

Centerfire Creek Water Quality Survey 2013

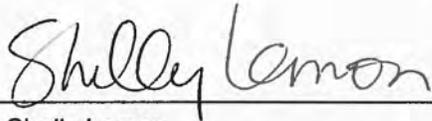
FIELD SAMPLING PLAN

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APPROVAL PAGE



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ACRONYMS

BMP	Best Management Practice
IR	State of New Mexico Clean Water Act §303(d)/305(b) Integrated Report
MASS	Monitoring, Assessment, and Standards Section
MPG	Miles per gallon
NMED	New Mexico Environment Department
NPS	Non-point Source
QAPP	Quality Assurance Project Plan
SLD	Scientific Laboratory Division
SOP	Standard Operating Procedures
SWQB	Surface Water Quality Bureau
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
EPA	United States Environmental Protection Agency
WPS	Watershed Protection Section
WQ	Water Quality
WQCC	Water Quality Control Commission
WQS	Water Quality Standard
WTU	Work Time Unit

INTRODUCTION

The purpose of this field sampling plan is to provide a detailed description of the Centerfire Creek Water Quality Survey to be conducted in the San Francisco watershed (HUC 15040004) during 2013 by the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB). It has been prepared in accordance with SOP 2.1, Field Sampling Plans. It describes project objectives and decision criteria, and includes the sampling plan with sampling locations, parameters and sampling frequencies for physical, chemical, and biological data. It may be amended as the need arises. Amendments will be documented and justified in the survey report.

This plan is a companion document to the Surface Water Quality Bureau Quality Assurance Project Plan (QAPP) for Water Quality Management Programs (NMED/SWQB 2013). Data will be collected according to the QAPP and the most recent version of the *Standards Operating Procedures (SOPs) for Water Quality Data Collection* (NMED/SWQB 2011).

1.0 PROJECT PERSONNEL

1.1 Personnel Roles and Responsibilities

Each team member is responsible for implementing the assigned responsibilities as listed in Table 1. If an individual is unable to fulfill their duties it is that individual's responsibility to find assistance and/or a replacement, in coordination with appropriate supervisors.

Table 1
Personnel Roles and Responsibilities

Team Member	Position/Role	Responsibilities
David Menzie 575-956-1548	Project Coordinators	<ul style="list-style-type: none">• Coordinates survey planning efforts (integrates the documentation of various team members' information into the field sampling plan and planning spreadsheet);• Coordinates and participates in the collection of chemical, biological, and habitat data including sonde and thermograph data collection efforts;• Manages chemical, biological, and habitat data for study (forms, data entry and analysis);• Provides chemical, biological, habitat, and long-term deployment data results for final report and writes appropriate portions of the survey report;• Coordinates development of final survey report (integrates information from all team members into final survey report);• Provide information and data needs pertaining to nonpoint sources of pollution and BMPs located within the study area
Matthew Schultz 575-956-1550	And Watershed Protection Section (WPS) Liaisons	

1.2 Organization

The Project Coordinators will report to the Monitoring, Assessment, and Standards Section Program Manager in addition to the Watershed Protection Section Program Manager for the purposes of this survey.

2.0 PROJECT DESCRIPTION

2.1 Background

Table 2 shows the streams assessment unit within the study. IR Category refers to the New Mexico's Integrated Report categories (Table 1 in the IR).

Table 2
Impairment and TMDL Status

Assessment Unit	Impairments	IR Category	TMDL Status
Centerfire Creek (San Francisco R to headwaters)	Nutrients/Eutrophication	5/5A	Completed (2002)
	Biological Indicators		303(d) List
	pH		Completed (2002)
	Specific Conductance		303(d) List
	Water Temperature		

This water quality monitoring serves to spatially characterize the existing impairments on a more refined scale approximating a 12 digit HUC, and potentially identify tributaries and subwatershed areas contributing to the listed impairments. The data will be used for future watershed planning and targeted best management practice (BMP) selection and implementation. Data needs have been determined based on identified data gaps and consultation with SWQB Monitoring, Assessment, and Standards Section (MASS) and Watershed Protection Section (WPS) staff as well as other state agencies, federal agencies, local watershed groups, and interested parties.

Measuring biological response indicators concurrent to physical habitat and chemistry gives an overall interpretation of the biological integrity of the reach represented, provides more complete information on characteristics of sediment and nutrients currently cycling through the stream, and may provide enough information to investigate or eliminate specific potential sources of water quality stress. SWQB is currently collecting fish, periphyton, macroinvertebrates, and physical habitat data at select sites to assess for potential impairment from excessively high temperatures, sediment deposition, nutrient enrichment, and toxic pollutants. Sampling methods are conducted in accordance with the most recent version of the SOPs. Biological sampling is conducted within a biological index period, August 15 through November 15, for appropriate comparability of samples and life history requirements. Sondes are deployed at select sites in the stream for a minimum of 3 days (72 hours) to record field variables, such as dissolved oxygen, pH, and turbidity, in no longer than one hour intervals. Thermographs (data logging thermometers) are deployed from May through August at select sites throughout the survey to measure temperature fluctuations. Stations in this survey requiring biological data collection will be compared, for assessment purposes, to reference conditions for the applicable ecoregion, as defined in Griffith *et al.* 2006.

2.2 Objectives

**Table 3
Project Objectives**

	Collect Water Quality Data to:	Question to be answered	Products/ Outcomes	Decision Criteria
Primary Objective	Identify sources of pollutant loads at a refined subwatershed scale to more effectively target BMPs. Provide information to the public on the condition of surface water	What tributaries and subwatershed areas within the watershed are contributing to listed impairments?	Survey Report; Information for future Watershed-Based Plan	WQS as interpreted by the Assessment Protocols
Secondary Objectives	Assess designated use attainment for the <i>Integrated Report</i> .	Are sampled waterbodies meeting WQS criteria?	Integrated Report	WQS as interpreted by the Assessment Protocols
	Develop load and waste load allocations for TMDLs	What is the maximum pollutant load a waterbody can receive and meet the requirements of the WQS?	TMDL loading calculations and NPDES permit limits	WQS as interpreted by the Assessment Protocols
	Evaluate restoration and mitigation measures implemented to control NPS pollution	Have watershed restoration activities and mitigation measures improved water quality?	Project Summary Reports, NPS Annual Report, <i>Integrated Report (De-Listing)</i>	WQS as interpreted by the Assessment Protocols
	Develop or refine WQS	Are the existing uses appropriate for the waterbody?	Use Attainability Analyses (UAA); Amendments to NM WQS	Are data sufficient to support a petition to the WQCC to revise WQS?

2.3 Schedule

As part of the survey planning process, public outreach will be conducted to receive public input on any areas of concern within the survey area and to inform interested parties about the monitoring, assessment and TMDL plans in the watershed.

Water chemistry analytical results typically take several months to return from the Scientific Laboratory Division (SLD). As these data are received, they are verified and validated as described in the most recent versions of the QAPP and SOP 15.0, Data Verification and Validation. Once all data have been received and validated and verified, the data will be assessed according to the most recent version of the assessment protocols (<http://www.nmenv.state.nm.us/swqb/protocols/index.html>) for incorporation into the 2016-2018 Integrated Report (IR). Once the assessments are complete, the TMDL development process for waters identified as impaired will begin. If necessary, TMDLs are tentatively scheduled for completion in fall 2016.

The progress of this project will be documented and tracked from its inception through implementation to ensure all sampling and analytical activities are performed in accordance with all applicable requirements and in a cost effective manner. Table 4 provides the project timeline.

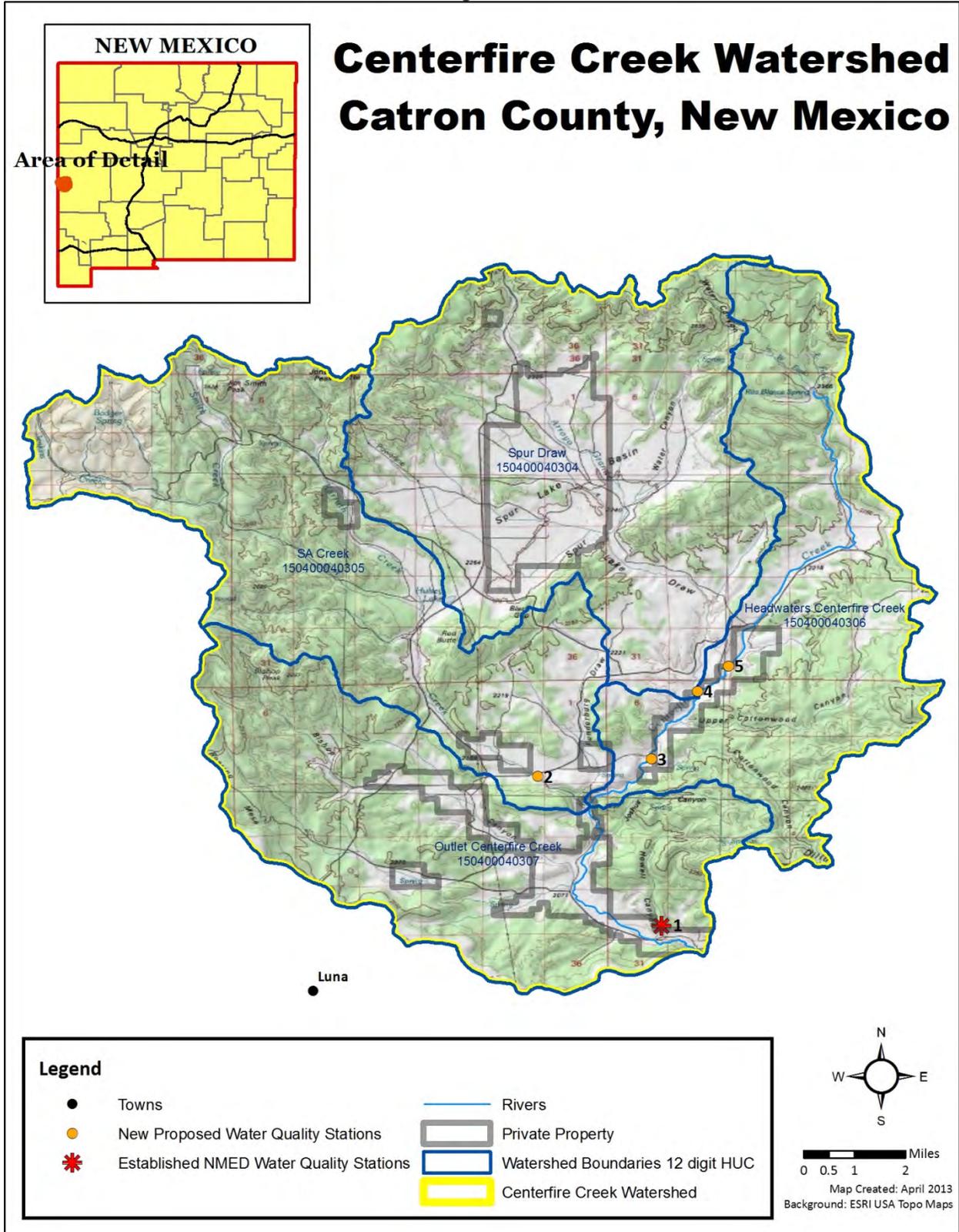
**Table 4
Project Schedule**

Activity	Winter 2012- 2013	Spring 2013	Summer 2013	Fall 2013	Winter 2013- 2014	Spring 2014	Summer 2014	Fall 2014	Winter 2014- 2015
Survey Planning, Site Reconnaissance, and Public Input Period	=====▶								
Data Collection & Submittal of WQ Samples to SLD		=====▶							
Data Verification & Validation Procedures, Assessment of data				=====▶					
Publication of Survey Report							=====▶		

2.4 Location

The project area includes portions of the San Francisco watershed (15040004) (see map below).

Figure 1



Stations Legend

Number	Station Name/ID
1	Centerfire Creek above San Francisco River - 80Center002.1
2	SA Creek at County Road B012 - 80SACree001.8
3	Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3
4	Centerfire Creek above Spur Lake Draw - 80Center013.1
5	Centerfire Creek at Centerfire Bog -80Center014.3

3.0 DOCUMENTATION

Project documents include this field sampling plan, calibration records, sonde download data, validation and verification records, field and lab data sheets (including sonde and thermograph deployment/retrieval sheets), and records of analytical data in hard copy or in electronic form. Documents will be maintained in accordance with the requirements of the Bureau QAPP (NMED/SWQB 2013).

Project documentation will include narrative descriptions of progress throughout the project relating to planning and implementation efforts, including deviations from the original plan and issues that arise along with any associated corrective actions.

Project activities will be documented on Stream Field Data Forms (<http://www.nmenv.state.nm.us/swqb/SOP/>). Information from the field sheets is entered in the SWQB database and maintained in the Survey files which are placed in the SWQB library at the conclusion of the project. Analytical results are electronically transferred into the SWQB database and uploaded to EPA's national database STORET WQX following completion of data verification and validation. The project is completed with the completion of the data assessment and the Survey Report.

4.0 SAMPLING PLAN

4.1 Chemistry Sampling

**Table 5
Water Chemistry Sampling Summary**

Assessment units are arranged as in the IR. Numbers indicate sampling events during the survey.

Station Name Station ID	Assessment Unit			Station Rationale
		Nutrients ¹	TDS/TSS	
Centerfire Creek abv San Francisco River - 80Center002.1	Centerfire Creek (San Francisco R to headwaters)	3	3	Refined WQ monitoring for watershed planning/BMP targeting
SA Creek at County Road B012 - 80SACree001.8	SA Creek (Centerfire Creek to headwaters)	3	3	Refined WQ monitoring for watershed planning/BMP targeting

Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3	Centerfire Creek (San Francisco R to headwaters	3	3	Refined WQ monitoring for watershed planning/BMP targeting
Centerfire Creek above Spur Lake Draw - 80Center013.1	Centerfire Creek (San Francisco R to headwaters	3	3	Refined WQ monitoring for watershed planning/BMP targeting
Centerfire Creek at Centerfire Bog - 80Center014.3	Centerfire Creek (San Francisco R to headwaters	3	3	Refined WQ monitoring for watershed planning/BMP targeting
QC ²	Quality Control samples collected per QAPP	3	0	
Totals		18	15	

¹Suite includes total Kjeldahl nitrogen, nitrate+nitrite, ammonia, and total phosphorus.

²QC frequency requirements were revised from Appendix E of the QAPP (NMED/SWQB 2012) to reflect single station sampling.

Water quality samples will be submitted to the New Mexico Scientific Laboratory Division (SLD) or processed in the SWQB laboratory in accordance with procedures as outlined in the most recent version of the SWQB Standard Operating Procedures for Data Collection (SOPs). (SWQB 2011).

Table 5 outlines water chemistry variables to be measured and the sampling frequency. In addition to the variables listed, field parameters (temperature, specific conductance, salinity, dissolved oxygen concentration, dissolved oxygen saturation, pH, turbidity, and flow) will be measured at each site using a multi-parameter sonde and flow meter. Where flow data are otherwise available (e.g., USGS gauge), flow will not be measured by SWQB.

Chemistry sampling locations for this study were chosen based on existing or potential non-point sources of pollution. Existing and potential sources of pollution are identified from historical data, information from other agencies, and local residents. Sampling stations were selected at locations that bracket potential pollution inputs, allow physical and legal access to the waterbody, and represent each stream reach in the study except for very small or mostly ephemeral systems. Where possible, the use of established stations allows for the examination of trends.

4.2 Biology/Habitat Sampling

Resources, such as staff and budgets, and other issues, such as legal access, do not allow for the collection of biological and habitat data at all stations. Stations are selected for biological and habitat monitoring based on 1) current Integrated List status, 2) results of the Level I Nutrient Assessment, 3) observations of the surrounding land use including upland and riparian habitat conditions, including results of the Probable Source Field Sheet. Additional sites determined, or considered, to be in "reference" or "best available condition" will also be selected for biological and habitat monitoring for inclusion in development and refinement of biological and habitat criteria.

**Table 6
Biological and Habitat Sampling Summary**

Station Name Station ID	Assessment Unit	Benthic macroinvertebrates	Pebble Count – Physical Habitat ¹	Thermograph ²	Nutrient Level 1	Sonde	Periphyton Chlorophyll a ³	Hydrology Protocol
Centerfire Creek abv San Francisco River - 80Center002.1	Centerfire Creek (San Francisco R to headwaters)	1	1	1	1	1	1	0
SA Creek at County Road B012 - 80SACree001.8	SA Creek (Centerfire Creek to headwaters)	0	1	1	1	1	1	2
Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3	Centerfire Creek (San Francisco R to headwaters)	1	1	1	1	1	1	0
Centerfire Creek above Spur Lake Draw - 80Center013.1	Centerfire Creek (San Francisco R to headwaters)	0	1	1	1	1	0	0
Replicate samples collected per QAPP	QC	0	1	-	-	-	-	1
Totals		2	5	4	4	4	3	2

* a “1” indicates that the variable will be monitored one time during the survey except: thermographs will be deployed June through August; sondes will be deployed for 3 or more days (at least 72 hours).

¹ If sedimentation data (pebble counts) exceed the threshold value for percent sand and fines at a site, more extensive habitat data are collected.

² If preliminary analysis of thermograph data indicates potential for impairment - cross-section, flow, canopy cover, and slope data required to use SSTEMP temperature modeling software will be collected.

³ Periphyton chlorophyll a may be added as indicated by preliminary (Level 1) nutrient assessment. From SOP: “Samples or filters can be kept frozen for 28 days before analysis for chlorophyll a. Samples from acidic water (< pH 7) should be processed promptly after filtration to prevent possible chlorophyll degradation from residual acidic water on filter.” Periphyton chlorophyll a samples will be collected by Silver City Field Office staff en route to scheduled meetings in Northern New Mexico and promptly delivered to the Santa Fe office for in-house analysis.

5.0 RESOURCE REQUIREMENTS

Various types of expendable supplies are required for collecting water chemistry samples. Estimates of the amounts required for each of these supplies are summarized in Table 7.

**Table 7
Estimated WQ Sampling Expendable Supplies Requirements**

Supply	Quantity Required
1 qt cubitainer®	33
RID stickers (3x)	33

Sample analysis costs include WTUs (work-time units) for chemical analysis performed at SLD and provided to SWQB through a Joint Powers Agreement between these State agencies, as well as analysis

costs for biological samples sent to contract labs and *E coli* analysis performed by SWQB. These costs are summarized in Table 8.

**Table 8
Estimated WQ Sample Analytical Expenditures**

Analyte	Total # Samples	Cost per Sample (WTU or \$)	Total Expenditure (WTU or \$)
TDS/TSS	15	24	360
Nutrients (Nitrate + Nitrite, Ammonia, TKN, Phosphate, Low)	18	100	1800
Macroinvertebrates	2	\$175	\$350
Chlorophyll a (in-house)*	3	\$45	\$135
TOTAL		--	± 2,160 WTUs and \$485

*Additional samples may be added after preliminary data are assessed

A round trip for this survey is approximately 210 miles. Summer gasoline costs have been estimated at \$4.00 per gallon. A 2010 Ford Expedition is typically used for local surveys, averaging approximately 18.0 miles per gallon (mpg). Three WQ sampling trips have been planned for this survey. These may be expected to be completed in one day with water chemistry samples being delivered to SLD in Albuquerque by Drinking Water Quality Bureau staff based out of the Silver City Field Office on their routine trips, or shipped.

**Table 9
Vehicle Costs**

Month	Approximate Miles	Estimated MPG	Estimated Cost of Gasoline/gallon	Total Fuel Costs
May	210	18.0	\$4.00	\$46.67
August	210	18.0	\$4.00	\$46.67
October	210	18.0	\$4.00	\$46.67
TOTAL	630			\$140.01

Two staff from Silver City do not require per diem, but will be included in salary calculations.

**Table 10
Per Diem and Salary Estimates**

Expense	Water Chemistry Survey	Biological Survey	Total
Per Diem (number of nights out)	0	0	0 nights
Salary Days	6	0	6 days

Staff days are estimated for 1 crew of 2 going out for water chemistry surveys.

Staff receives \$85 per night per diem for travel costs. Costs not included below may involve general sampling supplies such as WQ sample containers and preservatives, sonde calibration solutions, and periphyton, macroinvertebrate, fish, and habitat sampling/monitoring equipment. Vehicles will require standard preventative maintenance and unforeseen costs may arise at any time.

**Table 11
Draft Total Cost Estimates**

WTUs	Bio Sample \$	Fuel \$	Per Diem \$	Staff Field Days
2,160	\$485	\$140.01	\$0*	6

* Per Diem estimates do not include partial day rates

6.0 REFERENCES

Griffith, G.E., Omernik, J.M., McGraw, M.M., Jacobi, G.Z., Canavan, C.M., Schrader, T.S., Mercer, D., Hill, R., and Moran, B.C. 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,400,000).

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NMED/SWQB. 2013 or most recent. *Quality Assurance Project Plan for Water Quality Management Programs*, New Mexico Environment Department Surface Water Quality Bureau.