

Santa Fe River Water Quality Survey 2012 - 2013

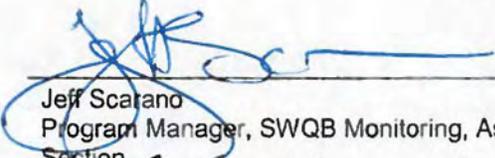
REVISED FIELD SAMPLING PLAN

September 30, 2013

Prepared by

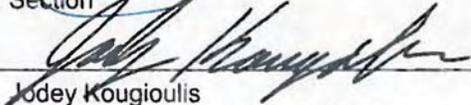
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APPROVAL PAGE



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ACRONYMS

ALU	Aquatic Life Use
AU	Assessment Unit
BMP	Best Management Practice
CWA	Clean Water Act
DM	Dissolved Metals
DO	Dissolved Oxygen
IR	State of New Mexico Clean Water Act §303(d)/305(b) Integrated Report
MAS	Monitoring and Assessment Section
MPG	Miles per gallon
NMED	New Mexico Environment Department
NPS	Non-point Source
PSRS	Point Source Regulation Section
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAD	Radionuclide
SBD	Stream Bottom Deposits
SLD	Scientific Laboratory Division
SC	Specific Conductance
SOP	Standard Operating Procedures
SVOC	Semi-Volatile Organic Carbon
SWQB	Surface Water Quality Bureau
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TM	Total Metals
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Carbon
WPS	Watershed Protection Section
WQ	Water Quality
WQCC	Water Quality Control Commission
WQS	Water Quality Standard
WTU	Work Time Unit
WWTP	Wastewater Treatment Plant

INTRODUCTION

The purpose of this field sampling plan is to provide a description of a limited Santa Fe River Water Quality Survey to be conducted in the Rio Grande - Santa Fe (HUC 13020201) during 2012 -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 and chemical data. It may be amended as the need arises. Amendments will be documented and justified.

This plan is a companion document to the Surface Water Quality Bureau Quality Assurance Plan for Water Quality Management Programs (NMED/SWQB 2012a). Data will be collected according to NMED/SWQB 2012b.

This FSP was revised September 30, 2013, to account for:

- unpredicted, prolonged drought which impacts the ability for the City to schedule and implement planned releases;
- new MASS personnel working on the project;
- acknowledgement of new WQS segments 20.6.4.136 and 20.6.4.137 (December 2012) and associated station establishment; and
- an unprecedented opportunity to sample a full suite of parameters during a prolonged, fall “base flow” release October 2013 that was necessary for reservoir repairs.

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
Lynette Guevara 505-827-2904	Project Co-coordinators	<ul style="list-style-type: none">• Coordinates survey planning efforts (integrates the documentation of information into the field sampling plan and planning spreadsheet);• Coordinates and participates in the collection of data• Manages data for study (forms, data entry and analysis);
Scott Murray 827-2621		<ul style="list-style-type: none">• Provides chemical, biological, and habitat results for any final report and writes appropriate portions of any subsequent survey report;• Coordinates development of final survey report (integrates information into final survey report); and• Provide information and data needs pertaining to nonpoint sources of pollution and BMPs located within the study area as needed.

1.2 Organization

The Project Coordinator will report to the Monitoring and Assessment Section Program Manager for the purposes of this survey.

2.0 PROJECT DESCRIPTION

2.1 Background

The study area is the Santa Fe River from the wastewater treatment plant (WWTP) outfall channel to Nichols reservoir. The Santa Fe River flows west perennially from the Sangre de Cristo Mountains. McClure and Nichols Reservoirs impound water on the Santa Fe River for municipal water supply purposes. During low flow periods when available surface water is being held back by the reservoir(s), the river below Nichols Reservoir can be dry. Periodic reservoir overflows, releases, and storm flows provide intermittent flow in sections of the river through the city of Santa Fe (Lewis and Borchert 2009a).

A public desire to have a “living river” through town prompted the determination of potential reservoir release scenarios based on a detailed hydrologic analysis of the Santa Fe River (Lewis and Borchert 2009a, 2009b, 2009c). In 2011, the city of Santa Fe council passed an ordinance allowing for scheduled releases from Nichols reservoir based on predicted watershed yield each year. For example, the target yield for 2012 is 600 acre feet based on the anticipated watershed yield of 60%. The City of Santa Fe has accordingly developed a draft reservoir release plan for 2012 (Figure 1). Similar draft reservoir release plans, based on predicted watershed yield, will be developed each year.

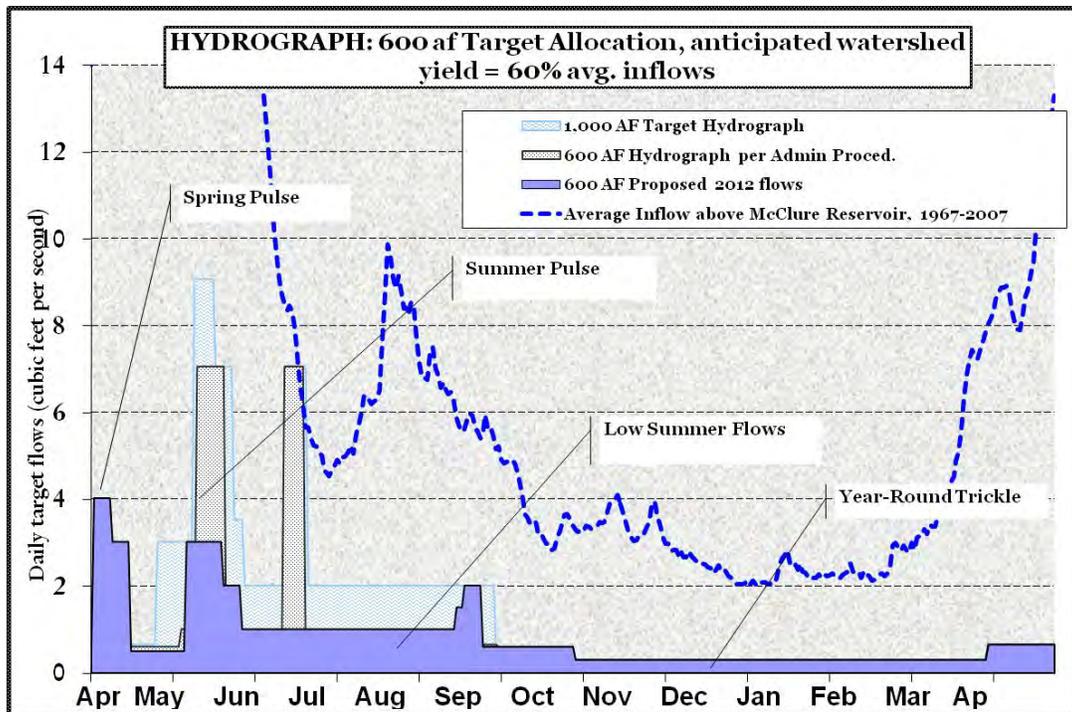


Figure 1
Santa Fe River Target Hydrograph (2012)

Table 2 shows the current stream assessment unit within the study area. 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	Completed TMDLs
Santa Fe River (Santa Fe WWTP to Nichols Rsvr)	Al (dissolved), <i>E. coli</i> , Total PCBs	5	None

The impairments currently noted in this assessment unit are the result of limited water quality sampling during the 2005 SWQB Middle Rio Grande water quality survey. Surface water quality sampling in this portion of the Santa Fe River has been largely stormwater-based and challenging in the past because it was not previously possible to anticipate when there would be either base flow or storm flow in the river. In addition, the applicable water quality criterion in this reach is now total recoverable aluminum. SWQB has not previously collected total recoverable aluminum in this reach.

The Santa Fe River is scheduled to be sampled as part of the 2014 Middle Rio Grande survey, but it is impossible to predict whether or not the watershed yield will be sufficient for the city to release water from the reservoir during the 2014 survey year. The city of Santa Fe has provided the proposed release schedule for the 2012 survey year (Figure 1), and will be able to provide the 2013 schedule based on predicted yield at that time. Therefore, SWQB is able to schedule sampling efforts in order to collect water quality samples during scheduled releases – spring pulse, summer pulse, and summer flow – as well as during storm events for listed parameters.

Data collected in 2012 and 2013 will also be used to inform survey co-leads during planning for the larger 2014 Middle Rio Grande survey (which includes the Santa Fe River watershed), confirm/determine impairments, and develop subsequent Total Maximum Daily Loads (TMDLs). Flow measurements (or flow observations when it is not possible to measure flow) collected during this sampling effort may also be used to assist with the joint SWQB-City effort to refine water quality standard segments and applicable designed uses from the WWTP to Nichols Reservoir.

Sampling will be conducted in accordance with SWQB's Standard Operating Procedures (SOPs) (NMED/SWQB 2012b or most recent). PCBs are not being collected because the New Mexico Scientific Laboratory Division (SLD) cannot presently analyze them using the congener method (EPA Method 1668), and SWQB does not have a separate funding source to pay for this analytical method at a contract lab.

2.2 Objectives

Objectives of this study are presented in Table 3.

**Table 3
Project Objectives**

	Collect Water Quality Data to:	Question to be answered	Products/ Outcomes	Decision Criteria
Primary Objective	Assess designated use attainment for the <i>Integrated Report</i> and provide information to the public on the condition of surface water	Are sampled waterbodies meeting WQS criteria?	Survey Report; Integrated Report	WQS as interpreted by the Assessment Protocols
Secondary Objectives	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
	Develop or refine WQS	Are the existing or proposed 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, SWQB will coordinate sampling efforts with the City of Santa Fe. Data from this 2012 – 2013 sampling effort will help to develop the larger Middle Rio Grande watershed schedule in 2014. Results from both surveys (2012-2013 and 2014) will be combined for assessment and TMDL development. Data for impaired parameters will also be used for any future TMDL development, tentatively scheduled for 2016 or sooner.

E. coli samples will be processed in the SWQB water quality lab within 6-hours of collection. Water chemistry analytical results typically take several months to return from SLD. As these data are received, they will be uploaded to NMEDAS, and verified and validated as described in NMED/SWQB 2012a. 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 (www.nmenv.state.nm.us/swqb/protocols/2014) for incorporation into the next Integrated Report (IR).

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 (2012, 2013)**

Activity	Spring 2012, 2013	Summer 2012, 2013	Fall 2012, 2013	Winter 2013, 2014
Survey Planning, Site Reconnaissance	=====▶			
Data Collection & Submittal of WQ Samples to SLD		=====▶		
Data Verification & Validation Procedures, Assessment of data				=====▶

2.4 Location

Sampling locations are in Figure 2. The project area includes portions of the Rio Grande - Santa Fe (HUC 13020201) Santa Fe River watershed, between the City of Santa Fe WWTP outfall and Nichols Reservoir (see map below).

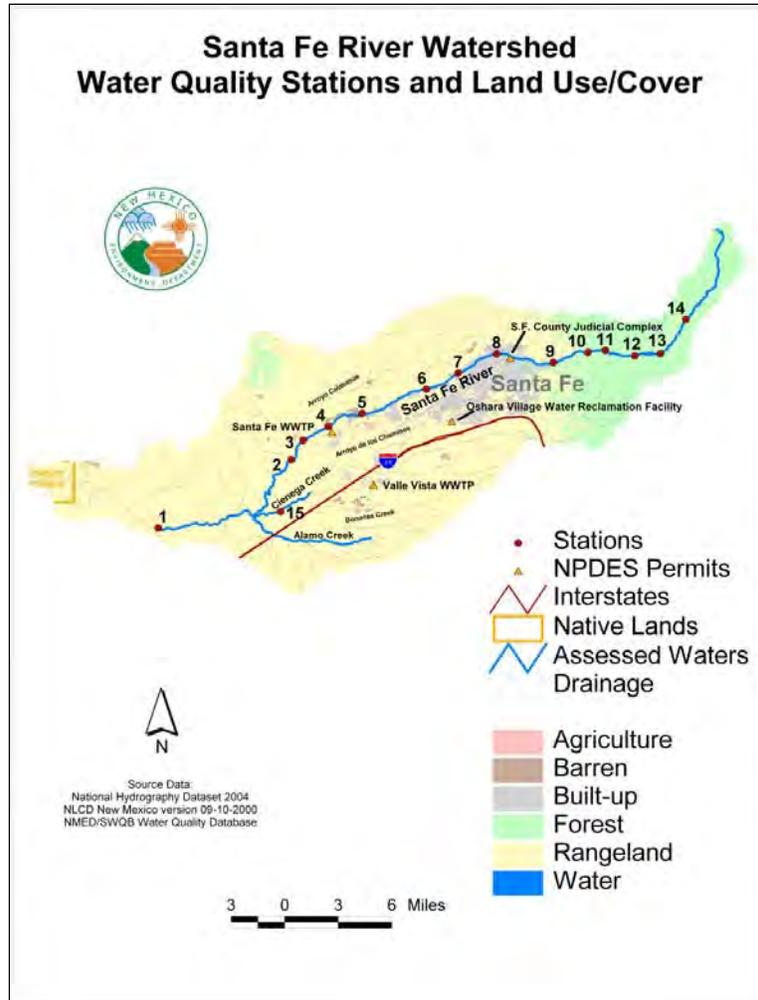


Figure 2
Santa Fe River Watershed Land Use and Sampling Stations

Sampling stations were selected to characterize reaches based on secondary and primary contact uses (when there are releases), and potential hydrologic character based on application of the Hydrology Protocol on May 22, 2012. Stations that may be sampled as part of this field sampling plan, depending on flow conditions, are in Table 5 below.

**Table 5
Santa Fe River sampling stations**

STATION #	Station Name	STORET/WQX ID	WQS Reference (Jan 2011)
9	Santa Fe River below Cerro Gordo Rd.	30SantaF052.4	20.6.4.137
NEW (8.5)	Santa Fe River ~75m u/s of Sandoval St.	30SantaFe050.5	20.6.4.137
8	Santa Fe River below St Francis Dr.	30SantaF047.9	20.6.4.136
7	Santa Fe River below Frenchies Field	30SantaF044.5	20.6.4. 136
6	Santa Fe River at CRd 68A (San Isidro Crossing) ¹	30SantaF041.2	20.6.4. 136
5	Santa Fe River above Hwy 599 ¹	30SantaF035.9	20.6.4. 136
4	Santa Fe River above WWTP ¹	30SantaF032.9	20.6.4. 136

¹ Secondary station because generally only flows during stormwater events. During reconnaissance in May 2012, these stations were not flowing during scheduled reservoir release of 3 cfs (2012 summer pulse). Santa Fe River at Siler was flowing during 2012 spring pulse (4 cfs release).

3.0 DOCUMENTATION

Project documents include this field sampling plan, calibration records, validation and verification records, sample collection data, records of analytical data in hard copy or in electronic form, and QC records. Documents will be maintained in accordance with the requirements of the Bureau QAPP (NMED/SWQB 2012a).

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 in SOP Field Sheets (NMED/SWQB 2012b). Information from the field sheets is entered in the SWQB database (NMEDAS) and maintained in the Survey files which are placed in the SWQB administrative record at the conclusion of the project. Analytical results are electronically transferred to NMEDAS 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 6 outlines water chemistry variables to be measured and the sampling frequency. All stations are currently in the assessment unit named "Santa Fe River (Santa Fe WWTP to Nichols Rsvr)." Numbers indicate proposed sampling events each year (2012, 2013). The intention is to sample during planned reservoir releases – spring pulse, summer pulse, and summer flows – and during 1-2 storm events. Exact timing and number of possible sampling events is dependent on city release schedule and storm events/magnitude each year.

Table 6
Water Chemistry Sampling Summary

Station Name Station ID	Calcium & Magnesium for hardness (200.7)	<i>E. coli</i>	Total Aluminum	Metals, rads, TN/TP ²	
Santa Fe River below Cerro Gordo Rd.	4	4	4	1	Top of AU. Spring pulse, summer pulse, summer flows.
Santa Fe River below St Francis Dr. (pre-WQS proposal)	2	2	2	1	At potential hydrologic break; downstream end of Santa Fe River Park; upstream end of reach with most contact use. Spring pulse, summer pulse, summer flows.
Santa Fe River ~75m u/s of Sandoval St. (post new WQS citations .136 and .137)	3	3	3		At WQS and AU break; downstream end of Santa Fe River Park; downstream end of reach through constricted downtown reach. Spring pulse, summer pulse, summer flows.
Santa Fe River below Frenchies Field	4	4	4	1	Downstream end of reach with most contact use. Lots of dog walking through this reach. Spring pulse, summer pulse, summer flows when adequate water to sample.
Santa Fe River at CRd 68A	1-2	1-2	1-2	1	New station. Spring pulse, and possibly summer pulse, when 100% target hydrograph met. Otherwise, stormwater station only.
Santa Fe River above Hwy 599	1-2	1-2	1-2	1	Primarily stormwater station. Will recon during spring pulse release.
Santa Fe River above WWTP	1-2	1-2	1-2	1	Primarily stormwater station. Will recon during spring pulse release.
QC ¹	1-2	4	1-2	1-2	
Totals	~26	~28	~26	~8	

¹ QC frequency requirements per Appendix E of the QAPP (NMED/SWQB 2012a).

² Sampling during prolonged release October 2013 for reservoir repairs.

Water quality samples for chemicals analysis will be submitted to SLD and *E. coli* samples will be processed in the SWQB laboratory in accordance with procedures as outlined in the SWQB SOP for Bacteriological Sampling (SOP 9.0)(NMED/SWQB 2012b).

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 or city gaging station), flow will not be measured by SWQB. When flow is too low to measure, flow will be estimated and noted as such on the field sheet. Photos will be taken to document flow (including no flow) conditions.

In general, chemistry sampling locations are chosen to monitor each assessment unit and are based on existing or potential point or non-point sources of pollution, as well as noted land use and designated or existing uses. Existing and potential sources of pollution are identified from point source permits, historical data, information from other agencies, and local residents. Sampling stations were selected at locations that bracket potential uses as well as hydrologic conditions, and allow physical and legal access to the waterbody. Where possible, the use of established stations allows for the examination of trends.

4.2 Biology/Habitat Sampling

None planned at this time. The Hydrology Protocol was performed during reconnaissance on May 22, 2012. The results were used to help identify appropriate sampling locations for this field sampling plan.

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 each year (2012, 2013) are summarized in Table 7.

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

Supply	Quantity Required
1 liter cubitainer [®]	52
Bacteria bottles, reagent, & Quanti-trays [®]	28 ea.
RID stickers (3x)	80
10 microns (?**) filters & tubing	24**

** Filtering requirements to determine total recoverable metals were still being discussed at the time this FSP was drafted (May 28, 2012). Turbidity values, and filtering specifics (if any), will be noted on the field sheet and recorded in the database.

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 Annually (2012, 2013)**

Analyte	Total # Samples	Cost per Sample (WTU or \$)	Total Expenditure (WTU or \$)
Calcium & Magnesium for hardness	24	50	1200
Total Aluminum	24	50	1200
Dissolved metals	6	235	1410
Total mercury and selenium	6	40	240
Radionuclides	6	120	720
TN/TP (nutrients)	6	100	600
<i>E. coli</i> (in-house)	28	\$5.08	\$142
TOTAL			± 5370 WTUs and \$142

*Additional samples may be added after preliminary data are assessed

Annual mileage for this field sampling plan is approximately 100 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). Sampling events are expected to be completed in one day. SLD sample delivery runs will coincide with other planned survey SLD runs, or will be dropped off by SWQB staff residing in Albuquerque, to negate the need for separate SLD runs.

**Table 9
Vehicle Costs**

Year	Approximate Miles	Estimated MPG	Estimated Cost of Gasoline/gallon	Total Fuel Costs
2012	100	18.0	\$4.00	\$22.22
2013	100	18.0	\$4.00	\$22.22
TOTAL	200			\$44.44

Staff days are estimated for 1 crew of 2 going out, although it is probable that one staff can complete the sampling requirements of this FSP. Per diem is not needed.

**Table 10
Per Diem and Salary Estimates Annually (2012, 2013)**

Expense	Water Chemistry Survey	Biological Survey	Total
Per Diem (number of nights out)	0	0	0 nights
Salary Days	10	0	10 days

6.0 REFERENCES

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