

Sample and Analysis Plan for Castle Valley Utah Water Watch Volunteer Monitoring Published January 1, 2015

1. Monitoring Goals and Objectives

The goal of this Sample and Analysis Plan (SAP) is to document the overall monitoring plan and provide clear documentation for how Utah Water Watch volunteers 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 total coliform and *E. coli* in streams to assess whether recreation and drinking source beneficial uses are met as part of the UDWQ's coliform monitoring program.
- Monitor temperature and total dissolved solids (TDS) to establish baseline conditions and track watershed improvement as part of the identified TMDL.

2. Background & Project Area Description

This project takes place along Castle Creek which flows through the town of Castle Valley. Castle Creek has its headwaters in the La Sal Mountains on USFS land and flows through the rural residential community of Castle Valley before it empties directly into the Colorado River.

Name	Assessment Unit	Beneficial Uses	2010 Assessment	TMDL
Castle Creek – 1	14030005-009	1C, 2A, 3B, 4	Impaired for 3B: Benthic Macroinvertebrate	Required, but not yet created
Castle Creek – 2	14030005-012	1C, 2A, 3B, 4	Not impaired; not all assessed	None

The area has a watershed coordinator and is part of the watershed group "[Moab Area Watershed Partnership](#)"

3. UWW volunteer role

The UWW volunteer will help with water quality sampling. The volunteer will serve as additional help for the watershed coordinator to monitor their many water bodies. Specifically, they will collect qualitative data about the site (water clarity, water color, number of dead fish, etc.), will measure several field parameters using calibrated field probes (temperature, TDS, pH, etc.), and they will collect an *E. coli* sample for IDEXX testing. The volunteers will also assist the WC with the continuous monitoring (deploying, checking, and downloading the probe). The volunteer will work with the local WC to schedule times for sampling. UWW volunteer will record and enter all data in the appropriate locations. If the volunteer needs more supplies they will contact the UWW program coordinator in time to ensure delivery of supplies before the

next scheduled sampling event. UWW volunteers will also share photos, stories, and potential problems with the local WC and UWW program coordinator.

4. Sampling Locations

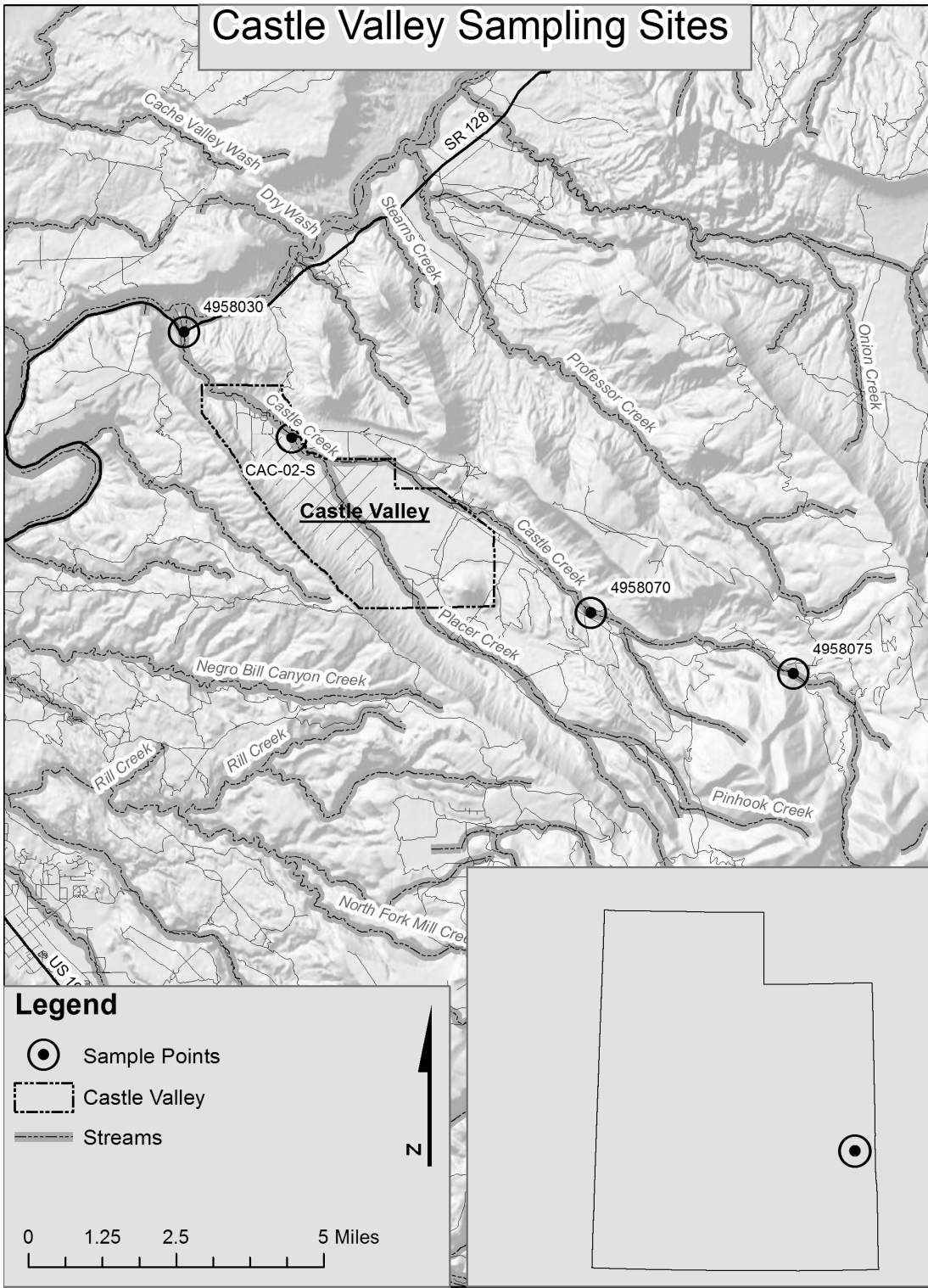


Figure 1. 2014 Monitoring Sites for Castle Valley. Visit the [UWW Map](#) for an interactive map.

DWQ Assessment Unit Name / UWW Stream Name	AWMQS Monitoring ID	UWW ID	Description	Latitude Longitude
Castle Creek -1 / Castle Creek	4958030	CAC-01-S	Castle Creek at U128 Xing	38°40'38.936"N 109°26'57.423"W
Castle Creek -1 / Castle Creek	4958088	CAC-02-S	Castle Creek ab Diversion in town	38°38'59.78"N 109°24'53.39"W
Castle Creek -1 / Castle Creek	4958070	CAC-03-S	Castle Valley Creek @ Castleton	38°36'23.946"N 109°19'23.417"W
Castle Creek -2 / Castle Creek	4958075	CAC-04-S	Castle Ck ab USFS Rd Xing to CO	38°35'25.950"N 109°15'36.415"W

5. Sample Parameters

Qualitative Parameters: UWW Field Observations – Observed Flow, Water Surface, Water Clarity, Water Color, Water Odor, Visual Algae Cover, # of Dead Fish, Present Weather, Past 24 HR weather, Estimated Inches of Rain fall in past 72 hours, Comments

Field Parameters: Temperature, pH, Conductivity, Salinity, & TDS; Turbidity & Total Depth;

Biological Parameters: Coliforms and *E. coli*

Continuous monitoring: Pressure Transducers (Pressure Transducers also measure temperature concurrently)

DWQ Assessment Unit Name / UWW Stream Name	AWMQS Monitoring ID	UWW ID	Monitoring
Castle Creek -1 / Castle Creek	4958030	CAC-01-S	Qualitative parameters Field Parameters Biological Parameters (USGS has a continuous gauging station at this location)
Castle Creek -1 / Castle Creek	4958088	CAC-02-S	Qualitative parameters Field Parameters Biological Parameters
Castle Creek -1 / Castle Creek	4958070	CAC-03-S	Qualitative parameters Field Parameters Biological Parameters Continuous monitoring: Pressure Transducer
Castle Creek -2 / Castle Creek	4958075	CAC-04-S	Qualitative parameters Field Parameters Biological Parameters

6. Sampling Frequency

Parameters	Responsible Party	Frequency	Timeline
Field Observations and Field Parameters	UWW volunteer	Once a month	December 2014 – December 2015
Biological Parameters	UWW volunteer & WC	Once a month May – Sept	December 2014 – December 2015
Continuous monitoring	WC	Collecting data every 15 min.	March 2015 – March 2016

7. Methodologies

All UWW volunteers have attended a training where they were instructed on proper techniques for sampling. Please refer to the UDWQ or UWW 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. The UWW SOPs are managed by USU Water Quality Extension Staff. Generally they are hosted on the [UWW website](#) and are publicly available.

UDWQ *E.coli* field sampling and processing SOPs
UDWQ Pressure Transducer SOP

[UWW Tier II Stream SOP](#)

- [Qualitative Field Observations](#)
- Oakton PCS 35 Tester [Field Probe Calibration for conductivity and pH](#)
- [Field Probe Measurements](#)

8. Field Equipment

Qualitative Parameters:

UWW Datasheet (Appendix)
Notebook
Pencil

Field Parameters:

[Oakton PCS 35 Testr](#)
Calibration Solutions for pH (4, 7, & 10) and conductivity (1413 $\mu\text{s}/\text{cm}$)
[60 cm Turbidity Tube](#)
UWW Datasheet (Appendix)

Biological Parameters:

UDWQ *E.coli* Datasheet (Appendix)

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 (Appendix)

9. Health & Safety

Safety is a primary concern at all times and in all sampling situations for field personal. All UWW volunteers 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 two 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 UWW volunteers have attended a training where they were instructed on proper techniques for sampling. Please refer to the UTDWQ or UWW 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	Each sampling trip	NA	Audit and train

	1 per trip if less than 10 sites. 1 Field Blank per trip			
pH	3 point meter calibration; written record of calibration	Within 24 hours prior to sampling	± 0.1	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	1-point calibration; Written record of calibration	Within 24 hours prior to sampling	± 5% of standard (70 µs/cm)	Repeat field check; if not correct return meter to manufacturer for repair

Data entry QAQC – UWW volunteer double check data when they enter it on the online UWW database. The database also has internal quality control for extreme values and data entry limitations. All data submitted to the UWW database is examined by WQE staff with a QAQC checker to examine high values and data entry errors. 10% of copies of original field datasheets are submitted annually to check for data accuracy. The local watershed coordinator should also look over reports submitted on the UWW database to ensure correct data.

11. Data Documentation and Storage

Field Observations & Parameters: UWW volunteer will record all field data on the UWW Tier II datasheet. UWW volunteer will submit the electronic data online on the [Utah Water Watch Database](#). The original field datasheets will be stored with the local watershed coordinator who can provide copies to the UWW volunteer if needed. The WC will be provided with a filing system to store all data sheets, SOPs, and SAPs in a clearly identifiable location. The UWW program coordinator will work with the UDWQ to transfer the formatted data to UDWQ's AQWMS database.

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 pressure transducer data will be maintained by the WC.

12. Decontamination

All Utah Water Watch volunteers 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.

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

13. Participants

Name	Role	UWW Volunteer ID	Email	Phone
Arne Hultquist	Watershed Coordinator	SE Colorado Watershed Coordinator	arnehultquist@gmail.com	435-259-7558
Mike Allred	DWQ Scientist	N/A	mdallred@utah.gov	801-536-4331
Dave Erley	GCT/ UWW Volunteer	13-44	dderley@frontiernet.net	435-259-4859
Mary O'Brien	GCT / UWW Volunteer	13-43	maryobrien10@gmail.com	435-259-6205
Brian Greene	UWW program coordinator	1	Brian.greene@usu.edu	435-797-2580

APPENDIX



UWW Tier II Stream Data Sheet

UtahStateUniversity
WATER QUALITY EXTENSION

Certified Monitor Name(s) _____ UWW ID # _____

Site Name _____ UWW Site # _____

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**

