
LITTLE BLACKFOOT RIVER TMDL PLANNING AREA SEDIMENT MONITORING

Sampling and Analysis Plan

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
P.O. Box 200901
Helena, MT 59620-0901

Prepared by:

PBS&J
3810 Valley Commons Drive, Suite 4
Bozeman, MT 59718

Approvals (All Signatures on file at MDEQ)

Banning Starr (TMDL Project Manager)

Date

Rosie Sada (WQ Monitoring Section Supervisor)

Date

Mark Bostrom (QA Officer)

Date

Jeff Dunn (Contractor – PBS&J)

Date

TABLE OF CONTENTS

1.0 Introduction.....	1
2.0 Objectives and Design.....	2
3.0 Field Sampling Methods.....	3
4.0 Quality Assurance and Quality Control Requirements	5
5.0 Data Analysis, Record Keeping, and Reporting Requirements	8
6.0 Schedule for Completion	8
7.0 Project Team and Responsibilities	8
8.0 References.....	9

LIST OF TABLES

Table 2-1 Aerial Assessment Reach Stratification Spatial Representation

LIST OF FIGURES

Figure 2-1 Little Blackfoot River Watershed Sediment Assessment Sites

1.0 Introduction and Background

This Sampling and Analysis Plan addresses potential sediment impairments to streams in the Little Blackfoot TMDL Planning Area (TPA), which is located on the western slope of the continental divide in the headwaters of the Clark Fork River. The Little Blackfoot River watershed encompasses 415 square miles (265,300 acres). The majority of the Little Blackfoot River watershed is located in Powell County, while the northeast corner of the watershed is located in Lewis and Clark County. The Little Blackfoot River watershed includes two 5th code HUCs (1701020106 and 1701020107) and is located in the Upper Clark Fork 4th code HUC (17010202).

Under Montana law, an impaired water body is defined as a water body for which sufficient and credible data indicates non-compliance with applicable water quality standards (MCA 75-5-103). Section 303 of the Federal Clean Water Act requires states to submit a list of impaired water bodies or stream segments to the U.S. Environmental Protection Agency (EPA) every two years. Prior to 2004, this list was referred to as the “303(d) list”, but is now named the “Integrated Report”. The Montana Water Quality Act further directs states to develop TMDLs for all water bodies appearing on the 303(d) list as impaired or threatened by “pollutants” (MCA 75-5-703). If sufficient credible data exists to support the sediment impairment determinations for the 1996 listed streams, then sediment TMDLs will be developed. If sufficient data does not exist, then data will be collected to confirm or deny the 1996 listings and TMDLs will be developed for all streams determined to be impaired. The field methods conducted under this SAP are intended to assist DEQ in evaluating the impairment status of streams in the Little Blackfoot River TPA and for developing TMDLs where necessary.

In the Little Blackfoot River TPA, Dog Creek, Telegraph Creek, Snowshoe Creek, Spotted Dog Creek and the Little Blackfoot River are listed as impaired due to sediment on the 2006 303(d) List. In addition, Elliston Creek and Threemile Creek are listed for alterations in stream-side or littoral vegetative covers, which is a sediment related impairment. Trout Creek is also included in this Sampling and Analysis Plan since the existing data indicate sediment impairments may be present.

2.0 Objectives and Design

The objective of this sampling plan is to collect sediment and stream habitat data that will be used for the following:

- Verification of sediment impairment conditions on 303(d) listed stream segments in the Little Blackfoot TPA
- Quantification of sediment loads associated with specific land use categories in the Little Blackfoot TPA to assist in TMDL sediment load allocations

Study Design

In order to meet the above objectives, substrate character and stream habitat conditions will be determined by extensive water quality sampling in the listed tributaries within the Little Blackfoot TPA. Longitudinal surveys that include pebble counts, grid toss, cross sections, pool data collection, riparian greenline surveys, and eroding bank information will be performed in the summer of 2009.

Following procedures described in the document *Watershed Stratification Methodology for TMDL Sediment and Habitat Investigations* (MT DEQ 2008), listed stream reaches within the Little Blackfoot TPA were stratified by ecoregion, stream order, valley gradient, and channel confinement. Additional stratification was performed through the use of aerial photography in order to identify distinct riparian conditions and to note areas of apparent local impacts.

Selection of Candidate Assessment Reaches

Candidate assessment reaches were selected in relatively low-gradient portions of the study streams to facilitate the evaluation of sediment loading impacts. Other considerations in selecting candidate assessment reaches included representativeness of the candidate reaches to other reaches of the same slope, order, confinement and ecoregion, as well as ease of access. Existing data collected by Montana Fish, Wildlife and Parks, Pacfish/Infish Biological Opinion, Land and Water Consulting, and Montana DEQ were also considered during site selection.

Within each candidate assessment reach, survey reaches ranging from 500, 1000, 1500, or 2000 feet will be established based on the bankfull width of the stream during the field assessment. Refer to the *Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments* (MT DEQ 2009) for additional details.

Sampling Sites

Nineteen sediment sampling sites spatially distributed throughout the study tributaries in the Little Blackfoot TPA were selected for inclusion in this project. Sampling sites were chosen to include streams where data will assist with impairment determinations, as well as represent the range of landscape characteristics and land use/land cover influences existing in the watershed. Sampling sites were identified by both assessment of aerial images and field surveying to capture

the variability in land use and watershed characteristics potentially contributing to sediment impairment issues in streams including: stream order, valley confinement and slope, ecoregion, and land use/land cover (e.g. known mined areas, forest, grass, riparian area, geology, and soils).

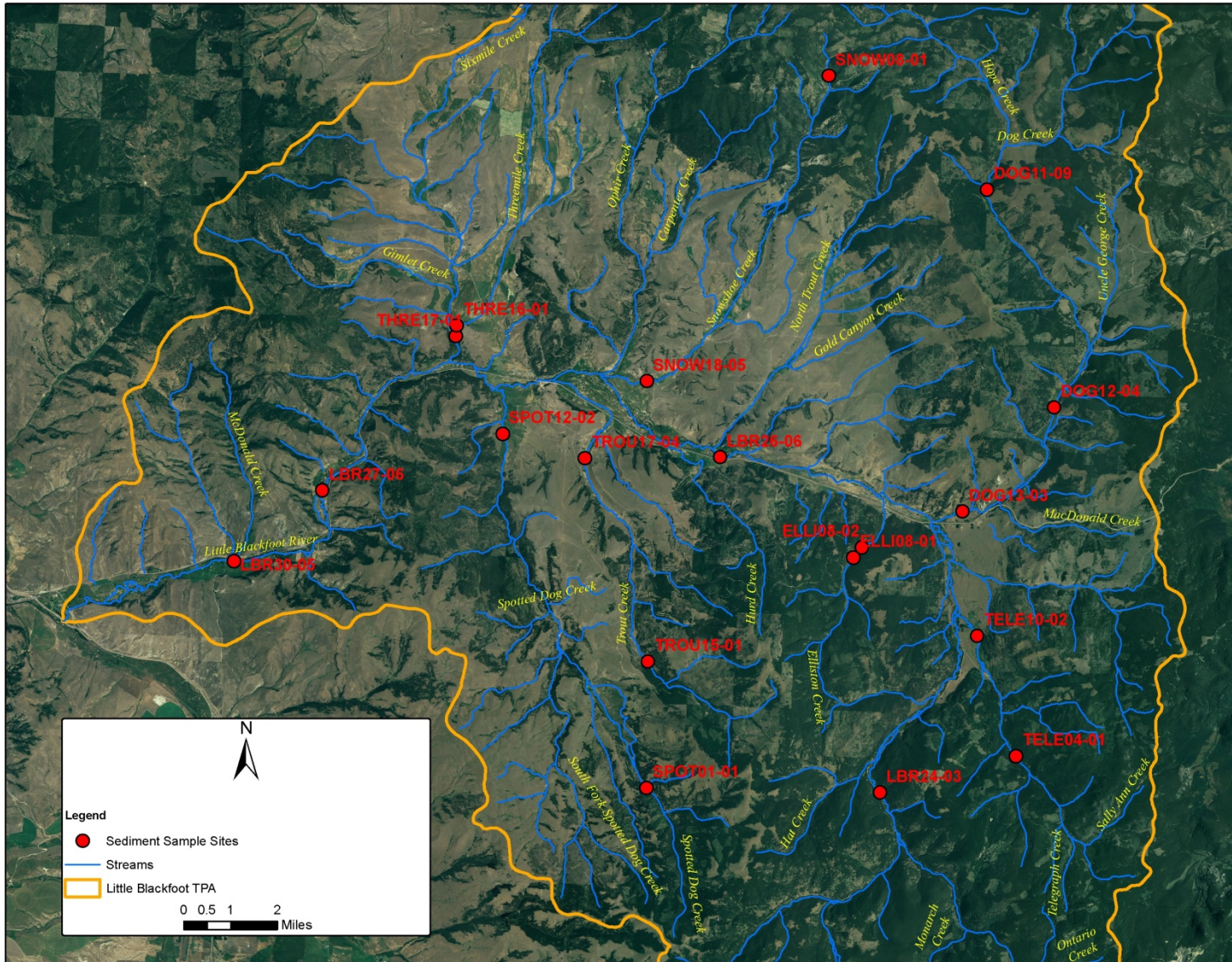
The following streams will be assessed in the Little Blackfoot TPA (**Figure 2-1**) (reach locations are in parenthesis):

- Dog Creek (11-09, 12-04, 13-03)
- Elliston Creek (08-01, 08-02)
- Little Blackfoot River (24-03, 26-06, 27-06, 30-05)
- Snowshoe Creek (08-01, 18-05)
- Spotted Dog Creek (01-01, 12-02)
- Threemile Creek (16-01, 17-01)
- Telegraph Creek (04-01, 10-02)
- Trout Creek (15-01, 17-04)

3.0 Field Sampling Methods

All monitoring and data collection will be done in accordance with the approach described in *Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments* (MT DEQ 2009) and *MDEQ's Field Procedures Manual* (MT DEQ 2005). Any alteration in or transgression from the SOPs will be determined by the DEQ TMDL project officer and will be discussed with all field crew members before field work begins. At the discretion of the DEQ project officer, only a portion of the method may be employed at some sites to avoid duplication of previous data collection efforts or to collect limited, targeted information to assist with sediment load calculations.

Figure 2-1. Little Blackfoot River Watershed Sediment Assessment Sites.



E:\Projects\10006824 - Little Blackfoot\Projects\little_blackfoot_base\map_report.mxd

4.0 Quality Assurance and Quality Control Requirements

Data Quality Objectives (DQOs) are the quantitative and qualitative criteria established for a sampling design in order to meet the project's objectives. Data Quality Indicators (DQIs) are quantitative criteria established for the data acquired within this design to assure it is of sufficient quality for its intended use.

DQOs

Representativeness

Representativeness refers to the extent to which measurements represent an environmental condition in time and space. This is a judgmental sampling design using the following rationale:

Spatial representation:

Sampling sites were chosen to represent the influence of landscape characteristics and land use/land cover existing in the watershed on stream substrate character, stream morphology and habitat conditions. Sampling sites were identified by both assessment of aerial images and field surveying to capture the variability in land use and landscape characteristics potentially contributing to sediment impairment issues in streams including: stream order, valley confinement, slope, ecoregion, and land use/land cover (e.g. known mined areas, forest, grass, riparian area, geology, and soils) (**Table 2-1**).

Temporal representation:

This study is designed to document a stream's geometry, riparian condition, and substrate characteristics. It uses bankfull width and depth for many of its measures, which is based upon a 1.2 – 2.0 year return cycle.

Comparability

Comparability is the applicability of the project's data to the project's decision rule. The decision rules used for this project will be determined based on reference data for sediment and habitat conditions based upon regional data, internal data (no/limited human impact), and literature values.

Completeness

Completeness is a measure of the amount of data prescribed for assessment activities and the usable data actually collected, expressed as a percentage. Completeness is determined after the evaluation of the project's DQIs. The overall project goal is 85% completeness.

Table 2-1. Aerial Assessment Reach Stratification Spatial Representation.

Reach Type	Number of Subreaches	Number of Sample Sites
MRI-0-1-U	2	
MRI-0-2-U	12	
MRI-0-3-U	25	2
MRI-0-3-C	4	
MRI-0-4-U	27	2
MRI-0-5-U	7	1
MRI-2-1-C	2	
MRI-2-1-U	5	
MRI-2-2-C	7	2
MRI-2-2-U	23	2
MRI-2-3-U	8	
MRI-4-1-C	14	
MRI-4-1-U	30	1
MRI-4-2-C	9	
MRI-4-2-U	11	
MRI-4-3-U	5	1
MRI-10-1-C	11	
MRI-10-1-U	18	
MRII-0-2-C	2	
MRII-0-2-U	20	2
MRII-0-3-C		
MRII-0-3-U	12	2
MRII-0-4-U	7	1
MRII-0-5-U	23	2
MRII-2-1-U	3	
MRII-2-2-C	1	
MRII-2-2-U	28	
MRII-2-3-C	1	
MRII-2-3-U	6	1
MRII-4-1-U	1	
MRII-4-2-C	6	
MRII-4-2-U	1	

DQIs

Precision

Precision refers to the degree of agreement among repeated measurements of the same characteristic. DEQ has tested the reproducibility of the measurements employed in this design and found that the precision of repeat measurements is sufficient relative the total variance from cell to cell. The greatest source of result variance comes from the heterogeneity of a study site (due to natural/human disturbance variability) rather than systematic and random error of individual measurements. Therefore, DEQ feels that precision of measurements is controlled satisfactorily through training and adherence to the sampling protocols described in *Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments* (MT DEQ 2009).

Sensitivity

Sensitivity refers to the limit of a measurement to reliably detect a characteristic of a sample. Similar to precision, the sensitivity of measurements was tested during method development. No modifications to the measurement increments or units specified in *Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments* (MT DEQ 2009) are allowed without consent from the DEQ TMDL Project Officer.

Bias

Bias is directional error from the true value. In this context, it is an extension of the representativeness concept applied to an individual sample. Bias can occur either during site selection or measurement.

The criteria for site selection in this study, as described in *A Watershed Stratification Approach in TMDL Sediment and Habitat Impairment Verification* (MT DEQ 2009) is designed to reduce bias and identify sites that are representative of the natural (physical) influences of sediment loading, transport, and deposition in contrast to sites with non-natural (anthropogenic) influence. Because the stratification of a watershed is so key to controlling bias in the resulting data, all decisions made during the stratification process will be overseen by the DEQ TMDL Project Officer.

5.0 Data Analysis, Record Keeping, and Report Requirements

A review of field data will be conducted following receipt of the field data package. All data collected as part of this SAP will be evaluated against the methods cited in Section 4.0. Data qualifiers may be assigned to data that does not appear to have followed these processes.

Following is a summary of the data qualifier codes that may be used

J - The associated numerical value is an extreme outlier to the dataset but the process appears to have been followed based on the supporting data and field notes. The use of a “J” qualifier allows the TMDL project officer to consider whether the value should be used outright, with caution, or censured from the dataset.

R – The associated numerical value is an extreme outlier to the dataset and the process appears NOT to have been followed based on the supporting data and field notes. The data are unusable; resampling and/or reanalysis are necessary if completeness goal is not met due to this data being rejected.

Summary of Data Quality

A summary discussion of data quality will be prepared following review of field documentation and data. The data quality analysis will summarize the QA/QC information from the field event, audit information, corrective actions taken (if any), and the overall results of sampling activities with respect to compliance with the provisions of this SAP. The primary focus of the data quality analysis will be an estimate of the effects that any deviations from approved procedures may have on the project objectives or data uses.

Data generated during this project will be stored on field forms and in electronic spreadsheets and summary reports. Written field notes and forms will be processed by DEQ staff following QA/QC procedures to screen for data entry errors. All approved data will be input into an electronic spreadsheet format for future analysis purposes.

6.0 Schedule for Completion

Sampling is scheduled for the summer of 2009.

7.0 Project Team Responsibilities

Banning Starr – DEQ Project Officer

Mark Bostrom – DEQ Quality Assurance Officer

Jeff Dunn – PBS&J Lead Scientist

8.0 References

MT DEQ 2008. Watershed Stratification Methodology for TMDL Sediment and Habitat Investigations. Montana Dept. of Environmental Quality.

MT DEQ 2009. Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments. Montana Dept. of Environmental Quality.

MT DEQ 2005. Water Quality Planning Bureau Field Procedures Manual for Water Quality Assessment Monitoring. Montana Dept. of Environmental Quality, WQPBWQM-020, revision 2. April 21, 2005. Available at <http://www.deq.state.mt.us/wqinfo/QAProgram/SOP%20WQPBWQM-020.pdf>

