

Lower Gallatin TMDL Planning Area Nutrient and E.coli Monitoring Sampling and Analysis Plan

***Addendum 3* September 2009**

This addendum presents sampling activity to be conducted in September 2009 in accordance with activity defined in the ***Lower Gallatin TMDL Planning Area Nutrient and E.coli Monitoring Sampling and Analysis Plan*** prepared in August of 2008. 2009 sampling activity will follow the protocols and procedures defined in the ***Lower Gallatin TMDL Planning Area Nutrient and E.coli Monitoring Sampling and Analysis Plan*** except for modifications provided below.

Significant modifications include:

- Number and location of sampling sites
- Sampling activity to be performed at each site
- Analytical Laboratories used for sample analysis

1.0 Introduction

This Sampling and Analysis Plan Addendum 3 addresses nutrient and e.coli sampling planned for selected locations in the lower Gallatin River watershed in September 2009.

2.0 Objectives and Design

The objectives of the original assessment are to:

- Quantify pathogen (*E. coli*) and nutrient concentrations throughout the lower Gallatin River watershed.
- Identify potential sources of pathogens and nutrients throughout the lower Gallatin River watershed.

2.1.4 Sampling Sites

SAP Addendum 3 includes 85 sampling sites (Table 1) within the lower Gallatin watershed (Figure 1) to be sampled in September 2009.

Table 1: 2009 Samplig sites and parameters: Lower Gallatin TMDL Planning Area						
Site	Stream	Nutrients/TSS	Ecoli	Algaephotos	Algae_full	Comment
CP05	Camp Creek	X	X			2008 site
CP03a	Camp Creek	X	X			
CP03	Camp Creek	X	X			2008 site
CP02a	Camp Creek	X	X			
CP02b	Camp Creek	X	X			
CP01	Camp Creek	X	X			2008 site
CP02	Camp Creek	X	X			2008 site
GD04	Godfrey Creek	X	X			2008 site
GD05	Godfrey Creek	X	X			2008 site
GD03a	Godfrey Creek	X	X			
GD03	Godfrey Creek	X	X	X		2008 site
GD01	Godfrey Creek	X	X	X		2008 site
GD02a	Godfrey Creek	X	X			
GD02	Godfrey Creek	X	X			2008 site
DY01	Dry Creek	X				2008 site
DY02	Dry Creek	X				2008 site
DY01b	Dry Creek	X				
DY01a	Dry Creek	X				
RS01	Reese Creek	X	X			2008 site
RS01b	Reese Creek	X	X			
RS01a	Reese Creek	X	X			
RS02	Reese Creek	X	X			2008 site
SM01	Smith Creek	X	X			2008 site
SM02	Smith Creek	X	X			2008 site
SM03	Smith Creek	X	X			2008 site
SM03a	Smith Creek	X	X			
SM04a	Smith Creek	X	X			
TH01	Thompson Creek	X		X		2008 site
TH01a	Thompson Creek	X			X	
TH02	Thompson Creek	X		X		2008 site
TH02a	Thompson Creek	X		X		
HY06	Hyalite Creek	X		X		2008 site
HY04	Hyalite Creek	X		X		2008 site
HY03	Hyalite Creek	X		X		2008 site
HY05	Hyalite Creek	X		X		2008 site
HY08	Hyalite Creek	X				2008 site
HY01	Hyalite Creek	X				2008 site
HY02	Hyalite Creek	X				2008 site
BG05	Bridger Creek	X		X		2008 site
BG04	Bridger Creek	X		X		2008 site
BG02	Bridger Creek	X		X		2008 site
BG01	Bridger Creek	X		X		2008 site
JK02a	Jackson Creek	X		X		
JK01a	Jackson Creek	X		X		
JK01b	Jackson Creek	X		X		

BR01	Bear Creek	X			X	2008 site
BR03	Bear Creek	X			X	2008 site
BR02	Bear Creek	X				2008 site
BR04	Bear Creek	X				2008 site
SD06	Sourdough Creek	X	X			2008 site
SD05a	Sourdough Creek	X	X			
SD04	Sourdough Creek	X	X	X		2008 site
SDP01	Sourdough Pipe	X	X			
SDTR01	Sourdough Trib	X	X			
SDTR02	Sourdough Trib	X	X			
SD03	Sourdough Creek	X	X			2008 site
SD03a	Sourdough Creek	X	X	X		
SDP02	Sourdough Pipe	X	X			
SDP03	Sourdough Pipe	X	X			
SDP04	Sourdough Pipe	X	X			
SD02a	Sourdough Creek	X	X			
SD01	Sourdough Creek	X	X			2008 site
SD02	Sourdough Creek	X	X			2008 site
SD05	Sourdough Creek	X	X	X		2008 site
EG01	East Gallatin River	X		X		2008 site
EG13	East Gallatin River	X			X	2008 site
GB01	Gibson Creek	X				2008 site
ET01	East Gallatin trib	X				2008 site
ST01	Story Creek	X				2008 site
EG12	East Gallatin River	X		X		2008 site
EG11	East Gallatin River	X		X		2008 site
BH01	Ben Hart Creek	X				2008 site
EG10	East Gallatin River	X			X	2008 site
EG09	East Gallatin River	X		X		2008 site
ET02	unnamed trib to Egal?	X				
EG08	East Gallatin River	X		X		2008 site
ET03	East Gallatin trib	X				
EG07a	East Gallatin River	X				
ET03a	East Gallatin trib	X				
EG07	East Gallatin River	X		X		2008 site
EG06a	East Gallatin River	X				
EG05a	East Gallatin River	X				
EG05	East Gallatin River	X			X	2008 site
EG02a	East Gallatin River	X			X	
RK01a	Rocky Creek	X				
	Totals	85	38	25	7	

3.0 Field Sampling Methods

Samples collected will be analyzed for nutrients, e.coli, chlorophyll-a and total suspended solids (TSS). Flow and field parameters will also be collected at each site as directed by the ***Lower Gallatin TMDL Planning Area Nutrient and E.coli Monitoring Sampling and Analysis Plan***. Sampling sites and analyses performed at each site are given in Table 1.

3.1 Nutrients

A suite of nutrients will be assessed at each site:

- Total Phosphorus (TP)
- Nitrate+nitrite Nitrogen (NO_2+NO_3)
- Ammonia Nitrogen (NH_4)
- Total Persulfate Nitrogen (TPN)

Field sampling methods for water column measurements of phosphorus and nitrogen will follow established DEQ protocols outlined in the Montana Department of Environmental Quality *Field Procedures Manual for Water Quality Assessment Monitoring* (MTDEQ 2005), available on the internet at: <http://www.deq.state.mt.us/wqinfo/QAProgram/SOP%20WQPBWQM-020.pdf>.

3.2 Total Suspended Solids

Total suspended solids (TSS) will be collected at each site following established DEQ protocols outlined in the Montana Department of Environmental Quality *Field Procedures Manual for Water Quality Assessment Monitoring* (MTDEQ 2005), available on the internet at: <http://www.deq.state.mt.us/wqinfo/QAProgram/SOP%20WQPBWQM-020.pdf>.

3.3 E.Coli

E.coli samples will be collected at selected sites (Table 1) following established DEQ protocols in the Montana Department of Environmental Quality SOP, *Sample Collection, Handling and Analysis of Escherichia Coli* (WQPBWQM-014), available on the internet at <http://www.deq.state.mt.us/wqinfo/QAProgram/PDF/WQPBWQM-014sign.pdf>

3.4 Chlorophyll-a/Algae

Algae will be assessed at selected sites (Table 1). Most sites will require only photo documentation of algae conditions, (algaephotos, Table 1) while other sites will require sample collection and analysis (algae_full) following DEQ protocols.

At algae photo documentation sites (algaephotos, Table 1), data collection shall consist of a series of photos that include:

- Several areas of representative stream substrate and algal conditions at the site

- Photographs of several individual rocks/pebbles showing representative algal growth
- Upstream and downstream photos
- Several landscape photos showing general characteristics of the sampling reach/site and any specific items of interest

At algae collection sites (algae_full, Table 1), data collection shall consist of photo documentation and chlorophyll-a collection following DEQ SOP, *Sample Collection and Laboratory Analysis of Chlorophyll-a* (WQPBWQM-011), available on the internet at http://www.deq.state.mt.us/wqinfo/QAProgram/PDF/SOP%20WQPBWQM-011v4_final.pdf. Where algal concentrations appear to be less than 50 mg/m2 (see appendix C), photo documentation may be conducted in lieu of chlorophyll-a sample collection.

4.0 Laboratory Analytical Methods

All water nutrient, TSS, and chlorophyll-a samples will be processed by **Energy Laboratories, Inc.** in Helena, MT. E.coli samples will be processed at **Bridger Analytical Lab** in Four Corners, MT. Table 2 provides sample collection and analysis requirements for all samples collected.

Table 2: Collection, storage and analytical methods for water quality parameters

	Parameter	Holding time	Bottle	Preservative	Storage	Analytical Method	Report Limit (ug/L)
Bottle 1	TSS	7 d	1L HDPE	none	4°C	EPA 160.2	1000
Bottle 2	Total Persulfate Nitrogen (TPN)	30 d	250ml HDPE	none	Frozen (0°C)	SM 4500-N C	50
Bottle 3	Total Phosphorus as P	28 d	500ml HDPE	H ₂ SO ₄	≤6°C	EPA 365.1	5
	Nitrate-Nitrite as N	28 d	500ml HDPE	H ₂ SO ₄	≤6°C	EPA 353.2	10
	Total Ammonia as N	28 d	500ml HDPE	H ₂ SO ₄	≤6°C	EPA 350.1	50
Bottle 4	E-coli	6 hr	100 ml HDPE	sodium thiosulfate	cool to <10°C	Idexx Quant Tray 2000	1 cfu/100 ml
	Chlorophyll-a	21 d	various	none	cool	SM 10200 H	

5.0 Quality Assurance and Quality Control Requirements

DEQ requires a minimum of 10% field duplicates and field blanks. For this SAP Addendum 3, field blanks and field duplicates will be collected at a minimum of 10%.

6.0 Data Analysis, Record Keeping, and Reporting Requirements

Data generated during this project will be stored on field forms, in laboratory reports obtained from Energy Labs, DEQ's MT-eWQX database, and EPA's Water Quality Exchange data system. Site Visit/Chain of Custody forms will be properly completed for all samples.

Details can be found on DEQ's Data Management website at:
<http://www.deq.mt.gov/wqinfo/datamgmt/index.asp>.

Written field notes, field forms, and digital photos will be processed by field staff following QA/QC procedures and the requirements set forth in the project's Scope of Work. All project forms and reports will be submitted to the DEQ Project Manager upon the completion of this project, following the Scope of Work deliverable dates.

Field data collected and data received from the water quality laboratory will be managed in spreadsheets or database tables compatible with the MT-eWQX database. Data tables will be maintained and managed in record format retaining the unaltered results and meta data recorded in the field or received in a laboratory's electronic data deliverable (EDD). After DEQ approval of the data quality summary, data from all sampling events will be entered into MT-eWQX compatible templates and provided to the DEQ Project Manager for review. Upon approval, data will be loaded into the Environmental Data Processor (EDP) for database QC review prior to data submittal to the MT-eWQX system. Data management tools (including the EDP application) and instructions for submittal to the MT-eWQX system can be found on DEQ's Data Management website noted above. Data entry will follow the requirements of the STORET/WQX Characteristic Names and Required Values for MTWTRSHD Org ID document also found at the above web site. Verification of successful data upload (i.e., copy of the MT-eWQX system generated email) will be submitted to DEQ. Further questions regarding data management or data upload shall be directed to the DEQ's TMDL Project Manager.

7.0 Schedule for Completion

Sampling described within this Sampling and Analysis Plan Addendum 3 is scheduled to be performed in September 2009.

Figure 1: Sampling Sites : LGTPA SAP Addendum 3

