2.0 mg/L in about 90 percent of the samples. However, at concentrations greater than 2 mg/L (50 percent of the MCL) water from consolidated rock aquifers generally contained more fluoride than did water from unconsolidated aquifers. Twenty percent of the samples from consolidated rock aquifers exceeded 2.0 mg/L; whereas only about 2 percent of the water samples from unconsolidated aquifers contained similar concentrations. The MCL was exceeded in 1 percent of the samples from unconsolidated aquifers and 6 percent of the samples from consolidated rock aquifers.

Sulfate: Sulfate is rarely absent in groundwater. Only about 6 percent of the samples did not contain detectable concentrations. About 30 percent of the 1,038 samples contained sulfate concentrations greater than the secondary drinking water standard of 250 mg/L. Fifty-six percent of the samples contained sulfate concentrations of less than 125 mg/L (50 percent of the secondary standard).

Water samples from unconsolidated aquifers had lower sulfate concentrations than did samples from consolidated rock aquifers. One hundred percent of the samples from unconsolidated aquifers contained sulfate concentrations of less than 125 mg/L, whereas only 20 percent of the water samples from consolidated rock aquifers contained sulfate concentrations below that level. None of the samples from unconsolidated aquifers contained sulfate concentrations greater than 250 mg/L, but 56 percent of the samples from consolidated aquifers exceeded the secondary standard.

Chloride: In about 90 percent of the 1,067 samples, chloride concentrations were less than 63 mg/L (25 percent of the secondary standard of 250 mg/L), but only about 6 percent of the samples did not contain detectable chloride. Only 1 percent of the samples from unconsolidated aquifers and 3 percent of the samples from consolidated rock aquifers contained greater than 250 mg/L chloride. Chloride is commonly present at low concentrations in natural water and the secondary standard is high compared to chloride concentrations in most of the samples.

About 50 percent of the samples contained chloride concentrations of less than 10 mg/L. About 40 percent of the samples contained more than 10 mg/L, but less than 63 mg/L of chloride. The median concentration of chloride for all the samples was 9.5 mg/L. The median concentration in unconsolidated aquifers was about 8.3 mg/L and the median concentration in consolidated rock aquifers was about 11.1 mg/L.

Metals: About 1,115 analyses included trace metals. Table 35 summarizes results for metals with primary or secondary MCLs. Only aluminum, arsenic, lead, and selenium were present in concentrations above their MCLs, but only in 1 to 7 percent of the samples. The percentage of samples that contained concentrations of any metal between the detection limit and 50 percent of the MCL or SMCL, ranged from 66 percent for lead to 100 percent for copper and zinc.

Table 35. Distribution of sampling results based on MCLs established for various trace metal concentrations in public drinking water supplies.

	MCL µg/L	Total Samples	Samples with either a reported value or a non-detect <= the MCL or SMCL	Percent samples below 50% MCL	Percent >50% MCL and <100% MCL	Percent >100% MCL
Aluminum*	50 (s)	1015	843	90.9	5.3	3.8
Arsenic	10 (p)	994	978	73.1	19.9	7.0
Chromium	100 (p)	1014	1014	98.4	1.6	0.0
Copper	1,000 (s)	1016	1016	100.0	0.0	0.0
Lead	10 (p)	992	890	66.1	33.4	0.6
Nickel	100 (p)	1015	1015	99.8	0.1	0.1
Selenium	50 (p)	1015	999	97.4	1.2	1.4
Silver	50 (p)	890	889	100.0	0.0	0.0
Zinc	5,000 (s)	1014	1014	99.6	0.2	0.2

*Aluminum has been associated with discoloration of drinking water following treatment and the SMCL is sometimes given as a range between 50 and 200 mg/L to allow states to address local conditions. The 50 µg/L minimum was used here for comparison purposes. (p) = primary drinking water standard. (s) = secondary drinking water standard. Acceptable detection limits (µg/L): Al = 10-50, As = 2-10, Cr = 2-100, Cu = 2-50, Pb = 2-10, Ni = 2-40, Se = 1-20, Ag = 1-20, Zn = 2-40. Non-detect results with detection limits above the MCL or SMCL were not included.

Arsenic: Based on 978 samples, almost all of Montana's groundwater contains arsenic, but 93 percent of the samples contain arsenic concentrations less than 10 µg/L. Table 36 shows that the arsenic distribution does not vary widely between consolidated and unconsolidated aquifers and also shows that 26 percent of the samples from unconsolidated aquifers and 35 percent of the samples from consolidated aquifers contained concentrations of more than 3 µg/L.

Table 36. Arsenic concentrations in 978 samples.

Arsenic µg/L	Unconsolidated aquifers	Percent	Consolidated aquifers	Percent	All aquifers	Percent
< 1	162	37	182	34	344	35
>= 1 and < 3	166	37	165	31	331	34
>= 3 and < 10	81	18	154	29	235	24
>= 10 and < 25	26	6	27	5	53	5
>= 25 and < 50	3	1	4	1	7	1
>= 50	5	1	3	1	8	1
Total	**443**	**100**	**535**	**101***	**978**	**100**

*Rounding causes total to be greater than 100 percent

Radon: Radon in water results from samples collected between August 1992 and September 2004 provide data for radon concentrations in groundwater. One hundred fifty-two of the 665 samples were collected since July 1, 2001. About 80 percent of Montana's groundwater contains radon concentrations greater than 300 pCi/L. Almost 90 percent of the samples contained concentrations less than 2,000 pCi/L. The frequency distribution did not vary widely between consolidated rock and unconsolidated aquifers although the highest radon concentrations occurred in water from igneous intrusive rock aquifers such as the Boulder Batholith in southwestern Montana. Frequency distributions for the radon results compared to proposed MCLs of 300 and 4,000 pCi/L are in Table 37 and Table 38.

Table 37. Radon concentration distribution based on a 300 pCi/L proposed MCL.

Radon pCi/L	Unconsolidated aquifers	Percent	Consolidated aquifers	Percent	All aquifers	Percent
<50	5	1	6	2	11	2
>50 and <150	14	3	23	3	37	6
>150 and <300	40	10	36	7	76	11
>300	350	86	191	88	541	81
Total	**409**	**100**	**256**	**100**	**665**	**100**

Table 38. Radon concentration distribution based on a 4,000 pCi/L proposed MCL.

Radon pCi/L	Unconsolidated aquifers	Percent	Consolidated aquifers	Percent	All aquifers	Percent
<500	119	29	104	41	223	34
>500 and <2000	256	63	111	43	367	55
>2000 and <4000	24	6	18	7	42	6
>4000	10	2	23	9	33	5
Total	**409**	**100**	**256**	**100**	**665**	**100**

D.2 Groundwater Protection Programs

Groundwater Management Strategy

Protection Strategy

The level of effort at DEQ for groundwater protection through public awareness and education is less than that for surface water and wetlands. This is a concern because groundwater supplies drinking water for most public and private users in Montana and because contaminated groundwater is very difficult to clean up. The rate and scale of ground water impacts are increasing for several reasons. These include the increasing use of septic systems associated with growth and development and increased agricultural use of groundwater for irrigation and livestock watering due to basin closures for surface water rights. Increased groundwater use for irrigation and livestock watering can potentially reduce recharge and increase the impacts from fertilizers, pesticides, and animal wastes to groundwater as these pollutants move through the soil and ultimately end up in groundwater.

The need to develop a management strategy to protect Montana's groundwater has been widely recognized for at least the past two decades. A planning committee has met at various times over the past 15 years to discuss management strategies for protecting and conserving groundwater in Montana. Wide-ranging scope, goals, agency reorganizations, and personnel changes have complicated this process. In 1992, the Department of Natural Resource Conservation (DNRC) released the Montana Water Plan. They, with the assistance of other State agencies, elaborated on one of the key sections, Integrated Water Quality & Quantity Management, resulting in the Montana Ground Water Plan, which the DNRC released in 1999.

Several DEQ bureaus and other State agencies, as part of their daily business, address many of the strategies laid out in the 1999 Ground Water Plan. However, a major recommendation laid out by the Ground Water Plan stated that: State agencies with groundwater programs should regularly evaluate the adequacy and effectiveness of their groundwater protection programs and submit the results of these evaluations to the Environmental Quality Council. Beginning in 2001, the Environmental Quality Council should review these evaluations and publish a summary report every four years.

As of 2005, there is no overall coordination of groundwater stewardship and protection activities within Montana. Implementation of groundwater protection strategies is still fragmented between multiple agencies. DNRC has recently (summer 2005) begun efforts to identify stakeholders, update the groundwater plan, and coordinate the groundwater strategy.

Remediation Strategy

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

The Groundwater Remediation Program regulates these sites under the Montana Water Quality Act (WQA). These sites typically require long-term soil, surface water, and/or groundwater remediation and monitoring. This program addresses sites that the Leaking Underground Storage Tank Program, Comprehensive Environmental Cleanup and Responsibility Act (CECRA) Program, Permitting and Compliance Division, or other state authorities do not address.

The Groundwater Remediation Program has overseen remediation at sites contaminated with petroleum, pesticides, and solvents. Sites range from small (not on National Priority List [NPL]) to large (on NPL) in scale. The program ranks sites as maximum, high, medium, or low priority sites, or as operation and maintenance sites.[90] Currently, the Groundwater Remediation Program is addressing 74 sites. The Groundwater Remediation Program works cooperatively with the Department of Agriculture when pesticides affect groundwater.

Source Water Protection

Montana is required under provisions of the 1996 federal Safe Drinking Water Act to carry out a Source Water Assessment Program (SWAP). A SWAP provides technical assistance to Public Water Supplies (PWS). The EPA formally approved Montana's program in November 1999. Directing Montana's source water protection (SWP) is the responsibility of the SWP Section of DEQ.

Section 1453 of the Safe Drinking Water Act (42 U.S.C. § 300j-13) requires the state program to:

1. Identify the source(s) of water used by PWSs

This process delineates capture zones for wells or a stream buffer area for surface water sources called the source water protection area.

2. Identify and Inventory Potential Contaminant Sources

Potential significant contaminant sources within the source water protection area are identified. Regulated contaminants of concern in Montana generally include nitrate, microbial contaminants, solvents, pesticides, and metals. Potential sources of these types of contaminants include septic systems, animal feeding operations, underground storage tanks, floor drains, sumps, and certain land use activities.

3. Assess the Susceptibility of the PWS to those identified potential contaminant sources

A susceptibility assessment considers the hazard rating of a potential contaminant source and potential barriers to evaluate the likelihood that a spill or release would reach the well or intake. A determination of susceptibility will be made for each identified potential contaminant source within the source water protection area.

4. Make the results of the delineation and assessment available to the public

Source water assessments must be made available to the public. Different resources will be used to bring this information to the public including consumer confidence reports, SWP Internet site, posting at public libraries, posting at local health department, and others.

a. Delineation and assessments will be compiled into a map and text report for each PWS.

b. Assistance is available for PWSs to help them use the delineation and assessment report to develop local source water protection plans. Participation in this part of the program will remain voluntary.

c. The program is applicable to all public water systems.

Implementation of SWP takes several forms in Montana, ranging from recognizing a PWS's protection strategy to certification of a source water protection plan (SWPP). When a PWS concurs with their Source Water Delineation and Assessment Report (SWDAR), the SWP section recognizes that the PWS has an established protection strategy. This demonstrates the PWS has acknowledged the assessed level of susceptibility, and recognizes management actions they can take to reduce susceptibility. If a PWS needs to take an action in order to reduce susceptibility, they have acknowledged by their concurrence that they are susceptible and they have acknowledged the existence of, or need for barriers. Where susceptibility is low, a PWS may not need to take an action for continued protection of the source and yet are considered to have a protection strategy in place. However, when all significant potential contaminant sources identified in the source water assessment cause higher than moderate susceptibility of the drinking water source to a significant potential contaminant source the SWP Section defines that PWS as "Substantially" implementing a SWP strategy.

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[90] Montana Department of Environmental Quality (US) [DEQ]. Cleaning Up Montana – Superfund Accomplishments 1983 – 1996 [online document]. Helena, MT: DEQ, Remediation Division; 1996. Available from: http://www.deq.mt.gov/rem/PDFs/Superfund_Booklet.pdf. Accessed 2005 November 11.

SWP developed these implementation definitions since they tie directly to the process of assessing susceptibility according to a hazard rating tempered by barriers. It is measurable and will be reportable through a database query. Using SWP's definitions, the DEQ may consider a PWS to be implementing a protection strategy without explicitly taking an action. This is acceptable in some Montana settings where thoughtful well field selection or aquifer conditions are such that protection is achieved when the well is constructed. The SWP program includes a 5-year inventory update so that changing conditions affecting susceptibility are addressed.

Additionally, a PWS may elect to complete a SWPP, and have the SWP program certify the plan. This process involves adding to and enlarging the scope of the SWDAR, and incorporating elements such as emergency and contingency planning. Due to the voluntary nature of the program and the considerable time and expense required to complete a plan, DEQ has certified relatively few SWPPs. Currently, the primary incentive for completing a SWPP is to eliminate the filtration requirement for a spring or surface water source. DEQ is currently considering a requirement for a certified SWPP in advance of granting PWS water quality-monitoring waivers.

Local Water Quality Districts

Local Water Quality Districts (LWQD) are established to protect, preserve, and improve the quality of surface water and groundwater within the district. Currently there are four in Montana. Lewis and Clark County established the state's first LWQD in 1992, covering the Helena Valley watershed. A year later, Missoula County set up a LWQD covering the Missoula Valley Sole Source Aquifer. Butte/Silver Bow established a LWQD in 1995. Gallatin County formed a LWQD covering the Gallatin Valley at Bozeman in 1997. Additionally, local groups in Yellowstone, Flathead, and Ravalli counties have expressed interest in forming LWQDs.

LWQD are formed pursuant to 7-13-4501 et. Seq., MCA by county governments. This legislation describes district organization and specifies local-level authorities. The DEQ provides support to LWQD programs, but does not have an active management role in their activities. These groups serve as local government districts with a governing board of directors, and funding obtained from fees collected annually with county taxes, similar to funding mechanisms for other county districts.

The districts must prepare an annual report that summarizes the yearly activities. These reports provide a review of the ongoing activities and allow for an assessment of each LWQD in meeting their program objectives established during formation of the districts. A staff member with the DEQ Source Water Protection Section serves as coordinator for LWQD activities, and reviews the annual reports.

A significant component of selected district programs is the ability to participate in the enforcement of the Montana Water Quality Act and related rules. Districts also may develop and implement local water quality protection ordinances, which they perform in conjunction with the Enforcement Division at DEQ.

DEQ is working with the districts to support implementation of the SWP Program at PWS systems within district boundaries. DEQ's LWQD coordinator participates annually in the process of planning for a meeting with all the districts to review programs and activities, and generally share ideas about how each district approaches and manages local water quality related issues.

Prevention of Agriculture Chemical Pollution

The Montana Department of Agriculture (MDA) Groundwater program has the responsibility of protecting groundwater and the environment from impairment or degradation due to the use or misuse of agricultural chemicals (pesticides and fertilizers).

The program ensures the proper and correct use of agricultural chemicals; the management of agricultural chemicals to prevent, minimize, and mitigate their presence in groundwater; and provides education and training to agricultural chemical applicators, dealers and the public on groundwater protection, agricultural chemical use and the use of alternative agricultural methods. The program was formed in 1989 and is comprised of groundwater monitoring, education, management plan development, and enforcement.

The MDA is also responsible for the Generic Management Plan (GMP) for the state. The GMP is an umbrella plan, the purpose of which is to provide guidance for the state to prevent groundwater impairment from agricultural chemicals (pesticides and fertilizers—including pesticide and fertilizer use that is not directly related to agriculture). Copies may be obtained by request from the Agricultural Sciences Division of the MDA.

Groundwater Monitoring & Education

The MDA conducts ambient groundwater monitoring for agricultural chemicals. The groundwater monitoring program's purpose is to determine whether residues of agricultural chemicals are present in groundwater and to assess the likelihood of an agricultural chemical entering groundwater. If agricultural chemicals are found in groundwater, the MDA is tasked to verify, investigate, and determine an appropriate response to the findings. The department also has an education program under which they conduct initial and re-certification training for commercial and government pesticide applicators. The department staff is available to provide or assist in training and education for the public regarding pesticides.

Groundwater Monitoring

Permanent monitoring wells serve as the foundation from which the MDA looks for current and new agricultural chemicals. The MDA selects sites to be representative of agricultural crops and cropping, as well as their associated pesticide usage. Monitoring wells are located in the following counties: Beaverhead, Blaine, Broadwater, Carbon, Chouteau, Daniels, Dawson, Glacier, Hill, Judith Basin, Lake, McCone, Pondera, Richland, Teton, Valley, Wheatland and Yellowstone. The department also evaluates new chemicals when labeled for use in Montana as analytical methods are established.

Fairfield Bench

In 2002, a review of monitoring data on the Fairfield Bench (Teton and Cascade Counties, Sun River Watershed) determined that criteria necessary to implement a Specific Management Plan (SMP) for Imazamethabenz-methyl in groundwater had been met, per 4.11.1206 of the Administrative Rules of Montana. In 2005 an evaluation of the SMP concluded that the conditions necessary for mitigation of Imazamethabenz-methyl on the Fairfield Bench had been achieved, and the SMP was repealed in 2006.[91]

Statewide Groundwater/Pesticide Projects

The MDA Groundwater Program is in its second year of performing statewide groundwater/pesticide characterization projects. The MDA will prioritize watersheds around the state in which to conduct one-year monitoring projects. The Department selects sites based on agricultural setting, soil type, groundwater table, and sampling availability of the wells. These projects provide a snapshot of pesticide and nitrate levels in the groundwater, usually associated with a surface water source such as a river system. In 2005, the Department of Agriculture received a grant from EPA to sample the groundwater along the Yellowstone River Valley for pesticides and nitrates.[92] This Lower Yellowstone River Project sampled 22 wells twice during 2005. Wells sampled for this project were located in agricultural settings from Stillwater County to Richland County. The wells are predominantly located within two miles of the Yellowstone River. In 2006, the Department of Agriculture completed the Gallatin Valley Project, which consisted of 26 groundwater wells and 3 surface water sites in the Belgrade, Bozeman, Manhattan, and surrounding area.[93]

Groundwater Enforcement Program

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

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[91] Bamber, A. Personal Interview. Discussion to clarify the Department of Agriculture’s comments on the 2006 Montana Integrated 303(d)/305(b) Water Quality Report (21 November 2006).
[92] Yellowstone River Valley Project – 2005 [Internet]. Helena, MT: Montana Department of Agriculture; (n.d.). Available from: http://agr.mt.gov/pestfert/groundwater/gwyellowstonereport.asp. Accessed 2006 November 16.
[93] Bamber, A. Personal Interview. Discussion to clarify the Department of Agriculture’s comments on the 2006 Montana Integrated 303(d)/305(b) Water Quality Report (14 November 2006).

D.3 Groundwater-Surface Water Interactions

The Surface Water Treatment Rule (SWTR) was introduced in the 1986 provisions of the federal Safe Drinking Water Act. Surface water sources, or sources influenced by surface water, are subject to additional treatment requirements (i.e. filtration). The SWTR required each state to assess all PWS that utilize groundwater to determine whether surface waters influence the water source. The DEQ performed these assessments, under a project known as the Groundwater Under the Direct Influence of Surface Water (GWUDISW) program.

Evidence of surface water influence on groundwater was defined under SWTR as:

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

The initial step in the GWUDISW program is completion of a preliminary assessment (PA). The PA scores the source based on the source location relative to surface water bodies and information provided on the driller's log. Accordingly, large numbers of wells far removed from any surface water failed the PA due to lack of a well log. The DEQ completed further assessment on sources that failed the PA. In some instances, the DEQ retained the MBMG to perform a detailed hydrogeologic assessment. These assessments were contracted primarily for spring sources or other complex hydrogeologic situations, in which a detailed study was warranted.

DEQ's evolving database does not currently provide discrete tracking of the GWUDISW program. As of 2005, DEQ has completed roughly 90% of the preliminary assessments. The MBMG completed approximately 45 hydrogeologic assessments on systems that failed the preliminary assessment.

PART E. PUBLIC PARTICIPATION

E.1 Public Participation Process

Background

Both federal and state law require the Department of Environmental Quality (DEQ) to engage in extensive consultation with the public when it develops procedures or processes for assessing water quality and setting priorities for Total Maximum Daily Load TMDL planning. The 2006 Integrated Water Quality Report underwent a 60-day Public review beginning September 8, 2006 and ending November 7, 2006.

Montana's 2004 Integrated Water Quality Report (hereinafter Integrated Report or IR) reflects guidance given by Environmental Protection Agency EPA in a July 29, 2005 Memorandum from Diane Regas, Director of the EPA's Office of Wetlands, Oceans, and Watersheds which includes "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act." This guidance document details the requirements for using a categorization system to better identify the status of surface waters in state to the public, cooperating agencies, EPA, and congress.

2006 List Development Consultation

Montana's Water Quality Assessment Methodology

The 2000 303(d) List was the first to be developed using procedures adopted to respond to the 1997 amendments to state water quality law. These procedures, especially the state's proposed assessment methodology received close public review. During its development, DEQ obtained assistance and reviews from a wide array of state, regional, and national water quality assessment experts; consulted the statewide TMDL advisory group (STAG); and discussed the proposals with a number of stakeholder groups around the state. Since the 2000 cycle, the assessment methodology has been incorporated into the bureau's Quality Assurance Program as a Standard Operating Procedure[94]. In taking this step, DEQ consulted with the STAG.

Since its incorporation into the SOP format there has only been one revision, in August of 2006. This revision was made to reflect recent changes to state water quality standards. The changes to water quality standards were themselves subject to public review and Board of Environmental Review approval. Therefore incorporation of these new water quality standards into the assessment method did not warrant redundant public participation.

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

In compliance with this requirement, DEQ sent out nearly 600 letters to stakeholders (local watershed groups, federal, state, and local agencies, private groups, and individuals with water quality interests) in February 2005 requesting any water quality information they might have which could be used to update the assessments included in this Integrated Report. Many of these stakeholders had provided information during the 2000, 2002, or 2004 reporting cycles while others provide data to DEQ on a continuing basis. The DEQ monitoring and assessment staff also receives data from many of these entities by means of regular working contacts.

Information received up to November 1, 2005 was included in assessments for the 2006 reporting cycle. After assembling both internal, and the aforementioned external data, an intense period of water quality assessments ran up to August 22, 2006. At that time, the Access Database (ADB) was closed to new entries for the 2006

[94] 2004. *Standard Operating Procedure Water Quality Assessment Process and Methods (WQPBWQM-001Rev#: 01)* [online document] (Montana Department of Environmental Quality, [cited 11/02/05]) available from the World Wide Web @ http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf.

reporting cycle (this allowed time for compilation and internal review of the draft 2006 Integrated Report for the public comment period beginning September 8, 2006).

Publication of the Draft 2006 Integrated Report initiated a 60-day comment period (from September 8, 2006 to November 7, 2006) to obtain public review of DEQ's updated listing determinations and planning schedule. Legal notices placed in five major newspapers around the state will provide formal notice of this comment opportunity. A news release announcing the comment period was also issued to most of Montana's media outlets, mailed to approximately 600 water quality stakeholders, and noticed on DEQ website, and the Montana Watershed Listserv hosted by the Montana Watercourse.

The 2006 Integrated Report materials that Montana submits to the EPA consist of an electronic database, text, Geographic Information System (GIS) map files, and electronic version of assessment files. Recognizing that few members of the public would have all the computer software needed to read all these files, the DEQ has developed an interactive website, Clean Water Act Information Center (CWAIC), with the assistance of the Montana State Library's Natural Resource Information System (NRIS) and Maxim Technologies. The draft list is published on the Internet by the Montana State Library at http://www.cwaic.mt.gov. This site is readable using any computer with Internet access. Reviewers can provide comments related to the draft 2006 Integrated Report directly via the CWAIC site or can mail their comments to DEQ.

All of the comment period announcements identified both a standard mailing address:

Integrated Report Coordinator,
Water Quality Planning Bureau
Department of Environmental Quality,
PO Box 200901
Helena, MT 59620-0901

and the CWAIC site for submitting comments on the draft list to DEQ.

Public Comment/DEQ Response

Public and Agency comments received by DEQ were logged in, copied for the Record of Comments, reviewed, and distributed to the DEQ staff best able to address and/or respond to the comment content.

Overall, there were 21 comments received during the public comment period. In presenting these comments, DEQ has removed the names of individuals to protect their privacy but have included agency or organization names where known.

Each comment is responded to individually, and in the order received via the CWAIC site as follows.

Comment number:
1. BLM - Lewistown Field Office, 09/12/06
2. EPA Region 8 - MO, 10/05/06
3. Private Citizen, 10/09/06
4. AVISTA Corp., 10/10/06
5. Montana Water Trust, 10/13/06
6. EPA Region 8 - MO, 10/17/06
7. Private Citizen, 10/25/06
8. Montana Department of Agriculture, 10/27/06
9. Private Citizen, 11/02/06
10. City of Bozeman, 11/03/06
11. Lower Musselshell Conservation District, 11/03/06
12. EPA Region 8 - MO, 11/03/06
13. McCone County Conservation District, 11/03/06
14. Private Citizen, 11/06/06
15. Missoula Conservation District, 11/07/06
16. All Consulting, 11/07/06

17. Private Citizen, 11/07/06
18. F.H. Stoltze Land & Lumber Co., 11/07/06
19. Private Citizen, 11/07/06
20. BLM - Miles City Field Office, 11/06/06 (hardcopy)
21. City of Billings WWTP, 11/06/06 (hardcopy)

E.2 Public Comments/State Responses

Comment #1:
Type: I am providing information, which could affect assessments and/or priority rankings.
Commenter: Bureau of Land Management-Lewistown Field Office
Received: 09/12/06

With regard to the elevated heavy metals concentrations and low pH in Armells Creek, Chicago Gulch, and Collar Gulch, the Federal Bureau of Mines started a water quality study in Collar Gulch and Armells Creek to find the potential source of the pollutants. The agency was disbanded before the study could be completed. However, the sampling that was conducted suggested that the source of the metals and low pH is natural.

The headwaters of Armells, Chicago, and Collar Gulch are located on a large sulfide deposit. Oxidation of the sulphur associated with arsenopyrite mineralization in the ore body causes a decrease in pH thereby increasing the concentration of heavy metals in solution. The metals and low pH in Armells, Chicago, and Collar Gulch are more than likely associated with acid rock drainage as opposed to acid mine drainage.

DEQ Response #1:

DEQ has data from the study referenced in the comment. For the 2006 cycle, the assessment records for Armells Creek (MT40E002_022), Collar Gulch (MT40B002_030), and Chicago Gulch (MT40B002_020) were only reformatted for migration of their information to EPA's Assessment Database version 2.2 and DEQ's new relational database for water quality assessments. The data and information from the Bureau of Mines study cited in the comment will be included in the next full assessment of these waterbodies.

Comment #2
Type: Other
Commenter: USEPA Region 8
Received: 10/05/06

We have been working collaboratively with your Quality Assurance Officer, Mark Bostrom, to conduct a review of the draft 2006 Integrated Report (IR). To date, we have completed a review of the main document and have also reviewed the Assessment Records for all of the waters that have been delisted in the Columbia and Upper Missouri Basins. Over the next couple of weeks, we plan to review the remaining waters that have been delisted.

Please note that this is an informal review. EPA's formal review will not be initiated until you officially submit the final IR. Although this is an informal review and it is not yet complete, we are providing you with these comments now to provide you with as much time as possible to make modifications prior to submitting the final document. Once we complete our review of the remaining delisted waters, we will follow-up with additional comments.

The following comments have been presented in hierarchical order, with the highest priority comments first and the lowest priority comments last.

1. States must show "good cause" for any segments that have been delisted. Good cause is defined in 40 CFR Part 130, Section 7, Paragraph (b)(6)(iv) and includes, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in §130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges. Prior to release of the draft IR to the public, we jointly reviewed all of the de-listings in the Columbia River Basin to ensure that "good cause" was provided. Since the IR was made available for public comment, we have reviewed all of the de-listings in the Upper Missouri Basin and it does not appear that good cause has been provided for the following segments:

Waterbody ID#	Waterbody Name	Waterbody ID#	Waterbody Name
MT41D003_120	Twelvemile Creek	MT41F004_030	Beaver Creek
MT41Q003_040	Flat Creek	MT41H003_050	Jackson Creek
MT41Q002_050	Box Elder Creek	MT41F004_120	Gazelle Creek
MT41D004_140	Miner Creek	MT41H003_040	Sourdough Creek
MT41I001_011	Missouri River	MT41J002_060	Elk Creek
MT41J002_100	Little Camas Creek	MT41D004_090	Joseph Creek
MT41F004_150	Buford Creek	MT41C003_080	West Fork of Ruby River
MT41A004_060	Hell Roaring Creek	MT14C003_150	Shovel Creek
MT41D004_040	Shultz Creek	MT41H003_020	East Gallatin River
MT41C003_140	Hawkeye Creek	MT41H003_030	East Gallatin River

Unless "good cause" can be demonstrated and provided in the administrative record, the previously listed impairments should be carried forward in the 2006 IR.

2. Appendix D of Montana's draft Integrated Report summarizes beneficial use designation changes from 2004 to 2006. In addition to this information, we request a summary of segment / pollutant combinations added or removed from 2004 to 2006. As an example, EPA's Integrated Report guidance provides a recommended format for states to summarize this information.

3. The description of Category 2, 2A, and 2B in Part C.3 is confusing and should be clarified.

4. Much of the information in the "Nonpoint Source Pollution of Montana" subsection of Part B.2 is based on old information (i.e., 2000 Montana Water Quality Assessment Database) and is currently outdated. For example, the "top five impairment sources" listed in Table 7 is not based on information in the current version of the assessment database.

5. The "Nonpoint Source Benefits" subsection of Part B.3 appears to be based on outdated information and the nonpoint source benefits are not well described.

6. The combination of text and tables provided in the "Designated Use Support Summaries" subsection of Part C.3 provide an inadequate level of interpretation. In general, as currently presented, it is difficult for the reader to easily glean the important facts and/or key points.

7. Forestry (i.e., silviculture) should not be lumped with agriculture in the "agriculture" subsection of Part B.2.

8. The organizational format of the document (i.e., Part A, Part B, B-1, B-2, etc.) is awkward and the "flow" from one section to the next is often unclear. This document may be better organized using a numeric style/format (e.g., 1.0, 1.1, 1.1.1, etc) with a unique numeric header for each section and subsection 3

9. Table 23 (Laboratory test results for Mercury and PCB's in Fish in Montana) can be summarized to present the key points /findings or an interpretation of the data. Otherwise, it is difficult for the reader to understand the key points.

10. As currently presented, it is unclear to the reader what Figures 4- 7 are intended to depict or what the points represent (e.g., sites, streams).

11. Section C describes MTDEQ's monitoring programs. The inclusion of Table 9 ("1996 versus 2006 Cause listings") in the middle of these program descriptions is awkward and confusing to the reader.

12. In general, Part B.2 is more detailed than necessary and could be streamlined by reducing the narrative and referring to other MTDEQ documents.

Cc:
Tina Laidlaw, 8MO
Julie Dalsoglio, 8MO
Jim Ruppel, 8EPR-EP
George Mathieus, MDEQ-PPAD
Mark Bostrom, MDEQ-PPAD
Michael Pipp, MDEQ-PPAD
Rosie Sada, MDEQ-PPAD

DEQ Responses #2:

Point 1 - DEQ appreciates the foresight and timely review of the Draft 2006 Report provided by EPA, thus allowing these issues to be addressed within the public comment period. As per the 2006 IR guidance[95], states are not required to provide "good cause" for each delisting prior to receiving a *formal* request, but are recommended to do so. This informal review identified specific waterbodies included in the Draft 2006 IR where "good cause" is not clearly communicated or justified in the waterbody's assessment record.

Following is EPA's table with a query of the 1996 pollutants that are neither included nor refined to a more specific impairment (e.g., delisted) in the Draft 2006 IR. The DEQ response or action is included.

Waterbody ID #	Waterbody Name	1996 Pollutants	DEQ Response/Action
MT41D003_120	Twelvemile Creek	Siltation	Sediment/siltation was added as a cause for A/L and CWF.
MT41Q003_040	Flat Creek	Siltation	Dearborn TMDL. Assessment record will be updated to reflect TMDL findings in further cycles.
MT41Q002_050	Box Elder Creek	Silt., Susp. Solids, Thermal Mod.	Sediment/siltation was added as a cause for A/L and CWF. Suspended solids are included in the sediment/siltation listing. Thermal modification de-listing was clarified in the listing history and summaries of the assessment record.
MT41D004_140	Miner Creek	Siltation	Sediment/siltation was added as a cause for A/L and CWF.
MT41I001_011	Missouri River	Thermal Modifications	Thermal modification de-listing was clarified in the listing history and summaries of the assessment record.
MT41J002_100	Little Camas Creek	Thermal Modifications	Thermal Modifications was added as a cause for A/L and CWF.
MT41F004_150	Buford Creek	Siltation	No action was taken. Sediment/siltation is already listed as a cause in the 2006 IR draft.

[95] United States Environmental Protection Agency (US) [EPA]. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act. Washington, DC: EPA; 2005 July. 89 p. Available from: http://www.epa.gov/owow/tmdl/2006IRG.

Waterbody ID #	Waterbody Name	1996 Pollutants	DEQ Response/Action
MT41A004_060	Hell Roaring Creek	Siltation	Sediment/Siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT41C003_140	Hawkeye Creek	Siltation	Sediment/Siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT41D004_040	Shultz Creek	Siltation	Sediment/siltation was added as a cause for A/L and CWF.
MT41F004_030	Beaver Creek	Suspended Solids	Suspended solids de-listing was clarified in the listing history and summaries of the assessment record.
MT41H003_050	Jackson Creek	Siltation	Sediment/siltation was added as a cause for A/L and CWF.
MT41F004_120	Gazelle Creek	Not listed in 1996	No action was taken regarding de-listings.
MT41H003_040	Sourdough Creek	Suspended Solids	Sediment/siltation was added as a cause for A/L and CWF.
MT41J002_060	Elk Creek	Thermal Modifications	Thermal Modifications was added as a cause for A/L and CWF.
MT41D004_090	Joseph Creek	Siltation	Sediment/siltation was added as a cause for A/L and CWF.
MT41C003_080	West Fork of Ruby River	Siltation, Suspended Solids	Sediment/siltation was added as a cause for A/L. Suspended solids is included in the sediment/siltation listing.
MT14C003_150	Shovel Creek	Siltation	Sediment/siltation was added a cause for A/L.
MT41H003_020	East Gallatin River	Siltation, pH	pH was added as a cause for A/L and CWF. Sediment/siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT41H003_030	East Gallatin River	Silt., Susp. Solids, Ammonia, pH	pH was added as a cause for A/L and CWF. Sediment/siltation, Suspended solids and Ammonia de-listings were clarified in the listing history and summaries of the assessment record.

Point 2 - DEQ provided EPA with a copy of the 2004 ADBv1.14 database as part of the 2004 submittal and will provide a copy of the 2006 ADBv2.2 database *prior* to its 2006 final submittal. This should allow sufficient time for EPA to develop the list for errata to the final IR.

Information from all waters was migrated from the ADBv1.14 to ADBv2.2 this cycle. These two databases handled impairment causes differently as illustrated in Table 9 of this draft. Therefore, all waters that either included an impairment listed in Table 9 or were assessed between 2004 and 2006 will have segment/pollutant combinations added, removed, or changed to reflect ADBv2.2 impairments.

DEQ should be able to provide this information in the next listing cycle once ADBv2.2 has been used consistently for two cycles.

Point 3 - EPA changed the Category 2 definition for the 2006 cycle. A brief description of that change is provided first. This change allowed more options for creating sub-categories. As a result, DEQ elected to create sub-categories 2A and 2B.

- Category 2A includes *partially assessed* segments where all beneficial uses that *have been* assessed are fully supported.
- Category 2B includes segments where a numeric standard is exceeded and the *only* identified source is natural (2B).

Waters listed in category 2B will be reviewed by water quality standards staff to determine if there are questions of classification or a need for site specific standards. The text presented in the Draft 2006 IR has been reviewed and edited for clarity.

Point 4 - Several other public comments noted that data or statements made in Part B.2 are dated, subjective, or otherwise inconsistent with information provided in Part C.3 of the 2006 Draft IR.

For Part B.2, the last NPS plan approved by EPA was from 2001. The Watershed Protection Section of the Water Quality Planning Bureau is presently in the final stages of production of an updated NPS plan for Montana, however, the draft of this NPS document was not available for the compilation of the Draft 2006 IR. Therefore, the information cited in Part B.2 NPS Program is based on the 2000 303(d) list, which was used to develop the 2001 NPS Plan. This will allow a vastly improved, updated, and synchronized NPS section for the 2008 IR.

For Part C.3, the source information contained in the Draft 2006 IR, which is derived from EPA's latest version of Assessment Database (ADB version 2.2), could not be used to develop a new NPS Source analysis due to its own internal inconsistencies. These inconsistencies were also commented upon by citizen ranchers and Conservation Districts during the public comment period.

The root cause of these inconsistencies appears to be EPA's decision to stop enforcing the source hierarchy in its newer version of the ADB (version 2.2). The source hierarchy structure of previous versions of the ADB had the general source (e.g., Agriculture) *always* accompanying specific sources when listing. This database rule was eliminated from ADBv2.2 and the source #156 "Agriculture" was allowed to be, *but not required to be*, omitted when more specific sources were selected. The result of this loss of hierarchal control in the database is evident in Tables 17 and 20 of the Integrated Report. For example, Table 17 indicates that 188 waterbody segments are impaired by "#156 - Agriculture", whereas 295 waterbody segments are impaired by "#46- Grazing in Riparian or Shoreline Zones." This confused the public and will require a very sophisticated query, which isn't currently available in ADB, to reproduce the 305(b) type statements generalizing sources categories that were available in earlier versions of the ADB.

DEQ is working to resolve the lack of hierarchy in ADBv2.2 in the reporting module of its new relational database for performing assessments. This DEQ database will be operational for the 2008 listing cycle.

Point 5 - The "Nonpoint Source Benefits" subsection Part B.3 is based upon information available between the 2004 and 2006 listing cycle. Also, DEQ's last EPA approved NPS Plan was from 2001, so some of the NPS program information is somewhat dated. DEQ is presently updating its NPS plan for approval in 2007. This will provide for a more recent and accurate analysis of NPS program costs and benefits for the 2008 Integrated Report.

Point 6 - DEQ agrees. DEQ used the ADBv2.2 as recommended by EPA. As noted in point 4, the source information contained in the Draft 2006 IR, which is derived from EPA's latest version of ADB, could not be used to develop NPS Source analyses. The inconsistencies that resulted were also commented upon by citizen ranchers and Conservation Districts during the public comment period.

Point 7 - In the federal government, the U.S. Forest Service is an Agency within the Department of Agriculture. Also, both Agriculture and Forestry are included by the U.S. Census Bureau under economic sector 11 (NAICS). Analyzing agriculture and forestry concurrently is appropriate despite the distinct NPS mitigation activities of Agriculture (as Crop production and Animal Production) versus those used for Forestry.

The title of the NPS Agriculture Strategy subsection is changed to *Agriculture and Forestry* to reflect the fact that these two industrial sub-sectors are both described therein.

Point 8 - DEQ used the formatting described in EPA's 2006 IR Guidance.

Point 9 - This is DPHHS information not DEQ information. DEQ did not feel it would be appropriate to further reduce or censure this information and place DEQ judgment upon what is, or is not, relevant DPHHS information for the public.

Point 10 - Improved graphics for of these figures are provided in the final to put them into geographical context.

Point 11 - DEQ included Table 9 to illustrate the different "cause" naming conventions between ADBv1.14 and ADBv2.2. These differences are what prevent DEQ from providing the summary of segment/pollutant combinations added or removed from 2004 to 2006 as requested at point #2.

Part 12 - DEQ will not edit the entire section B.2 for this cycle but will address concerns expressed in other this and other comments regarding statements made within the NPS portion of section B.2.

Comment #3:
Type: I have views or opinions regarding the 303(d) program or the assessments and prioritizations but am not providing or referencing any specific information.
Commenter: Private Citizen
Received: 10/09/06

In making decisions regarding water quality it is imperative to do so on the basis of documented, reproducible, factual data. As a board member of a grassroots citizen's based group, I have recently spoken with many Southeastern Montana residents. What many are expressing is that our regulatory agencies and government are not working toward balanced, fair, "pro-people" decisions. Instead, decisions seem to favor extreme environmentalism. Southeastern Montana residents tell me that they have an expectation for resolutions on these issues that do not devastate our local economies, promote harmony between man and environment and provide them with an assurance that you are working for them, not extremists. They are beginning to distrust government in general due to previous decisions. Please make decisions based on SCIENCE and FACT. They are defensible; hysteria is not. Thank you,

DEQ Response #3:

The opinion is noted.

Comment #4:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: AVISTA
Received: 10/10/06

There are differences in both Beneficial Use Support Information and Impairment Information from the Flathead to Noxon (MT76N001_010) and Noxon to Cabinet (MT76N001_020) reaches of the lower Clark Fork River. One would assume they should almost be the same. Also the Flathead to Noxon (MT76N001_010) is not listed for TDG, while Thompson Falls Dam is known to indeed increase TDG levels above 110%.

Current information on the fisheries resources of Noxon Reservoir is available through Avista (in Noxon) or MFWP (in TFalls).

Current information on the fisheries resources of Thompson Falls Reservoir is available through PPL-MT (in Butte) or MFWP (in TFalls).

Current information on TDG monitoring at Thompson Falls Dam is available through PPL-MT (in Butte).

DEQ Response #4:
For this cycle, the waterbodies noted in the comment were only reformatted as needed to complete the database migration from ADBv1.14 to ADBv2.2 and subsequently to DEQ's new relational database for assessments. The data and information noted in the comment are either already included in the assessment record file or will be added when the next full assessment is completed.

DEQ is working with Mr. Frank Pickett from PPL to obtain chemistry data collected by numerous PPL-MT operations in a database format that can be loaded into EPA's STORET database. Upon completion of this project, these data will be easily accessed by DEQ assessors and the public. DEQ is looking forward to receiving this data compilation in early 2007.

Comment #5:
Type: I have views or opinions regarding the 303(d) program or the assessments and prioritizations but am not providing or referencing any specific information.
Commenter: Montana Water Trust
Received: 10/13/06

Variation of instream flows in Montana's rivers and streams has numerous negative impacts on aquatic life. Temperature fluctuations render water bodies uninhabitable for certain species by raising or lowering the temperature beyond limits the species biology can handle. Low flows may also limit, if not eliminate, critical spawning and early life stage habitat. A low flow will also inhibit the streams ability to diffuse suspended solids, oxygen, and sediment increasing concentrations of those pollutants among others. As a result of these and other impacts only14-16% of streams in Montana which have a designated use of supporting aquatic life and fisheries are actually capable of supporting that use.[96] If the State is to take its obligation to ensure water bodies are capable of supporting their intended beneficial uses seriously then a minimum instream flow criteria is necessary and needs to be included in the relevant regulations. Continuing to use a limited definition of pollutants, one in which the instream flow needs are ignored, will simply perpetuate the inability of state and federal agencies to accurately address the needs of a healthy aquatic ecosystem and achieve the intended uses of impaired water bodies.

While the Clean Water Act itself may not explicitly include instream flows as a specific criteria it is an essential background factor in dealing with those criteria, such as temperature and pollutant concentrations, that are specifically mentioned. Any rehabilitation program cannot successfully address issues impairing a water body with out providing for adequate instream flows. Such requirements have been successfully implemented as part of the DEQ's flexible approach to TMDL programs in the past. Fortunately there are more organizations available today, such as the Montana Water Trust, Trout Unlimited as well as Fish, Wildlife, and Parks with the expertise and commitment necessary to ensure that any future TMDL projects using instream flows as a remedy are successful. Waiting for the classification and TMDL process though should not always be a necessary precursor to composing and implementing plans to improve the quality of Montana's rivers and streams. Explicitly providing for an instream flow crieteria in the regulations, as opposed to using it only as part of a TMDL project, will make it easier for private organizations to receive Clean Water Act section 319 funding and work proactively and cooperatively with watershed stakeholders to improve the quality of Montana's rivers and streams. This is why we want the 305(b)/303(d) report to include those streams that are impaired due to chronic dewatering and in need of instream restoration.

DEQ Response #5:

[96] 2006 Integrated 303(d)/305(b) Water Quality Report for Montana, pp. 78 (Sept. 2006) Site visited on Sept. 29th 2006: *http://www.deq.state.mt.us/cwaic/wqrep/2006/2006_IR_Master.pdf*

DEQ agrees that lack of instream flow is often one of the most significant factors in diminishing beneficial use support for aquatic life and fisheries. However, DEQ also recognizes individual water rights and has no authority to *require* minimum flows that may infringe upon those rights. The Montana Water Quality Act explicitly addresses this subject at 75-5-705 which reads, "Nonimpairment of water rights. Nothing in this part may be construed to divest, impair, or diminish any water right recognized pursuant to MCA Title 85."

DEQ acknowledges the excellent work done by organizations and agencies such as the Montana Water Trust, Trout Unlimited, FWP, and others securing voluntary reductions in irrigation withdrawal, leasing portions of water rights to maintain minimum flows, and programs for the improvement of irrigation and other water use efficiency. DEQ also acknowledges the water rights adjudication work being done by the DNRC Water Resources Division. Until the determination of who has the right to use how much water, where, when and for what purpose has been made through the Montana Water Court, the legally held water rights picture is not clearly defined.

Finally, this integrated report *does* identify waters impaired due to chronic dewatering. In the EPA's Assessment Database (ADB v2.2), the impairment # 270 - Low Flow Alterations is used to identify dewatering.

Comment #6:
Type: Other
Commenter: USEPA Region 8
Received: 10/17/06

As you know, we provided comments to you regarding the Draft 2006 Water Quality Integrated Report on October 4, 2006. At that time, we had only completed our review of the Assessment Records for the Columbia and Upper Missouri River Basins. Since that time, we have reviewed the Assessment Records associated with the delisted waters in the Yellowstone River Basin and offer the following comments. Over the next couple of weeks, we plan to finalize our review of Assessment Records for the remainder of the delisted waters in the state and may submit additional comments.

The following comments pertain to the waters we have reviewed in the Yellowstone River Basin:

1. States must show "good cause" for any segments that have been delisted. Good cause is defined in 40 CFR Part 130, Section 7, Paragraph (b)(6)(iv) and includes, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in §130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges.
It does not appear that good cause has been provided for delisting the following segments in the Yellowstone Basin:

Waterbody ID	Waterbody Name	Waterbody ID	Waterbody Name
MT42L001_020	Sandstone Creek	MT42K002_160	Little Porcupine Creek
MT43A002_010	Potter Creek	MT43D002_140	Cottonwood Creek
MT39F001_021	Little Missouri River	MT42K002_020	Harris Creek
MT43C002_042	Grove Creek	MT43A002_020	Antelope Creek
MT43D002_132	Rock Creek	MT43D002_100	Silvertip Creek
MT42K002_120	West Fork Armells Creek	MT42M002_130	Glendive Creek
MT43B004_042	Upper Deer Creek	MT42M002_100	Cottonwood Creek
MT42K002_080	North Fork Sunday Creek	MT43D001_012	Clarks Fork Yellowstone River
MT43D001_011	Clarks Fork Yellowstone River	MT42K002_170	East Fork Armells Creek
MT43R002_010	Tullock Creek	MT43D002_080	West Red Lodge Creek

MT43D002_020	Bear Creek	MT42L001_010	Pennel Creek
MT42K002_040	Muster Creek		

Unless "good cause" can be demonstrated and provided in the administrative record, the previously listed impairments should be carried forward in the 2006 IR.

Cc:
Tina Laidlaw, 8MO
Julie Dalsoglio, 8MO
Jim Ruppel, 8EPR-EP
George Mathieus, MDEQ-PPAD
Mark Bostrom, MDEQ-PPAD
Michael Pipp, MDEQ-PPAD
Rosie Sada, MDEQ-PPAD

DEQ Response #6:
Following is EPA's table with a query of the 1996 pollutants that are neither included nor refined to a more specific impairment (e.g., delisted) in the Draft 2006 IR. The DEQ response and actions taken are listed in the final column.

Waterbody ID	Waterbody Name	1996 Pollutants	DEQ Response/Action
MT42L001_020	Sandstone Creek	Other Inorganics, Salinity/TDS/Chlorides, Suspended Solids	Other Inorganics, Salinity/TDS/Chlorides, and Suspended solids de-listings were clarified in the listing history and summaries of the assessment record.
MT43A002_010	Potter Creek	Siltation, Suspended Solids	Sediment/Siltation and Suspended solids were added as causes for A/L and CWF.
MT39F001_021	Little Missouri River	Suspended Solids	Suspended solids de-listing clarified in listing history and summaries of the assessment record.
MT43C002_042	Grove Creek	Siltation, Suspended Solids	Not assessed. Field sampling scheduled for 2007.
MT43D002_132	Rock Creek	Nutrients	No action. This segment is listed as fully supporting since 2000. It will be updated with current criteria in further cycles.
MT42K002_120	West Fork Armells Creek	Nutrients, Salinity/TDS/Chlorides, Suspended Solids	Nutrients, Salinity/TDS/Chlorides and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT43B004_042	Upper Deer Creek	Suspended Solids	Suspended solids were added as a cause for A/L and CWF.
MT42K002_080	North Fork Sunday Creek	Salinity/TDS/Chlorides, Siltation, Suspended Solids	Salinity/TDS/Chlorides, Siltation and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.

Waterbody ID	Waterbody Name	1996 Pollutants	DEQ Response/Action
MT43D001_011	Clarks Fork Yellowstone River	Metals, Salinity/TDS/Chlorides, Thermal Modifications	Copper, Iron, Lead, Mercury, and Thermal Impacts were added as a cause for A/L and CWF. The Salinity/TDS/Chlorides de-listing was clarified in the overall summary.
MT43R002_010	Tullock Creek	Metals, Salinity/TDS/Chlorides, Other inorganics	Salinity/TDS/Chlorides and Other Inorganics de-listings were clarified in the listing history and summaries of the assessment record. Iron was added as a cause for A/L and WWF.
MT43D002_020	Bear Creek	Other inorganics, Metals	Other Inorganics de-listings were clarified in the listing history and summaries of the assessment record. Iron was added as a cause for A/L and CWF.
MT42K002_040	Muster Creek	Suspended Solids	Suspended solids were added as a cause for A/L and WWF.
MT42K002_160	Little Porcupine Creek	Salinity/TDS/Chlorides	Salinity/TDS/Chlorides were added as TDS only since the new EPA database does not have the option for the same listings than in 1996. TDS was added as a cause for A/L and WWF.
MT43D002_140	Cottonwood Creek	Suspended Solids	Suspended solids were added as a cause for A/L only since it was indicated in the 2006 IR draft that there was Insufficient Information to assess CWF (category 2B).
MT42K002_020	Harris Creek	Suspended Solids	Suspended solids were added as a cause for A/L and WWF.
MT43A002_020	Antelope Creek	Suspended Solids	Suspended solids were added as a cause for A/L and CWF.
MT43D002_100	Silvertip Creek	Salinity/TDS/Chlorides, Thermal Modifications, Nutrients, Suspended Solids	Salinity/TDS/Chlorides were added as TDS only since the new EPA database does not have the option for the same listings than in 1996. TDS was added as a cause for A/L. Thermal modifications and Suspended Solids were also added, as a cause for A/L only since it was indicated in the 2006 IR draft that there was Insufficient Information to assess CWF (category 2B).
MT42M002_130	Glendive Creek	Other Inorganics, Salinity/TDS/Chlorides, Suspended Solids	Salinity/TDS/Chlorides and Other Inorganics de-listings were clarified in the listing history and summaries of the assessment record. Suspended solids were added as a cause for A/L and WWF.
MT42M002_100	Cottonwood Creek	Salinity/TDS/Chlorides, Suspended Solids	Salinity/TDS/Chlorides and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.

Waterbody ID	Waterbody Name	1996 Pollutants	DEQ Response/Action
MT43D001_012	Clarks Fork Yellowstone River	Metals, Nutrients, Salinity/TDS/Chlorides, Siltation, Suspended Solids, Thermal Modifications	Not assessed. Field sampling scheduled for 2007.
MT42K002_170	East Fork Armells Creek	Nutrients, Suspended Solids	Nutrients and Suspended solids de-listings were clarified in listing history and summaries of the assessment record.
MT43D002_080	West Red Lodge Creek	Siltation, Suspended Solids	Sediment/Siltation was added as cause for A/L and CWF. The Suspended solids de-listing was clarified in the listing history and summaries of the assessment record.
MT42L001_010	Pennel Creek	Salinity/TDS/Chlorides	Salinity/TDS/Chlorides were added as TDS only since the new EPA database does not have the option for the same listings than in 1996. TDS was added as a cause for A/L and WWF.

Comment #7:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: Private Citizen
Received: 10/25/06

I am writing to comment on the Draft 2006 Integrated Water Quality Report for Tiber Reservoir (MT41P003_022).

I have lived in the Tiber Reservoir area most of my life, and I am concerned about the mercury problem in the reservoir. Currently, Tiber Reservoir is shown as fully supported for all beneficial uses. However, the Montana Department of Public Health and Human Services 2005 sport fishing consumption guidelines show mercury concentrations of up to .78 ug per gram of fish, which puts it into the category of Do Not Eat Any Fish on an annual basis for women of childbearing age.

In the accompanying chart, I show the mercury concentrations in fish for a number of large lakes and reservoirs in Montana. Tiber Reservoir is third highest on the list. I also show the draft beneficial uses of the water, the DEQ assessment, and the probable causes. In all cases except Tiber Reservoir, mercury is shown as the probable cause for an impairment of one or more beneficial uses.

Tiber is shown as fully supported for all beneficial uses, yet because of the fish advisory, we know that there are sources of mercury in the watershed. In a catch-22 situation, because there is no beneficial use shown as impaired, no mention can be made of these mercury sources. In the report, it is stated that there are no manmade sources of mercury in the watershed. However, we know this is not the case. All through the 50's, 60's and 70's, mercury based seed treatments were used on many thousands of acres all through the triangle area. There must have been may thousands of tons of mercury based seed treatment used over this period. This source, along with the ubiquitous atmospheric deposition of mercury, both man caused, certainly does constitute a potential problem.

In the summary for this water body, it is recommended that it be removed from the 303(d) water review process. This seems unacceptable.

The production of edible fish is currently not listed as a beneficial use of water bodies. Most ordinary Montanans would see the production of edible fish as a very important beneficial use, in many cases the most important beneficial use of a water body, if they do not get their drinking water from it.

While the basic enabling legislation, the Clean Water Act, does not list production of edible fish as a beneficial used required to be assessed, I see no reason that Montana can not add production of edible fish as an additional beneficial use to be assessed.

This is a public health issue. Many rural low-income people are at risk, as this is the population most likely to supplement their diet on a regular basis with indigenous sources of food, such as locally caught fish. This is also the population most likely to be less aware of agency publications of the health risks of doing so.

While the Department of Public Health and Human Services and the Department of Fish, Wildlife and Parks bear major responsibilities for publicizing and posting warnings near water bodies about this health threat, the Department of Environmental Quality also bears certain responsibilities in this area.

One way of fulfilling these responsibilities is to add the production of edible fish as a beneficial use, and to assess for it. I therefore formally request that the Department of Environmental Quality add the production of edible fish as a beneficial use to be assessed in its 303(d) assessment, either through administrative process, or enabling legislation.

It is simply the right thing to do.

Sincerely,

XXX

cc:
Eric Urban, Lower Missouri Water Monitoring Coordinator
Richard Opper, Dir., Department of Environmental Quality
Joan Miles, Dir., Department of Public Health and Human Services
Jeff Hagener, Dir., Department of Fish, Wildlife and Parks
Brian Schweitzer, Governor

DEQ Response #7:
A public comment received during the public comment period for the 2004 Integrated Report lead to a special study of mercury issues in Tiber Reservoir and in the Marias River below Tiber. This study was conducted during the 2005 field season and included sampling and analysis for mercury using the ultra low-level mercury analysis technique EPA 1631 as well as testing for methyl mercury. The results of this study did not detect exceedences of water quality standards for human health-surface water. Therefore, this recent data supported listing Tiber Reservoir as fully supporting all designated uses.

The fish consumption use is protected by current water quality standards. As is common with water quality standards set to protect human health, the mercury standard for surface water is calculated based on two routes of exposure, consuming fish and drinking the water. Because mercury has a high bioconcentration factor (5,500[97]), the fish consumption route of exposure accounts for almost the entire current water column standard of 0.05 ug/l.

Since Montana does not currently have a fish-tissue standard for Mercury or any other pollutant, listing decisions are based on the water column standard.

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[97] Department Circular DEQ-7, February 2006. The value listed in DEQ-7 was developed by EPA as mandated by Section 304a of the federal Clean Water Act and is published in National Recommended Water Quality Criteria: 2002 Human Health Criteria Calculation Matrix (EPA-822-R-02-012).

Although DEQ believes that fish consumption is protected under current water quality standards, the Department agrees to *consider* the addition of language to clarify that fish consumption is a beneficial use during the next water quality standards triennial review cycle.

Comment #8:
Type: Other
Commenter: Montana Department of Agriculture
Received: 10/27/06

Thank you for giving us the opportunity to comment on the Draft 2006 Integrated Water Quality Report. The sections reviewed by our Groundwater Protection Program are B.2 Nonpoint Source Pollution Control Program; C.6 Fish Kills, and Toxics and Carcinogens; and all of Part D. We have used bullets to facilitate readability. Thank you for taking our comments into consideration.

- The format of the report is inconsistent throughout the document. There is also inconsistent use of the words groundwater and ground water.
- Page 29, under <u>Nonpoint Source Pollution and Montana</u> states, *Farms and ranches cover two-thirds of the state. Therefore, it follows that agriculture is one of Montana's leading sources of nonpoint source pollution.* Without specific data to support this inference, it may be more appropriate to say *Agriculture has the potential to be a leading source of nonpoint source pollution.*
- On page 29, under <u>Agriculture,</u> the statistics regarding water impairment caused by agricultural activities are difficult to find in the reference (#36) given. It may also be beneficial to review the consistency and clarity of the language in the paragraph. It is stated that 6,416 miles of streams are impaired by agricultural activities, representing 60 percent of nonpoint source stream pollution. The next sentence states that farming and ranching are responsible for impacts on over 315,000 acres of lakes. Agriculture has a very broad definition and describes many diverse activities. What these two sentences say is that a variety of agricultural activities are associated with stream pollution (i.e. traditional cropping systems, livestock operations, timber harvesting, orchards, ornamental plant cultivation, etc.), but only traditional cropping systems and livestock are associated with lake pollution. By specifying which agricultural activities (i.e. livestock) are related to specific pollutants (i.e. thermal impacts), and then discussing the statistics associated with that impairment (i.e. number of stream miles affected), the section will be significantly strengthened.
- On page 88 under *Fish Kills*, the text says that there were four fish kills between 2004 and 2006, but only three are listed. Additionally, the description of the third listed fish kill may not be correct, i.e. Lake Kookiness and Konkani fish.
- The sub-heading *Toxics and Carcinogens* is misleading because it implies a comprehensive look at toxics and carcinogens in water as they relate to human health. A more accurate sub-heading might be *Mercury and PCBs in Fish in Montana.* Also, in the title for Table 23, the possessive apostrophe in PCB's should be stricken.

Section D.2 includes information directly related to our Groundwater Protection Program. We will attempt to address the draft text as best as possible here.

- On page 115, the first paragraph under Protection Strategy states, "*The rate and scale of ground water impacts are increasing for several reasons." These include the increasing use of septic systems associated with growth and development; and because basin closures for surface water rights result in increased agricultural use of groundwater for irrigation and livestock watering that can cause impacts from fertilizers, pesticides, and animal wastes.* It is unclear how the increased use of groundwater, rather than surface water, for irrigation and livestock watering increases impacts from fertilizers, pesticides, and animal waste.
- On page 116, the last paragraph of the Remediation Strategy section states that *The Montana Agricultural Chemical Ground Water Protection Act* (MACGWPA) *regulates investigation and cleanup of sites contaminated with agricultural chemicals.* Our groundwater program does not

perform any remediation. The MACGWPA gives us the authority to determine the best way in which to mitigate pesticide impacts if such impacts are found. Mitigation efforts can range from education, to development of locally specific Best Management Practices, to increased regulation of the pesticide of concern through a Specific Management Plan. It should also be noted that the MACGWPA only addresses nonpoint sources of contamination. The Montana Pesticide Act addresses agricultural chemical point source contamination of groundwater, and can require cleanup of sites contaminated with agricultural chemicals.

- On page 116 under Source Water Protection, number 2, the word herbicide should be stricken because herbicides are pesticides.
- Page 118 under Follow-up Sampling:
    - In our groundwater program, follow-up sampling is conducted simply to verify the presence of a chemical when it is found in groundwater the first time. It is the verification sample. The MDA tests it's permanent wells at a minimum of twice a year. Some wells that do not have any detections are put on a rotation so that they are sampled every other year, rather than every year.
- Page 118 under Statewide Groundwater/ Pesticide Projects
    - 1st sentence: MDA has just completed its second year of doing watershed level monitoring projects.
    - 2nd sentence: This would better read, *The MDA will prioritize watersheds around the state in which to conduct one-year monitoring projects.* These projects provide a snapshot of pesticide and nitrate levels in the groundwater, usually associated with a surface water source such as a river system.
    - The fourth sentence should reference the Yellowstone project as Yellowstone River Project. This is to avoid confusion with the characterization projects undertaken by the Montana Bureau of Mines and Geology. Also, the project entailed sampling 22 wells, rather than 15 as stated in the report.
    - It would be appropriate to delete the reference to the Flathead project, as it was only a one time sampling event, and we do not feel that it is as complete as it should be. A report was never written for it.
    - Please take a look at our website and you can see the Yellowstone River Project Report. http://agr.state.mt.us/pestfert/groundWater.asp
    - Also on our website is the Generic Management Plan for the state, which is referenced in the last paragraph under groundwater enforcement (not really an appropriate place for it). The Generic Management Plan (GMP) is the only State Management Plan –your text reads as though there are two separate plans. It is possible that this confusion has resulted from the difference in the GMP and Specific Management Plans (SMP). It may help to think of it this way: The GMP is an umbrella plan, the purpose of which is to provide guidance for the state to prevent groundwater impairment from agricultural chemicals (pesticides and fertilizers—including pesticide and fertilizer use that is not directly related to agriculture). If we find a chemical that meets the criteria described in the Montana Agricultural Chemical Groundwater Protection Act, we then implement a SMP. The SMP, as the name implies, is for a specific chemical in a specific area. The SMP allows us to use a more refined system to mitigate the presence of a pesticide by taking into account the specific attributes of a geographical area. At this time, we have no SMPs in the state. The Fairfield Bench SMP was repealed in August, 2006 (an SMP goes through the Administrative Rules of Montana process).
    - In 2006 we have completed the Gallatin Valley Project, which consists of 26 groundwater wells and 3 surface water sites, and incorporates Bozeman, Belgrade, Manhattan and surrounding areas. That report will be available on our website soon.

These comments directly relating to the Groundwater Protection Program address specific language in the text of the report. In addition to these specific instances, the entire section appears to intermingle the objectives of the Groundwater section with those of the Enforcement and Compliance section. There is an emphasis on some parts of our program, and not on others, which could be balanced a bit better. We would be happy to meet with the author to answer questions about the mission of our program, the scope of our authority, and to discuss the information that we can provide regarding water quality in Montana. Amy Bamber, Groundwater Protection Program manager, may be reached at 444-3676 or abamber@mt.gov.

Assembling a document of this size and scope, and including outside agencies, is certainly no small task. When complete, this report should be a useful tool for identifying areas in which we as a state can improve water quality, and for determining resources to help achieve that goal. Thank you again for considering our comments as you review the draft.

DEQ Response #8:

The format DEQ used for the 2006 MIWQR is based closely on the format recommended by EPA.[98] Staff from 11 different sections within DEQ and staff from the MBMG assisted with the development of this report. Care was taken to make the report as consistent as possible given EPA guidance, time constraints, and different writing styles. The final draft of the report will use the word "groundwater," except in cases where proper names use the alternative spelling "ground water."

Related to comments on page 29 under "Nonpoint Source Pollution and Montana," DEQ reviewed the entire NPS section and revised statements which were unsubstantiated.

On page 88 under Fish Kills, the text should have said that there were three fish kills between 2004 and 2006. The lake and fish species as referenced in this comment were misspelled in the MIWQR. The lake and fish species referenced should have been Lake Koocanusa, and Kokanee, respectively.

The sub-heading "Toxics and Carcinogens" has been changed to "Fish Consumption Advisories," to more accurately reflect the contents of the section. The apostrophe was removed from PCBs in Table 23's title.

On page 115, DEQ revised the paragraph under "Protection Strategy" stating, "The rate and scale of ground water impacts are increasing for several reasons. These include the increasing use of septic systems associated with growth and development; and because basin closures for surface water rights result in increased agricultural use of groundwater for irrigation and livestock watering that can cause impacts from fertilizers, pesticides, and animal wastes" to "The rate and scale of ground water impacts are increasing for several reasons. These include the increasing use of septic systems associated with growth and development and increased agricultural use of groundwater for irrigation and livestock watering due to basin closures for surface water rights. Increased groundwater use for irrigation and livestock watering can potentially reduce recharge and increase the impacts from fertilizers, pesticides, and animal wastes to groundwater as these pollutants move through the soil and ultimately end up in groundwater."

On page 116, DEQ removed the following statement: "*The Montana Agricultural Chemical Ground Water Protection Act* (MACGWPA) *regulates investigation and cleanup of sites contaminated with agricultural chemicals[,]"* from the Remediation Strategy section.

On page 116 under Source Water Protection, number 2, DEQ removed the word herbicide since herbicides are pesticides.

On page 118, DEQ removed the paragraph on "Follow-up sampling" in consultation with the Department of Agriculture.[99]

On page 118 under Statewide Groundwater/Pesticide Projects, DEQ has incorporated the suggestions provided by the Department of Agriculture.

[98] United States Environmental Protection Agency (US) [EPA]. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act. Washington, DC: EPA; 2005 July. 89 p. Available from: http://www.epa.gov/owow/tmdl/2006IRG. Accessed 2006 November 14.

[99] Bamber, A. Personal Interview. Discussion to clarify the Department of Agriculture's comments on the 2006 Montana Integrated 303(d)/305(b) Water Quality Report (14 November 2006).

Comment #9:
Type: Other
Commenter: Private Citizen
Received: 11/02/06
Note: This comment was received via the CWAIC site feedback option, which was designed for technical problems related to the website. The comment was obviously intended as a comment related to water quality issues in Montana and was transferred to the public comment section of CWAIC on 11/02/06.

i would like just a straight forward summary of the polution and toxins in the rivers. A lot of the informations seems incomplete or untested.

Is it safe to go kayaking at Brennans wave?

Warning system if the water is not safe below the milltown damn. Is it safe?

DEQ Response #9:
A summary of the impairments to Montana's rivers (in general) is provided in Part C3. Assessment Results, Table 16. Information related to specific water bodies is provided in Appendix H, Sections 1 - 3. Appendix H, Section 3 are the Category 5 waters of Montana, which is the list considered by EPA in the approval of the state's CWA Sec. 303(d) list.

State surface water standards for human health are set at a level such that water bodies that have drinking water designated as a use are deemed fit for human consumption or culinary use (A-Closed waters), or would be fit for human consumption or culinary use following conventional treatment (A-1, B-1, B-2, B-3 waters). If the surface water standard for Human Health is not attained for a waterbody segment in these classes of water bodies, it is listed as having the Drinking Water use impaired in this report.

For information related to the bacteriological activity and aesthetic qualities, the recreation use is relevant. All water bodies classes A through C are expected to support the recreation use. If a water body is high in bacteriological organisms or is generally unpleasant to recreate in due to algal growth, the recreation use is deemed impaired.

For more information on the monitoring of surface and ground waters associated with the Milltown Dam removal, please visit the EPA website at

http://www.epa.gov/region8/superfund/sites/mt/milltowncfr/home.html

This website has links to the Milltown project's ftp site which includes the results of surface and ground water monitoring data.

Comment #10:
Type: I am providing information, which could affect assessments and/or priority rankings.
Commenter: City of Bozeman
Received: 11/03/06

Thank you for the opportunity to provide comments on the Proposed 2006 Federal Clean Water Act Section 303(d) list of impaired waters. The City of Bozeman requests modification of the following water segment from the proposed 303(d) list:

Water Body ID: MT41H003_020
Hydro Unit:10020008-Gallatin
Location: East Gallatin River, Bridger Creek to Reese Creek

The City of Bozeman requests the Montana DEQ to modify or remove "Excess Algal Growth" as one of the probable causes of impairment on this segment of the East Gallatin River. Under the category of "Probable Sources" we also ask that "Municipal Point Source Discharges" be removed until there is sufficient credible data to support this assumption. We question the discussion that the macro algae is "high" in response to nutrient loading downstream of the treatment plant. The algae densities in the reaches downstream of the Bozeman wastewater treatment plant discharge were reported to be from 14.1 mg/m^2 immediately downstream to a high of 16.7 mg/m^2.

The measured algal densities in the East Gallatin River are not indicative of an impaired condition or "Excess Algal Growth." Algal density is a function of a number of factors including nutrient levels, substrate conditions, light penetration, stream velocity, scour, frequency of flooding events, grazing, temperature, etc. Generally accepted algal levels as nuisance targets of 100 to 200 mg/m^2 algal chlorophyll-a are reference points in other Total Maximum Daily Load (TMDL) programs and for general stream management (Biggs, 2000; Dodds and Welch, 2000; Larry Walker Associates, 2001). For example, the algal targets for water quality protection in the Clark Fork River Voluntary Nutrient Reduction Program (VNRP) were 100 mg/m^2 (summer mean) and 150 mg/m^2 (peak). In the recent "Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area" the year round proposed target was 37 mg/m^2, with summertime values listed at 23.36 mg/m^2 (75th percentile) and 45.95 mg/m^2 (90th percentile). The East Gallatin River values collected downstream of the Bozeman treatment plant are lower than all of these reference points for algal density.

We look forward to working with MDEQ in this process.

DEQ Response #10

This middle segment of the East Gallatin River is 14.6 miles in length, and about 12 river miles of the stream segment are located downstream of the Bozeman wastewater treatment (WWT) plant discharge point. The probable causes and sources address all the reach length, not just the portions located below the WWT. It is unclear from the information presented in comment #10 as to the origin of the data (i.e., algae densities of 14.1 mg/m^2 and 16.7 mg/m^2). However, information and data from the 2005 EPA field assessment indicated that the level of benthic algal growth increases significantly in some sections of the river downstream of the WWT plant. These qualitative observations were documented as part of the Stream Reach Assessment Field Forms. The chlorophyll-α concentration above the wastewater treatment plant discharge point was 3.9 mg/sq meter, and increased to 70.5 mg/sq meter at the site below the mixing zone, and 83.4 mg/sq meter at the site near Spain Bridge. The 2005 nutrient data showed that the Total Nitrogen (TN) concentration at the site downstream of the WWT plant mixing zone was 5.1 mg/L. High concentrations of TN persisted to the downstream extent of this stream segment. Total Phosphorus (TP) concentrations were also high at the sampling site below the WWT plant (0.870mg/L), a stark contrast to the results for the site located just upstream of the WWT plant where Total Phosphorus was just 0.003 mg/L. A Total Phosphorus concentration of 0.844 mg/L was recorded for the site located downstream near Spain Bridge. Nutrient concentrations are elevated in all the reaches below the WWT plant mixing zone. Concentrations decline below the mouth of Thompson Spring Creek, but are still in the range that would likely result in nuisance algae blooms.

Based on our current protocols, contact recreation is considered moderately impaired when chl a values are more than 50 mg/m2 and less than 100 mg/m2. The probable cause was listed as excess algal growth based on field observations and chl a results. It should be noted that the WWT plant was indicated as one of the four probable sources linked to the algal conditions and nutrient loading of the East Gallatin River. Agriculture/Grazing, Agriculture/Crop Production and Urban Runoff were also listed as probable sources.

Comment #11:
Type: I have views or opinions regarding the 303(d) program or the assessments and prioritizations but am not providing or referencing any specific information.
Commenter: Lower Musselshell Conservation District
Received: 11/03/06

There has been no flow in Painted Robe Creek for five years so the Lower Musselshell Conservation District questions DEQ identifying probable causes and probable sources

DEQ Response #11:
The most recent data available for this assessment was from 1999. Up to that point, measurable flows were recorded and water chemistry data collected. Many streams in Montana dry up in the late summer; however, water quality must be maintained during the periods when flows are present.

Ephemeral and intermittent streams may have periods of no flow, which are critical periods for the stream's channel and riparian area. Anthropogenic impacts can accumulate during dry spells and purge into the receiving water at the first significant rainfall.

In the assessment record, the listing of the impairment #367 Salinity is supported by citations 1C, 4C, 5C, 8C, 9C, and 10T. In citation 10T, local beef producers report losing bulls to alkali poisoning.

The listing of impairment # 401 Total Kjeldahl Nitrogen (TKN) is supported by citation #8N, which indicates that TKN was elevated in several samples (although this *may* be a natural condition).

The listing of impairment #84 Alterations in streamside or littoral vegetative covers is supported by citations 3RPF, and 9RPF. In citation 3RPF, which was a stream reach assessment performed in 1993 by Warren Kellogg, the information cited stated,

> *"Both reaches scored within moderate impairment, partial support. Riparian degradation, poor fish habitat, channel incision, and bank erosion were documented. Using data from the Redwater River as a reference, the upper reach scored within full support (80% of reference) while the lower reach scored 62% of reference (moderate impairment). Salinization near and in the channel was apparent, especially in the lower reach."*

Citation #9LU, which was a personal communication with Warren Kellogg of NRCS provides the linkage to the sources selected, # 87 Non-irrigated Crop Production, and #108 Rangeland Grazing by stating,

> *"Dryland wheat and hay production were identified as uses most likely contributing to water quality degradation. Timing and intensity of livestock grazing was generally consistent with best management practices. Livestock impacts, while present were minimal."*

While this personal communication indicated that livestock impacts were minimal, and generally consistent with best management practices, the assessment acknowledges the "minimal" impacts for further study in the Water Quality Restoration Plan/TMDL that will be prepared for this waterbody.

Comment #12:
Type: Other
Commenter: USEPA Region 8
Received: 11/03/06

We have completed our informal review of the delisted waters reported in the Draft 2006 Water Quality Integrated Report. As you know, we had completed our review of the Assessment Records for the Columbia prior to the public comment period and have already provided comments to you regarding the delisted waters in the Upper Missouri River and Yellowstone River Basins in letters dated October 4 and 17, 2006.

The following comments pertain to the waters we have reviewed in the Lower Missouri River Basin:

1. States must show "good cause" for any segments that have been delisted. Good cause is defined in 40 CFR Part 130, Section 7, Paragraph (b)(6)(iv) and includes, but is not limited to, more recent or accurate

data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in §130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges.

It does not appear that good cause has been provided for delisting the following segments in the Lower Missouri River Basin:

Waterbody ID	Stream Name	Waterbody ID	Stream Name
MT41M002_100	South Fork Dupuyer Creek	MT40E002_030	Two Calf Creek
MT41P002_020	Dry Fork Marias River	MT40J002_010	Beaver Creek
MT41P002_010	Dry Fork Marias River	MT40J002_030	Little Boxelder Creek
MT41P003_020	Lake Frances	MT40J001_020	Milk River
MT41T002_020	Dog Creek	MT40J003_010	Lodge Creek
MT40C002_010	North Willow Creek	MT40I001_020	Peoples Creek
MT40B002_040	Chippewa Creek	MT40J005_010	Black Coulee
MT40P002_010	East Redwater Creek	MT40K001_010	Whitewater Creek
MT40S004_010	Charlie Creek	MT40M001_010	Beaver Creek
MT40R003_020	Homestead Lake	MT40Q002_010	Butte Creek
MT41R001_020	Arrow Creek	MT40Q002_020	East Fork Poplar River
MT40E002_040	Cow Creek	MT40Q001_010	Poplar River & Middle Fork Poplar River
MT40N001_010	Eagle Creek		

Unless "good cause" can be demonstrated and provided in the administrative record, the previously listed impairments should be carried forward in the 2006 IR.

Sincerely,

Cc: Tina Laidlaw, 8MO
Julie Dalsoglio, 8MO
Jim Ruppel, 8EPR-EP
George Mathieus, MDEQ-PPAD
Mark Bostrom, MDEQ-PPAD
Michael Pipp, MDEQ-PPAD
Rosie Sada, MDEQ-PPAD

DEQ Response #12:

Waterbody ID	Stream Name	1996 Pollutants	DEQ Response/Action
MT41M002_100	South Fork Dupuyer Creek	Siltation, Suspended Solids	None. De-listings were correct as indicated in the 2006 IR draft.
MT41P002_020	Dry Fork Marias River	Other Inorganics, Salinity/TDS/Chlorides	Other Inorganics and Salinity/TDS/Chlorides de-listings were clarified in the listing history and summaries of the assessment record.

Waterbody ID	Stream Name	1996 Pollutants	DEQ Response/Action
MT41P002_010	Dry Fork Marias River	Other Inorganics, Salinity/TDS/Chlorides, pH, Thermal Modifications	Other Inorganics and Salinity/TDS/Chlorides, pH and Thermal modifications de-listings were clarified in the listing history and summaries of the assessment record.
MT41P003_020	Lake Frances	Nutrients, Pathogens, Suspended Solids, Thermal Modifications	No de-listings in the 2006 draft IR.
MT41T002_020	Dog Creek	Other inorganics, Salinity/TDS/Chlorides	Other Inorganics and Salinity/TDS/Chlorides de-listings were clarified in the listing history and summaries of the assessment record.
MT40C002_010	North Willow Creek	Siltation, Suspended Solids	Sediment/Siltation and Suspended Solids were added as a cause of impairment for A/L and WWF.
MT40B002_040	Chippewa Creek	Siltation	Sediment/Siltation was added as a cause of impairment for A/L and WWF.
MT40P002_010	East Redwater Creek	Siltation	Sediment/Siltation was added as a cause of impairment for A/L and WWF.
MT40S004_010	Charlie Creek	Siltation	Sediment/Siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT40R003_020	Homestead Lake	Salinity/TDS/Chlorides	None. De-listings were corrected as indicated in the 2006 IR draft.
MT41R001_020	Arrow Creek	Nutrients, Other Inorganics, Salinity/TDS/Chlorides, Siltation, Suspended Solids	Nutrients, Other Inorganics, Salinity/TDS/Chlorides, Siltation, and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT40E002_040	Cow Creek	Salinity/TDS/Chlorides, Suspended Solids	Salinity/TDS/Chlorides and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT40N001_010	Eagle Creek	Suspended Solids, Thermal Modifications	Suspended Solids and Thermal modifications de-listings were clarified in the listing history and summaries of the assessment record.
MT40E002_030	Two Calf Creek	Metals, Nutrients, Salinity/TDS/Chlorides, Suspended Solids	Metals, Nutrients, Salinity/TDS/Chlorides, and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT40J002_010	Beaver Creek	Siltation	None. Already listed for Sediment/Siltation in the 2006 IR draft.
MT40J002_030	Little Boxelder Creek	Siltation, Thermal Modifications	Sediment/Siltation and Thermal Impacts were added as a cause of impairment for A/L and CWF.

Waterbody ID	Stream Name	1996 Pollutants	DEQ Response/Action
MT40J001_020	Milk River	Nutrients, Other Inorganics, Salinity/TDS/Chlorides, Siltation, Suspended Solids	Nitrates were added as a cause of impairment for A/L and WWF. Other Inorganics, Salinity/TDS/Chlorides, Siltation, and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT40J003_010	Lodge Creek	Thermal Modifications	Thermal Modifications de-listing was clarified in the listing history and summaries of the assessment record.
MT40I001_020	Peoples Creek	Salinity/TDS/Chlorides, Suspended Solids	Salinity/TDS/Chlorides and Suspended Solids de-listings were clarified in the listing history and summaries of the assessment record.
MT40J005_010	Black Coulee	Siltation	Sediment/Siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT40K001_010	Whitewater Creek	Nutrients, Siltation	Nutrients and Sediment/Siltation de-listings were clarified in the listing history and summaries of the assessment record.
MT40M001_010	Beaver Creek	Siltation	Sediment/Siltation de-listing was clarified in the listing history and summaries of the assessment record.
MT40Q002_010	Butte Creek	Salinity/TDS/Chlorides	Salinity/TDS/Chlorides were listed as Sodium and SC, since the new EPA database does not have the same listing options than in 1996. Sodium and SC were listed as a cause for A/L. Sodium was also listed as a cause for agriculture. Organic Enrichment/DO, Other Inorganics, and Unionized Ammonia de-listings were clarified in the listing history and summaries of the assessment record. TKN, No3+NO2
MT40Q002_020	East Fork Poplar River	Nutrients, Organic Enrichment/DO, Other Inorganics, Salinity/TDS/Chlorides, Unionized Ammonia. Metals	Nutrients, Salinity/TDS/Chlorides, unionized Ammonia, and Organic Enrichment/DO de-listings were clarified in the listing history and summaries of the assessment record. Iron is already listed in the 2006 IR draft.
MT40Q001_010	Poplar River & Middle Fork Poplar River	Nutrients, Other Inorganics, Salinity/TDS/Chlorides, pH	Nutrients, Other Inorganics, Salinity/TDS/Chlorides and pH de-listings were clarified in the listing history and summaries of the assessment record.

Comment #13:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: McCone County Conservation District
Received: 11/03/06
Note: Due to the length and number of issues presented in this comment, DEQ response follows each distinct issue or question.

Comment #13 - Page 23;
The report states that additional water categories have been added to the classification system (D, E, F and G). What is the difference between E1 & E2 as far as the ephemeral stream classification? Also the new classifications for seasonal or semi-permanent lake and ponds classes (E-3, E-4 and E-5; and one low or sporadic flow class (F-1) and (G-1) will these classification pertain to private dams? My other question is by adding the new classification be a benefit to the streams that may have been classified wrong or is this for adding more streams to the 303 (d) list?

DEQ Response (page 23):
The use classifications D-1-2, E-1-5, F-1 were newly adopted in 2002 and the G-1 classification was newly adopted in 2003. Although all waters of the state are classified by the watershed based system in ARM 17.30.607-614 the D, E and F classifications allow for a better designation of uses for the unique circumstances found in ditches, ephemeral streams, lakes and ponds and low flow streams. The G-1 classification pertains only to off channel constructed ponds that hold water produced from coal bed methane wells. Reservoirs (i.e., stock ponds) are excluded from the classifications E-3 through 5.

The difference between the E-1 and E-2 classifications is whether or not the ephemeral stream receives a periodic or continuous discharge from a point source (i.e., municipal waste water).

The classifications D-1-2, E-1-5, F-1 and G-1are useful because they address the specific conditions found in each waterbody type. Although these classifications allow refinement of the designated uses and modification of standards on a case-specific basis, reclassification is not automatic. Prior to reclassification a scientific study of each waterbody is necessary. The study (called a use attainability analysis, UAA) examines the chemical, physical and biological condition of the waterbody to determine which classification is appropriate and what water quality standards are needed to protect the uses of the waterbody. The intensity or complexity of the study may vary from a simple field documentation of conditions to a major chemical, physical and biological analysis. Also, reclassification requires rulemaking action by the Board of Environmental Review and approval by the EPA. To date no waterbodies have been reclassified.

Use of these classifications may allow some waterbodies to be removed from the §303(d) list.

Comment #13 - Page 25;
Using (BPJ) Best Professional Judgment criteria for cold water streams and saying it has been slightly tailored different for warm water streams seems very unreliable way to use a stream as a reference stream, especially when you state that one of the screening tests were; impacts from land-use based on the proportion of agriculture. You also need to know other factors to the land-use based on the portion of agriculture. If it is cropland is it CRP, no-till or continuous cropping. Is this winter grazing or summer grazing, etc. We have some BPF done on streams in the Redwater River Watershed done in 1995 assessments that are truly not the condition of the streams based upon the individual's BPJ.

DEQ Response (page 25):
Best Professional Judgment (BPJ) was retained in our reference site screening process for a very particular reason; the scientific literature is still not sufficiently complete to make absolute decision criteria for all categories of potential water quality impacts. DEQ determines the percent crop agriculture for reference sites using geographic information for Montana (GAP database)[100]. Scientific studies have shown that demonstrable

[100] Fisher, F.B., Winne, J.C., Thorton, M.M., Tady, T.P., Ma, Z., Hart, M.M., Redmond, R.L.; Montana land cover atlas, the Montana gap analysis project. Unpublished Report [Internet]. Missoula, MT: Cooperative

impacts to water quality occur in basins where about 50% of the land in a basin is in crop agricultural. However, a stream that is in a basin that has much less that 50% land in crop agriculture could have severe water quality impacts, if the cropping is immediately adjacent to the creek, no riparian buffer is maintained, excess nutrients are applied to the crop, etc. DEQ's screening process is flexible enough (using BPJ) to account for this. Concerning grazing, DEQ assesses grazing impacts separate from crop agriculture impacts, and has a requirement that an assessment method that examines on-the-ground grazing impacts (e.g., the NRCS Riparian Assessment Worksheet) be completed for the site. All of these approaches are detailed in Section 3.0 of the report you refer to.

It should be remembered that the objective of the reference project is to pick sites that have the least likelihood of having anthropogenic water quality problems. In that light, DEQ prefers to error on the side of being a bit over critical in our selection of sites. Therefore, DEQ applies as many hard criteria to the selection process as possible, while still allowing flexibility (i.e., BPJ) in areas that are still "gray". Finally, the DEQ reference screening process will see further revision and improvement in the future, as more information becomes available in the peer-review scientific literature on the subject of water quality impacts from land use.

For more information about the approaches used for developing Reference Conditions and Reference Sites, please review DEQ's 2005 Reference Report[101].

Comment #13 - Page 29;
Stating that agriculture accounts for 60 percent of the non-point source stream pollution, and because 2/3 of the State is agriculture therefore it follows that agriculture is one of Montana's leading source of non-point source pollution is bias. I thought or at least by reading all the information printed on the 303(d) list that it is to be sufficient and credible data. Do you have this sufficient and credible data to support this statement?

DEQ Response (page 29):
DEQ reviewed this entire section and revise or provide context to the statements being made for the final IR submitted to EPA. The information that these statements are based upon came from the 2000 listing cycle, which immediately followed the delisting of nearly 500 waterbodies as per MCA 75-5-702(6). Therefore, the statement is dated and based on an abbreviated version of the ADB.

Sufficient Credible Data pertains to *individual* waterbodies and their beneficial use support, which ultimately drives listing. If an individual waterbody has sufficient credible data the assessment may proceed and the waterbody is included in Categories 1 - 5 of this report.

Comment #13 - Page 33;
Has there been any data collected to determine just exactly how much mercury is entering State waters from Yellowstone National Park or how much is naturally from the park or geology of an area?

DEQ Response #13 (Page 33):
DEQ is not aware of any studies of this nature, and has not received any reports during the call for all readily available data. If a study of this nature has been conducted it would most likely have been done by the USGS. DEQ routinely uses water quality data from the USGS National Water Information System (NWIS) database to query data collected, analyzed, and validated by the USGS.

Comment #13 - Page 43 -44;
Are all DEQ staff and consultants aware of this partnership and working with conservation districts? I do know that this is not always true. The conservation district was asked to be informed when DEQ came out to collect

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Wildlife Research Unit, the University of Montana; 1998, viii, 50 p. Available from: http://ku.wru.umt.edu/report/mtgap/mtcover.pdf.
[101] 2005 Reference Report, Montana Department of Environmental Quality. Available on the world wide web at http://www.deq.state.mt.us/wqinfo/Standards/Refsites_writeup_FINALPrintReady.pdf

data in 2003on Timber Creek. We were never notified until landowners called the conservation district wanting to know what was going on. This does not make for good relations with DEQ.

DEQ Response #13 (Pages 43 -44):
DEQ's staff and consultants are expected to work cooperatively with stakeholders. Three years ago DEQ staff conducted sampling within the McCone Conservation District but failed to notify the CD of its plans and schedule. Instead, landowners were contacted directly for site access permission. For this, DEQ monitoring Supervisor, Rosie Sada personally apologized to McCone CD. DEQ looks forward to the continued cooperation and support of conservation districts, watershed groups and other local stakeholders.

Comment #13 - Pages 78-87
I am totally confused. Your report states that agriculture is the leading source of non-point source pollution (60 percent) you list the cause of impairments then you list the sources. My question is what does source agriculture (as listed) cover or represent? Then you list (just to mention a few) Animal feeding operations, grazing in riparian zones or shorelines, livestock (grazing or feeding operations), rangeland grazing, non-irrigated crop production, irrigated crop production etc. Are these listing not agriculture?

DEQ Response (Pages 78-87): DEQ agrees that these tables are easily misinterpreted, particularly if they are compared with the information presented in the NPS section (page 29), which is from 2000 and was processed through an earlier version of EPA's Assessment Database (ADB Version 1.14). As noted previously, page 29 was reviewed.

The information presented on pages 78-87 is *current* information (2006 cycle). This information was processed through the most recent version of EPA's assessment Database (ADB Version 2.2).

The databases that have been provided by EPA to record assessment results have changed significantly over the past 5 listing cycles. There have been three major versions of databases with the most significant changes coming in the most recent Assessment Database version 2.2.

The question, "what does source agriculture (as listed) cover or represent?" depends on which database the statement or table was produced from. "Agriculture" as listed on page 29 came from ADBv1.14, which enforced a hierarchy in source selection, pulling the major category heading along when a specific source was selected. So for the information on page 29, "agriculture" covers all 1000 series sources listed below.

1000 Agriculture
- 1050 Crop-related sources
  - 1100 Nonirrigated Crop Production
  - 1200 Irrigated Crop production
  - 1300 Specialty Crop Production (e.g., horticulture, citrus, nuts, fruits)
- 1350 Grazing Related Sources
  - 1400 Pasture grazing - riparian and/or upland
    - 1410 Pasture grazing - riparian
    - 1420 Pasture grazing - upland
  - 1500 Range Grazing - riparian and/or upland
    - 1510 Range Grazing - riparian
    - 1520 Range Grazing - upland
- 1600 Intensive Animal Feeding Operations
  - 1620 Concentrated Animal Feeding Operations (CAFOs; permitted PS)
  - 1640 Concentrated Animal Feeding Operations (NPS)
  - 1700 Aquaculture

This hierarchal "following" of the major category simplified grouping pollution source categories by economic sector.

The information on pages 78-87 is based on ADBv2.2. ADBv2.2 did not enforce the hierarchy used in previous versions of the ADB and further confused the issue by including the general source #156 - Agriculture along side specific sources such as #108 - Rangeland Grazing. It also, allows (but does not require) one or more agricultural sources to be linked to a pollutant.

For example, the table below is copied directly from the EPA's Assessment Database version 2.2 used for this report.

SRC_GROUP_NAME	SOURCE_No	SOURCE_NAME
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	4	Animal Feeding Operations (NPS)
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	5	Animal Shows and Racetracks
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	6	Aquaculture (Not Permitted)
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	7	Aquaculture (Permitted)
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	11	Auction Barns
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	31	Dairies (Outside Milk Parlor Areas)
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	73	Managed Pasture Grazing
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	100	Permitted Runoff from CAFOs
AGRICULTURE-ANIMAL FEEDING/HANDLING OPERATIONS (NPS UNREGULATED)	156	Agriculture
AGRICULTURE-CROP PRODUCTION	30	Crop Production with Subsurface Drainage
AGRICULTURE-CROP PRODUCTION	66	Irrigated Crop Production
AGRICULTURE-CROP PRODUCTION	87	Non-irrigated Crop Production
AGRICULTURE-CROP PRODUCTION	123	Speciality Crop Production
AGRICULTURE-CROP PRODUCTION	144	Crop Production (Crop Land or Dry Land)
AGRICULTURE-CROP PRODUCTION	156	Agriculture
AGRICULTURE-CROP PRODUCTION	161	Pesticide Application
AGRICULTURE-GRAZING-RELATED SOURCES	31	Dairies (Outside Milk Parlor Areas)
AGRICULTURE-GRAZING-RELATED SOURCES	46	Grazing in Riparian or Shoreline Zones
AGRICULTURE-GRAZING-RELATED SOURCES	73	Managed Pasture Grazing

SRC_GROUP_NAME	SOURCE_No	SOURCE_NAME
AGRICULTURE-GRAZING-RELATED SOURCES	108	Rangeland Grazing
AGRICULTURE-GRAZING-RELATED SOURCES	143	Livestock (Grazing or Feeding Operations)
AGRICULTURE-GRAZING-RELATED SOURCES	156	Agriculture
OTHER	156	Agriculture

Thus, in 2006, there are 188 sources listed as #156 - Agriculture and 285 sources listed as #46 - Grazing in Riparian or Shoreline Zones. *No source in ADBv2.2 is a cumulative source total.* Each source presented in the tables on pages 78-87 can only be considered within itself. That is, "There are 188 waterbodies which include #156 - agriculture as a source" or "There are 285 waterbodies which include #46 - Grazing in Riparian or Shoreline Zones as a source."

DEQ has communicated this issue to EPA so that they can consider how to build a database patch or new query that provide for more meaningful source analyses.

Comment #13 - Page 84
The report states that mercury and lead are the top 10% causes of lake impairments. Then the next table states the top 10 % of lake impairments source is agriculture as Montana leading source and second leading source is abandoned mines. If mercury and lead are the leading causes and agriculture is the leading source, and abandoned mines is the second source, this statement does not make sense.

Then we list agriculture again and then all the separate agriculture listings. My question again is what does agriculture consist of? I am wondering how many of these listing maybe are listed twice or more then twice. Adding up the stream miles which are agriculture according to pages 78-87 and then using the miles you state on page 29 don't add up.

DEQ Response #13 Page 84:
On page 84 the fact that the lake impairment causes of Mercury and Lead are at the top of the *cause* list and agriculture is at the top of the *source* list is somewhat coincidental. The *majority* of metals listings are linked to mining related sources which accounts for abandon mines being number two.

Yes, multiple sources may be associated with impairment.

The stream miles shown on pages 78-87 are not comparable to the stream miles shown on page 29 because the 2001 NPS plan was based on information from the 2000 list and the information on pages 78-87 are based on 2006 data.

Comment #13 - Page 95; first paragraph
Another statement stating the source of mercury in Silver Creek is probably from historic use of mercury. I feel when you state that you need sufficient and credible data probably doesn't qualify.

DEQ Response #13 - Page 95; first paragraph:
All sources are *probable* until the source assessment phase of TMDL development is able to quantify the relative contributions of natural sources, and all point and non-point sources. Silver Creek drains a watershed where historic placer mining occurred. This placer mining was known to use mercury to amalgamate and recover gold.

Comment#13 - Specific Waterbodies
As far as comments on the streams listed on the 303(d) list for McCone County I have some questions.

The McCone Conservation District and DEQ staff assessed some streams in the summer of 2003. They were Nelson Creek, Prairie Elk Creek, Horse Creek, Sand Creek and Timber Creek. I do see reference to Timber Creek as the conservation district and Warren Kellogg (NRCS) was part of helping with the assessment of that creek. The conservation district is pleased to see that this information was used. But what happen to the assessments that were done by DEQ staff on Nelson Creek, Prairie Elk Creek, Sand Creek and Horse Creek in June and July of 2003. The assessment reports for these streams are not in the assessment reports in the 303(d) list and still reference 1976 and 1995 assessment data after assessments were done in 2003.

When the assessments were done in 2003 a lot of the things listed in the 1995 assessments weren't there. Also there is no data documenting all the CRP that has been put in since 1982. For instance after DEQ did on the ground assessment on Timber Creek the salinity call will be removed as a cause. 80% of Timber creek is rangeland and salinity is usually associated with crop fallow. (This is on the comment section of the 303(d) list).

On the 303 (d) list Horse Creek has an impairment listed as salinity. Source stated rangeland grazing!!!

There also were no metal exceedences on Timber Creek and the listing appears to be a mistake.
We have other creeks listing metal and other impairments on the 1996 list. Just how many of those impairments are mistakes?

Nelson Creek has sulfate impairment listed. The source listed is grazing in the riparian or shoreline zones??? I was wondering what the link to sulfates from grazing is? This area has high sulfates in the ground water. Some of the groundwater wells in this area are 500 ft – 1000 ft deep and the sulfates are 5 times the national secondary standards. Being our prairie streams are spring and groundwater feed, and these water sources have a high sulfate level it just makes common sense that it may be a natural source.

In closing I do not want to imply that agriculture is not a source of some impairments but I think it is very bias to state, because 2/3 of the State is agriculture, therefore it follows that agriculture is the leading impairment source of non-point sources. This is not sufficient and credible data.
Most native Montana Farmers and Ranchers know that if you do not take care of the natural resources and the land, you will not have that land or the natural resources for long.

DEQ Response #13:

Timber Creek - Timber Creek (MT40E003_010) is not listed for metals. The most recent data available was collected 06/17/04 through 06/18/04 from three sites and did not have an exceedence of state surface water standards.

Horse Creek - Horse Creek (MT40P002_020) assessment record was updated to the format needed to migrate its information into DEQ's new relational database for assessments. Therefore, this waterbody was not "reassessed" during this cycle, only reformatted.
In the reformatting, all sources from the original assessment were linked to all of the impairments. This was necessary because the new database (ADBv2.2) requires causes and sources to be linked whereas the old database (ADBv1.14) did not. To prevent the loss of this information, and with time limiting the number of assessments that could be completely redone prior to the closing of this cycle, this was the most logical compromise.

When the waterbody is reassessed, it will include the data collected in 2003 that was noted above and correct the apparent error that links the impairment #367 salinity to the source #108 grazing.

Nelson Creek, Prairie Elk Creek and Sand Creek - Nelson Creek (MT40E003_020), Prairie Elk Creek (MT40S002_010), and Sand Creek (MT40S002_030) are similar to Horse Creek, in that they were only reformatted during this cycle. When these waterbodies are reassessed, they will include the data collected in

2003 that was noted above. The apparent error that links the impairment #385 Sulfates to the source #46 Grazing in the riparian or shoreline zones on Nelson Creek will be corrected at that time.

Comment #14:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: Private Citizen
Received: 11/06/06

ID'd River was from Bridger to mouth of Yellowstone (Billings) only. WHY were the 21+ miles south of Bridger to the Wyoming border not assessed? I am a concerned river dweller ([redacted])adjacent to the only tract of BLM controlled land on the WEST bank of the Clark's Fork. These "upper" miles of the river offer incalcuably more critical riparian, aquatic, scenic, ecosystemic values than what every local has long known about the lack of such in the targeted assessed 41 miles. I attach two photos which can be googled using my Carbon Cty address above.

One shows winter clean water; the other, ag pollutions.

I caught grayling here 7 years ago...

My colleague, Dr. Jay Kirkpatrick, finds it the most special of all the Cl. F. river he has known as a biologist in 35 years. ASSESSMENT IS NEEDED URGENTLY in the face of rapid recent exponential development.

DEQ Response #14:
Since the 1996 listing cycle the Clark's Fork of the Yellowstone River was split into two segments. This was necessary due to the distinct pollutant concerns in segment MT43D001_011 from Bridger Creek to the mouth (Confluence with the Yellowstone River). DEQ acknowledges the need to complete the assessment of segment MT43D001_012 but lacked sufficient credible data specific to this extent due to the segment split.

The photos provided with the comment may be added to the assessment record if the photo point's time and location are provided. The photos alone do not provide overwhelming evidence of impairment to beneficial uses nor would they bolster the sufficient credible data score to the minimum scoring level of 6. DEQ appreciates the interest and concern of the commenter and looks forward to working with all stakeholders in Carbon County on the assessment and, if necessary, water quality restoration plan development for the Clark's Fork of the Yellowstone River.

Comment #15:
Type: Other
Commenter: Missoula Conservation District
Received: 11/07/06

Missoula CD comment is to reiterate the concern of the lack of supporting data for DEQ's conclusion of Ag activities causing up to 70% NPS pollution. Also, the apparent confusin if the NPS pollution is 60% or 70%. The confusion contributes to questionable veracity of the report. Thank you, Missoula Conservation District

DEQ Response #15:
This statement in the Draft IR was commented extensively on by McCone CD in Comment #14, The Montana Department of Agriculture in Comment #8, and by private citizens in comments #17 and #19. As explained in the response to McCone CD, the information on page 29 came from the year 2000 listing cycle whereas the information on pages 78-87 is current for this cycle.

Also, the new database provided by EPA (ADBv2.2) presents sources, in general, differently than in previous cycles, making meaningful analyses a challenge. Please refer to Comment number 2 and DEQ response Point 4 for a more detailed explanation. DEQ will discuss this with EPA to determine the best approach for presenting this information differently in future listing cycles.

For the final version of this Integrated Report, DEQ will review the entire NPS section and revise any statements which are unsubstantiated.

Comment #16:
Type: Other
Commenter: All Consulting
Received: 11/07/06

Montana Department of Environmental Quality

Re: Comments on Draft 305(b)/303(d) Water Quality Report

Dear Sir or Madam:

ALL Consulting has long been involved with water quality in Montana. We are particularly interested in your Draft Report and its findings for two areas – the Cedar Creek Anticline area of Eastern Montana and the Montana portion of the Powder River Basin. Both of these areas support important surface water resources and both areas have important oil and gas production. The continued protection of the water resaource and the continued development of the state's oil and gas resources are vital to the well-being of the state and her citizens.

Comments on the Montana Department of Environmental Quality – Draft 2006 Impaired Water Bodies Report

The State of Montana Department of Environmental Quality (MDEQ) is charged by the US EPA with completing an impaired waterbodies report listing those streams and lakes that do not currently support their appropriate uses. ALL Consulting has read the Draft 2006 Report and wishes to make several comments about the Draft Report as they apply to petroleum development and production in Montana.

Comments Relevant to the Cedar Creek Anticline Area of Montana
The Draft 2006 Report includes impaired designations on several streams in the vicinity of the Cedar Creek Anticline of Montana. The Cedar Creek Anticline (CCA) is a large geological structure in the eastern portion of Montana that embraces several very large oil and gas fields. The findings and conclusions about streams of the CCA within the Draft 2006 Report may have important implications for the oil and gas industry across the state of Montana.

303(d) Impairment List
The following comments concern those MDEQ impairment findings for waterbodies near oil and gas development in the state. These waterbodies are within the Lower Yellowstone watershed near the Cedar Creek Anticline fields. The MDEQ Draft Report implies that some of the impairment seen in the past two years is due in part to petroleum development near the Lower Yellowstone.

Within the Lower Yellowstone Watershed, several waterbodies were found to be impaired. But the progress of the impairment in most cases could not be determined. For example, some waterbodies were similar to Mizpah Creek whose designation went from "Full Support" in 2004 to "Insufficient information" in the Draft 2006 Report. Obviously the Mizpah situation is largely a data quality change, not necessarily a decline in actual, observed water quality; the change appears to be the result of more stringent requirements for data quality and not the result of a decline in existing water quality conditions. Other waterbodies such as Pryor Creek were not assessed in 2004 but were found to be in only "Partial Support" in 2006; whether this is an actual decline in water quality since 2004, is therefore unknown. Others such as Cedar Creek between 26 and 45 miles above the mouth, showed bona fide reduction in water quality and declined from "Full Support" in 2004 to "Partial Support" in the Draft 2006 Report.

Of all those waterbodies within the Lower Yellowstone watershed, only two showed an actual, documented decline in water quality rather than a decline in data quality:

Cedar Creek Upper Segment: between 26 and 45 miles up above the mouth: this segment of the Cedar Creek has shown decreased support for general aquatic life and warm water fish. The identified agents are metals including Arsenic, Selenium, Copper, Iron, and Lead. Probable cause is listed in the Draft 2006 Report as "Natural Causes".

Cedar Creek Lower Segment: the 26 miles of creek bed down to the mouth on the Yellowstone currently shows impact from the same suite of metals as mentioned above but the MDEQ Report lists the probable cause on this segment as "spills from trucks or trains". This lower segment of Cedar Creek lacked sufficient data to document a decrease in stream quality from 2004 to the present.

Sandstone Creek: on the western side of the Cedar Creek Anticline; it runs north through the town of Plevna. Sandstone Creek likewise showed a documented decrease in support for aquatic life and warm water fish from 2004 to 2006. The principal pollutant was Nitrogen and the probable cause was listed as "agriculture or municipal wastes".

The lower segment of Cedar Creek is somewhat problematic in that its listed probable cause ("spills from trucks and trains") implicates oil and gas operations. The difference in source determination from the upper to lower segments does not make sense because the constituents are the same and the physical setting is the same. Cedar Creek is largely confined to the outcrop belt of Pierre Shale on the Cedar Creek Anticline; the black marine shale is laden with heavy metal compounds that can leach their constituents into surface water. It is especially difficult to determine why this particular probable cause was assigned to the lower segment of this stream segment because nearby waterbodies with similar impacting constituents were assigned different probable causes. Note especially these particular tributaries to the Lower Yellowstone:

Glendive Creek: This stream is near Cedar Creek at the north end of the Cedar Creek Anticline. It shows impact by a larger though similar suite of metals than does Cedar Creek but its probable cause is listed in the 2006 Draft Report as "Source unknown".

Fox Creek (Richland County): This stream appeared to be impaired by the presence of Iron, Arsenic, Lead, and Mercury. Probable cause was identified by the Montana DEQ Draft 2006 Report as "Source unknown".

Sears Creek (Richland County): This stream was impaired by Copper, Iron, and Lead that were identified in the Draft 2006 Report as having a probable cause of "irrigated crop production".

While it is unfortunate that any Montana streams became impaired since the past 303(d) report, the MDEQ must be careful when assigning probable causes to the observed impairments. A case in point is Cedar Creek on the Cedar Creek Anticline. The Cedar Creek Anticline is home to several very large oil fields as well as considerable natural gas production. This production has been in place for over fifty years but its footprint on the rolling ranchland is surprisingly small. The Anticline is not a "Petroleum Sacrifice Zone" but an area of rich ranchland suitable for crop raising, beef production, and recreation. The biggest oil operator (Encore Operating LP) ships their oil, natural gas, and produced water by pipeline, not by trucks. Some minor producers truck their products but the truck traffic consists mostly of workover vehicles and pickup trucks driven by pumpers making their periodic inspections; there is not heavy traffic on the lease roads in the field.

Cedar Creek was split by the MDEQ into the lower segment and upper segment. Only the upper segment documented decreased water quality due to concentrations of a suite of metals. The lower portion of the creek also contained metals but this portion of the stream had insufficient data to determine if quality had diminished. There appears to be no justification to declare spills from trucks and trains as the cause of the impairment of the upper segment. The MDEQ must avoid making arbitrary statements about environmental impacts that could cause adverse public opinion to industries.

It is informative to look at other identified sources of impairment across the state. Within the entire state of Montana, the Draft 2006 Report lists approximately 15,000 miles of impaired streams in 790 waterbodies. The table below ranks the most frequent sources of impairment by amount of stream-miles as assigned in the Draft 2006 Report:

Rank of Impairment Sources (Table 17: 2006 Draft MDEQ 303(d) Report)		
Rank	**Source**	**Percent of impaired miles**
1	Agriculture	**35.34**
2	Grazing in Riparan or Soreline Zones	**34.33**
3	Unknown	**26.33**
4	Irrigated Crop Production	**25.66**
5	Natural Sources	**20.32**
6	Streambank Modifications	**15.29**
7	Flow from Hydrostructure Regulation	**13.66**
8	Rangeland Grazing	**13.47**
9	Impacts from Abandoned Mine Lands	**12.76**
10	Channelization	**12.31**
. . .		
	Spills from Trucks and Trains	**0.17**
	Petroleum and Natural Gas Activities	**0.12**
Note: More than one cause may be sited for any one impaired waterbody		

It is obvious that various phases of agriculture are most frequently the cause of surface water impairment. Compared to agriculture, oil and natural gas development is a vanishingly minor source. This wide disparity between impacts from oil and gas (0.12%) and impacts from agriculture (approximately 75%) needs to be an engine to drive environmental legislation and environmental regulations. If Montana is to continue to have clean surface water, it behooves the MDEQ to abate the most important sources of impairment that its own research documents. If the lion's share of the surface water impairment is laid at the feet of agriculture, that industry should receive the most legislative and regulatory scrutiny.

In the words of the agency, ***The MDEQ develops water quality standards to protect all appropriate beneficial uses.*** The purpose of standards is to protect and support beneficial uses that obtain in Montana's surface waters, as varied as they are. If agriculture is the most common source of impairment, it appears that the MDEQ is not fulfilling its charge to protect and support all beneficial uses but appears to be favoring agricultural uses. No one is suggesting a cost-benefit analysis to rank the impacts to the state of various impairments but the full range of beneficial uses needs to be maintained by the MDEQ. If, for example, grazing is eroding and degrading the Riparian Zone (RZ) of a certain water body, it is the responsibility of the MDEQ to encourage best management practices aimed at keeping livestock out the RZ.

Comments Relevant to the Powder River Basin of Montana

The Draft 2006 Report also contains water quality data concerning streams in the Montana portion of the Powder River Basin (PRB) that have implications for the development of Coal Bed Natural Gas (CBNG). Below are those PRB waterbodies considered in the Draft Report:

4th Order HUC	Stream or Waterbody	Water Quality Category	Beneficial Use Support	Impairment Sources	TMDL Needed?
Upper Tongue	Deer Ck	3	Not Assessed		
Upper Tongue	Lower Hanging Woman Ck	5	Partially Supporting	Grazing in the Riparian Zone	Yes
Upper Tongue	Upper Hanging Woman Ck	3	Not Assessed		
Upper Tongue	Squirrel Ck	3	Not assessed		
Upper Tongue	TR.: WY border to TR Res.	3	Not Assessed		
Upper Tongue	TR from TR Res to Hanging Woman Ck	3	Not Assessed		
Upper Tongue	TR Reservoir	5	Two uses partially supported	Agriculture or municipal discharge	Yes
Lower Tongue	TR Hanging Woman Creek to Diversion dam	3	Not Assessed		
Lower Tongue	TR from Diversion dam to mouth (Yellowstone)	4C	Three uses partially supported	Dam construction, hydrostructure flow control	No
Lower Tongue	Beaver Ck	3	Not Assessed		
Lower Tongue	Cook Ck	3	Not Assessed		
Lower Tongue	Foster Ck	3	Not Assessed		
Lower Tongue	Little Pumpkin Ck	3	Not Assessed		
Lower Tongue	Pumpkin Ck	3	Not Assessed		
Lower Tongue	Otter Ck	3	Not Assessed		
Middle Powder River	Middle Powder	3	Not Assessed		
Lower Powder River	Lower Powder	3	Not Assessed		
Lower Powder River	Stump Ck	3	Not Assessed		
Little Powder River	Little Powder	3	Not Assessed		
Rosebud Ck	Lower Rosebud (mouth to 3.8 mi from mouth)	4C	Two uses partially supported	Loss of Riparian habitat	No
Rosebud Ck	Middle Rosebud (3.8 mi from mouth to N. Cheyenne Res)	5	One use partially supported	Dam construction	Yes

Rosebud Ck	Upper Rosebud (headwaters to Cheyenne Res)	3	Not Assessed		
Mizpah Ck	Mizpah	3	Not Assessed		

General Comments
This portion of the basin is the subject of an ongoing TMDL process and the majority of PRB streams were not assessed in this round of 303(d) analysis. As detailed in the table above, only five stream segments were sampled in sufficient detail to allow an assessment to be made for the 2006 Report. Of these five, two were judged to be caused by agricultural activities and three caused by flow controls; none were identified as impaired by oil and gas sources. This relative importance of the impairment effects of agriculture and petroleum production is the same as noted above for the state as a whole. Agriculture is a much more powerful impairment agent than petroleum production. Indeed, petroleum production has negligible effects on surface water in the state.

The PRB watersheds are in the vicinity of present and future CBNG activity in the Montana portion of the basin. CBNG has been under development for six years in the PRB of Montana and several years longer in the PRB of Wyoming. It is this development that is producing large volumes of water from productive coal seams; operators have discharged produced water into creeks and surface impoundments and want to be able to continue to discharge some of this water onto cropland and into streams.

However, in opposition to the discharge of CBNG produced water, the following statement appears on page 31 of Draft 2006 Report Part B Background Information:

> *The DEQ develops water quality standards to protect all appropriate beneficial uses. The standards include general prohibitions that require state waters to be "free from substances attributable to municipal, industrial, agricultural practices, or other discharges that will create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life" (ARM 17.30.637(1)). The DEQ has developed electrical conductivity and sodium absorption ratio standards for the Tongue, Powder, and Rosebud watersheds where most of the state's CBM resources are located. These standards are designed to protect existing and future beneficial uses from impacts associated with CBM development.*

New standards adopted by the MDEQ have listed Electrical Conductivity (EC) and Sodium Absorption Ratio (SAR) as "harmful", despite the fact that neither is toxic or harmful to human, animal, plant, or aquatic life except in very high levels. Furthermore, EC and SAR are not "substances" but are indirect measures of various compounds dissolved in surface water or groundwater. Virtually every body of surface water contains dissolved compounds and will therefore have a certain EC and SAR measurement. Not every non-zero level of EC and SAR is either toxic or harmful.

Earlier this year the MDEQ proposed water quality standards for the four main streams (Tongue, Powder, Little Powder, and Rosebud) that are so low that discharge of CBNG produced water to streams or land surface would be impossible. And yet even after six years of production, it is not CBNG development that has caused the impairment of the five stream segments in the basin. While CBNG water can be high in SAR and EC, the four main streams have a history of periodically being high in both measures. Historical monitoring of water quality documents the variability of water quality long before the development of CBNG. Monitoring continues under the auspices of the PRB Interagency Working Group, which includes technical specialists from a wide range of Federal, State, local, and Tribal agencies. The PRB monitoring network has allowed for the collection of consistent data by many agencies without the duplication of effort.

Monitoring has not shown impact to surface waters from CBNG development, changes in water quality appear largely to be due to decrease in flow to the streams. The 2005 Water Year Overview of Surface Water

Monitoring Data in the Tongue River Watershed (May, 2006) published by the Miles City Field office of the BLM contains this conclusion:

> *"The main stem stations showed that the MDEQ and Northern Cheyenne surface water standards [as of 2005] for EC and SAR are not exceeded, except at the Miles City station. The mean monthly EC values at Miles City were slightly greater than the mean monthly irrigation season EC standard during March (1000.3 vs. 1000 µS/cm).*
>
> *The tributary stations showed that the MDEQ surface water standards for EC were typically exceeded by existing conditions. In many cases the existing conditions resulted in water quality values that were always in excess of the EC standards. The MDEQ standards for SAR were often exceeded at the Hanging Woman and Otter Creek stations, and were always exceeded at the Pumpkin Creek station. These exceedances in watersheds where little or no development has occurred indicate that natural conditions are responsible for these exceedances."*

The water quality standards proposed by the MDEQ in 2006 are more stringent and would lead to even more exceedances due to natural conditions. Clearly the new proposed standards will do nothing to improve existing natural conditions but can only be used to prevent discharges to streams or land surface even though existing CBNG development has had no detectable effect on water quality.

The Draft MDEQ 2006 303(d) Report has brought forward a hierarchy of water quality impairment sources and while agriculture is a valuable part of life in Montana, its impacts to the environment must be remembered. CBNG production is an important industry in the state that is being closely monitored and regulated, it has not had a detectable impact on the state's surface water quality. Throughout the Draft 2006 Report it is plain that the #1 source of surface water impairment is agriculture – stock grazing, irrigation, over-fertilization – it is the job of the MDEQ to protect surface water for all applicable beneficial uses.

We would be happy to discuss these comments with your Department zat any time.

Respectfully,
ALL Consulting

DEQ Response #16:
This comment expresses numerous concerns regarding the assessments presented during the 2006 reporting cycle, the manner that DEQ programs are operated, and opposes electrical conductivity (EC) and Sodium Adsorption Ratio (SAR) water quality standards for the Tongue, Powder, and Rosebud Basins.

Comments on state water quality standards and nonsignificance criteria for EC and SAR are more appropriately addressed by the Board of Environmental Review, which is the state agency that has authority to revise the state's water quality standards and nondegradation requirements.

The comment assumes that the impairment status of streams in the Powder River Basin will be determined by natural exceedances of the nonsignificance criterion for EC and SAR. This assumption is wrong. The designation of EC and SAR as "harmful" is for purposes of protecting "high quality waters" (i.e., water quality that is better than the standards) from new or increased discharges. Since the nondegradation criteria are used only for determining whether a new or increased discharge is "significant" and therefore requires an authorization to degrade, the criteria have no relevance in determining whether a stream is impaired. A stream is considered impaired if it fails to achieve applicable water quality standards.

A quote included in this comment pertaining to EC and SAR standards was copied from the NPS Resource Extraction Strategy section stating, "These standards are designed to protect existing and future beneficial uses from impacts associated with CBM Development."

THIS STATEMENT PUBULISHED IN THE DRAFT 2006 IR WAS INCORRECT and is revised as follows, “These standards are designed to protect existing and future beneficial uses from impacts associated with the discharge of high SAR and EC waters.”

Comments voicing concern over DEQ's lack of progress in addressing impacts from agriculture are noted. For clarification, the 303(d) list is the first step in identifying impaired streams and probable sources. The TMDL phase is where DEQ is required to assist nonpoint sources, such as agricultural sources, in developing "reasonable land, soil, and water conservation practices" to mitigate the impaired status of a water body.

The comments pertaining to assessments are duly noted, resulting in one correction. The listing of the source *#124 Spills from Trucks or Trains* on Cedar Creek (MT42M002_141) resulted from a train derailment in the 1980’s near the mouth of Cedar Creek, dumping lead and other metals into the creek. The sediment sample collected in 1998 from below the train spill site still reflected elevated levels of arsenic, lead and iron, a portion of which may be natural in origin due to the geology of the area.

Therefore, the listing of the source *#124 - Spills from Trucks or Trains* on lower Cedar Creek (MT42M002_141) was neither arbitrary nor an implication of petroleum operations in the watershed. The mistake on the assessment record was the linkage of source *#155 - Natural sources* to impairment *#84 Alterations in streamside or littoral vegetative covers.* The source *#155 - Natural Sources* should have been applied to the metals impairments <u>along with</u> the source *#124 - Spills from Trucks or Trains.*

Comment #17:
Type: I have views or opinions regarding the 303(d) program or the assessments and prioritizations but am not providing or referencing any specific information.
Commenter: Private Citizen
Received: 11/07/06

I am writing regarding your 2006 Integrated 303(d)Water Quality Report.

1. Your report is not consistant with its facts, as pg 19 states that "Agricultural activities impair 6982 miles of streams and accounts for 70% of NPS pollution". Pg 29 states that it is "6416 miles and 60%". Also pg 80 states that 34% or 5180 miles of impaired streams are the affect of Grazing in Riparian or Shoreline Zones. This does not seem to be a consistant number either. How many other inconsistancies are in this report.

2. Just because farms and ranches cover 2/3s of the state does not mean they produce 2/3s of the NPS pollution. I do not believe the DEQ has done enough assessment or research to justify that scenario.

3. As a rancher and conservation district supervisor, I resent the fact that Agriculture is constantly put at the head of the list for causing stream impairment. If the DEQ can give specific details that will scientificly back the above numbers up, then I would like to see them.

I realize this is a big job and some estimations etc. would be needed but every time this is written down, it solidifies it even more and I do not believe the science and facts are there to back it up.

Thank you for your consideration

DEQ Response #17:
This NPS section of the Draft IR was commented extensively on by McCone CD in Comment #14, The Montana Department of Agriculture in Comment #8, Missoula CD in comment #15 and by a private citizen in comments #19. As explained in the response to McCone CD, the information on page 29 came from the year 2000 listing cycle whereas the information on pages 78-87 is current for this cycle.

Also, the new database provided by EPA (ADBv2.2) presents sources, in general, differently than in previous cycles, making meaningful analyses a challenge. DEQ will discuss this with EPA to determine the best approach for presenting this information differently in future listing cycles.

For the final version of this Integrated Report, DEQ will review the entire NPS section and revise any statements which are unsubstantiated.

Comment #18:
Type: I have views or opinions regarding the 303(d) program or the assessments and prioritizations but am not providing or referencing any specific information.
Commenter: F.H. Stoltze Land & Lumber Co.
Received: 11/07/06

To Whom It May Concern:
Please accept the following comments on the 2006 Integrated 303(d)/305(b) Water Quality Report for Montana on behalf of F.H. Stoltze Land & Lumber Company of Columbia Falls, MT.

Stoltze is a family owned forest products company that owns and manages approximately 36,700 acres of forestland in Northwestern Montana. As owners of property within watersheds of lakes and streams listed on the current 303(d) we are interested in the content of this report.

We are concerned over the statement "Agricultural activities impair 6,416 miles of streams and account for 60% of the non point source stream pollution". Where is the scientific data that backs up this statement? We do not disagree that agricultural activities can be a significant source of non point source pollution. Unfortunately, when assessments of impaired streams are made the "probable source of impairment" is merely a judgment call and not a defensible fact, hence the use of the word "probable". The department needs to exercise caution when making statements of fact citing hard numbers that are backed up by the word "probable"!

We would like to see the department break out forest management from the "agricultural" category or at least treat as a sub category with separate analytical and discussion points. We feel that the issues surrounding forest management with respect to water quality are starkly different from agriculture as are the solutions. The forest management industry has been proactive in implementation of Best Management Practices for water quality with great success. As is referenced in the document, recent BMP audits indicate a 97% implementation rate and a 99% effectiveness rate or protecting water quality.

Please define the terms "Silvicultural Activities" and "Silviculture Harvesting" when used as a probable source of impairment. How is this determination made? Also disclose what aspects of these two activities specifically contribute to water quality problems. It is hard to mitigate effects if the vector causing the problem is not identified.

In your discussion of cost / benefit assessment you do an adequate job of identifying cost incurred by governmental entities, but completely ignore the investments made by private entities. The forest products industry alone has invested millions of dollars in implementation of BMP's for water quality. Countless other private individuals make investments to protect water quality either voluntarily or through regulatory requirements. While it may be difficult to quantify this economic investment, it needs to be discussed in a qualitative manner.

When determining TMDL's all sources are to be considered, point, non point and background. Additional effort must be directed to understanding the natural background sources especially when dealing with the sedimentation/siltation issue. The use of reference sites to determine endpoints for TMDL's may result in unattainable goals if natural background sedimentation levels are higher in the impaired streams than that of the reference stream.

We have sufficient data collected as well as sufficient history of implementing best management practices to start looking at trend data for our impaired streams. We can then start to look at the changes in land use in the watershed and draw conclusions on the effectiveness of various mitigation activities. The current report identifies 9 stream segments that were impaired due to Sedimentation/Siltation that have been de-listed. In all of these segments the State has determined the water quality standard is being met. Most all of these segments are in forested watersheds that listed Silvicultural harvest /activities and forest roads as a probable cause for impairment. Obviously forestry BMP's are working. This should be a model for other non point source solutions.

Thank you for the opportunity to comment on this report. We hope that you will consider making some revisions to the report to not only present the data in an appropriate light but to also highlight some of the success in the program.

Sincerely,

[redacted]

DEQ Response #18:
The statements made in the NPS section, particularly page 29, of the draft IR were commented upon extensively by other departments, conservation districts, and private citizens. For the final version of this Integrated Report, DEQ will review the entire NPS section and revise any statements which are unsubstantiated. DEQ agrees that using "probable" sources as a basis for the statements made for Clean Water Act section 305(b) reporting is challenging. The staffing and monetary resources necessary to improve upon the certainty of source identification are finite, and Montana is a very large state. So the processes used to identify impairments and their sources builds upon each preceding stage.

Detailed source assessments are expensive and are positioned in the Water Quality Restoration Plan/TMDL development stage (e.g., once impairment has been identified). This prevents the unwarranted and wasteful expenditure of public funds chasing sources where there are no identified problems.

The comment about including silviculture under agriculture was also made by EPA Region 8 in their informal comment (#2). DEQ will review this section and see if silviculture can be more clearly identified as a subcategory of agriculture.

In the cost/benefit section, DEQ is reporting to Congress on the use of public funds and benefits received by the public. The costs incurred by private companies for remediation of environmental liabilities, social liabilities, or both, as a result of their operations are a cost of business. When environmental laws and regulations are involved these costs are accounted for as an operating expense that is eventually passed on to consumers of their product. Some private companies go above and beyond what is required by law. These business decisions may be made with the objective of creating social capital within the society they operate so as to create favorable opportunities for future operations or may be engaged in out of a true philanthropic spirit for the benefit of the environment and for our broader community in general.

For Sediment TMDLs, DEQ is using mathematical models much more frequently than in the past. Models rely less on reference sites, but rather use the physical features and identified anthropogenic stressors of watersheds to identify natural loadings and all known point and non-point contributions of sediment.

DEQ acknowledges that successfully applied BMP's hold the key to many of the state's NPS pollutant and pollution issues. The nine stream segment that were noted in the comment were not identified specifically, however, DEQ continues to see improvements in the application of BMP's and the positive effect these have on water quality issues, particularly siltation and sedimentation.

Comment #19:
Type: Other
Commenter: Private Citizen
Received: 11/07/06

I find the report misleading and based on assumption and not data with regard to the statements made on page 29 concerning agriculture. Where is the data to make the connection between the 2/3 land area being ag and that ag accounts for 60% of the nonpoint source pollution? Largely inconclusive or non-existant. The CWA Information Center Database lists Natural as one of the possible causes. But that is not even mentioned on page 29. There is also no identification of which ag land uses are associated with which impairments.

I find serious problems with this report in these areas. It will lead the reader to conclusions of ag as the major culprit when there is inconclusive or no data. Public deserves information based on scientific data, and not assumptions, and no less.

DEQ Response #19:
This NPS section of the Draft IR was commented extensively on by McCone CD in Comment #14, The Montana Department of Agriculture in Comment #8, Missoula CD in comment #15 and by a private citizen in comments #17. As explained in the response to McCone CD, the information on page 29 came from the year 2000 listing cycle whereas the information on pages 78-87 is current for this cycle.

Also, the new database provided by EPA (ADBv2.2) presents sources, in general, differently than in previous cycles, making meaningful analyses a challenge. DEQ will discuss this with EPA to determine the best approach for presenting this information differently in future listing cycles.

For the final version of this Integrated Report, DEQ will review the entire NPS section and revise any statements which are unsubstantiated.

Comment #20:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: Bureau of Land Management - Miles City Field Office
Received: 11/06/06 (Hardcopy)

Integrated Report Coordinator
Water Quality Planning Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620

To Whom It May Concern:

We have reviewed the Montana Draft 2006 Integrated 303(d)/305(b) Water Quality Report prepared by the MDEQ. While reviewing this list, it became clear BLM data had not been incorporated into the report. Perhaps this is an area in which we can work in the future to ensure that the substantial data we collect on BLM surface is incorporated into the 303(d)/305(b) process. For this reason, we have conducted a brief review of the stream monitoring records for the BLM's Miles City Field Office for those streams listed as impaired, and for which a substantial portion (generally >1 mile) are located on BLM surface. The results of this review have been attached for your review, and for incorporation into future analysis (303(d), TMDLs, etc.).

There are several other points that came up during the review of this data. These include the following:

<u>**Little Missouri Sub-Major Basin:**</u>
Thompson Creek (MT39F001_010):

We have worked with the Thompson Creek task force in conducting monitoring and modeling to determine the source of the suspended solids (TSS). This work included an erosion model constructed by Jacek Blaszczynski from the BLM's National Science and Technology Center (Denver). This model and supporting data were supplied to the MDEQ in 2004. Based upon this and other information the MDEQ informed us that:

"Our Monitoring Staff has reviewed new assessment data (fish assemblages, TSS, flow, riparian condition, etc…) on Thompson Creek. After considering the data and applying it to the State's Sufficient Credible Data/Beneficial Use Determination (SCD/BUD) process, it has been determined that Thompson Creek is meeting its beneficial uses. That is, Thompson Creek is not impaired and will be removed from subsequent 303(d) lists." (e-mail from Pete Schade, 10/8/04).

Despite these clear conclusions, Thompson Creek is again listed as impaired, with abandoned mine lands as being the probable source of impairment, and it is listed as requiring a TMDL (Category 5). Based upon what we know, this stream should be listed as fully meeting its beneficial uses (Category 1).

Little Missouri River (MT39F001_021 & MT39F001_022):
Metals are listed as being one of the causes of impairment for this river and the source is unknown. It should be noted that given the geology of this area these concentrations likely result from natural sources.

<u>Lower Yellowstone Sub-Major Basin:</u>
Cedar Creek (MT42M002_141 & MT42M002_142)
Reach 142 is listed as having metals (Cu, Fe, Pb and Se) causing the impairment, and their source being "Natural Sources". As such it seems this reach should be listed solely as Category 2B. It also seems inconsistent that these metals are considered to be from "Natural Sources" in this reach, while most of these same metals (Cu, Fe, Pb) are listed as being solely from "Spills from Trucks or Trains" on the lower reach (141). Both of these areas are dominantly underlain by the Pierre Shale, with the Pierre Shale, Hell Creek and Fox Hills making up the majority of the drainage area. As such, there does not appear to be a geologic reason for this difference. Therefore we suggest "Natural Sources" be added as a probable source for the lower reach.

Cabin Creek (MT42M002_150)
This stream is an intermittent stream with perennial pools. It is listed from the headwaters to the mouth as being impaired due to low DO; however this low DO is likely due to no/low flow, and is a natural condition for intermittent to ephemeral streams. This lack of flow also likely contributes to the TKN levels.

Additionally, this entire stream is listed as having DO and sediment affected by Dams/Impoundments. It is our understanding that there is only one dam that is an issue on the Middle Fork of Cabin Creek. As such it seems a separate listing should be used for the Middle Fork and this source not be included for the remainder of the stream.

Also, several tributaries along the Lower Yellowstone (**Glendive, Cottonwood and Fox Creeks**) are listed due to unknown sources of metals. It should be noted that given the geology of this area and the fact that these are intermittent streams, these concentrations likely result from natural sources and are relatively high due to stagnation of the water which results in low DO. These metals are likely of similar origin to those seen in Cedar Creek or Lodgepole Creek.

<u>Middle Yellowstone Sub-Major Basin:</u>
Rosebud Creek (MT42A001_012)
This reach is Categorized as 5; however, the source of impairment is listed as "Dam Construction". As such, it seems this should be Category 4C (same as reach MT42A001_011).

<u>Musselshell Sub-Major Basin:</u>
Lodgepole Creek (MT40C004_020)
This stream is listed as being impaired due to iron from natural sources. As such it seems that it should be listed solely as Category 2B.

<u>Fort Peck Sub-Major Basin:</u>

Timber Creek (MT40E003_010):
This stream is listed as having Phosphorus and TKN causing the impairment, with their sources being "Natural Sources" and "Sources Unknown". As such, it seems that this reach should be listed Category 2B.
Nelson Creek (MT40E003_020)
Metals are listed as being one of the causes of impairment for this river and the source is unknown. It should be noted that given the geology of this area, these concentrations likely result from natural sources.

If you have any questions concerning these comments please feel free to contact [redacted].

Sincerely,
[redacted]

Enclosures: Review Results

DEQ Response #20:

Thompson Creek (MT39F001_010): The assessment record for this stream has been updated. Thompson Creek was listed for Cadmium, Copper, Iron and Zinc for A/L and WWF. The sources are natural, thus it has been placed in Category 2B. In the Clean Water Act Information Center (CWAIC), under Summary Report, Water Quality Category, both Categories 5 and 2B are listed. Categories 2B are waters where standards are exceeded due to an apparent natural source in the absence of any identified anthropogenic sources. Because numeric standards were exceeded, the current ADB system automatically sets the Water Quality Category to five. Under Category 5 is found Category 2B, which does not require a TMDL.

Little Missouri River (MT39F001_021 and MT 39F001-022): The lower segment MT39F001_021 had Natural Sources (#155) listed as a source of impairment in the 2006 draft. Natural sources have been added as a source of impairment to segment MT39F001_022.

Cedar Creek (MT42M002_141 and MT42M002_142): Natural Sources has been added as an additional source of impairment to the lower segment, MT42M002_141. MT42M002_142 is listed as Category 2B in the 2006 draft. In the Clean Water Act Information Center (CWAIC), under Summary Report, Water Quality Category, both Categories 5 and 2B are listed. Categories 2B are waters where standards are exceeded due to an apparent natural source in the absence of any identified anthropogenic sources. Because numeric standards were exceeded, the current ADB system automatically sets the Water Quality Category to five. Under Category 5 is found Category 2B, which does not require a TMDL.

Cabin Creek (MT42M002_150): Cabin Creek, from the headwaters to the mouth, is one segment. When this stream was assessed at the end of July 2005, the entire stream had at least a visible, if not measurable flow. The Montana numeric water quality standards apply to both perennial and intermittent streams. Montana's nutrient criteria for the Northwestern Great Plains Ecoregion (growing season) were based upon data that included low flow conditions; therefore, the TKN criteria used for Cabin Creek are applicable.

The dam on the Middle Fork of Cabin Creek was identified as a major source of sediment, but agriculture and natural sources were also identified. Sediment from the reservoir is impacting the mainstem of Cabin Creek for many miles downstream, and should remain as a source of sediment for the entire stream. The Middle Fork of Cabin Creek was not on the 1996 303(d) list, nor has it been listed for assessment since that time. MDEQ will take under advisement that the Middle Fork of Cabin Creek may require a separate listing in the future.

Glendive (MT42M002_130),, Cottonwood (MT42M002_100),, and Fox Creek (MT42M002_050): Natural Sources has been added as a source of impairment.

Rosebud Creek (MT42A001-012): The cause is what it defines in which category the stream is going to be placed. In this case, the impairment unknown placed it under Category 5, whereas the segment MT42A001-011 was placed under category 4C because of the cause physical substrate alteration which is a non-pollutant. The assessment record was updated to the format needed to migrate its information into DEQ's new relational database for assessments. Therefore, this waterbody was not "reassessed" during this cycle, only reformatted. In the reformatting, all sources from the original assessment were linked to all of the impairments. This was necessary because the new database (ADBv2.2) requires causes and sources to be linked whereas the old database (ADBv1.14) did not. This segment will be re-evaluated in further cycles to clarify the impairment unknown.

Lodgepole Creek (MT40C004-020): In the Clean Water Act Information Center (CWAIC), under Summary Report, Water Quality Category, both Categories 5 and 2B are listed. Categories 2B are waters where standards are exceeded due to an apparent natural source in the absence of any identified anthropogenic sources. Because numeric standards were exceeded, the current ADB system automatically sets the Water Quality Category to five. Under Category 5 is found Category 2B, which does not require a TMDL.

Timber Creek (MT40E003_010): Sources unknown means that we don't know if it is all natural or if there are anthropogenic effects. Because of this, it cannot be placed solely as Category 2B.

Nelson Creek (MT40E003-020): The assessment record was updated to the format needed to migrate its information into DEQ's new relational database for assessments. Therefore, this waterbody was not "reassessed" during this cycle, only reformatted. In the reformatting, all sources from the original assessment were linked to all of the impairments. This was necessary because the new database (ADBv2.2) requires causes and sources to be linked whereas the old database (ADBv1.14) did not. Natural sources will be added in the next cycle (2008).

Comment #21:
Type: I am referencing specific information sources, which could affect assessments and/or priority rankings.
Commenter: City of Billings WWTP
Received: 11/06/06 (Hardcopy)

Integrated Report Coordinator
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

RE: <u>2006 Draft Integrated 303(d)/305(b) Water Quality Report</u>

To Whom It May Concern:

The City of Billings, MT has reviewed the 2006 Draft Integrated 303(d)/305(b) Water Quality Report (the "Integrated List") that was obtained from the Department's Clean Water Act Information Center (www.cwaic,mt.gov) and provides the following comments regarding the 303(d) listing of unionized ammonia for segments of the Yellowstone River in the vicinity of Billings. Prior to the public notice of the Integrated List, the City received a revised MPDES permit. The fact sheet for the draft permit indicated that the outfall from the City's sewage treatment plant discharges to a segment of the Yellowstone River (HUC #10070007, ID: MT43Q001_012, Alkali Creek to the Huntley Diversion Dam) that is on the 1996 Total Maximum Daily Load (TMDL) impaired stream list for salinity/TDS/chlorides, suspended solids and unionized ammonia.

A review of the Integrated List and the water quality information available at the CWAIC website indicates that the river segment receiving the City's treated wastewater is not listed as either "partially supporting" or "not supporting" designated uses due to salinity/TDS/chlorides, suspended solids and unionized ammonia. However, the next downstream segment (HUC #10070007, ID: MT43Q001_011, Huntley Diversion Dam to the Big Horn River) is listed as requiring a TMDL for the parameters identified in the fact sheet. The probable sources for unionized ammonia are characterized as municipal and industrial point sources. The basis for this listing is provided in the Sufficient Credible Database (SCD) for the segment (obtained from the CWAIC website). The Listing History for Segment MT43Q001_011 provides the following discussion.

> **1996:** The Yellowstone River between the Huntley Diversion Dam and the Big Horn River was listed as only partially supporting its aquatic life, warm water fishery, drinking water supply and recreation beneficial uses due to salinity/TDS/chlorides, suspended solids and unionized ammonia likely caused by agriculture, industrial point sources, irrigated crop production, municipal point sources and natural sources. **2000-2004:** Insufficient information to evaluate this reach. **2006:** The monitoring design that was used for large rivers (i.e., Strahler Order 7 or greater) was similar to that used for wadeable streams. However, the rigor of this design was weak due to the limited reference data that are currently available for large river systems as well as issues over interpretation of "natural" (MCA 75-5-306). As a result, Montana is in the process of developing new protocols for large rivers. It is anticipated that the large river protocols will be finalized in 2007 (see 2006 Integrated Report for a summary of the large river protocol).
>
> The approach for large rivers that has been applied for the 2006 Integrated Report is to conservatively assume that the 1996 listed impairments, and causes/sources of impairment, persist at present. The exceptions to this approach would be for cases where new data definitively suggest good cause, or exceedences of Montana numeric criteria. In these cases, additional causes of impairment may be de-listed or added. <u>Therefore, the 2006 303(d) list will conservatively report that the aquatic life, warm water fishery, drinking water supply and recreation beneficial uses are partially supported due to salinity/TDS/chlorides, suspended solids and unionized ammonia likely caused by agriculture, industrial point sources, irrigated crop production, municipal point sources and natural sources.</u> This segment will be reassessed following completion of the large river protocols. (emphasis supplied)

The City believes that sufficient data are available to de-list this downstream segment for unionized ammonia. The data supporting such a determination are provided below along with an analysis demonstrating that existing ammonia-nitrogen discharges to the Yellowstone River from point sources cannot cause an exceedance of the DEQ's water quality standards.

2006 SCD Summary

Table 1 provides the data summaries for the Yellowstone River segments immediately upstream and downstream from the Billings STP outfall. These data, from the SWAIC website, confirm that unionized ammonia is present at undetectable levels in two river segments above the City's outfall. Based on these data, the DEQ delisted these segments for unionized ammonia. The river segment immediately upstream of the Billings STP outfall (MT43F001_010) was not assessed, but this segment does not have any significant ammonia-nitrogen sources, so this segment should similarly be delisted (pending confirmatory data collection). The only river segment below the Billings STP that is currently listed for unionized ammonia is river segment MT34Q001_011 (Huntley Diversion Dam to Big Horn River), but this listing is based on questionable data and will be reassessed when the Large River Protocol is finalized.

Reasonable Potential Analysis

As discussed above, the available data for the Yellowstone River upstream of the Billings STP indicates that ammonia-nitrogen levels are below the level of detection. Below the STP, there are two main sources of ammonia-nitrogen discharges to the river: the Billings STP and the Exxon-Mobil refinery. Information on the discharge of ammonia-nitrogen from these sources was evaluated to determine whether there was a reasonable potential to exceed the DEQ's water quality standard for ammonia-nitrogen.

<u>Determination of Downstream Ammonia-nitrogen Concentration</u>

The concentration of ammonia-nitrogen in downstream Yellowstone River segments was determined using the standard mixing equation:

$$C_D = \frac{C_U Q_U + \sum_{i=1}^{n} C_i Q_i}{Q_U + \sum_{i=1}^{n} Q_i} \qquad [1]$$

where:

C_D = downstream concentration, mg/L
C_U = upstream (background) concentration, mg/L
C_i = concentration for i-th point source discharge, mg/L
Q_U = upstream (background) flow, cfs
Q_i = flow for i-th point source discharge, cfs

Equation [1] assumes that complete mixing occurs between the flow in the river and the point source discharges. This assumption is reasonable given that the river section in question is far downstream (approximately 10 miles) from both point source dischargers. In addition, the City of Billings has notified the DEQ that it intends to install a diffuser to achieve a high degree of mixing within two river widths (approximately 700 feet) of the outfall and the Exxon-Mobil outfall has a diffuser that achieves near instantaneous mixing.

Loading information, from either the facility operations data (City of Billings) or the MPDES permit (Exxon-Mobil) will be used to characterize the point source loads. The upstream conditions will be defined using the assumptions presented by the DEQ in the fact sheet for the Billings MPDES permit. The $7Q_{10}$ river flow above the Billings outfall is 1,110 cfs and the upstream ammonia-nitrogen concentration was conservatively set at 0.04 mg/L.

The resulting downstream concentration will be compared against the DEQ water quality standard for ammonia-nitrogen. This standard, contained in Circular DEQ-7, is dependent upon the ambient pH and temperature of the river. Since these parameters change in value with the seasons, the following analysis evaluates reasonable potential for each month of the year.

Ammonia-nitrogen WQS

The DEQ water quality standard for ammonia-nitrogen, as contained in Circular DEQ-7, is dependent upon the pH and temperature of the receiving water. The chronic water quality standard varies depending upon whether or not early life stages (ELS) of fish are present. The applicable chronic standards are 30-day average concentrations, in mg N/L, given by the following equations:

When ELS are present,

$$CCC = \left[\frac{0.0577}{1+10^{(7.688-pH)}} + \frac{2.487}{1+10^{(pH-7.688)}}\right] x MIN\left(2.85, 1.45 x 10^{0.028 x (25-T)}\right) \qquad [2]$$

When ELS are not present,

$$CCC = \left[\frac{0.0577}{1+10^{(7.688-pH)}} + \frac{2.487}{1+10^{(pH-7.688)}}\right] x 1.45 x 10^{0.028 x (25-MAX(T,7))} \qquad [3]$$

where:

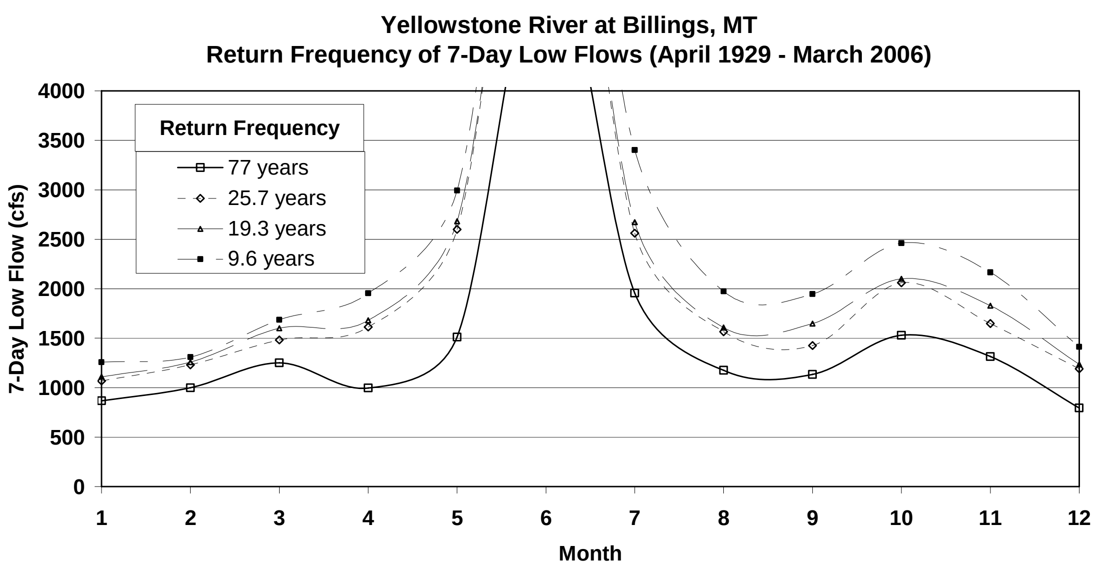
CCC = chronic ammonia-nitrogen criterion, mg N/L
pH = instream pH, standard units
T = instream temperature (ºC)

Circular DEQ-7 further notes that the standard is the average of separate evaluations of the formulas reflective of the fluctuations of flow, pH, and temperature within the averaging period, because the formulas are non-linear in pH and temperature. It is not appropriate to apply the formula to average pH, temperature and flow. (Circular DEQ-7, footnote 7 at 34).

Assessment of Seasonal Flows and Related Ambient Conditions

Flow data and water quality data collected by the USGS for Station 06214500 (Yellowstone River at Billings MT, upstream of the STP outfall) were evaluated to determine the appropriate values for determination of the downstream ammonia-nitrogen concentration and the applicable ammonia-nitrogen water quality standards. Daily flow data for the entire continuous period of record, April 1, 1929 through March 31, 2006, were evaluated to determine the minimum 7-day average low flows occurring each month for each water year (i.e., April – March) of the evaluation period. These data were then sorted to determine the minimum monthly 7-day low flows. These minimum low flows are illustrated in Figure 1. The figure shows that low flow conditions, characterized by the $7Q_{10}$ flow, primarily occur in the winter and late summer. For the purpose of evaluating downstream ammonia-nitrogen concentrations, the $7Q_{10}$ flow (1,110 cfs) was used unless the minimum 7-day average flow for the month exceeded this value. This application is highly conservative since the minimum observed 7-day average has a return frequency of 77 years while water quality standards have a return frequency of once in three years on average.

Figure 1



Water quality data for the period from July 1963 through August 2005 were obtained from the USGS website and are summarized in Table 2. Given the limited amount of data collected in any one month and year relative to the 30-day averaging period for the chronic ammonia-nitrogen standard, the monthly data for the entire record were averaged to characterize monthly conditions.

The Table 2 temperature data suggest that the cold weather period, with temperatures below 5ºC, correspond with the DEQ winter season (i.e., November – March). The winter period corresponds with the ELS-absent condition for this warm water fishery.

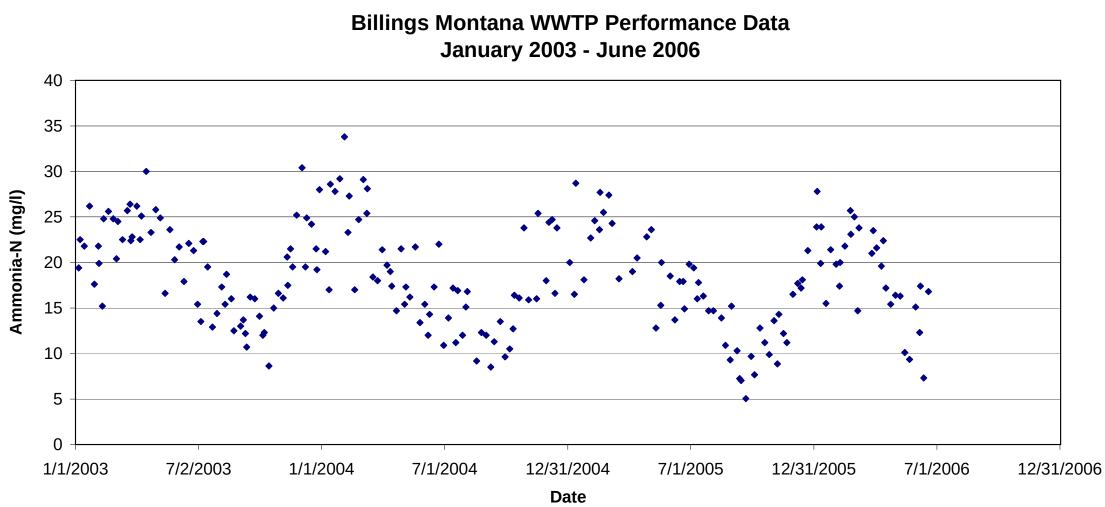
Point Source Effluent Characterization

The Billings STP does not have a limit for ammonia-nitrogen in its MPDES permit. Therefore, the ammonia-nitrogen load for the facility was estimated from performance data. The ammonia-nitrogen concentrations for the Billings STP are illustrated in Figure 2 and summarized in Table 3. The design flow for this facility is 26 MGD (40.2 cfs).

Table 2
Yellowstone River Water Quality Data (7/1963 – 8/2005)

Month	Temperature (ºC)			pH		
	Observations	Average	Standard Deviation	Observations	Average	Standard Deviation
January	29	1.0	1.51	27	7.98	0.349
February	26	0.8	1.26	30	7.92	0.324
March	29	4.1	2.76	37	7.94	0.330
April	29	10.0	2.55	29	7.86	0.348
May	52	11.8	2.55	35	7.81	0.366
June	47	13.9	2.43	40	7.69	0.489
July	36	18.7	2.15	32	7.77	0.408
August	53	19.7	1.86	54	8.19	0.463
September	60	17.0	2.76	49	8.02	0.444
October	37	10.1	3.00	25	8.06	0.381
November	28	2.8	2.41	33	8.05	0.420
December	27	0.7	1.39	33	7.94	0.299

Figure 2



The Exxon-Mobile facility, located a short distance downstream from the Billings STP outfall, has a monthly average ammonia-nitrogen limit of 267 lbs/day and a concentration limit of 21.2 mg/L. Based on these limits, the corresponding effluent flow is 1.51 MGD (2.34 cfs).

<u>Comparison of Predicted Concentrations with Criteria</u>

The data presented above were used in equations [1], [2], and [3] to calculate the concentration of ammonia-nitrogen in the Yellowstone River downstream from the two point source discharges and the corresponding chronic criteria. Table 4 summarizes the monthly downstream concentrations for two cases. The first case pairs the average monthly ammonia-nitrogen discharge from the Billings STP with the permit load from the Exxon-Mobile facility. The second case pairs the maximum daily ammonia-nitrogen concentration for each month from Billings with the Exxon-Mobile permitted load.

Table 3
Billings POTW Ammonia-Nitrogen (mg/L) Performance Summary (1/03 – 6/06)

Month	Observations	Average	Maximum	CV
January	21	22.4	29.2	0.190
February	22	23.2	33.8	0.172
March	21	23.0	29.1	0.155
April	19	21.2	30.0	0.178
May	18	17.1	24.9	0.253
June	20	16.6	22.1	0.235
July	17	16.2	22.3	0.196
August	14	14.1	18.7	0.199
September	16	11.0	16.2	0.276
October	15	13.3	23.8	0.290
November	16	17.0	25.4	0.264
December	15	22.1	30.4	0.180

Table 4
Downstream Ammonia-nitrogen Concentration (mg/L)

Month	River Flow (cfs)	Billings Effluent Average	Case 1 Yellowstone River	Billings Effluent Max-Day	Case 2 Yellowstone River
January	1110.0	22.4	0.864	29.2	1.101
February	1110.0	23.2	0.891	33.8	1.261
March	1250.0	23.0	0.793	29.1	0.983
April	1110.0	21.2	0.823	30.0	1.128
May	1511.4	17.1	0.514	24.9	0.715
June	5571.4	16.6	0.167	22.1	0.207
July	1955.7	16.2	0.390	22.3	0.513
August	1175.7	14.1	0.544	18.7	0.697
September	1134.3	11.0	0.457	16.2	0.634
October	1530.0	13.3	0.411	23.8	0.679
November	1314.3	17.0	0.580	25.4	0.828
December	1110.0	22.1	0.853	30.4	1.142

Notes: Yellowstone River background NH_3-N = 0.04 mg/L;
Billings STP flow = 26 MGD;
Exxon-Mobil flow = 1.51 MGD, NH_3 load = 267 lbs/day

Table 5 summarizes the chronic 30-day average ammonia-nitrogen criteria for two conditions. The first condition pairs the observed monthly average temperature and pH conditions for the Yellowstone River (from Table 2) with equations [2] or [3] to derive the corresponding ammonia-nitrogen criteria. The second condition pairs the observed monthly average temperature condition for the Yellowstone River with a fixed pH of 8.5 to represent a worst-case ammonia-nitrogen criteria condition. In both cases, early life stages are assumed to be present from April through October (criteria equation [2]) while early life stages are assumed absent from November through March (criteria equation [3]).

Table 5
Chronic Ammonia-nitrogen Criteria (mg/L)

Month	Yellowstone River Average pH	Yellowstone River Average Temp. (ºC)	Chronic Criteria (average pH)	Chronic Criteria (pH = 8.5)
January	7.98	1.0	4.08	1.77
February	7.92	0.8	4.42	1.77

March	7.94	4.1	4.31	1.77
April	7.86	10.0	2.97	1.09
May	7.81	11.8	3.15	1.09
June	7.69	13.9	3.63	1.09
July	7.77	18.7	2.51	0.83
August	8.19	19.7	1.32	0.78
September	8.02	17.0	2.02	0.93
October	8.06	10.1	2.23	1.09
November	8.05	2.8	3.70	1.77
December	7.94	0.7	4.31	1.77

Notes: ELS present from April – October
ELS absent from November - March

Table 6 presents a comparison of the estimated downstream ammonia-nitrogen concentrations (Table 4) with the chronic criteria (Table 5). When the downstream ammonia-nitrogen concentration, based on the average Billings effluent condition, is compared with the ammonia criteria based on average stream conditions, the instream concentrations are well below the chronic criteria values such that, even with a substantial margin of safety, water quality standards for ammonia-nitrogen will always be achieved. Even when the downstream ammonia concentration is estimated using the maximum observed monthly ammonia concentration from Billings, compliance with the water quality criteria is achieved with a large margin of safety.

When the ammonia criteria are derived assuming a very high monthly average pH of 8.5, the criteria are much more restrictive than required. Even so, the instream concentrations of ammonia-nitrogen, under average discharge conditions for Billings, are generally less than 50% of the criteria. For these conditions, the highest ratio (April) still provides a safety factor equivalent to the one third of the load in the river. If the instream concentration, based on the daily maximum load, is compared with the high pH standards, we still find that the criteria are higher concentrations than the instream concentration in all but one month. Thus, it is not possible that the river segment below Huntley is experiencing chronic ammonia-nitrogen standard exceedances as there is no continuous point source capable of contributing such an elevated ammonia level.

Table 6
Ratio of Downstream Ammonia Concentration to Chronic Criterion

Month	Chronic Ammonia Criterion based on Average pH and Temperature		Chronic Ammonia Criterion based on pH = 8.5 and Average Temperature	
	Case 1	Case 2	Case 1	Case 2
January	0.21	0.27	0.49	0.62
February	0.20	0.29	0.50	0.71
March	0.18	0.23	0.45	0.56
April	0.28	0.38	0.76	1.04
May	0.16	0.23	0.47	0.66
June	0.05	0.06	0.15	0.19
July	0.16	0.20	0.47	0.62
August	0.41	0.53	0.70	0.89
September	0.23	0.31	0.49	0.68
October	0.18	0.30	0.38	0.62
November	0.16	0.22	0.33	0.47
December	0.20	0.27	0.48	0.65

Notes: Case 1 – downstream ammonia concentration based on monthly average discharge concentration from Billings and Exxon-Mobil at permit limit.
Case 2 – downstream ammonia concentration based on monthly maximum discharge concentration from Billings and Exxon-Mobil at permit limit.

Summary

The analyses presented above provide a very conservative evaluation for assessing whether the Yellowstone River below Billings should be delisted for ammonia-nitrogen in the 2006 Integrated Report. The primary point source contributors are assumed to discharge at their design flows while the river flow is set at drought conditions. In addition, the Exxon-Mobil facility is assumed to be discharging at its permit limit. The ammonia-nitrogen load from Billings is based on the average monthly ammonia-nitrogen concentration and the design flow (26 MGD). The actual flow corresponding to the data is 13.8 MGD, thus the load estimated from Billings is double the actual load. The probability of these events occurring simultaneously is much less than the recurrence interval assumed for the chronic ammonia-nitrogen criterion, and represents a very conservative evaluation of the potential to exceed the State's ammonia-nitrogen standards.

A comparison of the ammonia-nitrogen standards, based on average conditions of pH and temperature in the river, with the conservatively estimated instream ammonia-nitrogen concentration shows there is no reasonable potential to exceed the water quality standard. Even when the ammonia-nitrogen standards are calculated using an elevated pH value of 8.5, the conservatively estimated instream ammonia-nitrogen concentrations do not exceed the standards.

The analysis does not account for additional stream flow that is contributed by downstream drainage areas. These drainage areas will provide additional dilution flow, further decreasing the instream ammonia-nitrogen concentration.

Conclusions

Based on the weight of evidence provided above, it is apparent that ammonia-nitrogen standards in the Yellowstone River, below Billings, must be achieved. Consequently, we request that the draft 2006 Integrated List be amended to de-list impairment for unionized ammonia in the Yellowstone River from the Billings PWS to the Big Horn River (MT43F001_010, MT43Q001_012, and MT43Q001_011).

Sincerely

[redacted]

Table 1
Summary of 2006 Sufficient Credible Data for
Yellowstone River Segments near Billings, MT

Description	Listing History
Bridger Creek to City of Laurel PWS Upstream of Billings STP HUC: 10070004 ID: MT43F001_012 Length = 58.2 miles	In 1996 this reach was part of a larger reach (MT43QJ001-01) extending from the Bridger Cr confluence to Alkali Cr (Alkali Cr is downstream of Billings). 1996 listings were unionized ammonia, salinity/TDS/chloride, and suspended solids. The 1996 segment included 3 beneficial water-use classes (B1, B2 and B3) , whereas the current segment extends from the Bridger Cr confluence to the Laurel water-supply intake and is exclusively B1. Older records don't clearly indicate from which part of the 1996-segment the listed problems were associated. From 2000-2004 the original 1996 reach was on the re-assessment list as lacking sufficient-credible data, except agriculture and industry, both of which were considered fully supporting. Pertaining to the B1 reach assessed here: ammonia was measured in 2003 at Columbus and Laurel, and was non-detect. As long ago as 1979, Karp et al. (1979) described this reach as having low TDS (< 500 mg/L); more recent data show the same. Salmonid fisheries appear healthy, as do aquatic life; suspended sediment problems not evident. <u>Therefore, the ammonia, salinity/TDS/chloride and suspended solids listings are dropped for this B1 reach.</u>
City of Laurel PWS to Billings PWS	See above for original reach description. The present segment only includes the B2 reach. Pertaining to the B2 reach assessed here: ammonia was measured at 3 sites in 2003 and all were non-detect. Karp et al. (1979) concluded there was a 0% probability that Yellowstone

Upstream of Billings STP HUC: 10070004 ID: MT43F001_011 Length = 21 miles	R. water quality at Billings would exceed 500 mg TDS/L, which is the accepted limit for public water supply. Measured TSS was low and biometrics showed sediment was not impacting aquatic life (discussed below). Ammonia, salinity/TDS/chlorides and suspended sediments are being removed as impacts to this reach.
City of Billings PWS to Alkali Creek Upstream of Billings STP HUC: 10070004 ID: MT43F001_010 Length = 3.1 miles	Not assessed for any designated uses (aquatic life, warm water fishery, agriculture, industrial, drinking water, and primary contact/recreation).

Description	Listing History
Alkali Creek to the Huntley Diversion Dam Billings STP discharges at upstream end of segment HUC: 10070007 ID: MT43Q001_012 Length = 10 miles	Segment designated as Fully supporting for Agricultural and Industrial uses, partially supporting for warm water fishery due to the fish barrier (habitat alteration) at the Huntley River Dam, not assessed for aquatic life, drinking water, and primary contact/recreation uses.
Huntley Diversion Dam to Big Horn River Downstream of Billings STP HUC: 10070007 ID: MT43Q001_011 Length = 62 miles	The 2006 303(d) list will conservatively report that the aquatic life, warm water fishery, drinking water supply and recreation beneficial uses are partially supported due to salinity/TDS/chlorides, suspended solids and unionized ammonia likely caused by agriculture, industrial point sources, irrigated crop production, municipal point sources and natural sources based on the 1996 listing. This segment will be reassessed following completion of the large river protocols. In general, data and information regarding this reach are lacking. While there appear to be some fisheries data, macroinvertebrate and periphyton data are either from the 1970's or had no interpretation available. The only recent water chemistry data for this reach were nutrient data from 2003. Other water chemistry data including metals were available only from 1970-1981. A series of PFC analyses were conducted by the BLM in this reach, but only one site had any relevant information regarding the condition of the site.

DEQ Response #21:
DEQ would like to say thank you to the City of Billings for the extensive analysis. This information is well structured and presents a strong case for removing unionized ammonia as an impairment to the aquatic life and fisheries uses for this segment. However, this segment will be merged with the adjacent B-3 classified segment in the next listing cycle. This merge and the subsequent assessment of the waterbody's whole extent will be performed in the 2008 listing cycle. DEQ simply ran out of time to get both the merge completed and incorporate the City of Billings information into the assessment for this cycle. DEQ must comply with its settlement agreement schedule for EPA approval of this cycle's list as its first priority.

End of comments

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 standards.

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 water quality standards 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 water quality standards 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 water quality standards 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 water quality standards 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 water quality standards (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)] Nonpoint source pollution is generally managed through best management practices or a water quality restoration plan.

Nonsupport A beneficial use determination, based on sufficient credible data, that a waterbody is not achieving all the water quality standards 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 water quality standards 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 water quality standards, 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.
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 water quality standards. [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 water quality standards. [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	A system defined by EPA guidance for classifying the water quality status

Categories 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 water quality standards 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 water quality standards. 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 WQB-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.