DRAFT: ASHLEY CREEK INSTREAM LAKE CORE SAMPLING - 2015

Sampling and Analysis Plan

Prepared for:

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Water Quality Monitoring and Assessment and Water Quality Management Sections, Water Quality Planning Bureau
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1.0 INTRODUCTION AND BACKGROUND INFORMATION

This project is to support source assessment already done as part of the Flathead-Stillwater TMDL Planning Area (TPA) document (DEQ and EPA 2014). The focus of this project will be on collecting sediment cores from the lakes within Ashley Creek downstream of Ashley Lake to be analyzed for diatom species composition. Based on the diatom species present we may be able to determine whether there may have been a historical human-caused pulse of nutrients in Ashley Creek (*sensu* Hausmann and Pienitz 2009). The outcome of this project (i.e., the determination that the nutrient loading measured today is either natural or the result of historical land use) will be considered when deciding if Ashley Creek-specific nutrient standards will be developed.

Ashley Creek is located in Flathead County, Montana. It is in the *Flathead Lake* (*17010208)* 4th level Hydrologic Unit Code (HUC), and is located within the Northern Rockies Level III Ecoregion (**Figure 1-1**). The Ashley Creek watershed is 325 mi^2 (841 km^2) in size, and Ashley Creek is 43 miles (69 kilometers) in length. The stream is divided into three water quality assessment units. From Ashley Lake to Smith Lake is defined as Montana water quality assessment unit MT76O002_010 (upper Ashley Creek), from Smith Lake to the Kalispell Airport Road as MT76O002_020 (middle Ashley Creek), and from Kalispell Airport Road to the mouth as MT76O0020_030. Upper Ashley Creek had total nitrogen as a nutrient probable cause on the 2014 303(d) list. A TMDL for this pollutant was written in 2014 (DEQ and EPA 2014).Sampling described in this sampling and analysis plan will occur in this upper segment and Smith Lake below the segment. The Ashley Creek watershed has been extensively logged and much of the land near Ashley Creek used for grazing. It is possible that heavy silviculture and agriculture activities in the past resulted in nutrient levels higher than those observed today. The analysis for this project will serve to augment the results of previous water quality modeling in the Ashley Creek watershed and of additional water quality data collection occurring in 2015 (DEQ 2015) by providing a description of historical nutrient loading conditions in the watershed.

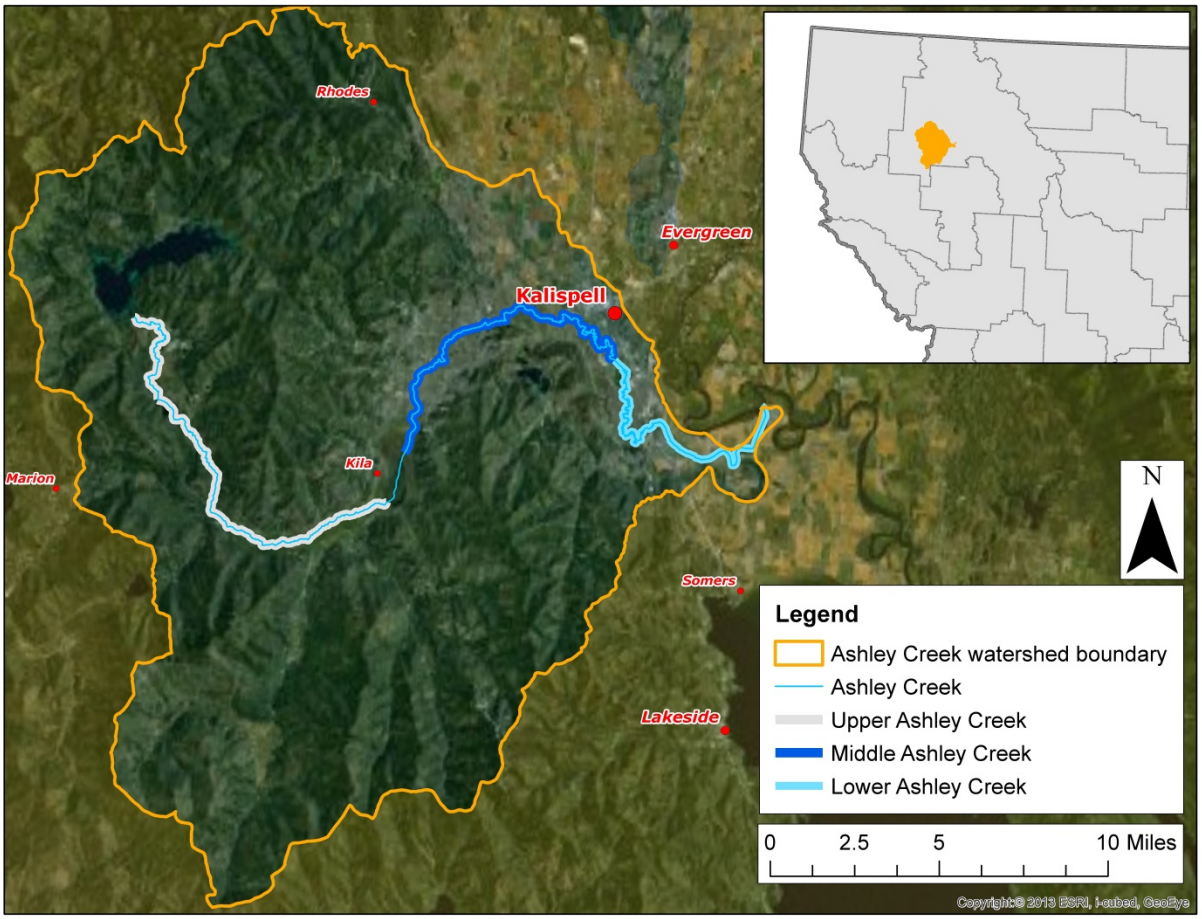

Figure 1-1. Location Map of Ashley Creek

2.0 Objectives and Design of the Investigation

2.1 Project Objectives

The objectives of this project are as follows:

- Examine changes in diatom community over the last 100 or more years
- Gain further insight into the Smith Lake "wetland complex" source in the current Ashley Creek Loading Simulation Program in C++ (LSPC) model
- Provide data that will help refine the Ashley Creek portion of the Flathead Lake LSPC model and provide better overall loading estimates to Flathead Lake

The specific data collection goals for this field work are:

- Collect sediment cores from the lakes within Ashley Creek downstream of Ashley Lake that can be examined for diatom species composition

2.2 Sampling Timeframe

The sediment core sampling will be done between July 1 and September 30, 2015 during already scheduled nutrients sampling trips. The cores could be collected on one trip or could be collected over

multiple trips as time and conditions allow. If the core sampling does not occur during 2015, it could occur in 2016.

3.0 FIELD SAMPLING METHODS

3.1 SELECTION OF SITES

Table 3-1 lists the monitoring sites to be sampled during the field effort, and **Figure 3-1** shows the location of each site. Time, weather, and other accessibility factors may dictate dropping some sites from the list or moving site locations while in the field. The sites were chosen because they will provide meaningful data for the project. All of the sites are new and the final sampling location and whether sampling can take place will be contingent upon gaining landowner permission to access sites.

Table 3-1. Monitoring site names and locations

Site ID	AUID	Site Name	Latitude	Longitude	Rationale
tbd	MT76O002_010[1]	Lone Lake Center	48.14261	-114.59154	Collect sediment cores
tbd	MT76O002_010[1]	Lake Monroe Center	48.12911	-114.57304	Collect sediment cores
tbd	None	Smith Lake Center	48.11721	-114.44372	Collect sediment cores

[1] The lake is part of the upper Ashley Creek segment

Note: tbd – to be determined

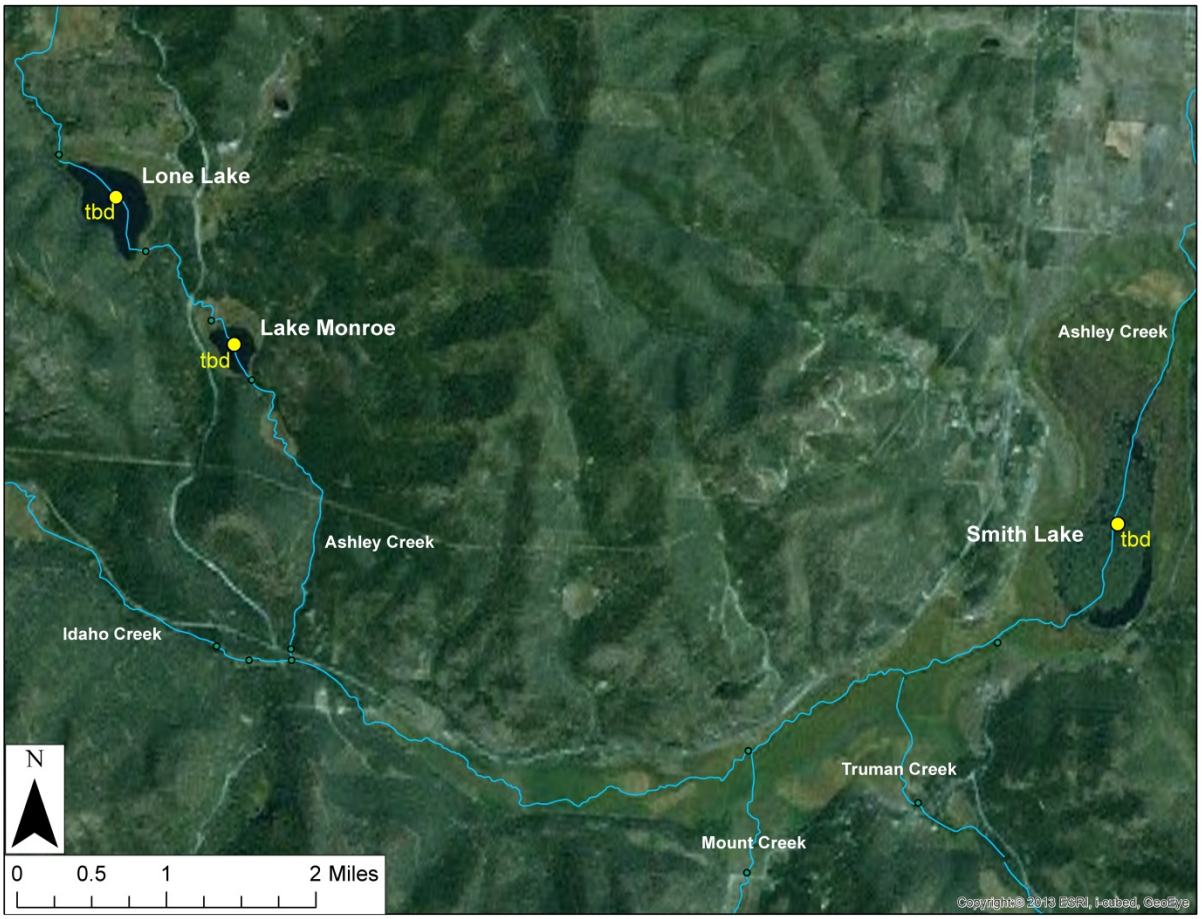

Figure 3-1. Proposed Sampling Locations for Field Effort

3.2 CORE SAMPLES

The methods for core sampling will be similar to Hausmann *et al*. (2011). Two sediment cores will be collected near the center of each lake using a gravity corer. After the cores are brought to the surface, each end will be plugged and the cores will be stored upright in a cooler. After the cores are brought to shore they will be extruded from the core tube top first. As the core is extruded, it will be sliced into 1 cm subsamples using a three inch-wide paint scraper. Each subsample will be placed in a petri-dish (**Table 3-2**) that is labeled based on the distance from the surface of the sediment sample (i.e., the top of the sample will be labeled 0-1 cm). The petri-dishes will then be taped shut and placed in plastic zip lock bags that are placed on ice in a cooler. Samples will be placed in a refrigerator at the Water Shed in Helena for long-term storage.

Table 3-2. Sampling Volumes, Containers, Preservation, and Holding Times

Analyte	Bottle Size	Container	Preservation	Storage	Holding time
Diatom frustules	75 x 15 mm	Petri-dish	None	On ice then in refrigerator	One year
Carbon 14 dating	75 x 15 mm	Petri-dish	None	On ice then in refrigerator	One year

3. 3 DIGITAL PHOTOGRAPHS

Digital photographs will be taken of each core from each site. The photo number will be recorded along with the location identifier and a description.

4.0 SAMPLE HANDLING PROCEDURES

Field samples will be collected and preserved in accordance with **Section 3**. DEQ personnel will be responsible for proper labeling, sample custody documentation and storage in accordance with the specifications in the Field Procedures Manual (DEQ 2012). Samples will be delivered to the appropriate laboratory for analysis once the specific laboratory has been selected.

5.0 LABORATORY ANALYTICAL MEASUREMENTS

At this time, the specific analytical measurements have not been decided. It is likely that samples will undergo testing for carbon 14 to date the core subsamples and will be examined for diatom frustules with species identification. If other analytical measures are required, an addendum or modifications will be made to the SAP.

5.1 DATA ANALYSIS

The core samples will be examined for evidence of historical elevated nutrient loading. Evidence of this includes the presence of nutrient-tolerant diatom frustules. If any changes in diatom community are identified, the core samples will be used in conjunction with the carbon 14 dating to estimate when any excess loading occurred. The results of this study will be integrated into the LSPC model for Ashley Creek and will help inform department managers decide whether site-specific nutrient standards for Ashley Creek should be developed.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

All QA/QC requirements followed by MT DEQ "internal process" will be instituted for this project DEQ (2005). Specific procedures that will be implemented include collecting a duplicate core sample at each site.

7.0 HANDLING SAMPLING RECORDS

Site Visit Forms, field forms, and digital photos will be processed by WQPB staff using QA/QC procedures described in procedures as indicated in DEQ (2005, 2012). Analytical laboratories will provide results to DEQ in their typical format. DEQ will perform the necessary data evaluations on results and will manage the data in accordance with DEQ (2005). The spatial location will be recorded in geographic coordinates (in decimal degrees) using the NAD 1983 datum.

8.0 SCHEDULE

All work will be done between July 1 and September 30, 2015. This sampling is likely to occur as part of nutrient and flow sampling that is planned for Ashley Creek. The cores may be sampled on one trip or over multiple trips; however, both cores for a given site will be collected in succession on the same trip. Samples will be delivered to the appropriate laboratory after one is selected and funding for analysis is procured. Because the sampling for this project is opportunistic, the overall cost of the project is reduced. Although the funding for sample analysis has not yet been procured, the long shelf-life of the samples (i.e., the frustules are made of silica and should not degrade if properly stored) means there is a low risk of the samples being unsuitable for analysis.

9.0 PROJECT TEAM AND RESPONSIBILITIES

The Watershed Management and Water Quality Monitoring and Assessment Sections will conduct this project. Paul Kusnierz will lead the field effort with potential assistance from other Water Quality Planning Bureau staff member and volunteers. The Water Quality Monitoring and Assessment Section will provide technical assistance with equipment and delivery of samples.

10.0 REFERENCES

DEQ (Montana Department of Environmental Quality). 2005. Quality Assurance Project Plan (QAPP) Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005. *Available at: http://www.deq.state.mt.us/wqinfo/QAProgram/PDF/SOPs/WQPBQAP-02.pdf*.

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