

**Sampling Analysis Plan
For Spanish Valley Moab Area Watershed Partnership Monitoring
Published January 16, 2021**

1. Monitoring Goals and Objectives

The goal of this SAP is to document the overall monitoring plan for Spanish Valley, Utah and provide clear documentation for how the Watershed Coordinator will provide assistance monitoring.

Monitoring objectives for this project are related to the UDWQ and Watershed Coordinator roles of monitoring water quality for assessment and long term data collection related to TMDLs.

Specific Objectives:

- Monitor seven stations for total coliform and in E. coli streams monthly from May through October to assess whether recreation and drinking source beneficial uses are met as part of the UDWQ’s Waterborne Pathogen Monitoring Program. Repeat sampling will be collected if necessary. Flow will also be measured when E. coli samples are collected
- Monitor seven stations for field parameters temperature, pH, dissolved oxygen, percent saturation and specific conductance to establish baseline conditions and track watershed improvement as part of the identified TMDL
- Monitor and service six stations for continuous (every 15 minutes) temperature and pressure data. Flow will be measured at those sites as needed.

2. Background & Project Area Description

This project is taking place in the Spanish Valley surrounding Moab, UT. The two main streams are Pack and Mill Creek. The creeks start in the La Sal Mountains and flow through city of Moab before Pack Creek joins Mill Creek. Mill Creek empties directly into the Colorado River.

Assessment Unit Name	Assessment Unit UDWQ Id	Beneficial Uses	2016 Assessment	TMDL
Mill Creek – 1	14030005-005	1C, 2A, 3A, 4	Impaired 2A E. coli; 3A Temp, dissolved oxygen,	Yes TMDL for Temperature, required for E. coli
Pack Creek	14030005-011	1C, 2A, 3A, 4	Impaired 2A E. coli; 3A Selenium & Temp; 4 TDS	Yes for Temperature-Linked in with Mill Creek

				TMDL <u>required for</u> <u>other</u> <u>parameters</u>
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Impairments were initially detected in 1997 and the DWQ has developed an approved TMDL for temperature in Mill Creek and TDS in Pack Creek. The area has a Watershed Coordinator (WC) and a watershed group “[Moab Area Watershed Partnership](#)”

3. Watershed Coordinator Role

The Watershed Coordinator will help with water quality sampling. Specifically, he/she will collect will measure several field parameters using calibrated field probes (temperature, pH, etc.), and also will collect an *E. coli* sample for IDEXX testing. The Watershed Coordinator will also service the continuous monitoring (deploying, checking, and downloading the probe). The Watershed Coordinator will record and enter all data in the appropriate locations. If the volunteer needs more supplies they will either procure them from a certified source or contact the UDWQ Monitoring program in time to ensure delivery of supplies before the next scheduled sampling event. The Watershed Coordinator will also share photos, stories, and potential problems with appropriate UDWQ and other agencies staff.

4. Sampling Locations are shown below in Table 2.

DWQ Assessment Unit Name / Stream Name	AWMQS Monitoring ID	Description	Latitude Longitude
Mill Creek -1 / Mill Creek Grand County	4956360	Mill Creek bl Confluence w/ Pack Ck at 500 West	38°34'19.936"N 109°33'39.422"W
Mill Creek -1 / Mill Creek Grand County	4956390	Mill Creek @ HWY 191 Xing	38°34'16.436"N 109°33'2.922"W
Mill Creek -1 / Mill Creek Grand County	4956393	Mill CK at Mill Creek Drive Xing	38°33'49.183"N 109°32'0.360"W
Mill Creek -1 / Mill Creek Grand County	4956395	Mill Creek bl Power Dam (EMAP)	38°33'40.509"N 109°31'19.604"W
Mill Creek -1 / Mill Creek Grand County	4956410	North Fork Mill Creek ab cnfl Mill Creek	38°33'50.937"N 109°30'23.420"W
Mill Creek -1 / Mill Creek Grand County	4956430	Mill Creek ab cnfl/ N Fk Mill Creek	38°33'45.937"N 109°30'27.420"W
Mill Creek -1 / Mill Creek Grand County	4956437	Mill Creek 1 mi ab Spring Canyon	38°31'53.66"N 109°27'34.40"W
Pack Creek / Pack Creek	4956455	Pack Creek ab cnfl Mill Ck @ west end of 200 S	38°34'12.858"N 109°33'14.731"W
Pack Creek / Pack Creek	4956510	Pack Creek at Pack Creek Campground	38°32'52.740"N 109°30'44.850"W

Pack Creek / Pack Creek	4956530	Pack Creek at Spanish Trail Drive Xing	38°32'3.439"N 109°29'36.619"W
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5. Sample Parameters

Field Parameters: Temperature, pH, Conductivity, Salinity, Dissolved Oxygen, and Percent Saturation. Flows are measured when E. coli is collected.

Biological Parameters: Total Coliforms and E. coli

Continuous monitoring: Pressure Transducers (Pressure Transducers also measure temperature concurrently). Flows are determined as needed to develop flow curve.

Table 3: Monitoring activities at sampling locations		
DWQ Assessment Unit Name / Stream Name	AWMQS Monitoring ID	Monitoring Parameters
Mill Creek -1 / Mill Creek bl Confluence w/ Pack Ck at 500 West	4956360	Field Parameters Biological Parameters
Mill Creek -1 / Mill Creek @ HWY 191 Xing	4956390	Field Parameters Biological Parameters Continuous Monitoring
Mill Creek -1 / Mill CK at Mill Creek Drive Xing	4956393	Field Parameters Biological Parameters
Mill Creek -1 / Mill Creek bl Power Dam (EMAP)	4956395	Field Parameters Biological Parameters
Mill Creek -1 / North Fork Mill Creek ab cnfl Mill Creek	4956410	Continuous Monitoring
Mill Creek -1 / Mill Creek ab cnfl/ N Fk Mill Creek	4956430	Continuous Monitoring
Mill Creek -1 / Mill Creek 1 mi ab Spring Canyon	4956437	Continuous Monitoring
Pack Creek / Pack Creek ab cnfl Mill Ck @ west end of 200	4956455	Field Parameters Biological Parameters Continuous monitoring
Pack Creek / Pack Creek at Pack Creek Campground	4956510	Field Parameters Biological Parameters
Pack Creek / Pack Creek at Spanish Trail Drive Xing	4956530	Field Parameters Biological Parameters Continuous monitoring

6. Sampling Frequency

Table 4: Sampling frequencies for all parameters			
Parameters	Responsible Party	Frequency	Timeline
Field Parameters	Watershed Coordinator (WC)	Once a month	December 2013 – Present
Biological Parameters	WC	monthly May – October	December 2013 – Present
Continuous monitoring	WC	Collecting data every 15 min.	December 2013 – Present

7. Methodologies

The Watershed Coordinator has and will attend a training where he/she are instructed on proper techniques for sampling. Please refer to the UDWQ SOPs if additional review is needed.

The UDWQ SOPs are managed by UDWQ staff. For latest versions visit [their website or contact their staff](#). The WC will be provided with a hard copy of the current SOPs at the time of this document's creation.

UDWQ *E.coli* field sampling and processing SOPs
 UDWQ Pressure Transducer SOP
 UDWQ's Field Parameter sampling SOP

8. Field Equipment

Field Parameters:

UWW Datasheet (Appendix)
 Notebook
 Pencil
[Oakton PCS 35 Testr](#)
[In-Situ SmarTroll](#)
 Calibration Solutions for pH (4, 7, & 10) and conductivity (1413 µs/cm)

Biological Parameters:

UDWQ *E.coli* Datasheet
 Sterile *E.coli* sample bottles
 Marker
 Cooler with wet ice
 Thermometer

Continuous Monitoring:

[Rugged TROLL 100 Pressure Transducer](#)
 Supplies to install and secure probes in the stream
 UDWQ Continuous Monitoring Data Sheet

9. Health & Safety

Safety is a primary concern at all times and in all sampling situations for field personal. All monitors are trained to minimize risk and sample in a safe manner. In any marginal or questionable situation, monitoring personnel (samplers) are required to assume worst case conditions and use safety precautions and equipment appropriate to that situation. Samplers who encounter conditions which in their best professional judgment may exceed the protection of their safety equipment (PFD, waders, boat, etc.) or may in any way represent a potential hazard to human health (high water levels, ice, etc.) and safety should immediately leave the area and sample at another safer time.

There should be a minimum of one sampling personnel present in the field. Samplers will wash hands and arms thoroughly with bacterial soap after sampling, before eating and drinking and at the end of the sampling run.

Before heading out to sample, samplers will inform a family member or friend when they are leaving for the field and their estimated time of return. Samplers are strongly encouraged to carry a cell phone. In case of emergency call 911.

General safety steps should be followed when on site. Wearing proper equipment (proper shoes or waders, PFD, etc.) and bringing a first aid kit is essential. Identify potential hazards (steep cliffs, barbed wire, broken glass, etc.) both on land and in the water. Follow the general standard that water flows above 1 cfs or that are deeper than knee depth can be hazardous.

10. QAQC

All monitors have attended a training where they were instructed on proper techniques for sampling. Please refer to the UTDWQ SOPs if additional review is needed.

Parameter	QC Check	Frequency	Acceptable Range	Correction Actions
<i>E. coli</i>	8 hour holding time; Replicates at 10 % of sites or 1 per trip if less than 10 sites. 1 Field Blank per trip	Each sampling trip	NA	Audit and train
pH	Standard Reference Material	Within 24 hours prior to sampling	± 10%	Repeat field check; if not correct return meter to manufacturer for repair

Temperature	Annual calibration against NIST thermometer	Annually	On the calibration mark	Repeat measurement with different thermometer; if not correct return meter to manufacturer for repair
Conductivity	Standard Reference Material	Within 24 hours prior to sampling	± 10% of standard	Repeat field check; if not correct return meter to manufacturer for repair

Data entry QAQC – Watershed Coordinator will double check data when they enter data on-line or submit to UDWQ. The database also has internal quality control for extreme values and data entry limitations. All data submitted to UDWQ is examined by UDWQ staff with a QAQC checker to examine high values and data entry errors.

11. Data Documentation and Storage

Field Parameters: The Watershed Coordinator volunteer will record all field data on the datasheet. The Watershed Coordinator will submit the electronic data to UDWQ as requested by UDWQ. The original field datasheets will be stored with the local watershed coordinator who can provide copies to UDWQ if needed. The WC will be provided with a filing system to store all data sheets, SOPs, and SAPs in a clearly identifiable location. Coliform data will be sent electronically by the WC to UDWQ for entry into the AQWMS data base. The WC will also maintain hard copies of bench sheets for three years after analysis.

Continuous temperature probe and pressure transducer data will be maintained by the WC.

12. Decontamination

All monitors are educated about the importance of proper decontamination to prevent the spread of aquatic invasive species. This is especially important for volunteers who travel to different watersheds or lakes.

The WC follows the Utah Division of Wildlife Resources recommended strategy of cleaning, draining, and drying all equipment. For further instructions visit the State of Utah's [decontamination webpage](#).

13. Participants

Name	Role	Email	Phone
Arne Hultquist	Watershed Coordinator	arnehultquist@gmail.com	435-259-7558
Lucy Parham	DWQ Scientist	lparham@utah.gov	801-536-4331
Ann Marie Aubry	BLM Hydrologist	aaubry@blm.gov	435-259-2173

APPENDIX

MAWP Stream Data Sheet

Certified Monitor Name(s) _____

Site Name _____

Mon Loc ID _____

Sample Date _____

Sample Time ____:____ (HH:MM 24 Hour)

Field Observations:

_____ **Flow** 1 – No flow 2 – Low 3 – Normal / Baseflow 4 – High / Runoff 5 – Flood

_____ **Water Surface** 1 – Clear 2 – Scummy 3 – Foamy 4 – Natural debris 5 – Trash 6 – Sheen/Oily

_____ **Water Clarity** 1 – Clear 2 – Cloudy/Milky 3 – Turbid

_____ **Water Color** ___ Normal ___ Abnormal 1– Clear 2– Brownish 3– Greenish 4– Reddish 5– Blue 6– Orange

_____ **Water Odor** 1 – None 2 – Oil 3 – Sewage 4 – Rotten Egg 5 – Fishy 6 – Musky 7 - Chlorine

_____ **Algae Cover** 1- Rare 2- Moderate substrate layer 3- Thick substrate layer 4- Little filamentous 5- Abundant filamentous

_____ **Dead Fish** 1 – None 2 – 1 to 3 3 – 4 to 10 4 - >10

_____ **Present Weather** 1–Clear 2 – Cloudy 3 – Overcast 4 – Light Rain 5 – Heavy Rain 6– Snow

_____ **Past 24Hr Weather** 1–Clear 2 – Cloudy 3 – Overcast 4 – Light Rain 5 – Heavy Rain 6– Snow

_____ **Inches of rainfall** accumulation in past 72 Hrs

Comments: _____

IDEXX *E.coli* Sample Collected: YES NO

Sampling

Location ___ Side ___ Center

Habitat ___ Riffle ___ Run ___ Pool

Meter Calibration Log: Store and calibrate standard at room temperature.			
Calibrated within 24 hours of sampling?		Yes	No
Parameter Type	Standard Value	Date	Time
Conductivity	1413		
pH	4.01		
pH	7.00		
pH	10.01		

_____ **Air Temperature** (°C)

_____ **Water Temperature** (°C)

_____ **pH**

_____ **Conductivity** (µS/cm)

_____ **TDS** (ppm)

_____ **Salinity** (ppm)

Turbidity > / = (circle one)

_____ **Turbidity Tube** (cm)

Total Depth _____ (cm)

_____ **Hours sampling and traveling**

_____ **Miles traveled (roundtrip)**

_____ **# of participants**

_____ **Decontamination**

UDWQ Pressure Transducers Continuous Monitoring Form

Utah DWQ, May 2011

**Utah DWQ Pressure Transducers
Installation, Inspection and Maintenance Form**

Site Name: _____ STORET: _____
 Latitude: _____ Longitude: _____
 Site Description: _____
 Pressure Transducer Make/Model/Serial Number: _____
 Pressure Transducer Factory Calibration Date: _____ Installation/Deployment Date: _____
 Installation Personnel: _____
 Notes from Installation: _____

Date	Monitor Initials	Visual Inspection Performed (Y or N)	Visual Inspection Okay (Y or N)	Data Retrieval Performed (Y or N)	Battery Life Remaining	Memory Remaining	Maintenance Performed (Y or N)	Flow Measurement Performed (Y or N)	Equipment Condition, Comments, Describe Maintenance