

Lewis & Clark County Water Quality Protection District

2020 Streamflow Monitoring Plan



Prepared by:

Peter Schade, Hydrologist
Lewis & Clark County Water Quality Protection District
03/19/2020

1.0 Introduction

The purpose of this Monitoring Plan is to document surface water monitoring activity conducted by the Lewis & Clark County Water Quality Protection District (WQPD) in 2020 on several streams within the Lake Helena watershed. Streams to be monitored include: Prickly Pear Creek, Tenmile Creek, Sevenmile Creek, and Silver Creek.

1.1 Project Area Overview

The Lake Helena watershed is located in west-central Montana in Lewis & Clark and Jefferson Counties. Helena, Montana's capitol city lies near the center of the watershed (Figure 1). The Lake Helena watershed is part of the Upper Missouri Watershed (USGS 8-digit hydrologic cataloging unit number 10030101).

1.2 Project Goals

The primary goal of this sampling plan is to document streamflow conditions in several streams in the project area: Prickly Pear Creek, Tenmile Creek, Sevenmile Creek, and Silver Creek. Previous data collection efforts by DEQ, EPA and WQPD have documented water quality and flow conditions in these and other streams in the Lake Helena watershed. The results of this and past data collection efforts will assist in not only establishing long-term monitoring datasets for the area, but will also inform evaluation of groundwater recharge to the Helena Valley aquifer from surface waters. Flow data collected under this monitoring plan is also used in support of ongoing WQPD projects and investigations such as the Prickly Pear Creek Rewatering Project and annual Tenmile Creek flood monitoring investigations.

2.0 Study Design

Monitoring activity consists of collecting manual discharge measurements and field measurements at several locations on the following streams: Prickly Pear Creek, Tenmile Creek, Sevenmile Creek, McClellan Creek and Silver Creek (Table 1, Figure 1).

2.1 Streamflow Monitoring

Streamflow monitoring will consist of measuring stream stage using data loggers - both Onset and Tru-Track stage monitoring instrumentation will be used. Data loggers record continual stage (water height) at pre-selected time intervals throughout the monitoring season (May-October). Data loggers are attached to vertical steel stakes driven into the stream channel (Figure 2). In order to associate the stage measurements collected by the data loggers to stream discharge in cubic-feet/second (CFS), manual flow measurements at a variety of different stages must be collected. Discharge measurements provide the basis of development of a rating curve, which allows correlation of stage with discharge (Figure 3). Table 1 provides station locations where data loggers will be installed and manual flow measurements taken.

Monitoring activity will consist of installing the data logger devices and an accompanying staff gauge at each monitoring station, and then collecting several manual flow measurements at different stages using a Marsh McBirney Flow Meter or OTT MF Pro Flow Meter. At the end of each monitoring season, data from the loggers is downloaded to a computer and seasonal flow rating curves for each station are developed.

In addition to manually measured streamflow as described above, the WQPD is partnering with the Montana Department of Natural Resources and Conservation (DNRC) to measure high flows on Sevenmile Creek near station 7M-1. To achieve this, a wire-weight wheel is being installed on the bridge where Birdseye Rd crosses Sevenmile Creek. In the spring of 2020, WQPD will coordinate with staff at the DNRC to measure high flow

discharge as needed using an acoustic doppler current profiler, and to measure stream stage with the bridge-mounted wire-weight wheel.

Streamflow measurement methodology follows procedures established in *Montana DEQ Water Quality Planning Bureau Field Procedures Manual for Water Quality Assessment Monitoring* (pp32-33).

<http://deq.mt.gov/Portals/112/Water/WQPB/QAProgram/Documents/PDF/SOPs/WQPBWQM-020.pdf>

2.2 Field Parameter Measurements

Field parameters will be collected at each station using a YSI Pro Plus multimeter. Field parameters include air temperature, water temperature, specific conductivity, dissolved oxygen concentration, dissolved oxygen saturation and pH. Field parameter measurement methodology follows procedures established in *Montana DEQ Water Quality Planning Bureau Field Procedures Manual for Water Quality Assessment Monitoring*

2.3 Field Forms

See Appendix A for the following Field Forms:

- Discharge/Flow Measurement Form
- Field Water Quality Measurement Form

3.0 Project Team and Data Management

3.1 Project Team and Responsibilities

Person	Role	Affiliation	Responsibilities
Lewis and Clark County Water Quality Protection District (WQPD)			
Peter Schade	Monitoring Project Manager/Coordinator	WQPD	Develop Monitoring Plan Obtain access agreements Maintain equipment Build and install flow monitoring stations Review data and conduct QA/QC Manage data Conduct flow measurements
Valerie Stacey	Field Technician	WQPD	Conduct flow measurements Data entry/data management Maintain equipment

3.2 Data Management and Reporting

Data collected will be managed by the Lewis & Clark County Water Quality Protection District, and maintained in spreadsheets, hardcopy field sheets and .pdf files. All data is available to the public, government agencies and non-government organizations by written request.

Raw data files include:

- Field data sheets of streamflow measurements
- Field data sheets of field parameter measurements

In addition to raw data files, the WQPD maintains electronic Excel spreadsheets of all streamflow data, field parameter measurements, and laboratory water quality results.

There are no statutory reporting requirements for this data. Data is reported to DEQ for use in the State's biennial Water Quality Integrated Report to the EPA. Additionally, data is reported in the WQPD's Prickly Pear Creek Re-Watering Project annual report.

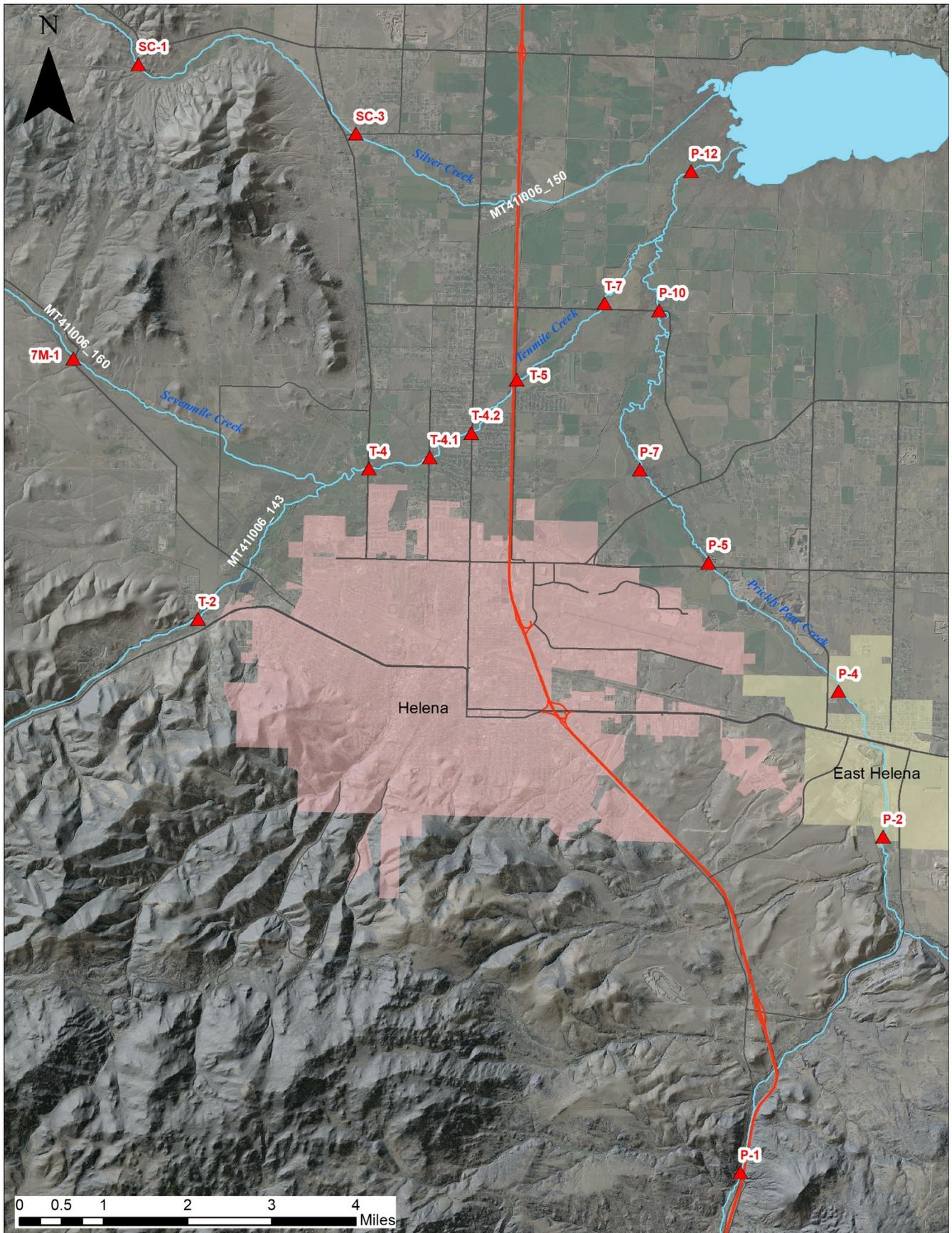


Figure 1: 2020 Monitoring Station Map

Table 1: 2020 Streamflow Monitoring Stations

Station ID	Waterbody	Station Name	Field Parameters	Flow Monitoring
7M-1	Sevenmile Creek	Sevenmile Creek at Birdseye Rd crossing	X	X
P-1	Prickly Pear Creek	Prickly Pear Creek at Frontage Rd crossing in Jefferson county	Z	Z
P-2	Prickly Pear Creek	Prickly Pear Creek downstream of McClellan Creek	X	X
P-4	Prickly Pear Creek	Prickly Pear Creek at Wylie Drive	X	X
P-5	Prickly Pear Creek	Prickly Pear Creek at Canyon Ferry Road crossing	X	X
P-7	Prickly Pear Creek	Prickly Pear Creek at FAS d/s of York Rd crossing	X	X
P-10	Prickly Pear Creek	Prickly Pear Creek at Sierra Road	X	X
P-12	Prickly Pear Creek	Prickly Pear Creek near mouth	X	X
SC-1	Silver Creek	Silver Creek upstream of Silver Creek Rd crossing	X	X
SC-3	Silver Creek	Silver Creek at John G Mine Rd crossing	X	X
T-2	Tenmile Creek	Tenmile Creek at Williams Street crossing	Z	Z
T-4	Tenmile Creek	Tenmile Creek at Green Meadow Drive crossing	X	X
T-4.1	Tenmile Creek	Tenmile Creek at McHugh Drive crossing	X	X
T-4.2	Tenmile Creek	Tenmile Creek at North Montana Ave crossing	X	X
T-5	Tenmile Creek	Tenmile Creek at Frontage Road crossing	X	X
T-7	Tenmile Creek	Tenmile Creek downstream from Sierra Road crossing	X	X
<p><i>X: Data Loggers will be installed at this station. Field parameters will be measured periodically through the season.</i> <i>Z: Station is located near an established USGS flow monitoring station. No additional flow data will be collected by WQPD.</i></p>				



Figure 2: Example Flow-Monitoring Station

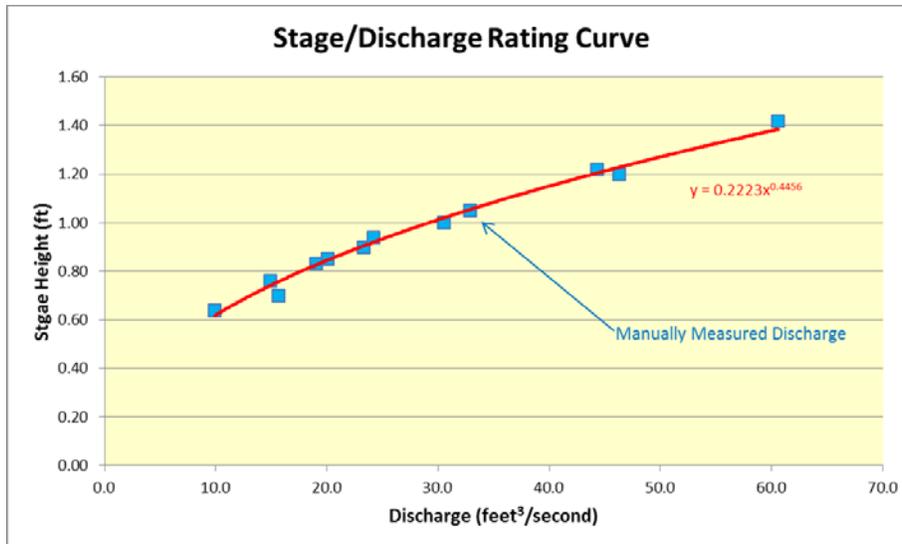


Figure 3: Example Flow-Rating Curve

APPENDIX A – Field Forms

- Discharge Measurement form
- Water Quality Field Measurement form

Station: _____

Date: _____

Water Quality Field Measurements

meter: YSI ProPlus _____ YSI 63 _____

Air Temp	(C/F)	
Water Temp	(C/F)	
DO saturation	(%)	
DO concentration	(mg/l)	
SPC	(uS/cm)	
C	(uS/cm)	
TDS	(mg/l)	
SAL	(ppt)	
pH	(su)	
Staff Gauge	(ft)	

Notes: