Non-wadeable River Planning Area

DRAFT
Sampling and Analysis Plan
Milk River

July 5, 2005

Prepared by

Tina Laidlaw, U.S. Environmental Protection Agency
Rosie Sada, MT Department of Environmental Quality

CONTENT

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
Milk River, Eastern U.S. Border crossing to Fresno Reservoir	31.9	1996	Aquatic Life Warm Warm Fishery	Siltation Flow alteration Nutrients Other habitat alteration
		2004	Did not meet SCD	Insufficient Data
Milk River, from Fresno Dam to Whitewater Creek	270.4	1996	Aquatic Life Drinking Water Warm Warm Fishery	Flow alteration Nutrients Other habitat alteration Other inorganic s Salinity/TDS/Cl Suspended solids
		2004	Drinking Water Aquatic Life Warm Water Fishery	Mercury Metals Insufficient Data Insufficient Data
Milk River, Whitewater Creek to Beaver Creek *Originally, this segment and the Fresno to*	38.2	1996	Aquatic Life Warm Water Fishery	Flow Alteration Nutrients Other Habitat Alterations Other Inorganics Salinity/TDS/Cl Suspended solids

Segment Name	Size (mi)	Listing year	Probable Impaired Uses	Probable Causes
Whitewater Creek formed one segment The original segment has been split.		2004	Drinking Water	Mercury Metals
Milk River, Beaver Creek to the mouth (Missouri River) *Two segments were joined to form this segment.*	135.9	1996	Agriculture Aquatic Life Drinking Water Warm Warm Fishery	Flow Alteration Nutrients Other Habitat Alterations Other Inorganics Salinity/TDS/Cl Suspended solids
		2004	Agriculture Drinking Water Industrial Aquatic Life Warm Water Fishery	Mercury Metals Nutrients Pathogens Insufficient Data Insufficient Data
		2004	Did not meet SCD	Insufficient Data
		2004	Agriculture Drinking Water Industrial Aquatic Life	Fully Supporting Fully Supporting Fully Supporting Insufficient Data

1.0. Proposed Sampling Plan for the Milk River

1.1. Summary of Available Data

A review of the data for the Milk River segments listed as "insufficient data" and those segments listed as "impaired" suggest that very limited data exists for the mainstem Milk River. Only one 38.2 mile segment of the Milk River is included on the Reassessment List; ironically, this segment is not listed as having "insufficient data", this segment is listed as impaired for mercury and metals. The headwaters segment of the Milk River shows that SCD was lacking and insufficient data existed to make impairment determinations for any beneficial uses. Based on this information, it appears that DEQ made a mistake and should have placed the 31.9 mile headwaters segment of the Milk River on the Reassessment list.

The other 3 segments of the Milk River are listed as impaired for metals, mercury, nutrients and pathogens. The data used to list these other segments as impaired are old and limited in their spatial and temporal distribution. In addition, aquatic life and warm water fisheries beneficial uses were not assessed for any of these segments. This sampling plan proposes to address the entire 476 miles of the Milk River to ensure adequate data to revisit the impairment determinations for all segments and to provide baseline information for TMDL development.

A review of available data for the Milk River shows sporadic sampling at several sites as part of various monitoring activities. U.S. EPA's EMAP program collected data in (dates) at two sites upstream of Havre (see Figure X) on the Milk River. Sampling parameters included: fish community information,

macroinvertebrates, periphyton, water chemistry (nutrients, metals, common ions), field measurements, flow, quantitative physical habitat measurements, and visual assessments of the stream reach. DEQ has sampled two sites on the Milk River as part of their fixed station monitoring program since 1999.

Table 1-2. DEQ's Fixed Station Monitoring Sites on the Milk River

Agency	Station ID	Station Description	Latitude	Longitude
MT-DEQ	M45MILKR01	Milk River at Nashua	48.1300000	-106.3658333
MT-DEQ	M45MILKR02	Milk River at Bjornberg Bridge	48.5076833	-107.2175500

Parameters collected by DEQ at these sites included: quarterly water chemistry samples, macroinvertebrates, and periphtyon.

The Fort Belknap Tribe sampled five sites on the mainstem Milk River for: water chemistry (nutrients, common ions, metals) and field parameters (DO, pH, temperature, conductivity). Sampling occurred monthly from May to September. Confirm sites (lat/longs) and parameters.

Table 1-3. Fort Belknap Water Quality Monitoring Sites

Agency	Station ID	Station Description	Latitude	Longitude
Ft. Belknap	FB01	Milk River at Harlem/ Ft. Belknap Bridge		
Ft. Belknap	FB01b	Milk River at Kulbeck Bridge		
Ft. Belknap	FB02	Milk River at Dodson Bridge		
Ft. Belknap	FB03	Milk River at Confluence of People's Creek		
Ft. Belknap	FB04	Milk River at Confluence of White Bear Creek		

NRCS completed a riparian assessment for the entire Milk River in May 2003. The survey located and quantified physical features along the Milk by conducting a Rapid Aerial Stream Corridor Assessment NRCS method. The wastewater treatment facilities collect monthly water quality samples to meet permit requirements.

DEQ contracted with the Milk River Alliance to develop a Preliminary Assessment Report (PAR) for the Milk River. The Alliance subcontracted with DNRC to produce the PAR. The draft PAR highlighted historical sampling locations and was used to guide site selection for the 2005 sampling effort.

The proposed monitoring plan considered the unique characteristics of the Milk River.

- First, 70-90% of the flows in the mainstem channel originate in St. Mary's River and are diverted 30 miles until it empties into the Milk River before entering Canada. The river then flows approximately 216 miles in Canada before re-entering the United States. The first Milk River segment starts at the U.S. / Canadian border upstream of Fresno Reservoir. This inter-basin transfer significantly augments flows in the mainstem channel and would influence channel dimensions, sediment transport, etc. Determining what is "natural" for the river as a point of comparison becomes even more challenging. In addition, limited data is available on the Canadian portion of the watershed.
- The river provides irrigation waters for several irrigation districts along the Hi-line. In an average precipitation year, the river runs dry in certain downstream sections due to water withdrawals for irrigation.

- The Milk River serves as the drinking water supply for the cities of Havre, Chinook, and Harlem. These communities provide drinking water for approximately 14,000 people (P. Azevedo, pers. com. 2005).

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 Milk 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 Milk include: nutrients, suspended solids, other inorganics, metals, and pathogens. Non-pollutant causes such as flow alteration and other habitat alterations will be also be evaluated. 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 Milk 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 Milk River. Results will also be compared to the EMAP-West dataset HBI values for non-wadeable streams from the Northwestern Glaciated Plains. In addition, analysis of DEQ's fixed station network data may provide a point of comparison for HBI values from similar streams.

Table 1-4. Proposed nutrient indicators for the Milk 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/m^2 = milligrams per square meter.

1.4. Sediment Indicators

Sediment indicators are challenging to select for a system like the Milk River. The river is naturally turbid, and given the flow augmentation from the St. Mary's diversion and the impacts from Fresno Reservoir, determining the natural sediment load is difficult. The proposed sediment indicators for the Milk 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 Milk 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 Milk River. However, development of a

sediment model is outside of the scope of this project.

Table 1-5. Proposed sediment indicators for the Milk 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.

This plan recognizes our current limitations and presents an approach to increase our confidence in making impairment determinations and evaluating sediment impacts for rivers such as the Milk.

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 Milk 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 **August 2005**. Sampling parameters at approximately 20 sites include:

- *Field Parameters* – Temperature, flow, dissolved oxygen, pH, turbidity, conductivity
- *Laboratory Parameters* – Total phosphorus (TP), nitrate plus nitrite (NO_2+NO_3), 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.
- *Physical Habitat Parameters* – DEQ habitat form
- Biological Parameters – Macroinvertebrates and chlorophyll a (water column, benthic, or hoop method).

Duplicate samples will be collected at 10% of the sites for water chemistry and biological parameters. The proposed sample sites are listed in Table 1-5.

Table 1-6. Proposed Milk River Sampling Sites

Site ID	Description	Site Type	Latitude	Longitude	Landowner Information
	Milk River, Upper segment prior to entering Canada. Intersection with 3 Bar Road.	New site			
	Milk River, downstream of US Border	New site			
	Milk River, u.s. of Fresno Reservoir	New site			
	Milk River, site d.s. of Fresno Reservoir near EMAP site (locate near EMAP site)	New site			
	Milk River, site d.s. of confluence with Big Sandy Creek	New site			
	Milk River, site near North Havre Bridge or d.s. of confluence with Beaver Creek	New site			
	Milk River, site near Lohman near Hwy 2 bridge	New site			
	Milk River, at Chinook below confluence with Battle Creek	New site			
	Milk River, d.s. of Lodge Creek before Harlem	FB01? (lat / long?)			
	Milk River, at Fort Belknap	Existing tribal data			
	Milk River, at Dodson d.s. of the confluence with People's Creek	FB02 ? (lat / long?)			
	Milk River, u.s. of Malta near confluence with Alkali Creek	New site			
	Milk River, d.s. of Malta along Hwy 191	New site – best available reach?			
	Milk River, site at Hwy 243	New site			
	Milk River, at the confluence with Frenchman's creek at Bjornberg Bridge Rd	New site			
	Milk River, at the confluence with Rock Creek near Hinsdale	New site			
	Milk River, u.s. of Glasgow near Riverside Rd.	New site			
	Milk River, d.s. of Glasgow near Whatley	New site			
	Milk River, at Nashua	USGS gaging station – fixed station site			

	Milk River, before confluence with Missouri