Sampling Summary

SACRAMENTO MOUNTAINS WATERSHEDS

Water Quality Survey

Survey Conducted
March-November, 2012
and
May-October, 2014

Summary Finalized
December, 2015

Monitoring, Assessment and Standards Section
Surface Water Quality Bureau
New Mexico Environment Department
P.O. Box 2610
Santa Fe, NM 87502

www.env.nm.gov/swqb

Abbreviations

AP	Assessment Protocol
AU	Assessment Unit
BLM	Bureau of Land Management
BMP	Best Management Practice
CWA	Clean Water Act
FR	Forest Road
FSP	Field Sampling Plan
HP	Hydrology Protocol
IR	State of New Mexico Clean Water Act §303(d)/305(b) Integrated Report
km	kilometer
MASS	Monitoring, Assessment and Standards Section
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
PSRS	Point Source Regulation Section
SLD	Scientific Laboratory Division
SOP	Standard Operating Procedures
SVOC	Semi-Volatile Organic Compounds
SWQB	Surface Water Quality Bureau
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
VOC	Volatile Organic Compounds
WQCC	Water Quality Control Commission
WPS	Watershed Protection Section
WQS	Water Quality Standard
WWTP	Wastewater Treatment Plant

INTRODUCTION

The New Mexico Environment Department (NMED), Surface Water Quality Bureau (SWQB) conducted a water quality survey of the watersheds surrounding the Sierra Blanca and Sacramento Mountains between March and October of 2012. Additional data were collected between May and October of 2014. SWQB finalized a Field Sampling Plan (FSP) for the Sacramento Mountains in April 2012. SWQB also released an amended Field Sampling Plan (FSP) for the Sacramento Mountains in April 2014 in response to data gaps generated from wildfires and flooding events during the 2012 field season. Both the original and amended FSPs are available on the SWQB website. This summary report is a companion document to the Sacramento Mountains FSPs (NMED/SWQB 2012, 2014) and details the completion or deviation from the planned activities.

The Sacramento Mountains are located in the south-central part of New Mexico, lying just east of Alamogordo in Otero, Lincoln, and Chaves counties. Neighboring ranges and landforms include the Guadalupe Mountains to the south; the Tularosa Basin to the west; Sierra Blanca and the Capitan Mountains to the north; Otero Mesa to the southeast; and the Border Hills and Pecos River valley to the east. The Rio Tularosa and the Rio Ruidoso separate the Sacramento Range from Sierra Blanca and the Capitan Mountains. For the sake of this study, all perennial waters with headwaters in the Sierra Blanca, Capitan Mountains, Sacramento Range, and neighboring foothills have been monitored under the generalization "Sacramento Mountains Watersheds."

The western edge of the Sacramento range forms a series of dramatic escarpments leading up to a high ridge. From this ridge the mountains slope gently down to the east, merging gradually with the plains to the west of Artesia. The range is a wide, east-dipping limestone fault block. Gypsum deposits washed from the range are a main source of the gypsum sand that makes up the dunes in White Sands National Monument. The Sacramento Mountains form the easternmost part of the rift system centered on the rift valley of the Rio Grande, and the rock strata found across the range were originally contiguous with those of the San Andres Mountains on the other side of the Tularosa Basin that have been separated due to down-faulting of the basin (USGS 2015).

In contrast to the Sacramento Mountains, the Sierra Blanca is a volcanic range consisting of an extrusive igneous complex that centers on the plutonic Sierra Blanca Peak and extends through the Capitan Mountains. This range includes the headwaters of the Rio Ruidoso, Rio Bonito, and Rio Tularosa (USGS 2015).

This study incorporated streams across approximately 1,000 mi^2 (2,590 km^2) of mountains, foothills, and plains. The upper extent of the range comprises mostly Omernick Level III ecoregion 23e-g (Arizona/New Mexico Mountains), extends into ecoregion 24a-h (Chihuahuan Deserts), and in some reaches accesses ecoregions 26h, 26o, and 26q (Southwestern Tablelands) (Griffith 2006). Annual precipitation across the region ranges from 30.25" in Cloudcroft, 21.85" in Ruidoso, 13.22" in Alamogordo, and 12.91" in Roswell (USCD 2015).

Land management in the study area headwaters is primarily U.S. Forest Service and Mescalero Apache Tribal Lands. Other uses in the area include private ownership, municipal management, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, N.M. State Land Office, U.S Department of Defense, and U.S. Department of Energy.

Personnel Roles and Responsibilities

This survey was primarily conducted by the SWQB Monitoring, Assessment and Standards Section (MASS), but staff from other sections within SWQB were involved in planning, and implementation. Individual roles and responsibilities are described in Table 1.

Table 1. Personnel Roles and Responsibilities.

Name	Position/Role	Responsibilities
Doug Eib 505-827-0106 Greg Huey 505-827-0596 Charles Dentino 505-827-2470	Monitoring Staff	• Survey planning • Collecting and documenting chemical, physical, and biological data • Provide results for assessment • Sampling summary preparation
Chris Canavan 575-647-7926	Watershed Protection Section (WPS) Liaison	• Provide information and data needs pertaining to nonpoint sources of pollution and best management practices (BMPs) located within the study area
Bruce Yurdin 505-827-2795	Point Source Regulation Section (PSRS) Liaison	• Provide information and data needs pertaining to point source discharges located within the study area
Heidi Henderson 505-827-2901	Total Maximum Daily Load (TMDL) Liaison	• Provide information and data needs pertaining to TMDL development to be conducted in the study area • Develop TMDLs as needed

Objectives

Data generated from this project serve the needs of all sections within the SWQB. Therefore, this survey had several objectives, as outlined in Table 2.

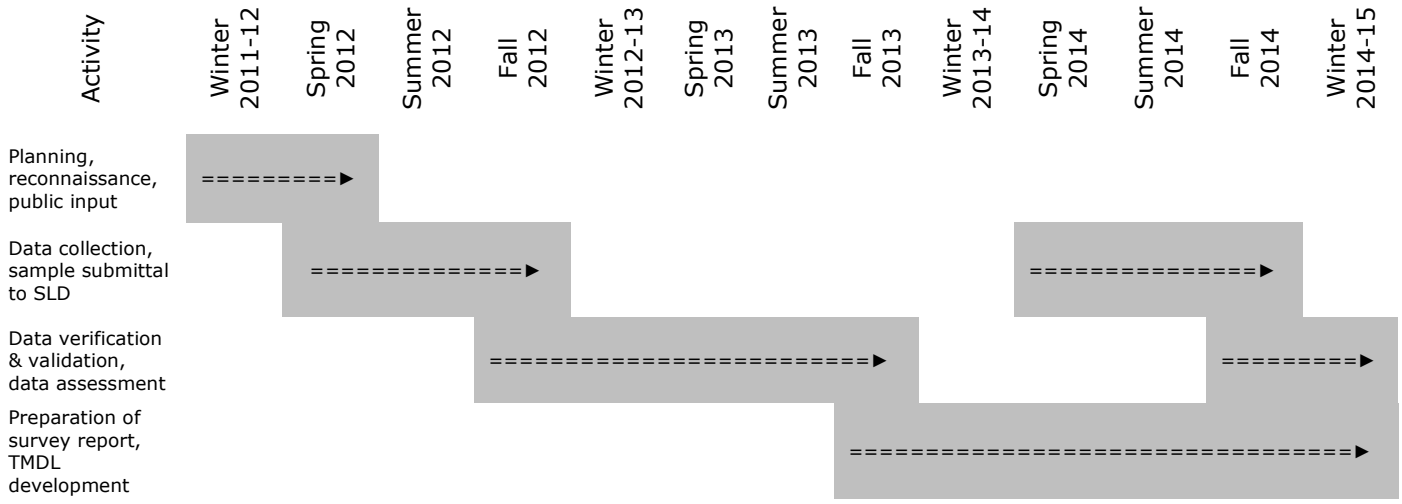
Table 2. Survey Objectives.

	Intended use of data	**Question to be answered**	**Products/ Outcomes**	**Decision Criteria**
Primary Objective	Assess designated use attainment for the New Mexico Clean Water Act §303(d)/305(b) *Integrated Report* and provide information to the public on the condition of surface waters	Are sampled waterbodies meeting water quality standards (WQS) criteria?	Integrated Report and Survey Report	WQS as interpreted by the SWQB Assessment Protocols (APs)
Secondary Objectives	Develop load and waste load allocations for TMDLs	What is the maximum pollutant load a waterbody can receive and still meet the requirements of the WQS?	TMDL loading calculations and National Pollutant Discharge Elimination System (NPDES) permit limits	WQS as interpreted by the APs
	Evaluate restoration and mitigation measures implemented to control Nonpoint Source (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 APs
	Develop or refine surface 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 Water Quality Control Commission (WQCC) to revise WQS?

Schedule

This survey was made up of many components, beginning with planning and ending with the generation of the State of New Mexico Clean Water Act (CWA) Section 303(d)/305(b) Integrated Report (IR). As part of the survey planning process, a public meeting was held to answer questions and solicit input for the survey. Total Maximum Daily Loads (TMDLs), if necessary, will be completed before 2022 based on SWQB's §303(d) prioritization framework and long-term vision for water quality in New Mexico.. A tentative schedule (Table 3) shows that completion of the entire project took four years.

Table 3. Project Schedule.



SAMPLING PLAN

The survey included monthly collection of chemical water samples, between March and October 2012, biological sampling conducted within the index period (August 15 - November 15), and physical measurements that were taken during periods of base flow, with additional data collection in 2014. Data were collected according to SWQB standard operating procedures (SOPs; NMED/SWQB 2013-2015) and the FSP and FSP amendment developed for this survey (NMED/SWQB 2012 and 2014). The monitoring stations and station rationales are presented in Figures 1 and 2 and Table 4.

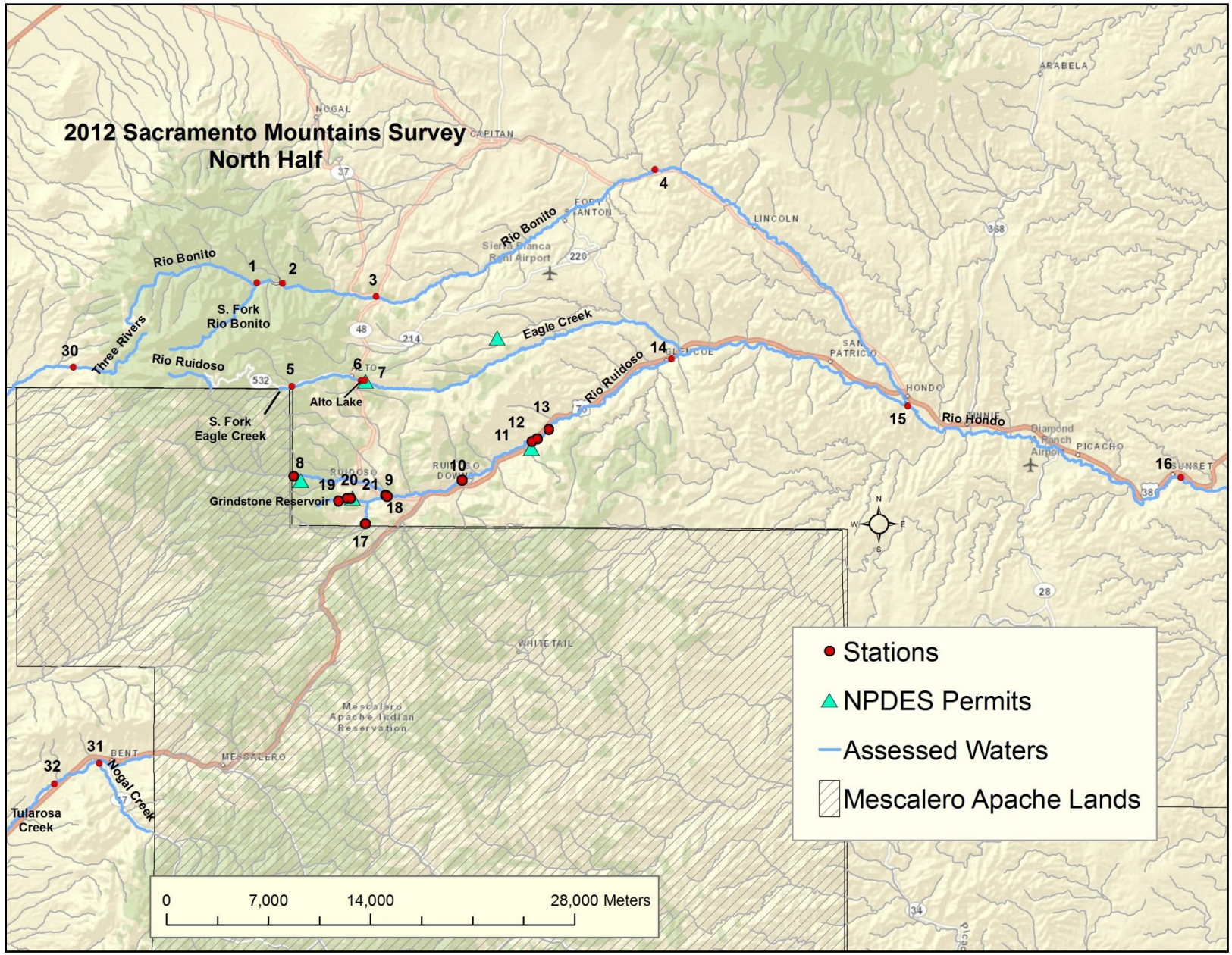


Figure 1. Sacramento Mountains Water Quality Survey, Northern Portion.

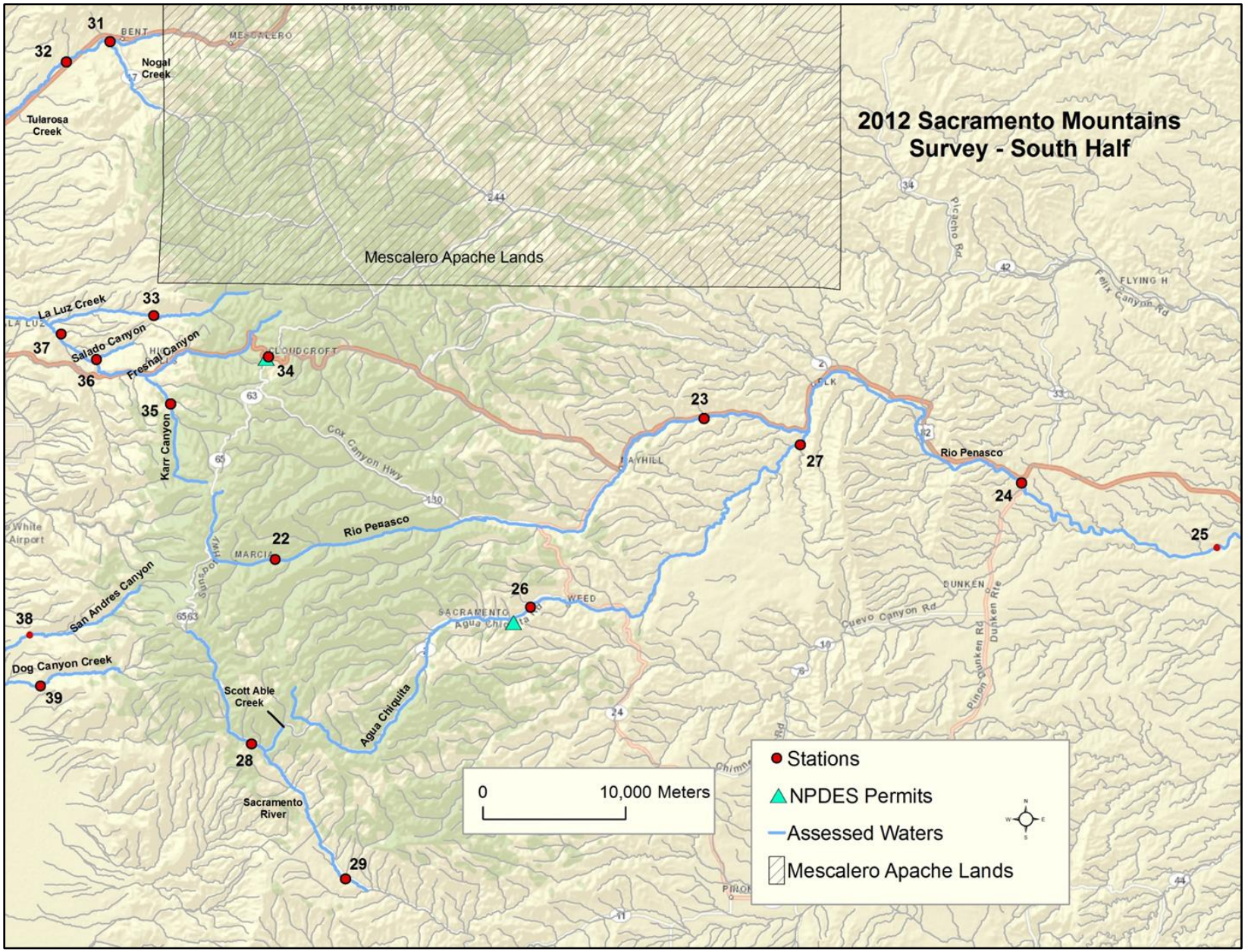


Figure 2. Sacramento Mountains Water Quality Survey, Southern Portion.

Table 4. Monitoring Stations Used in the Survey.

Station Number	Station Name	Assessment Unit (AU)	Water Quality Standard	Station Rationale
1	Rio Bonito above Bonito Lake	Rio Bonito (NM 48 to headwaters)	20.6.4.209	Lake Assessment
2	Bonito Lake	Bonito Lake	20.6.4.209	Lake Assessment
3	Rio Bonito at Angus Bridge	Rio Bonito (NM 48 to headwaters)	20.6.4.98	Lowest station in AU
4	Rio Bonito at BLM Apple Orchard Site	Rio Bonito (Rio Ruidoso to NM 48)	20.6.4.208	Only perennial reach
5	South Fork Eagle Creek at USGS gage	South Fork Eagle Creek (Eagle Creek to Mescalero Apache boundary)	20.6.4.98	Lowest station in AU
6	Alto Lake	Alto Lake	20.6.4.98	Lake Assessment
7	Eagle Creek below Alto Lake	Eagle Creek (Rio Ruidoso to Alto Lake)	20.6.4.98	Only station in AU
8	Rio Ruidoso at Tribal boundary	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	20.6.4.209	Monitor above village
9	Rio Ruidoso above Carrizo Creek	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	20.6.4.209	Monitor below upper village
10	Rio Ruidoso below Ruidoso Downs Racetrack	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	20.6.4.209	Monitor impacts of racetrack
11	Rio Ruidoso above NM 70 bridge	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	20.6.4.209	Bottom of AU
12	Ruidoso New WWTP Outfall	Rio Ruidoso (Rio Bonito to US Hwy 70 Bridge)	NPDES Permit NM0029165	Determine inputs from WWTP
13	Rio Ruidoso at CR E002	Rio Ruidoso (Rio Bonito to US Hwy 70)	20.6.2.208	Monitor receiving water for NPDES permit
14	Rio Ruidoso at FR 443	Rio Ruidoso (Rio Bonito to US Hwy 70)	20.6.4.208	Bottom of perennial reach
15	Rio Hondo below Rio Ruidoso	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	20.6.4.208	Monitor below confluence

Station Number	Station Name	Assessment Unit (AU)	Water Quality Standard	Station Rationale
16	Rio Hondo at Riverside	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	20.6.4.208	Lowest perennial reach
17	Carrizo Creek at Mescalero Boundary	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	20.6.4.209	Baseline below Tribal lands
18	Carrizo Creek above Rio Ruidoso	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	20.6.4.209	Bottom of AU
19	Grindstone Creek above Grindstone Reservoir	Grindstone Canyon (Grindstone Reservoir to headwaters)	20.6.4.98	Bottom of AU
20	Grindstone Canyon Reservoir	Grindstone Canyon Reservoir	20.6.4.208	Lake Assessment
21	Grindstone Creek below Grindstone Reservoir	Grindstone Canyon (Carrizo Creek to Grindstone Reservoir)	20.6.4.98	Monitor receiving water for NPDES permit
22	Rio Peñasco at Bluff Springs	Rio Peñasco (HWY 24 to headwaters)	20.6.4.208	Monitor upper perennial reach
23	Rio Peñasco below Mayhill	Rio Peñasco (HWY 24 to headwaters)	20.6.4.208	Determine flow status
24	Rio Peñasco at NM 24	Rio Peñasco (HWY 24 to headwaters)	20.6.4.208	Bottom of AU
25	Rio Peñasco near Helena Road	Rio Peñasco (Pecos River to Hwy 24)	20.6.4.206	Only station in AU
26	Agua Chiquita between Weed and Sacramento	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	20.6.4.208	Only station in perennial reach
27	Agua Chiquita above Rio Peñasco	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	20.6.4.206	Bottom of AU
28	Sacramento River at USGS Gage	Sacramento River (Perennial reaches)	20.6.4.208	Only station in perennial reach
29	Sacramento River below Timberon	Sacramento River (Perennial reaches)	20.6.4.98	Bottom of AU
30	3 Rivers at USFS Campground	Three Rivers (USFS boundary to headwaters)	20.6.4.802	Only station in perennial reach
31	Nogal Creek at CR B-17	Nogal Creek (Tularosa Creek to Mescalero Apache boundary)	20.6.4.801	Only station in AU

Station Number	Station Name	Assessment Unit (AU)	Water Quality Standard	Station Rationale
32	Tularosa Creek at USGS Gage	Tularosa Creek (Old US 70 crossing to Mescalero Apache boundary)	20.6.4.801	Only station in AU
33	La Luz Creek at CR A-70	La Luz Creek (perennial portions)	20.6.4.801	Only station in AU
34	Cloudcroft WWTP	Fresnal Canyon (La Luz Creek to headwaters)	NPDES Permit NM0023370	Monitor effluent
35	Karr Canyon above Raven Road	Karr Canyon (Fresnal Canyon to headwaters)	20.6.4.801	Only station in AU
36	Rio Salado above Fresnal Canyon	Salado Canyon (Fresnal Canyon to headwaters)	20.6.4.801	Only station in AU
37	Fresnal Creek at Alamogordo Water intake	Fresnal Canyon (La Luz Creek to headwaters)	20.6.4.801	Only station in AU
38	San Andreas Canyon	San Andreas Canyon (perennial portions)	20.6.4.99	Only station in AU
39	Dog Canyon Creek at Oliver Lee State Park	Dog Canyon Creek (perennial portions)	20.6.4.801	Only station in AU

2012 Data Collection Efforts in Sacramento Mountains

Chemical Sampling

Sampling stations (Figures 1 and 2) were generally allocated one per assessment unit (AU) and were usually positioned near the lower end of the AU, access permitting. Additional stations were located to document the condition of AUs below potential pollution sources and where AU and designated aquatic life use revisions are under consideration. 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. Chemical analytes and their sampling frequencies (planned vs. completed) are specified below (Table 5). In addition to the analytes listed, field measurements of temperature, specific conductance, dissolved oxygen (DO) concentration, DO percent saturation, pH, and turbidity were taken with multi-parameter sondes during each sampling visit.

Biological and Physical Habitat Sampling

Stations were selected for long-term data collection using multi-parameter sondes or thermographs, and biological and physical monitoring based on their current IR status and the results of level 1 nutrient surveys and stream bottom deposit assessments. As part of biological and physical habitat sampling long-term datasets were collected during deployments of multi-parameter sondes, thermographs or DO loggers set to record at 15 min intervals for at least three days. Resources and access issues did not allow for the collection all types of data in every AU. A monitoring summary for these parameters is shown below (Table 6).

Table 5. Chemical Sampling Planned/Completed in 2012.

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
1	Rio Bonito above Bonito Lake	Rio Bonito (NM 48 to headwaters)	0/3	6/5	3/3	3/3	6/4	0/0	0/0	0/1
2	Bonito Lake	Bonito Lake	4/2	4/2	4/2	4/2	4/2	2/2	2/1	2/1
added during survey	Rio Bonito below Bonito Lake	Rio Bonito (NM 48 to headwaters)	0/3	0/7	0/3	0/3	0/5	0/0	0/0	0/0
3	Rio Bonito at Angus Bridge	Rio Bonito (NM 48 to headwaters)	0/4	3/5	3/3	3/3	3/5	0/0	0/0	0/0
4	Rio Bonito at BLM Apple Orchard Site	Rio Bonito (Rio Ruidoso to NM 48)	6/5	6/7	4/4	4/4	6/7	0/0	2/0	2/0
5	South Fork Eagle Creek at USGS gage	South Fork Eagle Creek (Eagle Creek to Mescalero Apache boundary)	0/2	3/1	3/1	3/1	3/2	0/0	0/0	0/0
6	Alto Lake	Alto Lake	4/4	4/4	4/4	4/4	4/4	2/2	2/2	2/2
7	Eagle Creek below Alto Lake	Eagle Creek (Rio Ruidoso to Alto Lake)	0/2	3/4	3/2	3/2	3/3	0/0	0/0	0/0
8	Rio Ruidoso at Tribal boundary	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	6/6	6/7	4/5	4/5	6/5	0/0	0/0	0/0
9	Rio Ruidoso above Carrizo Creek	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	6/6	6/11	4/5	4/5	6/9	0/1	0/1	0/1

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
10	Rio Ruidoso below Ruidoso Downs Racetrack	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	6/6	6/9	0/4	0/4	6/6	0/0	0/0	0/0
11	Rio Ruidoso above NM 70 bridge	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	6/6	6/12	4/5	4/5	6/9	2/1	2/1	2/1
12	Ruidoso New WWTP Outfall	Rio Ruidoso (Rio Bonito to US Hwy 70 Bridge)	6/6	6/10	0/5	0/5	6/7	0/0	0/0	0/0
13	Rio Ruidoso at CR E002	Rio Ruidoso (Rio Bonito to US Hwy 70)	6/6	6/12	4/5	4/5	6/8	2/1	2/2	2/1
14	Rio Ruidoso at FR 443	Rio Ruidoso (Rio Bonito to US Hwy 70)	6/6	6/11	4/5	4/5	6/8	0/2	0/1	0/1
15/16*	Rio Hondo below Rio Ruidoso/ Rio Hondo at Riverside*	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	6/5	6/7	4/4	4/4	6/7	2/0	2/0	2/1
17	Carrizo Creek at Mescalero Boundary	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	6/5	6/7	4/4	4/4	6/5	0/0	0/0	0/0
18	Carrizo Creek above Rio Ruidoso	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	6/6	6/11	4/5	4/5	6/7	2/0	2/0	2/1

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
19	Grindstone Creek above Grindstone Reservoir	Grindstone Canyon (Grindstone Reservoir to headwaters)	3/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
20	Grindstone Canyon Reservoir	Grindstone Canyon Reservoir	0/4	4/4	4/4	4/4	4/4	2/2	2/2	2/2
21	Grindstone Creek below Grindstone Reservoir	Grindstone Canyon (Carrizo Creek to Grindstone Reservoir)	3/6	3/9	3/5	3/5	3/9	0/0	0/0	0/0
22	Rio Peñasco at Bluff Springs	Rio Peñasco (HWY 24 to headwaters)	6/6	6/6	4/4	4/4	6/6	0/0	0/0	2/2
23	Rio Peñasco below Mayhill	Rio Peñasco (HWY 24 to headwaters)	0/5	3/6	3/3	3/3	3/6	0/0	0/0	0/0
24	Rio Peñasco at NM 24	Rio Peñasco (HWY 24 to headwaters)	6/6	6/9	4/4	4/4	6/6	0/0	0/0	2/2
25	Rio Peñasco near Helena Road	Rio Peñasco (Pecos River to Hwy 24)	3/5	3/8	3/3	3/3	3/5	0/0	0/0	2/2
26	Agua Chiquita between Weed and Sacramento	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	6/5	6/8	4/4	4/4	6/5	0/0	0/0	2/2
27	Agua Chiquita above Rio Peñasco	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	3/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
28	Sacramento River at USGS Gage	Sacramento River (Perennial reaches)	6/6	6/6	4/4	4/4	6/5	0/0	0/0	2/2

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
29	Sacramento River below Timberon	Sacramento River (Perennial reaches)	3/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
30	3 Rivers at USFS Campground	Three Rivers (USFS boundary to headwaters)	6/6	6/8	4/4	4/4	6/7	0/0	0/0	2/2
31	Nogal Creek at CR B-17	Nogal Creek (Tularosa Creek to Mescalero boundary)	3/5	3/6	3/3	3/3	3/5	0/0	0/0	0/0
32	Tularosa Creek at USGS Gage	Tularosa Creek (Old US 70 crossing to Mescalero boundary)	6/6	6/6	3/2	3/2	6/6	0/0	0/0	2/2
33	La Luz Creek at CR A-70	La Luz Creek (perennial portions)	3/3	3/3	3/2	3/2	3/3	0/0	0/0	0/0
34	Cloudcroft WWTP	Fresnal Canyon (La Luz Creek to headwaters)	3/5	3/5	0/3	0/3	3/5	0/0	0/0	0/0
35	Karr Canyon above Raven Road	Karr Canyon (Fresnal Canyon to headwaters)	6/6	6/8	4/4	4/4	6/7	0/0	0/0	2/2
36	Rio Salado above Fresnal Canyon	Salado Canyon (Fresnal Canyon to headwaters)	6/5	6/8	3/3	3/3	6/8	0/0	0/0	2/1
37	Fresnal Creek at Alamogordo water intake	Fresnal Canyon (La Luz Creek to headwaters)	3/7	3/8	3/5	3/5	3/8	0/0	0/0	0/0
38	San Andreas Canyon	San Andreas Canyon (perennial portions)	4/0	4/0	4/0	4/0	4/0	0/0	0/0	2/0

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
39	Dog Canyon Creek at Oliver Lee State Park	Dog Canyon Creek (perennial portions)	6/6	6/7	4/4	4/4	6/6	0/0	0/0	2/0

*Rio Hondo at Riverside was evaluated as a primary station, but access issues necessitated collection upstream at the Rio Ruidoso confluence.
[1]Suite includes total Kjeldahl nitrogen (TKN), nitrate+nitrite, ammonia and total phosphorus.
[2]Suite includes aluminum, antimony, arsenic, barium, boron, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, silicon, silver, tin, vanadium, zinc and hardness.
[3]Aluminum, selenium and mercury only.
[4]Semi-volatile organic compounds; see Appendix B for a list of analytes included in this suite.
[5]Volatile organic compounds; see Appendix IB for a list of analytes included in this suite.
[6]A radionuclide sample will initially be analyzed for gross alpha and gross beta radiation and, depending on results of the gross alpha and gross beta screen, may include uranium mass and radium 226 + 228.

Table 6. Physical and Biological Sampling Planned/Completed in 2012.

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation Habitat[1][2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
1	Rio Bonito above Bonito Lake	Rio Bonito (NM 48 to headwaters)	23f	1/0	1/0	2/0	1/0	1/0	1/0	1/0	1/0
2	Bonito Lake	Bonito Lake	23f	0/0	0/0	0/0	0/0	4/2	4/2	0/0	0/0
added during survey	Rio Bonito below Bonito Lake	Rio Bonito (NM 48 to headwaters)	23c	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
3	Rio Bonito at Angus Bridge	Rio Bonito (NM 48 to headwaters)	23c	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
4	Rio Bonito at BLM Apple Orchard Site	Rio Bonito (Rio Ruidoso to NM 48)	23b	1/0	1/0	1/0	1/0	0/0	0/0	0/0	0/0
5	South Fork Eagle Creek at USGS gage	South Fork Eagle Creek (Eagle Creek to Mescalero Apache boundary)	23c	1/0	1/0	0/0	1/0	0/0	0/0	0/0	1/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
6	Alto Lake	Alto Lake	23c	0/0	0/0	0/0	0/0	4/2	4/2	0/0	0/0
7	Eagle Creek below Alto Lake	Eagle Creek (Rio Ruidoso to Alto Lake)	23c	1/0	1/0	0/0	1/0	0/0	0/0	0/0	1/0
8	Rio Ruidoso at Tribal boundary	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	23f	0/0	0/0	0/1	0/1	0/0	0/0	0/0	0/0
9	Rio Ruidoso above Carrizo Creek	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	23f	1/1	1/1	2/1	1/1	1/0	0/0	0/0	0/0
10	Rio Ruidoso below Ruidoso Downs Racetrack	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	23b	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/0
11	Rio Ruidoso above NM 70 bridge	Rio Ruidoso (US Hwy 70 Bridge to Mescalero Apache boundary)	23b	1/1	1/1	2/2	3/1	3/1	0/0	3/0	0/0
12	Ruidoso New WWTP Outfall	Rio Ruidoso (Rio Bonito to US Hwy 70 Bridge)	Not Applicable								
13	Rio Ruidoso at CR E002	Rio Ruidoso (Rio Bonito to US Hwy 70)	23b	1/1	1/1	2/1	3/1	3/1	0/0	3/0	0/0
14	Rio Ruidoso at FR 443	Rio Ruidoso (Rio Bonito to US Hwy 70)	26q	1/1	1/1	2/2	1/1	1/1	0/0	0/0	0/0
15/16*	Rio Hondo below Rio Ruidoso/ Rio Hondo at Riverside*	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	26q	1/0	1/1	2/1	1/1	1/0	0/0	1/0	0/0
17	Carrizo Creek at Mescalero Boundary	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	23f	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/0
18	Carrizo Creek above Rio Ruidoso	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	23b	1/0	1/1	2/1	1/1	1/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
19	Grindstone Creek above Grindstone Reservoir	Grindstone Canyon (Grindstone Reservoir to headwaters)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
20	Grindstone Canyon Reservoir	Grindstone Canyon Reservoir	23b	0/0	0/0	0/0	0/0	4/4	4/4	0/0	0/0
21	Grindstone Creek below Grindstone Reservoir	Grindstone Canyon (Carrizo Creek to Grindstone Reservoir)	23c	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
22	Rio Peñasco at Bluff Springs	Rio Peñasco (HWY 24 to headwaters)	26o	1/1	1/1	1/0	1/1	1/0	0/0	0/0	0/0
23	Rio Peñasco below Mayhill	Rio Peñasco (HWY 24 to headwaters)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
24	Rio Peñasco at NM 24	Rio Peñasco (HWY 24 to headwaters)	24a	1/1	1/1	2/1	1/1	1/0	0/0	0/0	0/0
25	Rio Peñasco near Helena Road	Rio Peñasco (Pecos River to Hwy 24)	24a	1/1	1/1	1/1	1/1	1/0	0/0	0/0	1/0
26	Agua Chiquita between Weed and Sacramento	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	23c	0/1	0/1	0/1	0/1	0/0	0/0	0/0	0/0
27	Agua Chiquita above Rio Peñasco	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	23f	1/0	1/0	1/0	1/0	1/0	0/0	1/0	1/0
28	Sacramento River at USGS Gage	Sacramento River (Perennial reaches)	23f	1/0	1/0	1/0	1/0	0/0	0/0	0/0	0/0
29	Sacramento River below Timberon	Sacramento River (Perennial reaches)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
30	3 Rivers at USFS Campground	Three Rivers (USFS boundary to headwaters)	23b	1/1	1/0	1/1	1/1	1/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
31	Nogal Creek at CR B-17	Nogal Creek (Tularosa Creek to Mescalero Apache boundary)	23a	1/0	1/1	1/1	1/1	1/0	0/0	0/0	1/0
32	Tularosa Creek at USGS Gage	Tularosa Creek (Old US 70 crossing to Mescalero Apache boundary)	23b	1/1	1/1	1/1	1/1	1/0	0/0	0/0	0/0
33	La Luz Creek at CR A-70	La Luz Creek (perennial portions)	23b	1/0	1/0	1/0	1/0	1/0	0/0	0/0	1/0
34	Cloudcroft WWTP	Fresnal Canyon (La Luz Creek to headwaters)	Not Applicable								
35	Karr Canyon above Raven Road	Karr Canyon (Fresnal Canyon to headwaters)	23a	1/1	1/1	1/1	1/1	1/0	0/0	0/0	1/0
36	Rio Salado above Fresnal Canyon	Salado Canyon (Fresnal Canyon to headwaters)	23a	1/0	1/1	1/1	1/1	0/1	0/0	0/0	1/0
37	Fresnal Creek at Alamogordo water intake	Fresnal Canyon (La Luz Creek to headwaters)	23a	1/1	1/1	1/1	1/1	1/0	0/0	0/0	1/0
38	San Andreas Canyon	San Andreas Canyon (perennial portions)	23a	1/0	1/0	1/0	1/0	0/0	0/0	0/0	1/0
39	Dog Canyon Creek at Oliver Lee State Park	Dog Canyon Creek (perennial portions)	23a	1/1	1/1	1/1	1/1	0/0	0/0	0/0	0/0

[1]Refers to cross-section, flow, canopy cover, and slope data required to use SSTEMP temperature modeling software for streams with temperature impairments.
[2]Additonal stations may be added as indicated by preliminary data.
[3]Level 2 nutrient assessments are scheduled at these sites because they are currently listed as impaired for nutrients. Additional stations will be added as indicated by preliminary data. Nutrient screening is a two-step process; a preliminary assessment of nutrient variables is used to determine if level 2 sampling, consisting of chlorophyll determinations and a sonde deployment to record diurnal variations in pH and dissolved oxygen concentrations, is warranted.

2014 Data Collection Efforts in Sacramento Mountains

The Little Bear Fire ignited in the Rio Bonito watershed on June 4, 2012 and burned 44,330 acres across numerous watersheds before being fully contained in July, 2012. This preceded an active monsoon season that resulted in perturbed conditions throughout the study area and prevented monitoring in those areas. Even in unburned areas, the frequency of intense storm events caused streambed scouring and prevented planned sampling. Therefore, a follow-up survey was planned and conducted in 2014 to complete sampling initially planned for 2012. Planned and completed physical and chemical monitoring (Table 7) and biological and habitat monitoring (Table 8) from 2014 are shown below.

In contrast to the watersheds affected by the Little Bear Fire and the heavy rains that followed, some streams in watersheds to the south of the Ruidoso area, and on the eastern slope of the Sacramento Mountains, did not contain water at all times. These included portions of the Sacramento River, Grindstone Creek, the Agua Chiquita, San Andreas Canyon, Fresnal Creek and La Luz Creek. It was not possible to sample these streams as scheduled and they are being evaluated for potential reclassification pending the outcome of the NMED Hydrology Protocol (HP) Use Attainability Analyses (UAAs).

Table 7. Chemical Monitoring Planned/Completed in 2014.

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
1	Rio Bonito above Bonito Lake	Rio Bonito (NM 48 to headwaters)	4/0	4/0	3/0	3/0	4/0	0/0	0/0	0/0
2	Bonito Lake	Bonito Lake	4/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
3	Rio Bonito at Angus Bridge	Rio Bonito (NM 48 to headwaters)	3/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
4	Rio Bonito at BLM Apple Orchard Site	Rio Bonito (Rio Ruidoso to NM 48)	4/0	4/0	0/0	0/0	4/0	0/0	0/0	2/0
5	South Fork Eagle Creek at USGS gage	South Fork Eagle Creek (Eagle Creek to Mescalero boundary)	0/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
6	Alto Lake	Alto Lake	0/0	4/1	0/0	0/0	4/1	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
7	Eagle Creek below Alto Lake	Eagle Creek (Rio Ruidoso to Alto Lake)	0/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
8	Rio Ruidoso at Mescalero boundary	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
9	Rio Ruidoso above Carrizo Creek	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
10	Rio Ruidoso below Ruidoso Downs Racetrack	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
11	Rio Ruidoso above Hwy 70 bridge	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
12	Ruidoso New WWTP Outfall	Rio Ruidoso (Rio Bonito to US Hwy 70 Bridge)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
13	Rio Ruidoso at CR E002	Rio Ruidoso (Rio Bonito to US Hwy 70)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
14	Rio Ruidoso at FR 443	Rio Ruidoso (Rio Bonito to US Hwy 70)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
15/ 16*	Rio Hondo below Rio Ruidoso/ Rio Hondo at Riverside*	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
17	Carrizo Creek at Mescalero Boundary	Carrizo Creek (Rio Ruidoso to Mescalero boundary)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
18	Carrizo Creek above Rio Ruidoso	Carrizo Creek (Rio Ruidoso to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
19	Grindstone Creek above Grindstone Reservoir	Grindstone Canyon (Grindstone Reservoir to headwaters)	3/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
20	Grindstone Canyon Reservoir	Grindstone Canyon Reservoir	4/2	4/2	0/0	0/0	4/2	0/0	0/0	0/0
21	Grindstone Creek below Grindstone Reservoir	Grindstone Canyon (Carrizo Creek to Grindstone Reservoir)	4/2	4/2	0/0	0/0	4/0	0/0	0/0	0/0
22	Rio Peñasco at Bluff Springs	Rio Peñasco (HWY 24 to headwaters)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
23	Rio Peñasco below Mayhill	Rio Peñasco (HWY 24 to headwaters)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
24	Rio Peñasco at NM 24	Rio Peñasco (HWY 24 to headwaters)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
25	Rio Peñasco near Helena Road	Rio Peñasco (Pecos River to Hwy 24)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
26	Agua Chiquita between Weed and Sacramento	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
27	Agua Chiquita above Rio Peñasco	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
28	Sacramento River at USGS Gage	Sacramento River (Perennial reaches)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
29	Sacramento River below Timberon	Sacramento River (Perennial reaches)	0/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
30	3 Rivers at USFS Campground	Three Rivers (USFS boundary to headwaters)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
31	Nogal Creek at CR B-17	Nogal Creek (Tularosa Creek to Mescalero boundary)	0/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
32	Tularosa Creek at USGS Gage	Tularosa Creek (Old US 70 crossing to Mescalero boundary)	0/0	4/2	0/0	0/0	4/0	0/0	0/0	0/0
33	La Luz Creek at CR A-70	La Luz Creek (perennial portions)	0/0	3/0	3/0	3/0	3/0	0/0	0/0	0/0
34	Cloudcroft WWTP	Fresnal Canyon (La Luz Creek to headwaters)	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
35	Karr Canyon above Raven Road	Karr Canyon (Fresnal Canyon to headwaters)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0
36	Rio Salado above Fresnal Canyon	Salado Canyon (Fresnal Canyon to headwaters)	0/0	4/1	0/0	0/0	4/0	0/0	0/0	0/0
37	Fresnal Creek at Alamogordo Water Intake	Fresnal Canyon (La Luz Creek to headwaters)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	TDS/TSS	Nutrients[1]	Dissolved Metals[2]	Total Metals[3]	E. coli	SVOC[4]	VOC[5]	Radionuclides[6]
39	Dog Canyon Creek at Oliver Lee State Park	Dog Canyon Creek (perennial portions)	0/0	4/0	0/0	0/0	4/0	0/0	0/0	0/0

[*]Rio Hondo at Riverside was evaluated as a primary station, but access issues necessitated collection upstream at the Rio Ruidoso confluence.
[1]Suite includes total Kjeldahl nitrogen (TKN), nitrate+nitrite, ammonia and total phosphorus.
[2]Suite includes aluminum, antimony, arsenic, barium, boron, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, silicon, silver, tin, vanadium, zinc and hardness.
[3]Aluminum, selenium and mercury only.
[4]Semi-volatile organic compounds; see Appendix B for a list of analytes included in this suite.
[5]Volatile organic compounds; see Appendix IB for a list of analytes included in this suite.
[6]A radionuclide sample will initially be analyzed for gross alpha and gross beta radiation and, depending on results of the gross alpha and gross beta screen, may include uranium mass and radium 226 + 228.

Table 8. Biological and Habitat Sampling Planned/Completed in 2014.

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation/ Habitat[1][2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
1	Rio Bonito above Bonito Lake	Rio Bonito (NM 48 to headwaters)	23f	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0
2	Bonito Lake	Bonito Lake	23f	0/0	0/0	0/0	0/0	1/0	4/0	0/0	0/0
3	Rio Bonito at Angus Bridge	Rio Bonito (NM 48 to headwaters)	23c	1/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
4	Rio Bonito at BLM Apple Orchard Site	Rio Bonito (Rio Ruidoso to NM 48)	23b	1/0	1/0	1/0	1/0	0/0	0/0	0/0	0/0
5	South Fork Eagle Creek at USGS gage	South Fork Eagle Creek (Eagle Creek to Mescalero Apache boundary)	23c	1/0	1/0	0/0	1/0	0/0	0/0	0/0	1/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
6	Alto Lake	Alto Lake	23c	0/0	0/0	0/0	0/0	4/2	4/2	0/0	0/0
7	Eagle Creek below Alto Lake	Eagle Creek (Rio Ruidoso to Alto Lake)	23c	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
8	Rio Ruidoso at Mescalero boundary	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	23f	0/0	0/0	0/1	0/1	0/0	0/0	0/0	0/0
9	Rio Ruidoso above Carrizo Creek	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	23f	0/0	0/0	1/1	1/1	1/1	0/0	0/0	0/0
10	Rio Ruidoso below Ruidoso Downs Racetrack	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	23b	0/0	0/0	0/0	1/1	0/0	0/0	0/0	0/0
11	Rio Ruidoso above NM 70 bridge	Rio Ruidoso (US Hwy 70 Bridge to Mescalero boundary)	23b	0/0	1/1	1/1	1/1	1/1	0/0	3/0	0/0
13	Rio Ruidoso at CR E002	Rio Ruidoso (Rio Bonito to US Hwy 70)	23b	0/0	0/0	1/1	1/1	1/1	0/0	0/0	0/0
14	Rio Ruidoso at FR 443	Rio Ruidoso (Rio Bonito to US Hwy 70)	26q	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
15/16	Rio Hondo below Rio Ruidoso/ Rio Hondo at Riverside*	Rio Hondo (perennial reaches Bonney Canyon to Rio Ruidoso)	26q	1/0	1/0	1/0	1/0	1/0	0/0	1/0	0/0
17	Carrizo Creek at Mescalero Boundary	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	23f	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
18	Carrizo Creek above Rio Ruidoso	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	23b	0/0	0/0	1/1	1/1	1/1	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
19	Grindstone Creek above Grindstone Reservoir	Grindstone Canyon (Grindstone Reservoir to headwaters)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
20	Grindstone Canyon Reservoir	Grindstone Canyon Reservoir	23b	0	0	0	0	4/3	4/3	0	0
21	Grindstone Creek below Grindstone Reservoir	Grindstone Canyon (Carrizo Creek to Grindstone Reservoir)	23c	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
22	Rio Peñasco at Bluff Springs	Rio Peñasco (HWY 24 to headwaters)	26o	0/0	0/0	0/0	1/0	1/0	0/0	0/0	0/0
23	Rio Peñasco below Mayhill	Rio Peñasco (HWY 24 to headwaters)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
24	Rio Peñasco at NM 24	Rio Peñasco (HWY 24 to headwaters)	24a	0/0	0/0	2/1	1/1	1/1	0/0	0/0	0/0
25	Rio Peñasco near Helena Road	Rio Peñasco (Pecos River to Hwy 24)	24a	0/0	0/0	1/1	1/1	1/1	0/0	0/0	1/0
28	Sacramento River at USGS Gage	Sacramento River (Perennial reaches)	23f	0/0	0/0	1/0	1/0	0/0	0/0	0/0	0/0
29	Sacramento River below Timberon	Sacramento River (Perennial reaches)	23b	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0
30	3 Rivers at USFS Campground	Three Rivers (USFS boundary to headwaters)	23b	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0
31	Nogal Creek at CR B-17	Nogal Creek (Tularosa Creek to Mescalero Apache boundary)	23a	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0

Station Number	Station Name	Assessment Unit (AU)	Ecoregion	Sedimentation[1] Habitat[2]	Thermograph	Sonde[3]	Nutrient Survey	Chlorophyll	Phytoplankton	Macroinvertebrates	Hydrology Protocol
32	Tularosa Creek at USGS Gage	Tularosa Creek (Old US 70 crossing to Mescalero Apache boundary)	23b	0/0	1/0	1/0	1/0	1/0	0/0	0/0	0/0
33	La Luz Creek at CR A-70	La Luz Creek (perennial portions)	23b	1/0	1/0	1/0	1/0	1/0	0/0	0/0	1/0
35	Karr Canyon above Raven Road	Karr Canyon (Fresnal Canyon to headwaters)	23a	1/1	1/0	1/0	1/0	1/0	0/0	0/0	0/0
36	Rio Salado above Fresnal Canyon	Salado Canyon (Fresnal Canyon to headwaters)	23a	1/1	1/0	1/0	1/0	0/0	0/0	0/0	1/0
37	Fresnal Creek at Alamogordo Water intake	Fresnal Canyon (La Luz Creek to headwaters)	23a	0/0	1/0	1/0	1/0	1/0	0/0	0/0	1/0
38	San Andreas Canyon	San Andreas Canyon (perennial portions)	23a	1/0	1/0	1/0	1/0	0/0	0/0	0/0	1/0
39	Dog Canyon Creek at Oliver Lee State Park	Dog Canyon Creek (perennial portions)	23a	0/0	1/0	1/0	1/0	0/0	0/0	0/0	0/0

[1]Refers to cross-section, flow, canopy cover, and slope data required to use SSTEMP temperature modeling software for streams with temperature impairments.
[2]Additonal stations may be added as indicated by preliminary data.
[3]Level 2 nutrient assessments are scheduled at these sites because they are currently listed as impaired for nutrients. Additional stations will be added as indicated by preliminary data. Nutrient screening is a two-step process; a preliminary assessment of nutrient variables is used to determine if level 2 sampling, consisting of chlorophyll determinations and a sonde deployment to record diurnal variations in pH and dissolved oxygen concentrations, is warranted.

A variety of issues again prevented all planned sampling from being completed in 2014. Chief among these were the continuing impacts of the Little Bear Fire which resulted in ash transport and erosion in the Eagle Creek and Rio Bonito watersheds. A decision was made to postpone sampling in these areas until conditions stabilize. As in 2012, a lack of precipitation and runoff resulted in dry channels at a number stations in the Rio Salado, Agua Chiquito, Grindstone Canyon and Rio Peñasco watersheds. Future work at these locations will be directed at determining if they are perennial and if adjustments to existing WQS are warranted.

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APPENDIX A. Analytes included in Volatile (VOC) and Semi-volatile (SVOC) organic compound suites.

Semi-Volatile Organic Compounds	Volatile Organic Compounds
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

Semi-Volatile Organic Compounds	Volatile Organic Compounds
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	

Semi-Volatile Organic Compounds	Volatile Organic Compounds
Nitrobenzene	
N-nitrosodimethylamine	
N-nitroso-di-n-propylamine	
N-nitrosodiphenylamine	
Pentachlorophenol	
Phenanthrene	
Phenol	
Prometryne	
Pyrene	
Pyridine	
Simazine	
trans-Chlordane	