WATER QUALITY SURVEY SUMMARY

FOR THE

GILA, SAN FRANCISCO, AND MIMBRES RIVER WATERSHEDS

2019-2020

Snow Lake

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.

Table of Contents

WATER QUALITY SURVEY SUMMARY i
ACRONYMS iv
1.0 INTRODUCTION 5
1.1 PRINCIPAL INVESTIGATORS 6
Table 1. Personnel Roles and Responsibilities 6
2.0 PROJECT DESCRIPTION 8
2.1 BACKGROUND 8
Table 2. Impairment and TMDL Status of Survey Assessment Units (NMED/SWQB 2018a) 10
2.2 OBJECTIVES 12
Table 3. Project Objectives 13
2.3 SCHEDULE 13
Table 4. Project Schedule 14
2.4 PROJECT LOCATION 14
Figure 1. 2019-2020 Survey Area 15
Table 5. Water Quality Stations: Gila, Mimbres, and San Francisco Watershed Survey 2019-2020 16
Figure 2. Gila River, Mimbres River, and San Francisco River: northern sampling area and monitoring locations 20
Figure 3. Gila River, Mimbres River, and San Francisco River: southern sampling area and monitoring locations 21
3.0 DOCUMENTATION 22
4.0 SAMPLING PLAN 22
4.1 METHODS 22
4.2 CHEMISTRY SAMPLING 22
Table 6. Water Chemistry Sampling Frequency 23
4.3 LONG-TERM DATASET, BIOLOGICAL, AND PHYSICAL HABITAT SAMPLING 26
Table 7. Summary of Long-Term Deployment, Biological and Physical Habitat Sampling 2019-2020 26
4.4 DEVIATIONS FROM THE 2019-2020 FIELD SAMPLING PLAN 30
5.0 Summary 30
6.0 References 30
APPENDIX A: Integrated Report Categories 32
APPENDIX B: Volatile and Semi-Volatile Organic Analytical Suite 34

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 Gila River, Mimbres River, and San Francisco River watersheds (Figure 1). Lake sampling was conducted at Snow, Roberts, Bear, and Bill Evans.

Historic and current land uses in the watersheds include agriculture (range, pasture, and croplands), mining, 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 and private parcels. The study areas incorporate parts of the Gila River, Mimbres River and San Francisco River basins and together encompass approximately 25,088 square miles (64,978 square kilometers) in New Mexico. The watersheds are located in Omernik Level III Ecoregions 23 (Arizona/New Mexico Mountains), 24 (Chihuahuan Desert), and 79 (Madrean Archipegalo) (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	Provides 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	Provides 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	Provides 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	Provides 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 2007 and 2014, 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 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 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 (SWQB 2020) published in 2019 and amended in 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 – to prioritize AUs. High ranking priority waters (primary AUs) received a greater amount of monitoring, whereas low 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 is 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
Allie Canyon (Mimbres River to headwaters)	20.6.4.804	3/3A		
Apache Creek (Tularosa River to Hardcastle Canyon)	20.6.4.98	2		
Bear Canyon (Mimbres River to headwaters)	20.6.4.804	3/3A		
Bear Canyon Reservoir	20.6.4.806	5/5A	Mercury - Fish Consumption Advisory|Nutrients|Temperature	
Bear Creek (Gila River nr Cliff to headwaters)	20.6.4.502	2		
Beaver Creek (Perennial prt Taylor Ck to Mule Canyon)	20.6.4.503	5/5B	Temperature	
Bill Evans Lake	20.6.4.505	5/5C	Mercury - Fish Consumption Advisory|PCBS - Fish Consumption Advisory	
Bitter Creek (AZ border to headwaters)	20.6.4.98	3/3A		
Black Canyon Creek (East Fork Gila River to headwaters)	20.6.4.503	4A	Temperature	Temperature
Blue Creek (Gila River to headwaters)	20.6.4.502	2		
Burro Cienaga (Lordsburg Playa to headwaters)	20.6.4.98	3/3A		
Cameron Creek (San Vicente Arroyo to headwaters)	20.6.4.98	3/3A		
Canyon Creek (Middle Fork Gila River to headwaters)	20.6.4.503	4A	Nutrients|Turbidity	Nutrients|Turbidity
Carlisle Creek (Gila River to headwaters)	20.6.4.98	2		
Centerfire Creek (San Francisco R to headwaters)	20.6.4.603	5/5A	E. coli|Nutrients|Sedimentation/Siltation|Specific Conductance|Temperature|Turbidity	Specific Conductance|Nutrients|E. coli|Turbidity
Cold Springs Creek (Hot Springs Creek to headwaters)	20.6.4.803	4A	Cadmium, Dissolved|Lead, Dissolved	
Diamond Ck (Perennial prt Bailey Ck to headwaters)	20.6.4.503	1		
Diamond Ck (Perennial prt East Fork Gila R to Bailey Ck)	20.6.4.503	3/3A		
Dry Blue Creek (AZ bnd to headwaters)	20.6.4.603	3/3A		
East Fork Gila River (Gila River to headwaters)	20.6.4.503	5/5C	Benthic Macroinvertebrates	Aluminum
Gallinas Creek (Mimbres River to headwaters)	20.6.4.803	5/5C	Nutrients	
Gila River (AZ border to Red Rock)	20.6.4.501	5/5A	Temperature	
Gila River (Mangas Creek to Mogollon Creek)	20.6.4.502	5/5B	Temperature	
Gila River (Mogollon Ck to East and West Forks of Gila R)	20.6.4.502	5/5B	Temperature	
Gila River (Red Rock to Mangas Creek)	20.6.4.502	5/5C	Nutrients|Temperature	
Gilita Creek (Middle Fork Gila R to Willow Creek)	20.6.4.503	5/5A	Temperature	
Gilita Creek (Perennial reaches abv Willow Creek)	20.6.4.503	3/3A		

Assessment Unit Name	WQS Reference	IR Category	Impairments	TMDL Completed
Hanover Creek (Whitewater Creek to headwaters)	20.6.4.98	2		
Hot Springs Ck (Perennial prt of Mimbres R to headwaters)	20.6.4.803	3/3A		
Hoyt Creek (Wall Lake to headwaters)	20.6.4.98	3/3A		
Iron Creek (Middle Fork Gila R to headwaters)	20.6.4.503	5/5B	Temperature	
Lake Roberts	20.6.4.504	5/5A	Mercury - Fish Consumption Advisory|Nutrients	
Leyba Lake	20.6.4.98	2		
Little Creek (West Fork Gila River to headwaters)	20.6.4.503	3/3A		
Mangas Creek (Gila River to Mangas Springs)	20.6.4.502	5/5A	Nutrients|Temperature	Nutrients
Mangas Creek (Mangas Springs to headwaters)	20.6.4.502	2		
McKnight Canyon (Mimbres River to headwaters)	20.6.4.804	1		
Middle Fork Gila River (Canyon Creek to headwaters)	20.6.4.503	5/5B	Temperature	
Middle Fork Gila River (West Fork Gila R to Canyon Creek)	20.6.4.503	5/5B	Temperature	
Mimbres R (Perennial reaches Allie Canyon to Cooney Cny)	20.6.4.804	1		
Mimbres R (Perennial reaches Cooney Cyn to headwaters)	20.6.4.807	1		
Mimbres R (Perennial reaches downstream of Allie Canyon)	20.6.4.803	4A	E. coli	
Mineral Creek (San Francisco R to headwaters)	20.6.4.98	2		
Mogollon Creek (Gila River to USGS Gage 09430600)	20.6.4.98	3/3A		
Mogollon Creek (Perennial prt USGS Gage 09430600 to hwtrs)	20.6.4.503	2		Aluminum
Mule Creek (San Francisco R to Mule Springs)	20.6.4.601	5/5C	Dissolved oxygen	
Negrito Creek (Tularosa River to confl of N and S forks)	20.6.4.603	5/5B	Temperature	
North Fork Negrito Creek (Negrito Creek to headwaters)	20.6.4.603	2		
North Lordsburg Playa	20.6.4.98	3/3A		
S A Creek (Perennial prt of Centerfire Creek to headwaters)	20.6.4.99	3/3A		
Sacaton (No Name) Playa	20.6.4.98	3/3A		
San Francisco River (AZ border to Box Canyon)	20.6.4.601	3/3A		
San Francisco River (Box Canyon to Whitewater Creek)	20.6.4.601	5/5C	Benthic Macroinvertebrates	
San Francisco River (Centerfire Creek to AZ border)	20.6.4.602	5/5C	Benthic Macroinvertebrates| Temperature	Temperature| Nutrients
San Francisco River (NM 12 at Reserve to Centerfire Creek)	20.6.4.602	5/5A	E. coli|Temperature| Turbidity	E. coli|Turbidity
San Francisco River (Pueblo Ck to Willow Springs Cyn)	20.6.4.601	3/3A		
San Francisco River (Whitewater Ck to Pueblo Ck)	20.6.4.601	5/5A	Sedimentation/Siltation	

Assessment Unit Name	WQS Reference	IR Category	Impairments	TMDL Completed
San Francisco River (Willow Springs Cyn to NM 12 at Reserve)	20.6.4.601	4A	E. coli	E. coli
San Vicente Arroyo (Mimbres R to Maudes Cny)	20.6.4.97	3/3A		
San Vicente Creek (Perennial prt Maudes Cny to Silva Creek)	20.6.4.803	5/5C	Nutrients	
Sapillo Creek (Gila River to Lake Roberts)	20.6.4.503	1		Total Organic Carbon| Turbidity
Silver Creek (Mineral Creek to headwaters)	20.6.4.98	2		
Snow Canyon Ck (Perennial prt Gilita Ck to Snow Lake)	20.6.4.99	2		
Snow Lake	20.6.4.504	5/5A	Nutrients|pH	
South Fork Negrito Creek (Negrito Creek to headwaters)	20.6.4.603	4A	E. coli|Temperature	E. coli|Temperature
South Lordsburg Playa	20.6.4.98	3/3A		
Stone Creek (San Francisco R to AZ border)	20.6.4.603	3/3A		
Taylor Creek (Perennial reaches Beaver Creek to headwaters)	20.6.4.503	5/5C	Nutrients|Temperature	Aluminum| Temperature
Trout Creek (Perennial prt San Francisco R to headwaters)	20.6.4.603	5/5B	Temperature	
Tularosa River (Apache Creek to headwaters)	20.6.4.603	3/3A		
Tularosa River (San Francisco R to Apache Creek)	20.6.4.603	5/5A	E. coli|Temperature| Turbidity	Specific Conductance| E. coli| Turbidity
Turkey Creek (Gila River to headwaters)	20.6.4.503	5/5B	Temperature	
West Fork Gila R (East Fork to Middle Fork)	20.6.4.503	5/5B	Temperature	
West Fork Gila R (Middle Fork to headwaters)	20.6.4.503	5/5B	Temperature	
White Creek (West Fork Gila River to headwaters)	20.6.4.503	3/3A		
Whitewater Creek (San Francisco R to Whitewater Campgrd)	20.6.4.603	2		Turbidity|Aluminum
Whitewater Creek (San Vicinte Arroyo to headwaters)	20.6.4.98	3/3A		
Whitewater Creek (Whitewater Campgrd to headwaters)	20.6.4.603	2		
Willow Creek (Gilita Creek to headwaters)	20.6.4.503	5/5A	Aluminum, Total Recoverable| Temperature	Aluminum

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

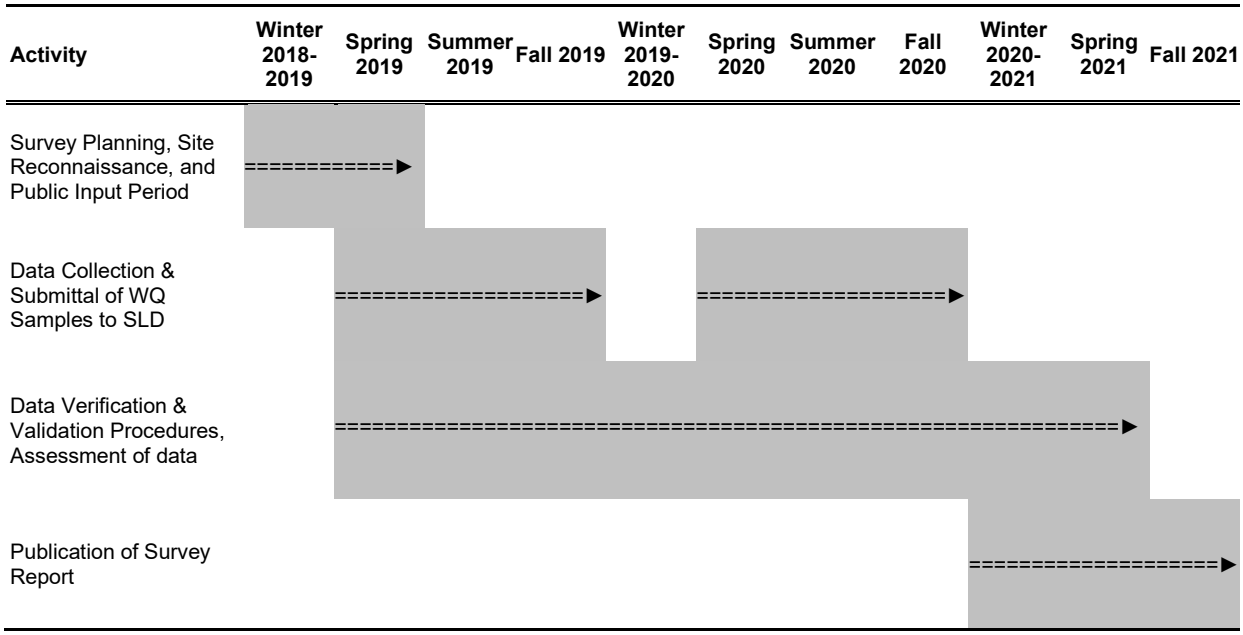
	Purpose for Water Quality Data Collection	Question to be answered	Products/ Outcomes	Decision Criteria
Primary Objective	Assess designated use attainment for the *Integrated Report* and provide information to the public on the condition of surface waters	Are sampled waterbodies meeting WQS criteria?	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 project area includes three survey areas: the Gila River, Mimbres River, and San Francisco River watersheds. The Gila, Mimbres, San Francisco sampling area includes the Gila River and tributaries from the headwaters to the Arizona border, the Mimbres from the headwaters to below Dwyer, and the San Francisco and tributaries from the Arizona border to the Arizona border. **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

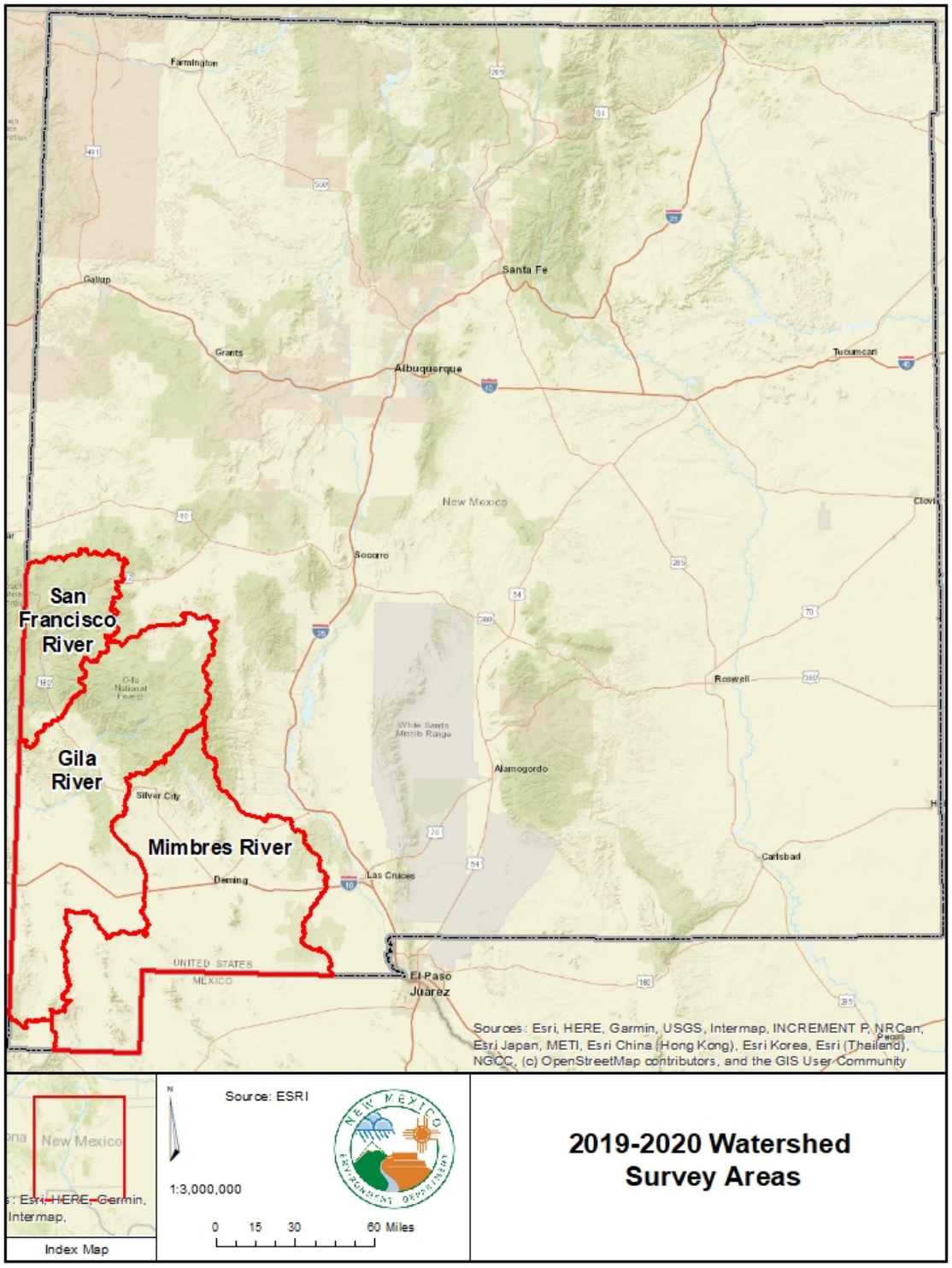


Table 5. Water Quality Stations: Gila, Mimbres, and San Francisco Watershed Survey 2019-2020

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
1	Bear Canyon abv Reservoir - 45BearCn001.0	45BearCn001.0	Bear Canyon (Mimbres River to headwaters)	Lake Inlet
2	Bear Canyon below Reservoir - 45BearCn000.3	45BearCn000.3	Bear Canyon (Mimbres River to headwaters)	Lake Outlet
3	Bear Canyon Reservoir - 45BearCanyonD	45BearCanyonD	Bear Canyon Reservoir	Impaired for Nutrients/Mercury in fish
4	Bear Creek on Double E Ranch - 78BearCr011.7	78BearCr011.7	Bear Creek (Gila River nr Cliff to headwaters)	Possible WQS change, Temperature only
5	Beaver Creek above Taylor Creek - 77Beaver000.1	77Beaver000.1	Beaver Creek (Perennial prt Taylor Ck to Mule Canyon)	Possible WQS change
6	Bill Evans Lake Deep near dam - 78BillEvansDP	78BillEvansDP	Bill Evans Lake	AU impaired for Hg/PCBs
7	Black Cyn Cr @ lower Black Cyn cmpgd - 77BlackC016.5	77BlackC016.5	Black Canyon Creek (East Fork Gila River to headwaters)	AU impaired for Temp, possible WQS change
8	Blue Creek 0.5 mile abv Gila River - 78BlueCr000.9	78BlueCr000.9	Blue Creek (Gila River to headwaters)	Possible WQS change, Temp only
9	Canyon Creek - 77Canyon007.5	77Canyon007.5	Canyon Creek (Middle Fork Gila River to headwaters)	Impaired for Temp/Nutrients/Turb; access may preclude chem monitoring
10	Centerfire Creek abv San Francisco River - 80Center002.1	80Center002.1	Centerfire Creek (San Francisco R to headwaters)	Impaired for Sed/Temp/Cond/E. coli
11	Cold Springs abv Mimbres - 45ColdSp009.3	45ColdSp009.3	Cold Springs Creek (Hot Springs Creek to headwaters)	Pb, Cd impairment
12	Dry Blue Creek abv Pace Creek - 80DryBlu008.0	80DryBlu008.0	Dry Blue Creek (AZ bnd to headwaters)	Temp only, possible WQS change
13	East Fork Gila above West Fork - 77EFkGil000.2	77EFkGil000.2	East Fork Gila River (Gila River to headwaters)	AU impaired for BMI, possible WQS change
14	Gallinas Creek at Lower Gallinas Camground near Hwy 152 - 45Gallin021.5	45Gallin021.5	Gallinas Creek (Mimbres River to headwaters)	AU impaired for Nutrients
15	Gila R @ NM 92 - 78GilaRi011.5	78GilaRi011.5	Gila River (AZ border to Red Rock)	AU impaired for Temp, possible WQS change
16	Gila River @ Dam Cyn - 78GilaRi077.9	78GilaRi077.9	Gila River (Mangas Creek to Mogollon Creek)	AU impaired for Temp / possible WQS change
17	Gila R abv Mogollon Cr - 77GilaRi101.4	77GilaRi101.4	Gila River (Mogollon Ck to East and West Forks of Gila R)	AU impaired for Temp, possible WQS change
18	Gila R @ Patton Rd bridge in Redrock - 78GilaRi041.8	78GilaRi041.8	Gila River (Red Rock to Mangas Creek)	AU impaired for Nutrients/Temp, possible WQS change

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
19	Gilita Creek above Middle Fork Gila R - 77Gilita000.2	77Gilita000.2	Gilita Creek (Middle Fork Gila R to Willow Creek)	AU impaired for Temp
20	Gilita Cr abv Willow Cr - 77Gilita010.3	77Gilita010.3	Gilita Creek (Perennial reaches abv Willow Creek)	Possible WQS change
21	Iron Cr @ Forest trail 151 - 77IronCr009.7	77IronCr009.7	Iron Creek (Middle Fork Gila R to headwaters)	AU impaired for Temp, Possible WQS change
22	Lake Roberts at dam - 77LRobertsDam	77LRobertsDam	Lake Roberts	AU impaired for Nutrients/Hg in fish
23	Little Cr abv W Fk Gila - 77Little000.1	77Little000.1	Little Creek (West Fork Gila River to headwaters)	Never assessed, possible WQS change
24	Mangas Creek above Gila River (Forest Road 809) - 78Mangas000.7	78Mangas000.7	Mangas Creek (Gila River to Mangas Springs)	AU impaired for Temp/Nutrients
25	Middle Fork Gila above Iron Creek - 77MFkGil049.0	77MFkGil049.0	Middle Fork Gila River (Canyon Creek to headwaters)	AU impaired for Temp, possible WQS change
26	Middle Fork Gila above West Fork - 77MFkGil000.1	77MFkGil000.1	Middle Fork Gila River (West Fork Gila R to Canyon Creek)	AU impaired for Temp, possible WQS change
27	Mimbres River at upper TNC - 45Mimbre112.2	45Mimbre112.2	Mimbres R (Perennial reaches Allie Canyon to Cooney Cny)	Major tributary
28	Mimbres below Dwyer at Ranch del Rio - 45Mimbre062.7	45Mimbre062.7	Mimbres R (Perennial reaches downstream of Allie Canyon)	AU impaired for E. coli
29	Mineral Cr @ Forest Trail 808 – 80Minera009.4	80Minera009.4	Mineral Creek (San Francisco R to headwaters)	Possible WQS change, Gila trout recovery stream
30	Mule Cr blw NM 78 - 80MuleCr014.5	80MuleCr014.5	Mule Creek (San Francisco R to Mule Springs)	AU impaired for DO, possible WQS change
31	Negrito Creek above Tularosa River - 80Negrit000.1	80Negrit000.1	Negrito Creek (Tularosa River to confl of N and S forks)	AU impaired for Temp, possible WQS change
32	North Fork Negrito Creek abv South Fork Negrito Creek - 80NNegri000.1	80NNegri000.1	North Fork Negrito Creek (Negrito Creek to headwaters)	Possible WQS change
33	San Francisco R @ USGS gauge nr Glenwood - 80SanFra028.6	80SanFra028.6	San Francisco River (Box Canyon to Whitewater Creek)	AU impaired for BMI, possible WQS change
34	San Francisco R blw Luna - 80SanFra144.9	80SanFra144.9	San Francisco River (Centerfire Creek to AZ border)	AU impaired for BMI/Temp, possible WQS change, two stations in this AU?
35	San Franicisco R @ Cienega Cyn - 80SanFra117.9	80SanFra117.9	San Francisco River (NM 12 at Reserve to Centerfire Creek)	AU impaired for E. coli/Temp/Turbidity, possible WQS change
36	San Francisco River abv Pueblo Creek - 80SanFra061.0	80SanFra061.0	San Francisco River (Pueblo Ck to Willow Springs Cyn)	Unassessed, possible WQS change

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
37	San Francisco River at Alma Bridge - 80SanFra048.8	80SanFra048.8	San Francisco River (Whitewater Ck to Pueblo Ck)	AU impaired for Sedimentation, possible WQS change
38	Reserve WWTP - NM0024163	NM0024163	San Francisco River (Willow Springs Cyn to NM 12 at Reserve)	NPDES permit
39	San Francisco River below Reserve - 80SanFra105.7	80SanFra105.7	San Francisco River (Willow Springs Cyn to NM 12 at Reserve)	Below NPDES discharge/E. coli impairment
40	San Vicente Arroyo at Ancheta Mill - 45SanVic053.9	45SanVic053.9	San Vicente Creek (Perennial prt Maudes Cny to Silva Creek)	Nutrient impairment
41	Silver City WWTP - NM0020109	NM0020109	San Vicente Creek (Perennial prt Maudes Cny to Silva Creek)	NPDES permit
42	Sapillo Creek @ NM 15 - 77Sapill012.0	77Sapill012.0	Sapillo Creek (Gila River to Lake Roberts)	Historic impairments, possible WQS change
43	Snow Canyon Creek above Gilita Creek - 77SnowCa000.2	77SnowCa000.2	Snow Canyon Ck (Perennial prt Gilita Ck to Snow Lake)	Possible WQS change
44	Snow Lake at Dam (Deep) - 77SnowLkDamDp	77SnowLkDamDp	Snow Lake	Impaired for Nutrients/pH
45	South Negrito Creek - 80SNegri000.1	80SNegri000.1	South Fork Negrito Creek (Negrito Creek to headwaters)	Au impaired for E. coli/Temp, possible WQS change
46	Stone Creek abv San Francisco R - 80StoneC000.1	80StoneC000.1	Stone Creek (San Francisco R to AZ border)	Unassessed, possible WQS change
47	Taylor Creek above Beaver Creek - 77Taylor000.1	77Taylor000.1	Taylor Creek (Perennial reaches Beaver Creek to headwaters)	AU impaired for Temp/Nutrients, possible WQS change
48	Trout Creek near FR 220 - 80Trout009.4	80TroutC009.4	Trout Creek (Perennial prt San Francisco R to headwaters)	AU impaired for Temp, possible WQS change
49	Tularosa River abv Aragon at USGS gage 9442692 - 80Tularo050.8	80Tularo050.8	Tularosa River (Apache Creek to headwaters)	Unassessed, possible WQS change
50	Tularosa River above San Francisco River - 80Tularo001.3	80Tularo001.3	Tularosa River (San Francisco R to Apache Creek)	AU Impaired for E. coli/Temp/Turbidity, possible WQS change
51	Turkey Creek (at Wilderness Boundary Forest Trail 155) - 77Turkey001.8	77Turkey001.8	Turkey Creek (Gila River to headwaters)	AU impaired for Temp, possible WQS change, AU may need split
52	W Fk Gila R abv Gila R - 77WFkGil000.1	77WFkGil000.1	West Fork Gila R (East Fork to Middle Fork)	AU impaired for Temp, possible WQS change
53	W Fk Gila R @ TJ Corral - 77WFkGil008.7	77WFkGil008.7	West Fork Gila R (Middle Fork to headwaters)	AU impaired for Temp, possible WQS change
54	Bayard, Village of/WWTP	NM0020231	Whitewater Creek (Mimbres River to headwaters)	NPDES permit; No discharge

Map #	Station Name	Station ID	Assessment Unit	Rationale/Comments
55	NMG&FD/Glenwood Fish Hatchery-002	NM0030163 - 002	Whitewater Creek (San Francisco R to Whitewater Campgrd)	NPDES permit
56	Whitewater Creek at Glenwood above San Francisco River - 80Whitew000.5	80Whitew000.5	Whitewater Creek (San Francisco R to Whitewater Campgrd)	Historic Turbidity impairment
57	NMG&FD/Glenwood Fish Hatchery-001	NM0030163 - 001	Whitewater Creek (San Francisco R to Whitewater Campgrd)	NPDES permit
58	Whitewater Creek abv campground - 80WhiteW008.8	80WhiteW008.8	Whitewater Creek (Whitewater Campgrd to headwaters)	Gila trout renovation
59	Willow Creek above Gilita Creek - 77Willow000.1	77Willow000.1	Willow Creek (Gilita Creek to headwaters)	AU impaired for Temp/Al, possible WQS change
60	Bear Creek below Cypress Mine - 78BearCr047.0	78BearCr047.0	Bear Creek (Gila River nr Cliff to headwaters)	Possible mining impacts
61	Bayard Cyn @ Pinos Altos St	45Bayard000.7	Unassessed, No AU	Possible mining impacts
62	Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3	80Center010.3	Centerfire Creek (San Francisco R to headwaters)	Dry at lower station
63	San Francisco River above Luna - 80SanFra154.1	80SanFra154.1	San Francisco River (Centerfire Creek to AZ border)	Above diversion
64	Sapillo Creek below Lake Roberts - 77Sapill018.0	77Sapill018.0	Sapillo Creek (Gila River to Lake Roberts)	Lake outlet
65	WEST FORK GILA RIVER ABOVE MIDDLE FORK GILA - 77WFkGil008.0	77WFkGil008.0	West Fork Gila R (Middle Fork to headwaters)	Added in 2020 for thermograph
66	Tularosa River at Forest Road 233 - 80Tularo017.4	- 80Tularo017.4	Tularosa River at Forest Road 233 - 80Tularo017.4	Dry at lower station

Figure 2. Gila River, Mimbres River, and San Francisco River: northern sampling area and monitoring locations

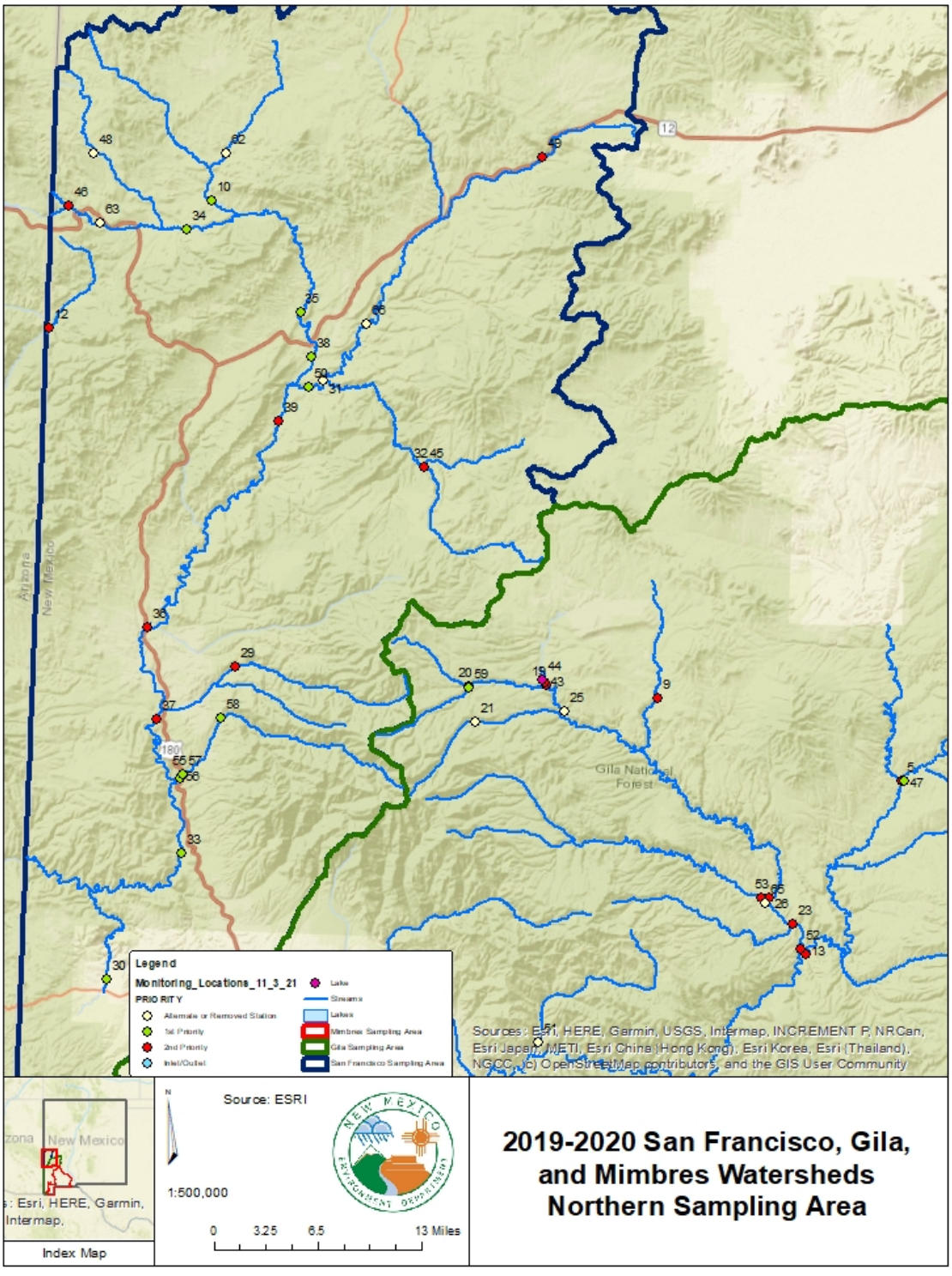
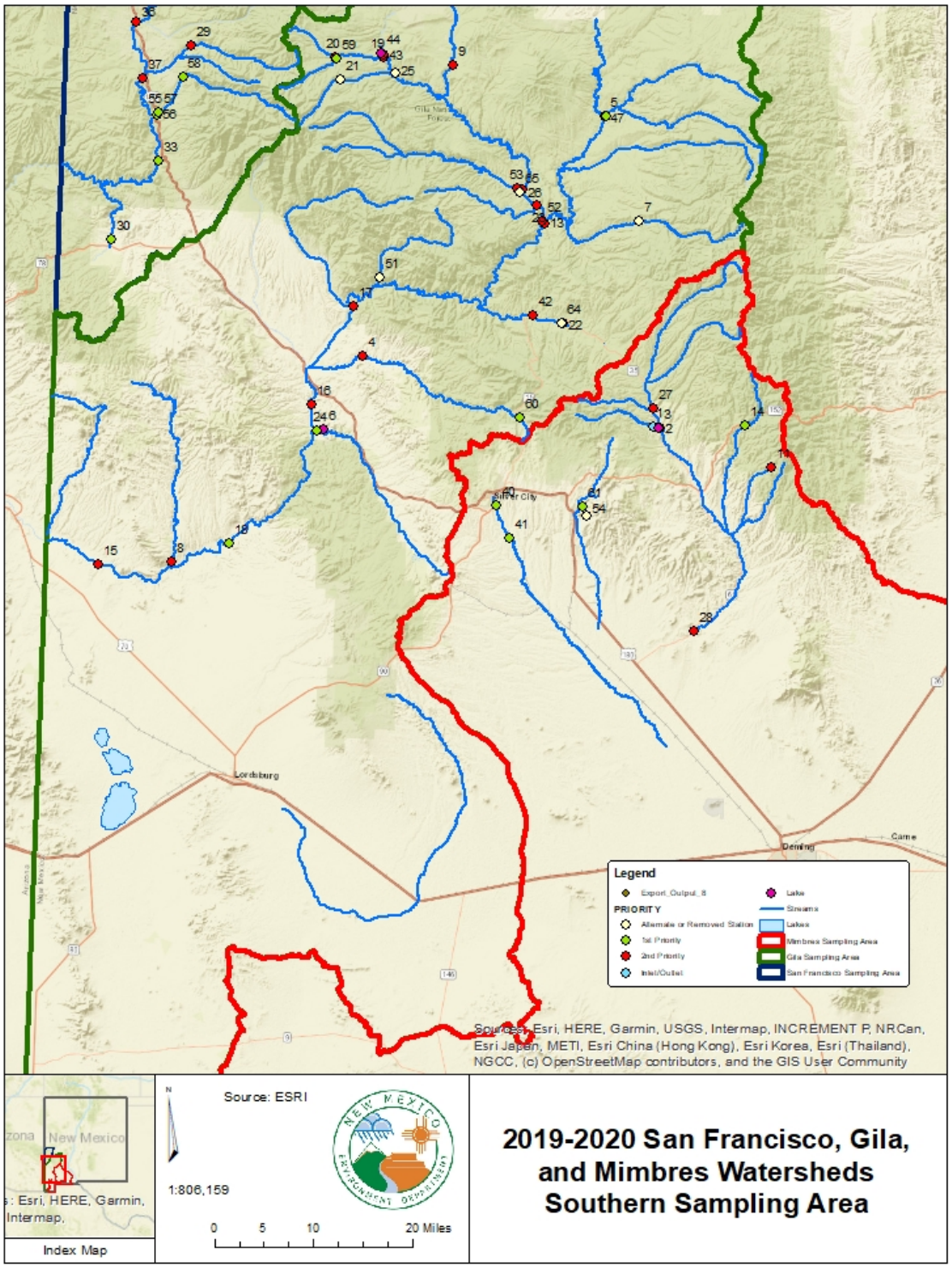


Figure 3. Gila River, Mimbres River, and San Francisco River: southern sampling area and monitoring locations



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 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 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	TDS/TSS		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		*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	Bear Canyon abv Reservoir - 45BearCn001.0	4		4		2		4		4		4							
2	Bear Canyon below Reservoir - 45BearCn000.3	4		4		2		4		4		4							
3	Bear Canyon Reservoir - 45BearCanyonD	4	2	4	2	2		4	2	4	2	4	2	2	1	2	1	2	1
4	Bear Creek on Double E Ranch - 78BearCr011.7	4	3	5	3	2		4	3	4	3	4	3						
5	Beaver Creek above Taylor Creek - 77Beaver000.1																		
6	BILL EVANS LAKE DEEP NEAR DAM - 78BillEvansDP	4	2	4	2	2		4	2	4	2	4	2	2	1	2	1	2	1
7	BLACK CNY CREEK AT LOWER BLACK CNY CAMPGROUND - 77BlackC016.5																		
8	Blue Creek 0.5 mile abv Gila River - 78BlueCr000.9																		
9	Canyon Creek - 77Canyon007.5																		
10	Centerfire Creek abv San Francisco River - 80Center002.1	8	1	8	1	2		6	1	6	1	8	1						
11	Cold Springs abv Mimbres - 45ColdSp009.3	4	4	4	4	2		4	4	4	4	4	3						
12	Dry Blue Creek abv Blue R - 80DryBlu000.1	4	2	4	2	2		4	2	4	2	4	2						
13	East Fork Gila above Gila R - 77EFkGil000.2	4	3	5	3	2		4	3	4	3	4	2						
14	Gallinas Creek at Lower Gallinas Camground near Hwy 152 - 45Gallin021.5	8	4	8	4	2		6	2	6	2	8	4						
15	GILA RIVER AT NM 92 BRIDGE - 78GilaRi011.5	4	1	5	1	2		4	1	4	1	4	1	2		2		2	
16	Gila River @ Dam Cyn - 78GilaRi077.9	4	3	5	3	2		4	3	4	3	6	3						
17	Gila River above Mogollon Cr- 77GilaRi101.4	4	3	5	3	2		4	3	4	3	4	3						
18	Gila R @ Patton Rd bridge in Redrock - 78GilaRi041.8	8	5	8	5	2		6	5	6	5	8	5		1		1		1
19	Gilita Creek above Middle Fork Gila R - 77Gilita000.2	4	3	5	3	2		4	3	4	3	4	3						
20	Gilita Cr abv Willow Cr - 77Gilita010.3	4	2	5	2	2		4	2	4	2	4	2						
21	IRON CREEK AT FOREST TRAIL 151 - 77IronCr009.7																		

Map #	Station Name	TDS/TSS		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		*E. Coli*		Volatile Organics[3]		Semi-Volatile Organics[4]		Radionuclides[5]	
22	LAKE ROBERTS at dam - 77LRobertsDam	4	2	4	2	2		4	2	4	2	4	2	2	1	2	1	2	1
23	Little Cr abv W Fk Gila - 77Little000.1	4	3	5	3	2		4	3	4	3	4	2						
24	Mangas Creek above Gila River (Forest Road 809) - 78Mangas000.7	8	4	8	4	2		6	3	6	3	8	4						
25	Middle Fork Gila above Iron Creek - 77MFkGil049.0																		
26	Middle Fork Gila above West Fork - 77MFkGil000.1	4	3	5	3	2		4	3	4	3	4	2						
27	Mimbres River at upper TNC - 45Mimbre112.2	4	3	5	3	2		4	3	4	3	4	3						
28	Mimbres below Dwyer at Rancho del Rio - 45Mimbre062.7	4	2	4	2	2		4	2	4	2	6	2						
29	Mineral Cr @ Forest Trail 808 – 80Minera009.4	4	3	4	3	2		4	3	4	3	4	3						
30	Mule Cr blw NM 78 - 80MuleCr014.5	8	4	8	4	2		6	3	6	3	8	4						
31	Negrito Creek above Tularosa River - 80Negrit000.1																		
32	North Fork Negrito Creek abv Negrito Creek - 80NNegri000.1	4	3	5	3	2		4	3	4	3	4	3						
33	San Francisco R @ USGS gauge nr Glenwood - 80SanFra028.6	8	5	8	5	2		6	3	6	3	8	5	2	2	2	2	2	2
34	San Francisco R blw Luna - 80SanFra144.9	8	4	8	4	2		6	4	6	4	8	4						
35	San Franicisco R @ Cienega Cyn - 80SanFra117.9	8	5	8	5	2		6	4	6	4	8	5						
36	San Francisco River abv Pueblo Creek - 80SanFra061.0	4	3	5	3	2		4	3	4	3	6	3						
37	San Francisco River at Alma Bridge - 80SanFra048.8	4	2	5	2	2		4	2	4	2	6	2						
38	Reserve WWTP - NM0024163	8	4	8*	4	2			1		1	8	4						
39	San Francisco River below Reserve - 80SanFra105.7	4	3	5	3	2		4	3	4	3	6	3						
40	San Vicente Arroyo at Ancheta Mill - 45SanVic053.9	8	4	8	4	2		6	3	6	3	8	4						
41	SILVER CITY WASTEWATER PLANT - NM0020109	8	4	8*	4	2						8	4						
42	Sapillo Creek @ NM 15 - 77Sapill012.0	4	3	5	3	2		4	3	4	3	4	2						
43	Snow Canyon Creek above Gilita Creek - 77SnowCa000.2		1		1				1		1		1						
44	Snow Lake at Dam (Deep) - 77SnowLkDamDp	4	2	4	2	2		4	2	4	2	4	2	2	1	2	1	2	1
45	South Negrito Creek - 80SNegri000.1	4	3	5	3	2		4	3	4	3	6	3						

Map #	Station Name	TDS/TSS		Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)		Dissolved Organic Carbon		Total Metals[1]		Dissolved Metals[2]		*E. Coli*		Volatile Organics[3]		Semi-Volatile Organics[4]		Radionuclides[5]	
46	Stone Creek abv San Francisco R - 80StoneC000.1	4	3	4	3	2		4	3	4	3	4	3						
47	Taylor Creek above Beaver Creek - 77Taylor000.1																		
48	Trout Creek near FR 220 - 80Trout009.4																		
49	Tularosa River abv Aragon at USGS gage 9442692 - 80Tularo050.8	4	3	5	3	2		4	3	4	3	4	3						
50	Tularosa River above San Francisco River - 80Tularo001.3	8	5	8	5	2		6	4	6	4	8	5						
51	Turkey Creek (at Wilderness Boundary Forest Trail 155) - 77Turkey001.8																		
52	West Fork Gila above Gila R - 77WFkGil000.1	4	3	5	3	2		4	3	4	3	4	2						
53	W Fk Gila @ TJ Corral- 77WFkGil008.7	4	1	5	1	2		4	1	4	1	4	1						
54	Bayard, Village of/WWTP																		
55	NMG&FD/Glenwood Fish Hatchery-002																		
56	Whitewater Creek at Glenwood above San Francisco River - 80Whitew000.5	8	4	8	4	2		6	2	6	2	8	4						
57	NMG&FD/Glenwood Fish Hatchery-001	6	4	6*	4	2			1		1		1						
58	Whitewater Creek abv campground - 80WhiteW008.8	8	4	8	4	2		6	3	6	3	8	4						
59	Willow Creek above Gilita Creek - 77Willow000.1	8	4	8	4	2		6	3	6	3	8	4						
60	Bear Creek below Cypress Mine - 78BearCr047.0	4		4		2		4		4		4							
61	Bayard Cyn @ Pinos Altos St	4		4		2		4		4		4							
62	Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3		1		1				1		1		1						
63	San Francisco River above Luna - 80SanFra154.1		1		1				1		1		1						
64	Sapillo Creek below Lake Roberts - 77Sapill018.0		2		2				2		2		2						
65	WEST FORK GILA RIVER ABOVE MIDDLE FORK GILA - 77WFkGil008.0		1		1				1		1		1						
66	Tularosa River at Forest Road 233 - 80Tularo017.4																		
Totals		250	144	246	144	96	0	202	121	202	121	256	135	10	7	10	7	10	7

Map #	Station Name	TDS/TSS	Total Nutrients (TP, NH4, TKN, Nitrate+Nitrite)	Dissolved Organic Carbon	Total Metals[1]	Dissolved Metals[2]	*E. Coli*	Volatile Organics[3]	Semi-Volatile Organics[4]	Radionuclides[5]
Percent Completed		57.6	58.5	0.0	59.9	59.9	52.7	70.0	70.0	70.0

[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.

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. 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		Macroinvertebrates	
Planned/Completed		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
1	Bear Canyon abv Reservoir - 45BearCn001.0											4	1								
2	Bear Canyon below Reservoir - 45BearCn000.3											4	1								
3	Bear Canyon Reservoir - 45BearCanyonD															4	2	2	0		
4	Bear Creek on Double E Ranch - 78BearCr011.7									1		4	3	1	1						
5	Beaver Creek above Taylor Creek - 77Beaver000.1																				
6	BILL EVANS LAKE DEEP NEAR DAM - 78BillEvansDP															4	2	2	0		

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin		Macroinvertebrates	
7	BLACK CNY CREEK AT LOWER BLACK CNY CAMPGROUND - 77BlackC016.5	1	1	1	1	1	1	1	1	1	1										
8	Blue Creek 0.5 mile abv Gila River - 78BlueCr000.9																				
9	Canyon Creek - 77Canyon007.5																				
10	Centerfire Creek abv San Francisco River - 80Center002.1	1		1		1		1		1		8	3	1							
11	Cold Springs abv Mimbres - 45ColdSp009.3											4	4								
12	Dry Blue Creek abv Blue R - 80DryBlu000.1	1		1		1		1		1	1	4	2								
13	East Fork Gila above Gila R - 77EFkGil000.2	1		1		1		1		1	1	4	3	1							
14	Gallinas Creek at Lower Gallinas Camground near Hwy 152 - 45Gallin021.5	1	1									8	5								
15	GILA RIVER AT NM 92 BRIDGE - 78GilaRi011.5									1	1	4	2								
16	Gila River @ Dam Cyn - 78GilaRi077.9	1	1	1	1	1	1	1	1	1	2	4	3								
17	Gila River above Mogollon Cr- 77GilaRi101.4									1		4	3								
18	Gila R @ Patton Rd bridge in Redrock - 78GilaRi041.8	1	1							1	2	8	5								
19	Gilita Creek above Middle Fork Gila R - 77Gilita000.2	1		1		1		1		1	2	4	3								
20	Gilita Cr abv Willow Cr - 77Gilita010.3	1		1		1		1		1	2	4	3								
21	IRON CREEK AT FOREST TRAIL 151 - 77IronCr009.7									1											
22	LAKE ROBERTS at dam - 77LRobertsDam															4	2	2	0		
23	Little Cr abv W Fk Gila - 77Little000.1									1	1	4	3								
24	Mangas Creek above Gila River (Forest Road 809) - 78Mangas000.7		1							1	1	8	4								
25	Middle Fork Gila above Iron Creek - 77MFkGil049.0									1	1										
26	Middle Fork Gila above West Fork - 77MFkGil000.1									1	2	4	3								
27	Mimbres River at upper TNC - 45Mimbre112.2									1	1	4	3								
28	Mimbres below Dwyer at Rancho del Rio - 45Mimbre062.7	1		1		1		1		1	1	4	3								
29	Mineral Cr @ Forest Trail 808 – 80Minera009.4	1		1		1		1		1	2										

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin		Macroinvertebrates	
30	Mule Cr blw NM 78 - 80MuleCr014.5	1	1									8	4								
31	Negrito Creek above Tularosa River - 80Negrit000.1																				
32	North Fork Negrito Creek abv Negrito Creek - 80NNegri000.1									1	2	4	3								
33	San Francisco R @ USGS gauge nr Glenwood - 80SanFra028.6	1		1		1		1		1	2	8	5	1						1	0
34	San Francisco R blw Luna - 80SanFra144.9	1		1		1		1		1	1	8	4	1						1	0
35	San Franicisco R @ Cienega Cyn - 80SanFra117.9	1	1	1	1	1	1	1	1	1	1	8	5	1	1						
36	San Francisco River abv Pueblo Creek - 80SanFra061.0	1		1		1		1		1	2	4	3								
37	San Francisco River at Alma Bridge - 80SanFra048.8									1	2	4	3	1	1						
38	Reserve WWTP - NM0024163																				
39	San Francisco River below Reserve - 80SanFra105.7		1							1	1	4	3								
40	San Vicente Arroyo at Ancheta Mill - 45SanVic053.9											8	4								
41	SILVER CITY WASTEWATER PLANT - NM0020109																				
42	Sapillo Creek @ NM 15 - 77Sapill012.0									1	2	4	3								
43	Snow Canyon Creek above Gilita Creek - 77SnowCa000.2												2								
44	Snow Lake at Dam (Deep) - 77SnowLkDamDp															4	2	2	0		
45	South Negrito Creek - 80SNegri000.1												3								
46	Stone Creek abv San Francisco R - 80StoneC000.1												3	1	1						
47	Taylor Creek above Beaver Creek - 77Taylor000.1																				
48	Trout Creek near FR 220 - 80Trout009.4									1	2										
49	Tularosa River abv Aragon at USGS gage 9442692 - 80Tularo050.8	1		1		1		1		1	2	4	3								
50	Tularosa River above San Francisco River - 80Tularo001.3	1	1	1	1	1	1	1	1	1	2	8	5	1							
51	Turkey Creek (at Wilderness Boundary Forest Trail 155) - 77Turkey001.8									1	2										
52	West Fork Gila above Gila R - 77WFkGil000.1	1		1		1		1		1	2	4	3								

Map #	Station Name	Dissolved Oxygen		Turbidity		Conductivity		pH		Temperature		Flow		Physical Habitat		Chlorophyll a + Phytoplankton		Microcystin		Macroinvertebrates	
53	W Fk Gila @ TJ Corral-77WFkGil008.7	1		1		1		1		1	2	4	1								
54	Bayard, Village of/WWTP																				
55	NMG&FD/Glenwood Fish Hatchery-002																				
56	Whitewater Creek at Glenwood above San Francisco River - 80Whitew000.5									1		8	4								
57	NMG&FD/Glenwood Fish Hatchery-001																				
58	Whitewater Creek abv campground - 80WhiteW008.8									1	1	8	4								
59	Willow Creek above Gilita Creek - 77Willow000.1									1	2	8	4								
60	Bear Creek below Cypress Mine - 78BearCr047.0																				
61	Bayard Cyn @ Pinos Altos St																				
62	Centerfire Creek at Freeman Mtn Trail (County Road B025) - 80Center010.3										1		1								
63	San Francisco River above Luna - 80SanFra154.1										1		1								
64	Sapillo Creek below Lake Roberts - 77Sapill018.0										2		2								
65	WEST FORK GILA RIVER ABOVE MIDDLE FORK GILA - 77WFkGil008.0										2										
66	Tularosa River at Forest Road 233 - 80Tularo017.4														1						
Totals		20	9	17	4	17	4	17	4	36	55	196	130	9	4	16	8	8	0	2	0
Percent Completed		45.0		23.5		23.5		23.5		152.8		66.3		44.4		50.0		0.0		0.0	

4.3.1 Microcystin Sampling

Although scheduled at lake stations, microcystin sample collection was not completed due to a delay in laboratory adoption of the analytical method as a result of the reallocation of resources to COVID-19 response. Higher priority was assigned to monitoring parameters used for assessment.

4.3.2 Macroinvertebrate Sampling

Although scheduled at 80SanFra028.6 and 80SanFra144.9, 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 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 *15040001, 15040002, 15040004, and 13030202*, 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

New Mexico Administrative Code (NMAC). 2020a. *State of New Mexico Standards for Interstate and Intrastate Surface Waters; 20.6.4.* New Mexico Water Quality Control Commission. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/wqs/

NMED/SWQB. 2020b. *2019-2020 Watershed Survey Field Sampling Plan Upper Pecos River, San Francisco River, Gila River, Mimbres River, and Lower Rio Grande* (Amended). Santa Fe, NM.

NMED/SWQB. 2020c. *Standard Operating Procedure 15.0: Data Verification and Validation.* Santa Fe, NM.

NMED/SWQB. 2019. *Standard Operating Procedure 2.1: Field Sampling Plan Development and Execution.* Santa Fe, NM.

NMED/SWQB. 2018a. *2018-2020 State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated List and Report*. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/303d-305b/.

NMED/SWQB. 2018b. *Quality Assurance Project Plan for Water Quality Management Programs*. Santa Fe, NM. Available at: Available at: https://www.env.nm.gov/wp-content/uploads/sites/25/2018/11/QAPP-SWQB-2018-EPA-approved-1.pdf

NMED/SWQB. 2016. Surface Water Quality 10-Year Monitoring and Assessment Strategy. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning/.

U.S. Environmental Protection Agency (USEPA), 2006, Level III ecoregions of the continental United States (revision of Omernik, 1987): Corvallis, Oregon, USEPA – National Health and Environmental Effects Research Laboratory, Map M-1, various scales.

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	