WATER QUALITY SURVEY SUMMARY

FOR THE

LOWER RIO GRANDE WATERSHED

2019-2020

Rio Grande at Las Cruces

Prepared by
Surface Water Quality Bureau
New Mexico Environment Department

November 2021

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.

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ACRONYMS

AU	Assessment Unit
BLM	Bureau of Land Management
CALM	Comprehensive Assessment and Listing Methodology
CWA	Clean Water Act
IR	State of New Mexico Clean Water Act §303(d)/305(b) Integrated Report
MASS	Monitoring, Assessment, and Standards Section
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Non-point Source
PCB	Polychlorinated biphenyl
PSRS	Point Source Regulation Section
QAPP	Quality Assurance Project Plan
SLD	Scientific Laboratory Division
SOP	Standard Operating Procedure
SWQB	Surface Water Quality Bureau
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USEPA	United States Environmental Protection Agency
USFWS	United States Forest Service
WPS	Watershed Protection Section
WQ	Water Quality
WQCC	Water Quality Control Commission
WQS	Water Quality Standards
WTU	Work Time Unit
WWTP	Wastewater Treatment Plant

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 are publicly available to interested parties by making a formal request to the SWQB Monitoring, Assessment, and Standards Section or by downloading from the Environmental Protection Agency's Water Quality Data Portal[1]. 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. Assessment conclusions are published in the State of New Mexico 303(d)/305(b) Integrated Report, available from the SWQB website[2].

The project area includes the Lower Rio Grande from Elephant Butte Reservoir to the New Mexico border **(Figure 1**). Lake sampling was conducted at Elephant Butte and Caballo reservoirs. Elephant Butte and the Rio Grande flowing into the reservoir were included in this survey due to the proximity to Caballo Reservoir. The survey area encompasses the 8-digit Hydrologic Unit Code 13030102 and part of 13020211.

Historic and current land uses in the watershed include ranching, silviculture, recreation, mining, and urban and residential development. Land cover in the watershed is composed of shrub/scrubland, grassland, deciduous and mixed forest, cultivated crops and lotic waters and wetlands. Land ownership in the watershed includes U.S. Forest Service, U.S. Fish and Wildlife Service, New Mexico State Parks, New Mexico Department of Game and Fish, Bureau of Land Management (BLM), Bureau of Reclamation (BOR), Department of Defense (DOD), and State and Private parcels. The study area encompasses approximately 8,008 square miles (~20,740 square kilometers) in New Mexico. The watershed is located in Omernik Level III Ecoregion 23 (Arizona/New Mexico Mountains) in the headwaters and Level III Ecoregion 24 (Chihuahuan Deserts) in the lowlands (USEPA 2006).

The SWQB divides rivers and streams 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 2016). Monitoring activities conducted at each site are summarized in **Tables 6** and **7**.

[1] https://www.waterqualitydata.us/portal/

[2] https://www.env.nm.gov/surface-water-quality/303d-305b/

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	Program Manager	Approves FSP, directs staff to publish the FSP according to program and/or grant requirements. Manages project personnel and resources throughout the project in coordination with Project Manager(s) Provides oversight and coordinates with QAO and Project Manager(s) on any data collection activities conducted not in accordance with the FSP, QAPP, or current SOPs. Conducts environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs.

Team Member	Position/Role	Responsibilities
Charles Dentino Monitoring Team Supervisor Charles.Dentino1@state.nm.us (505) 946-8868	Project Manager	Manages project personnel and resources throughout the project in coordination with Program Manager. Conduct environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs. Any data collection activities not conducted in accordance with the FSP, QAPP, or current SOPs are documented and reported to the Program Manager and QAO. Conducts mid-project meeting with team to discuss any changes to the project plan. Coordinates and conducts post-project meeting with team to discuss differences between planned and actual sampling and what data gaps, if any, exist. Writes, coordinates, and assembles report and/or other grant deliverables required of the project.
Jonathan Celmer Monitoring Team Scientist Jonathan.Celmer@state.nm.us (505) 946-8808 Eliza Martinez Monitoring Team Scientist Eliza.Montoya@state.nm.us (505) 819-8099	Project Team	Conduct environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs. Any data collection activities not conducted in accordance with the FSP, QAPP, or current SOPs are documented and reported to the Project Manager. Writes assigned sections of reports and/or other grant deliverables required throughout the project.
Miguel Montoya Miguel.Montoya@state.nm.us (505) 819-9882	QAO	Approves and ensures FSP is retained in accordance with 1.21.2 NMAC, Retention and Disposition of Public Records. Conducts audits as needed to ensure compliance with FSP, QAPP and SOPs.

Team Member	Position/Role	Responsibilities
Jennifer Fullam Jennifer.Fullam@state.nm.us (505) 946-8954	Standards, Planning and Reporting Team (SPRT) Liaison	Provide information and data needs pertaining to water quality standards development and refinement located within the study area.
Heidi Henderson Heidi.Henderson@state.nm.us (505) 819-9986	TMDL and Assessment Team (TAT) Liaison	Provide information and data needs pertaining to TMDL development and assessment to be conducted in the study area.
Susan Lucas-Kamat Susan.LucasKamat@state.nm.us (505) 946-8924	Point Source Regulation Section (PSRS) Liaison	Provide information and data needs pertaining to point source discharges located within the study area.
Abe Franklin Abraham.Franklin@state.nm.us (505) 946-8952	Watershed Protection Section (WPS) Liaison	Provide information and data needs pertaining to nonpoint sources of pollution and BMPs located within the study area.

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 water quality standards (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 2018c). Impairments for AUs in this survey area were identified during SWQB's previous surveys of this watershed, most recently conducted in 2004 and 2011, and include assessments based on data from a variety of other investigations. **Table 2** lists the AU impairment status for surveyed waterbodies in the IR current during the development of the FSP for this survey (NMED/SWQB 2018a). The "IR Category" column provides the AU status from the 2018-2020 IR (see Appendix A for definitions). "Water Quality Section" provides the applicable WQS section 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 2020a). 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 occurs on a ten-year watershed rotation, meaning a given waterbody is generally surveyed intensively, on average, every ten 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 AU is represented by a small number of monitoring stations (often only one), each of which receives 4-8 site visits during the survey.

The monitoring described in this report was planned and documented in a Field Sampling Plan published in 2019 and amended in 2020 (SWQB 2020). The FSP was prepared in accordance with SWQB Standard Operating Procedure 2.1: Field Sampling Plan Development and Execution (NMED/SWQB 2019). 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, the SWQB utilized a two-tier monitoring system – primary and secondary – was developed to prioritize AUs. High ranking priority waters (primary AUs) received a greater amount of monitoring, whereas lower ranking waters (*i.e.*, tertiary AUs) received fewer. 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. 2021) and are opened for the EPA and the public to review and comment as part of the update process. The SWQB reports its assessment conclusions every even year (e.g. 2022) on the State's IR List and subsequently develops TMDLs or TMDL alternatives for listed AUs.

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

Assessment Unit Name	WQS Reference	IR Category	Impairments	TMDL Completed
Burn Lake (Dona Ana)	20.6.4.99	1		
Caballo Reservoir	20.6.4.104	5/5C	Mercury - Fish Consumption Advisory|Nutrients	
Cuchillo Negro Creek (Rio Grande to Willow Spring Draw)	20.6.4.98	3/3A		
Elephant Butte Reservoir	20.6.4.104	5/5C	Mercury - Fish Consumption Advisory|PCBS - Fish Consumption Advisory	
Las Animas Ck (perennial prt Animas Gulch to headwaters)	20.6.4.103	5/5C	Benthic Macroinvertebrates|Dissolved oxygen	
Las Animas Ck (perennial prt R Grande to Animas Gulch)	20.6.4.103	3/3A		
Palomas Creek (perennial portion R Grande to N and S Forks)	20.6.4.103	1		
Percha Ck (Perennial prt Caballo Rsvr to Wicks Gulch)	20.6.4.103	3/3A		
Percha Ck (Perennial prt Wicks Gulch to Middle Percha Ck)	20.6.4.103	1		
Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	20.6.4.101	4A	E. coli	E. coli
Rio Grande (Caballo Reservoir to Elephant Butte Reservoir)	20.6.4.103	5/5C	Dissolved oxygen	
Rio Grande (Elephant Butte Rsvr to San Marcial at USGS)	20.6.4.105	5/5A	Aluminum, Total Recoverable	
Rio Grande (International Mexico bnd to Anthony Bridge)	20.6.4.101	5/5A	Boron, Dissolved|E. coli	E. coli
Rio Grande (Leasburg Dam to one mile below Percha Dam)	20.6.4.101	4A	E. coli	E. coli
Rio Grande (NM192 bridge W of Mesquite to Picacho Bridge)	20.6.4.101	1		E. coli
Rio Grande (one mile below Percha Dam to Caballo Reservoir)	20.6.4.102	1		
Rio Grande (Picacho Bridge to Leasburg Dam)	20.6.4.101	1		E. coli
South Fork Las Cruces Arroyo (Las Cruces Arroyo to hdwtrs)	20.6.4.98	3/3A		
Tierra Blanca Creek (Rio Grande to headwaters)	20.6.4.98	2		

2.2 Objectives

Table 3 outlines the project objectives that have been identified to meet the various needs within the SWQB. The SWQB determined its data needs 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?

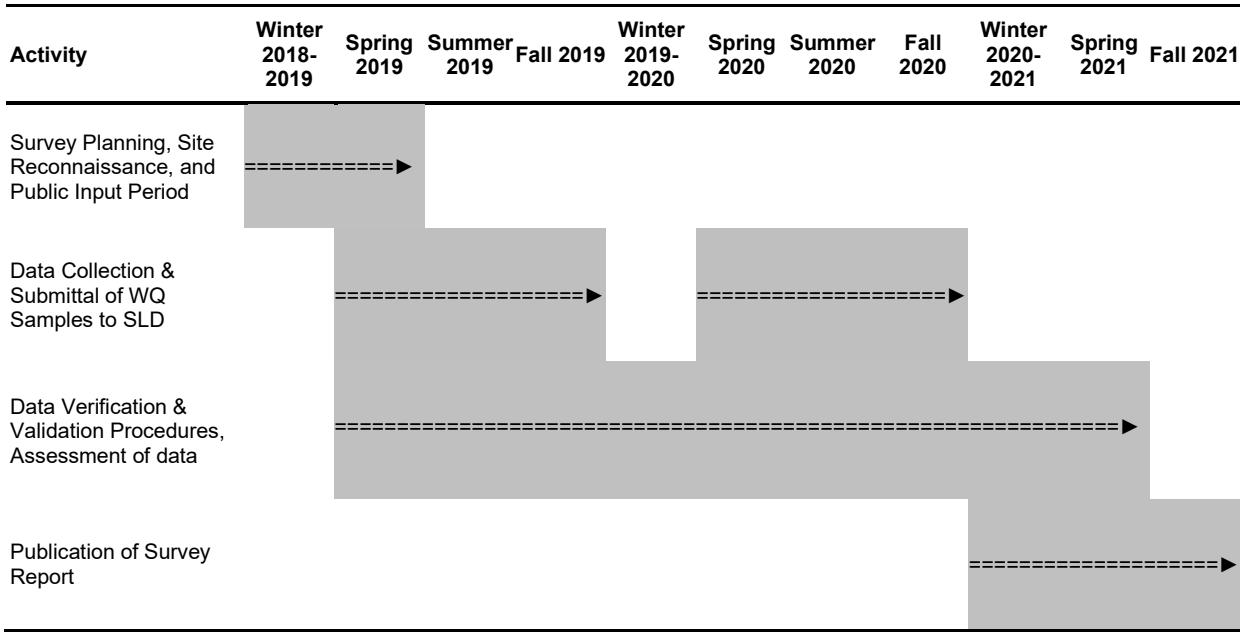
2.3 Schedule

As part of the survey planning process, the SWQB held public meetings 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). The SWQB verified and validated field and laboratory data according to SWQB SOPs. These data form the bulk of information used to update the assessment conclusions in the 2022-2024 IR List. Following EPA-approval of the IR, the SWQB will begin the TMDL development process in 2022 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 were performed in accordance with all applicable requirements and in a cost-effective manner. **Table 4** provides the project timeline.

Table 4. Project Schedule



2.4 Project Location

The survey includes the Lower Rio Grande, and associated tributaries, from just above Elephant Butte Reservoir south to the New Mexico border. Some of the major tributaries included in this study are Las Animas and Percha Creeks. Lake sampling was conducted at Elephant Butte and Caballo Reservoirs. **Table 5** lists the water quality stations in the survey and **Figures 2-3** show sub-watersheds within the survey area.

Figure 1. 2019-2020 Survey Area

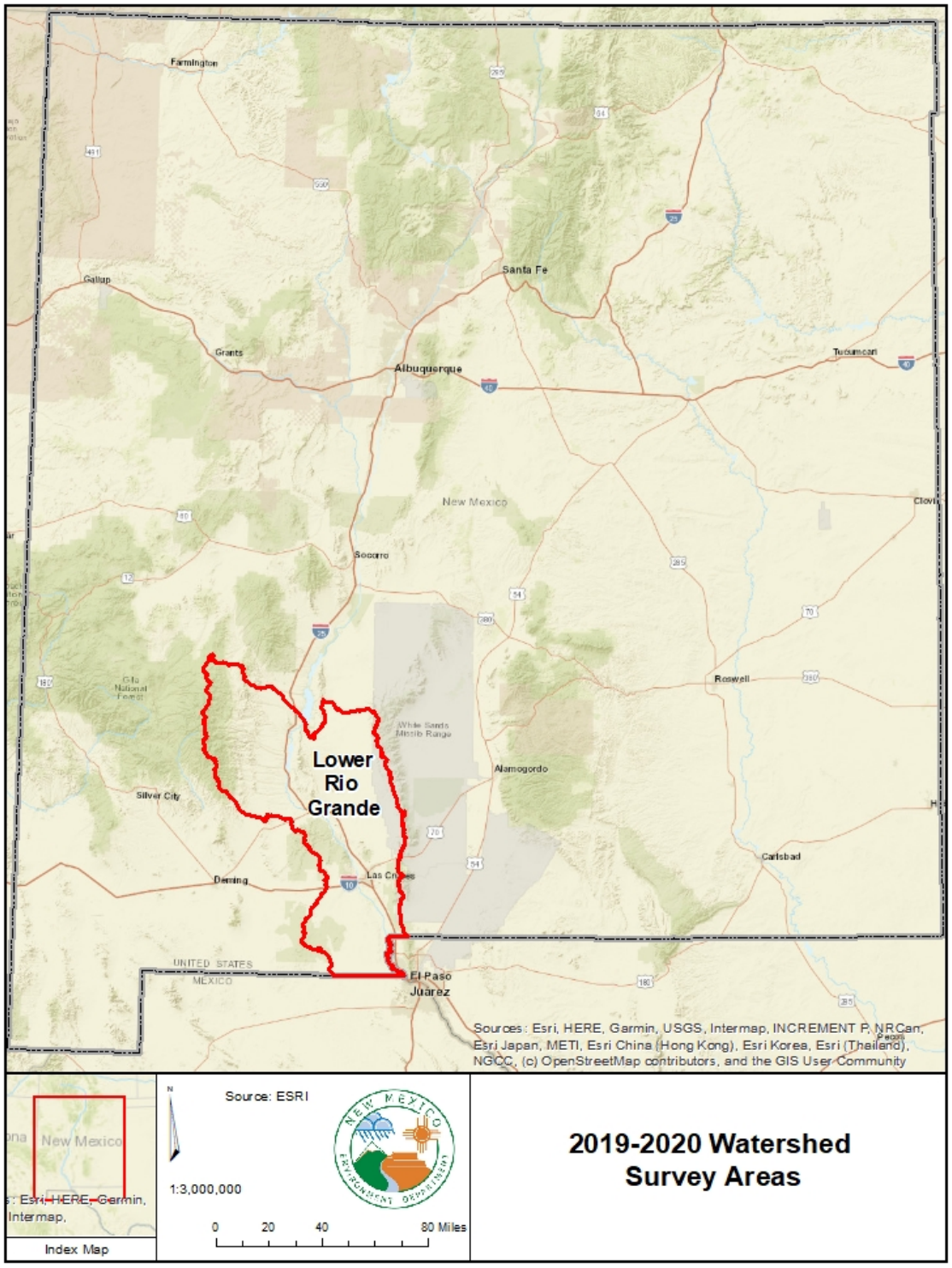


Table 5. Water Quality Stations: Lower Rio Grande Watershed Survey 2019-2020

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
1	CABALLO LAKE AT DAM DEEP - 41CaballoLkDam	41CaballoLkDam	Caballo Reservoir	Nutrients
2	CABALLO LAKE AT KELLY POINT SHALLOW - 41CaballoLkSh	41CaballoLkSh	Caballo Reservoir	Nutrients
3	Sierra County Regional WWTP - NM0030864	NM0030864	Cuchillo Negro Creek (Rio Grande to Willow Spring Draw)	NPDES permit
4	E BUTTE AT DAM - 40EButteReDam	40EButteReDam	Elephant Butte Reservoir	Major reservoir
5	Elephant Butte Reservoir at Rock Canyon - 40EButteRockC	40EButteRockC	Elephant Butte Reservoir	Major reservoir
6	Las Animas Cr abv Animas Gulch - 41LAnima020.0	41LAnima020.0	Las Animas Ck (perennial prt Animas Gulch to headwaters)	AU impaired for BMI/DO, possible WQS change
7	Las Animas Cr at Animas Rd Ford - 41LAnima009.0	41LAnima009.0	Las Animas Ck (perennial prt R Grande to Animas Gulch)	Unassessed; need new station. possible WQS change
8	Palomas Cr abv Diversion - 41Paloma027.9	41Paloma027.9	Palomas Creek (perennial portion R Grande to headwaters)	Possible WQS change
9	Percha Creek at Percha Box - 41Percha025.3	41Percha025.3	Percha Ck (Perennial prt Wicks Gulch to Middle Percha Ck)	Significant tributary
10	ANTHONY WATER AND SANITATION - NM0029629	NM0029629	Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	AU impaired for E. coli, NPDES permit, batch discharge
11	Gadsden Independent School District - NM0028487	NM0028487	Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	AU impaired for E. coli, NPDES permit
12	RIO GRANDE AT NM-225 BRIDGE NR ANTHONY, NM - 42RGrand030.8	42RGrand030.8	Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	AU impaired for E. coli
13	South Central Regional WWTP - NM0030490	NM0030490	Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	AU impaired for E. coli; batch discharge
14	Rio Grande blw Truth or Consequences WWTP - 41RGrand205.4	41RGrand205.4	Rio Grande (Caballo Reservoir to Elephant Butte Reservoir)	inlet/river station, AU impaired for DO
15	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE - 41RGrand217.5	41RGrand217.5	Rio Grande (Caballo Reservoir to Elephant Butte Reservoir)	outlet/river station, AU impaired for DO
16	T OR C WASTEWATER TREATMENT PLANT DISCHARGE - NM0020681	NM0020681-C	Rio Grande (Caballo Reservoir to Elephant Butte Reservoir)	AU impaired for DO, NPDES permit

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
17	Rio Grande above E Butte - 40RGrand254.7	40RGrand254.7	Rio Grande (Elephant Butte Rsvr to San Marcial at USGS)	inlet; AU impaired for total recoverable Al
18	El Paso Electric Co. Outfall No. 2 - NM0000108-2	NM0000108-2	Rio Grande (International Mexico bnd to Anthony Bridge)	NPDES permit, AU impaired for boron, E. coli
19	El Paso Electric Co. Outfall No.1 - NM0000108-1	NM0000108-1	Rio Grande (International Mexico bnd to Anthony Bridge)	NPDES permit, AU impaired for Boron/E. coli
20	Montoya Drain at Racetrack Dr. – 42Montoy000.7	42Montoy000.7	Rio Grande (International Mexico bnd to Anthony Bridge)	Above NPDES discharge
121	RIO GRANDE AT CORCHESNE BRIDGE- 42RGrand002.7	42RGrand002.7	Rio Grande (International Mexico bnd to Anthony Bridge)	AU impaired for Boron/E. coli.
22	Rio Grande blw Sunland Park WWTP outfall - 42RGrand004.3	42RGrand004.3	Rio Grande (International Mexico bnd to Anthony Bridge)	Above NPDES discharge and Montoya Drain
23	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL - 42RGrand004.7	42RGrand004.7	Rio Grande (International Mexico bnd to Anthony Bridge)	Above NPDES discharge and Montoya Drain
24	Sunland Park WWTP effluent - NM0029483	NM0029483-C	Rio Grande (International Mexico bnd to Anthony Bridge)	NPDES permit, AU impaired for boron, E. coli
25	Sunland Park WWTP effluent - north	NM0031178	Rio Grande (International Mexico bnd to Anthony Bridge)	NPDES permit, second outfall
26	HATCH WASTEWATER PLANT - NM0020010	NM0020010	Rio Grande (Leasburg Dam to one mile below Percha Dam)	NPDES permit, AU impaired for E. coli
27	Rio Grande at Leasburg Dam, NM - 42RGrand099.8	42RGrand099.8	Rio Grande (Leasburg Dam to one mile below Percha Dam)	AU impaired for E. coli
28	Salem WWTP - NM0030457	NM0030457	Rio Grande (Leasburg Dam to one mile below Percha Dam)	AU impaired for E. coli; batch discharge
29	LAS CRUCES WASTEWATER PLANT - NM0023311	NM0023311	Rio Grande (NM192 bridge W of Mesquite to Picacho Bridge)	NPDES permit, TMDL for E. coli
30	Rio Grande @ NM 192 nr Mesquite	42RGrand052.2	Rio Grande (NM192 bridge W of Mesquite to Picacho Bridge)	NPDES permit, TMDL for E. coli
31	RIO GRANDE BLW CABALLO DAM,NM - 42RGrand171.9	42RGrand171.9	Rio Grande (one mile below Percha Dam to Caballo Reservoir)	Lake outlet
32	RIO GRANDE AT PICACHO AVE IN LAS CRUCES - 42RGrand073.5	42RGrand073.5	Rio Grande (Picacho Bridge to Leasburg Dam)	TMDL for E. coli

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
33	Las Cruces, City of/East Mesa Water Reclamation Facility - NM0030872	NM0030872	South Fork Las Cruces Arroyo (Las Cruces Arroyo to hdwtrs)	Monitor to confirm lack of discharge
34	RIO GRANDE ABOVE CABALLO LAKE - 41RGrand196.6	41RGrand196.6	Rio Grande (Caballo Reservoir to Elephant Butte Reservoir)	inlet/river station, AU impaired for DO

Figure 2. Lower Rio Grande: northern sampling area and monitoring locations

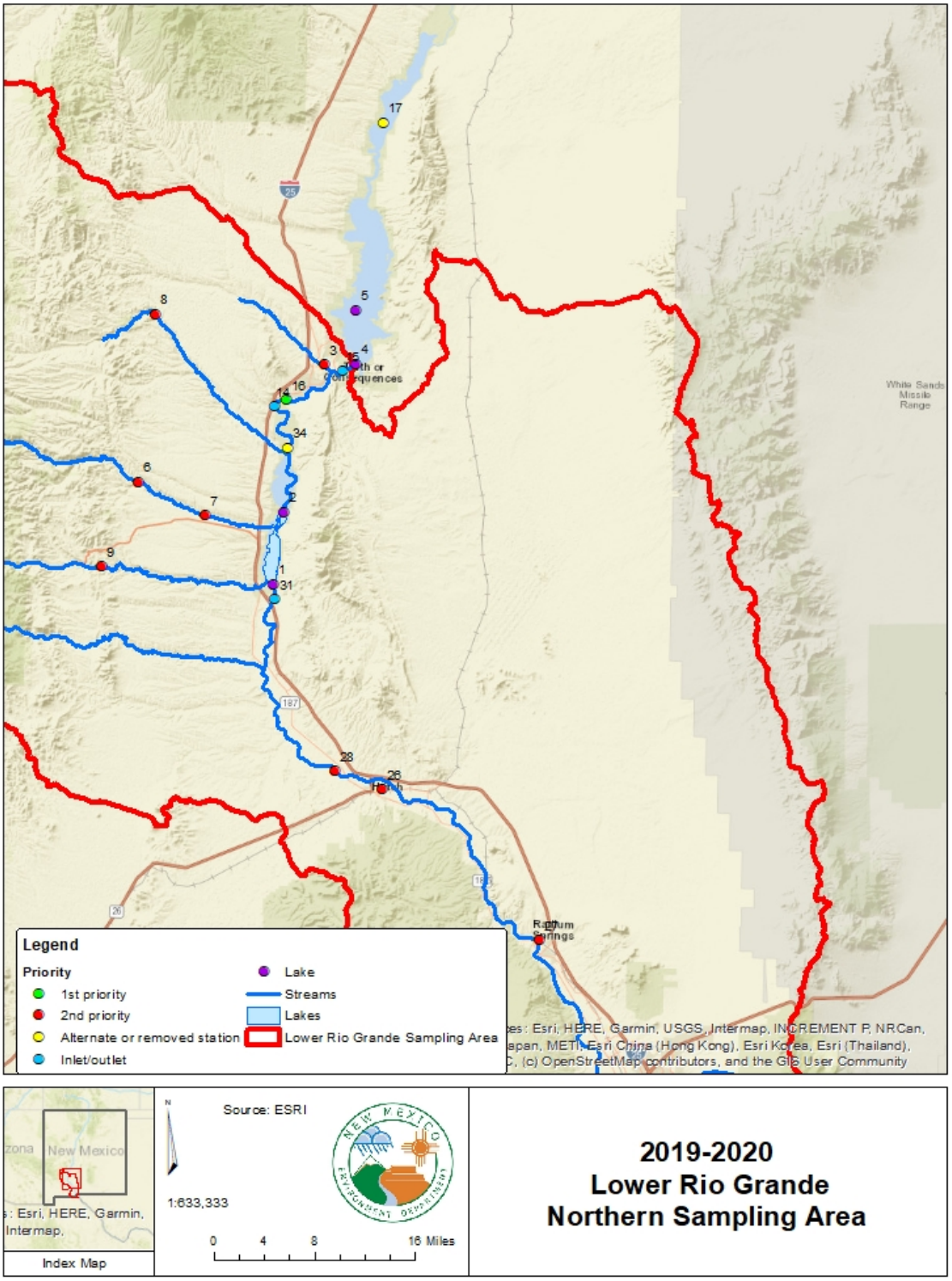
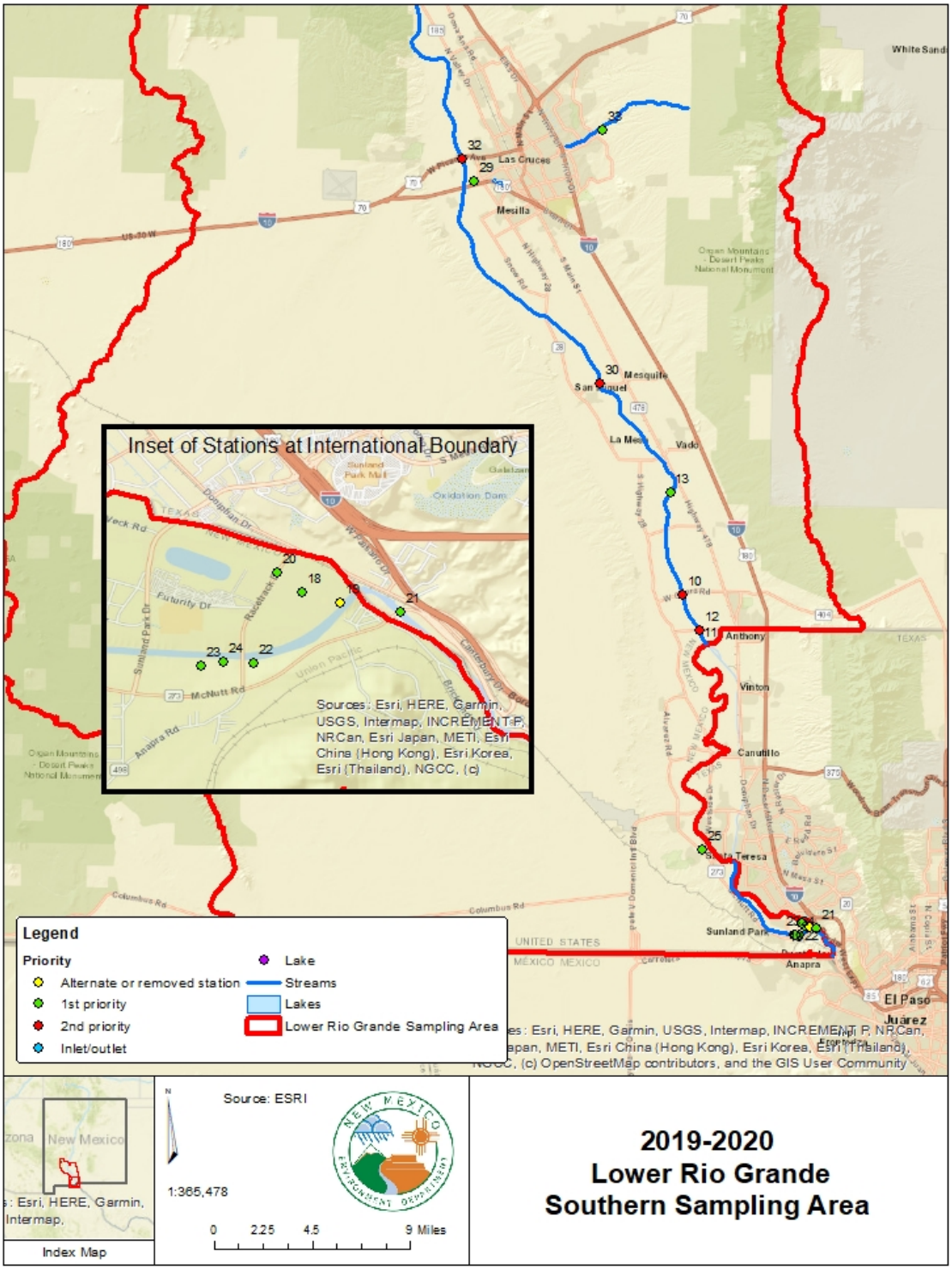


Figure 3. Lower Rio Grande: southern sampling area and monitoring locations



3.0 DOCUMENTATION

Project documents include the field sampling plan, 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 are maintained in accordance with the requirements of the SWQB Quality Assurance Project Plan (QAPP; NMED/SWQB 2018b).
Project documentation includes narrative descriptions of progress throughout the life of the project relating to planning and implementation efforts, including deviations from the original FSP and issues that developed along with any associated corrective actions.

Project activities were documented in SWQB Monitoring Field Sheets. Information from field sheets are 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 finalization of this Survey Report.

4.0 SAMPLING PLAN

4.1 Methods

All data were collected in accordance with procedures documented in the SWQB QAPP (NMED/SWQB 2018b) 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. Water Chemistry Sampling Frequency

Map #	Station Name	TSS/TDS/Cl/ S04		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		SWQB E Coli		Volatile Organics[3]		Semi-Volatile Organics[4]		Radionuclides[5]	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
1	CABALLO LAKE AT DAM DEEP - 41CaballoLkDam	4	4	4	4	2		4	4	4	4	4	4	2	2	2	2	2	2
2	Caballo Lake Shallow - 41CaballoLkSha	2	1	2	1	2		2	1	2	1	2	1						
3	Sierra County Regional WWTP - NM0030864	3	3	3	3	1						3	3						
4	E BUTTE AT DAM - 40EButteReDam	4	4	4	4	2		4	4	4	4	4	4	2	2	2	2	2	2
5	Elephant Butte Reservoir at Rock Canyon - 40EButteRockC	2	1	2	1	2		2	1	2	1	2	1						
6	Las Animas Cr abv Animas Gulch - 41LAnima020.0	4		4		2						4							
7	Las Animas Cr at Animas Rd Ford - 41LAnima009.0	4	2	4	2	2						4	2						
8	Palomas Cr abv Diversion - 41Paloma027.9	4		4		2						4							
9	Percha Creek at Percha Box - 41Percha025.3	4	2	4	2	2						4	2						
10	ANTHONY WATER AND SANITATION - NM0029629	3	2	3	2	2						3	2						
11	Gadsden Independent School District - NM0028487	3	2	3	2							3	2						
12	RIO GRANDE AT NM-225 BRIDGE NR ANTHONY, NM - 42RGrand030.8	6	2	6	2	2						6	2						
13	South Central Regional WWTP - NM0030490	6	4	6	4	2		6	4	6	4	6	4	2	1	2	1		
14	Rio Grande blw Truth or Consequences WWTP - 41RGrand205.4	8	7	8	7	2			3		3	8	7						
15	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE - 41RGrand217.5	4	2	4	2	2		4	2	4	2	4	2						
16	T OR C WASTEWATER TREATMENT PLANT DISCHARGE - NM0020681	6	4	6	4	2		6	4	6	4	6	4						

Map #	Station Name	TSS/TDS/Cl/ S04		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		SWQB E Coli		Volatile Organics[3]		Semi-Volatile Organics[4]		Radionuclides[5]	
17	Rio Grande above Elephant Butte - 40RGrand254.7	4	3	4	3	2		4	3	4	2	4	3						
18	El Paso Electric Co. Outfall No. 2 - NM0000108-2	6	4			2		6	4	6	4								
19	El Paso Electric Co. Outfall No.1 - NM0000108-1																		
20	Montoya Drain at Racetrack Dr. - 42Montoy000.7	6	3	6	4	2		6	4	6	4	6	4	3	2	3	2	3	2
21	RIO GRANDE AT CORCHESNE BRIDGE- 42RGrand002.7	8	4	8	4	6		8	4	8	4	8	4	4	2	4	2	4	2
22	Rio Grande blw Sunland Park WWTP outfall - 42RGrand004.3	4	4	4	4			4	4	4	4	4	4	1	1	1	1	1	1
23	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL - 42RGrand004.7	4	3	4	3	4		4	3	4	3	4	3	1		1		1	
24	Sunland Park WWTP effluent - NM0029483	6	4	6	4	1		6	4	6	4	6	4						
25	Sunland Park North WWTP effluent - NM0031178	6	4	6	4	1		6	4	6	4	6	4	2	1	2	1		
26	HATCH WASTEWATER PLANT - NM0020010	3	1	3	1	1						3	1						
27	Rio Grande at Leasburg Dam, NM - 42RGrand099.8	6	2	6	2	2						6	2						
28	Salem WWTP - NM0030457	3	2	3	2	1						3	2						
29	LAS CRUCES WASTEWATER PLANT - NM0023311	6	4	6	4	1		6	4	6	4	6	4	2	1	2	1		
30	Rio Grande @ NM 192 nr Mesquite - 42RGrand052.2	6	2	6	2	2						6	2						
31	RIO GRANDE BLW CABALLO DAM,NM - 42RGrand171.9	4	3	4	3	2		4	3	4	3	4	3						
32	RIO GRANDE AT PICACHO AVE IN LAS CRUCES - 42RGrand073.5	6	2	6	2	2						6	2						
33	Las Cruces, City of/East Mesa Water Reclamation Facility - NM0030872	6	3	6	3	1		6	3	6	3	6	3	2	1	2	1		
34	RIO GRANDE ABOVE CABALLO LAKE - 41RGrand196.6		1		1								1						

Map #	Station Name	TSS/TDS/Cl/ S04		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		SWQB E Coli		Volatile Organics[3]		Semi-Volatile Organics[4]		Radionuclides[5]	
Sampling Totals		151	89	145	86	59	0	88	63	88	62	145	86	21	13	21	13	13	9
Percent Completed		58.9		59.3		0.0		71.6		70.5		59.3		61.9		61.9		69.2	

[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.

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. Thermographs and conductivity loggers were deployed season long (approximately May to October). Sondes and DO loggers were deployed for a minimum of 7 days with the maximum being 14 to 21 days to avoid sensor fouling and drift. Chlorophyll and phytoplankton data were collected at lake stations for nutrient assessments. **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 2019-2020

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin	
1	CABALLO LAKE AT DAM DEEP - 41CaballoLkDam															4	4	2	3
2	Caballo Lake Shallow - 41CaballoLkSha															2	1	2	1
3	Sierra County Regional WWTP - NM0030864																		
4	E BUTTE AT DAM - 40EButteReDam															4	4	2	2
5	Elephant Butte Reservoir at Rock Canyon - 40EButteRockC															2	1	2	1
6	Las Animas Cr abv Animas Gulch - 41LAnima020.0									1		4							
7	Las Animas Cr at Animas Rd Ford - 41LAnima009.0	1		1		1		1		1	1	4	2						
8	Palomas Cr abv Diversion - 41Paloma027.9	1		1		1		1		1		4							
9	Percha Creek at Percha Box - 41Percha025.3									1	1	4	2						
10	ANTHONY WATER AND SANITATION - NM0029629																		
11	Gadsden Independent School District - NM0028487																		
12	RIO GRANDE AT NM-225 BRIDGE NR ANTHONY, NM - 42RGrand030.8											4	3						
13	South Central Regional WWTP - NM0030490																		
14	Rio Grande blw Truth or Consequences WWTP - 41RGrand205.4	1		1		1		1		1		8	7						
15	RIO GRANDE BELOW E. BUTTE DAM AT USGS GAGE - 41RGrand217.5	1		1		1		1				8	3						
16	T OR C WASTEWATER TREATMENT PLANT DISCHARGE - NM0020681																		
17	Rio Grande above Elephant Butte - 40RGrand254.7											4	3						
18	El Paso Electric Co. Outfall No. 2 - NM0000108-2																		

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin	
19	El Paso Electric Co. Outfall No.1 - NM0000108-1																		
20	Montoya Drain at Racetrack Dr. - 42Montoy000.7												4						
21	RIO GRANDE AT CORCHESNE BRIDGE- 42RGrand002.7											8	4						
22	Rio Grande blw Sunland Park WWTP outfall - 42RGrand004.3											8	4						
23	RIO GRANDE ABV SUNLAND PARK WWTF OUTFALL - 42RGrand004.7												3						
24	Sunland Park WWTP effluent - NM0029483																		
25	Sunland Park North WWTP effluent - NM0031178																		
26	HATCH WASTEWATER PLANT - NM0020010																		
27	Rio Grande at Leasburg Dam, NM - 42RGrand099.8											4	2						
28	Salem WWTP - NM0030457																		
29	LAS CRUCES WASTEWATER PLANT - NM0023311																		
30	Rio Grande @ NM 192 nr Mesquite - 42RGrand052.2											4	3						
31	RIO GRANDE BLW CABALLO DAM,NM - 42RGrand171.9											4	3						
32	RIO GRANDE AT PICACHO AVE IN LAS CRUCES - 42RGrand073.5											4	3						
33	Las Cruces, City of/East Mesa Water Reclamation Facility - NM0030872																		
34	RIO GRANDE ABOVE CABALLO LAKE - 41RGrand196.6												1						
Sampling Totals		4	0	4	0	4	0	4	0	5	2	72	47	0	0	12	10	8	7
Percent Completed		0.0		0.0		0.0		0.0		40.0		65.3		0.0		83.3		87.5	

4.3.1 Sonde/DO/Conductivity Sampling

Although scheduled at four stations, sample collection was not completed due to resource limitations and COVID-19 restrictions.

4.4 Deviations from the 2019-2020 Field Sampling Plan

Major reductions in the implementation of the 2019-2020 Upper Pecos River, San Francisco River, Gila River, Mimbres River, and Lower Rio Grande Field Sampling Plan were necessary as a result of dry conditions, resource limitations, and COVID-19 travel restrictions.

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 2022-2024 Integrated Report, which is planned for completion in 2022 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 or 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 2019-2020 survey have been validated and verified according to SWQB SOP (NMED/SWQB 2020c) 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 HUCs *13020211, 13030101 and 13030102* , 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 through a 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 exceedances. AUs are listed in this subcategory when there are no exceedances in the limited data set. These are considered low priority for follow up monitoring.

3B. Limited data available, exceedance. AUs are listed in this subcategory when there is an exceedance 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
Atrazine	Chloroethane
Azobenzene	Chloroform

Organics (semi-volatiles)	Organics (volatiles)
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	
Methoxychlor	
Metolachlor	
Metribuzin	
Naphthalene	
Nitrobenzene	
N-nitrosodimethylamine	

Organics (semi-volatiles)	Organics (volatiles)
N-nitroso-di-n-propylamine	
N-nitrosodiphenylamine	
Pentachlorophenol	
Phenanthrene	
Phenol	
Prometryne	
Pyrene	
Pyridine	
Simazine	
trans-Chlordane	