WATER QUALITY SURVEY SUMMARY

FOR THE

SAN JUAN RIVER WATERSHED

(Navajo Nation at Hogback to the Colorado border)

2017-2018

San Juan River upstream of the Animas River

Prepared by

Surface Water Quality Bureau

New Mexico Environment Department

September 2020

Water quality surveys and assessments conducted by the New Mexico Environment Department Surface Water Quality Bureau are completed to fulfill Section 106 of the Clean Water Act [33 USC 1251 et seq.], Work Program for Water Quality Management. This project was funded, in part, by a grant from the U.S. Environmental Protection Agency.

Table of Contents

1.0 INTRODUCTION

SWQB conducts concentrated watershed-based water quality surveys to fulfill work plan requirements of the Clean Water Act (CWA) Section 106 grant. This grant provides federal funding to ensure that high quality, defensible data are collected and available to make informed resource management decisions. Data and conclusions are publicly available to interested parties by making a formal request to the Program Manager of SWQB's Monitoring, Assessment, and Standards Section. The purpose of water quality sampling is to assess the quality of surface waters in the state, determine where water quality standards are not being met (i.e. where water quality is impaired), and to inform development of Total Maximum Daily Loads (TMDLs) for impaired waters, which lay the foundation for restoring these waters.

This sampling summary provides a detailed description of the two-year Water Quality Survey conducted in the San Juan River from Navajo Tribal boundary to the Colorado border during 2017-2018 by the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB). This is a companion document to the SWQB *Quality Assurance Project Plan for Water Quality Management Programs* (NMED/SWQB 2016b) (QAPP). Data were collected according to the QAPP and the appropriate SWQB Standard Operating Procedures (SOPs) for water quality data collection. Both the QAPP and SOPs are posted on the SWQB website at https://www.env.nm.gov/surface-water-quality/monitoring-assessment-and-standards-section/. This Report describes project objectives and decision criteria, and it includes the sampling conducted with locations, constituents, and frequencies for physical, chemical, and biological data collection.

The project area includes the San Juan River from Navajo Tribal boundary to the Colorado border (Figure 1). Some of the major tributaries included in this study are the Animas River, La Plata River, and the Navajo River. Lake sampling was conducted at Navajo Reservoir and Lake Farmington. The survey area encompasses the New Mexico portions of 6-digit Hydrologic Unit Code 140801.

Historic and current land uses in the watersheds include agriculture (range, pasture, and croplands), mining, oil and gas, forest, grassland, residential, shrubland, water, and wetlands. Land ownership in the watershed includes the Bureau of Land Management (BLM), U.S. Forest Service, Bureau of Reclamation (USFS BOR), National Park Service, New Mexico State Parks, New Mexico Department of Game and Fish, and state, tribal, and private parcels. The study area is part of the Colorado River basin and encompasses approximately 5,400 square miles (13,985 square kilometers) in New Mexico. The watershed is located in Omernik Level III Ecoregion 21 (Southern Rockies) in the headwaters and Level III Ecoregion 26 (Arizona/New Mexico Plateau) in the lowlands (USEPA 2006).

Rivers are divided into assessment units (AUs) based on differing geological and hydrological properties, and each AU is assessed individually using data from one or more monitoring sites located within the AU. Selected monitoring locations were sampled for water quality constituents 6-10 times over two years. The total number of samples for each location was determined through a priority ranking of Integrated Report (IR) classification, presence of point source discharge, and TMDL status, among other considerations. The framework for monitoring prioritization is discussed in the SWQB 10-Year Monitoring and Assessment Strategy (NMED/SWQB 2016d). Monitoring activities conducted at each site are summarized in Tables 6 and 7.

1.1 Principal Investigators

Table 1 details the responsibilities for this project. Each team member was responsible for implementing the assigned responsibilities. Questions or comments regarding this survey report should be directed to the MASS project coordinators.

Table 1. Personnel Roles and Responsibilities

Team Member	Position/Role	Responsibilities
Kris Barrios Monitoring, Assessment, and Standards Section Program Manager kristopher.barrios@state.nm.us (505) 946-8713 Charles Dentino Monitoring Team Supervisor charles.dentino1@state.nm.us (505) 946-8868	MASS Project Coordinators	• Coordinate survey planning efforts (integrate the documentation of various team members' information into the field sampling plan and planning spreadsheet); • Prepare final survey report integrating information from all team members.
Meredith Zeigler Monitoring Team Scientist meredith.zeigler@state.nm.us (505) 819-9972	MASS Field Team	• Coordinate and participate in the collection of chemical, biological, and habitat data including sonde and thermograph data collection efforts; • Manage data for study (forms, data entry, data verification and analysis);
Jennifer Fullam jennifer.fullam@state.nm.us (505) 946-8954	Standards Liaison	• Provide information and data needs pertaining to water quality standards development and refinement located within the study area.
Sarah Holcomb sarah.holcomb@state.nm.us (505) 819-9734	Point Source Regulation Section (PSRS) Liaison	• Provide information and data needs pertaining to point source discharges located within the study area; • Assist with development of final survey report, as needed.
Alan Klatt alan.klatt@state.nm.us (505) 819-9623	Watershed Protection Section (WPS) Liaison	• Provide information and data needs pertaining to nonpoint sources of pollution and BMPs located within the study area. • Assist with development of final survey report, as needed.

Heidi Henderson Heidi.henderson@state.nm.us (505) 819-9986	TMDL Liaison	• Provide information and data needs pertaining to TMDL development to be conducted in the study area; • Assist with development of final survey report, as needed; and • Develop TMDLs as needed.

2.0 PROJECT DESCRIPTION

2.1 Background

Section 303(d) of the Federal Water Pollution Control Act, known as the Clean Water Act (CWA), requires that each state submit to the U.S. Environmental Protection Agency (EPA) a list of water quality limited segments that require load allocations, waste load allocations, and TMDLs. The current §303(d) Program in New Mexico consists of three major steps: monitoring of surface waters; assessing monitoring data against the WQS; and developing TMDLs for those waters not meeting water quality standards (i.e. impaired).

CWA §305(b) requires that each state also submit a biennial report to the U.S. Congress through the EPA. The two requirements are combined into *The State of New Mexico §303(d)/§305(b) Integrated List and Report* (NMED/SWQB 2018a) (IR). It also serves as a source of basic information on water quality and water pollution control programs in New Mexico.

In accordance with the above stated statutory requirements, the IR report contains the following information:

- An assessment of surface water quality;
- An analysis of the extent to which the CWA §101(a) goal of surface water quality to provide for protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water is being achieved;
- An overview of progress in water pollution control and recommendations for further action; and
- A description of the nature of nonpoint source pollution and of programs for nonpoint source control.

The activities described in this Report are focused toward meeting the goals of the most recent, EPA-approved IR published prior to the survey (NMED/SWQB 2016a). Impairments for AUs in this survey area were identified during SWQB's previous surveys of this watershed, last conducted in 2000 and 2010, and include assessments based on data from a variety of other investigations. Table 2 lists AU impairment status for surveyed waterbodies in the most recent approved IR published prior to this report (NMED/SWQB 2018a). The "IR Category" column provides the current AU's status in the IR (see Appendix A for definitions). "Water Quality Section" provides the applicable WQS section as assigned to each AU and described in Section 20.6.4 New Mexico Administrative Code (NMAC) as governed by the New Mexico Water Quality Control Commission (WQCC) (NMAC 2020). The purpose of 20.6.4 NMAC is to establish WQS that consist of the designated uses of surface waters of the state, the water quality criteria necessary to protect those uses, and an antidegradation policy. The "TMDL Status" column lists the EPA-approved TMDLs for the Assessment Unit.

Monitoring of surface waters across the State has traditionally occurred on an eight-year rotational watershed approach, meaning a given waterbody is generally surveyed intensively, on average, every eight years. Monitoring occurs during the non-winter months (March through November); focuses on physical, chemical, and biological conditions in perennial waters; and includes sampling for most pollutants that have numeric and/or narrative criteria in the WQS. Each assessment unit is represented by a small number of monitoring stations (often only one), each of which receives 6–10 site visits during the survey.

The monitoring described in this report was planned and documented in a Field Sampling Plan (SWQB 2018b) prepared in accordance with SWQB Standard Operating Procedure 2.1: Field Sampling Plan Development and Execution (NMED/SWQB 2015). The Plan describes project objectives and decision criteria, and it includes the sampling schedule with locations, constituents, and frequencies for physical, chemical, and biological data collection. Through public outreach, inter-agency coordination, and a scoring system which takes into account a variety of factors, a three-tier monitoring system – primary, secondary, and tertiary – was developed to prioritize AUs. High ranking priority waters (primary AUs) received the greatest amount of monitoring, whereas low ranking waters (*i.e.*, tertiary AUs) received the least. The two-year monitoring allows more data to be collected from the highest priority waters to better capture inter-annual variability due to hydrologic conditions during sampling events, and year-2 monitoring may be adjusted dependent on year-1 analytical results

Assessment of surface waters against the WQS occurs after the monitoring data have been verified and validated, using the most recent assessment protocols. These protocols are updated every odd year (e.g. 2019) and are opened for the EPA and the public to review and comment as part of the update process. Waterbodies determined to be impaired are reported as such every even year (e.g. 2020) on the State's IR List and TMDLs or TMDL alternatives are developed for listed AUs.

Table 2. Impairment and TMDL Status of Survey Assessment Units (NMED/SWQB 2018a)

Assessment Unit	Water Quality Section	Impairment	IR Category	TMDL Status
Animas River (Estes Arroyo to So. Ute Indian Tribe bnd)	20.6.4.404	Escherichia coli|Phosphorus (Total)|Temperature, water|Turbidity	5/5A	TMDLs for E. coli and Total Phosphorus
Animas River (San Juan River to Estes Arroyo)	20.6.4.403	Escherichia coli|Nutrient/Eutrophication Biological Indicators|Temperature, water	4A	TMDLs for nutrients, temperature, and E. coli
Gallegos Canyon (San Juan River to Navajo bnd)	20.6.4.99	Selenium	4A	TMDL for selenium
La Plata River (McDermott Arroyo to So. Ute Indian Tribe bnd)	20.6.4.402	Escherichia coli|Nutrient/Eutrophication Biological Indicators	5/5A	TMDLs for DO and E. coli

La Plata River (San Juan River to McDermott Arroyo)	20.6.4.402	Escherichia coli| Oxygen, Dissolved| Sedimentation/Siltation	5/5C	TMDLs for sedimentation and E. coli
Lake Farmington (Beeline Reservoir)	20.6.4.409	Mercury in Fish Tissue|PCB in Fish Tissue	5/5A	None
Los Pinos River (Navajo Reservoir to CO border)	20.6.4.407		3/3A	None
Navajo Reservoir	20.6.4.406	Mercury in Fish Tissue|Temperature, water	5/5A	None
Navajo River (Jicarilla Apache Nation to CO border)	20.6.4.407	Temperature, water	5/5B	None
San Juan River (Animas River to Cañon Largo)	20.6.4.408	Escherichia coli| Sedimentation/Siltation	4A	TMDLs for sedimentation and E. coli.
San Juan River (Cañon Largo to Navajo Reservoir)	20.6.4.405		2	None
San Juan River (Navajo bnd at Hogback to Animas River)	20.6.4.401	Escherichia coli| Sedimentation/ Siltation|Turbidity	5/5C	TMDL for E. coli
Shumway Arroyo (San Juan River to Ute Mtn Ute bnd)	20.6.4.98		2	None
Stevens Arroyo (Perennial prts San Juan R to headwaters)	20.6.4.99		2	None

2.2 Objectives

Table 3 outlines the project objectives that have been identified to meet the various needs within the SWQB. Data needs have been determined based on impairments from previous studies, identified data gaps, and consultation with SWQB MASS, PSRS, and WPS staff as well as other state agencies, federal agencies, tribes, local watershed groups, and interested parties.

Table 3. Project Objectives

	Purpose for Water Quality Data Collection	Question to be answered	Products/ Outcomes	Decision Criteria
Primary Objective	Assess designated use attainment for the *Integrated Report* and provide information to the public on the condition of surface waters	Are sampled waterbodies meeting WQS criteria?	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
	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, *Integrated Report (De-Listing)*	WQS as interpreted by the Assessment Protocols
	Develop or refine the WQS	Are the existing uses appropriate for the waterbody?	Use Attainability Analyses (UAA); Amendments to 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 meetings were held to receive input on any areas of concern within the AUs surveyed and to inform interested parties about the SWQB water quality survey process, specific sampling plans in the watershed, and the assessment and TMDL processes.

Water chemistry results typically take several months to return from the analytical laboratory, the New Mexico Scientific Laboratory Division (SLD). When these data are received, they are verified and validated according to SWQB SOPs. Once all data have been received, validated, and verified, the data will be assessed according to assessment protocols in time for incorporation into the 2020-2022 IR List. Once the assessments are complete, the TMDL development process will begin for any identified impairments.

The progress of this project was 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 2016-2017	Spring 2017	Summer 2017	Fall 2017	Winter 2017-2018	Spring 2018	Summer 2018	Fall 2018	Winter 2018-2019	Spring 2019	Fall 2019
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 survey includes the San Juan River from the Navajo Tribal boundary to the Colorado border. Some of the major tributaries included in this study are the Animas River, La Plata River, and the Navajo River. Lake sampling was conducted at Navajo Reservoir and Lake Farmington. Table 5 shows a complete list of stations as presented in Figure 2 – Figure 3.

Figure 1. 2017-2018 San Juan survey area shown in red.

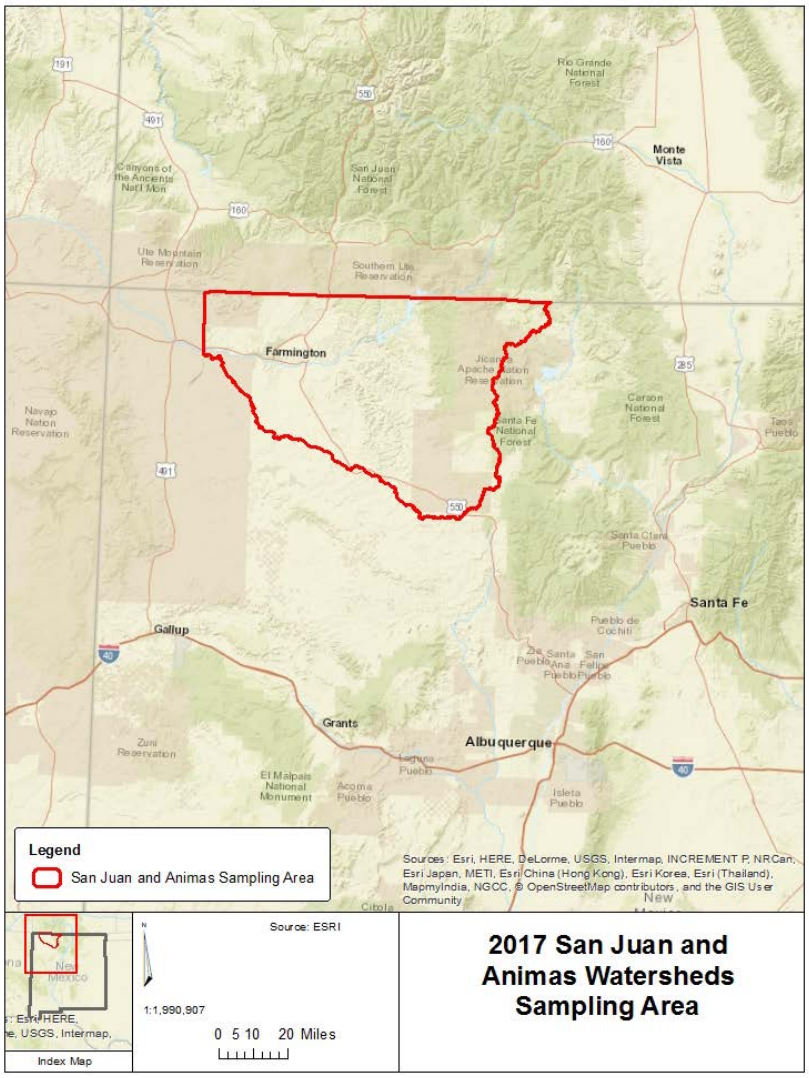


Table 5. Water Quality Stations: San Juan Watershed Survey 2017-2018

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
1	ANIMAS R AT FARMINGTON - 66Animas001.7	66Animas001.7	Animas River (San Juan River to Estes Arroyo)	Bottom of AU. Impairment.
2	Animas River 0.5 mi blw state line - 66Animas057.0	66Animas057.0	Animas River (Estes Arroyo to So. Ute Indian Tribe bnd)	Water entering NM.
3	Animas River above Estes Arroyo - 66Animas028.1	66Animas028.1	Animas River (Estes Arroyo to So. Ute Indian Tribe bnd)	Bottom of AU. Impairment. Above WWTP.
4	Animas River at CR 350 Bridge - 66Animas017.4	66Animas017.4	Animas River (San Juan River to Estes Arroyo)	Below WWTP.
5	Aztec WWTP - NM0020168	NM0020168	Animas River (San Juan River to Estes Arroyo)	WWTP
6	BLOOMFIELD WWTP OUTFALL - NM0020770	NM0020770	San Juan River (Animas River to Canon Largo)	WWTP.
7	FARMINGTON WASTEWATER PLANT - NM0020583	NM0020583-M	San Juan River (Navajo bnd at Hogback to Animas River)	WWTP.
8	Gallegos Canyon at San Juan River - 64Galleg000.4	64Galleg000.4	Gallegos Canyon (San Juan River to Navajo bnd)	Only station in AU. Impairment
9	La Plata at Farmington City Park - 67LaPlat002.3	67LaPlat002.3	La Plata River (San Juan River to McDermott Arroyo)	Bottom of AU. Impairment.
10	LA PLATA RIVER AT LA PLATA, NM - 67LaPlat024.8	67LaPlat024.8	La Plata R (McDermott Arroyo to So. Ute Indian Tribe bnd)	Bottom of AU. Impairment.
11	LAKE FARMINGTON DEEP - 66LkFarmiDeep	66LkFarmiDeep	Lake Farmington (Beeline Reservoir)	Lake. Drinking water supply. Recreation lake. Impairment
12	Los Pinos above Navajo Reservoir	64LosPin021.7	Los Pinos River (Navajo Reservoir to CO border)	Lake inlet.
13	NAVAJO LAKE AT SIMS MESA MARINA - 64NavajoLkSim	64NavajoLkSim	Navajo Reservoir	Recreation lake. Impairment.
14	NAVAJO RESERVOIR AT GOOSENECK - 64NavajoLkGoo	64NavajoLkGoo	Navajo Reservoir	Recreation lake. Impairment.

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
15	NAVAJO RESERVOIR TOWARDS THE DAM - 64NavajoLkDam	64NavajoLkDam	Navajo Reservoir	Recreation lake. Impairment.
16	Navajo River upstream of Jicarilla Bnd - 64Navajo022.1	64Navajo022.1	Navajo River (Jicarilla Apache Nation to CO border)	Impairment. Only station in AU.
17	San Juan Below Navajo Lake - 64SanJua171.9	64SanJua171.9	San Juan River (Canon Largo to Navajo Reservoir)	Lake outlet.
18	SAN JUAN R AT HOGBACK - 67SanJua065.3	67SanJua065.3	San Juan River (Navajo bnd at Hogback to Animas River)	Bottom of AU. Impairment.
19	San Juan River 0.5 mile above NM Border - 64SanJua226.2	64SanJua226.2	San Juan River (New Mexico portion above Navajo Reservoir)	Lake inlet.
20	San Juan River abv Animas - 64SanJua101.6	64SanJua101.6	San Juan River (Animas River to Canon Largo)	Bottom of AU. Impairment.
21	SAN JUAN RIVER AT BLOOMFIELD BRIDGE - 64SanJua126.2	64SanJua126.2	San Juan River (Animas River to Canon Largo)	Above WWTP.
22	SAN JUAN RIVER AT BRIDGE NEAR BLANCO - 64SanJua144.8	64SanJua144.8	San Juan River (Canon Largo to Navajo Reservoir)	Bottom of AU.
23	San Juan River at Lions Park near Kirtland - 67SanJua088.1	67SanJua088.1	San Juan River (Navajo bnd at Hogback to Animas River)	Below WWTP.
24	San Juan River at McGee Park - 64SanJua113.5	64SanJua113.5	San Juan River (Animas River to Canon Largo)	Below WWTP.
25	Shumway at Hwy 64 bridge - 67Shumwa002.4	67Shumwa002.4	Shumway Arroyo (San Juan River to Ute Mtn Ute bnd)	Bottom of AU.
26	Stevens Arroyo below CR 6100 - 67SteveArroyo	67Steven000.7	Stevens Arroyo (Perennial prts San Juan R to headwaters)	Bottom of AU.

Figure 2. Western project area and sampling locations.

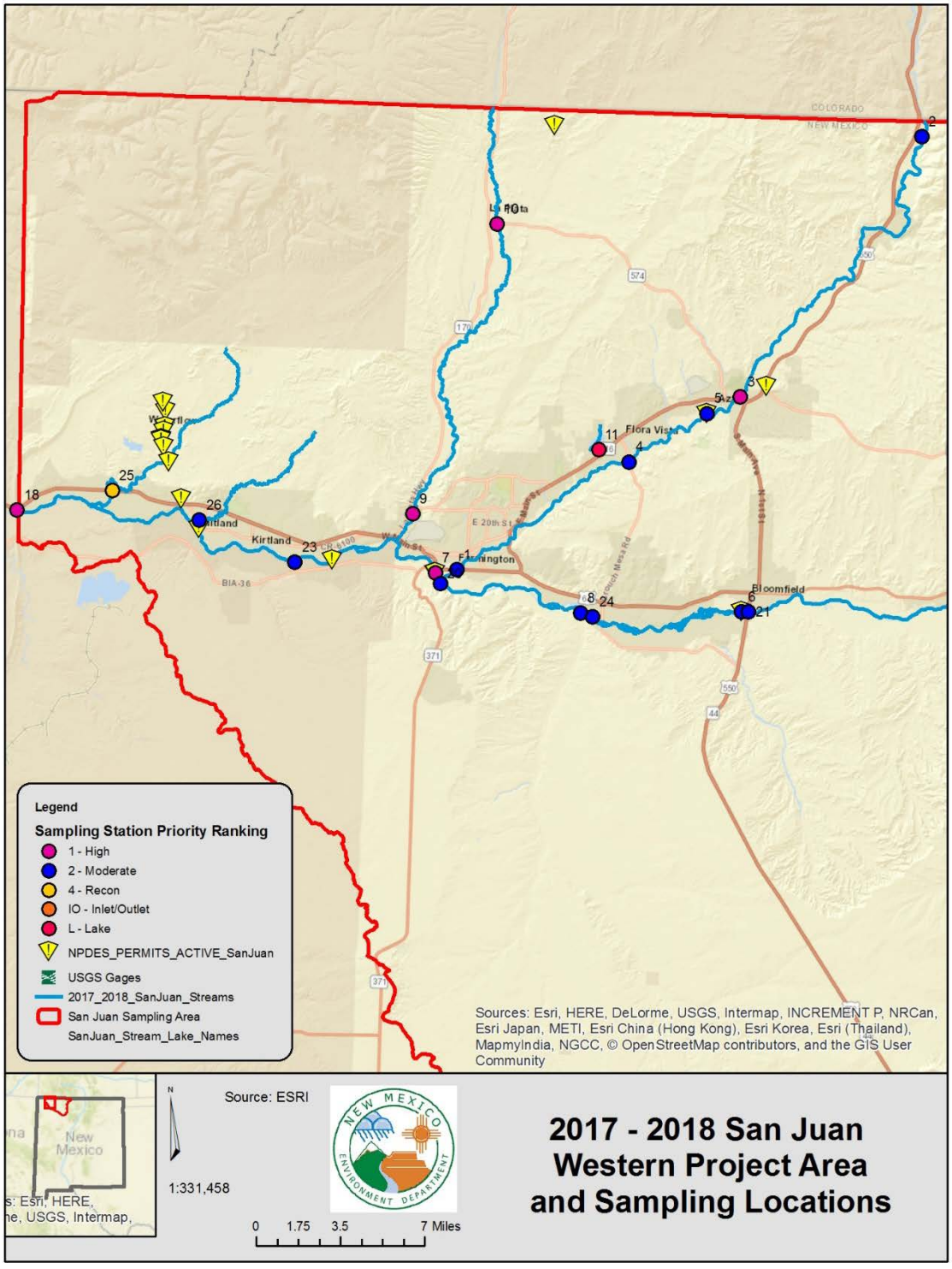
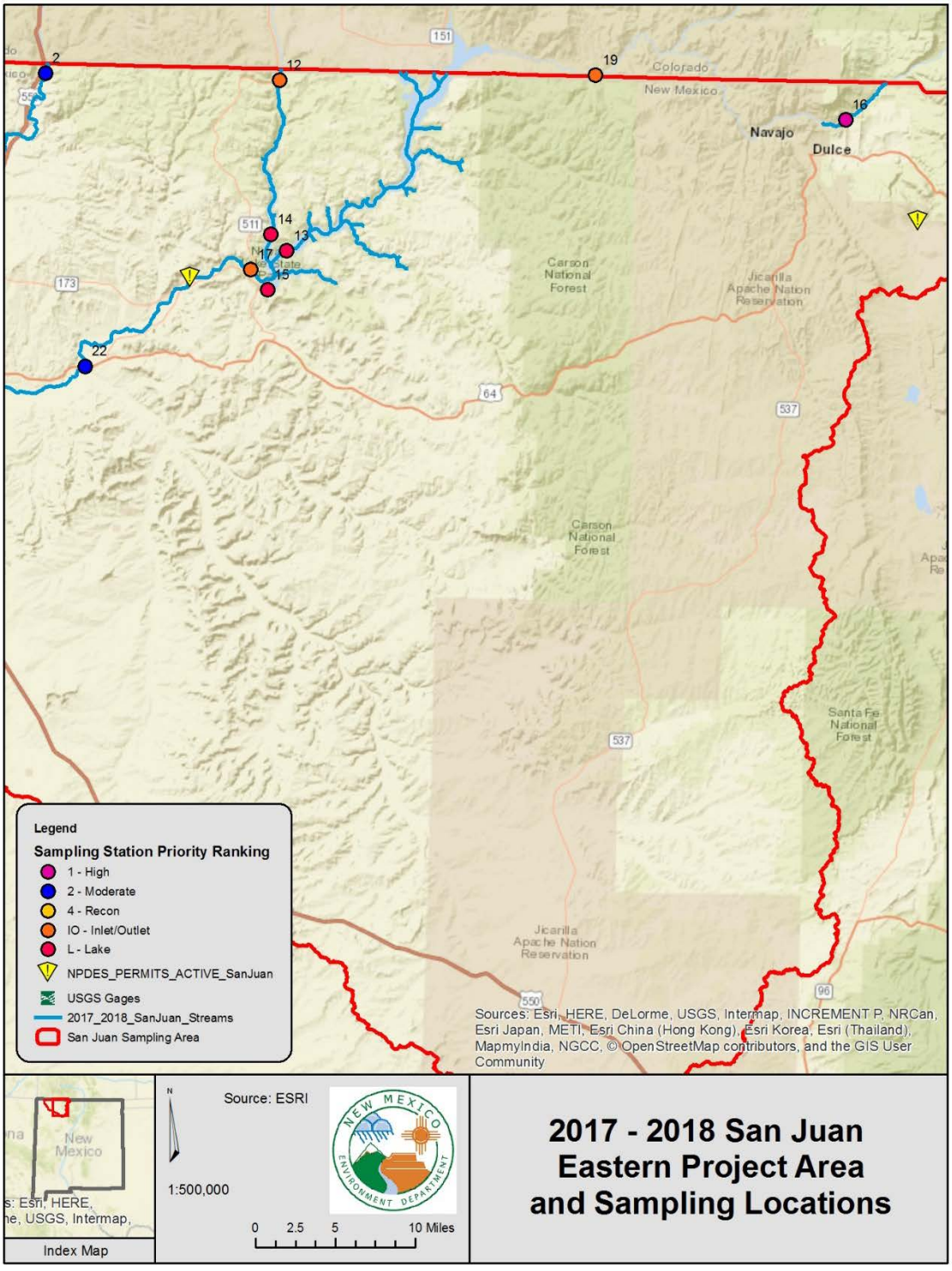


Figure 3. Eastern project area and sampling locations.



3.0 DOCUMENTATION

Project documents include the Field Sampling Plan for the project (SWQB 2018b), probable source sheets, calibration records, field sheets (including sonde and thermograph deployment/retrieval sheets), electronic data logger downloads, data validation and verification records, sample collection data, lab submittal forms, and records of analytical data in hard copy or in electronic form. Documents were maintained in accordance with the requirements of the SWQB QAPP.

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

Project activities were documented in SWQB Monitoring Field Sheets. Information from field sheets were entered in the SWQB database or maintained in the Project Coordinator's survey files at the conclusion of the project. Analytical results were electronically transferred into the Bureau's database and uploaded to US EPA'S Water Quality Exchange database. The project is completed with the publication of this Survey Report.

4.0 SAMPLING SUMMARY

4.1 Methods

All data were collected in accordance with procedures documented in the SWQB Quality Assurance Project Plan (QAPP; NMED/SWQB 2016b) and the applicable SWQB Standard Operating Procedures for Data Collection available at https://www.env.nm.gov/surface-water-quality/protocols-and-planning/. Water quality samples were submitted to the SLD or processed in the SWQB laboratory in accordance with procedures as outlined in the SWQB SOPs.

4.2 Chemistry Sampling

For the survey, one chemical sampling station was planned near the lower end of each AU, access permitting, and at actively discharging NPDES permit locations in the watershed. Additional stations were located to document the conditions downstream of potential pollution sources and where AU or water quality standards revisions are recommended. Stations from previous surveys were used whenever possible to evaluate trends. Water samples for chemical analyses were submitted to the New Mexico Scientific Laboratory Division (SLD). E. coli samples were processed in the SWQB laboratory or with mobile equipment. Table 6 outlines the water quality analytes measured and the sampling conducted for each analyte during the two-year survey. In addition to the analytes listed, field parameters (temperature, specific conductance, salinity, dissolved oxygen concentration, dissolved oxygen saturation, pH, and turbidity) were measured at each site using a multi-parameter sonde.

Table 6. Summary of Chemistry Sampling 2017-2018

Map #	Station name	TDS/TSS		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Total Metals[1]		Dissolved Metals[2]		*Total Coliforms and E. Coli*		Volatile Organic Compounds[3]		Semi-volatile Organics[3]		Radionuclides[4]	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
1	[5]ANIMAS R AT FARMINGTON - 66Animas001.7	8	9	8	9	6	6	6	6	8	9	2	2	2	2	2	2
2	[5]Animas River 0.5 mi blw state line - 66Animas057.0	8	9	8	9	6	6	6	6	8	9						
3	[5]Animas River above Estes Arroyo - 66Animas028.1	10	10	10	10	6	8	6	8	10	10						
4	Animas River at CR 350 Bridge - 66Animas017.4	8	8	8	8					8	8						
5	Aztec WWTP - NM0020168	8	8	8	8	4	4	4	4	8	7						
6	BLOOMFIELD WWTP OUTFALL - NM0020770	8	8	8	8	4	4	4	4	8	8						
7	FARMINGTON WASTEWATER PLANT - NM0020583	10	10	10	10	6	6	6	6	10	10						
8	Gallegos Canyon at San Juan River - 64Galleg000.4	8	7	8	7	4	3	4	2	8	7						
9	La Plata at Farmington City Park - 67LaPlat002.3	10	8	10	8	6	6	6	6	10	8	2	2	2	2	2	2
10	LA PLATA RIVER AT LA PLATA, NM - 67LaPlat024.8	10	9	10	9	6	6	6	6	10	9						
11	LAKE FARMINGTON DEEP - 66LkFarmiDeep	6	5	6	5	4	4	4	4	6	5	2	3	2	3	2	2
12	Los Piños River above Navajo Reservoir - 64LosPin021.7	6	6	6	6	4	5	4	5	6	6						
13	NAVAJO LAKE AT SIMS MESA MARINA - 64NavajoLkSim	6	5	6	5					6	4						
14	NAVAJO RESERVOIR AT GOOSENECK - 64NavajoLkGoo	6	5	6	5					6	4						
15	NAVAJO RESERVOIR TOWARDS THE DAM - 64NavajoLkDam	6	5	6	5	4	5	4	5	6	4	2	2	2	2	2	2
16	Navajo River upstream of Jicarilla Bnd - 64Navajo022.1	10	10	10	10	6	6	6	6	10	10						
17	San Juan Below Navajo Lake - 64SanJua171.9	6	6	6	6	4	5	4	5	6	6						
18	[5]SAN JUAN R AT HOGBACK - 67SanJua065.3	10	10	10	10	6	8	6	8	10	10	2	2	2	2	2	2

Map #	Station name	TDS/TSS		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Total Metals[1]		Dissolved Metals[2]		*Total Coliforms and E. Coli*		Volatile Organic Compounds[3]		Semi-volatile Organics[3]		Radionuclides[4]	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
19	San Juan River 0.5 mile above NM Border - 64SanJua226.2	6	6	6	6	4	5	4	5	6	6						
20	San Juan River abv Animas - 64SanJua101.6	8	8	8	8	4	4	4	4	8	8						
21	SAN JUAN RIVER AT BLOOMFIELD BRIDGE - 64SanJua126.2	8	8	8	8	4	4	4	4	8	8						
22	SAN JUAN RIVER AT BRIDGE NEAR BLANCO - 64SanJua144.8	8	8	8	8	4	4	4	4	8	8						
23	San Juan River at Lions Park near Kirtland - 67SanJua088.1	8	8	8	8					8	8						
24	San Juan River at McGee Park - 64SanJua113.5	8	8	8	8					8	8						
25	Shumway at Hwy 64 bridge - 67Shumwa002.4		6		6		4		4		6						
26	Stevens Arroyo below CR 6100 - 67Steven000.7	8	7	8	7	4	4	4	4	8	7						
	Totals	198	197	198	197	96	107	96	106	198	193	10	11	10	11	10	10
	Percent Completed	99.5		99.5		111.5		110.4		97.5		110.0		110.0		100.0	

[1] Suite includes aluminum, mercury, selenium

[2] Suite includes aluminum, antimony, arsenic, barium, boron, beryllium, calcium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, mercury, magnesium, nickel, selenium, silicon, silver, thallium, tin, uranium, vanadium and zinc.

[3] See Appendix B for a complete list of analytes.

[4] Radionuclide samples include gross alpha and gross beta and depending on detections may include Uranium mass and Radium 226 + 228.

[5] Additional analytes were sampled at Map # 1,2,3, and 18 to assist with Bonita Peak Mining District sampling efforts. Total Metals suite includes aluminum, antimony, arsenic, barium, boron, beryllium, calcium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, mercury, magnesium, nickel, selenium, silicon, silver, thallium, tin, uranium, vanadium, zinc, iron, sodium, and potassium. Dissolved Metals suite adds iron, sodium, silicon, and potassium to the existing suite. SWQB Anions suite includes alkalinity, chloride, sulfate, TDS, TSS.

4.3 Long-term Dataset, Biological, and Physical Habitat Sampling

Temperature data loggers (thermographs) were deployed at strategic locations within the study area to record maximum and maximum-duration temperature data. Multi-parameter data loggers (sondes) were deployed at stations in selected assessment units primarily to examine diel fluxes in pH and dissolved oxygen (DO) and to record turbidity data for assessment against maximum-duration thresholds. Thermographs and sondes were programmed to record at 15-minute intervals. Chlorophyll and phytoplankton data were collected at lake stations for nutrient assessments. The EMAP boatable method was used to collect biological and habitat data in the San Juan River because the river is too large to

effectively wade. This method entails floating a length of river approximately 40 times the average width of the river. Average width of a representative reach in each assessment unit was estimated from satellite imagery obtained from Google™ Earth. Sampling was conducted at the beginning of the sampled reach and again at each tenth of the sampled reach for a total of 11 transects. Although not initially planned for the survey, periphyton and benthic macroinvertebrates samples were collected to aid in the development of assessment methods for nutrients and benthic macroinvertebrate communities in large rivers. Table 7 summarizes the long-term, biological, and physical habitat sampling conducted during the survey.

Table 7. Summary of Long-Term Deployment, Biological and Physical Habitat Sampling 2017-2018

Map #	Station Name	Sonde/DO Deployment		Thermograph		Flow		Physical Habitat		Chlorophyll a		Phytoplankton		Periphyton-diatoms		Macro-invertrebrates		Fish Tissue	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
1	ANIMAS R AT FARMINGTON - 66Animas001.7	2	1			10	9												
2	Animas River 0.5 mi blw state line - 66Animas057.0					8	9												
3	Animas River above Estes Arroyo - 66Animas028.1	2	1			10	9												
4	Animas River at CR 350 Bridge - 66Animas017.4					8	8												
5	Aztec WWTP - NM0020168																		
6	BLOOMFIELD WWTP OUTFALL - NM0020770																		
7	FARMINGTON WASTEWATER PLANT - NM0020583																		
8	Gallegos Canyon at San Juan River - 64Galleg000.4			2	1	8	8	1											
9	La Plata at Farmington City Park - 67LaPlat002.3	2		2	2	10	10	1											
10	LA PLATA RIVER AT LA PLATA, NM - 67LaPlat024.8	2	1	2	2	10	10	1											
11	LAKE FARMINGTON DEEP - 66LkFarmiDeep									6	5	6	5					1	1
12	Los Piños above Navajo Reservoir	2		2	2	6	5												
13	NAVAJO LAKE AT SIMS MESA MARINA - 64NavajoLkSim									6	5	6	5						
14	NAVAJO RESERVOIR AT GOOSENECK - 64NavajoLkGoo									6	5	6	5						
15	NAVAJO RESERVOIR TOWARDS THE DAM - 64NavajoLkDam									6	5	6	5					1	
16	Navajo River upstream of Jicarilla Bnd - 64Navajo022.1	2	1	2	2	10	10	1											
17	San Juan Below Navajo Lake					6	5												

Map #	Station Name	Sonde/DO Deployment		Thermograph		Flow		Physical Habitat		Chlorophyll a		Phytoplankton		Periphyton-diatoms		Macro-invertebrates		Fish Tissue	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
18	SAN JUAN R AT HOGBACK - 67SanJua065.3	2	1			10	9												
19	San Juan River 0.5 mile above NM Border - 64SanJua226.2					6	5												
20	San Juan River abv Animas - 64SanJua101.6	2			1	10	8												
21	SAN JUAN RIVER AT BLOOMFIELD BRIDGE - 64SanJua126.2					8	7												
22	SAN JUAN RIVER AT BRIDGE NEAR BLANCO - 64SanJua144.8			2	1	10	8												
23	San Juan River at Lions Park near Kirtland - 67SanJua088.1					8	8												
24	San Juan River at McGee Park - 64SanJua113.5		1			8	8												
25	Shumway at Hwy 64 bridge - 67Shumwa002.4				2		6												
26	Stevens Arroyo below CR 6100 - 67SteveArroyo		1	2	2	8	7	1											
	Totals	16	7	14	15	154	149	5	0	24	20	24	20					2	1
	Percent Completed	43.8%		107.1%		96.8%		0.0%		83.3%		83.3%						50.0%	

4.4 Deviations from the 2017-2018 Field Sampling Plan

Minor deviations from the 2017-2018 San Juan River Field Sampling Plan were necessary as a result of dry conditions. Gallegos Canyon and La Plata River at Farmington had insufficient water to sample in August 2018. Additional chemical sampling was conducted at high priority stations.

Significant deviation from the Field Sampling Plan occurred in the following areas:

- Sonde/DO Deployment – Several stations originally planned for deployment were at active USGS gages that could provide the needed information; thus, these deployments were reduced. Deployments planned for the La Plata River at Farmington could not be completed due to insufficient water depth.
- Physical Habitat – Scouring events prevented completion of Physical Habitat monitoring in 2017 and resource limitations prevented rescheduling in 2018.
- Fish Tissue – Resource limitations resulted in a prioritization of sampling in Lake Farmington.
- Lake Sampling – A boat malfunction prevented sampling on one of the planned sampling runs. Due to resource limitations, staff were unable to schedule a replacement sampling event.

5.0 Summary

The data from this project will be assessed to determine the impairment status of the sampled waters. The assessments are conducted in accordance with the Comprehensive Assessment and Listing Methodology which is available on the SWQB website at https://www.env.nm.gov/surface-water-quality/calm/. Assessment conclusions will be incorporated into the 2020-2022 Integrated Report, which is planned for completion in 2020 and will be posted to the SWQB website at https://www.env.nm.gov/surface-water-quality/303d-305b/. In cases where impairments to water and habitat quality are found or confirmed, data from this survey will be used to draft TMDL planning documents.

To supplement data collected for this project, SWQB accepts readily available water quality data submitted from outside sources that meet SWQB QA/QC review and documentation requirements. Data from outside sources will undergo review by the SWQB QA Officer to ensure only data meeting specific requirements are used for assessment purposes.

The data from the 2017-2018 survey have been validated and verified according to SWQB SOP (NMED/SWQB 2016c) and have been uploaded to USEPA's Water Quality Portal via The Water Quality Exchange (WQX). To download this dataset, visit the Water Quality Portal at https://www.waterqualitydata.us/portal/ and query Organization ID *21NMEX_WQX* and HUC *140801*, or click on this link. For assistance with queries to the portal, please contact the Project Coordinators listed in Table 1. The data collected during this survey are also available by public records request to the SWQB.

6.0 References

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APPENDIX A: Integrated Report Categories

IR (Integrated Report) Category: Overall water quality standards attainment category for each assessment unit as determined by combining individual designated use support decisions. The unique assessment categories for New Mexico are described as follows:

IR Category 1 Attaining the water quality standards for all designated and existing uses. AUs are listed in this category if there are data and information that meet all requirements of the assessment and listing methodology and support a determination that the water quality criteria are attained.

IR Category 2 Attaining some of the designated or existing uses based on numeric and narrative parameters that were tested, and no reliable monitored data is available to determine if the remaining uses are attained or threatened. AUs are listed in this category if there are data and information that meet requirements of the assessment and listing methodology to support a determination that some, but not all, uses are attained based on numeric and narrative water quality criteria that were tested. Attainment status of the remaining uses is unknown because there is no reliable monitored data with which to make a determination.

IR Category 3 Insufficient or no reliable data and/or information to determine if any designated or existing use is attained. AUs are listed in this category where sufficient data to support an attainment determination for any use are not available, consistent with requirements of the assessment and listing methodology. In order to relay additional information to stakeholders including SWQB staff, Category 3 is further broken down in New Mexico into the following categories:

3A. Limited data available, no exceedences. AUs are listed in this subcategory when there are no exceedences in the limited data set. These are considered low priority for follow up monitoring.

3B. Limited data available, exceedence. AUs are listed in this subcategory when there is an exceedence in the limited data set. These are considered high priority for follow up monitoring.

IR Category 4A Impaired for one or more designated uses but does not require development of a TMDL because a TMDL has been completed. AUs are listed in this subcategory once all TMDL(s) have been developed and approved by USEPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of an AU, the AU remains in Category 5A (see below) until all TMDLs for each pollutant have been completed and approved by USEPA.

IR Category 4B Impaired for one or more designated uses but does not require development of a TMDL because other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future. Consistent with the regulation under 40 CFR 130.7(b)(i),(ii), and (iii), AUs are listed in this subcategory where other pollution control requirements required by local, state, or federal authority are

stringent enough to implement any water quality standard (WQS) applicable to such waters.

IR Category 4C Impaired for one or more designated uses but does not require development of a TMDL because impairment is not caused by a pollutant. AUs are listed in this subcategory if a pollutant does not cause the impairment. For example, USEPA considers flow alteration to be "pollution" vs. a "pollutant."

IR Category 5A Impaired for one or more designated or existing uses and a TMDL is underway or scheduled. AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant. Where more than one pollutant is associated with the impairment of a single AU, the AU remains in Category 5A until TMDLs for all pollutants have been completed and approved by USEPA.

IR Category 5B Impaired for one or more designated or existing uses and a review of the water quality standard will be conducted. AUs are listed in this category when it is possible that water quality standards are not being met because one or more current designated use is inappropriate. After a review of the water quality standard is conducted, a Use Attainability Analysis (UAA) will be developed and submitted to USEPA for consideration, or the AU will be moved to Category 5A and a TMDL will be scheduled.

IR Category 5C Impaired for one or more designated or existing uses and additional data will be collected before a TMDL is scheduled. AUs are listed in this category if there is not enough data to determine the pollutant of concern or there is not adequate data to develop a TMDL. For example, AUs with biological impairment will be listed in this category until further research can determine the pollutant(s) of concern. When the pollutant(s) are determined, the AU will be moved to Category 5A and a TMDL will be scheduled. If it is determined that the current designated uses are inappropriate, it will be moved to Category 5B and a UAA will be developed. If it is determined that "pollution" is causing the impairment (vs. a "pollutant"), the AU will be moved to Category 4C.

APPENDIX B: Volatile and Semi-Volatile Organic Analytical Suite

Organics (semi-volatiles)	Organics (volatiles)
1,2,4-Trichlorobenzene	1,1,1,2-Tetrachloroethane
1,2-Dichlorobenzene	1,1,1-Trichloroethane
1,2-Dinitrobenzene	1,1,2,2-Tetrachloroethane
1,3-Dichlorobenzene	1,1,2-Trichloroethane
1,3-Dinitrobenzene	1,1-Dichloroethane
1,4-Dichlorobenzene	1,1-Dichloroethene
1,4-Dinitrobenzene	1,1-Dichloropropene
1-Methylnaphthalene	1,2,3-Trichlorobenzene
2,3,4,6-Tetrachlorophenol	1,2,3-Trichloropropane
2,3,5,6-Tetrachlorophenol	1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol	1,2,4-Trimethylbenzene
2,4,6-Trichlorophenol	1,2-Dibromo-3-chloropropane (DBCP)
2,4-Dichlorophenol	1,2-Dibromoethane (EDB)
2,4-Dimethylphenol	1,2-Dichlorobenzene
2,4-Dinitrophenol	1,2-Dichloroethane
2,4-Dinitrotoluene	1,2-Dichloropropane
2,6-Dinitrotoluene	1,3,5-Trimethylbenzene
2-Chloronaphthalene	1,3-Dichlorobenzene
2-Chlorophenol	1,3-Dichloropropane
2-Methylnaphthalene	1,4-Dichlorobenzene
2-Methylphenol	1,4-Dioxane
2-Nitroaniline	2,2-Dichloropropane
2-Nitrophenol	2-Butanone (MEK)
3,3'-Dichlorobenzidine	2-Chloroethyl vinyl ether
3-Methylphenol & 4-Methylphenol	2-Chlorotoluene
3-Nitroaniline	2-Hexanone
4,4'-DDD	4-Chlorotoluene
4,4'-DDE	4-Isopropyltoluene
4,4'-DDT	4-Methyl-2-pentanone
4,6-Dinitro-2-methylphenol	Acetone
4-Bromophenyl Phenyl Ether	Acetonitrile
4-Chloro-3-methylphenol	Acrolein
4-Chloroaniline	Acrylonitrile
4-Chlorophenyl Phenyl Ether	Allyl chloride
4-Nitroaniline	Benzene
4-Nitrophenol	Bromobenzene
Acenaphthene	Bromochloromethane
Acenaphthylene	Bromodichloromethane
Alachlor	Bromoform
Aldrin	Bromomethane
alpha-BHC	Carbon disulfide
Aniline	Carbon tetrachloride
Anthracene	Chlorobenzene

Organics (semi-volatiles)	Organics (volatiles)
Atrazine	Chloroethane
Azobenzene	Chloroform
Benzidine	Chloromethane
Benzo(a)anthracene	Chloroprene
Benzo(a)pyrene	cis-1,2-Dichloroethene
Benzo(b)fluoranthene	cis-1,3-Dichloropropene
Benzo(g,h,i)perylene	cis-1,4-Dichloro-2-butene
Benzo(k)fluoranthene	Dibromochloromethane
Benzyl alcohol	Dibromomethane
beta-BHC	Dichlorodifluoromethane
bis(2-Chloroethoxy)methane	Ethyl methacrylate
bis(2-Chloroethyl)ether	Ethylbenzene
bis(2-Chloroisopropyl)ether	Hexachlorobutadiene
bis(2-Ethylhexyl)adipate	Iodomethane
bis(2-Ethylhexyl)phthalate	Isobutyl alcohol
Butyl Benzyl Phthalate	Isopropylbenzene
Carbazole	m- & p-Xylenes
Chrysene	Methyl methacrylate
cis-Chlordane	Methylacrylonitrile
Cyanazine	Methylene chloride (Dichloromethane)
delta-BHC	Naphthalene
Dibenz(a,h)anthracene	n-Butylbenzene
Dibenzofuran	Nitrobenzene
Dieldrin	o-Xylene
Diethylphthalate	Pentachloroethane
Dimethylphthalate	Propionitrile
Di-n-butyl Phthalate	Propylbenzene
Di-n-octyl phthalate	sec-Butylbenzene
Endosulfan I	Styrene
Endosulfan II	tert-Butyl methyl ether (MTBE)
Endosulfan sulfate	tert-Butylbenzene
Endrin	Tetrachloroethene
Endrin aldehyde	Tetrahydrofuran (THF)
Endrin ketone	Toluene
Fluoranthene	Total trihalomethanes
Fluorene	Total xylenes
gamma-BHC (lindane)	trans-1,2-Dichloroethene
Heptachlor	trans-1,3-Dichloropropene
Heptachlor epoxide	trans-1,4-Dichloro-2-butene
Hexachlorobenzene	Trichloroethene
Hexachlorobutadiene	Trichlorofluoromethane
Hexachlorocyclopentadiene	Vinyl acetate
Hexachloroethane	Vinyl chloride
Indeno(1,2,3-cd)pyrene	
Isophorone	

Organics (semi-volatiles)	Organics (volatiles)
Methoxychlor	
Metolachlor	
Metribuzin	
Naphthalene	
Nitrobenzene	
N-nitrosodimethylamine	
N-nitroso-di-n-propylamine	
N-nitrosodiphenylamine	
Pentachlorophenol	
Phenanthrene	
Phenol	
Prometryne	
Pyrene	
Pyridine	
Simazine	
trans-Chlordane	