

**Non-wadeable River Planning Area
Marias River**

**DRAFT
Sampling and Analysis Plan**

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Introduction

A Joint Motion to Amend Judgment was filed in U.S. District Court in Missoula on November 18, 2004 settling two lawsuits related to the State of Montana’s Total Maximum Daily Load (TMDL) program. A Consent Decree, requiring EPA to ensure that the waters removed from the 1996 Section 303(d) List, due to a lack of sufficient credible data, are re-assessed, was a component of this settlement. The Consent Decree also requires EPA is also to ensure that the data and information collected in the reassessments are considered in preparation of the 2006-303(d) list. In accordance with the Consent Decree, field monitoring and data analysis must be completed on X stream segments that are considered non-wadeable rivers.

The Sampling and Analysis Plan (SAP) outlined in this document describes a monitoring and sample collection plan to evaluate water quality and beneficial uses for these non-wadeable streams. Targeted stream segments and associated potential causes of impairment are shown in Table 1-1.

The following sections of this document include a water body-by-water body discussion of the proposed monitoring strategy.

Table 1-1. Non-wadeable streams for Reassessment in 2005

Segment Name	Size (mi)	Listing year	Probable Impaired Uses	Probable Causes
Marias River , Tiber Reservoir to Two Medicine River – Cut Bank Creek Confluence (above the Reservoir; MT41_P001_010)	60	1996	Aquatic Life Coldwater Fishery	Nutrients Salinity/TDS/Cl TSS
		2004	Insufficient Data	Insufficient Data
Marias River , Tiber Dam to Co Road X-ing (just below the reservoir; MT41_P001_021)	10.8	1996	Aquatic Life Coldwater Fishery	Flow Alteration Other Habitat Alterations
		2004	Aquatic Life Coldwater Fishery	Flow Alteration Other Habitat Alterations
Marias River , From Co Road x-ing to mouth (MT41P001_022)	70.89	1996	Aquatic Life Warm Water Fishery	Flow Alteration Other Habitat Alterations
		2004	Aquatic Life	Flow Alteration

1.0. Proposed Sampling Plan for the Marias River

1.1. Summary of Available Data

A review of the data for the Marias River indicates the only one sixty mile segment (from Two Medicine River to Tiber Reservoir) lacks sufficient credible data to making any beneficial use support determinations.

Only the headwaters reach is on the Reassessment list. However, concerned citizens contacted DEQ about mercury contamination issues in Tiber Reservoir and the Marias River downstream of the reservoir. Based on limited data and the desire to conduct a synoptic study of the Marias, the field monitoring effort has been expanded to include sampling sites on the entire river. Because of concerns raised about possible mercury contamination, EPA's field crew will collect water chemistry samples for analysis using both the 200.8 method and the low-level method (EPA 1631) at sites immediately downstream of the reservoir and before the confluence with the Missouri River. MT DEQ will cover the analytical costs associated with the low-level method.

Aquatic life and warm water fisheries beneficial uses were not assessed for any of the Marias River segments. This sampling plan proposes to address the entire Marias River to ensure adequate data to review the impairment determinations for all segments and to provide baseline information for TMDL development.

NRCS completed a riparian assessment for the entire Marias River in July 2005. The survey located and quantified physical features along the Marias by floating the upstream and middle river segments. NRCS may conduct additional water quality sampling in Fall 2005. In 2005, Watershed Consulting (Amy Chadwick) collected physical habitat information and evaluated possible sources of pollutant loading on major tributaries to the Marias.

Other available data?

1.2. Background on Sampling Design and Required Parameters

To develop if a waterbody is meeting its beneficial uses, it is necessary to evaluate whether the waterbody is meeting all applicable water quality standards. Determining water quality standards attainment involves a comparison to the applicable numeric and narrative water quality standards associated with the beneficial uses. Because there is no single direct measure of beneficial use impairment associated with nutrients or sediment, a suite of water quality indicators has been selected for use in combination with one another. In light of the available data, these indicators are considered to be the most reliable and robust measures of nutrient and sediment impairment and beneficial use support. These indicators address the physical, biological, and chemical characteristics of the waters, as well as the presence or absence of potential human sources that may be contributing to impairments.

DEQ uses single sampling events to assess for attainment of numeric criteria. For example, listing a waterbody as impaired for drinking water with a single exceedence of the Human Health Standard for metals is considered appropriate where the data set is small. Alternatively, DEQ could: 1) List on one exceedence under the assumption that the single exceedence represents the potential for other exceedences that would likely occur in a large data set. 2) Delay the decision until a large data set is available (collect more data) and the excursion rate of numeric standard exceedence can be understood with greater confidence (WQS Rules applied = 96 hour rule, and 10% of large data set of three years quarterly data). Given the schedule for completion mandated by the consent decree, option two is not available, therefore, the stream should be listed for the Human Health Standard exceedence from a single point in a small dataset.

Monitoring for the Marias River must address the pollutants of concern identified in the 1996 303(d) and collect sufficient data to assess all beneficial uses. The pollutants of concern for the mainstem Marias include: nutrients, suspended solids, and salinity / TDS / chlorides, and metals (citizen concerns). The final assessment will also evaluate non-pollutant causes such as flow alteration and other habitat alterations. Assessing attainment of aquatic life use support requires a comparison to "reference" or the

use of biological interpretative tools developed for non-wadeable systems. Since biological communities often respond to reach scale disturbances, an internal reference reach” approached will be employed. GIS and BPJ will be used to determine the “best available” reference reach for sampling.

1.3. Nutrient Indicators

In-stream total nitrogen, total Kjeldahl nitrogen, total phosphorus and chlorophyll-a are proposed as indicators for the nutrient-related impairments in the Marias River. These values will be compared to:

- nutrients thresholds to values derived from DEQ’s analysis of ecoregional reference information
- published criteria
- EPA’s recommended limits for nutrient concentrations in rivers and streams in Ecoregion II, sub-ecoregion 42, (USEPA, 2000a)
- nutrient concentrations from non-wadeable streams sampled in EMAP-West
- comparison to values obtained at DEQ’s fixed station network sites
- output from the national large river nutrient criteria meeting

DEQ’s nutrient coordinator will determine the final threshold values. The threshold values are shown in Table 1-2 below (add values in the fall, once the work is completed).

The Hilsenhoff Biotic Index (HBI) is an abundance weighted index developed to assess impacts from organic pollution (Hilsenhoff, 1987). Since the original HBI was developed in Wisconsin, the HBI metric is used to “screen” for possible indications of nutrient impacts. Reach specific HBI values will be compared to a HBI values from a reference reach on the Marias River. In addition, analysis of DEQ’s fixed station network data may provide a point of comparison for HBI values from similar streams.

Table 1-2. Proposed nutrient indicators for the Marias River.

Water Quality Indicators	Threshold Values
Total Nitrogen	TBD
Total Kjeldahl Nitrogen	TBD
Total Phosphorus	TBD
Nitrate plus Nitrite-Nitrogen	TBD
Water column chlorophyll a	TBD
Macroinvertebrate Hilsenhoff Index of Biotic Integrity (HBI)	TBD
Anthropogenic Nutrient Sources	No significant sources identified based on field surveys

Notes: mg/L = milligrams per liter; mg/m² = milligrams per square meter.

1.4. Sediment Indicators

Sediment indicators are challenging to select for a system like the Marias River. Because the river is naturally turbid, determining the natural sediment load is difficult. The proposed sediment indicators for the Marias River include instream sediment measures, direct measures of aquatic life, an evaluation of the riparian condition, and assessment of possible anthropogenic sources.

Phase I:

At this point, the relationship between Montana’s existing sediment indicators and their use in non-wadeable streams is unknown. Applying existing approaches such as the Relative Bed Stability without further study may lead to erroneous conclusions. Therefore, we propose to concentrate the 2005 sampling efforts on a specific list of indicators related to sediment that can be more accurately assessed.

Phase II:

Because the SCD/BUD process requires an evaluation of the 1996 303(d) listed pollutants, development of model to calculate sediment loads to the mainstem Marias River may assist DEQ in evaluating sediment impacts. Use of predictive models to compare to natural conditions is described in Table 10 of the SCD/BUD tables as an assessment tool that can be utilized to evaluate sediment impacts. Given the struggle with identifying useful sediment indicators for plains systems, development of a sediment model may assist with understanding potential sediment loads to the Marias River. However, development of a sediment model is outside of the scope of this project.

NRCS plans to compare historical aerial photographs to recent surveys to determine changes in channel morphology.

Table 1-3. Proposed sediment indicators for the Marias River.

Water Quality Indicators	Proposed Criteria
Suspended sediment concentration	TBD
Total suspended solids concentration	TBD
Turbidity	TBD
Anthropogenic sediment sources	No significant sources identified based on field surveys.
DEQ’s riparian assessment form with photo documentation	No significant riparian degradation.

1.5. Salinity/ TDS/ chlorides and Other Inorganics Indicators

Indicators to evaluate salinity impacts and other inorganics will focus on collection on electrical conductivity, SAR, and sulfates. Salinity will be measured using EC. Studies have shown that electrical conductivity values between 1,000 and 1,500 uS affect aquatic life use support. Chloride concentrations will be compared to values in WQB7. If sufficient data exists, correlations between EC and TDS values will used to assess TDS impacts.

1.6. Proposed Monitoring Strategy for the Marias River

Sampling protocols will follow EPA EMAP protocols as described in EPA’s *Field Operations Manual for Non-Wadeable Rivers and Streams* (2003) for macroinvertebrate data collection and DEQ’s *Field Procedures Manual* (2005) for collecting water chemistry samples and for the visual habitat form.

Sampling is proposed for **July 2005**. Sampling parameters, at approximately 18-20 sites, include:

- *Field Parameters* – Temperature, flow, dissolved oxygen, pH, turbidity, conductivity
- *Laboratory Parameters* – Total phosphorus (TP), nitrate plus nitrite (NO₂+NO₃), total Kjeldhal nitrogen (TKN), total nitrogen (calculated), ammonia, total suspended solids (TSS), suspended sediment concentrations (SSC), total dissolved solids (TDS), volatile suspended solids (VSS),

SAR, common ions (including sulfates and chloride), and a metals scan. Low-level mercury samples will be collected at a subset of sites.

- *Physical Habitat Parameters* – DEQ habitat form
- *Biological Parameters* – Macroinvertebrates and chlorophyll a (either hoop method, water column, or benthic).

Duplicate samples will be collected at 10% of the sites for water chemistry and biological parameters. The proposed sample sites are listed in Table 1-4.

Table 1-4. Proposed Marias River Sampling Sites

Site ID	Description	Site Type	Latitude	Longitude	Landowner Information
	Two Medicine	Tribal sampling site?	48.4835	-112.2290	Blackfeet Tribe
	Cutbank Creek	Tribal sampling site?	48.4902	-112.2315	Blackfeet Tribe
6030MA01-Confirmed	Marias River , at Sullivan Bridge, near Ethridge, MT	Existing DEQ site	48.4880556 (48.4798, map)	-112.2238889 (-112.2092, map)	Close to DEQ site – sample date?
Optional	Marias River	New site	48.4671	-112.1321	Marias River Land and Livestock, 1137 Adel Rd, Cascade, MT
Optional	Marias River , possible reference?	New site	48.4411	-111.9949	Marias River Bird Preserve, 200 Hubbard Dam Rd.
5933MA01-Confirmed	Marias River , at USGS gaging station near Williamson Park	Existing DEQ site	48.4266667	-111.8883333	
Optional	Marias River	New site	48.4060	-111.8471	Allan and Diane Underdal / Edward Gallup
Optional	Marias River	New site	48.3959	-111.7896	Charles Stalnaker / BLM / State of MT
Confirmed	Marias River , at F Bridge	New site	48.3836	-111.7190	Micheal, Fretheim, Shelby, MT
5740MA01-Confirmed	Marias River , d.s. of Tiber Reservoir at Gaging Station	USGS site	48.3055556	-111.0791667	
5742MA01 and BKK077	Marias River , DS of Chester Hwy	Existing DEQ site	48.229444	-110.780000	

	Marias River	New site – from boat	48.2478	-110.6914
	Marias River	New site – from boat	48.1913	-110.6121
	Marias River	New site – from boat	48.1285	-110.6708
	Marias River	New site – from boat	47.9742	-110.6079
Opportunity Sample	Marias River			
Opportunity Sample	Marias River			
Opportunity Sample	Marias River			
5344MA01	Marias River, at Loma	Existing DEQ site	47.9313889	-110.5069444