FINAL DRAFT

TOTAL MAXIMUM DAILY LOAD (TMDL)

FOR THE

SACRAMENTO MOUNTAINS

[RIO HONDO, TULAROSA, AND RIO PEÑASCO WATERSHEDS]

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COVER PHOTO: Rio Peñasco below Helena Road, August 2012. Scott Murray-NMED/SWQB.

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LIST OF ABBREVIATIONS

4Q3	4-Day, 3-year low-flow frequency
AU	Assessment Unit
BLM	Bureau of Land Management
BMP	Best management practices
BST	Bacterial Source Tracking
CFR	Code of Federal Regulations
cfs	Cubic feet per second
cfu	Coliform forming units
CGP	Construction general storm water permit
CWA	Clean Water Act
^{o}C	Degrees Celsius
DO	Dissolved Oxygen
EQIP	Environmental Quality Incentive Program
^{o}F	Degrees Fahrenheit
HUC	Hydrologic unit code
j/m^2/s	Joules per square meter per second
km^2	Square kilometers
LA	Load allocation
lbs/day	Pounds per day
MASS	Monitoring, Assessment and Standards Section
mgd	Million gallons per day
mg/L	Milligrams per Liter
mi^2	Square miles
mL	Milliliters
MOS	Margin of safety
MOU	Memorandum of Understanding
MS4	Municipal separate storm sewer system
MSGP	Multi-sector general storm water permit
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source
NRCS	Natural Resource Conservation Service
NTU	Nephelometric Turbidity Units
QAPP	Quality Assurance Project Plan
RFP	Request for proposal
SEE	Standard Error of the Estimate
SEV	Severity of Ill Effect
SWPPP	Storm water pollution prevention plan
SWQB	Surface Water Quality Bureau
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen

TP	Total Phosphorous
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WBS	Watershed-based plan
WQCC	Water Quality Control Commission
WQS	Water quality standards
WQX	Water quality exchange
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Under Section 303(d) of the Federal Water Pollution Control Act , a.k.a., Clean Water Act ("CWA"), 33 U.S.C. §§ 1251 to 1388, states establish water quality standards which are submitted and subject to the approval of the U.S. Environmental Protection Agency ("USEPA"). 33 U.S.C. §1313[1]. The CWA requires states to develop Total Maximum Daily Load ("TMDL") management plans for water bodies determined to be impaired. *Id*. A TMDL is defined as "*a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standard including consideration of existing pollutant loads and reasonably foreseeable increases in pollutant loads"* (USEPA 1999). A TMDL documents the amount of a pollutant that a waterbody can assimilate without exceeding the state's water quality standard for that waterbody and allocates loads to known point sources and nonpoint sources. It further identifies potential methods, actions, or limitations that could be implemented to achieve water quality standards. "Total Maximum Daily Load" is defined as the sum of the individual Waste Load Allocations ("WLA") for point sources and Load Allocations ("LA") for nonpoint source and background conditions. (see 40 C.F.R. §130.2(i))[2]. TMDLs also include a Margin of Safety ("MOS"), a required component that acknowledges and counteracts uncertainty.

The New Mexico Environment Department ("NMED") Surface Water Quality Bureau ("SWQB") conducted water quality surveys of the Sacramento Mountains in 2012. Water quality monitoring stations were located within the watersheds to evaluate ambient water quality conditions and the impact of tributary streams. As a result of assessing data generated during these monitoring efforts, the following impairments of water quality standards were found:

- *E.coli* for Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary), Rio Bonito (NM 48 near Angus to headwaters), Nogal Creek (Tularosa Creek to Mescalero Apache boundary), Rio Ruidoso (Eagle Creek to US Hwy 70 bridge), and Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek).
- Turbidity for Agua Chiquita (perennial portions McEwan Canyon to headwaters), Rio Peñasco (Hwy 24 to Cox Canyon), and Rio Ruidoso (Eagle Creek to US Hwy 70 bridge).

This TMDL addresses the above impairments as summarized in Tables ES1 – ES7. The 2012 field studies identified other potential water quality impairments which are not addressed in this document due to additional data needs, assessment protocol revisions or re-application, or impending use attainability analyses. If additional impairments are verified or found, subsequent TMDLs will be developed for those impairments. SWQB prepared TMDLs in 2006 for portions of these watersheds including: TMDLs for *E.coli* on Carrizo Creek, Rio Bonito, and Rio Hondo; as well as TMDLs for plant nutrients, temperature, and turbidity on the Rio Ruidoso.

SWQB's Monitoring, Assessment, and Standards Section ("MASS") will next collect water quality data in the Sacramento Mountains in 2020. TMDLs will be re-examined and potentially revised at that time as this document is considered to be an evolving management plan. In the

[1] http://www.epw.senate.gov/water.pdf
[2] http://www.gpo.gov/fdsys/pkg/CFR-2002-title40-vol18/pdf/CFR-2002-title40-vol18-part130.pdf

event that the new data indicate that the targets used in the analyses are not appropriate and/or if new standards are adopted, the TMDLs will be adjusted accordingly. When attainment of applicable water quality standards has been achieved, the impairment will be removed from New Mexico's CWA §303(d) List of Impaired Waters.

SWQB's Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans ("WBPs") to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the WBP will be done with participation of all interested and affected parties. Further information on WBPs is in Section 8.

ES1. TOTAL MAXIMUM DAILY LOAD FOR AGUA CHIQUITA (PERENNIAL PORTIONS MCEWAN CANYON TO HEADWATERS)

New Mexico Standards Segment	20.6.4.208 NMAC
Waterbody Identifier	NM-2208_01
Segment Length	22.87 miles
Parameters of Concern	Turbidity
Uses Affected	Coldwater Aquatic Life
Geographic Location	Rio Peñasco USGS Hydrologic Unit Code 13060010
Land Type	Arizona/New Mexico Mountains (Ecoregion 21f)
Probable Sources	Bridges/culverts/railroad crossings, channelization, drought-related impact, highway/road/bridge runoff, legacy logging operations, paved roads, gravel or dirt roads, pavement/impervious surfaces, rangeland grazing, residences/buildings.
IR Category	5
Priority Ranking	High
TMDL for: Turbidity	**WLA + LA + MOS = TMDL**

Duration (consecutive hrs)	WLA (lbs/day)*	LA (lbs/day)	MOS (15%) (lbs/day)	TMDL (lbs/day)
720	0	33.06	5.83	38.90
336	0	44.71	7.89	52.60
168	0	56.73	10.01	66.75
144	0	59.74	10.54	70.28
120	0	65.37	11.54	76.91
96	0	71.39	12.60	83.98
72	0	80.03	14.12	94.15

ES2. TOTAL MAXIMUM DAILY LOAD FOR CARRIZO CREEK (RIO RUIDOSO TO MESCALERO APACHE BOUNDARY)

New Mexico Standards Segment	20.6.4.209 NMAC
Waterbody Identifier	NM-2209.A_22
Segment Length	2.03 miles
Parameters of Concern	*E.coli*
Uses Affected	Primary Contact
Geographic Location	Rio Hondo USGS Hydrologic Unit Code 13060008
Land Type	Arizona/New Mexico Mountains (Ecoregion 21f)
Probable Sources	Bridges/culverts/railroad crossings, channelization, highway/road/bridge runoff, on-site treatment systems, paved roads, pavement/impervious surfaces, residences/buildings, site clearance, urban runoff/storm sewers, storm water runoff due to construction, waterfowl.
IR Category	5
Priority Ranking	High
TMDL for: *E.coli*	**WLA + LA + MOS = TMDL** 0 + 4.87×10^8 + 8.6×10^7 = 5.73×10^8 cfu/day

ES3. TOTAL MAXIMUM DAILY LOAD FOR NOGAL CREEK (TULAROSA CREEK TO MESCALERO APACHE BOUNDARY)

New Mexico Standards Segment	20.6.4.801 NMAC
Waterbody Identifier	NM-2801_10
Segment Length	4.08 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary contact
Geographic Location	Tularosa Valley USGS Hydrologic Unit Code 13050003
Land Type	Arizona/New Mexico Mountains (Ecoregion 23b)
Probable Sources	Bridges/culverts/railroad crossings, gravel/dirt roads, highway/road/bridge runoff, on-site treatment systems, paved roads, pavement/impervious surfaces, rangeland grazing, residences/buildings, wildlife other than waterfowl.
IR Category	5
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** 0 + 1.38×10^9 + 2.44×10^8 = 1.62×10^9 cfu/day

ES4. TOTAL MAXIMUM DAILY LOAD FOR RIO PEÑASCO (HIGHWAY 24 TO COX CANYON)

New Mexico Standards Segment	20.6.4.208 NMAC
Waterbody Identifier	NM-2208_00
Segment Length	34.67 miles
Parameters of Concern	Turbidity
Uses Affected	Coldwater Aquatic Life
Geographic Location	Rio Peñasco USGS Hydrologic Unit Code 13060010
Land Type	Arizona/New Mexico Mountains (Ecoregion 23f)
Probable Sources	Angling pressure, bridges/culverts/railroad crossings, channelization, dams/diversions, dredging, drought-related impacts, fish stocking, flow alteration, highway/road/bridge runoff, irrigated crop production, irrigation return drains, legacy logging operations, paved roads, gravel/dirt roads, pavement/impervious surfaces, rangeland grazing, wildlife other than waterfowl.
IR Category	5/5A
Priority Ranking	High
TMDL for: Turbidity	**WLA + LA + MOS = TMDL**

Duration (consecutive hrs)	WLA (lbs/day)*	LA (lbs/day)	MOS (10%) (lbs/day)	TMDL (lbs/day)
720	0	351.36	39.04	390.40
336	0	494.17	54.91	549.07
168	0	636.97	70.77	707.75
144	0	673.24	74.80	748.05
120	0	743.51	82.61	826.13
96	0	813.79	90.42	904.21
72	0	920.33	102.26	1,022.58

ES5. TOTAL MAXIMUM DAILY LOAD FOR RIO BONITO (NM 48 NEAR ANGUS TO HEADWATERS)

New Mexico Standards Segment	20.6.4.209 NMAC
Waterbody Identifier	NM-2209.A_10
Segment Length	12.98 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary contact
Geographic Location	Rio Hondo USGS Hydrologic Unit Code 13060008
Land Type	Arizona/New Mexico Mountains (Ecoregion 23f)
Probable Sources	Bridges/culverts/railroad crossings, dams/diversions, fire suppression, flow alteration, highway/road/bridge runoff, legacy logging operations, paved roads, gravel/dirt roads, pavement/impervious surfaces, recent overbank flows. watershed runoff following forest fire.
IR Category	5/5C
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** $0 + 1.87 \times 10^9 + 3.30 \times 10^8 = 2.20 \times 10^9$ cfu/day

ES6. TOTAL MAXIMUM DAILY LOAD FOR RIO RUIDOSO (US HWY 70 BRIDGE TO CARRIZO CREEK)

New Mexico Standards Segment	20.6.4.209 NMAC
Waterbody Identifier	NM-2209.A_21
Segment Length	7.58 miles
Parameters of Concern	*E.coli*
Uses Affected	Primary contact, High Quality Coldwater Aquatic Life
Geographic Location	Rio Hondo USGS Hydrologic Unit Code 13060008
Land Type	Arizona/New Mexico Mountains (Ecoregion 23f)
Probable Sources	Bridges/culverts/railroad crossings, CAFO, channelization, drought-related impacts, dumping/garbage/litter/trash, highway/road/bridge runoff, inappropriate waste disposal, livestock grazing, municipal point source discharge, paved road, gravel/dirt roads, pavement/impervious surfaces, rangeland grazing, residences/buildings, stream channel incision, urban runoff/storm sewers, waste from pets, waterfowl, watershed runoff following forest fire.
IR Category	5/5C
Priority Ranking	High
TMDL for:	**WLA + LA + MOS = TMDL**
E.coli	$0 + 4.34 \times 10^{10} + 4.82 \times 10^{8} = 4.82 \times 10^{9}$ cfu/day

ES7. TOTAL MAXIMUM DAILY LOAD FOR RIO RUIDOSO (EAGLE CREEK TO US HWY 70 BRIDGE)

New Mexico Standards Segment	20.6.4.208 NMAC
Waterbody Identifier	NM-2208_20
Segment Length	8.24 miles
Parameters of Concern	*E.coli*, Turbidity
Uses Affected	Primary contact, High Quality Coldwater Aquatic Life
Geographic Location	Rio Hondo USGS Hydrologic Unit Code 13060008
Land Type	Arizona/New Mexico Mountains (Ecoregion 23b)
Probable Sources	Channelization, drought-related impacts, gravel/dirt roads, surface films/odors, mass wasting, on-site treatment systems, pavement/impervious surfaces, residences/buildings, stream channel incision, waterfowl, watershed runoff following forest fire.
IR Category	5/5A
Priority Ranking	High
TMDL for:	**WLA + LA + MOS = TMDL**
E.coli	$1.29 \times 10^{10} + 3.05 \times 10^{9} + 1.77 \times 10^{9} = 1.77 \times 10^{10}$ cfu/day

Turbidity

Duration (consecutive hrs)	WLA (lbs/day)	LA (lbs/day)	MOS (10%) (lbs/day)	TMDL (lbs/day)
720	418.83	99.12	57.55	575.51
336	531.42	125.77	73.02	730.22
168	653.02	154.55	89.73	897.30
144	684.55	162.01	94.06	940.62
120	749.85	177.46	103.03	1,030.35
96	815.15	192.92	112.01	1,120.08
72	920.99	217.97	126.55	1,265.50

1.0 INTRODUCTION

This document provides TMDLs for stream segments within the Sacramento Mountains that have been determined to be impaired based on a comparison of measured concentrations and conditions with numeric water quality criteria or with numeric translators for narrative standards.

This document is divided into several sections. Section 2.0 provides background information on the location and history of the Sacramento Mountains, provides applicable water quality standards for the assessment units addressed in this document, and briefly discusses the intensive water quality survey that was conducted in the Sacramento Mountains in 2012. Section 3.0 provides *E. coli* TMDLs; Section 4.0 contains plant nutrient TMDLs; Section 5.0 contains total phosphorus TMDLs; and Section 4.0 contains turbidity TMDLs. Pursuant to CWA §106(e)(1), Section 5.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 6.0 discusses implementation of TMDLs (phase two) and the relationship between TMDLs and WBPs. Section 7.0 discusses assurance; Section 8.0 discusses public participation in the TMDL process; and Section 9.0 provides references.

2.0 SACRAMENTO MOUNTAIN CHARACTERISTICS

The watersheds in the Sacramento Mountains were sampled by SWQB from April to October 2012 (NMED/SWQB 2012b). Surface water quality monitoring stations were selected to characterize water quality of perennial stream reaches of the Sacramento Mountains. Information regarding previous sampling efforts by SWQB in the Sacramento Mountains is detailed in the Sacramento Mountains Field Sampling Plan (NMED/SWQB 2012b) available on the SWQB website. A number of water quality impairments identified during this survey are addressed in this document.

2.1 Location Description

The watersheds within the Sacramento Mountains (U.S. Geological Survey [USGS] Hydrologic Unit Code [HUC] 13060003, 13060008, and 13060010) are located in south central New Mexico. The Rio Hondo, Rio Peñasco, and Tularosa watersheds encompass approximately 9,329 square miles and extend over portions of Lincoln, Chaves, and Otero Counties. The watersheds in the Sacramento Mountains are located in Omernik Level III Ecoregion 23b and 23f (Arizona/New Mexico Mountains).

As presented in **Figure 2.1**, the Tularosa Valley HUC (13060003) land use is 79% rangeland, 14% forest, and 6% barren. **Figure 2.2** shows ownership as 30% private, 26% BLM, 16% U.S. Forest Service ("USFS"), 9% State, 8% Tribal, 3% National Park Service, and 1% U.S. Fish and Wildlife Service. Federally listed threatened and endangered species include the Pecos Bluntnose Shiner, Rio Grande Silvery Minnow, Pecos Gambusia, and the Mexican Spotted Owl.

As presented in **Figure 2.1**, the Rio Hondo HUC (13060008) land use is 55% rangeland, 40% forest, 4% agriculture, and 2% built-up. **Figure 2.2** shows ownership as 57% private, 18% USFS, 11% Tribal, 10% Bureau of Land Management ("BLM"), an 4% State. Federally listed threatened and endangered species include the Pecos Bluntnose Shiner, Chihuahua Chub, Rio Grande Silvery Minnow, Pecos Gambusia, Mexican Spotted Owl, Pecos Sunflower, Kuenzler's Hedgehog Cactus, Pecos Assiminea, Koster's Springsnail, and the Roswell Springsnail.

As presented in **Figure 2.1**, the Rio Peñasco HUC (13060010) land use is 58% forest, 40% rangeland, and 2% agriculture. **Figure 2.2** shows ownership as 38% USFS, 29% private, 11% State, 11% BLM, and 10% Tribal. Federally listed threatened and endangered species include the Chihuahua Chub, Mexican Spotted Owl, Southwestern Willow Flycatcher, Sacramento Mountains Thistle, and the Kuenzler's Hedgehog Cactus.

According to the Smokey Bear Ranger District in the Lincoln National Forest, the White Fire burned 10,361 acres from Trash and Lookout Canyons to Lone Pine Canyon in the Sacramento Mountains adjacent to the Village of Ruidoso and Highway 70 in April 2011 (Smokey Bear Ranger District 2011). The Little Bear Fire burned approximately 44,330 acres in the White Mountain Wilderness and the mountains adjacent to the communities of Ruidoso, Alto, and Angus in June 2012 (Smokey Bear Ranger District 2012).

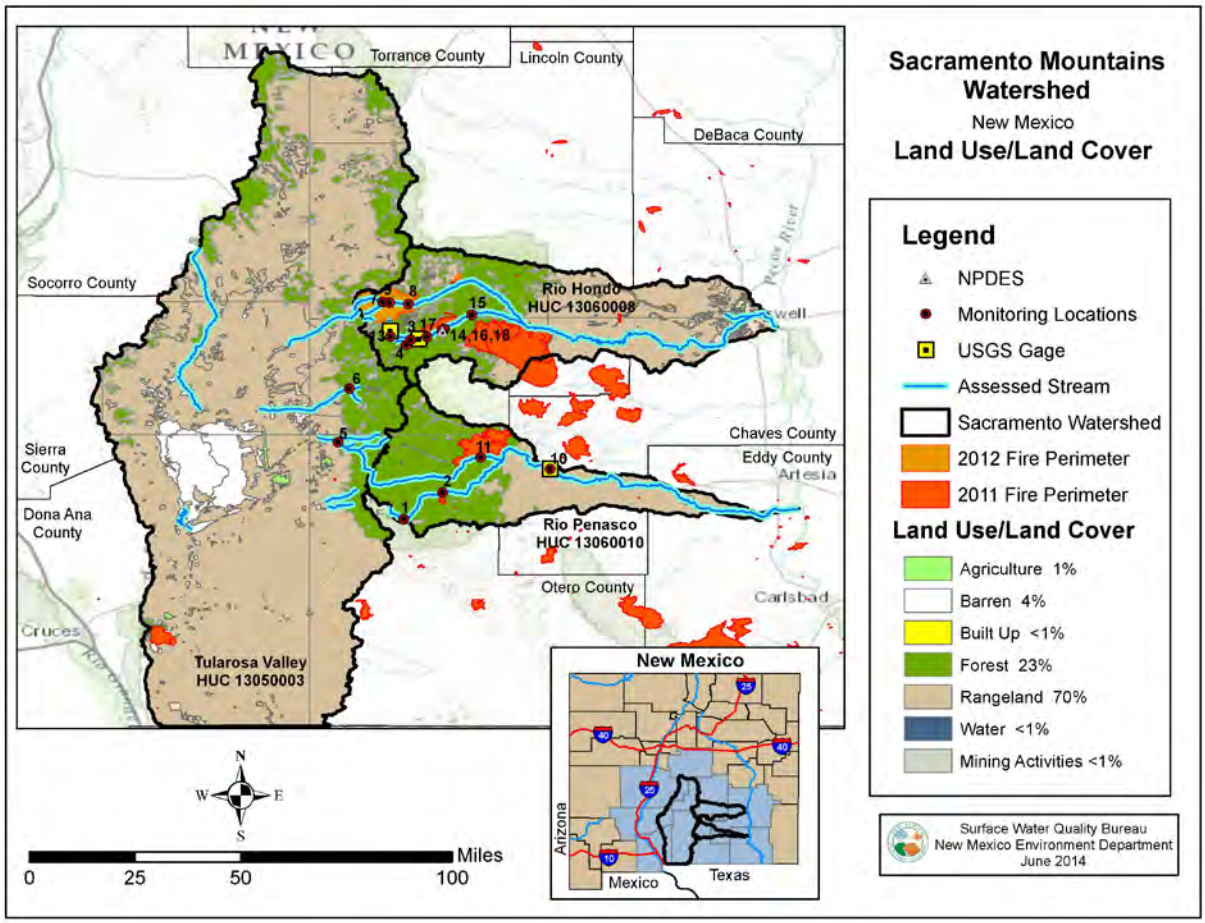

Figure 2.1 Land Use and 2012 Sampling Stations in the Sacramento Mountains. See Table 2.1 for station information.

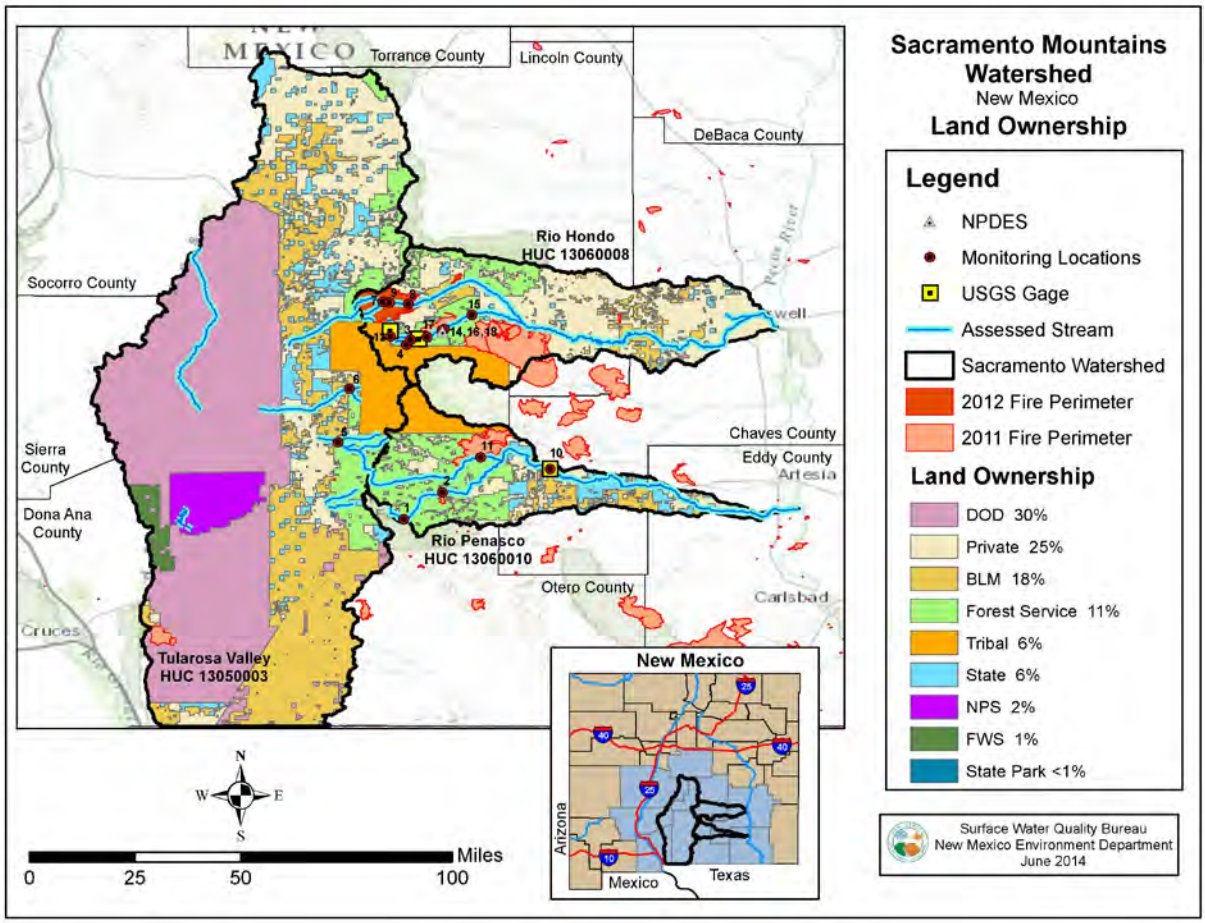

Figure 2.2 Land Management and 2012 Sampling Stations in the Sacramento Mountains Watershed

2.2 Geology and History

The geology of the Rio Hondo watershed consists of a complex distribution of Cretaceous intrusive rocks, Permian sedimentary rocks, and Cretaceous sedimentary rocks (Table 2.1, Figure 2.3). The high dome of Mt Sierra Blanca is an intrusion of Tertiary igneous rocks associated with many nearby faults and dikes (Chronic 1987). Sierra Blanca is separated from the smaller Tertiary intrusions of the Carrizo and Capitan Mountains by the valley of soft, Cretaceous shale around its north end (*Ibid*). The Cenozoic igneous rocks of Sierra Blanca and the northwestern part of the Mescalero Apache Reservation include intrusive plugs, stocks, and dikes of the Sierra Blaca volcanic pile (Ahlen and Hanson 1986). Breccias and purplish-green porphyrys are commonly exposed on Sierra Blanca towards the Ski Area on Sierra Blanca Peak (*Ibid*). Cenozoic rocks are also exposed on Sierra Blanca that include igneous intrusive, volcanic, and sedimentary rocks (*Ibid*). There are also glacial deposits in the cirque on the northeast slopes of the Peak at the head of the North Fork of the Rio Ruidoso (*Ibid*). San Andres Limestone forms the surface between Tularosa and Ruidoso; the stream valleys in this watershed cut down into the

red and yellow soil zone of the Yeso Formation (Chronic 1987). Cub Mountain Formation consists of white sandstone, multicolored siltstone, and light-colored igneous rocks (Ash and Davis 1964). The Yeso formation consists of beds of siltstone, sandstone, shale, limestone, anhydrite, gypsum, and salt and does not readily transmit water (Mourant 1963). The Yeso Formation was formed by the precipitation of gypsum and salt from an evaporating inland sea (Chronic 1987). The San Andres Limestone forms the aquifer for Roswell's water (*Ibid*). The upper part of the San Andres Limestone consists of dolomite and chert-limestone, as well as siltstone, sandstone, gypsum, anhydrite, and shale. The Artesia Formation consists of similar sedimentary rocks (Mourant 1963). The Cretaceous Dakota Sandstone consists of quartzose sandstone interbedded with grey shale and conglomerate (*Ibid*). Mancos Shale is black shale, limestone and sandstone while the Mesaverde Formation is grey, yellow, and buff quartzose sandstone, grey shale, and coal (*Ibid*).

Mining activity in Lincoln County has produced a number of minerals and metals including: gold, coal, iron, lead, copper, zinc, fluorite, gypsum, tungsten, and bastnaesite (Griswold 1959). Spaniards likely performed the earliest mining in Lincoln County, but no evidence of their activity exists (*Ibid*). However, the first mining in Lincoln County by Americans appears to be a gold vein at the Helen Rae and American mines in 1868 (*Ibid*).

Three Rivers Petroglyphs (west of Sierra Blanca) is a mile-long display of pictures carved into the volcanic rock mostly made by prehistoric Native Americans and may be contemporary with the nearby Mimbres site dating from 900-1,000 A.D. (Ash and Davis 1964). Hale Springs (south of Ruidoso Downs) once fed a Native American irrigation ditch and the caliche formed in this ditch is used to line the driveways in the area (Ash and Davis 1964). One of the first battles of the Lincoln County War occurred at Blazer's Mill (southwest of Ruidoso) on April 5, 1878 when Billy the Kid and the McSween faction attempted to make an arrest (Ash and Davis 1964). The 116-mile Bonito pipeline built in 1908 supplied water for railroad and domestic use from Nogal Lake (Ash and Davis 1964). Bonito Lake was built in the 1930's to store the water from Nogal Lake when the first lake started leaking (Barker *et al.* 1991). As a cub, Smokey the Bear was rescued from a forest fire in Capitan Gap in 1950, nursed back to health, and flown to Washington, D.C. to become the mascot for the U.S. Forest Service's fire prevention program (Ash and Davis 1964). Hispanic farmers from the Rio Grande valley established the Village of Tularosa in 1862 and the village was named after the Spanish description for the rose-colored reeds that grow along the Rio Tularosa (Village of Tularosa, 2014).

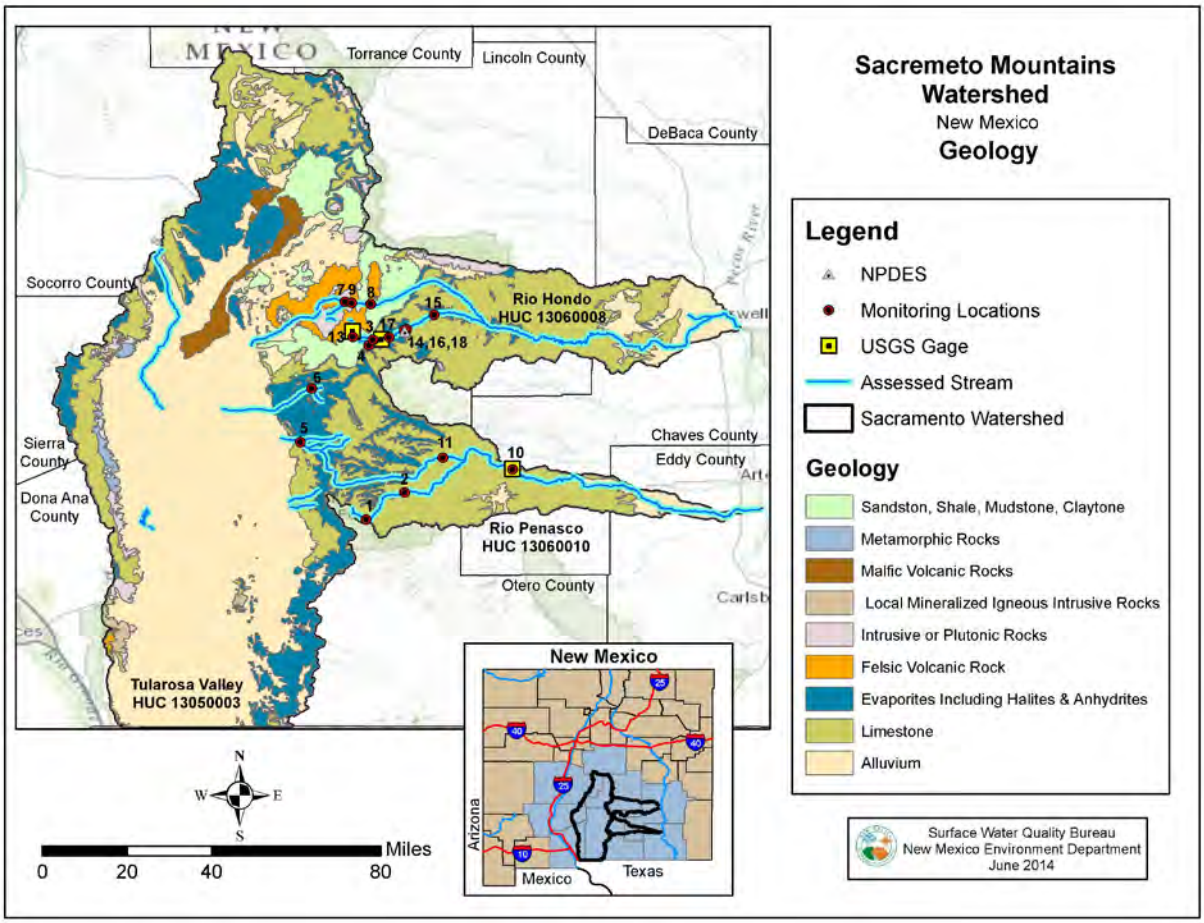

Figure 2.3 Geologic Map of the Sacramento Mountains and 2012 Sampling Stations

2.3 Water Quality Standards and Designated Uses

Water quality standards ("WQS") for all assessment units in this document are set forth in Sections 208, 209, and 801 of the *Standards for Interstate and Intrastate Surface Waters*, 20.6.4 New Mexico Administrative Code ("NMAC"), as amended through February 14, 2013 (NMAC 2013). These standards have been approved by the USEPA for CWA purposes.

20.6.4.208 PECOS RIVER BASIN - Perennial reaches of the Rio Peñasco and its tributaries above state highway 24 near Dunken, perennial reaches of the Rio Bonito downstream from state highway 48 (near Angus), the Rio Ruidoso downstream of the U.S. highway 70 bridge near Seeping Springs lakes, perennial reaches of the Rio Hondo upstream from Bonney canyon and perennial reaches of Agua Chiquita.

A. Designated Uses: fish culture, irrigation, livestock watering, wildlife habitat, coldwater aquatic life and primary contact. 20.6.4 NMAC 28

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: temperature 30°C (86°F) or less, and phosphorus (unfiltered sample) less than 0.1 mg/L.

20.6.4.209 PECOS RIVER BASIN - Perennial reaches of Eagle creek upstream of Alto dam to the Mescalero Apache boundary, perennial reaches of the Rio Bonito and its tributaries upstream of state highway 48 (near Angus) excluding Bonito lake, and perennial reaches of the Rio Ruidoso and its tributaries upstream of the U.S. highway 70 bridge near Seeping Springs lakes, above and below the Mescalero Apache boundary.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat, public water supply and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 600 µS/cm or less in Eagle creek, 1,100 µS/cm or less in Bonito creek and 1,500 µS/cm or less in the Rio Ruidoso; phosphorus (unfiltered sample) less than 0.1 mg/L; the monthly geometric mean of *E. coli* bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

20.6.4.801 CLOSED BASINS - Rio Tularosa east of the old U.S. highway 70 bridge crossing east of Tularosa and all perennial tributaries to the Tularosa basin except Three Rivers and excluding waters on the Mescalero tribal lands.

A. Designated Uses: coldwater aquatic life, irrigation, livestock watering, wildlife habitat, public water supply and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

The numeric criteria identified in these sections are used for assessing waters for use attainability. The referenced Section 20.6.4.900 NMAC provides a list of water chemistry analytes for which SWQB tests and identifies numeric criteria for specific designated uses. In addition, waters are assessed against the narrative criteria identified in Section 20.6.4.13 NMAC, including bottom sediments and suspended or settleable solids, plant nutrients, and turbidity. The individual water quality criteria or narrative standards are detailed for each parameter in the chapters that follow.

Current impairment listings for the Sacramento Mountain watersheds are included in the 2014-2016 State of New Mexico Clean Water Act §303(d)/ §305(b) Integrated List (NMED/SWQB 2014). The Integrated List is a catalog of assessment units ("AUs") throughout the state with a summary of their current status as assessed/not assessed or impaired/not impaired. Once a stream AU is identified as impaired, a TMDL guidance document is developed for that segment with guidelines for stream restoration. Target values for TMDLs are determined based on: 1) applicable numeric criteria or appropriate numeric translator to a narrative standard; 2) the degree of experience in applying various management practices to reduce a specific pollutant's loading; and 3) the ability to easily monitor and produce quantifiable and reproducible results. AU names and WQS have changed over the years and the history of these individual changes is tracked in the Record of Decision document associated with the 2012-2014 Integrated List available on the SWQB website.

New Mexico's *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC) establish surface water quality standards that consist of designated uses of surface waters of the State, the water quality criteria necessary to protect the uses, and an antidegradation policy. New Mexico's antidegradation policy, which is based on the requirements of 40 CFR 131.12, describes how

waters are to be protected from degradation (Subsection A of 20.6.4.8 NMAC) while the *Antidegradation Policy Implementation Procedure*s establish the process for implementing the antidegradation policy (NMED/SWQB 2011). At a minimum, the policy mandates that "the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state." In addition, whether or not a segment is impaired, the State's antidegradation policy requirements, as detailed in the *Antidegradation Policy Implementation Procedures* (NMED/SWQB 2011), must be met. TMDLs are consistent with this policy because implementation of a TMDL restores water quality so that existing uses are protected and water quality criteria are achieved. The *Antidegradation Policy Implementation Procedures* can be found in Appendix A of the *Statewide Water Quality Management Plan and Continuing Planning Process* document.

2.4 Water Quality Sampling

The Sacramento Mountain watersheds were sampled by the SWQB in 2012. A brief summary of the survey and the hydrologic conditions during the sample period is provided in the following subsections. A more detailed description can be found in the Sacramento Mountains Field Sampling Plan (NMED/SWQB 2012b).

2.4.1 Survey Design

The Monitoring, Assessment, and Standards Section ("MASS") of the SWQB conducted a water quality survey of the Sacramento Mountains in 2012 between April and October. Most sites were sampled eight (8) times, while some secondary sites were sampled one to four times. Monitoring these sites enabled an assessment of the cumulative influence of the physical habitat, water sources, and land management activities upstream from the sites. Data results from grab sampling are housed in the SWQB provisional water quality database and uploaded to USEPA's Water Quality Exchange ("WQX") database. Sampling sites in **Figure 2.1** and listed in **Table 2.1** represent only those sites that are discussed in this document.

All temperature and chemical/physical sampling and assessment techniques are detailed in the *Quality Assurance Project Plan* (NMED/SWQB 2012a) and the SWQB assessment protocols (NMED/SWQB 2013). As a result of the 2012 monitoring effort and subsequent assessment of results, several surface water impairments were determined. Accordingly, these impairments were added to New Mexico's Integrated CWA §303(d)/305(b) List in 2014 (NMED/SWQB 2014).

Table 2.1 SWQB 2012 Sacramento Mountains Sampling Stations

Station #	Station Description	STORET/ WQX ID
1	Agua Chiquita below Barrel Springs	59AquaCh050.2
2	Agua Chiquita between Weed and Sacramento	59AguaCh029.0
3	Carrizo Creek above Rio Ruidoso	57Carriz000.1
4	Carrizo Creek at Mescalero Boundary	57Carriz003.0

Station #	Station Description	STORET/ WQX ID
5	Fresnal Canyon at Alamogordo water intake	48FresCa001.0
6	Nogal Creek at County Road B-17	48NogalC000.2
7	Rio Bonito at FR 107	57RBonit061.1
8	Rio Bonito at Hwy 48 bridge-USGS Gage 0838850	57RBonit053.4
9	Rio Bonito below Dam	57RBonit059.9
10	Rio Peñasco above NM 24-USGS Gage 08397600	59RPenas108
11	Rio Peñasco on USFS (below Mayhill)	59RPenas140.2
12	Rio Ruidoso at Carrizo Creek	57RRuido045.3
13	Rio Ruidoso at Mescalero boundary at USGS Gage 08386505	57RRuido052.4
14	Rio Ruidoso @ CR E002	57RRuido030.5
15	Rio Ruidoso at Glencoe FR 443	57RRuido019.8
16	Ruidoso new WWTP outfall pipe	NM0029165
17	Rio Ruidoso abv Hwy 70 bridge	57RRuido031.5
18	Rio Ruidoso blw Ruidoso Downs Racetrack @ Joe Welch Dr	57RRuido039.4

2.4.2 Hydrologic Conditions

There are two active USGS gaging stations on the portion of the Sacramento Mountains encompassed in this survey. As described in the following sections, USGS gage 08397600 and 08387000 were used, as appropriate, in flow calculations in the TMDLs. **Figure 2.4** displays the mean discharges for 2012 and **Figure 2.5** displays the mean discharges for the period of record for each USGS gage.

Table 2.2 USGS gages in the Sacramento Mountains

Agency	Site Number	Site Name	Period of Record
USGS	08397600	Rio Peñasco near Dunken, NM	1956-present
USGS	08387000	Rio Ruidoso at Hollywood	1953-present
USGS	08386505	Rio Ruidoso at Ruidoso	1998-present

As stated in the Assessment Protocol (NMED/SWQB 2013), data collected during all flow conditions, including low flow conditions (e.g., flows below 4-day, 3-year flows [4Q3]), will be used to determine designated use attainment status during the assessment process. For the purpose of assessing designated use attainment in ambient surface waters, WQS apply at all times under all flow conditions.

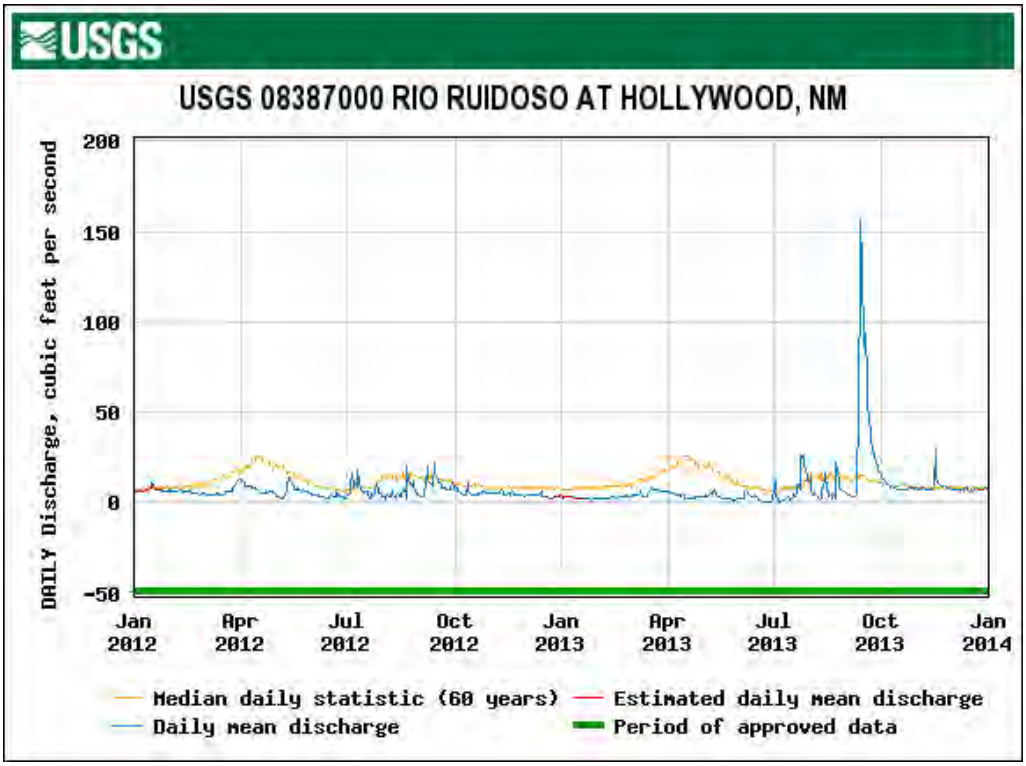

Figure 2.4 Daily mean and historic median discharge for the Rio Ruidoso near Hollywood, NM (2012-2013)

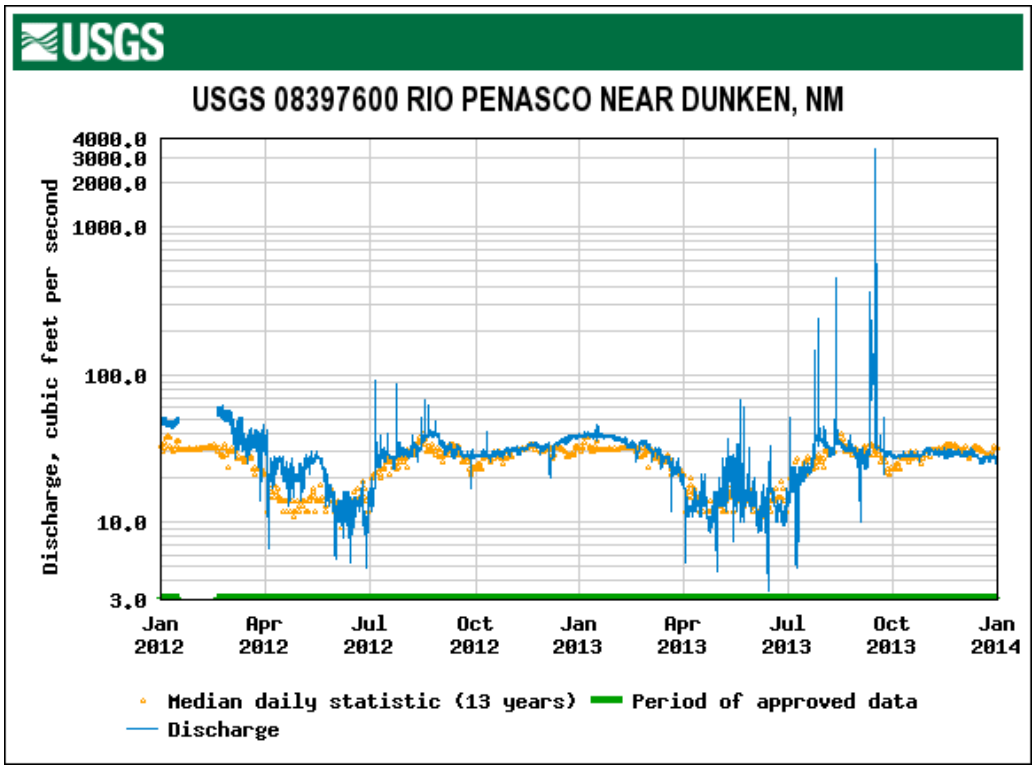

Figure 2.5 Daily mean and historic median discharge for the Rio Peñasco near Dunken, NM (2012 – 2013)

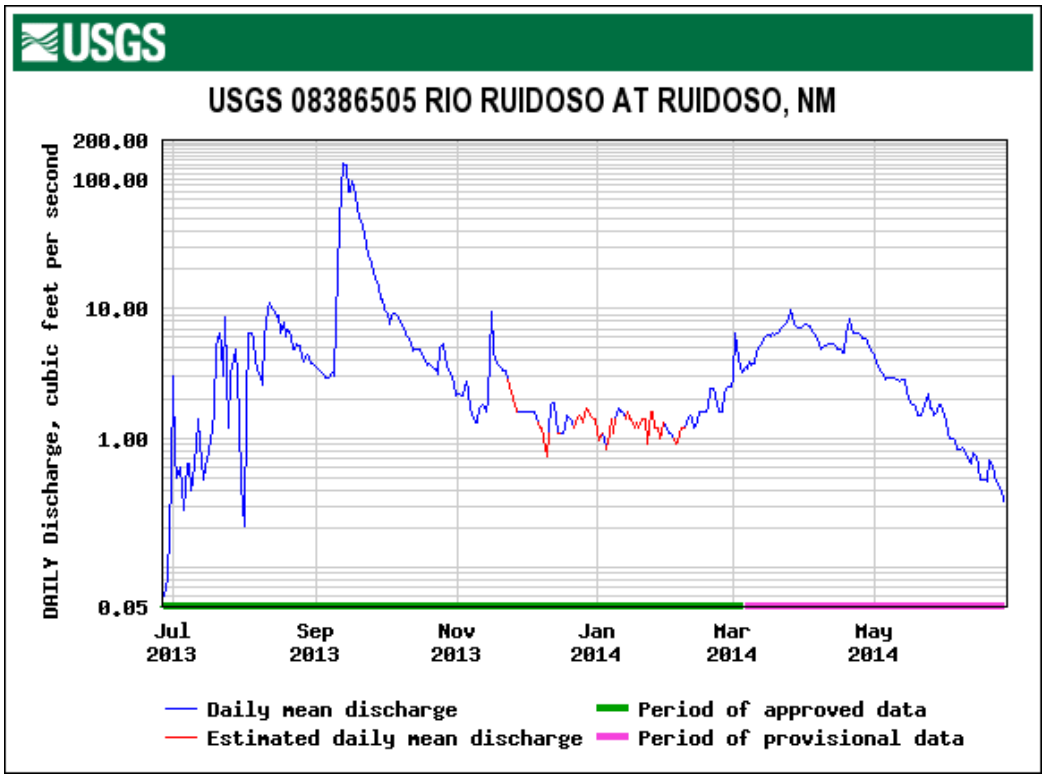

Figure 2.6 Daily mean and historic median discharge for the Rio Ruidoso at Ruidoso, NM (1998-2014)

3.0 BACTERIA

Assessment of data from the 2012 SWQB water quality survey in the Sacramento Mountains watershed identified exceedances of the numeric criteria of New Mexico water quality standards for *E. coli* bacteria in Carrizo Creek, Nogal Creek, Rio Bonito, and two reaches of the Rio Ruidoso.

As a result, these assessment units were listed on the Integrated CWA §303(d)/§305(b) List with *E. coli* as a pollutant of concern (NMED/SWQB 2014). If and when water quality criteria have been met, the reach will be moved to the appropriate category on the Clean Water Act Integrated §303(d)/§305(b) List of assessed waters. A TMDL for fecal coliform was developed for the Rio Bonito as part of the 2006 Rio Hondo (Lincoln County) TMDL document (NMED/SWQB 2006). This *E.coli* TMDL will replace the 2006 TMDL for Rio Bonito (Angus Canyon to headwaters).

3.1 Target Loading Capacity

For this TMDL document, target values for bacteria are based on the reduction in bacteria necessary to meet numeric criteria for the primary contact designated use in 20.6.4.900 NMAC of 126 cfu/100 mL *E. coli* geometric mean and 410 cfu/100 mL *E. coli* single sample, except for the segment specific criteria in 20.6.4.209 and 20.6.4.801 NMAC of 126 cfu/100 mL *E. coli* geometric mean and 235 cfu/100 mL *E. coli* single sample.

The presence of *E. coli* bacteria is an indicator of the possible presence of other pathogens that may limit beneficial uses and present human health concerns. Exceedences for each assessment unit are presented in Table 3.1 and *E. coli* data are in Appendix C.

Table 3.1 *E. coli* exceedences

Assessment Unit	WQS Segment	Associated Criterion (a) (cfu/100mL)	Exceedence Ratio (b)
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	20.6.4.209	235	3/13=23%
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	20.6.4.801	235	2/4=50%
Rio Bonito (NM 48 near Angus to headwaters)	20.6.4.209	235	2/10=20%
Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek)	20.6.4.209	235	11/14=79%
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	20.6.4.208	410	6/15=40%

Notes: *(a)* = single sample criterion
(b) = # exceedances/total # samples
cfu = colony forming units
mL = milliliters

3.2 Flow

TMDLs are calculated at a specific flow but bacteria concentrations can vary as a function of flow. SWQB determined streamflow either by using the active USGS gage network or by taking direct in-stream flow measurements utilizing standard procedures (NMED/SWQB 2010a). Water quality standard exceedances for all impaired reaches occurred during low and moderate

flows. Therefore, for these reaches, the critical flow value used to calculate the TMDLs was obtained using a 4-day, 3-year low-flow frequency ("4Q3") regression model. The 4Q3 is the annual lowest four (4) consecutive day flow that occurs with a frequency of at least once every three (3) years. According to the New Mexico Water Quality Standards, the low flow critical condition is defined as 4Q3 (20.6.4.11(B)(2) NMAC) for numeric criteria. Critical low flow was determined on an annual basis utilizing all available daily flow values rather than on a seasonal basis for these TMDLs because exceedences occurred across both low and high flow conditions.

When available, USGS gages were used to estimate the critical flow. The USGS gage on the Rio Ruidoso at Hollywood (08387000) was the only active gage on the Rio Ruidoso. The 4Q3 flow for Rio Ruidoso was estimated using the appropriate gage data and DFLOW software, Version 3.1b (USEPA 2006). DFLOW 3.1b is a Windows-based tool developed to estimate user selected design stream flows for low flow analysis by utilizing algorithms based on Log Pearson Type III distribution. However, the 4Q3 was calculated using the 10-year period from 2004-2014. This period was selected because it represents the most recent hydrologic conditions but also is representative of long term precipitation based on tree ring data from AD 1000 – 2000 (Gutzler 2007).

The calculated 4Q3 for the USGS 08387000 gage using DFLOW software is 1.01 mgd. In the case of ungaged streams, analysis methods developed by Waltemeyer can both be used to estimate flow (Waltemeyer 2002). In Waltemeyer's analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of New Mexico (i.e., statewide and mountainous regions above 7,500 feet in elevation). The 4Q3s for Carrizo Creek, Fresnal Canyon, and Nogal Creek were estimated using the mountainous regression equation regions (Eq. 3-1) because the mean elevations for these assessment units were greater than 7,500 feet in elevation (Table 3.3).

$$4Q3 = 7.3287 \times 10^{-5}\ DA^{0.70}\ P_w^{\ 3.58}\ S^{1.35} \qquad \text{(Eq. 3-1)}$$

where,

DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)
S = Average basin slope (%)

For details and development of this equation, please see Analysis of the Magnitude and Frequency of the 4-Day Annual Low Flow and Regression Equations for Estimating the 4-Day, 3-Year Low-Flow Frequency at Ungaged Sites on Unregulated Streams in New Mexico, USGS Water-Resources Investigations Report 01-4271 (Waltemeyer 2002).

Table 3.2 Calculation of 4Q3 Low-Flow Frequencies

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean Winter Precipitation (in.)	Average Basin Slope (percent)	4Q3 (cfs)	4Q3 (mgd)
Carrizo Creek	7,680	22.5	8.13	0.26	0.19	0.12
Nogal Creek	7,864	34.4	9.28	0.31	0.52	0.34
Rio Bonito	8,320	46.5	8.64	0.40	0.71	0.46

The critical streamflow values were converted from cubic feet per second ("cfs") to units of million gallons per day ("mgd") as follows:

$$_____ \frac{ft^3}{\sec} \times 1{,}728 \frac{in^3}{ft^3} \times 0.004329 \frac{gal}{in^3} \times 86{,}400 \frac{\sec}{day} \times 10^{-6} = _____ \, mgd \qquad \text{(Eq. 3-2)}$$

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of a planning process designed to meet water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

3.3 Calculations

Bacteria criteria are expressed as colony forming units ("cfu") per unit volume. The *E. coli* criteria used to calculate the allowable stream loads for the impaired assessment units are listed in Table 3.4. Target loads for bacteria are calculated based on flow values, water quality standards, and a conversion factor (Equation 3-3). The more conservative monthly geometric mean criteria are utilized in TMDL calculations to provide an implicit MOS. Furthermore, if the single sample criteria were used as targets, the geometric mean criteria may not be met.

*C as cfu/100 mL * 1,000 mL/1 L * 1 L/ 0.264 gallons * Q in 1,000,000 gallons/day = cfu/day* (Eq. 3-3)

where,

C = the water quality criterion for bacteria,
Q = the critical stream flow in million gallons per day (mgd)

Table 3.3 Calculation of TMDL for *E. coli*

Assessment Unit	Critical Flow (mgd)	*E. coli* geometric mean criteria (cfu/100mL)	Conversion Factor[(a)]	TMDL (cfu/day)
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	0.12	126	3.79×10^7	5.73×10^8
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	0.34	126	3.79×10^7	1.62×10^9
Rio Bonito (NM 48 near Angus to headwaters)	0.46	126	3.79×10^7	2.20×10^9
Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek)	1.01	126	3.79×10^7	4.82×10^9
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	3.71*(b)*	126	3.79×10^7	1.77×10^{10}

Notes: *(a)* Based on equation 3-3.

(b) Gage is upstream of WWTP. Combined flow based on 4Q3 (1.01 mgd) plus the WWTP design capacity (2.70 mgd)

The measured loads for *E. coli* were similarly calculated. The arithmetic mean of the data used to determine the impairment was substituted for the criterion in Equation 3-3. The same conversion factor was used. The measured load was calculated using the arithmetic mean of the data. Because the arithmetic mean of a dataset is always greater than the geometric mean (Muirhead 1903), the arithmetic mean acts as a component of the implicit MOS. Results are presented in Table 3.4.

Table 3.4 Calculation of measured loads for *E. coli*

Assessment Unit	Critical Flow (mgd)	*E. coli* Arithmetic Mean[(a)] (cfu/100mL)	Conversion Factor[(b)]	Measured Load (cfu/day)
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	0.12	273.49	3.79×10^{7}	1.24×10^{9}
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	0.34	194.68	3.79×10^{7}	2.51×10^{9}
Rio Bonito (NM 48 near Angus to headwaters)	0.46	95.02	3.79×10^{7}	1.66×10^{9}
Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek)	1.01	1158.70	3.79×10^{7}	4.44×10^{10}
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	3.71[(c)]	630.61	3.79×10^{7}	8.87×10^{10}

Notes: *(a)* The field measurement is the arithmetic mean of the available *E. coli* samples.
(b) Based on equation 3-3.
(c) Combined flow based on 4Q3 (1.01 mgd) plus the WWTP design capacity (2.70 mgd).

The samples collected and the impairment determinations are based on exceedences of the State's single sample criterion, and the TMDL is written to address the monthly geometric mean criteria. As such, any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over-estimation of the actual reduction necessary. Furthermore, neither Section 303 of the CWA nor Title 40, Part 130.7 of the Code of Federal Regulations ("CFR") require states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the "percent reduction" value can be calculated in multiple ways and as a result can often be misinterpreted. Therefore, a percent reduction is not presented for *E. coli*.

3.4 Waste Load Allocations and Load Allocations

3.4.1 Waste Load Allocation

There are no active point source dischargers on Carrizo Creek, Nogal Creek, and Rio Bonito. The Cloudcroft Wastewater Treatment Plant ("WWTP") National Pollutant Discharge Elimination System ("NPDES") permit (NM0023370) includes *E.coli* permit limits of 126 cfu/100 mL (30 day average) and 235 cfu/100 mL (daily maximum). However, the Cloudcroft WWTP discharges into Fresnal Creek (Salado Creek to headwaters) which is upstream of the Fresnal Creek assessment unit discussed in this TMDL and, therefore, no WLA is assigned to this facility. There are no NPDES permits in the Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek) assessment unit; however the City of Ruidoso Downs/Village of Ruidoso WWTP discharges into the Rio Ruidoso (Eagle Creek to US Hwy 70 Bridge) assessment unit. The NPDES permit (NM0029165) includes *E.coli* permit limits of 126 cfu/100 mL (30 day average) and 410 cfu/100 mL (daily maximum). The WLA assigned in Table 3.6 is consistent with the *E.coli* criteria in 20.6.4.208 NMAC and the current NPDES permit. There are no Municipal Separate Storm Sewer System ("MS4") storm water permits in these AUs.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the NPDES Construction General Storm Water Permit ("CGP") for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan ("SWPPP") that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices ("BMPs") and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids ("TSS"), turbidity, siltation, stream bottom deposits, etc. BMPs also include measures to reduce flow velocity during and after construction compared to pre-construction conditions to assure that WLAs or applicable water quality standards, including the antidegradation policy, are met. Compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Storm water discharges from active industrial facilities are generally covered under the current NPDES Multi-Sector General Storm Water Permit ("MSGP"). This permit also requires preparation of an SWPPP, which includes specific requirements to limit (or eliminate) pollutant loading associated with the industrial activities in order to minimize impacts to water quality. Compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL.

It is not possible to calculate individual WLAs for facilities covered by these General Permits at this time using the available tools. Discharges from these permits are typically transitory and enforcement is complex as permittees are temporary. Loads that are in compliance with the General Permits are therefore currently included as part of the LA. However, excess bacteria concentrations may be a component of some storm water discharges covered under general NPDES permits, so the load for these dischargers should be addressed. While these sources are

not given individual allocations, they are addressed through other means, including BMPs, storm water pollution prevention conditions, and other requirements.

3.4.2 Load Allocation

In order to calculate the LA, the WLA and MOS were subtracted from the target capacity TMDL following Equation 3-4:

$$WLA + LA + MOS = TMDL \qquad \text{(Eq. 3-4)}$$

The MOS is estimated to be 15 percent of the target load calculated in Table 3.4. Results are presented in Table 3.5 Additional details on the MOS chosen are presented in Section 3.7.

The extensive data collection and analyses necessary to determine background *E. coli* loads for the Sacramento Mountain watershed were beyond the resources available for this study, however this type of data collection could be appropriate for a future Bacteria Source Tracking study. It is therefore assumed that a portion of the LA is made up of natural background loads.

It is important to note that WLAs and LAs are estimates based on a specific flow condition. Under differing hydrologic conditions, the loads will change. Successful implementation of this TMDL will be determined based on achieving the *E. coli* standards.

Table 3.5 TMDL for *E. coli*

Assessment Unit	WLA (cfu/day) [(a)]	LA (cfu/day)	MOS (15%) (cfu/day)	TMDL (cfu/day)
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	0	4.87×10^{8}	8.6×10^{7}	5.73×10^{8}
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	0	1.38×10^{9}	2.44×10^{8}	1.62×10^{9}
Rio Bonito (NM 48 near Angus to headwaters)	0	1.87×10^{9}	3.30×10^{8}	2.20×10^{9}
Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek)	0	4.34×10^{9}	4.82×10^{8} [(c)]	4.82×10^{9}
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) [(b)]	1.29×10^{10}	3.05×10^{9}	1.77×10^{9} [(c)]	1.77×10^{10}

Notes: [(a)] Zero WLA indicates that no NPDES permit discharges into the AU.
[(b)] See discussion in Section 3.4.1. WLA calculated using design capacity of 2.70 mgd.
[(c)] Margin of Safety for Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) and Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek) AUs are 10%. See Section 3.7 for details.

3.5 Identification and Description of Pollutant Source(s)

SWQB fieldwork includes an assessment of the probable sources of impairment (Appendix B). The approach for identifying "Probable Sources of Impairment" was modified in 2010 by SWQB to include additional input from a variety of stakeholders including landowners, watershed groups, and local, state, tribal and federal agencies. Probable Source Sheets are filled out by

SWQB staff during watershed surveys and watershed restoration activities. The draft probable source list will be reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period. Probable sources that may be contributing to the observed load are displayed in **Table 3.6**:

Table 3.6 Pollutant source summary for *E. coli*

Assessment Unit	NPDES permits	Probable Sources[(a)]
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	None	Bridges/culverts/railroad crossings, channelization, highway/road/bridge runoff, on-site treatment systems, paved roads, pavement/impervious surfaces, residences/buildings, site clearance, urban runoff/storm sewers, storm water runoff due to construction, waterfowl.
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	None	Bridges/culverts/railroad crossings, gravel/dirt roads, highway/road/bridge runoff, on-site treatment systems, paved roads, pavement/impervious surfaces, rangeland grazing, residences/buildings, wildlife other than waterfowl.
Rio Bonito (NM 48 near Angus to headwaters)	None	Bridges/culverts/railroad crossings, dams/diversions, fire suppression, flow alteration, highway/road/bridge runoff, legacy logging operations, paved roads, gravel/dirt roads, pavement/impervious surfaces, recent overbank flows. watershed runoff following forest fire.
Rio Ruidoso (US Hwy 70 Bridge to Carrizo Creek)	None	Bridges/culverts/railroad crossings, channelization, drought-related impacts, dumping/garbage/litter/trash, highway/road/bridge runoff, inappropriate waste disposal, livestock grazing, municipal point source discharge, paved road, gravel/dirt roads, pavement/impervious surfaces, rangeland grazing, residences/buildings, stream channel incision, urban runoff/storm sewers, waste from pets, waterfowl, watershed runoff following forest fire.
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	NM0029165	Channelization, drought-related impacts, gravel/dirt roads, surface films/odors, mass wasting, on-site treatment systems, pavement/impervious surfaces, residences/buildings, stream channel incision, waterfowl, watershed runoff following forest fire.

Notes: This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

The Probable Source Identification Sheets in Appendix B provide an approach for a visual analysis of a pollutant source along an impaired reach. Although this procedure is subjective, SWQB feels that it provides the best available information for the identification of probable sources of impairment in a watershed. The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled

"Probable" and generally includes several sources for each impairment. Table 3.6 displays probable sources of impairment along the reach as determined by field reconnaissance and assessment. Probable sources of *E. coli* will be evaluated, refined, and changed as necessary through the WBP.

3.6 Linkage of Water Quality and Pollutant Sources

Among the probable sources of bacteria are municipal point source discharges such as wastewater treatment facilities, poorly maintained or improperly installed (or missing) septic tanks, livestock grazing of valley pastures and riparian areas, upland livestock grazing, in addition to wastes from pets, waterfowl, and other wildlife. Howell et. al. found that bacteria concentrations in underlying sediment increase when cattle have direct access to streams, such as the waters in the Sacramento Mountains. (Howell *et al*. 1996). Natural sources of bacteria are also present in the form of other wildlife such as elk, deer, and any other mammals and birds. In addition to direct input from grazing operations and wildlife, *E. coli* concentrations may be subject to elevated levels as a result of resuspension of bacteria laden sediment during storm events. Temperature can also play a role in bacteria concentrations. Howell *et al*. (1996) observed that bacteria viability in sediments increases with water temperature.

In order to determine exact sources and relative contributions, further study is needed. One method of characterizing sources of bacteria is a Bacterial, or Microbial, Source Tracking ("BST") study. The extensive data collection and analyses necessary to determine bacterial sources were beyond the resources available for this study. While sufficient data currently exist to support development of *E. coli* TMDLs to address the stream standards exceedances, a BST dataset will likely prove useful in the future to better identify the sources of *E. coli* impacting the stream.

3.7 Margin of Safety

TMDLs should reflect a MOS based on the uncertainty or variability in the data, the point and nonpoint source load estimates, and the modeling analysis. For these bacteria TMDLs, the MOS was developed using a combination of conservative assumptions and inputs and explicit recognition of potential errors in flow calculations. Therefore, the MOS is the sum of the following assumptions:

- *Conservative Assumptions:*
    - *E. coli* bacteria do not readily degrade in the environment;
    - Basing the target load capacity on the geometric mean criterion rather than the higher-concentration single sample criterion; and
    - Calculating the measured load with the arithmetic mean rather than the geometric mean of the sample results produces a greater mean and therefore a more conservative load estimate.
- *Explicit recognition of potential errors:*

- Uncertainty exists in sampling nonpoint sources of pollution. A conservative MOS for this element is therefore **5%**.
- The critical flow value for the ungaged streams was estimated based on a regression equation from Waltemeyer (2002) and ungagged sites on gaged streams was estimated based on the Thomas (1997) method. There is inherent error in all flow calculations, including those based on gage data. A conservative MOS for this element for AUs which used the regression equation or area-weighted equation is therefore **10 %**.
- There is inherent error in all flow measurements; a conservative MOS for this element in gaged streams is **5%**.

3.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Data used in the calculation of these TMDLs were collected during the spring, summer, and fall of 2012 in order to ensure coverage of any potential seasonal variation in the system. Bacteria exceedances occurred during both high and low flow events. Higher flows may flush more nonpoint source runoff containing bacteria. It is possible the criterion may be exceeded under a low flow condition when there is insufficient dilution.

3.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2040. The Lincoln County population is projected to grow by an estimated 1.3% over the 2010-2040 time period. Similarly, the Chaves County population is projected to grow by an estimated 4.71% and the Otero County population is project to grow by an estimated 0.79% over the same time period. The 2010 Census population for Lincoln County is 20,497, Chaves County is 65,783, and Otero County is 64,275 (NMBBER 2012).

Estimates of future growth are not anticipated to lead to a significant increase in bacteria concentrations that cannot be controlled with BMPs in this watershed. However, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit. Any future growth would be considered part of the existing load allocation, assuming persistence of the hydrologic conditions used to develop these TMDLs.

4.0 TURBIDITY

During the 2012 survey, exceedances of the numeric turbidity thresholds, resulting in an impairment of the narrative criterion for turbidity in 20.6.4.13 NMAC, were documented in three AUs: Agua Chiquita (perennial portions McEwan Canyon to headwaters), Rio Peñasco (Hwy 24 to Cox Canyon), and Rio Ruidoso (Eagle Creek to US Hwy 70 bridge).

4.1 Target Loading Capacity

Target values for this turbidity TMDL were based on the turbidity thresholds identified in the NMED 2013 Assessment Protocol. According to the New Mexico WQS (20.6.4.13(J) NMAC), the general narrative standard for turbidity reads:

> *"Turbidity: Turbidity attributable to other than natural causes shall not reduce light transmission to the point that the normal growth, function, or reproduction of aquatic life is impaired or that will cause substantial visible contract with the natural appearance of the water…"*

The assessment approach used to determine turbidity impairments relies upon the use of biotranslators to derive numeric thresholds from the narrative standard above (NMED/SWQB 2013). A biotranslator is a physical or chemical water quality parameter that has been isolated and effects an impairment of a quantifiable attribute of an indicator organism. In some cases, the quantifiable attribute may be the lethal dose or concentration of the parameter. In the case of turbidity, the attribute is typically based upon observed behavior and Severity of Ill Effects ("SEV") index (NMED/SWQB 2013).

The three AUs for which turbidity TMDLs have been developed in this document are designated as either coldwater or high quality cold water. The most representative fish to use in determining the appropriate turbidity thresholds for coldwater aquatic life and high quality coldwater aquatic life stream segments are salmonids, as a majority of studies on turbidity in fish have been conducted with them. The numeric thresholds have been supported with studies of turbidity and benthic macroinvertebrates (NMED/SWQB 2013).

An SEV index of 3.5 was selected to develop thresholds for turbidity impairment in New Mexico. This value corresponds to the boundary between conditions that effect changes to feeding and those that reduce growth rate and habitat size. The relationship between turbidity, duration, and an SVE of 3.5 is given in Equation 6-1 for durations from 7 hours to 720 hours. Shorter-term turbidity excursions are unlikely to impair the growth and reproduction of aquatic life, as required by New Mexico's narrative turbidity water quality criterion, while thresholds for durations longer than 720 consecutive hours result in turbidity values that are lower than supported by literature available at the time of the assessment protocol development.

$$x = 37{,}382y^{-1.9887} \qquad \text{(Eq. 6-1)}$$

x = duration in hours and
y = turbidity in Nephelometric Turbidity Units ("NTUs")

Table 1 in the turbidity assessment protocol (NMED/SWQB 2013) provides a series of turbidity thresholds and durations, which are listed in Table 4.1.

Table 4.1 Turbidity impairment thresholds and durations

Turbidity Threshold (NTU)	Allowable Duration (consecutive hours)	Allowable Duration (consecutive days)
23	72	3
20	96	4
18	120	5
16	144	6
15	168	7
11	336	14
7	720	30

Notes:
NTU = Nephelometric Turbidity Units

Because a TMDL requires a numeric loading component, TSS has been used in previous SWQB TMDLs as a numeric target. The TSS analytical method is a commonly-used measurement of suspended material in surface water. This method was originally developed for use on wastewater samples, but has widely been used as a measure of suspended materials in stream samples because it is acceptable for regulatory purposes and is an inexpensive laboratory procedure. Since there are no WWTPs discharging into or upstream of the AUs targeted in this TMDL, it is assumed that TSS measurements in these ambient stream samples are representative of erosional activities and thus comprised primarily of suspended sediment versus any potential biosolids, such as those from WWTP effluent.

Turbidity levels can be inferred from studies that monitor suspended sediment concentrations. Extrapolation from these studies is possible when a site-specific relationship between concentrations of suspended sediments and turbidity is confirmed. Activities that generate varying amounts of suspended sediment will proportionally change or affect turbidity (USEPA 1991). The impacts of suspended sediment and turbidity are well documented in the literature. An increased sediment load is often the most important adverse effect of activities on streams, according to a monitoring guidelines report (USEPA 1991). This impact is largely a mechanical action that severely reduces the available habitat for macroinvertebrates and fish species that utilize the streambed in various life stages. An increase in suspended sediment concentration will reduce the penetration of light, decreases the ability of fish or fingerlings to capture prey, and reduce primary production (USEPA 1991). As stated in Relyea *et al*., "*increased turbidity by sediments can reduce stream primary production by reducing photosynthesis, physically abrading algae and other plants, and preventing attachment of autotrophs to substrate surfaces.*" (Relyea *et al*. 2000).

TSS and turbidity were measured in the Sacramento Mountain watershed (Table 4.2) during the 2012 survey. Turbidity impairment was determined based on available sonde data. The TSS target was derived using a regression equation developed with turbidity and TSS data obtained from grab samples. The equation and regression statistics are displayed below in Figures 4.1-4.3 and in Table 4.3.

Because the Turbidity – TSS relationship is unique to each watershed, different types of regression equations were found to offer the best fit for each AU based on both the R^2 value (coefficient of determination) and the appropriateness of the resulting TSS values. The R^2 value is essentially a measure of how well a dataset fits the applied model; R^2 values approaching 1 are considered better fits than R^2 values approaching 0.

Table 4.2 Measured Turbidity and TSS – Grab Data

Assessment Unit	Date	Turbidity (NTU)	TSS (mg/L)	Flow (cfs)
Agua Chiquita (perennial portions McEwan Cny to headwaters)- Agua Chiquita between Weed and Sacramento - 59AguaCh029.0	4/5/2012	2.1	5	0.5
	5/10/2012	6	8	0.48
	6/13/2012	0	3	0.5
	7/26/2012	1310	1240	0.31
	9/26/2012	0.4	4	moderate
Rio Peñasco (HWY 24 to Cox Canyon)- Rio Peñasco at NM 24- USGS Gage 08397600 - 59RPenas108.4	4/5/2012	3.9	7	moderate
	5/10/2012	0.2	3	moderate
	6/14/2012	0	3	moderate
	7/26/2012	29.5	46	moderate
	8/8/2012	0.2	10	moderate
	9/26/2012	0.6	3	moderate
Rio Peñasco (HWY 24 to Cox Canyon)- Rio Peñasco on USFS (below Mayhill) - 59RPenas140.2	4/5/2012	14.5	24	15.8
	5/10/2012	17.2	33	78.3
	6/14/2012	4.9	12	10.2
	7/26/2012	41.5	188	17.5
	8/8/2012	16	41	n/a
Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)- Rio Ruidoso @ CR E002 - 57RRuido030.5	4/3/2012	2.5	5	moderate
	5/9/2012	0.5	3	4.4
	6/12/2012	1.1	4	4.8
	7/11/2012	79.5	168	10.4
	8/7/2012	0	8	moderate
	9/12/2012	18.1	37	11.2
Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)- Rio Ruidoso at Gelncoe-FR 443 - 57RRuido019.8	4/3/2012	1.7	3	4.8
	5/9/2012	1.4	65	1.5
	6/12/2012	0	3	1.3
	7/11/2012	185.1	340	10.2
	8/7/2012	3.7	6	1.1
	9/12/2012	476.4	30	25.2

Table 4.3 Regression Equation and R^2 – Turbidity and TSS

Assessment Unit	Equation Type	Regression Equation	R^2 Value
Agua Chiquita (perennial portions McEwan Cny to headwaters)	Linear	Y=0.782x + 3.3383	$R^2 = 0.983$
Rio Peñasco (HWY 24 to Cox Canyon)	Linear	y = 1.5689x + 4.5506	$R^2 = 0.912$
Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)	Polynomial	$y = 0.0118x^2 + 1.039x + 10.729$	$R^2 = 0.870$

Notes:
y = TSS target (mg/L)
x = given turbidity (NTU)

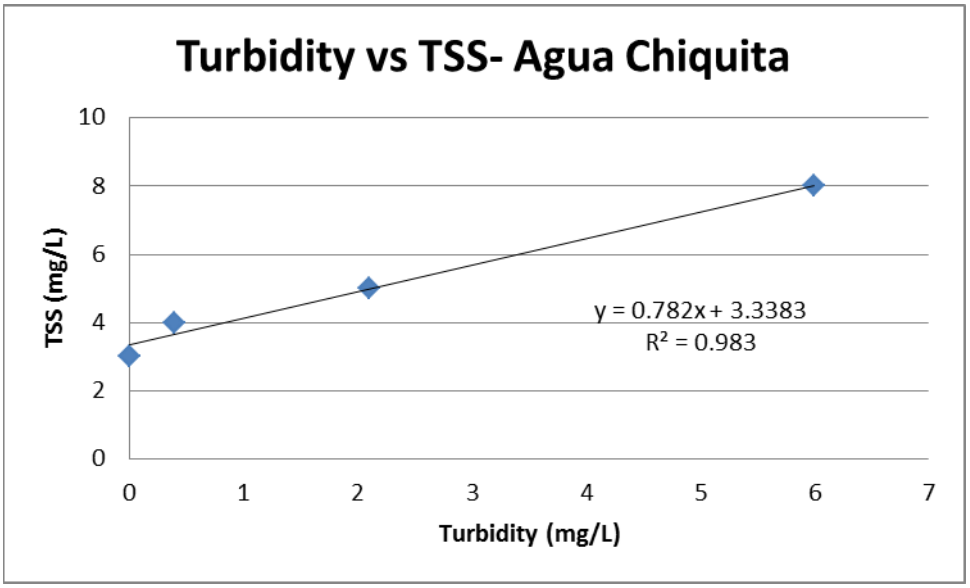

Figure 4.1 Turbidity – TSS relationship in the Agua Chiquita (perennial portions McEwan Canyon to headwaters) AU

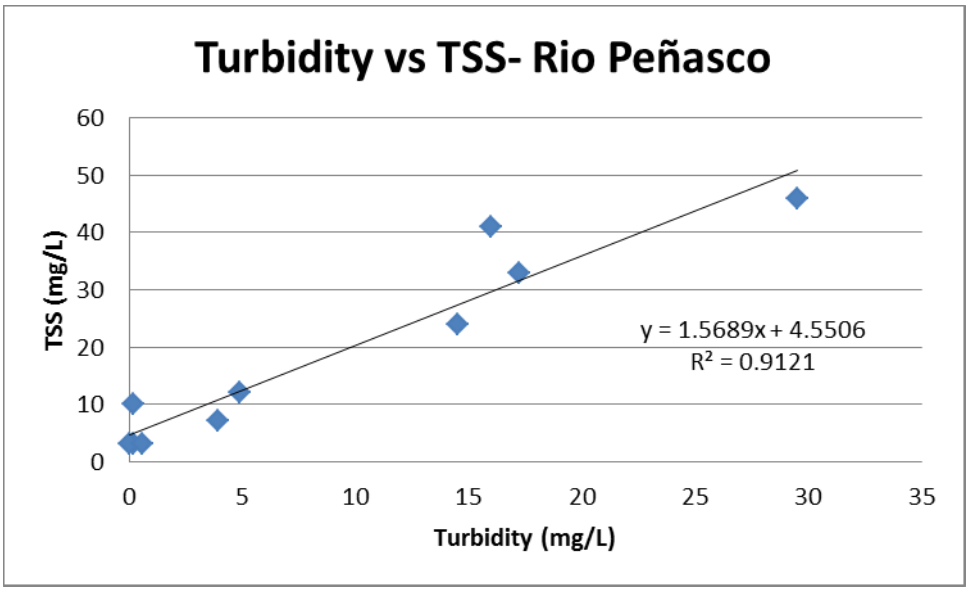

Figure 4.2 Turbidity – TSS relationship in the Rio Peñasco (HWY 24 to Cox Canyon) AU

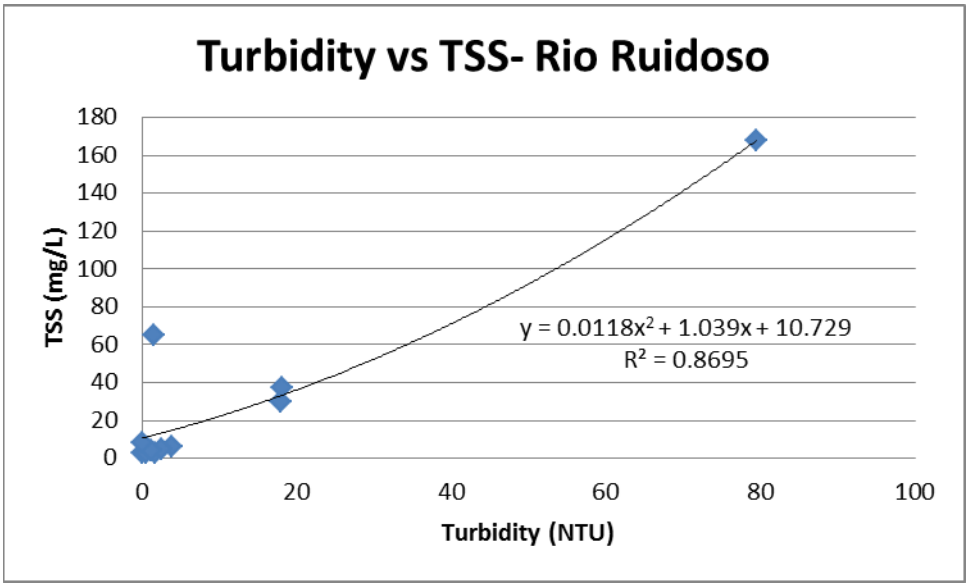

Figure 4.3 Turbidity – TSS relationship in the Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge) AU

4.2 Flow

Sediment transport in a stream varies as a function of flow. As flow increases, the amount of sediment being transported increases. The average, maximum, and minimum turbidity measurements based on sonde data are located in Table 4.4.

Table 4.4 Sonde deployments and turbidity statistics

Assessment Unit	Station	Sonde deployment	Duration of Deployment (hours)	Average (NTU)	Maximum (NTU)	Minimum (NTU)
Agua Chiquita (perennial portions McEwan Cny to headwaters)	59AguaCh029.0	August 8-September 5, 2012	678	46.72	1332	0.1
Rio Peñasco (HWY 24 to Cox Canyon)	59RPenas108.4	August 8-September 5, 2012	674	153.28	3000	0.3
Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)	57RRuido030.5	Sept 5-19 2012	332	92.49	1310.3	2.3
	57RRuido019.8	September 5-19, 2012	337	148.02	1778.7	3.4

As stated above, the 4Q3 is the annual lowest four (4) consecutive day flow that occurs with a frequency of at least once every three (3) years and the low flow critical condition is defined as 4Q3 (20.6.4.11(B)(2) NMAC). The 4Q3 flow was estimated using the appropriate gage data and DFLOW software, Version 3.1b (USEPA 2006). There are USGS gages on Rio Peñasco and Rio Ruidoso (Table 6.5), thus flow was determined using a 4Q3 regression model. However, the 4Q3 was calculated using the 10-year period from 2004-2014. This period was selected because it represents the most recent hydrologic conditions but also is representative of long term precipitation based on tree ring data from AD 1000 – 2000 (Gutzler 2007).

Table 4.5 USGS Gages in Study Area

Gage	Name	Start Date	End Date	4Q3 (cfs)	4Q3 (MGD)
08397600	Rio Peñasco near Dunken, NM	2004	2014	4.67	3.02
08387000	Rio Ruidoso at Hollywood	2004	2014	1.56	1.01

In the case of ungaged streams, an analysis method developed by Waltemeyer (2002) can be used to estimate flow. In Waltemeyer's analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e., statewide and mountainous regions above 7,500 ft in elevation). Because the average elevation of the Agua Chiquita (perennial portions McEwan Canyon to headwaters) watershed is above 7,500 ft, the decision was made to use the mountainous regions regression equation.

The following mountainous regions regression equation is based on data from 40 gaging stations located above 7,500 ft in elevation with non-zero discharge (Waltemeyer 2002):

$$4Q3 = 7.3287 \times 10^{-5} DA^{0.70} P_w^{\ 3.58} S^{1.35}$$

(Eq. 4-2)

Where:

4Q3 = Four-day, three-year low-flow frequency (cfs)
DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)
S = Average basin slope (%)

4Q3 values calculated using Waltemeyer's methods (Eq. 4-2) are presented in Table 4.6.

Table 4.6 Calculation of 4Q3

Assessment Unit	Average Elevation (ft)	Drainage Area (mi^2)	Mean Winter Precipitation (in)	Average Basin Slope (%)	4Q3 (cfs)	4Q3 (MGD)
Agua Chiquita (perennial portions McEwan Cny to headwaters)	8422	58.25	10.02	0.268	0.82	0.53

It is important to remember that the TMDL itself is a value calculated at a defined critical condition as part of a planning process designed to achieve water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained. Meeting the calculated TMDL at a given time may be a difficult objective. Because impairment of a waterbody is dependent on the duration of elevated turbidity, a separate TMDL has been determined for each NTU/duration threshold identified in the turbidity assessment protocol for each assessment unit.

4.3 Calculations

This section describes the relationship between the numeric target and the allowable pollutant load by determining the total assimilative capacity of the waterbody, or loading capacity, for turbidity at each threshold. The loading capacity is the maximum amount of pollutant that a waterbody can receive, at a specific flow, while meeting its water quality objectives. This TMDL was developed using the relationship between turbidity and TSS, the 4Q3 flow condition, turbidity/duration thresholds identified in the turbidity assessment protocol, and a conversion factor.

Using the regression equations provided in Table 4.3, TSS values for each turbidity threshold were calculated for each assessment unit (Table 4.7).

Table 4.7 Calculated TSS threshold values Agua Chiquita, Rio Peñasco, and Rio Ruidoso

		Agua Chiquita	Rio Peñasco	Rio Ruidoso
Turbidity (NTU)	**Duration (consecutive hrs)**	**TSS (mg/L)**	**TSS (mg/L)**	**TSS (mg/L)**
7	720	8.8	15.5	18.6
11	336	11.9	21.8	23.6
15	168	15.1	28.1	29.0
16	144	15.9	29.7	30.4
18	120	17.4	32.8	33.3
20	96	19.0	35.9	36.2
23	72	21.3	40.6	40.9

The TSS values calculated in Table 4.7 were then substituted into Equation 4-2 to determine the target loading capacity for each assessment unit at each turbidity threshold (Tables 4.8 – 4.10).

Critical flow (4Q3) x WQS x Conversion Factor = Target Loading Capacity (TMDL) (Eq. 4-3)

Table 4.8 TMDL / Single Day Target Load for Turbidity in Agua Chiquita (perennial portions McEwan Canyon to headwaters)

TSS (mg/L)	Duration (consecutive hrs)	4Q3 (MGD)	Conversion Factor	Target Load (mg/L)
8.8	720	0.53	8.34	38.90
11.9	336	0.53	8.34	52.60
15.1	168	0.53	8.34	66.75
15.9	144	0.53	8.34	70.28
17.4	120	0.53	8.34	76.91
19.0	96	0.53	8.34	83.98
21.3	72	0.53	8.34	94.15

Table 4.9 TMDL / Single Day Target Load for Turbidity in Rio Peñasco (HWY 24 to Cox Canyon)

TSS (mg/L)	Duration (consecutive hrs)	4Q3 (MGD)	Conversion Factor	Target Load (mg/L)
15.5	720	3.02	8.34	390.40
21.8	336	3.02	8.34	549.07
28.1	168	3.02	8.34	707.75
29.7	144	3.02	8.34	748.05
32.8	120	3.02	8.34	826.13
35.9	96	3.02	8.34	904.21
40.6	72	3.02	8.34	1,022.58

Table 4.10 TMDL / Single Day Target Load for Turbidity in Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)

TSS (mg/L)	Duration (consecutive hrs)	4Q3 (MGD)	Conversion Factor	Target Load (mg/L)
18.6	720	3.71	8.34	575.51
23.6	336	3.71	8.34	730.22
29.0	168	3.71	8.34	897.30
30.4	144	3.71	8.34	940.62
33.3	120	3.71	8.34	1,030.35
36.2	96	3.71	8.34	1,120.08
40.9	72	3.71	8.34	1,265.50

Notes: *Critical flow is 4Q3 (1.01 mgd) plus the design capacity of the WWTP (2.70 mgd)

Note that the single day target load is the TMDL for an assessment unit for a particular turbidity/duration pairing. It should not be extrapolated to longer or shorter durations.

4.4 Waste Load Allocation and Load Allocations

4.4.1 Waste Load Allocation

There are no individually permitted point source facilities or MS4/sMS4 storm water permits in the Rio Peñasco assessment unit, however the Village of Ruidoso/City of Ruidoso Downs WWTP (NM0029165) discharges into the Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) assessment unit and the Sacramento Methodist Assembly WWTP (NM002886) discharges into an unnamed intermittent tributary to the Agua Chiquita AU. The Agua Chiquita (perennial portions McEwan Cny to headwaters) is located approximately ½ mile below the WWTP outfall but, except during storm flows, the effluent percolates into the ground before reaching the Agua Chiquita because this stream reach is a losing reach. In other words, it is losing water to infiltration and evaporation. In fact, the AU immediately downstream of this reach of the Agua Chiquita was determined to be naturally ephemeral through application of SWQB's Hydrology Protocol (see NMED/SWQB 2013b). Since the facility is a minor discharger (0.042 mgd design flow) that does not discharge continuously and already has TSS permit limitations, and given the

likelihood that the effluent does not reach the Agua Chiquita except during storm flows, it is assumed that the Sacramento Methodist Assembly WWTP does not contribute to the loading or concentration of turbidity-TSS in the Agua Chiquita (perennial portions McEwan Cny to headwaters) in excess of de minimis amounts. Therefore, a wasteload allocation for this facility is not included in this TMDL. Conversely, the Village of Ruidoso/City of Ruidoso Downs WWTP discharges directly into the Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) assessment unit. The NPDES permit (NM NM0029165) currently includes the following TSS limits: 30 mg/L (30-day average) and 45 mg/L (7-day average). The values in Table 4.7 indicate that the TSS values equivalent to the turbidity values necessary to protect aquatic life are 29 mg/L TSS for 7 days (168 hours) and 18.6 mg/L TSS for 30 days (720 hours). In order to calculate the WLA, the most conservative TSS value from Table 6.10 was used.

Sediment may be a component of some (primarily construction) storm water discharges that contribute to suspended sediment impacts, and should be addressed. In contrast to discharges from other industrial storm water and individual process wastewater permitted facilities, storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the NPDES CGP requires preparation of a SWPPP that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. In addition, the current CGP also includes state-specific requirements to implement BMPs that are designed to prevent the maximum extent practicable, an increase in sediment or a parameter that addresses sediment (e.g., TSS, turbidity, siltation, stream bottom deposits), and flow velocity during and after construction compared to pre-construction conditions. In this case, compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Other industrial storm water facilities are generally covered under the current NPDES MSGP. This permit also requires the preparation of a SWPPP that includes identification and control of all pollutants associated with the industrial activities to minimize impacts to water quality. In addition, the current MSGP also includes state-specific requirements to further limit (or eliminate pollutant loading) to water quality impaired/water quality limited waters from facilities where there is a reasonable potential to contain pollutants for which the receiving water is impaired. In this case, compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL. It is not possible to calculate individual WLAs for facilities covered by these General Permits at this time using available tools. The discharges from these permits are typically transitory and enforcement is complex as permittees are temporary. Loads that are in compliance with the General Permits are therefore currently included as part of the load allocation. While these sources are not given individual allocations, they are addressed through other means, including BMPs, storm water pollution prevention conditions, and other requirements.

4.4.2 Load Allocation

In order to calculate the LA for turbidity, the MOS was subtracted from the target load (TMDL) using the following Equation 4-4:

$$LA + MOS = TMDL$$

Or

$$LA = TMDL - MOS \quad \text{(Eq. 4-4)}$$

The MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors. The explicit MOS is estimated to be 15% of the target load calculated in Table 4.8-4.10 for the ungaged AU; an MOS of 10% has been assigned to the gaged AUs; see Section 4.7 for details. The TMDLs were allocated per Equation 4.4 and the allocations between point sources, nonpoint source, and the MOS are listed in Tables 4.11-4.13.

Table 4.11 TMDL for Turbidity in Agua Chiquita (perennial portions McEwan Cny to headwaters)

Duration (consecutive hrs)	WLA (lbs/day)*	LA (lbs/day)	MOS (15%) (lbs/day)	TMDL (lbs/day)
720	0	33.06	5.83	38.90
336	0	44.71	7.89	52.60
168	0	56.73	10.01	66.75
144	0	59.74	10.54	70.28
120	0	65.37	11.54	76.91
96	0	71.39	12.60	83.98
72	0	80.03	14.12	94.15

Note: *Zero WLA indicates that no NPDES permit discharges to the AU.

Table 4.12 TMDL for Turbidity in Rio Peñasco (HWY 24 to Cox Canyon)

Duration (consecutive hrs)	WLA (lbs/day)*	LA (lbs/day)	MOS (10%) (lbs/day)	TMDL (lbs/day)
720	0	351.36	39.04	390.40
336	0	494.17	54.91	549.07
168	0	636.97	70.77	707.75
144	0	673.24	74.80	748.05
120	0	743.51	82.61	826.13
96	0	813.79	90.42	904.21
72	0	920.33	102.26	1,022.58

Note: *Zero WLA indicates that no NPDES permit discharges to the AU.

Table 4.13 TMDL for Turbidity in Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)

Duration (consecutive hrs)	WLA (lbs/day)*	LA (lbs/day)	MOS (10%) (lbs/day)	TMDL (lbs/day)
720	418.83	99.12	57.55	575.51
336	531.42	125.77	73.02	730.22
168	653.02	154.55	89.73	897.30
144	684.55	162.01	94.06	940.62
120	749.85	177.46	103.03	1,030.35
96	815.15	192.92	112.01	1,120.08
72	920.99	217.97	126.55	1,265.50

Notes: * WWTP design capacity (2.70 mgd) used to calculate WLA.

4.5 Identification and Description of Pollutant Sources

SWQB fieldwork includes an assessment of the probable sources of impairment (Appendix B). The approach for identifying "Probable Sources of Impairment" includes additional input from a variety of stakeholders including landowners, watershed groups, and local, state, tribal, and federal agencies. Probable Source Sheets are filled out by SWQB staff during watershed surveys and watershed restoration activities. The draft probable source list will be reviewed and modified, as necessary, with watershed groups and other stakeholder input during the TMDL public meeting and comment period.

Although this procedure is subjective and qualitative, SWQB has concluded that it provides the best available information for the identification of probable sources of impairment in a watershed. The list of "Probable Sources" is not intended to single out a particular land owner or land management activity and generally includes several potential sources per impairment. Table 4.14 displays pollutant sources that may contribute to each segment as determined by field reconnaissance and evaluation. Probable sources of turbidity impairments will be evaluated, refined, and changed as necessary through the WBP.

Table 4.14 Probable Source Summary for Turbidity

AU	NPDES permits	Probable Sources
Agua Chiquita (perennial portions McEwan Cny to headwaters)	none	Bridges/culverts/railroad crossings, channelization, drought-related impact.highway/road/bridge runoff, legacy logging operations, paved roads, gravel or dirt roads, pavement/impervious surfaces, rangeland grazing, residences/buildings.
Rio Peñasco (HWY 24 to Cox Canyon)	none	Angling pressure, bridges/culverts/railroad crossings, channelization, dams/diversions, dredging, drought-related impacts, fish stocking, flow alteration, highway/road/bridge runoff, irrigated crop production, irrigation return drains, legacy logging operations, paved roads, gravel/dirt roads, pavement/impervious surfaces, rangeland grazing, wildlife other than waterfowl.
Rio Ruidoso (Eagle Ck to US Hwy 70 Bridge)	NM0029165	Channelization, drought-related impacts, gravel/dirt roads, surface films/odors, mass wasting, on-site treatment systems, pavement/impervious surfaces, residences/buildings, stream channel incision, waterfowl, watershed runoff following forest fire.

4.6 Linkage between Water Quality and Pollutant Sources

Turbidity is an expression of the optical property in water that causes incident light to be scattered and absorbed rather than transmitted in straight lines. It is the condition resulting from suspended solids in the water, including silts, clays, and plankton. Such particles absorb heat in the sunlight, thus raising water temperature, which in turn lowers dissolved oxygen levels. It also prevents sunlight from reaching plants below the surface. This decreases the rate of photosynthesis, so less oxygen is produced by plants. Turbidity may harm fish and their larvae. Turbidity exceedences, historically, are generally attributable to soil erosion, excess nutrients, various wastes and pollutants, and the stirring of sediments up into the water column during high flow events.

Turbidity increases, as observed in SWQB monitoring data, show turbidity values along these reaches that exceed the State Standards for the protection of designated uses. Through

monitoring, and pollutant source documentation, it has been observed that the most probable cause for these exceedences are due to increased land disturbance and changing land use. Disturbances may be historical or current in nature.

The components of a watershed continually change through natural ecological processes such as vegetation succession, erosion, and evolution of stream channels. Intrusive human activity often affects watershed function in ways that are inconsistent with the natural balance. These changes, often rapid and sometimes irreversible, occur when people:

- Cut forests;
- Clear and cultivate land;
- Remove stream-side vegetation;
- Alter the drainage of the land;
- Channelize watercourses;
- Withdraw water for irrigation;
- Build towns and cities; and
- Discharge pollutants into waterways.

Possible effects of these practices on aquatic ecosystems include:

- Increased amount of sediment carried into water by soil erosion, which in turn may:
    - Increase turbidity of the water;
    - Reduce transmission of sunlight needed for photosynthesis;
    - Interfere with animal behaviors dependent on sight (foraging, mating, and escape from predators);
    - Impede respiration (e.g., by gill abrasion in fish) and digestion;
    - Reduce oxygen in the water;
    - Cover bottom gravel and degrade spawning habitat; and
    - Cover eggs, which may suffocate or develop abnormally; fry may be unable to emerge from the buried gravel bed.
- Clearing of trees and shrubs from shorelines, which in turn may:
    - Destabilize banks and promote erosion;
    - Increase sedimentation and turbidity;
    - Reduce shade and increase water temperature which could disrupt fish metabolism; and
    - Cause channels to widen and become more shallow.
- Land clearing, constructing drainage ditches, straightening natural water channels, which in turn may:
    - Create an obstacle to upstream movement of fish and suspend more sediment in the water due to increased flow;
    - Strand fish upstream and dry out recently spawned eggs due to subsequent low flows; and
    - Reduce base flows.

Where data gaps exist or the level of uncertainty in the characterization of sources is large, the recommended approach to TMDL assignments requires the development of allocations based on estimates utilizing the best available information.

Additional turbidity and TSS sampling would need to be conducted in the referenced reaches to more fully characterize probable sources of turbidity. However, sufficient data exist to support development of turbidity TMDLs to address the stream standards exceedences.

4.7 Margin of Safety

TMDLs should reflect a MOS based on the uncertainty or variability in the data, the point and nonpoint source loading estimates, and the modeling analysis. The MOS can be expressed implicitly, explicitly, or a combination of the two. An implicit MOS is incorporated by making conservative assumptions in the TMDL analysis, such as allocating a conservative load to background sources. An explicit MOS is applied by reserving a portion of the TMDL and not allocating it to any other sources.

The MOS for the TMDLs was developed using a combination of conservative assumptions and allocating an explicit portion of the TMDL in recognition of potential errors. Therefore, this MOS is the sum of the following two elements:

- *Conservative Assumptions*
  - TSS is a conservative parameter that does not settle out of the water column
- *Explicit Recognition of Potential Errors*
  - Uncertainty exists in the relationship between TSS and turbidity. A conservative MOS for this element is **5 %**.
  - The critical flow value for the ungaged streams was estimated based on a regression equation from Waltemeyer (2002). There is inherent error in all flow calculations, including those based on gage data. A conservative MOS for this element for AUs which used the regression equation is therefore **10 %**.
  - There is inherent error in all flow measurements; a conservative MOS for this element in gaged streams is **5 %**.

4.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Data used in the calculation of these TMDLs were collected during the spring, summer, and fall of 2012 in order to ensure coverage of any potential seasonal variation in the system. Since the critical flow condition is set to estimate critical low flow discharge, it is assumed that if critical conditions are met, coverage of any potential seasonal variation will also be met.

4.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2040. The Lincoln County population is projected to grow by an estimated 1.3% over the 2010-2040 time period. Similarly, the Chaves County population is projected to grow by an estimated 4.71% and the Otero County

population is project to grow by an estimated 0.79% over the same time period. The 2010 Census population for Lincoln County is 20,497, Chaves County is 65,783, and Otero County is 64,275 (NMBBER 2012).

Due to the lack of unpermitted point sources in the watersheds, it is likely that turbidity is primarily due to diffuse nonpoint sources. Estimates of future growth in Lincoln, Chaves, and Otero counties are not anticipated to lead to a significant increase in turbidity that cannot be controlled with BMP. However, it is imperative that BMPs continue to be utilized to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit. Any future growth would be considered part of the existing load allocation, assuming persistence of the hydrologic conditions used to develop these TMDLs.

5.0 MONITORING PLAN

Pursuant to CWA Section 106(e)(1), 33 U.S.C. Section 1251, the SWQB has established appropriate monitoring methods, systems and procedures in order to compile and analyze data on the quality of the surface waters of New Mexico. In accordance with the New Mexico Water Quality Act, NMSA 1978, Section 74-6-1 et seq., the SWQB has developed and implemented a comprehensive water quality monitoring strategy for the surface waters of the State.

The monitoring strategy establishes the methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments. SWQB revised its 10-year monitoring and assessment strategy (NMED/SWQB 2010a) and submitted it to EPA Region 6 for review on March 23, 2010. The strategy details both the extent of monitoring that can be accomplished with existing resources plus expanded monitoring strategies that could be implemented given additional resources. The SWQB utilizes a rotating basin approach to water quality monitoring. In this approach, a select number of watersheds are intensively monitored each year with an established return frequency of approximately every eight years. The next scheduled monitoring date for the Sacramento Mountains is 2020. The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities. This document, called the QAPP, is updated and certified annually by USEPA Region 6. In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program. Current priorities for monitoring in the SWQB are driven by the CWA Section 303(d) list of streams requiring TMDLs. Short-term efforts were directed toward those waters that are on the USEPA TMDL consent decree list (U.S. District Court for the District of New Mexico 1997), however NMED/SWQB completed the final remaining TMDL on the consent decree in December 2006 and USEPA approved this TMDL in August 2007. The U.S. District Court dismissed the Consent Decree on April 21, 2009.

Once assessment monitoring is completed, those reaches showing impacts and requiring a TMDL will be targeted for more intensive monitoring. The methods of data acquisition include fixed-station monitoring, intensive surveys of priority assessment units (including biological assessments), and compliance monitoring of industrial, federal, and municipal dischargers, as specified in the SWQB Standard Operating Procedures (NMED/SWQB 2010a).

Long-term monitoring for assessments will be accomplished through the establishment of sampling sites that are representative of the waterbody and which can be revisited approximately every eight years. This information will provide time relevant information for use in CWA Section 303(d) listing and 305(b) report assessments and to support the need for developing TMDLs. The approach provides:

- a systematic, detailed review of water quality data which allows for a more efficient use of valuable monitoring resources;
- information at a scale where implementation of corrective activities is feasible;

- an established order of rotation and predictable sampling in each basin which allows for enhanced coordinated efforts with other programs; and
- program efficiency and improvements in the basis for management decisions.

It should be noted that a watershed would not be ignored during the years in between water quality surveys. The rotating basin program will be supplemented with other data collection efforts such as the funding of long-term USGS water quality gaging stations for long-term trend data and on-going studies being performed by the USGS and USEPA. Data will be analyzed and field studies will be conducted to further characterize acknowledged problems and TMDLs will be developed and implemented accordingly. Both long-term and intensive field studies can contribute to the State's Integrated §303(d)/§305(b) listing process for waters requiring TMDLs.

6.0 IMPLEMENTATION OF TMDLS

6.1 Point Sources- NPDES permitting

Specific NPDES permit implementation discussions are included in Sections 3.4.1 and 4.4.1.

City of Ruidoso Downs and Village of Ruidoso WWTP (NPDES permit NM0029165)
The *E. coli* WLA assigned to the Ruidoso/Ruidoso Downs WWTP is based on the *E. coli* criterion in 20.6.4.208 NMAC.

The turbidity WLA assigned to the Ruidoso/Ruidoso Downs WWTP is based on the turbidity-TSS relationship calculated for the Rio Ruidoso (Eagle Creek to US Hwy 70) assessment unit. Although lower TSS concentrations were used to calculate the WLA than are applied in the current NPDES permit, NMED fully expects that the WWTP will be able to meet the WLA based on evaluation of 2012-2014 discharge monitoring report (DMR) data, which show TSS concentrations significantly below the TMDL limits (average = 0.22 mg/L for reported 30-day averages and 0.38 mg/L for reported 7-day averages).

Sacramento Methodist Assembly WWTP (NPDES permit NM0028886)
The Sacramento Methodist Assembly WWTP discharges into an unnamed intermittent tributary to the Agua Chiquita. The Agua Chiquita (perennial portions McEwan Cny to headwaters) is located approximately ½ mile below the WWTP outfall. Except during storm flows the effluent percolates into the ground before reaching the Agua Chiquita. It was assumed that the Sacramento Methodist Assembly WWTP does not contribute to the loading or concentration of turbidity-TSS in the Agua Chiquita (perennial portions McEwan Cny to headwaters) in excess of de minimis amounts. Therefore, a turbidity WLA for this facility was not included in this document (See Section 4.4.1 for more detail).

There are no other NPDES permits that discharge to assessment units addressed in this document.

6.2 Nonpoint Sources – WBP and BMP Coordination

A WBP is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies in reducing and preventing nonpoint source impacts to water quality. This long-range strategy will become instrumental in coordinating efforts to achieve water quality standards in the watershed. The WBP is essentially the Implementation Plan, or Phase Two of the TMDL process. The completion of the TMDLs and WBP leads directly to the development of on-the-ground projects to address surface water impairments in the watershed.

SWQB staff will continue to provide technical assistance such as selection and application of BMPs needed to meet WBP goals. Stakeholder public outreach and involvement in the implementation of this TMDL will be ongoing.

The White Fire burned 10,300 acres in the Lincoln National Forest in 2011 and the Little Bear Fire burned 44,330 acres in the Lincoln National Forest in 2012. SWQB staff created the Wildfire Impacts on Surface Water Quality website http://www.nmenv.state.nm.us/swqb/Wildfire/index.html to further inform stakeholders and management agencies about the water quality impacts from fires.

6.3 Clean Water Act § 319(h) Funding

The Watershed Protection Section of the SWQB can potentially provide USEPA §319(h) funding to assist in implementation of BMPs to address water quality problems on reaches listed as category 4 or 5 waters on the Integrated §303(d)/ §305(b) list. These monies are available to all private, for-profit, and nonprofit organizations that are authenticated legal entities, or governmental jurisdictions including: cities, counties, tribal entities, federal agencies, or agencies of the State. Proposals are submitted by applicants through a Request for Proposal (RFP) process. Selected projects require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Funding is potentially available, generally annually, for both watershed-based planning and on-the-ground projects to improve surface water quality and associated habitat. Further information on funding from the CWA §319(h) can be found at the SWQB website: http://www.nmenv.state.nm.us/swqb/.

6.4 Other Funding Opportunities and Restoration Efforts in the Sacramento Mountains

Several other sources of funding exist to address impairments discussed in this TMDL document. NMED's Construction Programs Bureau assists communities in need of funding for WWTP upgrades and improvements to septic tank configurations. They can also provide matching funds for appropriate CWA §319(h) projects using state revolving fund monies. The USDA Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) program can provide assistance to private land owners in the basin. The USDA Forest Service aligns their mission to protect lands they manage with the TMDL process, and is another source of assistance. The Bureau of Land Management (BLM) has several programs in place to provide assistance to improve unpaved roads and grazing allotments.

On August 15, 2013, the intention for a new state-funded stream restoration program called the River Stewardship Program was announced. The River Stewardship Program has the overall goal of addressing the root causes of poor water quality and stream habitat. Objectives of the River Stewardship Program include: restoring or maintaining hydrology of streams and rivers to better handle overbank flows and thus reduce flooding downstream; enhancing economic benefits of healthy river systems such as improved opportunities to hunt, fish, float or view wildlife; and providing state matching funds required for federal CWA grants." The New Mexico Legislature provided $2.3 million in the state FY2015 budget to support this initiative. Responsibility for the program will be assigned to NMED, and staff will develop and administer the program.

7.0 APPLICABLE REGULATIONS and STAKEHOLDER ASSURANCES

New Mexico's Water Quality Act ("Act") authorizes the WQCC to "promulgate and publish regulations to prevent or abate water pollution in the state" (NMSA 1978, § 74-6-4 (E)) and to require permits. The Act authorizes a constituent agency to take enforcement action against any person who violates a water quality standard. Several statutory provisions on nuisance law could also be applied to NPS water pollution. The Water Quality Act also provides that:

> *"[t]he Water Quality Act does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights."*

NMSA 1978, §74-6-12 (A). In addition, the State of New Mexico Surface Water Quality Standards, Subsection C of 20.6.4.4 NMAC also provides:

"C. Pursuant to Subsection A of Section 74-6-12 NMSA 1978, this part does not grant to the water quality control commission or to any other entity the power to take away or modify property rights in water."

20.6.4.4 (C) NMAC. New Mexico policies are in general accord with the federal Clean Water Act Section 101 (g), 33 U.S.C. §1251 (g), goals:

"It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is the further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources."

33 U.S.C. §1251 (g). New Mexico's CWA Section 319 program has been developed in a coordinated manner with the State's 303(d) process. All Section 319 watersheds that are targeted in the annual RFP process coincide with the State's preparation of the biennial impaired waters listing as approved by the USEPA. The State has given a high priority for funding, assessment, and restoration activities to these impaired/listed watersheds.

As a constituent agency, NMED has the authority pursuant to NMSA 1978, Section 74-6-10, to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard including a violation caused by a NPS. The NMED NPS water quality management program has historically strived for and will continue to promote voluntary compliance to NPS water pollution concerns by utilizing a voluntary, cooperative approach. The State provides technical support and grant monies for implementation of BMPs and other NPS prevention mechanisms through Section 319 of the Clean Water Act (33 U.S.C. § 1329). Since portions of this TMDL will be implemented through NPS control mechanisms, the New Mexico Watershed Protection Program will target efforts to this and other watersheds with TMDLs.

In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including federal, state, and private entities, NMED has established Memoranda of Understanding ("MOU") with various federal agencies, in particular the USFS and the BLM. A MOU has also been developed with other state agencies, such as the New Mexico Department of Transportation. These MOUs provide for coordination and consistency in dealing with NPS issues.

The time required to attain standards for all reaches is estimated to be approximately ten to twenty years. This estimate is based on a five-year time frame implementing several watershed projects that may not be starting immediately or may be in response to earlier projects. Stakeholders in this process will include the SWQB, and other parties identified in the WBP. The cooperation of watershed stakeholders will be pivotal in the implementation of these TMDLs as well.

8.0 PUBLIC PARTICIPATION

Public participation was solicited in development of this TMDL. The draft TMDL was made available for a 30-day comment period beginning on July 7, 2014. Responses to comments are attached as **Appendix D** to the final draft document. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, webpage postings (http://www.nmenv.state.nm.us), and press releases to area newspapers. A public meeting was held on July 16, 2014 in Ruidoso. A meeting with all parties who submitted public comments was held on October 24, 2014 to discuss the draft TMDL and the draft Response to Comments. A meeting was held with all parties on December 5, 2014 to discuss the 2015 sampling to be performed by Parametrix and the Village of Ruidoso/City of Ruidoso Downs. SWQB staff provided comments on the draft field sampling plan to Parametrix on January 2, 2015. The SWQB plans to present the final draft TMDL to the Water Quality Control Commission (WQCC) at the regularly scheduled August 2015 meeting.

Once the TMDL is approved by the WQCC, the next step for public participation will be activities as described in Section 6.0 and participation in watershed protection projects including those that may be funded by Clean Water Act Section 319(h) grants.

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APPENDIX A

CONVERSION FACTOR DERIVATIONS

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FLOW

Flow (as million gallons per day [MGD]) and concentration values (milligrams per liter [mg/L]) must be multiplied by a conversion factor in order to express the load in units "pounds per day." The following expressions detail how the conversion factor was determined.
TMDL Calculation:

$$Flow\ (MGD) \times Concentration\left(\frac{mg}{L}\right) \times CF\left(\frac{L-lb}{gal-mg}\right) = Load\left(\frac{lb}{day}\right)$$

Conversion Factor Derivation:

$$CF = 10^6 \times \frac{3.785\ L}{gal} \times \frac{1\ lb}{454{,}000\ mg} = 8.34\left(\frac{L-lb}{gal-mg}\right)$$

Flow is converted from cfs to MGD by the following equation:

$$\left(\frac{ft^3}{s}\right) * \left(\frac{86{,}400\ s}{1\ day}\right) * \left(\frac{7.48\ gal}{ft^3}\right) * \left(\frac{1\ Million\ gal}{1{,}000{,}000\ gal}\right) = MGD$$

APPENDIX B

PROBABLE SOURCES OF IMPAIRMENT

"Sources" are defined as activities that may contribute pollutants or stressors to a water body (USEPA 1997). The list of "Probable Sources of Impairment" in the Integrated 303(d)/305(b) List, Total Maximum Daily Load documents (TMDL's), and Watershed-Based Plans (WBP's) is intended to include any and all activities that could be contributing to the identified cause of impairment. Data on Probable Sources is routinely gathered by Monitoring and Assessment Section staff and Watershed Protection Section staff during water quality surveys and watershed restoration projects and is housed in the Assessment Database (ADB version 2). ADB was developed by USEPA to help states manage information on surface water impairment and to generate §303(d)/ §305(b) reports and statistics. More specific information on Probable Sources of Impairment is provided in individual watershed planning documents (e.g., TMDL's, WBP's, etc) as they are prepared to address individual impairments by assessment unit.

USEPA through guidance documents strongly encourages states to include a list of Probable Sources for each listed impairment. According to the 1998 305(b) report guidance, "…, states must always provide aggregate source category totals…" in the biennial submittal that fulfills CWA section 305(b)(1)(C) through (E) (USEPA 1997). The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled "Probable" and generally includes several sources for each known impairment.

The approach for identifying "Probable Sources of Impairment" was recently modified by SWQB. Any new impairment listing will be assigned a Probable Source of "Source Unknown." Probable Source Sheets will continue to be filled out during watershed surveys and watershed restoration activities by SWQB staff. Information gathered from the Probable Source Sheets will be used to generate a draft Probable Source list in consequent TMDL planning documents. These draft Probable Source lists will be finalized with watershed group/stakeholder input during the pre-survey public meeting, TMDL public meeting, WBP development, and various public comment periods. The final Probable Source list in the approved TMDL will be used to update the subsequent Integrated List.

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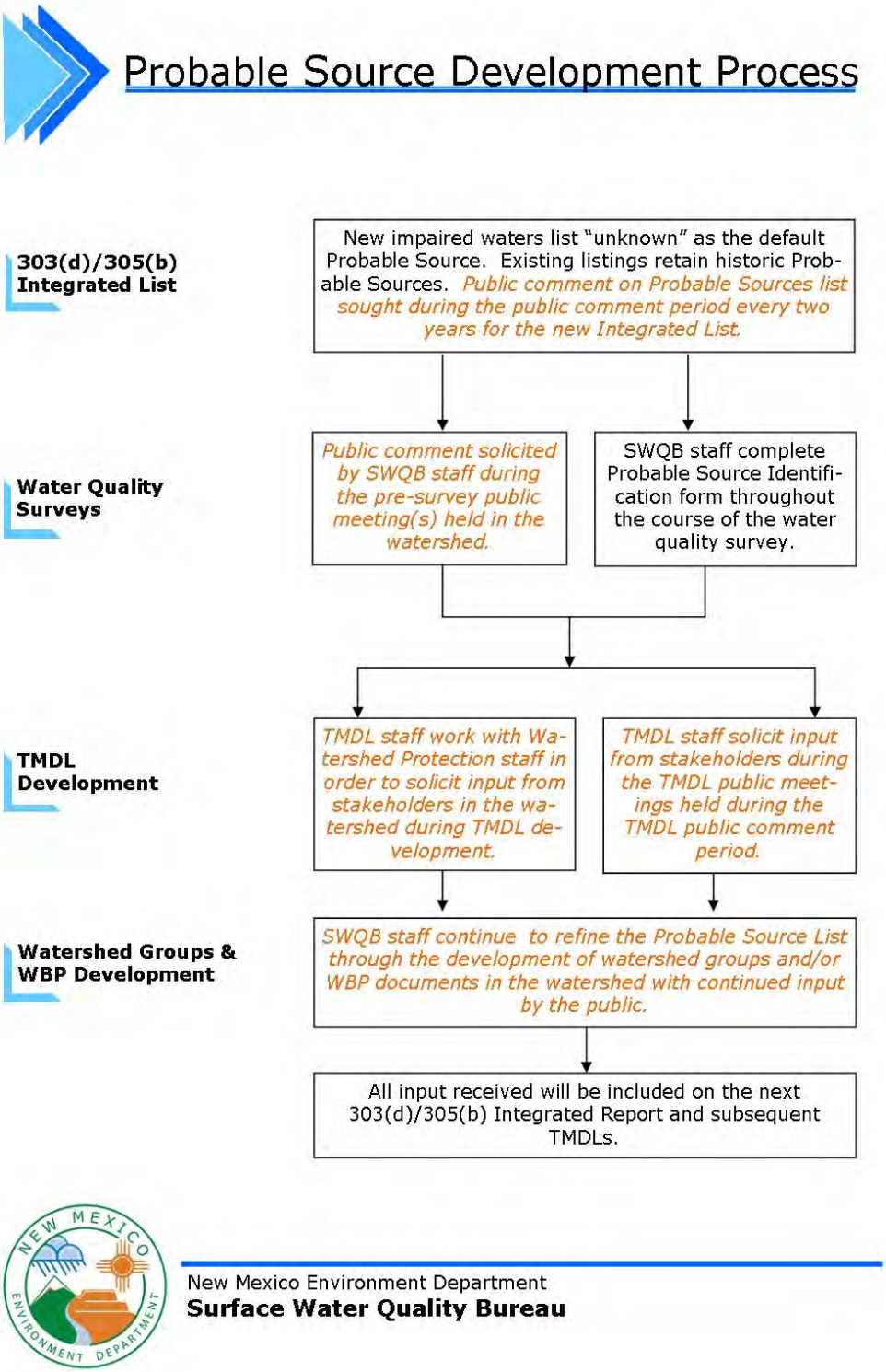
Figure B1. Probable Source Development Process and Public Participation Flowchart



APPENDIX C

WATER QUALITY DATA

Table C1. *E.coli* data

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	4/4/2012	1
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	5/8/2012	3.1
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	6/13/2012	13.5
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	7/10/2012	1413.6
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	8/7/2012	93.3
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	8/22/2012	866.4
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	9/19/2012	38.4
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz000.1	10/10/2012	4.1
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz003.0	4/4/2012	2
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz003.0	5/8/2012	15.8
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz003.0	6/13/2012	29.2
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz003.0	7/10/2012	1046.2
Carrizo Creek (Rio Ruidoso to Mescalero Apache bnd)	57Carriz003.0	8/7/2012	28.8

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	48NogalC000.2	5/8/2012	14.6
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	48NogalC000.2	5/22/2012	21.3
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	48NogalC000.2	7/25/2012	307.6
Nogal Creek (Tularosa Creek to Mescalero Apache bnd)	48NogalC000.2	8/23/2012	435.2

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit053.4	4/3/2012	1
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit053.4	5/8/2012	79.4
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit053.4	6/13/2012	488.4
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit053.4	8/7/2012	263.1
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit059.9	5/16/2012	1
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit059.9	6/13/2012	9.8
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit059.9	6/20/2012	1
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit061.1	4/3/2012	1
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit061.1	5/8/2012	27.5
Rio Bonito (NM 48 near Angus to headwaters)	57RBonit061.1	5/16/2012	78

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	4/4/2012	1
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	5/8/2012	35.9
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	6/13/2012	50.4
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	8/22/2012	2419.6
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	9/19/2012	122.3
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	10/10/2012	28.5
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	4/4/2012	1
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	5/8/2012	11.9
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	6/13/2012	67.6
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	7/10/2012	2419.6
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	8/7/2012	52.1

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	4/3/2012	72.2
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	5/9/2012	1732.9
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	6/12/2012	920.8
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	7/11/2012	980.4
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	8/7/2012	579.4
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	8/22/2012	2419.6
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	9/19/2012	1553.1
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	10/10/2012	104.6
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	4/4/2012	9.7
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	5/9/2012	686.7
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	6/13/2012	2419.6
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	7/11/2012	1553.1
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	8/7/2012	770.1
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	8/22/2012	2419.6

Assessment Unit	Site	Date	*E.coli* results (cfu/100mL)
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	4/3/2012	27.5
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	5/9/2012	77.1
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	6/12/2012	35
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	7/11/2012	2419.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	8/7/2012	325.5
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	8/22/2012	2419.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	9/19/2012	410.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	10/10/2012	66.3
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	4/3/2012	13.2
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	5/9/2012	71.7
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	6/12/2012	517.2
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	7/11/2012	866.4
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	8/7/2012	313
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	8/22/2012	2419.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	9/19/2012	60.2
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	10/10/2012	47.3

Table C2. Turbidity and TSS data

Assessment Unit	Site	Date	Turbidity (NTU)	TSS (mg/L)
Agua Chiquita (perennial portions McEwan Canyon to headwaters)	59AguaCh029.0	4/5/2012	2.1	5
Agua Chiquita (perennial portions McEwan Canyon to headwaters)	59AguaCh029.0	5/10/2012	6	8
Agua Chiquita (perennial portions McEwan Canyon to headwaters)	59AguaCh029.0	6/13/2012	0	3
Agua Chiquita (perennial portions McEwan Canyon to headwaters)	59AguaCh029.0	7/26/2012	1310.4	1240
Agua Chiquita (perennial portions McEwan Canyon to headwaters)	59AguaCh029.0	9/26/2012	0.4	4

Assessment Unit	Site	Date	Turbidity (NTU)	TSS (mg/L)
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	4/5/2012	3.9	7
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	5/10/2012	0.2	3
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	6/14/2012	0	3
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	7/26/2012	29.5	46
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	8/8/2012	0.2	10
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas108.4	9/26/2012	0.6	3
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas140.2	4/5/2012	14.5	24
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas140.2	5/10/2012	17.2	33
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas140.2	6/14/2012	4.9	12
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas140.2	7/26/2012	41.5	188
Rio Peñasco (Hwy 24 to Cox Canyon)	59RPenas140.2	8/8/2012	16	41

Assessment Unit	Site	Date	Turbidity (NTU)	TSS (mg/L)
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	4/3/2012	1.7	3
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	5/9/2012	1.4	65
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	6/12/2012	0	3
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	7/11/2012	185.1	340
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	8/7/2012	3.7	6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	9/12/2012	476.4	30
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	4/3/2012	2.5	5
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	5/9/2012	0.5	3
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	6/12/2012	1.1	4
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	7/11/2012	79.5	168
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	8/7/2012	0	8
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	9/12/2012	18.1	37

APPENDIX D

PUBLIC COMMENTS

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SWQB hosted a public meeting in Ruidoso, NM on July 16, 2014 to discuss the Public Comment Draft Sacramento Mountains TMDL. Notes from the public meeting are available in the SWQB TMDL files in Santa Fe.

SWQB received the following public comments on the Sacramento Mountains TMDLs:

A. City of Ruidoso Downs, Resolution 2014-14
B. Village of Ruidoso, Resolution 2014-20
C. Steve Sugarman representing Rio Hondo Land & Cattle Co, LP and WildEarth Guardians
D. Village of Ruidoso and City of Ruidoso Downs

Changes made to the TMDL based on public comment include:

1. Section 4 (Plant Nutrients) and Section 5 (Total Phosphorus) were removed from this TMDL document due to the scope and complexity of the public comments received. Those impairments will be addressed in a later TMDL.
2. The flow used to calculate the WLA was changed from the maximum discharge to the design capacity. This change was made to the TMDLs for E.coli and turbidity for the Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) assessment unit.
3. Minor editorial corrections were made throughout the document.
4. Language about the River Stewardship program was added to Section 6.4.
5. Section 8 (Public Participation) was updated.

PLEASE NOTE:

When feasible, original typed letters that were not received electronically were scanned and converted to MSWord. Likewise, when feasible, letters received electronically were also converted to MSWord. All text was converted to Times New Roman 12 font with standard page margins for ease of collation. Contact information such as phone number, street addresses, and e-mail addresses from private citizens were removed for privacy reasons. All original letters of comment are on file at the SWQB office in Santa Fe, NM.

Comment Set A

The City of
RUIDOSO DOWNS

Gary L. Williams, Mayor

July 30, 2014

Heidi Henderson
NMED SWQB
P.O. Box 5469
Santa Fe, New Mexico 87502

Re: Resolution No. 2014-14-Formal Comments for Inclusion into the Public Record

Dear Ms. Henderson,

The City of Ruidoso Downs is hereby submitting a copy of Resolution No. 2014-04 adopted and approved July 28, 2014 during their regularly scheduled city council meeting. Formal comments for inclusion into the public records.

- Related to the New Mexico Environmental Department's July 7, 2014 Draft Total Maximum Daily Load (TMDL) document for the Sacramento Mountains, including the Rio Ruidoso to become part of the public record.

Should you have any other questions or need further information, please do not hesitate to contact me at 575-378-4422 or you may email at cvirden@ruidosodowns.us

Sincerely,

Carol Virden

Carol Virden, City Clerk, MMC

Enclosure: Resolution No. 2014-14

Cc: Gary L. Williams, Mayor
City Councilors
H. John Underwood, City Attorney
File

City Councilors
Tommy Hood ~ Margie R. Morales ~ Judy R. Miller ~ Dale Perry
P.O. Box 348 Ruidoso Downs, NM 88346 ~ 123 Downs Drive ~ (575) 378-4422 ~ Fax 378-4586
www.ruidosodowns.us

CITY OF RUIDOSO DOWNS
RESOLUTION NO. 2014-14

RESOLUTION RELATED TO THE NEW MEXICO ENVIRONMENTAL DEPARTMENT'S JULY 7, 2014 DRAFT TOTAL MAXIMUM DAILY LOAD (TMDL) DOCUMENT FOR THE SACRAMENTO MOUNTAINS, INCLUDING THE RIO RUIDOSO

WHEREAS, the Governing Body of the City of Ruidoso Downs, New Mexico is a member, along with the Village of Ruidoso, of the Regional Wastewater Treatment Plant Joint Use Board; and

WHEREAS, the Governing Body has spent many years and significant sums of money improving the water quality of the Rio Ruidoso, most notably through the construction and operation of a new wastewater treatment plant ("Plant"); and

WHEREAS, the Plant is more effective in removing Total Phosphorus and Total Nitrogen (collectively "Nutrients") from Plant effluent than any other wastewater treatment plant in the State of New Mexico and is one of the most effective treatment plants in the United States; and

WHEREAS, an example of the effectiveness of the Plant is that Total Phosphorous concentrations in the Rio Ruidoso downstream of the Plant's point of discharge are considerably lower than the concentrations of Total Phosphorus in the Rio Ruidoso upstream of the Plant; and

WHEREAS, the Governing Body is extremely concerned that the Plant cannot achieve the Waste Load Allocation of 2.46 milligrams per liter for Total Nitrogen in the Total Maximum Daily Loads ("TMDL") proposed by the New Mexico Environment Department ("NMED") on July 7, 2014 ; and

WHEREAS, the Governing Body's specific concerns include the following:

- The cost of debt service for construction of the Plant and the cost of operating the Plant are extremely high, including the cost of approximately $500.00 per day for the purchase of alum to treat Total Phosphorus in wastewater; and

- If it becomes necessary to purchase and utilize methanol for the treatment of Total Nitrogen in wastewater, the Plant operator is concerned about explosivity and other dangers caused by methanol; and

- Because the City of Ruidoso Downs is economically disadvantaged, the economic impact of paying for and operating the Plant is severe, let alone

paying for any increased future costs of attempting to achieve further reductions in Nutrient levels in Plant effluent; and

- The City of Ruidoso Downs and Village of Ruidoso continue to aggressively pursue a program of replacing sewer line interceptors and adding additional sewer collection systems to prevent contaminants from entering the Rio Ruidoso; and

- Additional improvements in the water quality of the Rio Ruidoso can be made far more cost-effectively by expending scarce municipal resources on reducing the number of septic systems and other nonpoint sources of water pollution than by funding upgrades to the exceptionally effective Plant; and

- NMED should provide the City of Ruidoso Downs and the Village of Ruidoso with the same flexibility and the same consideration of cost effectiveness in achieving water quality goals in the Rio Ruidoso as NMED provides to other municipalities in the State of New Mexico.

NOW, THEREFORE, BE IT RESOLVED that the Governing Body of the City of Ruidoso Downs hereby requests that the New Mexico Environment Department address our foregoing concerns and amend its July 7, 2014 proposed TMDL so that our new wastewater treatment plant can achieve the Waste Load Allocation in the TMDL without the necessity of constructing costly Plant upgrades that create their own adverse environmental impacts or the necessity of utilizing additional costly and dangerous wastewater-treatment chemicals.

Resolved in Regular Session this 28th Day of July, 2014.

Gary L. Williams

Gary L. Williams, Mayor

Judy Miller, City Councilor

Dale Perry

Dale Perry, City Councilor

Margie Morales

Margie Morales, City Councilor

Tommy Hood - APPROVED VIA TELECONFERENCE

Tommy L. Hood, City Councilor

ATTEST:

Carol Virden, City Clerk

<u>SWQB Response:</u> Thank you for your continued work toward improving the water quality in the Rio Ruidoso and SWQB looks forward to updates about the ongoing projects to repair the sewer line interceptors and address septic systems in the watershed. Technical comments submitted by the Village of Ruidoso and the City of Ruidoso Downs are included in Comment Set D of this document.

Comment Set B

VILLAGE OF RUIDOSO
RESOLUTION 2014-20

RESOLUTION RELATED TO THE NEW MEXICO ENVIRONMENT DEPARTMENT'S JULY 7, 2014 DRAFT TOTAL MAXIMUM DAILY LOAD (TMDL) DOCUMENT FOR THE SACRAMENTO MOUNTAINS, INCLUDING THE RIO RUIDOSO.

WHEREAS, the Governing Body of the Village of Ruidoso, New Mexico is a member, along with the City of Ruidoso Downs, of the Regional Wastewater Treatment Plant Joint Use Board; and

WHEREAS, the Governing Body has spent many years and significant sums of money improving the water quality of the Rio Ruidoso, most notably through the construction and operation of a new wastewater treatment plant ("Plant"); and

WHEREAS, the Plant is more effective in removing Total Phosphorus and Total Nitrogen (collectively "Nutrients") from Plant effluent than any other wastewater treatment plant in the State of New Mexico and is one of the most effective treatment plants in the United States; and

WHEREAS, an example of the effectiveness of the Plant is that Total Phosphorous concentrations in the Rio Ruidoso downstream of the Plant's point of discharge are considerably lower than the concentrations of Total Phosphorus in the Rio Ruidoso upstream of the Plant; and

WHEREAS, the Governing Body is extremely concerned that the Plant cannot achieve the Waste Load Allocation of 2.46 milligrams per liter for Total Nitrogen in the Total Maximum Daily Loads ("TMDL") proposed by the New Mexico Environment Department ("NMED") on July 7, 2014; and

WHEREAS, the Governing Body's specific concerns include the following:

- The cost of debt service for construction of the Plant and the cost of operating the Plant are extremely high, including the cost of approximately $500.00 per day for the purchase of alum to treat Total Phosphorus in wastewater; and

- If it becomes necessary to purchase and utilize methanol for the treatment of Total Nitrogen in wastewater, the Plant operator is concerned about explosivity and other dangers caused by methanol; and

- Because the City of Ruidoso Downs is economically disadvantaged, the economic impact of paying for and operating the Plant is severe, let alone paying for any increased future costs of attempting to achieve further reductions in Nutrient levels in Plant effluent; and

- Because the Village of Ruidoso is also challenged economically and is already one of the most expensive municipalities in the State in terms of wastewater collection and wastewater treatment cost and fees to its citizens; and

- The City of Ruidoso Downs and Village of Ruidoso continue to aggressively pursue a program of replacing sewer line interceptors and adding additional sewer collection systems to prevent contaminants from entering the Rio Ruidoso; and

- Additional improvements in the water quality of the Rio Ruidoso can be made far more cost-effectively by expending scarce municipal resources on reducing the number of septic systems and other nonpoint sources of water pollution than by funding upgrades to the exceptionally effective Plant; and

- NMED should provide the City of Ruidoso Downs and the Village of Ruidoso with the same flexibility and the same consideration of cost effectiveness in achieving water quality goals in the Rio Ruidoso as NMED provides to other municipalities in the State of New Mexico.

NOW, THEREFORE, BE IT RESOLVED that the Governing Body of the Village of Ruidoso hereby requests that the New Mexico Environment Department address our foregoing concerns and amend its July 7, 2014 proposed TMDL so that our new wastewater treatment plant can achieve the Waste Load Allocation in the TMDL without the necessity of constructing costly Plant upgrades that create their own adverse environmental impacts or the necessity of utilizing additional costly and dangerous wastewater treatment chemicals.

Resolved in Regular Session this 29th day of July, 2014.

VILLAGE OF RUIDOSO NEW MEXICO SEAL

Tom Battin, Mayor

SEAL ATTEST:

Irma Devine, Village Clerk

<u>SWQB Response:</u> Thank you for your continued work toward improving the water quality in the Rio Ruidoso and SWQB looks forward to updates about the ongoing projects to repair the sewer interceptors and address septic systems in the watershed. Technical comments submitted by the Village of Ruidoso and the City of Ruidoso Downs are included in Comment Set D of this document.

Comment Set C

Steven Sugarman Attorney At Law

August 7, 2014

VIA ELECTRONIC MAIL
heidi.henderson@state.nm.us

Ms. Heidi Henderson
Surface Water Quality Bureau
New Mexico Environment Department
P.O. Box 5469
Santa Fe, New Mexico 87502

Re: Comments to Draft TMDL for the Sacramento Mountains

Dear Ms. Henderson:

I submit the following comments to the draft TMDL for the quality- impaired Sacramento Mountain stream segments on behalf of Rio Hondo Land & Cattle Co, LP and WildEarth Guardians. Both entities are concerned that approval of the draft TMDL will result in the deterioration of water quality in the Rio Ruidoso, and submit that the TMDL as currently drafted must be disapproved as it violates pertinent provisions of the Clean Water Act and impermissibly contemplates prohibited backsliding in the effluent limitations currently governing the quality of discharges from the Village of Ruidoso wastewater treatment plant.

StevenSugarman@hotmail.com 347 County Road 55A Phone: (505) 672-5082 Cerrillos, New Mexico 8701

1. Introduction

On July 7, 2014, the New Mexico Environment Department ("NMED") issued a draft Total Maximum Daily Load ("TMDL") for the Sacramento Mountains. The Rio Hondo stream system is within the geographic scope of the TMDL and, accordingly, the draft document includes proposed TMDLs for water- quality impaired segments of the Rio Ruidoso and its tributaries.

The proposed TMDL violates the Clean Water Act ("CWA") in various respects, some of which are set out below, and cannot be approved. Most fundamentally, TMDLs for impaired stream segments must be "established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety." 33 U.S.C. § 1313(d)(1)(C). The TMDL drafted for the Eagle Creek to U.S. Highway 70 Bridge Assessment Unit of the Rio Ruidoso (hereafter referred to as the "Below WWTP Reach," as the Assessment Unit includes the outfall of the Ruidoso wastewater treatment plant) *will not* bring this quality-impaired segment into compliance with applicable water quality standards.[1] For this reason, the TMDL must be disapproved.

Even on its face, the proposed TMDL for the Below WWTP Reach fails to comply with the CWA requirement that a TMDL for a quality-impaired segment ensures compliance with applicable water quality standards. The 2006 TMDL for the subject stream segment *did not* bring the segment into compliance with applicable water quality standards.[2] Notwithstanding the failure of the 2006

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[1] This comment letter focuses on the various inadequacies of the TMDL drafted for the Eagle Creek to U.S. Highway 70 Bridge Assessment Unit of the Rio Ruidoso, however many of the comments incorporated into this letter are also applicable to other quality-impaired segments addressed in the Sacramento Mountains TMDL.

[2] The Assessment Unit that includes the outfall of the Ruidoso WWTP in the 2006 TMDL does not exactly conform in length to the Assessment Unit including the outfall of the Ruidoso WWTP in the draft 2014 TMDL. The 2014

TMDL to bring the Below WWTP Reach into compliance with applicable water quality standards, NMED now proposes to increase target pollutant loads for the reach above and beyond the target pollutant loads established in the 2006 TMDL for the segment. In fact, NMED proposes to increase the target load for Total Nitrogen by almost 225% from 27.2 lbs/day to 60.8 lbs/day. At the same time, NMED acknowledges that steam flow in the segment is decreasing – presumably as a result of increased depletions associated with additional surface diversions and groundwater pumping for domestic water supply combined with global climate change. It states that the median flow value for the period of record has decreased from 11.9 cfs to 6.75 cfs. Clearly, a TMDL which elevates pollutant loading into a stream segment which is increasingly unable to assimilate pollutants through dilution is not a recipe for the attainment of applicable water quality standards.

Additionally, the TMDL for the Below WWTP Reach is critically flawed by the erroneous assumption that the U.S. Environmental Protection Agency ("EPA") can (and will) approve a relaxation in the effluent limitations that are incorporated into the WWTP's NPDES permit. Currently, NPDES effluent limits for the WWTP include a 0.1 mg/L limit for Total Phosphorous ("TP") and a 1.0 mg/L limit for Total Nitrogen ("TN"). The proposed TMDL for the Below WWTP Reach is premised on the erroneous assumption that the effluent limits will be relaxed to 0.16 mg/L for TP and 2.46 mg/L for TN. The assumed relaxation in effluent limits would constitute a violation of the CWA's anti-backsliding provision, 33 U.S.C. § 1342(o)(1), and there is no exception to the general prohibition on backsliding that applies in the case of the WWTP.

NMED first claims that a relaxation in the WWTP's effluent limitations is appropriate under the anti-backsliding exception provided by 33 U.S.C. § 1342(o)(2)(E). This is incorrect, as that exception applies only to facilities where "[t]he permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit." Here, Ruidoso itself acknowledges that the WWTP was *not* designed to meet the effluent limitation for TN. Under such circumstances, Exception (2)(E) cannot come into play. NMED also claims that backsliding in connection with the WWTP's NPDES permit, if permissible under Exception (2)(E) (which, as explained immediately above, is not the case), is allowed by 42 U.S.C. § 1313(d)(4)(A). However, this provision of the CWA allows backsliding in non-attainment waters *only* in the event that (1) relaxation of NPDES permit limits is otherwise allowed by one of the exceptions enumerated in 33 U.S.C. § 1342(o)(2) *and* (2) a relaxation of NPDES permit limits in the applicable TMDL will nonetheless "assure attainment of [pertinent] water quality standards." Neither of these two requirements are met in this case: no exception to the CWA's anti-backsliding provision applies *and* the TMDL for the Below WWTP Reach does not assure attainment of applicable water quality standards.

Assessment Unit is shorter than the 2006 Assessment Unit.

At bottom, it is plainly evident that NMED's guiding principle in drafting the Sacramento Mountains TMDL was *not* compliance with water quality standards in quality-impaired stream segments. Rather, it is clear that NMED's primary concern in drafting the TMDL was to provide a justification for relaxation of the effluent limitations incorporated into the Ruidoso WWTP NPDES permit. The resulting load targets and allocations are nothing less than egregious. As just one example, NMED calculated a target load of 27.2 lbs/day of TN in the stream segment that includes the WWTP outfall in the 2006 TMDL. In the 2014 draft TMDL, NMED proposes a Waste Load Allocation ("WLA") of 38.6 lbs/day of TN for the Ruidoso WWTP alone. This proposed WLA is more than 200% of the WLA calculated for the WWTP in the 2006 TMDL (18.9 lbs/day) and exceeds the *total* calculated permissible TN load for the stream segment from the 2006 TMDL (27.2 lbs/day) by more than 40%. In this connection, it also bears noting that even the more stringent 2006 TMDL did not achieve compliance with pertinent water quality standards and that decreasing flow volumes attributable to increased depletions associated with domestic water supply combined with global climate change indicate a need to draft a more stringent TMDL – *not a relaxed TMDL* – to satisfy the CWA's core TMDL requirement.

For the reasons set forth above, and for the other reasons set out in this comment letter, NMED's Sacramento Mountains TMDL cannot be approved consistent with the requirements of the CWA

SWQB Response: *These introductory comments are addressed in Items #2-9 below.*

2. NMED's calculations of target loads is arbitrary and capricious

A critical threshold step in the development of any TMDL is the calculation of target loads for pollutants of concern in quality-impaired stream segments. This calculation combines applicable water quality standards for the relevant pollutants with appropriate critical flows to yield a total volume of regulated pollutant that can be discharged into a stream segment without a resulting water quality standard violation. As applicable water quality standards are exogenous to the TMDL development process, there is generally no problem in the determination of such values in the context of target load calculation. However, the Sacramento Mountains TMDL demonstrates that the development of a TMDL that will ensure compliance with water quality standards, as required by the CWA, can be subverted by an arbitrary selection of critical flow values.

Specifically, the bacteria and nutrient TMDLs for the Below WWTP Reach are flawed at their cores by NMED's overstatement of critical flows. This overstatement yields artificially – and arbitrarily – high target loads for bacteria and nutrients. Since the WLA and the Load Allocation ("LA") for the Below WWTP Reach are guided and constrained by the inflated target loads, it is impossible that implementation of the TMDL will result in compliance with applicable water quality standards.

As NMED acknowledges in the draft TMDL, calculation of target loads should be based on critical low flow values – or "4Q3" values – as these values determine the pollutant assimilative capacity of receiving waters in low flow conditions. Using a higher value for critical flows results in pollutant concentrations that exceed applicable water quality standards. In stating one component of the critical flow values for the Below WWTP Reach – in-stream flow – NMED correctly uses the 4Q3 value of 1.01 mgd for the stream segment. However, NMED makes two critical mistakes in its statement of total critical flows. First, NMED erroneously uses the design capacity of the Ruidoso WWTP– 2.70 mgd – in its calculation of critical flows, despite the fact that a flow of this magnitude has never been observed at the WWTP.[3] Second, in stating the critical flow value for TN, NMED arbitrarily – and impermissibly – uses median flow values rather than 4Q3 values.

As for the first error – the use of the WWTP's 2.70 mgd design capacity to define critical flows – there is simply no basis in law or in fact for the use of this value when there is ample data on *actual* flows discharged from the WWTP. At the request of Rio Hondo, Balleau Groundwater, Inc. ("BGW") reviewed and analyzed WWTP discharge flow data reported by the Village of Ruidoso. Using the DFLOW 3.1 software, the same software used by NMED in calculating 4Q3 values, BGW calculated the 4Q3 value of WWTP discharge flows at 1.01 mgd.[4] The 4Q3 value for this flow is only 37% of the WWTP design capacity flow (2.70 mgd) that NMED used in the statement of critical flows for bacteria and TP.

If NMED had correctly used the 4Q3 value of WWTP discharge flows to calculate total critical flow values in the Below WWTP Reach for bacteria and TN, then the aggregate critical flow value for the bacteria and TP parameters would be 2.02 mgd (1.01 mgd in-stream + 1.01 mgd WWTP 4Q3 discharge). NMED's statement of 3.71 mgd (1.01 mgd in-stream + 2.70 mgd WWTP design discharge) as the critical flow for bacteria and TP overstates the actual critical flow value for those parameters in the Below WWTP Reach by more than 83%. In turn, the significant overstatement of critical flow values for bacteria and TP results in a correspondingly significant overstatement of target loads for bacteria and TP.

The second error – the use of median flow to define critical flow values for TN – is also without basis. NMED asserts in the draft TMDL that New Mexico water quality standards do not require the use of 4Q3 values to define critical low flows for narrative criteria. NMED also states that "after careful consideration of a number of low flow stream conditions NMED is proposing to use the annual median flow" to define critical low flow for TN.[5] NMED provides no information as to the issues that it took into account during the course of its "careful consideration," and it is not apparent that there is any legitimate justification for the use of annual median flow data as critical flow data in this circumstance. Indeed, the 2006 TMDL utilized the expected – and permissible – approach by stating the critical flow for calculation of *all* target nutrient loads (both TP and TN) in the same way. That is, there was no divergence between critical flow for TN and TP in the 2006 TMDL.

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[3] In the draft TMDL, NMED reports that the highest observed flow discharged from the WWTP is 1.88 mgd.

[4] The data set that BGW used for this calculation are discharge flows from the WWTP for the period April 2006 through March 2013.

As for NMED's claim that New Mexico water quality standards permit the use of annual median flow in the calculation of critical flow for TN loading, this claim is inconsistent with NMAC 20.6.4.11(B)(2) which states that the critical low flow value for narrative criteria is the 4Q3 flow. There is no provision of New Mexico's water quality standards that approves the use of annual median flows to state critical flow values, even with respect to narrative criteria. Additionally, the use of annual median flow in this instance is inconsistent with EPA regulations which require that TMDLs take "seasonal variations" in flow values into account. 40 C.F.R. § 130.7(c)(1). Finally in this regard, the NMED states that "[t]he use of the median flow . . . is appropriate [for purposes of stating TN critical flow] because of the long term growth cycle of algae in response to excess nutrients, in contrast to protecting for acute toxicity." However, NMED correctly used the 4Q3 flow value to state TP critical flow despite the fact that "the long term growth cycle of algae in response to excess nutrients" has equal application in the context of TP critical flow. There is simply no justification provided by NMED for this divergent approach to TP and TN critical flows.

The use of annual median flow to state the critical flow value for the calculation of target TN loading compounds the error discussed above – that is, the use of WWTP design capacity in the statement of critical flow in the Below WWTP Reach. As indicated above, the 4Q3 value for WWTP discharge flow is 1.01 mgd. Also as indicated above, if this number is added to the 4Q3 value for in-stream flow in the subject stream segment the total critical flow value for calculation of target loads in the Below WWTP Reach is 2.02 mgd. However, NMED's two errors in the calculation of TN critical flow result in a calculated critical flow of 7.29 mgd for TN – a flow which is 360% of the actual critical flow. Of course, the very significant overstatement of critical flow for TN leads to a wildly exaggerated TN target load. As noted in the introductory section of this comment letter, NMED's draft TMDL proposes to increase the TN target load in the receiving stream segment by approximately 225% from 27.2 lbs/day to 60.8 lbs/day. In a stream segment that is already in a non-attainment status for TN, and where flows are diminishing as a result of increased depletions associated with development of domestic water supply combined with global climate change and therefore losing assimilative capacity, it is clear that such a dramatic increase in TN target loading cannot assure compliance with the pertinent water quality standard.

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[5] As discussed below in this comment letter, it appears that the "careful consideration" may have been nothing more than being successfully lobbied by a Village of Ruidoso consulting firm which had been retained to secure a relaxation in nutrient effluent limitations for the Ruidoso WWTP in the context of the TMDL.

In sum, the critical flow calculations in the draft TMDL are arbitrary, capricious, and in violation of law. The overstated critical flow values result in overstated target loads at levels that will almost certainly swamp the assimilative capacity of the Below WWTP Reach. For this reason, the TMDL cannot be approved.[6]

SWQB Response: *SWQB recognizes that the design capacity flow should be used for both the TMDL calculation and for the calculation of the Waste Load Allocation (WLA). Even though the WWTP is currently discharging flows below the design capacity, the use of the design capacity allows the WWTP to be able to eventually grow into the design capacity discharge. Also, 40 CFR 122.45 currently requires the use of the design capacity when calculating effluent limits. Therefore, the design capacity of 2.70 mgd was used to calculate the WLA for E.coli and turbidity. The TMDL has been updated to reflect these changes to the calculations.*

The remaining comments are directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.

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[6] In a July 22, 2014 article in the Ruidoso News entitled "Ruidoso keeps wastewater consultants onboard," an attorney for the Village of Ruidoso is quoted as stating that Parametrix (a Village consultant) convinced the NMED to alter critical flow values in the draft TMDL, thereby paving the way for increased target loads and increased WLAs. This statement confirms the fact that the guiding principle in development of the draft TMDL was relaxation of the effluent limitations for Ruidoso's WWTP, not attainment of applicable water quality standards. Such an approach is clearly at odds with the requirements of the Clean Water Act

3. The TMDL fails to account for pollutant loads associated with the Concentrated Animal Feeding Operation ("CAFO") at Ruidoso Downs

In an "NPDES Compliance Inspection Report" of August 9, 2012, NMED concluded that the Ruidoso Downs Racetrack CAFO "requires appropriate NPDES permit coverage." That same Inspection Report notes that the Ruidoso Downs CAFO is too large to qualify for coverage under a general CAFO permit and that the facility fails to comply with requirements necessary to a determination that the facility has the ability to contain all process generated wastewater and the runoff from a 25 year - 24 hour storm event. The clear implication of NMED's Inspection Report is that the facility cannot be expected to contain all discharges from a 25 year - 24 hour storm event.

Despite the fact that the Ruidoso Downs CAFO is recognized as an unpermitted point source discharger, the Sacramento Mountains TMDL does not assign any WLA to the facility. Nor does the TMDL assign any LA to the facility. Rather, the Sacramento Mountains TMDL is premised on the fiction that "no discharge is expected from this CAFO." The apparent basis for this unsupported fictional assumption is the fact that the general CAFO permit – which does not apply in this case – contains a prohibition on the discharge of pollutants into waters of the United States. Clearly, NMED's "analysis" of this issue is inadequate. The prohibition on discharge in the inapplicable general CAFO permit is simply irrelevant to the nature and extent of the Ruidoso Downs CAFO's actual discharges into the Rio Ruidoso.

The Ruidoso Downs CAFO is in the Assessment Unit immediately upstream of the Below WWTP Reach. However, NMED's failure to account for the CAFO in the pertinent TMDL has a direct and significant impact on pollutant budgeting in the Below WWTP Reach. Pollutant-laden discharge from that facility (which, under CWA requirements, must be assigned a WLA) contributes background levels of turbidity, bacteria, and nutrients to the Below WWTP Reach that must be taken into account in calculating the WLA for the Ruidoso WWTP and the LA for the WWTP Reach.[7]

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

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[7] The draft TMDL is similarly flawed by NMED's failure to include estimates of the pollutant loads attributable to construction sites and storm-water discharges.

4. **The TMDL fails to account for elevated background levels of non- point source pollutants associated with recent forest fires in the Rio Ruidoso watershed**

The 2006 TMDL for the Rio Hondo system incorporates calculated values for background levels of nutrients. The 2014 proposed TMDL fails to incorporate such values, and is therefore inadequate, especially in light of the unusually large wildlife fires that occurred in the upper reaches of the impacted watersheds.

While the 2014 draft TMDL acknowledges that background levels of bacteria and nutrients are likely associated with unusually high run-off from the White Fire area and the Little Bear Fire area in the Rio Ruidoso watershed, NMED makes no apparent effort to calculate these levels. Putting aside the question as to whether elevated levels of non-point source pollutants contributed by wildland fire scar run-off are best characterized as part of background or are accounted for in the pertinent Las, NMED cannot simply turn a blind eye to the fact that such pollutants currently contribute to the non-attainment status of quality-impaired stream segments within the geographic scope of the Sacramento Mountains TMDL.

SWQB Response: *SWQB recognizes the impacts wildfires have on water quality and created a public information website on the issue- http://www.nmenv.state.nm.us/swqb/Wildfire/. The TMDL includes language recognizing the fires that impacted watersheds in the Sacramento Mountains watershed. The magnitude of impairment is captured in the measured load values associated with each TMDL. While non-point sources are allocated separately from point sources, the TMDL does not attempt to allocate non-point sources between fire and other sources. SWQB intends that type of analysis could occur after the TMDL process through the SWQB Nonpoint Source Management Program and the development of a Watershed Based Plan.*

5. **The TMDL fails to account for pollutants associated with leaks in**

Ruidoso's sewer system

In the draft 2014 TMDLs for bacteria and nutrients, NMED acknowledges that "[w]ater pollution caused by on-site septic systems is a widespread problem in New Mexico" and that "groundwater contaminated by septic system effluent can discharge into gaining streams." The TMDL purports to account for this pollution as part of the LA, despite the fact that prevailing case law on the issue indicates that such pollutants should be accounted for as a component part of the WLA. (See discussion below.)

However, despite the fact that NMED acknowledges a direct hydrological connection between groundwater and surface water and concludes that the impacts of on-site septic systems are one of the probable causes of non-attainment for bacteria and nutrients, NMED fails to account for the fact that leaks in its sewer system also contribute pollutants to the Rio Ruidoso.

It is widely acknowledged that there is a significant problem with inflow and infiltration *into* the Ruidoso sewer system. Indeed the Village of Ruidoso has studied this issue and estimated that approximately 500-600 acre-feet/year of groundwater finds its way into the sewer system through leaking pipes and loose connections. Accordingly, those portions of the Ruidoso sewer system that are above groundwater are likely to be discharging untreated sewage *out of* the Ruidoso sewer system, and that untreated sewage – like the discharge from on-site septic systems – makes its way into gaining streams. Of course, the introduction of this untreated sewage into the Rio Ruidoso contributes bacteria and nutrients which contribute to the water quality violations currently observed in the pertinent stream segments.

NMED's failure to account for this potentially significant contribution of pollutants in the draft TMDL is arbitrary and capricious, and requires disapproval of the TMDL.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

6. **The required reductions in nutrient loads in the stream segment immediately upstream of the Below WWTP Reach are incorrectly stated**

NMED calculates the target nutrient loads for the stream segment immediately upstream of the Below WWTP Reach as 0.84 lbs/day TP and 38.3 lbs/day TN. (See Table 4.5) However, in calculating the load reductions necessary to attain water quality standards in the quality-impaired reach NMED uses an entirely different set of target load amounts: 2.03 lbs/day TP and 55.5 lbs/day TN. (Table 4.9) There is no indication anywhere in the draft TMDL as to how the values in Table 4.9 were calculated, and it appears that the values are incorrect.

The net effect of the utilization of incorrect numbers in this regard is an understatement of the load reductions necessary to achieve compliance with the applicable nutrient standards. Based on erroneous target load values, NMED erroneously calculates that there is a requirement to reduce the TP load by 14% and the TN load by 45% in the segment in order to achieve compliance. In fact, substituting in the correct target loads for the incorrectly stated target loads indicates that much larger load reductions will be necessary to achieve compliance. Specifically, a 64% reduction in TP loading and a 62% reduction in TN loading will be required if water quality standards are to be achieved in this stream segment.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

7. **The draft TMDL does not contain adequate implementation measures to assure that non-point source pollutants introduced into the quality-impaired segments will not exceed the assigned LAs**

As discussed above, the pollutant load allocated to WLA in the Below WWTP Reach is increased dramatically (and impermissibly) in the draft TMDL. Such an increase in the WLA requires a corresponding decrease in the LA. (Of course, the significant decrease in non-point source pollutants needed to achieve compliance with applicable water quality standards is masked in the 2014 draft TMDL by the wildly exaggerated critical flow values and target loads.) However, the draft TMDL provides patently inadequate assurances that the necessary reductions in non-point source pollutants can be achieved. For this reason, the draft TMDL must be disapproved.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

8. NMED did not take into account seasonal variations in developing the draft TMDL

Regulations implementing the CWA require that TMDLs take into account seasonal variations in the calculation of target loads, WLAs, and LAs. 40 C.F.R. §130.7(c)(1). NMED failed to meet this regulatory requirement in the case of the Sacramento TMDL. A consideration of seasonal variations is of particular importance in the Below WWTP Reach because the two component parts of flow volume in this stream segment – in-stream flow and discharge flow from the Ruidoso WWTP – work in tandem to create predictable variations in flow volume over the course of an annual cycle. That is, in-stream flow values in the Below WWTP reach are generally highest in the summer months as a result of the monsoonal pattern that prevails in the Sacramento Mountains. Likewise, WWTP discharge flows are generally highest in the summer months as an influx of tourists and part-time residents into the Ruidoso area results in a spike of inflow into the WWTP and a corresponding spike in discharge flow. Aggregating these two component parts of flow volume – and their independent and re-enforcing seasonal variations – depicts an annual flow cycle with a marked peak in the summer months and a marked trough in the winter months. Failure to consider these seasonal variations is a critical flaw in the TMDL.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

9. Backsliding in the Ruidoso WWTP's effluent limitations is impermissible in this case

As noted in the introductory section of this comment letter, NMED proposes in the draft TMDL that backsliding be allowed in current nutrient limits for Ruidoso's WWTP, and that the effluent limitations be relaxed to 0.16 mg/L TP and 2.46 mg/L TN. At the outset, it bears noting that the proposed modification constitutes a significant modification to the current TN:TP ratio of 10:1 and will result in a new TN:TP ratio of 15.375:1. The introduction of proportionately greater quantities of nitrogen into the Rio Ruidoso is a concern, especially in light of the fact that NMED states in the draft TMDL that "nitrogen is the primary limiting nutrient in the Rio Ruidoso and is driving the productivity of algae and macrophytes in the stream." The draft TMDL is impermissibly silent as to how a relaxation in effluent limitations resulting in a modification to the currently permitted TN:TP ratio will affect algae production in the Rio Ruidoso, a known issue associated with nutrient overloading in this particular stream.

Moreover, the CWA's anti-backsliding requirements prohibit a relaxation of the Ruidoso WWTP's effluent limitations. NMED asserts that one of the exceptions to the anti-backsliding

requirement applies in this case – the exception applicable to treatment facilities that have been designed and constructed to achieve pertinent effluent limitations but have "nevertheless been unable to achieve the effluent limitations." 33 U.S.C. § 1342(o)(2)(E). However, in the case of the Ruidoso WWTP it is absolutely clear that the facility was *not* designed or intended to meet the effluent limitation for nitrogen of 1.0 mg/L. The Village of Ruidoso admits this fact in the "Ruidoso Settlement Agreement Final Report" of March 1, 2013, wherein the Village concedes that "the New Plant was not designed to meet an effluent limitation of 1.0 mg/L . . . for TN." Since the facility was clearly not designed or constructed to achieve compliance with the controlling TN limit, the exception is simply not applicable.

Furthermore, there are clear indications that the Village could make further improvements in TN discharges from the facility, but chooses not to for impermissible reasons. In the July22, 2014 Ruidoso News article referenced in footnote 6 above, the WWTP operator is quoted as stating that relaxation of the TN effluent limitation will avoid "the need to use costly chemicals in achieving the [TN standard]" and will, thereby, avoid increases to monthly user fees. However, there are no exceptions to the CWA's anti-backsliding requirements that accommodate a municipality's desire to avoid user fee increases. As the Village acknowledges, and as NMED presumably knows, operations at Ruidoso's WWTP could be modified to improve TN concentrations in the WWTP's discharge. Simply put, the Village's desire to hold the line on user fees associated with a WWTP facility that was admittedly *not* designed to achieve the applicable TN standard is not permissible under the claimed exception.

As for the proposed relaxation in the effluent limitation for TP – from 0.1 mg/L to 0.16 mg/L – the claimed exception is likewise not applicable. By its plaint terms, the exception only comes into play when an effluent limitation is *not* achieved. The exception is not available to justify backsliding with respect to an effluent limitation that is achieved – such as the TP effluent limitation in the case of the Ruidoso WWTP.

Furthermore, NMED asserts that back-sliding is permissible in the case pursuant to 33 U.S.C. § 1313(d)(4)(A). This assertion is likewise without foundation in law or fact. As a preliminary matter, the provision of 33 U.S.C. §1313(d)(4)(A) that permits backsliding is available *only* in those limited instances where backsliding is otherwise allowed by an applicable exception to the CWA's anti-backsliding requirement. As discussed immediately above, there is no exception to the anti-backsliding requirement that applies in this case. Accordingly, 33 U.S.C. § 1313(d)(4)(A) cannot be used to justify a relaxation in the Ruidoso WWTP effluent limitations.

Additionally, the provisions of 33 U.S.C. § 1313(d)(4)(A) allow for the relaxation of effluent limitations in the context of a TMDL *only* in those limited circumstances where the TMDL will nonetheless "assure the attainment" of pertinent water quality standards. As discussed throughout this comment letter, the NMED is *not* able to provide assurances that the draft TMDL will assure compliance with applicable nutrient standards in the Below WWTP Reach. In fact, all indications are that the draft TMDL – if approved – will result in increases in frequency and extent of nutrient exceedances in the Below WWTP Reach.

It is physically impossible for a non-attainment stream segment that is diminishing in flow over time as a result of additional depletions associated with domestic water development and global climate change – such as the Below WWTP Reach – to improve in quality when pollutant loading into that reach increases. In this case, NMED acknowledges that median in-stream flows in the Below WWTP Reach have decreased significantly over the period of record – specifically, those flows have decreased from 11.9 cfs to 6.75 cfs over the last decade – a dramatic decrease of 43% . At the same time, NMED proposes to increase the nutrient pollutant loading in the Below WWTP Reach by a significant fraction: NMED's proposal is to increase the TP load by almost from 2.72 lbs/day to 3.09 lbs/day and the TN load from 27.2 lbs/day to 60.8 lbs/day. Any expectation of quality improvement in such a scenario is patently arbitrary, and simply defies common-sense, logic, and science.

In this case, NMED – at the apparent behest of a permitted entity – has manipulated critical flow values in the TMDL in order to increase nutrient target loads and the associated WLA for the Ruidoso WWTP. The manipulated critical flow values – and the overstated target loads and WLA which are premised on those manipulated critical flow values – are clearly inconsistent with CWA requirements and subvert the core purpose of TMDL development. In essence, the NMED has reduced the TMDL development process into an exercise in "providing cover" for otherwise impermissible backsliding in the Ruidoso

WWTP's effluent limitations.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

10. Conclusion

The draft TMDL for the Sacramento Mountains must be disapproved. The document fails to comply with CWA requirements, and represents nothing more than a transparent and impermissible attempt to set the stage for illegal backsliding on effluent limitations applicable to the Ruidoso WWTP. If approved, the draft TMDL will result in a deterioration of water quality in the Below WWTP Reach segment of the Rio Ruidoso as it contemplates increased pollutant loading into that stream segment which is already quality-impaired. Any assertion that the draft TMDL will assure compliance with applicable water quality standards by *increasing* the allowable pollutant loads into the Below WWTP Reach is simply illogical.

Clearly, the Village of Ruidoso desires a relaxation in the effluent limitations which apply to its WWTP. Equally obvious is the fact that NMED desires to accommodate the Village's desire for relaxed effluent limitations. However, the draft TMDL simply fails to provide any permissible legal or factual basis for such backsliding. In sum, the draft TMDL – together with the proposed relaxation in the Ruidoso WWTP's effluent limitations – is arbitrary, capricious, and contrary to the requirements of law. It must be disapproved.

Sincerely,

/s/ Steven Sugarman
Steven Sugarman
Attorney for Rio Hondo Land & Cattle Co, LP and
WildEarth Guardians

cc: Katrina Coltrain, USEPA Region VI

Comment Set D

August 7, 2014

Ms. Heidi Henderson
Surface Water Quality Bureau
New Mexico Environment Department
1.O. Box 5469
Santa Fe, NM 87502-5469

Re: Ruidoso's Comments on the New Mexico Environment Department's July 7, 2014 Draft Total Maximum Daily Load (TMDL) Document for the Sacramento Mountains, including the Rio Ruidoso

Dear Ms. Henderson:

On behalf of the Village of Ruidoso and the City of Ruidoso Downs (collectively "Ruidoso "), we are providing comments on the referenced Total Maximum Daily Load ("Draft TMDL"). Our two municipalities are the members of the Regional Wastewater Treatment Plant Joint Use Board ("JUB") that is responsible for operating Ruidoso's wastewater treatment plant ("Plant"). The Plant discharges treated wastewater into the Rio Ruidoso between Eagle Creek and the US Hwy 70 Bridge. Consequently, references to the "Draft TMDL" are references to the Draft TMDL for this particular segment of the Rio Ruidoso, and references to the "Rio Ruidoso" or "stream" are also to this segment of the Rio Ruidoso unless otherwise noted.

By way of background, we are attaching our March 1, 2013 Settlement Agreement Final Report. The Report summarizes the history of efforts to control Total Phosphorus and Total Nitrogen (collectively "Nutrients") in the Rio Ruidoso, the capabilities of the new Plant, the response of the stream to reduced Nutrients in effluent from the new Plant and Ruidoso's recommended TMDL for Total Nitrogen. We are incorporating by reference into these comments two reports underlying the attached Report: (1) *Wastewater Treatment Facility Performance and Additional Treatment Considerations,* prepared by Molzen-Corbin & Associates and Dr. David Stensel; and (2) *Rio Ruidoso Monitoring Program Project Completion Report,*prepared by Parametrix. Although your office received these documents on March 1, 2013, we would be happy to provide additional copies.

Ruidoso's comments on the Draft TMDL consist primarily of the attached Technical Memorandum prepared by Parametrix and the attached Memorandum prepared by Dr. David Stensel. Below is a summary of several of these comments as well as a few of our additional comments.

1. **Effectiveness of New Plant**- We appreciated the opportunity to meet with representatives of the New Mexico Environment Department on July 31st. We were pleased that NMED recognizes that the Plant is a state-of-the-art facility that operates better than the widely recognized limits of Total Nitrogen ("TN") removal technology. Finally, we were pleased that NMED recognizes that further improvements in the water quality of the Rio Ruidoso should be accomplished by controlling various nonpoint sources of contamination rather than by constructing additional costly (and probably ineffective) upgrades to the Plant. Finally, we were pleased by NMED's expressions of a willingness to exercise flexibility in developing solutions for improving the water quality of the Rio Ruidoso.

   SWQB Response: *Thank you for your comments.*

2. **NMED's Proposed TN Effluent Limit of 2.46 mg/1**- We understand that the proposed wasteload allocation for TN at a Plant discharge rate of 1.88 million gallons per day translates into a TN effluent limit of 2.46 milligrams per liter ("mg/1"). At our July 31st meeting, NMED noted that the Plant appears to be meeting this limit. We expressed our concern that we do not believe that Ruidoso can meet this limit consistently in the future. Our primary reason for concern is that the plant effluent soluble organic nitrogen concentration will definitely increase due to receiving more highly concentrated domestic wastewater flow as septic tanks are replaced by the new collection system and the reduction of infiltration due to sewer improvements. As noted the soluble organic nitrogen is not removed in the biological treatment process, and a significant portion of this has been found to be nonavailable for algae consumption in studies by the Water Environment Research Foundation (WERF). It is also known that the available organic nitrogen is used by algae at a much slower rate than the inorganic nitrogen (ammonia+ nitrate+ nitrite). Some permits in other states have been based on the effluent inorganic nitrogen. In view of these uncertainties and the question of the role of soluble organic nitrogen in the relatively short time for the stream flow between the Plant discharge and critical section of the stream, a more reasonable and attainable approach may be to base the effluent nitrogen limit on the total inorganic nitrogen concentration. Alternatively, we believe that a somewhat higher TN effluent limit will be necessary to accommodate the likely impacts of increased loadings and sewer improvements.

   SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

3. **Ruidoso's Proposed TN Effluent limit of 4.0 mg/1**- Based on the reasons discussed in Section 2 and the advice of our Plant operator, Ruidoso recommends that the final TMDL contain a wasteload allocation for TN consistent with a TN effluent limit of 4.0 mg/1 (30-day average) with no seasonal variation. This recommendation is part of our attached March 1, 2013 Ruidoso Settlement Agreement Final Report. We believe that this limit is challenging and, along with extremely effective Total Phosphorus ("TP") removal at the Plant, will constitute the Plant's fair and reasonable contribution to improving water quality in the Rio Ruidoso. As will be discussed below, we believe that NMED, Ruidoso and other landowners and users of the watershed should now shift gears and focus on reducing nonpoint sources of contamination, and that some current assumptions concerning the 1.0 mg/1 TN target for in-stream water quality and applicable water quality standards should be revisited.

   SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new*

public comment period at which time there will be the opportunity to provide comments on the new TMDL.

4. **Total Nitrogen: Total Phosphorus Ratio-** We understand that the TP standard of 0.1 mg/1 and a TN:TP ratio of 10:I create the in-steam TN target concentration of 1.0 mg/1 and the resulting TN effluent limit of 2.46 mg/1. Consequently, the TN:TP ratio can be viewed as the cornerstone in the calculation of a TN effluent limit. As described in the attached memoranda from Parametrix and Dr. Stensel, Ruidoso is concerned that NMED's use of a 10:1 ratio is not well supported by data. We believe that existing credible data support a higher ratio or, in the alternative, more nutrient data should be collected to provide stronger support for an accurate TN:TP ratio in the Rio Ruidoso. Our experts conclude that (1) in seeking to define the "balanced condition" at which neither nitrogen nor phosphorus is limiting, 16:1 is the correct ratio, rather than 10:1; and (2) there is evidence that the TN:TP ratio in the Rio Ruidoso below the Plant's discharge point is considerably higher that 16:1. These conclusions lead to the larger point that by extremely effective phosphorus removal the Plant is causing the downstream segment to be heavily phosphorus-limited with the result that further nitrogen removal from wastewater is not necessary or helpful to protecting in-steam water quality.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

5. **Allocation of TMDL Between the Plant and Nonpoint Sources-** At our meeting on July 31st we were pleased by NMED's recognition that Ruidoso's ongoing efforts to improve sewer lines and encourage conversion from septic systems to centralized treatment should be rewarded by increasing the Nutrient wasteload allocations for the Plant. Such an increase in the wasteload allocations is discussed briefly in Section 8.1 of the Draft TMDL. As discussed at our meeting, Ruidoso requests that the final TMDL include a specific procedure or schedule whereby conversion of septic systems and prevention of exfiltration from sewer lines will translate automatically into increases in Nutrient wasteload allocations at the Plant. Ruidoso requests that the procedure, covering these improvements since the time when NMED calculated the proposed wasteload allocations and load allocations, be specific enough in the final TMDL that it can be incorporated into the next NPDES Permit. Ruidoso would like to avoid the necessity of amending the TMDL frequently to account for reductions of contamination from septic systems and sewer lines. As an indication of the extent to which water quality in the Rio Ruidoso can be improved under this program, we calculate that there are now 956 residences in the Village of Ruidoso not connected to the sewer collection system within 150 meters of the stream, 429 of which are within 50 meters of the stream. In addition, a major sewer interceptor line along the bed of

the Rio Ruidoso, which probably contains leaks, will be removed from the stream and replaced within four years.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

6. **Use Attainability Analysis to Support a Change in Designated Use from Coldwater to Coolwater Aquatic Life-** Ruidoso notes that one of the designated uses of the stream is "coldwater aquatic life." One of the segment-specific criteria is temperature 30°C (86°F) or less. This temperature criterion is more consistent with the specific temperature criterion for "coolwater aquatic life" or "warmwater aquatic life." If the designated use of the stream segment were changed to either of these aquatic life uses, the associated dissolved oxygen minimum would be 5.0 mg/1. As a result, the stream would no longer be considered impaired and a TMDL for Nutrients would no longer be necessary. The first step in seeking a modification of the designated use would be to conduct a use attainability analysis ("UAA") under NMAC 20.6.4.15. Ruidoso requests NMED to conduct such a UAA and petition the Water Quality Control Commission ("WQCC") to modify the designated use from "coldwater aquatic life" to "coolwater aquatic life" or "warmwater aquatic life." Ruidoso would like to discuss the process further with NMED.

SWQB Response: *This comment is addressed in the response to the Technical Memorandum from Parametrix in this same document.*

7. **Change in Site-Specific Criterion for Dissolved Oxygen from 6.0 mg/1 to 5.0 mg/1** -For the reasons discussed in Section 6 and in the Parametrix Technical Memorandum, a dissolved oxygen criterion of 5.0 mg/1 appears more consistent with the warm temperature criterion in the stream than a dissolved oxygen criterion of 6.0 mg/1. Perhaps filing a petition with the WQCC to adopt a site-specific criterion under NMAC 20.6.4.1 O.D would be a more straightforward approach to obtaining an achievable dissolved oxygen criterion than seeking to modify a designated use. With a dissolved oxygen criterion of 5.0 mg/1, the stream segment would no longer be considered impaired and a TMDL for Nutrients would no longer be necessary. Ruidoso requests NMED to consider petitioning the WQCC to adopt a 5.0 mg/1 dissolved oxygen criterion for this stream segment. Ruidoso would like to discuss the process further with NMED.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

8. **Consideration of the Draft TMDL by the WQCC-** Ruidoso understands that NMED currently plans to request approval of eight draft TMDLs for watersheds in the Sacramento Mountains by the WQCC at the WQCC's September 9, 2014 meeting. The Draft TMDL for the Rio Ruidoso from Eagle Creek to US Hwy 70 Bridge, which is the subject of these comments, is one of the eight draft TMDLs for watersheds in the Sacramento Mountains. Ruidoso requests that NMED postpone its request for approval of the Draft TMDL for the following reasons: (I) Although Ruidoso has greatly appreciated NMED's extensive efforts to work closely with Ruidoso to develop an appropriate and fair TMDL, the Draft TMDL is not quite achievable by Ruidoso; (2) If NMED requested the WQCC to approve the current Draft TMDL, Ruidoso would be forced to express our opposition, which we would prefer not do after years of cooperating with NMED; (3) Ruidoso believes that the TMDL can be significantly improved by taking more time to develop a supportable TN:TP ratio and a specific schedule to shift the load allocation (nonpoint sources) to the wasteload allocation (the Plant) as contamination from septic systems and sewer lines is reduced; and (4) Ruidoso believes the NMED should consider, with Ruidoso's assistance as needed, the modification of the coldwater aquatic life use and the adoption of a lower site-specific criterion for dissolved oxygen.

SWQB Response: *SWQB sent an email on August 20, 2014 to notify those that submitted public comments that the SWQB would not present the TMDLs for WQCC approval at the September 9, 2014 meeting due to the scope and complexity of the public comments. On September 26, 2014,*

SWQB sent a meeting request to those that submitted public comments to discuss the Bureau's response to the public comments. The SWQB Response to Comments was sent to the meeting invitees on October 25, 2014 and a meeting was held on October 28, 2014 in Albuquerque to discuss the public comments and the SWQB responses. Items #3-4 are addressed in the response to the Technical Memorandum from Parametrix in this same document.

Ruidoso appreciates your consideration of our comments on the Draft TMDL and looks forward to further discussion of these issues.

Sincerely,

Mayor
City of Ruidoso Downs

Tom Rattin

Attachments:

(1) March 1, 2013 letter to Dr. James Hogan from Ruidoso
(2) March 1, 2013 Ruidoso Settlement Agreement Final Report
(3) August 6, 2014 Technical Memorandum from Parametrix
(4) August 7, 2014 Memorandum from Dr. David Stensel

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TECHNICAL MEMORANDUM

DATE: August 6, 2014
TO: Regional Wastewater Treatment Plant Joint Use Board
FROM: Jim Good
SUBJECT: TMDL for the Sacramento Mountains
CC: Ned Kendrick
PROJECT NUMBER: 573-6327-001
PROJECT NAME: Ruidoso Monitoring

The New Mexico Environment Department Surface Water Quality Bureau (SWQB) has posted a Public Comment Draft of the Total Maximum Daily Load (TMDL) for the Sacramento Mountains, and comments are due by Thursday, August 7: http://www.nmenv.state.nm.us/swqb/TMDL/SacramentoMnts/SacramentoMnts-PublicCommentDraftTMDL.pdfhttp://www.nmenv.state.nm.us/swqb/303d-305b/2014-2016/. The document includes waste load allocations for total phosphorus and total nitrogen from the regional wastewater treatment plant (RWWTP) that discharges treated effluent to the Rio Ruidoso downstream from the US 70 Bridge, and calculates effluent limits for these aquatic plant nutrients. The purpose of this memorandum is to provide input that could be incorporated in comments on the draft TMDL submitted by the Village of Ruidoso/City of Ruidoso Downs RWWTP Joint Use Board (JUB).

Nutrient Reduction Strategy New Mexico's Nutrient Reduction Strategy (SWQB 2014) states that "…New Mexico seeks to adopt nutrient TMDLs that recognize the threshold concentrations necessary to be protective of designated uses while developing approaches for implementation of the waste load allocations that are technologically achievable and are neither over- nor under-protective. The State is currently evaluating discharges that are scientifically based, environmentally sound, and consider the existing facility design, facility age and local economic factors." The JUB supports the goal of TMDLs that recognize threshold concentrations protective of existing and attainable uses, and approaches to implementing waste load allocations that are technologically achievable and neither over- nor under-protective. However, it is not clear in Table 10 of the Nutrient Reduction Strategy document why the Rio Ruidoso is identified as ineligible for phased implementation or TMDL implementation options. Having completed facility upgrades at great expense and having demonstrated dramatic reductions in effluent nutrient concentrations, Ruidoso should be eligible for any

options and alternative approaches (e.g. phased implementation, longer compliance schedules, seasonal effluent limits, etc.) available to other communities in New Mexico, before considering any further facility upgrades in the future. The TMDL document should explain how the establishment of nutrient TMDLs for the Rio Ruidoso is consistent with the SWQB's Nutrient Reduction Strategy.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"The Nutrient Reduction Strategy documents the current nutrient TMDLs adopted. The Rio Ruidoso TMDL has recently been revised and posted for public comments; included within the proposed revision to the TMDL is alternative compliance approaches."

Upper Rio Ruidoso Nutrient TMDLs The JUB is encouraged to see that the SWQB has recognized that sources upriver from the treatment plant discharge location are causing nutrient/eutrophication and total phosphorus impairment, as indicated by the TMDLs for the river reach from the US Highway 70 Bridge to Carrizo Creek and from Carrizo Creek to the Mescalero Apache boundary, respectively. The Rio Ruidoso Monitoring Program conducted by Parametrix on behalf of the JUB (RRMP) concluded that since the new treatment plant became operational, treated effluent has diluted total phosphorus (TP) concentrations in the river during the few occurrences when TP exceeded the 0.1 mg/L target concentration downstream (Parametrix 2013). In other words, sources other than the treatment plant effluent were responsible for TP in the river exceeding 0.1 mg/L. This study further concluded that effluent TN concentrations have met the TMDL target concentrations in the river downstream most of the time; however, nitrogen concentrations from upstream sources will make it difficult to consistently achieve 1.0 mg/L TN in the Rio Ruidoso. The Level II nutrient assessment in this study also showed that response variables were improving and nearly met the thresholds that would show the Eagle Creek to US Highway 70 Bridge segment is fully supporting the narrative nutrient standard, and thus would no longer require a TMDL. The new Ruidoso treatment plant is among the top plants in the U.S. in nutrient removal performance, but the most recent studies show that reductions in upstream sources of nutrients will be necessary to consistently meet TMDL target concentrations in the river. Given the major investment already required of utility rate payers to upgrade the treatment plant, it is important that the emphasis on reducing other nutrient sources proceed as soon as possible.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*

Rio Ruidoso Turbidity TMDLs It is noted that the Eagle Creek to US Highway 70 Bridge assessment unit has a TMDL for turbidity for the first time. Controlling

turbidity from the listed probable sources (e.g. gravel/dirt roads, watershed runoff following forest fire) is expected to reduce nutrient loading from nonpoint sources. The 2006 TMDL for the Rio Hondo had a turbidity TMDL for the Rio Ruidoso from US Highway 70 to the Mescalero Apache Boundary, but the current draft TMDL does not include turbidity among the parameters of concern for the two segments upstream from US Highway 70. Tables 6.2 and C4 do not include any turbidity data for the upper segments. Was turbidity measured in these segments in 2012? If not, what was the basis for not including TMDLs for turbidity in these assessment units? No turbidity data were collected during the RRMP (Parametrix 2013); however, very high turbidity from upstream sources was observed during many of the 44 monitoring events conducted by Parametrix between 2009 and 2012. Many of the probable sources identified in the draft TMDL for total phosphorus and plant nutrients are associated with the erosion and sediment transport processes that also cause high turbidity, including watershed runoff following forest fire. It is not clear why the segments upstream from the US Highway 70 Bridge no longer have TMDLs for turbidity.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"The US Highway 70 Bridge to Carrizo Creek assessment unit is no longer listed as impaired for turbidity because turbidity sonde data collected by SWQB from September 5, 2012 to September 16, 2012 did not exceed associated SEV thresholds. SEV thresholds and the turbidity assessment process are detailed in the Turbidity Assessment Protocol, available at:
http://www.nmenv.state.nm.us/swqb/protocols/2014/AssessmentProtocol-w-Appendices-2014.pdf."

As previously mentioned, turbidity is identified as an impairment in the assessment unit Eagle Creek to US Highway 70 Bridge, and an associated TMDL has been drafted. Although TMDLs are written on an assessment unit basis, and are based on assessment unit impairment determinations, it is recognized that all land use activities in the watershed area above the impaired reach can contribute to the impairment. Therefore, since there is a TMDL for the lower assessment unit (Eagle Creek to US Highway 70 Bridge), efforts to address non-point sources anywhere in the watershed area above Eagle Creek are encouraged and promoted to help address the impairment(s).

Rio Ruidoso *E. coli* TMDLs It is further noted that the Eagle Creek to US Highway 70 Bridge segment has a TMDL for *E. coli* for the first time. However, it is not understood why probable sources listed for this assessment unit do not include livestock grazing and rangeland grazing, sources that were listed for the segment immediately upstream. Probable Source Identification Sheets were not found in the appendices, as noted on page 41. Herds of cattle and horses are common in floodplain pastures throughout the Eagle Creek to US Highway 70 Bridge segment, and livestock grazing allotments are likely also extensive in the rangelands and forestlands that contribute runoff to this assessment unit. Livestock were often seen standing in or

wading through the river during the monthly Parametrix monitoring events from 2009 through 2012 - they contribute nutrients both directly to the stream and indirectly through runoff. Controlling *E. coli* loading from grazing animals is expected to substantively reduce nutrient loading from nonpoint sources.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"Controlling E. coli loading from grazing animals does have the potential to reduce both E. coli and nutrient loading from nonpoint sources, however these are nonpoint sources of pollution and all efforts would be strictly voluntary on the part of local property owners. "Livestock grazing" is currently listed as a probable source in the Rio Ruidoso (US Highway 70 to Carrizo Creek) draft TMDL, and will be added to the Rio Ruidoso (Eagle Creek to US Highway 70 Bridge) draft TMDL as well. After the WQCC and USEPA approve these two TMDLs, the probable sources listed for these two assessment units will be updated on the subsequent Integrated List."

Integrated Report Categories The US Highway 70 Bridge to Carrizo Creek assessment unit is listed as category 5/5C, indicating that additional data will be collected before a TMDL is scheduled. A Public Comment Draft TMDL has been published; thus, it appears that the segment no longer fits the 5/5C category, as defined. What additional data will be collected this year? Does the data collection effort include repeating the chlorophyll *a* sampling and analysis that was rejected from the 2011 and 2012 SWQB assessment? Presuming the data are collected this year, will the TMDLs for this assessment unit proceed on the same schedule with the other Rio Ruidoso segments? Given the major investment already required of utility rate payers to upgrade the treatment plant, it is important that the emphasis on reducing other nutrient sources proceed as soon as possible.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"SWQB plans to collect TN and TP, chlorophyll a, and sonde data in this assessment unit during the 2014 field season. SWQB drafted a nutrient TMDL based on the 2014 assessment for this assessment unit because of a planned revision to the nutrient TMDL in the downstream assessment unit. Coordinating similar TMDLs is more efficient and helps ensure the entire watershed is addressed. The IR Category has been changed to 5/5A."

Designated Uses for Aquatic Life and Water Quality Standards Table ES8 shows high quality coldwater aquatic life as a designated use for the Eagle Creek to US Highway 70 Bridge assessment unit, and this designated use is shown as coldwater aquatic life in Section 2.3. However, the current water quality standards recognize that

temperature criteria for coldwater aquatic life are not attainable in this reach of the Rio Ruidoso as NMAC 20.6.4.208. has a segment-specific temperature criterion of 30°C (86°F) or less. NMAC 20.6.4.10.D states that the commission may adopt site-specific criteria based on five examples of site-specific conditions. Was the site- specific criterion for temperature adopted because (1) actual species in the segment are less sensitive to high temperatures, (2) natural background conditions cause temperature to exceed the coldwater criteria, or (3) some other relevant site-specific condition exists? The ability for water to contain DO is dependent on cool temperatures, so would the same justification for adopting a higher maximum temperature criterion not also justify adopting a lower minimum DO criterion?

NMAC 20.6.4.900.H specifies the criteria that are applicable to aquatic life use designations where segment- specific criteria are not established. The general criteria for coldwater aquatic life include dissolved oxygen 6.0 mg/L or more, 6T3 temperature 25°C (77°F), and maximum temperature 24 °C (75°F). The segment-specific temperature criterion for this reach of the Rio Ruidoso (30°C) lies between the general criteria of maximum temperature 29°C (84°F) for marginal coldwater and coolwater, and the maximum temperature 32.2°C (90°F) for warmwater. In other words, streams in New Mexico with temperature criteria greater than 29°C (84°F) are nearly always designated for warmwater aquatic life, with this segment of the Rio Ruidoso being a rare exception. If the segment was designated for warmwater or coolwater aquatic life rather than coldwater aquatic life, the general DO criterion would be 5.0 mg/L or more, rather than 6.0 mg/L or more. If the DO criterion was 5.0 mg/L or more, the most recent Level II nutrient assessment would have concluded that this segment of the Rio Ruidoso was fully supporting the narrative nutrient criteria in 2012, and would therefore no longer carry the impairment status that requires a TMDL for nutrients.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"The above points have merit, however the assessment process for the Integrated List only compares water quality data to those standards adopted by the WQCC and approved by USEPA. The appropriate avenue to address concerns regarding applicable water quality standards in 20.6.4 NMAC is through a use attainability analyses, which evaluates what is the highest existing or attainable use for a waterbody. No response required with respect to the draft Integrated Report."

The same response applies in the context of this TMDL.

Nutrient Assessment Thresholds and Water Quality Standards The applicable nutrient assessment thresholds in Table 4.1 are somewhat simplified. SWQB's Dissolved Oxygen Dataset Assessment Protocol (SWQB 2013) provides the following discussion of dissolved oxygen criteria and assessment:

> "Currently, New Mexico's criteria for DO are expressed only as mass per volume (mg/L). However, in certain circumstances such as high altitudes where atmospheric pressure is comparatively low or high air temperatures that reduce oxygen solubility (and particularly when these two conditions are both present), DO may be reduced so much that the concentration-based criterion is physically impossible to attain. For this reason, this assessment protocol takes into account the percent saturation, as this integrates several factors that influence the amount of oxygen that water can contain. Specifically, water quality criteria for DO concentration are considered to be met if the measured DO percent saturation is equal to or greater than 90 percent."

The Eagle Creek to US Highway 70 Bridge segment of the Rio Ruidoso commonly experiences the combined conditions of high temperatures and low atmospheric pressure. The relationship between temperature and DO can be observed using dissolved oxygen solubility tables, such as the web-based calculator provided by the U.S. Geological Survey: http://water.usgs.gov/software/DOTABLES/ (USGS 2014). Using the single-value computation function you can provide inputs and calculate percent DO saturation. At the water temperature criterion of 30.0°C, and assuming a barometric pressure of 610 mm Hg (24.0 inches Hg, a common barometric pressure at the approximately 6,000 foot elevation below the US Highway 70 Bridge) and a specific conductance of 1,500 µS/cm (a roughly average specific conductance measured by Parametrix from 2009 through 2012), a DO concentration of 5.37 mg/L would result in 90% DO saturation and the DO saturation would increase if the barometric pressure dropped lower and other conditions remained the same. Continuous hourly monitoring in the year after the new treatment plant became fully operational measured no occasions when the DO was both less than 90% saturation and less than 5.4 mg/L. Research on the historical range of local barometric pressures might be necessary to establish a consistently attainable DO concentration threshold; however, if the DO threshold was 5.4 mg/L, the most recent Level II nutrient assessment would have concluded that this segment of the Rio Ruidoso was fully supporting the narrative nutrient criteria in 2012, and would therefore no longer carry the impairment status that requires a TMDL for nutrients.

It is not logical that a river segment with allowable temperatures up to 30°C (86°F) would be designated for coldwater aquatic life and also have a DO criterion of 6.0 mg/L or more. The SWQB should take the necessary steps to re-classify the Eagle Creek to US Highway 70 Bridge assessment unit to the appropriate aquatic life use designation for the protection and propagation of aquatic species that actually exist in this reach, and with temperature and DO criteria that are feasibly attainable and consistent with these species' requirements.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. Below is the SWQB response provided for the record:*

"The above points merit consideration, and your request regarding review of the currently designated aquatic life use has been provided to SWQB's Monitoring, Assessment and Standards Section for consideration. This does not establish a commitment or priority to reclassify this AU in accordance with 20.6.4.15 NMAC. At the present time, however, the assessment process for the Integrated List requires comparison of water quality data to those standards adopted by the WQCC and approved by USEPA. The appropriate avenue to address concerns regarding applicable water quality standards in 20.6.4 NMAC is through a use attainability analyses, which involves evaluating a waterbody to determine the highest existing or attainable use."

The same response applies in the context of this TMDL.

Total Nitrogen (TN) Water Quality Standard Following Table 4.1, Section 4.1 of the draft TMDL document repeats the justification of the 1.0 mg/L total nitrogen (TN) standard that was presented in the 2006 TMDL. Appendix D of the 2006 TMDL is a 2002 report from the University of New Mexico, Department of Biology titled *Algal Growth Potential (AGP) Assays on Water from the Rio Ruidoso*. Although Appendix D is missing from the new draft TMDL, the call-out in Section 4.1 indicates that it is the same 2002 algal assay report. Table 4.2 of the TMDL presents total nitrogen:total phosphorus (TN:TP) ratios for Rio Ruidoso water samples and an indication of the limiting nutrient based on bioassays for one site at the highway 70 bridge (TN:TP ratio = 14.7, phosphorus limited), one site described only as "Rio Ruidoso above the site on Susan Lattimer's property" (TN:TP ratio = 6.2, nitrogen limited), and two other sites in the headwaters. The TMDL adds the following about Table 4.2:

> "Based on chemical analysis of the Rio Ruidoso's waters, ratios above 10:1 were predictive of phosphorus limitation whereas ratios below 10:1 reflected nitrogen limitation. Table 4.2 reflects the usefulness of the N:P ratio in predicting algal productivity."

Because of the dramatic reductions in nutrient concentrations in the Eagle Creek to US Highway 70 Bridge assessment unit accomplished by completion of the new treatment plant, the Section 4.1 analysis of limiting nutrients used to support the 10:1 TN:TP ratio and 1.0 mg/L TN standard is out of date. Is the draft TMDL assuming that algal assay results and indications of the nutrient limiting algal productivity would remain the same today as they were in 2002? Recent sampling by Parametrix has shown that the TN:TP ratio is now much higher due to the proportionately greater removal of phosphorus compared to nitrogen.

- For the 19 RRMP events between when the new treatment plant became fully operational in June 2011 and December 2012, the average TN:TP ratio was 33.0 at the Vigil site (i.e. a short distance downstream from the treated effluent discharge location and below the US Highway 70 Bridge), much higher than the ratios cited in the 2006 TMDL.
- The TN:TP ratio in effluent samples from these 19 events was 93.5.

These results indicate strong phosphorus limitation and suggest that periphyton growth and the response variables that showed the Rio Ruidoso being close to non-impairment (i.e. dissolved oxygen concentrations, periphyton chlorophyll *a* as an indicator of biomass) are now controlled predominantly by phosphorus availability. The draft TMDL states that co-limitation of phosphorus and nitrogen is unusual and if the limiting nutrient is increased, then a second nutrient becomes limiting. Following this logic, higher loads of nitrogen from the treatment plant and nonpoint sources would be allowable without a risk of stimulating additional periphyton growth, provided that phosphorus loads are not increased. Further, any reductions in phosphorus loading can be expected to move the assessment unit closer to fully supporting the narrative standards for nutrients. New Mexico's Nutrient Reduction Strategy states that if a single nutrient can be definitively established as "limiting", regulation of that single nutrient can be considered (SWQB 2014).

Section 4.1 also mentioned that a nutrient TMDL in California and another in Maryland had relied on a 10:1 TN:TP ratio, but it is not clear how these citations are relevant to the Rio Ruidoso. The Malibu Creek Watershed TMDL in California discussed the challenges of using TN:TP ratios to determine nutrient target concentrations and ultimately used the reference waterbody approach to develop numeric targets (USEPA 2003). While settling on seasonal TN targets of 1.0 and 8.0 mg/L, USEPA (2003) also cited Dodds et al. (1998) in suggesting a threshold of 1.5 mg/L nitrogen for distinguishing between eutrophic and mesotrophic conditions in streams based on a review of stream data from various locations around the world, and recommended further study to assess whether total nitrogen, total phosphorus, or other parameters limit algal growth in the watershed. The Unnamed Tributary of La Trappe Creek In-Stream Pond TMDL cited Chianudani et al. (1974) in stating that if the TN:TP ratio is greater than 10:1, phosphorus tends to be limiting, and if the TN:TP ratio is less than 5:1, nitrogen tends to be limiting (MDE 2002). However, they did not use a ratio to establish a nutrient target concentration. It is not clear how either the California or Maryland examples support the approach taken in the draft TMDL to establish a target concentration for TN in the Rio Ruidoso.

Section 4.6 provides further discussion of limiting nutrients and notes that recent data collections by SWQB show that the limiting nutrient varies seasonally. In recent discussions with the SWQB we have learned that many of the data included in Appendix C have been rejected through their data quality review process, and deemed unsuitable for use in calculating the TN:TP ratios used as indicators of nutrient limitation. In most cases, sample results were rejected because blank contamination indicated a potential high bias in sample results. Of the 23 total data sets from the two SWQB sampling stations in the Eagle Creek to US 70 Bridge segment, 11 sets were rejected. For the lower station at Glencoe, the average of all TN:TP ratios using accepted data was 14.4, and the summer average TN:TP ratio using accepted data was 12.8. For the upper station the average TN:TP ratios were 10.3 for all accepted data and 11.3 for summer accepted data. Data from only one non-summer event was accepted from the lower station and two non-summer data sets were accepted from the upper station. Because so many data were rejected, seasonal variability was not apparent and unsufficient data were available to address the question of seasonal variability.

At the Vigil site (i.e. close to the SWQB's upper station), Parametrix samples had average summer TN:TP ratios of 24.0 in 2011 and 27.9 in 2012, well below the 33.0 TN:TP average ratio measured in samples from the entire July 2011 through December 2012 post-treatment plant startup period. Section 4.4.1 states that biological treatment is highly temperature dependent therefore seasonal limits may need to be considered in some cases. However, there was no further discussion in the TMDL of the SWQB considering seasonal TN target concentrations for the Rio Ruidoso, as was concluded appropriate in the Malibu Creek Watershed example (USEPA 2003). With the slower metabolism in the wastewater treatment plant's biological treatment system during the winter months, a higher TN target concentration and corresponding higher winter TN effluent limits would be very helpful for compliance without risking increased algal productivity in the river.

As part of comments on the CWA 303(d)/305(b) Integrated List and Report, Parametrix and the JUB addressed in detail questions about the RRMP nutrient data raised in the External Data Quality Assurance Assessment. This assessment rejected the nutrient data based primarily on changes in the sample preservation methods employed by the study from those specified in the Quality Assurance Project Plan (QAPP). It is correct to state that the preservation of samples did not follow the project QAPP because samples were not acidified at the time of collection. However, because for most samples the preservation methods met the intent of sample preservation by retarding biological action through freezing, and these methods are recommended by *Standard Methods for the Examination of Water and Wastewater*, the nutrient sample data from samples that were frozen should not be rejected from use in nutrient assessment and calculating TN:TP ratios. Acknowledging the procedural mistake in not amending the QAPP to reflect the change in sample preservation methods, it is not necessary to completely reject the RRMP sample results. *National Functional Guidelines for Inorganic Superfund Data Review* provide guidance on qualifying sample data associated with preservation or holding time questions (USEPA 2013), including what to do when water samples are received by the laboratory with pH>2 and then adjusted to pH<2 at the time of sample receipt. This guidance recommends qualifying detected results as estimated low (J-), but does not recommend rejecting detected results as unusable. Given that nearly half of the TN:TP ratios calculated from SWQB samples were rejected, the RRMP nutrient results are particularly important to understanding the change in TN:TP ratios since the new treatment plant was completed.

The question of limiting nutrient is critical not only for the development of this TMDL and consequent effluent from the RWWTP, but also for the health of the Rio Ruidoso. The Rio Ruidoso nutrient assessments have shown that since completion of the RWWTP, the river is at the tipping point for non-impairment and on the verge of fully supporting the narrative nutrient standards for the current coldwater aquatic life use designation. The limited SWQB data from 2012 show average TN:TP ratios of 10.3:1 and 14.4:1 at the two stations in the Eagle Creek to US 70 Bridge segment, with ratios greater than 10:1 indicating phosphorus limitation. Data from 19 RRMP sampling events show strong phosphorus limitation, with an average TN:TP ratio of 33.0:1, which makes sense given the 93.5:1 ratio in effluent since the new RWWTP became fully operational.

With these results indicating phosphorus limitation, a ratio greater than 10:1 can be used to establish the TMDL target concentration for TN resulting in achievable TN effluent limits with no effect on algal productivity. However, algal productivity is expected to be very responsive to changes in phosphorus loading, and further substantive reductions of the limiting nutrient are expected to reduce algal productivity and result in non-impairment. Undue emphasis on further TN reduction from RWWTP effluent would not only stretch the limits of available and affordable treatment technology, it could waste limited resources when improving river health is dependent on controlling phosphorus from many sources in the watershed.

SWQB Response: *This comment was also received during the public comment period for the 2014-2016 Integrated List of Impaired Waters. The same response applies in the context of this TMDL; additional information related to TN/TP ratios, included data collected by Parametrix, is provided in response to Dr. Stensel's comments below. Below is the SWQB response provided for the record:*

"As documented in the 303(d)/305(b) data submission guidelines (http://www.nmenv.state.nm.us/swqb/DataSubmittals/), SWQB employs a two part test of documentation associated with outside data sources, which includes: (1) verification that there is there documentation of QA/QC procedures that, at a minimum, meet the QA/QC requirements described in the SWQB's most recent QAPP; and (2) verification that there is reasonable evidence or assurance that these procedures were followed.

As acknowledged in the technical memo provided by Parametrix, the freezing of nutrient samples does not conform to the approved nutrient preservation procedures identified in the Rio Ruidoso Quality Assurance Project Plan (QAPP). Freezing and acidification (on ice) are preservation methods identified in Standard Methods for both phosphorous and ammonia. However, Standard Methods clearly states that when freezing phosphorous and ammonia samples, they must be kept at or below -10°C and -20°C respectively. Documentation that demonstrates that these temperature requirements were maintained throughout shipment and laboratory receipt has not been provided; the documentation provided does demonstrate that a significant number of samples did not maintain a 0°C temperature lending doubt that -10°C and -20°C were achieved in an even larger number. Other analytes (nitrate, nitrite and Kjeldahl nitrogen) lack method specific guidance in Standard Methods; preservation of these analytes should follow the standard preservation techniques identified, which are designed to minimize the potential for volatilization or biodegradation between sample collection and analysis by keeping samples cool (4°C) without freezing and adding a chemical preservative if immediate analysis is not possible.

The nutrient samples collected and frozen by Parametrix for Ruidoso were analyzed following USEPA Methods (300 Series), which calls for samples to be preserved with sulfuric acid and stored at 4°C at time of collection. Additionally, sample preservation requirements identified in 40 CFR Part 136

Table II for all nutrient analytes are acid preservation and sample temperature maintained at or below 6°C without freezing unless data demonstrating that sample freezing does not adversely impact sample integrity is maintained on file and accepted as valid by the regulatory authority. The nutrient preservation requirements identified in 40 CFR Part 136 Table II are followed by SWQB, and compliance with these requirements is factor in determining whether externally submitted data is of equal or comparable quality to data collected and used by SWQB in nutrient assessments.

In summary the Ruidoso samples for which freezing has been documented as the preservation technique does not conform to 1) the approved Ruidoso QAPP, 2) the USEPA analysis methods used by the laboratory, 3) SWQB standard operating nutrient sample preservation procedures, which ensure data comparability, and 4) the requirements in 40 CFR Part 136 Table II, to which the SWQB and USEPA are required to conform. The Standard Method reference provided by Ruidoso and the consideration of a documented subset of frozen samples does not change the quality assurance assessment determination of these data. These data remain ineligible for use in regulatory decisions for failure to meet SWQB's external data submission criteria. While this dataset fails to meet the QA requirements of SWQB for use in assessment, we acknowledge the use of freezing likely results in the necessary preservation of nutrients within the samples. As such we believe these results can be used for informational purposes and to guide further data collection efforts. To that end we have compared the nutrient data collected by Parametrix with data collected by SWQB and find assessment of the datasets to result in the same impairment conclusions. For example, there were 15/15 TN exceedences and 7/23 TP exceedences in the SWQB data set for the AU from Eagle Creek to HWY 70. The decision to not include the Parametrix TN and TP data does not alter the assessment conclusion for either segment of the Rio Ruidoso.

Additional references:

Code of Federal Regulations. 2014. Title 40: Protection of Environment, Part 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants, Table II – Required Containers, Preservation Techniques, and Hold Times. Available at: http://www.ecfr.gov/cgi-bin/textidx?SID=e58fcd49bcbdc8bdb679467cb4b8d694&node=40:23.0.1.1.1&rgn=div5."

NPDES Permit Effluent Limits Section 8.1 addresses permit limits for TN and TP. The change to 30-day average rather than daily maximum limits is appropriate, as discussed, for the chronic rather than acute nature of nutrient impairments. The TN limit of 2.46 mg/L for the current maximum treatment plant discharge of 1.88 mgd is below the 3.0 mg/L TN concentration generally considered to be the limit of technology (see Section 4.4.1, Jeyanayagam 2005). As shown in Table 8.1, if the treatment plant discharge increases from population growth or connecting residences that are currently using septic systems, the TN effluent limit could go even further below the limit of technology. New Mexico's Nutrient Reduction Strategy indicates that "To date, in nutrient TMDLs with wasteload allocations, the State has recommended, and EPA Region 6 has assigned, permit effluent limits based on the limits of technology, although this is not always the case" (SWQB 2014). Before new and lower TN effluent limits are imposed on the RWWTP, the following questions regarding nutrient impairment should be addressed:

- What is the appropriate aquatic life use designation for this stream segment that has a temperature standard of 30 °C (86°F)?
- What is the appropriate water quality standard for DO for a stream segment with a temperature standard of 30 °C, and what DO concentration equates to an acceptable 90% DO saturation during the warm season?
- If the aquatic life use designation and DO criterion is aligned with the site-specific temperature standard for this segment, would the nutrient assessment show that the Rio Ruidoso is currently meeting the narrative standard for nutrients and therefore a TMDL for plant nutrients is not needed?
- Given the recent sample data showing high TN:TP ratios and indicating strong phosphorus limitation, is the regulation of nitrogen necessary? If so, what is the TN target concentration that will meet the narrative water quality standard for nutrients, but not needlessly require further resources to further reduce nitrogen discharges to the river from treated effluent?
- Are there sufficient nutrient data to support using a TN:TP ratio to establish the TN target concentration, and what is the ratio indicated by the data?
- Why does the TMDL recommend effluent limits that are below the cited limits of technology?
- The draft TMDL suggests that there may be seasonal differences in the limiting nutrient, but after much of the SWQB data were rejected through quality assurance review, seasonality appears inconclusive. If the TN:TP ratio is higher outside of the summer months, should there be a higher TN target concentration and effluent limits during that period?
- What options and alternative approaches will be available to the JUB under New Mexico's Nutrient Reduction Strategy, proposed temporary water quality standards, or other regulatory provisions?

SWQB Response: *SWQB appreciates the summary of your previous comments. Comments regarding effluent limits and appropriate water quality standards are previously addressed in other portions of Comment Set D.*

References

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To: Regional Wastewater Treatment Plant Joint Use Board

Re: Comments on NMED Draft TMDL

The draft TMDL based the nutrient waste load allocation for the Ruidoso wastewater treatment plant (WWTP) effluent on a Rio Ruidoso water criterion of an N:P ratio equal to 10.0. This ratio is not well justified and fails to recognize the dynamics of a dual nutrient limitation condition that the TMDL acknowledges for the Rio Ruidoso.

A common formula to illustrate the kinetics of a dual limitation is as follows:

$$\frac{dP}{dt} = \left(\frac{P}{k_p + P}\right)\left(\frac{N}{k_N + N}\right)K'$$

where:

dp/dt	= rate of algae productivity
P	= stream phosphorus concentration
N	= stream nitrogen concentration
Kp and KN	= kinetic constants specific to P and N respectively K'
	= stream constant

From this fundamental analysis it can be seen that the algae productivity rate can be the same for a wide range of N:P ratios. For example, as the phosphorus concentration is decreased the nitrogen concentration must be increased to result in the same productivity and vice versa.

The stream quality has improved and its N:P ratio has increased since the Ruidoso advanced treatment system has been operating. The N:P ratio in the WWTP effluent has increased considerably since the advanced treatment began. Before the new advanced treatment system was online the effluent N:P ratio averaged 7.2 and ranged from 4.1 to 11.4. The N:P ratio in the effluent from the advanced treatment system has averaged 93.5 and has ranged from 18 to 220.

According to the draft TMDL the basis for the stream 10:1 ratio is given on page 33 according to a study referenced in Appendix D which stated that at a 10:1 ratio neither P or N were nutrient limited or that the system was in balance. On page 34 the TMDL states "*In recommending a nitrogen standard, the SWQB bases its projection on a 10:1 ratio of N:P, which appears to be where neither phosphorous nor nitrogen is limiting. The chemical analysis of the Rio Ruidoso's waters supports the projection of a nitrogen standard that is 10 times greater than a phosphorus standard (Appendix D; Table 4.2). With a TP standard of 0.1 mg/L, the corresponding nitrogen standard is 1.0 mg/L.*" I am familiar with this document as it was referenced in setting the earlier effluent N and P values for the Ruidoso WWTP effluent. However, there is no supporting data to establish the 10:1 ratio and there were very limited algal bottle test results reported.

It appears that the intent of the TMDL was to have N and P in balance as indicated by the statement at the bottom of page 42. "*.. the stoichiometry of N and P supply and demand must generally be in close balance in most ecosystems*." With that in mind the commonly accepted N:P ratio for a balanced system is the well known Redfield Ratio of 16:1. We recommend that this more established N:P ratio be used instead of the 10:1 ratio in setting the nitrogen load allocation.

During discussion of the basis for the 10:1 ratio in our July 31st meeting with NMED we were told that the ratio was not based on the Appendix D but rather on the stream sampling after the advanced treatment system was on line. The data for this sampling program was summarized on page 92 for N and P analyses. There were 23 grab sample events over an 8-month period from April 2012 to November 2012. These data showed a wide range of N:P ratios in the stream; from 3.4 to 260 and averaged 44. We were then informed that not all of the data shown was used and in the following week NMED provided the data set showing the data used and the date disqualified based on their lab QA/QC procedures. From this 12 data sets remained and for these data the N:P ratio ranged from 3.4 to 24.5 and averaged 10-14. We are of the opinion that this is very limited data from which to set a stream quality N:P ratio.

A greater amount of stream N and P data is available in the Parametrix study and many of these values had N:P ratios above 16:1 and average 44. NMED refuses to consider these data because of a procedural issue. During the study Parametrix changed the sample preservation method to freezing versus acidification as described in the QAPP. This method is well recognized and is actually preferred; thus the data obtained by Parametrix is valid and points out the increased stream N:P ratios as the stream water quality has improved.

In summary the draft TMDL does not provide a good basis for selecting the 10:1 N:P ratio which is very critical in determining an effluent total nitrogen concentration from the advanced wastewater treatment plant that is attainable. We recommend that based on the criteria posed in the TMDL of having a balanced N:P ratio that the established Redfield ratio of 16:1 be used. This should result in an attainable effluent TN concentration from the WWTP while also providing a low effluent TP concentration and improving the stream water quality.

SWQB Response: *This comment is directly related to the plant nutrient TMDLs that have now been removed from this document. All those submitting public comments on the 2014 nutrient TMDLs will be notified when the revised nutrient TMDLs are released for a new public comment period at which time there will be the opportunity to provide comments on the new TMDL.*