WQCC APPROVED

TOTAL MAXIMUM DAILY LOAD (TMDL)
FOR THE
RIO RUIDOSO

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Prepared by

New Mexico Environment Department, Surface Water Quality Bureau, Monitoring, Assessment, and Standards Section

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For additional information please visit:

www.nmenv.state.nm.us/swqb

~or~

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COVER PHOTO: Rio Ruidoso above Highway 70, September 2012. NMED/SWQB.

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4Q3	4-Day, 3-year low-flow frequency
AU	Assessment Unit
BL-A	Background Load Allocation
BLM	Bureau of Land Management
BMP	Best management practices
BST	Bacterial Source Tracking
CAFO	Concentration Animal Feeding Operation
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
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EQIP	Environmental Quality Incentive Program
^{o}F	Degrees Fahrenheit
FG-WLA	Future Growth Wasteload Allocation
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
NOI	Notice of Intent
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
TSS	Total Suspended Solids
UL	Upstream Loading
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WBP	Watershed-based plan
WQCC	Water Quality Control Commission
WQS	Water quality standards
WQX	Water quality exchange
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Section 303(d) of the Federal Water Pollution Control Act, a.k.a. Clean Water Act (CWA), 33 U.S.C. §1313[1], requires states to develop Total Maximum Daily Load (TMDL) management plans for water bodies determined to be impaired. A TMDL defines 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:

- Plant nutrients for Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) and Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek).
- Total phosphorus for Rio Ruidoso (Carrizo Creek to Mescalero Apache boundary)

This TMDL addresses the above impairments as summarized in Table ES1. 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, impending use attainability analyses, or they have been addressed in other TMDL documents. Additional information can be reviewed in the 2016-2018 Clean Water Act §303(d)/ §305(b) Integrated Report and List. If additional impairments are verified or found, subsequent TMDLs will be developed for those impairments. The SWQB prepared TMDLs in 2006 for portions of these watersheds including: TMDLs for bacteria on Carrizo Creek, Rio Bonito, and Rio Hondo; as well as TMDLs for plant nutrients, temperature, and turbidity on the Rio Ruidoso. The SWQB prepared TMDLs in 2015 for portions of these watersheds including: TMDLs for *E.coli* on Carrizo Creek, Rio Bonito, Nogal Creek, and Rio Ruidoso; as well as TMDLs for turbidity for Agua Chiquita, Rio Peñasco, and Rio Ruidoso.

The SWQB's Monitoring, Assessment and Standards Section (MASS) will next collect water quality data in the Sacramento Mountains in 2021-2022. TMDLs will be re-examined and potentially revised at that time as this document is considered to be an evolving management plan. In the 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.

[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

The 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 5.

ES1. TOTAL MAXIMUM DAILY LOAD FOR RIO RUIDOSO UPSTREAM OF EAGLE CREEK

New Mexico Standards Segment	20.6.4.209 and 20.6.4.208
Waterbody Identifier	NM-2209.A_20 NM-2209.A_21 NM-2208_20
Combined Segment Length	20.5 miles
Parameters of Concern	Total phosphorus Total nitrogen
Uses Affected	High Quality Coldwater Aquatic Life and Coldwater Aquatic Life
Geographic Location	Rio Hondo USGS Hydrologic Unit Code 13060008
Land Type	Arizona/New Mexico Mountains (Ecoregion 23f) Arizona/New Mexico Mountains (Ecoregion 23b)
Combined Probable Sources	Bridge/culverts/railroad crossings, CAFO, channelization, drought-related impacts, dumping/garbage/litter/trash, flow alterations, gravel/dirt roads, highway/road/bridge runoff, inappropriate waste disposal, livestock grazing, mass wasting, on-site treatment systems, pavement/impervious surfaces, rangeland grazing, residences/buildings, stream channel incision, surface films/odors, urban runoff/storm sewers, waste from pets, waterfowl, watershed runoff following forest fire.
IR Category	5/5A
Priority Ranking	High

	WLA	**FG-WLA**	**LA**	**B-LA**	**MOS**	**TMDL**
Total Phosphorus	1.64	0.72	0.44	0.25	0.34	3.39 lbs/day
Total Nitrogen	37.1	16.2	14.0	9.06	8.48	84.8 lbs/day

NOTE: "FG-WLA" = Future Growth Wasteload Allocation
"B-LA" = Background Load Allocation (upstream contributions)

1.0 INTRODUCTION

Under Section 303 of the Federal Water Pollution Control Act, a.k.a. the Clean Water Act (CWA), 33 U.S.C. §1313, individual states establish water quality standards, which are submitted and subject to the approval of the U.S. Environmental Protection Agency (USEPA). Under Section 303(d)(1) of the CWA (33 U.S.C. §1313(d)), states are required to develop a list of waters within a state that are impaired and establish a total maximum daily load ("TMDL") for each pollutant. 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 a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations (CFR) Part 130 (40 C.F.R. §130) as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background conditions." TMDLs also include a margin of safety (MOS).

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, specifies applicable water quality standards for the assessment units addressed in this document, and briefly discusses the water quality survey that was conducted in the Sacramento Mountains in 2012. Section 3.0 provides total nitrogen and total phosphorus TMDLs. Pursuant to CWA Section 106(e)(1), Section 4.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 5.0 discusses implementation of TMDLs (phase two) and the relationship between TMDLs and Watershed-Based Plans (WBPs). Section 6.0 discusses applicable regulations and stakeholder assurances, Section 7.0 public participation in the TMDL process, and Section 8.0 provides references.

2.0 SACRAMENTO MOUNTAIN CHARACTERISTICS

The watersheds in the Sacramento Mountains were monitored by the Surface Water Quality Bureau (SWQB) from April to October 2012 with additional monitoring in 2014. 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 Water Quality Sampling Summary (NMED/SWQB 2015b) available on the SWQB website.

2.1 Location Description

The watersheds within the Sacramento Mountains (US 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 Ecoregions 23, 24, and 26 (Arizona/New Mexico Mountains, Chihuahuan Deserts, and Southwestern Tablelands) (Omernik 2006). This document covers impaired waters within the Rio Hondo watershed in the Arizona/New Mexico Mountains.

As presented in **Figure 2.1**, the Rio Hondo HUC (13060008) land use is 19% rangeland, 70% forest, 7% agriculture, and 3% built-up. **Figure 2.2** shows ownership as 58% private, 17% USFS, 11% Tribal, 10% BLM, and 4% State. Federally listed threatened and endangered species include the Pecos Bluntnose Shiner, Chihuahua Chub, Pecos Gambusia, Mexican Spotted Owl, Pecos Sunflower, Kuenzler's Hedgehog Cactus, Pecos Assiminea, Koster's Springsnail, and the Roswell Springsnail. (See http://nhnm.unm.edu/)

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).

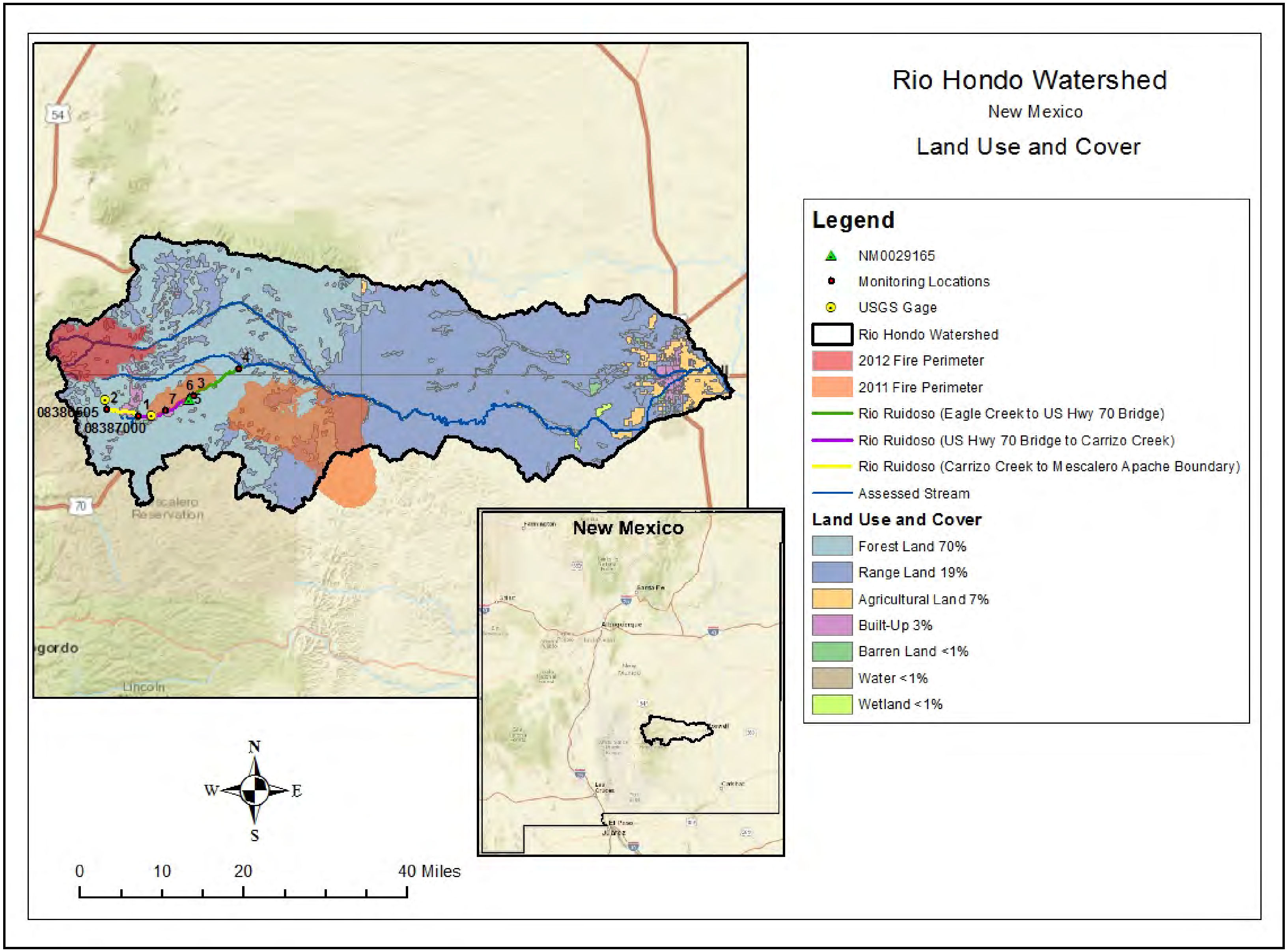

Figure 2.1 Land Use and 2012 Sampling Stations in the Sacramento Mountains. See Table 2.1 for station information.

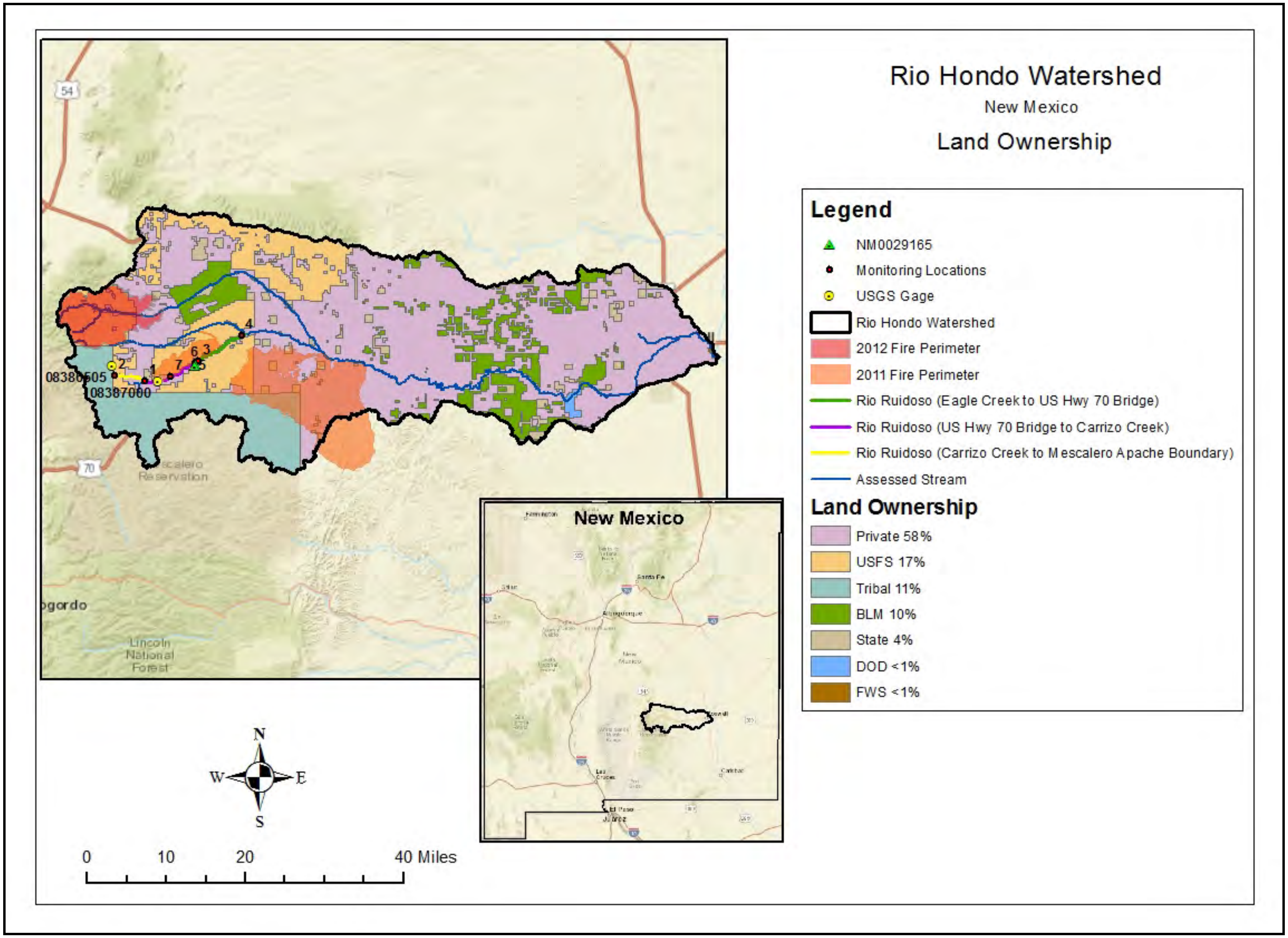

Figure 2.2 Land Management and 2012 Sampling Stations in the Sacramento Mountains

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 (Figure 2.3). The high dome of Sierra Blanca Peak 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 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 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 (USFS) 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).

2.3 Water Quality Standards and Designated Uses

Water quality standards (WQS) for all assessment units in this document are set forth in Sections 206.4.208 and 20.6.4.209 of the *Standards for Interstate and Intrastate Surface Waters,* 20.6.4 New Mexico Administrative Code (NMAC), as amended through June 5, 2013 (NMAC 2013). These standards have been approved by the USEPA for CWA purposes. The following are the relevant NMAC code sections:

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.

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.

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.

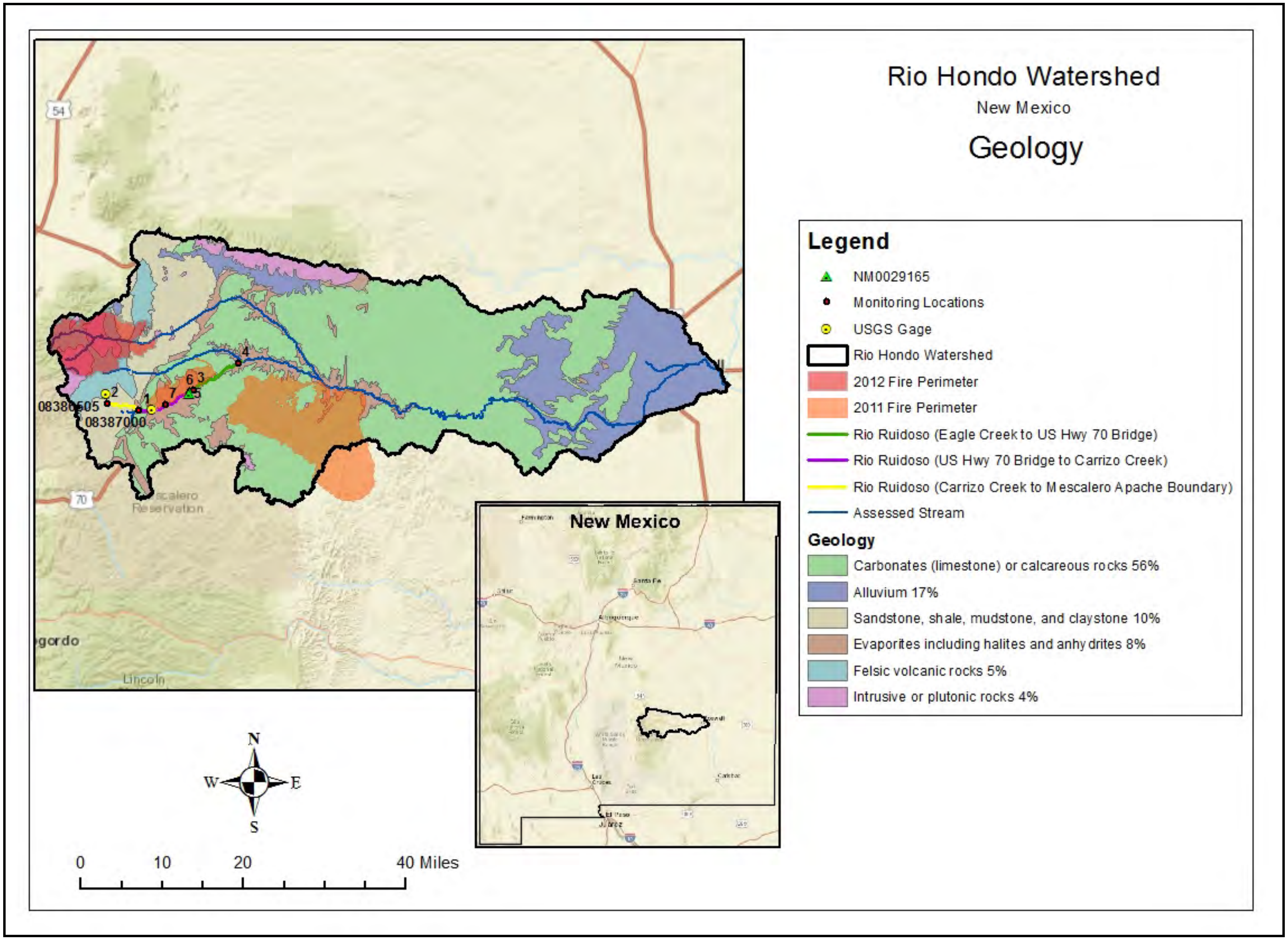

Figure 2.3 Geologic Map of the Sacramento Mountains and 2012 Sampling Stations

Current impairment listings for the Sacramento Mountain watersheds are included in the WQCC-approved 2016-2018 State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List (NMED/SWQB 2016a). 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 2016-2018 Integrated List available at https://www.env.nm.gov/swqb/303d-305b/2016-2018/index.html.

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 Procedure* (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 Procedure* 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 monitored by the SWQB in 2012 and 2014. 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 Water Quality Sampling Summary (NMED/SWQB 2015b).

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 March and November and again in 2014 between May and October. Most sites were sampled eight 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 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 2012) and the SWQB assessment protocols (NMED/SWQB 2015a). As a result of the 2012 and 2014 monitoring efforts and subsequent assessment, 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 2016a).

In addition to the 2012 and 2014 water quality sampling, fish sampling was conducted by SWQB staff in the Rio Ruidoso on September 16-17, 2015 at four locations. All sampling was performed using a backpack electrofisher (Smith-Root, Model 12-B). Stream lengths sampled varied from 60 to 100 meters. All available habitat types (pool, run, riffle) were sampled. The first location sampled was immediately below the Mescalero Apache boundary. SWQB captured 39 brown trout (*Salmo trutta*) ranging from 92 mm to 280 mm total length (TL) and 27 longnose dace (*Rhinichthys cataractae*) up to 132 mm TL. The second location was immediately upstream of the confluence with Carrizo Creek at Two Rivers Park. A single rainbow trout (*Oncorhynchus mykiss*), 280 mm TL was captured, which appeared to be a hatchery stocked fish. Additionally, 30 brown trout (88-275 mm TL) and 67 longnose dace (adults and juveniles) were captured. The third location was just downstream of the Ruidoso Downs racetrack. Three stocked rainbow trout (260, 290, 320 mm TL), 20 brown trout (100-280 mm TL), 24 longnose dace (adults and juveniles), and 3 Rio Grande chub (*Gila pandora*) (180, 210, 213 mm TL) were captured. The fourth and final location was downstream of the US 70 bridge just below the wastewater treatment plant. Only two species were captured: 45 longnose dace and 123 Rio Grande chub, both species exhibiting various size classes. All trout are classified as cold water species; longnose dace and Rio Grande chub are cool water species.

Table 2.1 SWQB Sacramento Mountains Sampling Stations

Station #	Station Description	STORET/ WQX ID
1	Rio Ruidoso at Carrizo Creek	57RRuido045.3
2	Rio Ruidoso at Mescalero boundary at USGS Gage 08386505	57RRuido052.4
3	Rio Ruidoso @ CR E002	57RRuido030.5
4	Rio Ruidoso at Glencoe FR 443	57RRuido019.8
5	Ruidoso new WWTP outfall pipe	NM0029165
6	Rio Ruidoso abv Hwy 70 bridge	57RRuido031.5
7	Rio Ruidoso blw Ruidoso Downs Racetrack @ Joe Welch Dr	57RRuido039.4

2.4.2 Hydrologic Conditions

There are two active USGS gaging stations in the portion of the Sacramento Mountains with impaired AUs included in this document (**Table 2.2**). As described in the following sections, USGS gage 08387000 and 08386505 were used, as appropriate, in flow calculations in the TMDLs. **Figure 2.4 and Figure 2.5** display the daily and historic mean discharge for each USGS gage.

Table 2.2 USGS gages in the Sacramento Mountains

Agency	Site Number	Site Name	Period of Record
USGS	08387000	Rio Ruidoso at Hollywood (near intersection of Hwy 48 and Hwy 70)	1953-present
USGS	08386505	Rio Ruidoso at Ruidoso (at Mescalero boundary)	1998-present

As stated in the Assessment Protocol (NMED/SWQB 2015a), data collected during all flow conditions, including low flow conditions (e.g., flows below 4-day, 3-year flows), 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. Flow data used in the calculation of the TMDLs is discussed in Section 3.2.

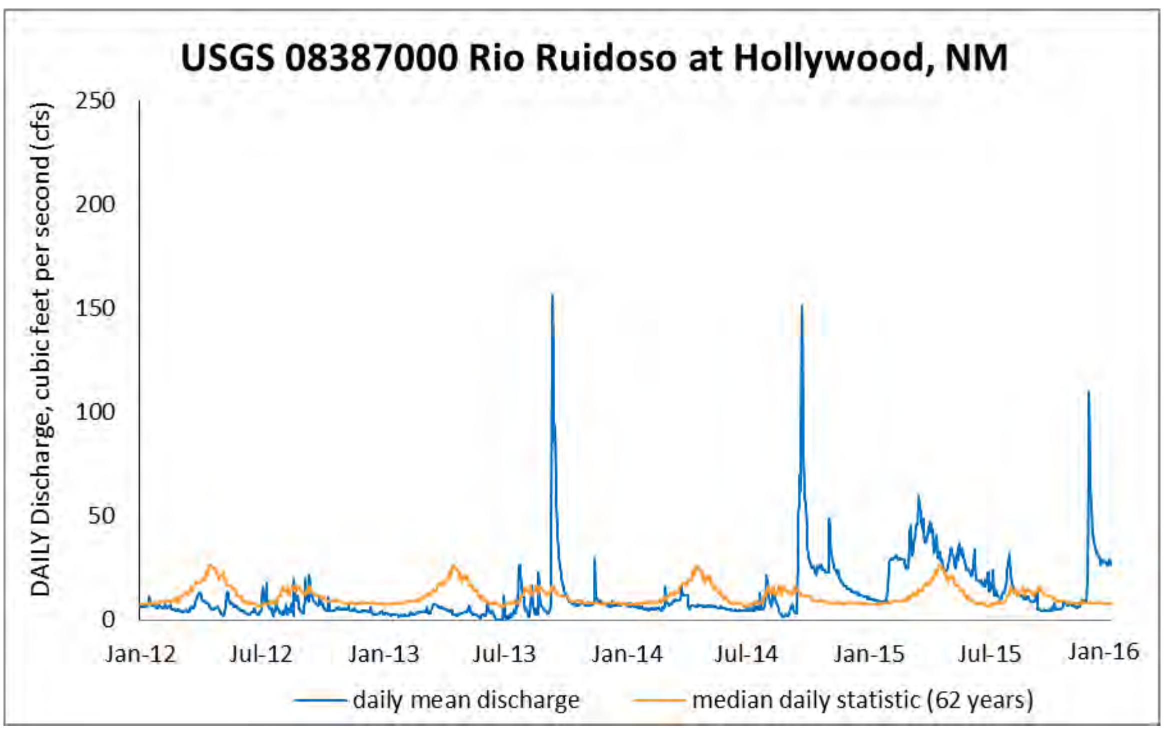

Figure 2.4 Daily and historic mean discharge for the Rio Ruidoso near Hollywood, NM (2012-2016)

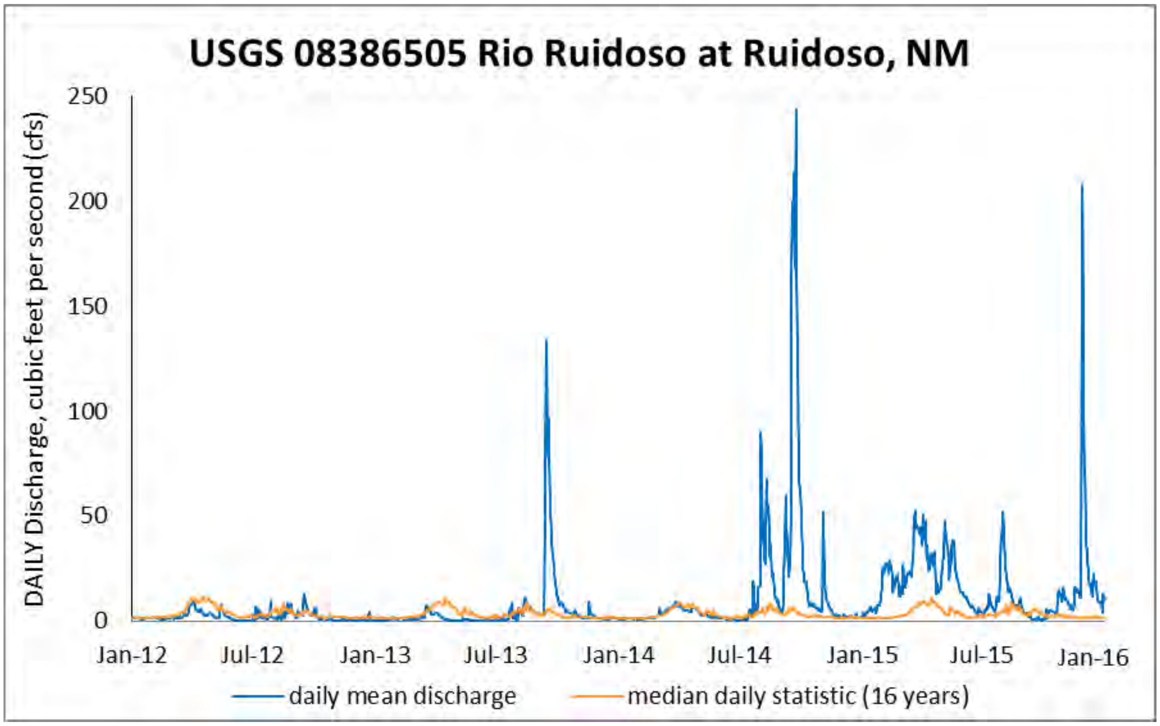

Figure 2.5 Daily and historic mean discharge for the Rio Ruidoso at Ruidoso, NM (2012-2016)

3.0 PLANT NUTRIENTS AND TOTAL PHOSPHORUS

Level I and Level II nutrient assessments were conducted on waterbodies in the Sacramento Mountains in 2012. Detailed assessment of various water quality parameters indicated plant nutrient impairment in two portions of the Rio Ruidoso: US Hwy 70 to Carrizo Creek and Eagle Creek to US Hwy 70. Assessment of water quality data indicated total phosphorus impairment for the Rio Ruidoso (Carrizo Creek to Mescalero Boundary) assessment unit. A TMDL for plant nutrients was developed in 2006 for the Rio Ruidoso (Rio Bonito to US Hwy 70) assessment unit; the plant nutrients TMDL for Rio Ruidoso (Eagle Creek to US Hwy 70) in this document serves as a revision to the 2006 TMDL.

SWQB is revising the 2006 TN and TP TMDLs for the Rio Ruidoso based on additional data collection, new nutrient and critical flow analyses, and to re-evaluate the wasteload allocation for the NPDES permit for the City of Ruidoso Downs and Village of Ruidoso Wastewater Treatment Plant (NM0029165). This revised TMDL is based on the same in-stream targets used in the previous 2006 TMDL (0.1 mg/L TP and 1.0 mg/L TN); however the critical flows in the revised TMDL are estimated using more recent streamflow data (2004-2015). Furthermore, the critical flow for nutrients was re-evaluated and determined to be the average annual median flow because of the long term growth cycle of algae in response to excess nutrients, in contrast to protecting for acute toxicity using the 4Q3 (see Section 3.2 for more information). Therefore, comparison of the 2006 TMDL with this revised TMDL should be done with caution as several parameters have changed the calculations and subsequent allocations. SWQB staff will conduct routine monitoring in the Rio Ruidoso watershed in 2021-2022, assess the new data in 2023, and revise the TMDL if necessary at that time.

To address concerns about reasonable assurance and questions that were raised during the first public review period in 2014 as well as USEPA reviews, SWQB is also taking a watershed approach to this revised TMDL to account for upstream contributing areas. This type of approach allows for calculation of a watershed-wide TMDL and better accounting of the incoming nutrient loads and allowable loading in the impaired sub-watersheds. By using this approach, point and nonpoint sources throughout the watershed are accounted for and can be appropriately targeted through the implementation process. Additional information about reasonable assurance is included in Section 5.0.

3.1 Target Loading Capacity

There are two potential causes of nutrient enrichment in a given stream: excessive phosphorus and/or nitrogen. Phosphorous is found in water primarily as orthophosphate. In contrast nitrogen may be found as several dissolved species, all of which must be considered in nutrient loading. Total nitrogen is defined as the sum of nitrate+nitrite (N+N), and Total Kjeldahl Nitrogen (TKN). At the present time, there is no USEPA-approved method to test for total nitrogen, however adding the results of USEPA methods 351.2 (TKN) and 353.2 (N+N) is appropriate for estimating total nitrogen (APHA 1989).

The intent of nutrient criteria, whether numeric or narrative, is to limit nutrient inputs in order to control the excessive growth of attached algae and higher aquatic plants. Controlling algae and plant growth preserves aesthetic and ecologic characteristics along the waterway. While conceptually there may be a number of possible combinations of total nitrogen (TN) and total phosphorus (TP) concentrations that are protective of water quality, the application of simple chemical limitation concepts to a complex biologic system to determine these combinations is challenging. One of the primary reasons for this is that different species of algae and higher aquatic plants will have different nutritional needs. Some species will thrive in nitrogen limited environments while others will thrive in phosphorous limited environments. Because of the diversity of nutritional needs amongst organisms, numeric thresholds for both TN and TP are required to preserve the aesthetic and ecologic characteristics along a waterway. Focusing on one nutrient or trading a decrease in one for an increase in the other may simply favor a particular species without achieving water quality standards (USEPA 2012).

New Mexico has a narrative criterion for plant nutrients set forth in Subsection E of 20.6.4.13 NMAC:

> ***Plant Nutrients:*** *Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in the dominance of nuisance species in surface waters of the state.*

This narrative criterion can be challenging to assess because the relationships between nutrient levels and impairment of designated uses are not defined, and distinguishing nutrients from “other than natural causes” is difficult. Numeric thresholds are necessary to establish targets for TMDLs, to develop water quality-based permit limits and source control plans, and to support designated uses within the watershed. Therefore, SWQB, with the assistance from EPA and the USGS, developed nutrient-related thresholds, or *narrative translators*, to address both cause (TN and TP) and response variables (dissolved oxygen [DO], pH, and periphyton chlorophyll *a*). Water quality assessments for nutrients are based on quantitative measurements of these causal and response indicators. If these measurements exceed the numeric nutrient threshold values, indicate excessive primary production, and/or demonstrate an unhealthy biological community, the reach is considered impaired (NMED/SWQB 2015a). The applicable threshold values for cause and response variables in the Rio Ruidoso watershed are shown in **Table 3.1**. These threshold values were used for water quality assessments and as a starting point for TMDL development.

Table 3.1 Applicable nutrient-related thresholds for the Rio Ruidoso watershed

Ecoregion	23-Arizona/New Mexico Mountains
WQS segment	20.6.4.208, 20.6.4.209
Aquatic Life Use	Coldwater, High Quality Coldwater
Total Phosphorus	< 0.1 mg/L[(a)]
Total Nitrogen	≤ 0.25 mg/L[(b)]
Dissolved Oxygen	≥ 6.0 mg/L[(c)]
pH	6.6 – 8.8[(c)]
Chlorophyll *a*	5.8 – 11.0 μg/cm^2 [(b)]

Notes: *(a)* Segment-specific TP criterion in 20.6.4.208 and 20.6.4.209 NMAC.
(b) Threshold value for Ecoregion 23.
(c) Criteria for coldwater and high quality coldwater aquatic life uses.

For this TMDL the target value for TP is the segment-specific TP criterion of 0.1 mg/L (20.6.4.208 and 20.6.4.209 NMAC); however, in recommending a TN target for this TMDL, a 10:1 ratio of TN:TP was determined to be appropriate. With a segment-specific TP standard of 0.1 mg/L, the corresponding TN TMDL target is 1.0 mg/L. Documentation in support of the 10:1 ratio include regional studies from the Rocky Mountain West (see discussion below) as well as site-specific data from the Rio Ruidoso.

A nutrient ratio of 10:1 is consistent with other recently adopted nutrient limits in the Rocky Mountain West and NMED's ecoregion-based nutrient thresholds for the state of New Mexico**.** Colorado and Montana are two Mountain West states that have recently adopted numeric TN and TP standards. Colorado adopted interim nutrient limits which have a TN:TP ratio of 11.4 and 11.8 for warm and cold water streams and rivers, respectively (Colorado Department of Public Health and Environment 2013). Montana's nutrient standards have TN:TP ratios that range from 2.4 to 13.3, with an average ratio of 7.6 (Montana Department of Environmental Quality 2014). Finally, New Mexico specific TN:TP ratios calculated from the nutrient thresholds developed using regional data range from 5.5 to 13 with an average of 10.2 (NMED/SWQB 2015a). Of particular note, the Rio Ruidoso is located within the Arizona/New Mexico Mountain Ecoregion. The ratios of nutrient thresholds for this ecoregion are 12.5 for coldwater systems and 5.8 for warmwater systems. The Rio Ruidoso is located in a transitional zone between these systems, with segment 20.6.4.209 designated high-quality cold water and segment 20.6.4.208 designated coldwater with a segment specific criterion of 30°C. The ratios of TN and TP thresholds in the *Refinement of Stream Nutrient Impairment Thresholds in New Mexico* report (NMED/SWQB 2016b) are 10 for steep sites and 8.4 for flat-moderate sites.

A nutrient ratio of 10:1 is also supported by site specific data collected on the Rio Ruidoso. The water quality data collected by SWQB during the 2012 survey indicate that the stream is impaired, but marginally. A review of 26 stream samples (**Table 3.2**) collected above and below the Highway 70 bridge during the summer period (July through September) when biological productivity is greatest, found that concentrations averaged above the TMDL targets of 1.0 and 0.1 mg/L for TN and TP, respectively, whereas the median values are just below these targets. Both average and median values produce ratios near 10:1. This is a strong indication that these targets based on the 10:1 ratio are protective of water quality in the Rio Ruidoso.

Table 3.2 2012-2014 Rio Ruidoso water quality data statistical summary

	TN (mg/L)	TP (mg/L)	TN:TP Ratio
Average	2.09	0.54	14.2
Median	0.69	0.09	10.4
Maximum	10.12	3.11	60
Minimum	0.30	0.005	3.25
Sample size (n)	26	26	22

These results are consistent with an algal growth assay study conducted in 2002 by UNM (under contract from NMED). This study examined the effect of phosphorus and nitrogen additions on algal mass for river waters from three sites (**Table 3.3**) on the Rio Ruidoso (**Appendix D**).

Table 3.3 2002 Algal Bioassay sites

Site number	Site Name
I	Rio Ruidoso @ Mescalero Boundary west of Ruidoso – Upper Canyon Road
II	Rio Ruidoso @ NM mile marker 267.5 (HWY 70), below WWTP
III	Rio Ruidoso abv. site on Susan Lattimer's property

In all three water samples, algal growth was increased by the addition of nitrogen indicating that nitrogen is the primary limiting nutrient in the Rio Ruidoso and is driving the productivity of algae and macrophytes in the stream. Two examples of the responses are shown in **Figures 3.1 and 3.2**. Phosphorus addition alone did not increase algal growth but did increase growth when added along with nitrogen. Therefore, the algal growth assay suggests that to ensure that the narrative WQS are met, land use and/or point source management activities should avoid any increased inputs of nitrogen as well as nitrogen and phosphorus combinations.

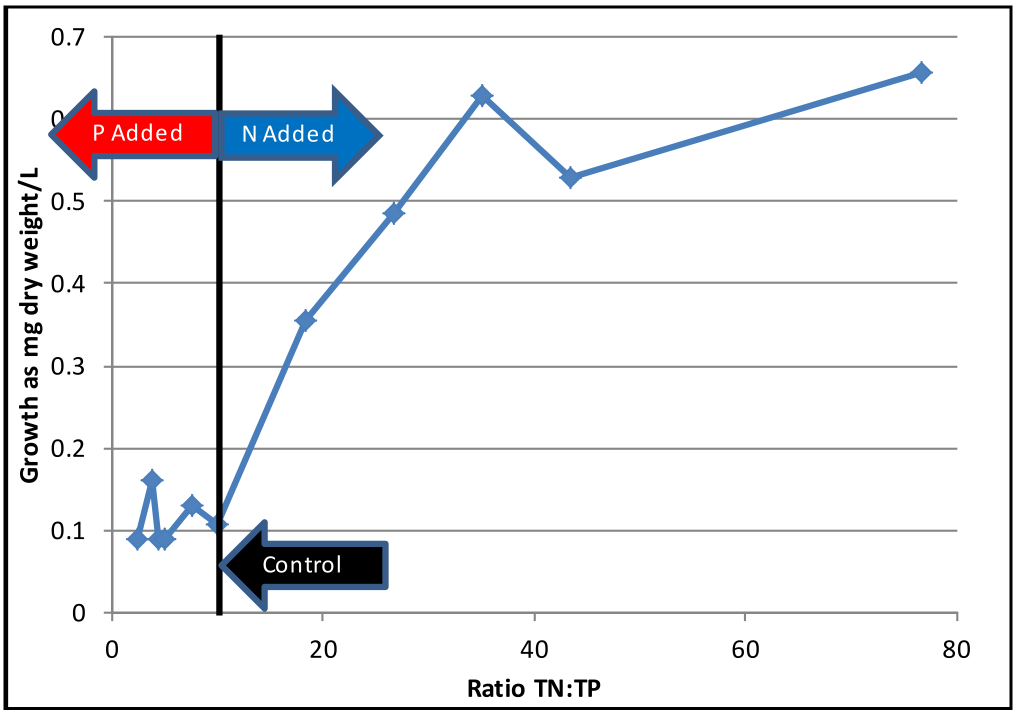

Figure 3.1 2002 Algal Growth Assay at Site I

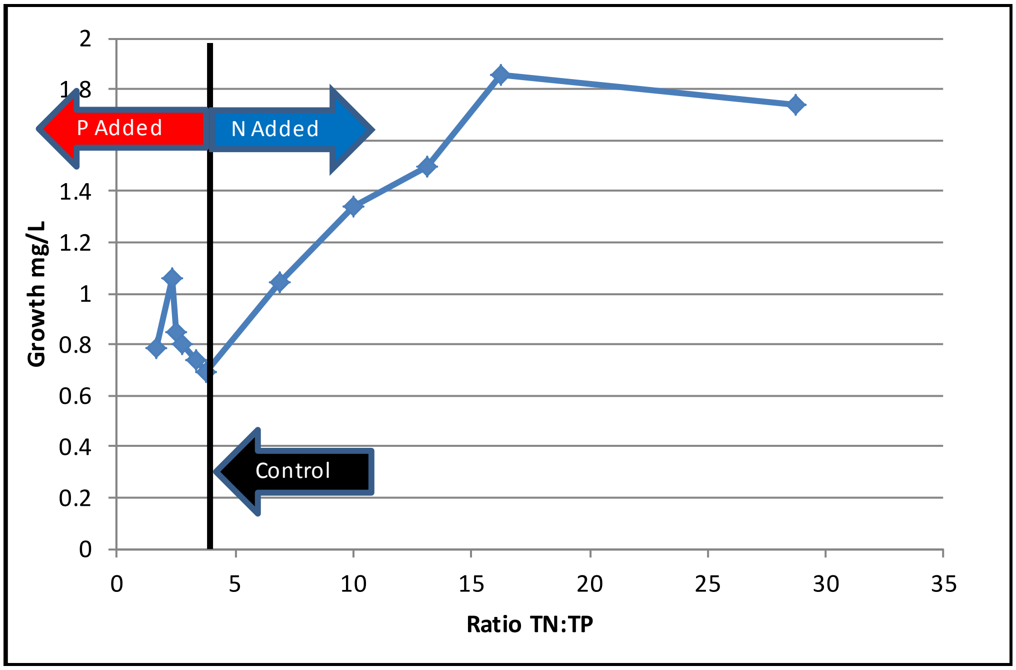

Figure 3.2 2002 Algal Growth Assay at Site II

3.2 Flow

40 CFR 130.7(c)(1) requires states to calculate a TMDL using the critical conditions for stream flow. The presence of plant nutrients in a stream can vary as a function of flow, however, higher nutrient concentrations typically occur during low-flow conditions because there is reduced stream capacity to assimilate nutrients. In other words, as flow decreases, the stream cannot dilute its constituents causing the concentration of plant nutrients to increase.

The critical low flow definition in 20.6.4.11 NMAC indicates that for numeric criteria (e.g., TP), the critical low flow is the 4Q3, which is defined as the minimum average four consecutive day flow that occurs with a frequency of at least once every 3 years. The 4Q3 was calculated using the 11-year period from 2004-2015. 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 A.D. 1000 – 2000 (Gutzler 2007). SWQB tested this idea by calculating flows for different time periods. It was discovered, presumably because of drying trends in the region, that using the full period of record may over-predict flows currently being observed in the Rio Ruidoso.

For the narrative TN translator, the WQS regulations do not require a specific low flow condition, and after careful consideration of a number of critical flow conditions NMED is proposing to use the average annual median flow. The use of the median flow, rather than a 4Q3 flow, is appropriate because of the long term growth cycle of algae in response to excess nutrients, in contrast to protecting for acute toxicity. The summer months are the critical time period for nutrient growth as this is when stream temperature, and thus stream metabolism, is greatest. However, based on SWQB review, there is no significant difference between the summer and annual median flow values, so the average annual median flow for 2004-2015 was used for the TN TMDL calculations. For the same reasons as discussed above for the 4Q3 flow, median flow for the last decade (2004-2015) was used. Other states have also used median flow for TMDL calculations, such as in the phosphorus TMDL for the Little Bear River in Utah (UDEQ 2006) and Rock River in Wisconsin (WIDNR 2011).

When available, USGS gages are used to estimate flow. There are two gages on the Rio Ruidoso (see Section 2.4.2) but one active gage in the Rio Ruidoso watershed that is appropriate to estimate flow for the impaired reaches (**Table 3.4**). The 4Q3 flow was estimated using gage data from the Rio Ruidoso 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.

A climatic year starting April 1 of the prior year and ending March 31 is often used when examining critical low flow conditions in the United States. This choice reduces the likelihood of splitting low flow periods - typically found in the summer or fall - across different years and thereby affecting the results of Log Pearson Type III analysis of series of annual low flows. A different climatic year or shorter season may be used if low flow periods occur at other times of the year or overlap the boundaries of the climatic year.

Table 3.4 USGS gage in the Rio Ruidoso used for TMDL flow estimations

USGS Gage	Site Name	Period of Record	4Q3*	Annual median*
08387000	Rio Ruidoso at Hollywood	1953-present	1.67 cfs 1.08 mgd	9.13 cfs 5.90 mgd

*Time period used for calculation was 01-01-2004 to 12-31-2015

The 4Q3 and average annual median flows for the Rio Ruidoso at Hollywood gage are displayed in **Table 3.4**. Because the bottom of the assessment unit at Eagle Creek is below the 08387000 gage, the gage flows were area weighted according to Thomas et al. (1997).

Critical flow ungaged = Q(u) = Q(g) x $(Au/Ag)^{0.5}$
Where:
Q(g) = Critical flow at the gaged site (cfs)
Au = drainage area at the ungaged site (mi^2)
Ag = drainage area at the gaged site (mi^2)
Q(u) = area weighted critical flow at the ungaged site (cfs)

Finally, in order to calculate the critical flow for the total Rio Ruidoso watershed, the design capacity (2.70 mgd) of the Village of Ruidoso/City of Ruidoso Downs Wastewater Treatment Plant (WWTP) was added to the area weighted 4Q3 and average annual median flow because the WWTP is located downstream of the gage. The calculation of the total critical flow for the Rio Ruidoso watershed is outlined in **Table 3.5**.

Table 3.5 Flow summaries for Rio Ruidoso watershed

Watershed	Parameter	Area-weighted Stream Critical Flow (mgd)	WWTP Design Flow (mgd)	Total Critical Flow (mgd)*
Rio Ruidoso watershed upstream of Eagle Creek	Total Phosphorus	1.37	2.7	4.07
	Total Nitrogen	7.46	2.7	10.2

*Total critical flow = stream critical flow + WWTP design flow

It is important to remember that in this case, the TMDL itself is a value calculated at a defined critical flow condition, and is calculated as part of the 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 also vary.

3.3 TMDL Calculation

This subsection describes the relationship between the numeric nutrient targets and the allowable pollutant-level by determining the total assimilative capacity of the waterbody, or loading capacity, for the pollutant. The loading capacity is the maximum amount of pollutant loading that a waterbody can receive while meeting its water quality objectives.

As a river flows downstream it has a specific carrying capacity for nutrients. This carrying capacity, or TMDL, is defined as the mass of pollutant that can be carried under critical flow conditions without violating the target concentration for that constituent. These TMDLs were developed based on simple dilution calculations using critical flows, the numeric target, and a conversion factor. The specific carrying capacity of a receiving water for a given pollutant, was estimated using Equation 3-1. The calculated daily target loads (i.e. TMDLs) for TP and TN are summarized in **Table 3.6**.

Critical flow (4Q3) x WQS x Conversion Factor = Target Loading Capacity (TMDL) **(Eq. 3-1)**

Table 3.6 Daily target loads for TP & TN

TMDL Watershed	Parameter	Critical Flow (mgd)[(a)]	In-Stream Target (mg/L)	Conversion Factor	TMDL (lbs/day)
Rio Ruidoso watershed upstream of Eagle Creek	Total Phosphorus	4.07	0.1	8.34	3.39
	Total Nitrogen	10.2	1.0	8.34	84.8

Notes: *(a)* See Section 3.2 for details about critical flow calculations.

This total TMDL for the Rio Ruidoso watershed upstream of Eagle Creek is then allocated as follows: first the MOS is subtracted as described in Section 3.4, then the Load Allocation is subtracted as described in Section 3.5.1, and the remainder is the Waste Load Allocation as described in Section 3.5.2.

3.4 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. The MOS can be expressed either implicitly or explicitly. 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.

For these nutrient TMDLs, the margin of safety was developed using a combination of conservative assumptions and explicit recognition of potential errors. Therefore, this margin of safety is the sum of the following two elements:

- *Conservative Assumptions*
    - Treating phosphorus and nitrogen as pollutants that do not readily degrade in the environment.

- *Explicit Recognition of Potential Errors*
    - Uncertainty exists in sampling nonpoint sources of pollution. A conservative MOS for this element is therefore **5 %**.
    - There is inherent error in all flow measurements; a conservative MOS for this element in gaged streams is **5 %**.

3.5 Load Allocations and Waste Load Allocations

3.5.1 Load Allocation

The total LA for the Rio Ruidoso watershed upstream of Eagle Creek was calculated using the total area-weighted critical stream flow from the 08387000 gage (see **Table 3.5**) and the targets proposed in the "*Refinement of Stream Nutrient Impairment Thresholds in New Mexico"* summary report (NMED/SWQB 2016b) of 0.061 mg/L TP and 0.37 mg/L TN. The Total Watershed LA is listed in **Table 3.7.**

Table 3.7 Watershed Load Allocation

TMDL Watershed	Parameter	Unimpaired concentration (mg/L) [(a)]	Critical flow (mgd) [(b)]	Conversion Factor	Total LA (lbs/day)
Rio Ruidoso watershed upstream of Eagle Creek	Total Phosphorus	0.061	1.37	8.34	0.69
	Total Nitrogen	0.37	7.46	8.34	23.0

[(a)] Unimpaired concentration from "*Refinement of Stream Nutrient Impairment Thresholds in New Mexico*" summary report

[(b)] Critical flow is area-weighted as described in Section 3.2. The critical flow for the LA does not include the 2.70 mgd WWTP design capacity

The total LA (**Table 3.7**) was subdivided into a load allocation and a background load allocation based on a percent watershed approach. The background LA is comprised of loading contributed to the impaired watershed from tributaries or upstream watersheds. For example, Carrizo Creek is 26% of the total watershed area of the Rio Ruidoso upstream of Eagle Creek, the Rio Ruidoso watershed upstream of Carrizo Creek is 13% of the total watershed area, and the watershed upstream of the Mescalero Apache boundary is 10% of the watershed area; the background LA is the sum of the individual tributary loads. Therefore, the Background LA for the watershed was calculated as follows:

TP Background LA = 0.25 lbs/day
Carrizo Creek Background LA = percent watershed x total LA
= 26% x 0.69 lbs/day
= 0.18 lbs/day
Rio Ruidoso above Mescalero bnd = percent watershed x total LA
= 10% x 0.69 lbs/day
= 0.07 lbs/day
Therefore, 0.18 lbs/day + 0.07 lbs/day = 0.25 lbs/day

TN Background LA = 9.06 mg/L
Carrizo Creek Background LA = percent watershed x total LA
= 26% x 23 lbs/day
= 5.97 lbs/day
Rio Ruidoso Watershed (above Carrizo Creek) = percent watershed x total LA
= 13% x 23 lbs/day
= 3.09 lbs/day
Therefore, 5.97 lbs/day + 3.09 lbs/day = 9.06 lbs/day

3.5.2 Waste Load Allocation

There are no National Pollutant Discharge Elimination System (NPDES) individual permits that discharge to the Rio Ruidoso (US Hwy 70 to Carrizo Creek) or Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd) assessment units. However, the Village of Ruidoso/City of Ruidoso Downs WWTP (NM0029165) directly discharges into the Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) assessment unit, the most downstream AU in the previously-defined watershed. The WWTP was upgraded and became operational in 2011. The total WLA was calculated as the remainder of the TMDL after subtracting the MOS and LA for the Rio Ruidoso watershed upstream of Eagle Creek (**Table 3.8**). The total WLA was further divided (based on flow proportion) into a Current WLA and a Future Growth WLA as follows, where 1.88 mgd is the maximum WWTP discharge for the 2012-2016 period and 2.70 mgd is the design flow of the plant:

Total TP WLA = 2.36 lbs/day TP
Current TP WLA = 2.36 x (1.88 mgd/2.70 mgd) = 1.64 lbs/day
Future Growth TP WLA = 2.36 – 1.64 = 0.72 lbs/day

Total TN WLA = 53.3 lbs/day
Current TN WLA= 53.3 x (1.88 mgd/2.70 mgd) = 37.1 lbs/day
Future Growth WLA = 53.3 – 37.1 = 16.2 lbs/day

Discharge Monitoring Reports (DMRs) from the Village of Ruidoso/City of Ruidoso Downs WWTP for the 2012-2016 period are included in **Appendix C**.

Nutrient removal is a pressing challenge facing wastewater treatment facilities. Nutrients can be removed from wastewater via biological, chemical, or combined biological and chemical processes. There are limits of removal that can be achieved with different removal mechanisms. The limit of technology, based on annual averages, is generally considered to be 0.1 mg/L for TP and 3 mg/L for TN (Jeyanayagam 2005). More recent studies by USEPA show that the limit of technology for TP is less than 0.01 mg/L. According to USEPA (2007), chemical addition to wastewater with aluminum, or iron-based coagulants followed by tertiary filtration, can reduce TP concentrations in the final effluent to very low levels. Land application of tertiary effluent through soil has been shown to meet a TP effluent concentration of 0.01 mg/L at all times (USEPA 2008). In addition, the cost of applying tertiary treatment for phosphorus removal is affordable, with monthly residential sewer rates charged to maintain and operate the entire treatment facility ranging from as low as $18 to as high as $46 (USEPA 2007).

TP concentrations in treated effluent typically range from 0.1 to 1.0 mg/L, whereas TN concentrations typically range from 3.0 to 10.0 mg/L, depending on the removal process and site-specific conditions. Some facilities may be able to achieve lower concentrations by using a combination of biological and chemical treatments, however biological treatment is highly temperature dependent therefore seasonal limits may need to be considered in some cases. The choice of technology to be used as well as the option and use of seasonal limits depend on the site-specific conditions, such as temperature, dissolved oxygen levels, and pH in combination with the economic feasibility.

The Ruidoso Downs Racetrack is located within the Rio Ruidoso (Hwy 70 bridge to Carrizo Creek) assessment unit. The racetrack does not currently have a NPDES individual permit; however, the racetrack submitted a Notice of Intent (NOI) to obtain coverage under the Concentrated Animal Feeding Operation (CAFO) general permit but the NOI was not approved. The current general CAFO permit states that "*there shall be no discharge of manure, litter, or process wastewater pollutants into waters of the United States from the production area*" except in extreme precipitation events described in the permit. The new general CAFO permit is expected to be issued in 2016. As no discharge is expected from this CAFO unless it exceeds the 25 year – 24 hour event, no WLA is assigned to the facility at this time.

There are no Municipal Separate Storm Sewer System (MS4) permits in these AUs. However, excess nutrient loading may be a component of some storm water discharges covered under general NPDES permits. There may be storm water discharges from construction activities covered under the NPDES Construction General Permit (CGP). Permitted sites require preparation of a 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, 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 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 available tools. Loads that are in compliance with the General Permits are therefore currently included as part of the LA. The City's sewer line extension project and the sewer interceptor replacement project are discussed in Section 5.0.

In summary, a watershed TMDL was calculated as described in Section 3.3 and a watershed LA (Section 3.5.1) and WLA (Section 3.5.2) were calculated. A summary of the allocations is included in **Table 3.8.**

Table 3.8 Allocation of TMDLs for TP and TN

TMDL Watershed	Parameter	WLA[(a)] (lbs/day)		LA (lbs/day)		MOS (10%)	TMDL (lbs/day)
		C	**FG**	**LA**	**BLA**		
Rio Ruidoso watershed upstream of Eagle Creek	Total Phosphorus	1.64	0.72	0.44	0.25	0.34	3.39
		C	**FG**	**LA**	**BLA**		
	Total Nitrogen	37.1	16.2	14.0	9.06	8.48	84.8

Notes: *(a)* WLA is for NM0029165. CAFO permit is pending; WLA for CAFO will remain zero. C= Current WLA and FG= Future Growth WLA. LA = Load Allocation and BLA = Background Load Allocation.

3.5.3 Load Reductions

The measured loads for TP and TN can be calculated using Equation 3-1; the measured load for the Rio Ruidoso (Eagle Creek to US Hwy 70) AU, as a representation of the entire Rio Ruidoso watershed upstream of Eagle Creek, is presented in **Table 3.9** The load reductions necessary to meet the target loads were calculated as the difference between the calculated daily target load (**Table 3.6**) and the measured load, and are shown in **Table 3.9**.

Table 3.9 Calculation of load reduction for TP and TN

TMDL Watershed	Parameter	Target Load[(a)] (lbs/day)	Measured Load[(b)] (lbs/day)	Load Reduction (lbs/day)	Percent Reduction[(c)]
Rio Ruidoso watershed upstream of Eagle Creek	Total Phosphorus	3.05	7.96	4.91	62%
	Total Nitrogen	76.3	132	55.7	42%

Notes: *(a)* Target Load = TMDL – MOS. The MOS is not included in the load reduction calculations because it is a set aside value, which accounts for any uncertainty or variability in TMDL calculations and therefore should not be subtracted from the measured load.

(b) The measured load is the magnitude of point and nonpoint sources. It is calculated using mean measured values for the Rio Ruidoso (Eagle Creek to US Hwy 70 bridge) AU (see Appendix C) and the total critical flow (Table 3.5).

(c) Percent reduction is the percent the existing measured load must be reduced to achieve the target load, and is calculated as follows: (Measured Load – Target Load) / Measured Load x 100.

3.6 Identification and Description of Pollutant Sources

SWQB fieldwork includes an assessment of the probable sources of impairment (**Appendix A**). The approach for identifying "Probable Sources of Impairment" was modified 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 (**Table 3.10**) will be reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period.

Table 3.10 Pollutant source summary for plant nutrients and total phosphorus

TMDL Watershed	NPDES permits[(a)]	Probable Sources
Rio Ruidoso watershed upstream of Eagle Creek	NM0029165	Bridge/culverts/railroad crossings, CAFO, channelization, drought-related impacts, dumping/garbage/litter/trash, flow alterations, gravel/dirt roads, highway/road/bridge runoff, inappropriate waste disposal, livestock grazing, mass wasting, on-site treatment systems, pavement/impervious surfaces, rangeland grazing, residences/buildings, stream channel incision, surface films/odors, urban runoff/storm sewers, waste from pets, waterfowl, watershed runoff following forest fire.

Notes: *(a)* Racetrack CAFO permit pending NMG010000.

The Probable Source Identification Sheets in **Appendix A** provide an approach for a visual analysis of a pollutant source along an impaired reach. Although this procedure is qualitative, 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. Probable sources of impairment along each reach as determined by field reconnaissance and assessment are listed in **Table 3.10**. Probable sources of nutrients will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

3.7 Linkage between Water Quality and Pollutant Sources

The source assessment phase of TMDL development identifies sources of nutrients that may contribute to both elevated nutrient concentrations and the stimulation of algal growth in a waterbody. 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.

Photo 1: Algae at Rio Ruidoso at County Road E002. Credit: NMED/SWQB, 2012.

Phosphorus and nitrogen generally drive the productivity of algae and macrophytes in aquatic ecosystems, therefore they are regarded as the primary limiting nutrients in freshwaters. The main reservoirs of natural phosphorus are rocks and natural phosphate deposits. Weathering, leaching, and erosion are all processes that breakdown rock and mineral deposits allowing phosphorus to be transported to aquatic systems via water or wind. The breakdown of mineral phosphorus produces inorganic phosphate ions ($H_2PO_4^-$, HPO_4^{2-}, and PO_4^{3-}) that can be absorbed by plants from soil or water (USEPA 1999). Phosphorus primarily moves through the food web as organic phosphorus (after it has been incorporated into plant or algal tissue) where it may be released as phosphate in urine or other waste by heterotrophic consumers and reabsorbed by plants or algae to start another cycle (Nebel and Wright 2000).

The largest reservoir of nitrogen is the atmosphere. About 80% of the atmosphere by volume consists of nitrogen gas (N_2). Although nitrogen is plentiful in the environment, it is not readily available for biological uptake. Nitrogen gas must be converted to other forms, such as ammonia (NH_3 and NH_4^+), nitrate (NO_3^-), or nitrite (NO_2^-) before plants and animals can use it. Conversion of gaseous nitrogen into usable mineral forms occurs through three biologically mediated processes of the nitrogen cycle: nitrogen fixation, nitrification, and ammonification (USEPA 1999). Mineral forms of nitrogen can be taken up by plants and algae and incorporated into their tissue. Nitrogen follows the same pattern of food web incorporation as phosphorus and is released in waste primarily as ammonium compounds. The ammonium compounds are usually converted to nitrates by nitrifying bacteria, making it available again for uptake, starting the cycle anew (Nebel and Wright 2000).

Rain, overland runoff, groundwater, drainage networks, and industrial and residential waste effluents transport nutrients to receiving waterbodies. Once nutrients have been transported into a waterbody they can be taken up by algae, macrophytes, and microorganisms either in the water column or in the benthos; they can sorb to organic or inorganic particles in the water column and/or sediment; they can accumulate or be recycled in the sediment; or they can be transformed and released as a gas from the waterbody (**Figure 3.3**).

As noted above, phosphorus and nitrogen are essential for proper functioning of ecosystems. However, excess nutrients cause conditions unfavorable for the proper functioning of aquatic ecosystems. Nuisance levels of algae and other aquatic vegetation (macrophytes) can develop rapidly in response to nutrient enrichment when other factors (e.g., light, temperature, substrate) are not limiting (**Figure 3.3**). The relationship between nuisance algal growth and nutrient enrichment in stream systems has been well documented in the literature (Welch 1992; Van Nieuwenhuyse and Jones 1996; Dodds *et al.* 1997; Chetelat *et al.* 1999). Unfortunately, the magnitude of nutrient concentration that constitutes an "excess" is difficult to determine and varies by ecoregion. The recommended level of total phosphorus to avoid algal blooms in nitrogen-limited ecosystems is 0.01 to 0.1 mg/L and 0.1 mg/L to 1 mg/L of total nitrogen. The upper end of these ranges also support less biological diversity (NOAA/USEPA 1988).

An algal bioassay study conducted in the Rio Ruidoso prior to the development of the 2006 TMDL indicates that the Rio Ruidoso nitrogen limited, but that the addition of both phosphorous and nitrogen also caused algal growth. Recent data collections by SWQB show that nutrient ratios vary seasonally, but during the summer the existing ratio of TN:TP is approximately 10:1. The biogeochemical cycling of N and P are closely linked to each other, and thus measures focusing on one of the nutrients can influence the other (Ekholm 2008). Davidson and Howarth (2007) summarize the combined effect of TN and TP in aquatic ecosystems with the following:

> "*Analysis demonstrates a surprisingly consistent pattern of a synergistic effect of N and P addition on net primary productivity across all ecosystem types. Adding N and P together seems to give photosynthesis by algae and higher plants more of a boost than adding either one separately… the stoichiometry of N and P supply and demand must generally be in close balance in most ecosystems. According to this interpretation, P is rarely available in great excess relative to N, so a modest addition of N quickly provokes a limitation on P. When N and P are added together, N and P limitation may alternate in numerous small incremental steps, ultimately producing a synergistic effect.*"

Seasonal changes in nutrient limitation and co-limitation are often observed in freshwater stream systems (USEPA 2012).

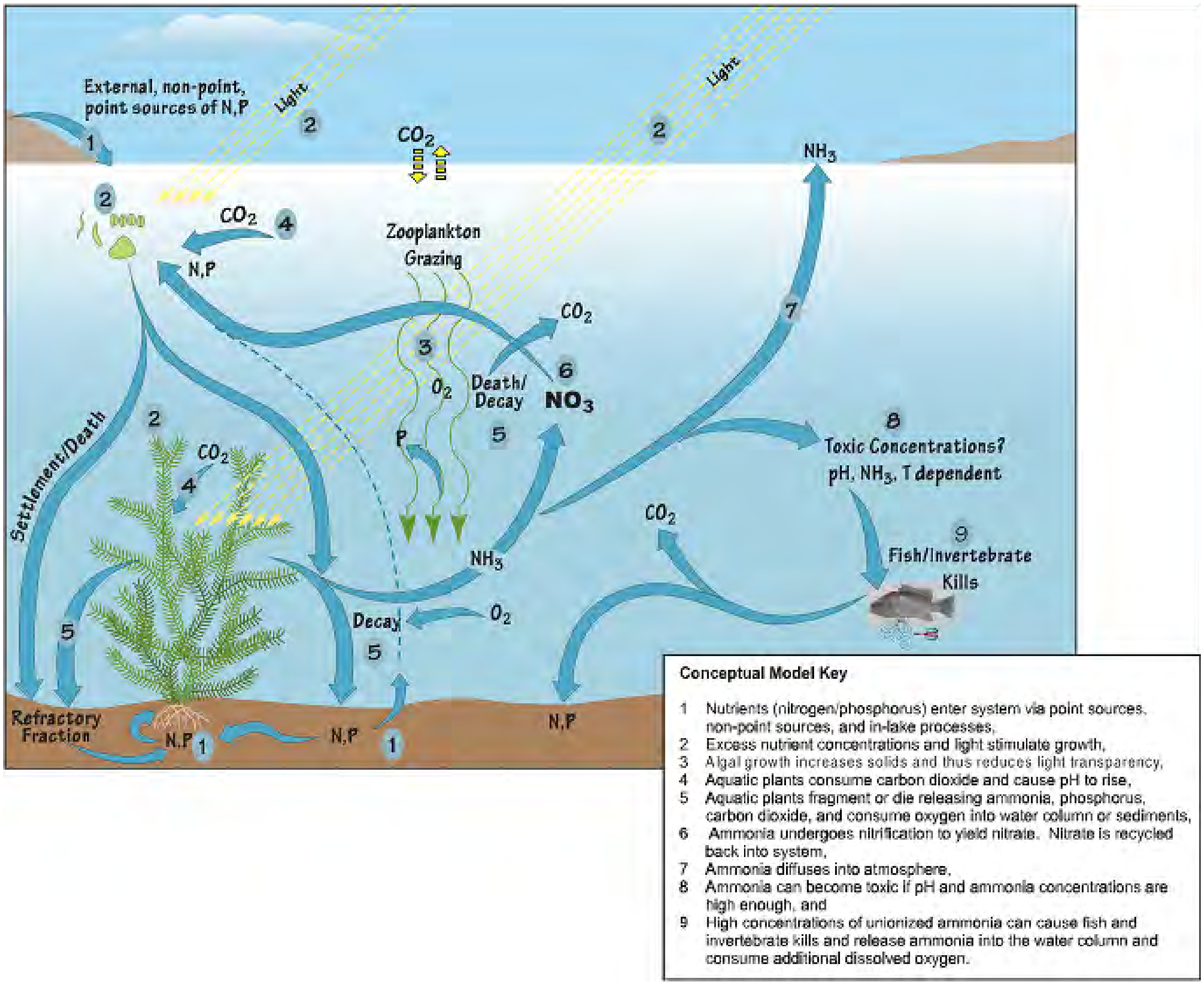

Figure 3.3 Nutrient conceptual model (USEPA 1999)

As described in Section 3.2, the presence of plant nutrients in a stream can vary as a function of flow. As flow decreases through water diversions and/or drought-related stressors, the stream cannot effectively dilute its constituents, which causes the concentration of plant nutrients to increase. Nutrients generally reach a waterbody from land uses that are in close proximity to the stream because the hydrological pathways are shorter and have fewer obstacles than land uses located away from the riparian corridor. During the growing season (i.e. in agricultural return flow) and in storm water runoff, distant land uses can become hydrologically connected to the stream, thus transporting nutrients from the hillslopes to the stream during these time periods.

In addition to agriculture, there are several other human-related activities that influence nutrient concentrations in rivers and streams. Residential areas contribute nutrients from septic tanks, landscape maintenance, as well as backyard livestock (e.g., cattle, horses) and pet wastes. Urban development contributes nutrients by disturbing the land and consequently increasing soil erosion, by increasing the impervious area within the watershed, and by directly applying nutrients to the landscape. Recreational activities such as hiking and biking can also contribute nutrients to the stream by reducing plant cover and increasing soil erosion (e.g., trail network, streambank destabilization), direct application of human waste, campfires and/or wildfires, and dumping trash near the riparian corridor.

Undeveloped, or natural, landscapes also can deliver nutrients to a waterbody through decaying plant material, soil erosion, and wild animal waste. Another geographically occurring nutrient source is atmospheric deposition, which adds nutrients directly to the waterbody through dryfall and rainfall. Atmospheric phosphorus and nitrogen can be found in both organic and inorganic particles, such as pollen and dust as well as anthropogenic sources such as combustion and agriculture. The contributions from these natural sources are generally considered to represent background levels.

Photo 2: Cattle at Rio Ruidoso upstream of Highway 70 bridge. Credit: NMED/SWQB, 2003.

Water pollution caused by on-site septic systems is a widespread problem in New Mexico (McQuillan 2004). Septic system effluents have contaminated more water supply wells, and more acre-feet of ground water, than all other sources in the state combined. Groundwater contaminated by septic system effluent can discharge into streams gaining from groundwater inflow. Nutrients such as phosphorous and nitrogen released into gaining streams from aquifers contaminated by septic systems can contribute to eutrophic conditions.

3.8 Consideration of Seasonal Variability

Section 303(d)(1) of the CWA requires TMDLs to be "established at a level necessary to implement the applicable WQS with seasonal variation." Data used in the calculation of this TMDL were collected during the spring, summer, and fall to ensure coverage of any potential seasonal variation in the system. Exceedences were observed during all seasons, which captured flow alterations related to snowmelt, the growing season, and summer monsoonal rains. The critical condition used for calculating the TMDL is considered to be conservative and protective of the water quality standard under all flow conditions. Based on SWQB review, there is no significant difference between the summer and annual median flow values, so the average annual median flow was chosen for the TN TMDL calculations (see Section 3.2). Calculations made at the critical flow, in addition to using other conservative assumptions as described in the previous section on MOS, should be protective of the water quality standards designed to preserve aquatic life in the stream. It was assumed that if critical conditions were met during this time, coverage of any potential seasonal variation would also be met. Flow considerations are discussed in Section 3.2.

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 in Lincoln, Chaves, and Otero counties are not anticipated to lead to a significant increase in nutrients that cannot be controlled with BMPs. 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. The Total WLA for the NM0029165 permit was divided into a Current WLA and a Future Growth WLA in order to facilitate the allocation of additional WLA to the facility if it begins to discharge at its design flow.

4.0 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, Sections 74-6-1 to -17, 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 2010b) and submitted it to USEPA 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 2021-2022. 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 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.

5.0 IMPLEMENTATION OF TMDLS

When approving TMDL documents, EPA takes action on the TMDL, LA, WLA, and other components of the TMDL as needed (e.g. MOS and future growth). EPA does not take action on the implementation section of the TMDL, and EPA is not bound to implement any recommendations found in this section, in particular if they are found to be inconsistent with Clean Water Act and NPDES regulations, guidance, or policy.

5.1 Point Sources – NPDES permitting

City of Ruidoso Downs and Village of Ruidoso WWTP (NPDES permit NM0029165)

In 1987, Congress passed amendments to the Clean Water Act (CWA). In those amendments, Congress added two "anti-backsliding" provisions, Sections 303(d)(4), that restrict the circumstances under which NPDES permit limits may be relaxed upon permit renewal, reissuance, or modification. Section 303(d)(4), which identifies further grounds for backsliding for water quality-based permits. Under Section 303(d)(4),

> "*For waters… where the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard…*"

As explained by USEPA, for non-attainment waters, 303(d)(4) allows backsliding only where the existing permit limit sought to be revised is based on a TMDL or other WLA, and the revised permit limit assures attainment of the water quality standard at issue.

This revised nutrient TMDL allocates a larger waste load allocation and assigns less stringent permit limits for plant nutrients than the original 2006 TMDL (NMED/SWQB 2006). However, the revised TMDL is calculated using the same protective, in-stream targets from the original TMDL and the revised wasteload allocations assigned to the Ruidoso/Ruidoso Downs WWTP (NM0029165) are consistent with the TMDL. Therefore, if the conditions in the TMDL are met, attainment of the water quality standard is assured.

There are WLAs for TN and TP assigned to the Ruidoso/Ruidoso Downs WWTP. Due to the chronic rather than acute nature of nutrient impairments (as discussed in Section 3) the TN and TP effluent limits should be implemented as a 30-day average, or longer averaging period, rather than a daily maximum limit[3] in the future permit. Based on DMRs submitted by the permittee from January 2012-April 2016 (see Appendix C), the average monthly (i.e., 30-day) effluent loading was 30.1 lbs/day TN and 0.7 lbs/day TP. As the WWTP daily discharge changes,

[3] See Section 4.3.1.4 of the June 2014 National Association of Clean Water Agencies' review of EPA's Methods for Setting Water Quality-Based Effluent Limits for Nutrients. http://www.ppacg.org/files/ENVIRON/AF%20CURE/effluent_limits_june2014.pdf

nutrient concentrations in the effluent would have to change accordingly to maintain the assigned WLA. For example, as discharge volume increases, the effluent concentrations would need to decrease in order to meet the WLA. The concentrations associated with the Total WLA as well as the Current WLA and Future Growth WLA are 0.11 mg/L TP and 2.41 mg/L TN. However, as detailed below, SWQB encourages EPA Region 6 to include only loading (and not concentrations) in future permits. SWQB suggests that the next permit include the Current-WLA with a provision that addresses the permittee's ability to apply for portions of the FG-WLA during the next permit renewal or through a permit revision.

SWQB offers the following considerations in order to address TMDL implementation through the next NPDES permit process. It is possible that a combination of portions of the following options could result in the most effective implementation of the TMDL and WLA through the permit process.

- The next permit could be issued utilizing interim temperature-dependent TN 30-day average permit limits, similar to the previous permit, and include a compliance schedule to allow the facility time to meet the new WLA.

- The next permit could only include loading limits that would be based on a 30-day average (or longer averaging period) rather than a daily maximum. The permit could include a compliance schedule to allow the facility time to meet the new WLA.

- The next permit could include additional nutrient monitoring beyond the minimum of twice monthly.

- A Temporary Standard (TS) provision was approved by the NMWQCC in September 2016 as part of the Triennial Review. As approved, a TS proposal could be submitted that is waterbody-pollutant specific. The TS would apply for a set amount of time and would include milestones to be achieved. The original water quality standard would apply upon expiration of the TS. SWQB is currently working with USEPA to implement a work plan that details a nutrient implementation strategy for point source dischargers.

There are no other individual NPDES permits that discharge to assessment units addressed in this document. The MSGP and CGP NPDES permits, as well as the pending CAFO permit for the Ruidoso Downs Racetrack, are discussed in Section 3.5.2.

5.2 Nonpoint Sources – WBP and BMP Coordination

The 2007 Settlement Agreement between NMED and the City of Ruidoso Downs and the Village of Ruidoso outlined plans to address non-point sources in the Rio Ruidoso watershed. The City of Ruidoso Downs and the Village of Ruidoso submitted the final report in fulfillment of the Settlement Agreement in March 2013. The City of Ruidoso Downs and the Village of Ruidoso continue to pursue projects to address non-point source sources of nutrients in the Rio Ruidoso watershed. As a result of the June 2008 flood, the Village of Ruidoso entered into an agreement on January 9, 2016 with the Federal Emergency Management Agency (FEMA) and the New Mexico Department of Homeland Security and Emergency Management to include hazard mitigation of disaster-damaged elements of the Ruidoso Sewer Line Relocation Project. The facility sustained damage as a result of flooding (FEMA-1783-DR-NM) and will be funded under the Public Assistance Grant Program authorized for the major disaster declaration FEMA-11783-DR-NM declared on August 14, 2008. The Project will include design, project management costs and repair and replacement costs to mitigate the flood damage to the Ruidoso Sewer System in the Upper, Middle and Lower Canyon of Ruidoso and Ruidoso Downs, which probably contains leaks, located under the Rio Ruidoso. The main sewer line will be relocated away from the river bed. FEMA has approved 30% of the design of the Project, and the Village has completed this first portion of design. Design is planned to resume in August 2016, and construction is planned to begin in 2017.

Public awareness and involvement will be crucial to the successful implementation of these plans and improved water quality. A Watershed-Based Plan ("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. BMPs to be considered as part of on-the ground-projects to address nutrients include: bioretention areas (rain gardens), vegetated water quality swales, infiltration trenches and basins, riparian buffer or vegetation filter strips, constructed wetlands, stormwater detention or wetland retrofits, cisterns, and permeable pavement. Additional information about the reduction of non-point source pollution can be found online at: https://www.epa.gov/polluted-runoff-nonpoint-source-pollution.

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.

5.3 Clean Water Act §319(h) Funding

The Watershed Protection Section of the SWQB can potentially provide USEPA Section 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 Section 319(h) can be found at the SWQB website: http://www.nmenv.state.nm.us/swqb/.

Historically, the Ruidoso River Association was involved in watershed restoration and planning. The following four projects were previously funded with 319(h) funds in the Rio Ruidoso watershed-

- Rio Ruidoso Watershed Restoration Project Phase I (FY98-D).

- Upper Hondo Restoration Project Phase I (FY01-L).
- Rio Ruidoso Watershed Restoration Project Phase II (FY03-D).
- Upper Hondo Restoration Project Phase II (FY06-B).

SWQB staff will continue to conduct outreach related to the CWA 319(h) funding program which could lead to the formation of additional watershed groups in the area.

5.4 Other Funding Opportunities and Restoration Efforts in the Rio Ruidoso Watershed

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 are 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.

SWQB annually makes available Section 604(b) funds through a Request for Quotes (RFQ) process. SWQB requests quotes from regional public comprehensive planning organizations to conduct water quality management planning as defined under Sections 205(j) and 303(e) and the CWA. SWQB seeks proposals to conduct water quality management planning with a focus on projects that clearly address the State's water quality goals to preserve, protect and improve the water quality in New Mexico. SWQB encourages proposals focused on TMDLs and UAAs or other water quality management planning activities that will directly address identified water quality impairments. The SWQB 604(b) RFQ is released annually in September.

The New Mexico Legislature appropriated $2.3 million in state funds for the River Stewardship Program during the 2014 Legislative Session, $1 million during the 2015 Special Session, and $1.5 million during the 2016 Legislative Session. 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." A competitive request for proposals was conducted for 2014 funding and twelve projects located throughout the state were selected. Responsibility for the program is assigned to NMED, and SWQB staff administers the projects. SWQB issued a competitive request for proposals for the 2015-2016 funding in early 2016. Submitted project proposals have been reviewed, funding has been approved, and contracts are currently in development.

Information on additional watershed restoration funding resources is available on the SWQB website at- https://www.env.nm.gov/swqb/Watershed_Protection/FundingSourcesforWatershedProtection.pdf.

6.0 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[4]) 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[5]. 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[6]. 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)[7]. New Mexico's CWA Section 319 program has been developed in a coordinated manner with the State's Section 303(d) process. All Section 319 watersheds that are targeted in the annual RFP process coincides 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

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[4] http://www.nmlegis.gov/sessions/03%20Regular/FinalVersions/HB0114.html
[5] http://www.nmlegis.gov/sessions/03%20Regular/FinalVersions/HB0114.html
[6] http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0004.htm
[7] http://www.epw.senate.gov/water.pdf

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.

7.0 PUBLIC PARTICIPATION

Public participation was solicited in development of the first draft of this TMDL document (*E.coli*, turbidity, total phosphorus, and plant nutrient TMDLs). The first draft TMDL was made available for a 30-day comment period beginning on July 7, 2014. 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. Comments on the revised TMDL and the draft Response to Comments were received from EPA Region 6, Steve Sugarman (representing Rio Hondo Land & Cattle Co, LP and WildEarth Guardians), and Village of Ruidoso/City of Ruidoso Downs on January 5, 2015. The plant nutrient and total phosphorus TMDLs were removed from the document and the remaining *E.coli* and turbidity TMDLs were presented to the WQCC for approval on August 11, 2015 and received USEPA Region 6 approval on September 21, 2015. On February 22, 2016, SWQB received from the Village of Ruidoso/City of Ruidoso Downs Joint Use Board, a Notice of Intent to conduct a Use Attainability Analysis (UAA) on the Rio Ruidoso downstream of the Highway 70 bridge.

The revised plant nutrient and total phosphorus TMDL document was made available for a 30-day comment period beginning on August 22, 2016.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 will be held on September 14, 2016 in Ruidoso. In addition, a separate meeting will be held with affected stakeholders on September 7, 2016 in Ruidoso.

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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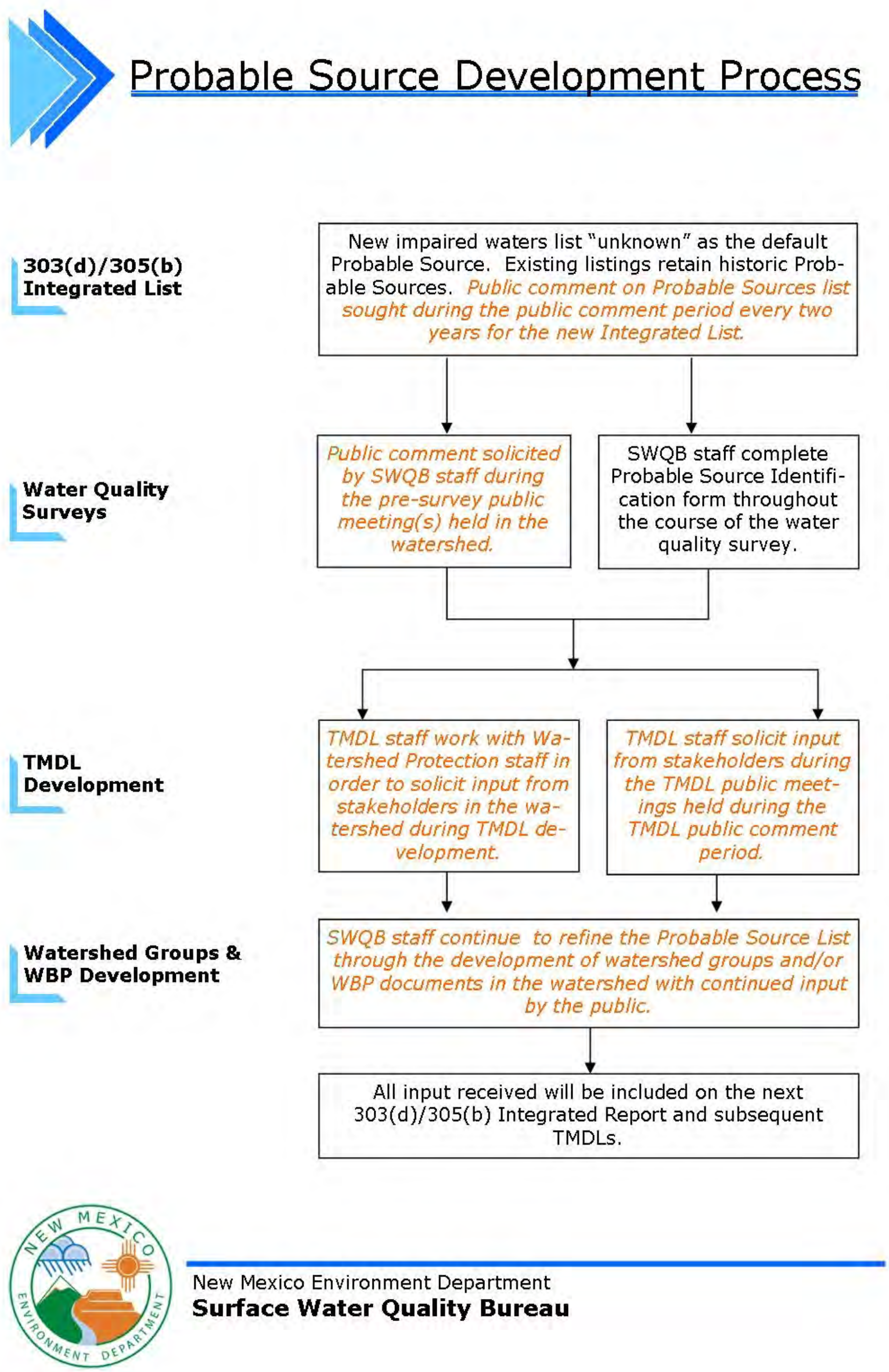
Figure B1. Probable Source Development Process and Public Participation Flowchart



APPENDIX C

WATER QUALITY DATA

Table C1. Plant nutrient data

Assessment Unit	Site	Date	TN (mg/L)	TP (mg/L)	TN:TP ratio
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	7/26/2012	0.61	0.14	4.4
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	8/7/2012	0.7	0.031	22.6
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	8/22/2012	9.32	2.56	3.6
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	9/5/2012	1.17	0.107	10.9
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	9/12/2012	0.56	0.153	3.7
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	7/9/2014	0.61	0.017	35.9
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido031.5	7/17/2014	0.82	0.034	24.1
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	7/26/2012	10.12	3.11	3.3
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	8/7/2012	0.3	0.048	6.3
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	8/22/2012	8.19	2.39	3.4
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	9/12/2012	0.43	0.066	6.5
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	7/9/2014	0.41	0.02	20.5
Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	57RRuido039.4	7/17/2014	0.3	0.005	60.0

Assessment Unit	Site	Date	TN (mg/L)	TP (mg/L)	TN:TP ratio
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	7/26/2012	0.57	0.125	4.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	8/7/2012	0.67	0.036	18.6
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	8/22/2012	8.43	2.14	3.9
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	9/5/2012	0.47	0.03	15.7
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido030.5	9/12/2012	0.96	0.069	13.9
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	8/7/2012	1.08	0.044	24.5
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	8/22/2012	2.62	0.777	3.4
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	9/5/2012	0.5	0.037	13.5
Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	57RRuido019.8	9/12/2012	0.75	0.076	9.9

	TN	TP	Ratio
Average	2.089231	0.537577	14.2322
Median	0.685	0.0915	10.4015
Maximum	10.12	3.11	60
minimum	0.3	0.005	3.254019
sample size	26	26	22

Table C2. Total phosphorus data

Assessment Unit	Site	Date	TP (mg/L)
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	4/4/2012	0.026
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	5/8/2012	0.037
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	6/13/2012	0.01
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	7/25/2012	2.58
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	8/7/2012	0.083
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	8/22/2012	2.27
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	9/5/2012	0.114
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	9/12/2012	0.09
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	9/19/2012	0.083
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	10/10/2012	0.261
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	7/9/2014	0.014
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido045.3	7/17/2014	0.024
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	4/4/2012	0.02
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	5/8/2012	0.017
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	6/13/2012	0.025
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	7/10/2012	2.37
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	8/7/2012	0.089
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	9/12/2012	0.094
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	7/9/2014	0.031
Rio Ruidoso (Carrizo Creek to Mescalero Apache bnd)	57RRuido052.4	7/17/2014	0.056

Table C4. Discharge Monitoring Report (DMR) data for NM0029165

Date	Flow (mgd)		TN (mg/L)		TP (mg/L)	
	30-day	Daily max	30-day	Daily max	30-day	Daily max
Apr-16	1.40	1.69	1.94	2.24	0.01	0.01
Mar-16	n/a	n/a	n/a	n/a	n/a	n/a
Feb-16	1.67	1.90	1.36	1.92	0.01	0.01
Jan-16	1.70	2.11	1.68	2.79	0.022	0.022
Dec-15	1.66	2.03	4.3	8.69	0.017	0.017
Nov-15	1.49	2.05	2	3.2	0.06	0.06
Oct-15	1.50	1.74	1.18	1.98	0.1	0.1
Sep-15	1.54	2.06	2.57	2.99	0.097	0.097
Aug-15	NR	NR	2	2.63	0.06	0.06
Jul-15	1.84	2.09	2.7	3.53	0.023	0.023
Jun-15	1.67	1.90	1.26	1.26	0.017	0.017
May-15	1.65	2.14	1.34	2.84	0.34	0.34
Apr-15	1.56	1.88	1.71	2.56	0.013	0.013
Mar-15	1.69	1.89	1.50	2.36	0.002	0.002
Feb-15	1.58	1.84	1.85	2.00	0.039	0.039
Jan-15	1.64	2.15	2.03	2.53	0.075	0.075
Dec-14	1.59	2.02	2.1	3.02	0.048	0.048
Nov-14	1.56	1.85	4.2	6.3	0.068	0.068
Oct-14	1.69	2.02	3.03	3.64	0.073	0.073
Sep-14	1.84	2.37	2.57	2.8	0.031	0.031
Aug-14	1.81	2.22	2.4	2.6	0.077	0.077
Jul-14	1.75	2.12	2.4	2.8	0.09	0.09
Jun-14	1.54	1.78	3.17	3.85	0.06	0.06
May-14	1.47	2.01	1.93	2.69	0.042	0.042
Apr-14	1.39	1.67	2.6	3.4	0.043	0.045
Mar-14	1.51	1.74	1.75	2.66	0.05	0.05
Feb-14	1.45	1.68	1.83	2.49	0.02	0.02
Jan-14	1.56	2.01	2.6	3.8	0.031	0.031
Dec-13	1.54	2.08	2.13	3.8	0.06	0.06
Nov-13	1.45	1.74	3.98	5	0.097	0.097
Oct-13	1.56	1.78	2.56	3.63	0.088	0.088
Sep-13	1.88	2.75	2.69	3.34	0.068	0.068
Aug-13	1.85	2.20	2.28	3.73	0.089	0.089
Jul-13	1.82	2.54	2.19	3.25	0.088	0.088
Jun-13	1.48	1.74	2.3	3.24	0.057	0.057
May-13	1.41	1.93	1.8	2	0.074	0.074

Date	Flow (mgd)		TN (mg/L)		TP (mg/L)	
	30-day	Daily max	30-day	Daily max	30-day	Daily max
Apr-13	1.35	1.49	1.8	2	0.098	0.098
Mar-13	1.47	1.64	2	2.1	0.084	0.084
Feb-13	1.43	1.70	2	2.2	0.073	0.073
Jan-13	1.58	2.04	1.7	2	0.002	0.002
Dec-12	1.48	1.99	3	3.3	0.037	0.037
Nov-12	1.40	1.70	2.3	2.5	0.088	0.088
Oct-12	1.48	1.85	2.5	3.7	0.09	0.09
Sep-12	1.66	2.00	1.7	1.9	0.09	0.09
Aug-12	1.82	2.05	2.3	2.6	0.065	0.065
Jul-12	1.80	NR	2.1	2.2	0.073	0.073
Jun-12	1.64	NR	1.8	2	0.078	0.078
May-12	1.61	NR	2.2	2.6	0.1	0.12
Apr-12	1.48	NR	2.5	2.9	<0.05	<0.05
Mar-12	1.52	NR	2.5	2.9	<0.05	<0.05
Feb-12	1.47	NR	4	5.5	<0.05	<0.05
Jan-12	1.73	NR	2.6	2.9	<0.05	<0.05

NR = not reported
n/a = DMR data not available

DMR Summary Statistics

	Flow (mgd)		TN (mg/L)		TP (mg/L)	
	30-day	daily max	30-day	daily max	30-day	daily max
Average	1.59	1.96	2.29	3.04	0.06	0.06
MAX	1.88	2.75	4.30	8.69	0.34	0.34
MIN	1.35	1.49	1.18	1.26	<0.05	<0.05

APPENDIX D

ALGAL GROWTH POTENTIAL ASSAY (AGP)

*SWQB notes a potential typo in the attached document. SWQB believes that the first paragraph of the section titled, "Comparison of Algal Growth Bioassay to Chemical Analysis of Water Samples" should read Sites I and III rather than Sites I and II.

Algal Growth Potential (AGP) Assays

on

Water from the Rio Ruidoso

to

State Of New Mexico
Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502

submitted to

Julie Tsatsaros

August 7, 2002

by

Larry L. Barton and Gordon V. Johnson

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Background:

The water was collected on 5-20-02 and transported on ice to our laboratory. Water from each site was autoclaved and filtered, and used immediately. The initial tests for growth potential were initiated two days later and were terminated after 7 days of incubation under continuous illumination.

The procedures used for determining limiting nutrients and toxicity to algae was as established in the EPA-600/9-78-018 publication entitled "The *Selenastrum Capricornutum* Prinz Algal Assay Bottle Test" and EPA-660/3-75-034 publication entitled "Proceedings: Biostimulation/and/ Nutrient Assessment Workshop" The design is as follows:

Water from the creeks/rivers was autoclaved and passed through filters which had a pore diameter of 0.4 micrometers. The filtered water, 25 ml, was placed in 125 ml Erlenmeyer flasks which were cotton plugged. Each assay was conducted in triplicate.

The design of the test for algal growth potential are as listed below:

1. Control (filtered river water with no additions)
2. Control + 0.05 mg P/liter
3. Control + 1.00 mg N/liter
4. Control + 1.00 mg N + 0.05 mg P /liter
5. Control + 1.00 mg Na_2 EDTA/liter
6. Control + 1.00 mg Na_2 EDTA + 0.05 mg P/liter
7. Control + 1.00 mg Na_2 EDTA + 1.00 mg N/liter
8. Control + 1.00 mg Na_2 EDTA + 1.00 mg N + 0.05 mg P/liter
9. Control + 1.00 mg Na_2 EDTA + 1.00 mg N + 0.05 mg P + 4.5 µg Fe/liter

At the end of 7 days of incubation, the amount of chlorophyll was determined using fluoresence measurements. The fluorescence values were converted to dry weight values using a standard that we had constructed under these conditions of growth. The results are given in dry weight measurements as is accordance with the EPA procedure.

The water samples were designated as follows:

Designation	Site of collection
I	Rio Ruidoso @ Mescalero Boundary west of Ruidoso - upper canyon Road
II	Rio Ruidoso @ NM 267 ½ HWY 70
III	Rio Ruidoso above site on Susan Lattimer's property

Results:

The values for algal growth potential are given below as mg dry weight of algae/L.

Algal assays	Sites of water collection I	II	III
1. Control (filtered river water with no additions)	0.108	0.695	0.086
2. Control + 0.05 mg P/liter	0.157	1.061	0.077
3. Control + 1.00 mg N/liter	0.528	1.856	0.274
4. Control + 1.00 mg N + 0.05 mg P /liter	0.742	1.268	0.421
5. Control + 1.00 mg Na_2 EDTA/liter	0.125	0.757	0.096
6. Control + 1.00 mg Na_2 EDTA + 0.05 mg P/liter	0.102	0.787	0.045
7. Control + 1.00 mg Na_2 EDTA + 1.00 mg N/liter	0.497	1.783	0.212
8. Control + 1.00 mg Na_2 EDTA + 1.00 mg N + 0.05 mg P/liter	0.718	1.380	0.421
9. Control + 1.00 mg Na_2 EDTA + 1.00 mg N + 0.05 mg P + 4.5 µg Fe/liter	0.853	1.554	0.779

A study concerning the effect of N and P additions on algal growth was conducted on appropriate creek/river waters. The growth values are presented below and as graphs for various additions of P and N alone.

Nutrients were added to the sterilized water and the amount of algal mass was determined after 7 days of incubation.

Productivity of algae as influenced by Nitrogen addition. Growth as mg dry weight/L.

Nitrogen added (Mg N/L)	Sites of water collection I	II	III
0	0.108	0.695	0.085
0.25	0.356	1.043	0.211
0.5	0.485	1.339	0.225
0.75	0.628	1.493	0.268
1.0	0.528	1.857	0.274
2.0	0.656	1.736	0.309

Productivity of algae as influenced by Phosphorus addition. Growth as mg dry weight/L.

Phosphorus added (Mg N/L)	Sites of water collection I	II	III
0	0.108	0.695	0.085
0.01	0.129	0.736	0.049
0.025	0.094	0.797	0.043
0.0375	0.092	0.849	0.053
0.05	0.157	1.061	0.262
.1	0.090	0.791	0.049

NOTE: Graphs of the N and P additions are in the attachment entitled graphs.

The following summary statements can be made concerning the individual waters:

Rio Ruidoso @ Mescalero Boundary west of Ruidoso - upper canyon Road

Site I has low algal productivity. Growth is increased by addition of nitrogen indicating that nitrogen is the primary limiting nutrient. When both nitrogen and phosphorus are added, a small increase in productivity occurs.

Rio Ruidoso @ NM 267 ½ HWY 70

Site II has a high level of algal productivity without nutrient additions. Growth was increased by nitrogen addition indicating that nitrogen is the limiting nutrient. The high phosphorous availability results in large increases in algal growth when the nitrogen levels are increased. Management procedures should not increase the amount of nitrogen entering the water at this site and if possible, the inputs of both phosphorus and nitrogen should be decreased.

Rio Ruidoso above site on Susan Lattimer's property

Site III has low algal productivity. Growth is increased by the addition of nitrogen and this indicates that nitrogen is the primary limiting nutrient. With added nitrogen, an increase in productivity occurs with additions of phosphorus. With addition of both nitrogen and phosphorus, a further increase in productivity occurs when iron is added.

Addition of the metal chelating agent, EDTA, to water from Sites I, II, and III did not increase algal productivity indicating that no toxic metals were inhibiting algal growth.

Comparison of Algal Growth Bioassay to Chemical Analysis of Water Samples

Results of the algal growth responses to nutrient additions are in agreement with the chemical analysis of water samples provided by the NM Environment Department. Sites I and II had very low algal growth potential without addition of nitrogen or phosphorus to the water samples as suggested by the very low dissolved nitrogen and total phosphorus present in the water samples. Nitrogen was the limiting nutrient for algal growth at both Site I and from Site II.

Chemical analysis of water samples from Site II showed nearly 10X as much dissolved nitrogen and nearly 20X as much total phosphorus as samples from Sites I and III. Without nutrient addition, algal growth was 7X greater in samples from Site II than from Sites I and III. Addition of nitrogen to samples from Site II resulted in further increases in algal growth; indicating that nitrogen is the limiting nutrient at Site II.

Aquatic plants identified from Rio Ruidoso

Site II	*Clasospora*, a green alga, was present. This organism is common throughout the state. It will grow as a dense mat in the water.
Site III	*Potamogeton foliosus* was present. This plant is commonly found in many of the water ways thorough out New Mexico.

Productivity

The basis for productivity classification of river water using standards established for lakes using the laboratory assay technique to assess biomass. (Reference: EPA-600/9-78-018 publication entitled "The *Selenastrum Capricornutum* Prinz Algal Assay Bottle Test" and EPA-660/3-75-034 publication entitled "Proceedings: Biostimulation/and/ Nutrient Assessment Workshop")

Classification	Algal cell density (algal dry weight)
Low productivity	0.00 - 0.10 mg/L
Moderate productivity	0.11 - 0.80 mg/L
Moderately high productivity	0.81 - 6.00 mg/L
High Productivity	6.10 - 20.00 mg/L

1. Status of water in Rio Ruidoso water at the three sites equivalent.

Site I (@ Mescalero Boundary)	Site II (Below the WWTP @ MM 267 ½)	Site III (@ Susan Lattimer's property)
Low productivity	Moderate productivity	Low productivity

2. Effect of N addition to the sites:

Site I (Mescalero boundary): Addition of 0.25 mg/L and 0.5 mg/L result in moving the trophic status up to the lower portion of the MODERATE level. The addition of 0.75mg/L and higher levels result in raising the productivity to the MODERATE level.

Site II (Below the WWTP): The addition of 0.25 mg N/L produces a MODERATELY HIGH level and addition of up to 2.0 mg/L of N produces a MODERATELY HIGH level.

Site III (Susan Lattimer's property): The addition of 0.25 - 2.0 mg/L of N gives MODERATE productivity.

3. Effect of P addition to the three sites:

Site I (Mescalero Boundary): Increase of P up to 0.1 mg/L does not increase cell yield and beyond 0.1 mg/L P the water is at the high end of LOW PRODUCTIVITY.

Site II (Below the WWTP) : Increase of P from 0.025 to 0.1 mg/L will trend toward MODERATELY HIGH productivity.

Site III (Susan Lattimer's property) : Addition of up to 0.1 mg/L of P will not exceed low productivity.

4. General comments:

- If limiting nutrient (typically nitrogen) is added then phosphorus addition will increase algal productivity.

- If phosphorus level is adequate to support algal growth but nitrogen is limiting, this creates a condition favorable for N_2 - fixing cyanobacterial growth.

- If phosphorus and nitrogen level is high enough to support algal growth, then green algae will be abundant. This is the case at Site II.

APPENDIX E

RESPONSE TO COMMENTS

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The public comment draft of the 2016 Rio Ruidoso TMDLs was provided to the parties that submitted public comments on the 2014 Sacramento Mountain TMDLs (hereafter collectively referred to as "parties") on August 16, 2016. A summary of changes between the 2014 and 2016 TMDLs was provided to the same parties on August 23. In addition, SWQB hosted a stakeholder meeting with the parties on September 8, 2016 in Albuquerque to discuss the public comment draft of the 2016 Rio Ruidoso TMDLs. SWQB also hosted a public meeting in Ruidoso, NM on September 14, 2016 to discuss the Public Comment Draft Rio Ruidoso TMDLs. Notes from the public meeting are available in the SWQB TMDL files in Santa Fe.

The 30-day public comment period was originally scheduled to be from August 22-September 22, 2016. An informal request was made at the September 8 stakeholder meeting to extend the public comment period. SWQB sent an email to the SWQB mailing list (1196 email addresses) on September 15 to announce the one week extension of the comment period. The extended comment period ended at 4pm on September 29. As a result, the parties had a little over six weeks to review the 2016 public comment draft TMDL while other reviewers had approximately 5 weeks to review the document.

SWQB received the following written public comments on the Rio Ruidoso nutrient TMDLs before 4pm on September 29, 2016:

A. New Mexico Municipal Environmental Quality Association
B. Village of Ruidoso and City of Ruidoso Downs

SWQB received the following written public comments on the Rio Ruidoso nutrient TMDLs after 4pm on September 29, 2016. Although these comments were received after the close of the extended public comment period, SWQB will still provide responses as a courtesy to the commenters:

C. Aquatic Consultants, Inc.
D. Steven Sugarman on behalf of Rio Hondo Land & Cattle Co, LP and WildEarth Guardians

Changes made to the TMDL based on public comment include:

1. Clarifying language was added to Section 3.5.1.
2. Additional language was added to Section 5 regarding the WLA
3. Section 7 was updated with recent public participation information
4. Appendix C was updated to include the TN and TP data used to calculate the ratios
5. A clarification was added to the cover page of Appendix D
6. Minor editorial corrections were made throughout the document.

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
New Mexico Municipal Environmental Quality Association

NM Municipal Environmental Quality Association

(A Subsection of the New Mexico Municipal League)

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

September 28, 2016

Re: Comments on August 2016 Public Comment Draft Total Maximum Daily Load for the Rio Ruidoso

Dear Ms. Henderson:

The New Mexico Municipal Environmental Quality Association (NMMEQA), a subsection of the New Mexico Municipal League, appreciates the opportunity to review and comment on the public comment draft of the Total Maximum Daily Load (TMDL) for the Rio Ruidoso. The NMMEQA represents the 106 local municipal entities in the State of New Mexico in regards to environmental issues, with a particular focus on water quality protection.

NMMEQA members identified several issues relating to this public discussion draft document:

1. The New Mexico Environment Department (NMED) introduced two new concepts into this TMDL: Future Growth Wasteload Allocation (FG-WLA) and the Background Load Allocation (B-LA). These concepts result in more stringent allocations and appear to be redundant with the Margin of Safety (MOS) component of the TMDL. The NMMEQA requests that NMED include the rationale for these new concepts and why they are addressed separately from the MOS.

SWQB response: *In order to better characterize non-point source loading, SWQB chose to divide the Total Load Allocation into a Background Load (B-LA) and a Load Allocation (LA). The B-LA characterizes the upstream loading coming into the impaired assessment units whereas the LA characterizes the loading coming into the impaired assessment units directly from the adjacent landscape. Both the LA and B-LA are components of the Total Load Allocation attributable to non-point sources and do not represent the MOS nor an additional allocation. This refinement of the Total Load Allocation should help target watershed restoration efforts because it differentiates non-point source loading from upstream contributions and non-point source contributions from the impaired watershed.*

The Total WLA is calculated using the design capacity of the facility even though the facility may not be discharging at capacity. To recognize this inconsistency, the Total WLA was divided into a Current-WLA (based on current discharge records) and a Future Growth-WLA (based on the remaining design capacity of the WWTP). At its maximum discharge, the WWTP has yet only used 69.6% of its total design capacity and is therefore assigned 69.6% of the Total WLA for the Current-WLA. The remaining 30.4% of the WLA can be utilized as the WWTP discharges more. Both the Current-WLA and Future-WLA are components of the Total Wasteload Allocation attributable to the WWTP and do not represent the MOS nor an additional allocation.

2. Specifically for the FG-WLA, on page 29, NMED writes: "The Total WLA for the NM0029165 permit was divided into a Current WLA and a Future Growth WLA in order to facilitate the allocation of additional WLA to the facility if it begins to discharge at its design flow." Design flow had been used in all previous TMDLs. The shift to the current maximum flow translates to more stringent WLAs. In addition, this is inconsistent with the requirement at 40 CFR 122.45(b) which states that for production based limits for publicly owned treatment works (POTWs) shall be calculated based on design flow. The design flow should be used to calculate the WLA. This is important because a POTW must treat all of the flow discharged to the collection system.

   a. If the FG-WLA concept is retained, then NMED should specify that any translation of the WLA into a permit condition should also include the FG-WLA portion. This should be described in Section 5.0 of the TMDL.
   b. If the FG-WLA will not be applied in the permit, NMED should describe the process that a POTW would need to undergo in order to use the FG-WLA. To ensure that portion is reserved for the POTW, the TMDL should specify that the FG-WLA is reserved for the existing point source -

SWQB response: *Thank you for your comments. Yes, 40 CFR 122.45(b)* [1] *does require permit limits to be calculated using design flow—"In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow." The design flow was used in the calculation of the Total WLA as described in Section 3.5.2. SWQB anticipates that the permit drafted by EPA Region 6 in 2017 will include the Current-WLA with a provision that addresses the permittee's ability to apply for portions of the FG-WLA during the next permit renewal or through a permit revision. Additional language regarding Current-WLA and Future-WLA for the next permit has been added to Section 5 of the TMDL.*

3. Page 15. Table 3.2 – NMED should clarify which data was used and the calculation for the TN:TP ratios. Some of the TN:TP ratios do not appear to be correct.

SWQB response: *A column has been added to the Tables C.1 and C.2 to clarify the ratios described in Table 3.2.*

4. Appendix D – Algal Growth Potential (AGP) Assays – Comparison of Algal Growth Bioassay to Chemical Analysis of Water Sample. NMED should verify language in the first paragraph. The reference to low algal growth potential is to "Sites I and II". The discussion implies that the reference should be to "Sites I and III".

Please let me know if you would like clarification regarding any of the comments.

Sincerely yours,

Dan Campbell
NMMEQA President

NM Municipal Environmental Quality Association
LEAGUE HEADQUARTERS • 1229 PASEO DE PERALTA
PO Box 846 • Santa Fe, New Mexico 87504-0846
Phone: (505) 982-5573 • (800) 432-2036 • Fax: (505) 984-1392 • www.nmml.org

SWQB response: *After additional review, SWQB believes that the first paragraph of the section titled, "Comparison of Algal Growth Bioassay to Chemical Analysis of Water*

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[1] https://www.gpo.gov/fdsys/pkg/CFR-2002-title40-vol18/pdf/CFR-2002-title40-vol18-sec122-45.pdf

Samples" should read Sites I and III rather than Sites I and II. Although this document was prepared by an outside third party, a note has been added to the cover page indicating the typo.

Comment Set B
Village of Ruidoso and City of Ruidoso Downs

September 29, 2016

By Email and U.S. Mail

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

Re: Ruidoso's Comments on the New Mexico Environment Department's August 22, 2016 Public Comment Draft Total Maximum Daily Load (TMDL) Document for 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 August 22, 2016 Public Comment Draft Total Maximum Daily Load ("Draft TMDL") document. Our two municipalities are the members of the Regional Wastewater Treatment Plant Joint Use Board 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.

Ruidoso appreciates NMED's willingness to continue working with us and other stakeholders in developing an amended nutrient TMDL for the Rio Ruidoso. Ruidoso believes that these efforts represent significant advances toward developing an approach to controlling nutrient levels in New Mexico streams that recognizes the attributes of nutrients that are unique among water pollutants. Consequently, Ruidoso considers the Draft TMDL to be a positive step that we generally support.

Ruidoso's central concern with the Draft TMDL is how it will be implemented in the Plant's NPDES Permit, currently due to be renewed on August 1, 2017 ("Permit Renewal"). Our comments will describe (1) Ruidoso's concern that any requirement to reduce Total Nitrogen ("TN") in Plant effluent beyond current levels achievable by the

Plant would be unlikely to improve water quality in the Rio Ruidoso; (2) why it is technically impossible for Ruidoso's new Plant to meet TN effluent limits based on the Draft TMDL's wasteload allocation ("WLA"); (3) Ruidoso's support for NMED's recommendations for implementing the TMDL for the Plant; and (4) why Ruidoso believes it would be premature for EPA to determine a final effluent limit for TN based on the Draft TMDL.

1. **<u>The Proposed Wasteload Allocation for Total Nitrogen is Unlikely to Improve Water Quality in the Rio Ruidoso.</u>**

Our experts, Dr. David Stensel with the University of Washington and Jim Good with Environmental Science Associates, have examined how the presence of nutrients in the Rio Ruidoso contributes to algal growth. Specifically, they have examined how Total Phosphorous ("TP") and TN, considered together, contribute to algal growth. They conclude that TP, rather than TN, is the primary limiting nutrient in the Rio Ruidoso downstream of the outfall of the Plant. Consequently, it is doubtful that any further reduction of TN concentrations beyond the capabilities of the Plant would further reduce potential algal growth. They recommend that the most effective next step to reduce algal growth in the Rio Ruidoso is to continue planned projects to reduce sources of TP throughout the watershed. A copy of Dr. Stensel and Mr. Good's Memorandum addressing these points is enclosed as Attachment A.

SWQB response: *Thank you for your comments as well as the additional information provided by Dr. Stensel and Mr. Good in Appendix A. For the three impaired assessment units of the Rio Ruidoso described in the TMDL, causal variables (TN and TP) continue to be present at levels that do not meet the applicable threshold values (as noted in the 2016-2018 Integrated List of Impaired Waters*[2]*) and the stream remains impaired for plant nutrients. Increasing nitrogen inputs below the WWTP discharge are likely changing the trophic status of the Rio Ruidoso, which is forcing P-limitation over time*[3]*. Literature reviews indicate spatial and temporal variation in nutrient limitation with co-limitation commonly observed across freshwater systems*[4,5,6,7]*. This concept is supported by the 2003 algal assay (before the upper reaches were impaired) as well as data collected during SWQB water quality surveys.*

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[2] https://www.env.nm.gov/swqb/303d-305b/2016-2018/index.html

[3] Sylvan et al. 2007. Eutrophication-induced phosphorus limitation in the Mississippi River plume: Evidence from fast repetition rate fluorometry. Limnology and Oceanography. 56(6):2679-2685.

[4] Elser et al. 2007. Global analysis of nitrogen and phosphorus limitation of primary production in freshwater, marine, and terrestrial ecosystems. Ecology Letters. 10:1135-1142.

[5] Francoeur, S.N. 2001. Meta-analysis of lotic nutrient amendment experiments: detecting and quantifying subtle responses. Journal of the North American Benthological Society 20:358–368.

[6] Harpole et al. 2011. Nutrient co-limitation of primary producer communities. Ecology Letters, 14: 852–862.

[7] Tank, J. and W. K. Dodds. 2003. Responses of heterotrophic and autotrophic biofilms to nutrients in ten streams. Freshwater Biology 48:1031-1049.

Historically, nutrient management efforts have focused on controlling a single limiting nutrient (i.e., N or P); however, science has shown that this may be over-simplifying nutrient management[8]*. For example, nutrient limitation can change spatially and temporally within the same watershed; aquatic flora and fauna have different nutritional needs such that different species may benefit from N limitation, while others benefit from P limitation or co-limitation; and, focusing on only the perceived limiting nutrient can enhance export of the uncontrolled "non-limiting" nutrient downstream. It is for these reasons that SWQB asserts that reduction strategies for both N and P must be implemented.*

2. **The New Plant Would Be Unable to Meet Effluent Limits for Total Nitrogen Based on the Proposed Wasteload Allocation.**

We understand from our Plant Director and our consultants that it would be impossible for the Plant to meet a TN effluent limit based on the proposed 37.1 pounds-per-day TN WLA. Our consultants reviewed Appendix C4 of the TMDL showing effluent flows and TN concentrations in Plant effluent from January 2012 to April 2016. After converting TN concentrations in milligrams per liter ("mg/l") to pounds per day, they noted 11 months in which the proposed 37.1 pounds-per-day TN WLA was exceeded. Our consultants believe that 11 exceedances in 52 months are an accurate reflection of the inability of the Plant to meet the proposed WLA.

We understand that the proposed 37.1 pounds per day TN WLA translates to an effluent limit of 2.36 mg/l. Our Plant Director and consultants advise that with careful operation the Plant is capable of producing effluent with an average TN concentration below 4.0 mg/l. Our recommendation, which was included in our March 1, 2013 *Ruidoso Settlement Agreement Final Report* to NMED is that the WLA for TN should be consistent with a TN effluent limit of 4.0 mg/l (30-day average) with no seasonal variation. This recommended WLA is 62.7 pounds per day of TN at an effluent flow of 1.88 million gallons per day ("mgd") and 90.1 pounds per day of TN at an effluent flow of

[8] USEPA. 2012. *Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria*. Office of Water. December 2012. EPA-820-S-12-002.

2.70 mgd. As discussed below, pounds per day in effluent during the summer months could be reduced further if Ruidoso is able to re-use treated effluent for land application.

We have determined that a Plant upgrade required to meet the proposed WLA for TN is technically and economically infeasible. At the direction of the Ruidoso Joint Use Board, the Board's consultant Molzen Corbin prepared a December 2015 study titled *Affordability of a Wastewater Treatment Plant Upgrade for Total Nitrogen Removal* ("Affordability Study"). A few notable conclusions of the Affordability Study are;

(1) Reverse osmosis is the only treatment technology capable of further reducing TN to or below 1.0 mg/l. Other candidate technologies considered and rejected are chemical treatment, activated carbon adsorption treatment, ion exchange treatment and advanced oxidation.

(2) The estimated cost of a reverse osmosis facility is $31,900,000. This cost approaches the cost of the current Plant of approximately $34 million.

(3) Average estimated residential wastewater bills reflecting the cost of a reverse osmosis facility would be likely to impose economic hardship on the residents of both the City of Ruidoso Downs and the Village of Ruidoso. This conclusion is reached using EPA's affordability criteria that include an upward limit of 2% of Median Household Income.

SWQB response: *Based on the Discharge Monitoring Report (DMR) data provided by the WWTP for the January 2012-April 2016 period (Appendix C), SWQB approximated the current average monthly (i.e., 30-day) effluent loading as 30.6 lbs/day TN and 0.74 lbs/day TP. Loading values calculated from Appendix C should be considered estimates as reported "load" on DMRs are calculated with flow on the day of sampling not calculated using an average flow. Section 3.5.2 of the TMDL provides Current WLAs of 37.1 lbs/day TN and 1.64 lbs/day TP. These values are water quality based effluent limits designed to improve water quality to meet standards and protect aquatic life uses in the Rio Ruidoso. SWQB reviewed the 2013 and 2015 reports referenced in your comments and recognizes the improvement in WWTP effluent quality since the development of the 2006 TMDL. As such, SWQB is committed to continuing to work with the City/Village and EPA Region 6 to draft a new NPDES permit that uses permitting tools, such as compliance schedules, additional monitoring and Temporary Standards, and also protects the aquatic life uses in the Rio Ruidoso.*

3. **Ruidoso Supports NMED's Suggestions for Implementing the TMDL.**

Because it is impossible for the Plant to meet effluent limits for TN based on the proposed WLA, NMED's suggestions to EPA in Section 5.1 of the Draft TMDL are significant. These suggestions address Ruidoso's central concern as to how the TMDL will be implemented as effluent limits in the Renewed Permit. We support these recommendations for the following reasons:

A. Effluent Limits as loadings (i.e., pounds per day) rather than concentrations (i.e., mg/l) - The discussion of pounds-per-day effluent loadings at the bottom of page 32 of the Draft TMDL indicates that NMED is suggesting to EPA that effluent limits be expressed as loadings rather than concentrations. Further, the entire Draft TMDL discusses nutrient loadings rather than concentrations. Ruidoso supports this approach because it will allow flexibility in managing effluent. For example, Ruidoso potentially could reduce nutrient loadings to the stream during the summer, when algae growth is most likely, through land application of effluent.

B. Effluent limits implemented as a 30-day average or longer averaging period rather than a daily maximum – We agree with the Draft TMDL's recognition of the chronic rather than acute nature of nutrient impairments. Because periphyton and aquatic plant growth responses to nutrients in a water body are less immediate than toxic responses to other substances, the presence of nutrients is more appropriately viewed over a longer time frame. Consequently, we support an effluent limit based on at least a 30-day averaging period.

C. Compliance Schedule – As discussed above, our Plant cannot meet TN effluent limits based on the proposed WLA even though it is a state-of-the-art facility that achieves better results than the widely recognized limits of TN-removal technology. Consequently, we support a compliance schedule as necessary to allow the Plant to continue operating lawfully. For reasons discussed above, there are no currently available, affordable technologies that could allow the Plant to be upgraded to meet the new WLA. However, a schedule of compliance in the Renewed Permit would support efforts (described below in Sections 3.E, 3.F and 4) that should substantially improve water quality and refine water quality objectives in the Rio Ruidoso, ultimately enabling standards to be achieved.

D. Interim temperature–dependent effluent limits – This approach has proved to be reasonable in the current Permit. It reflects the reality that biological treatment of nutrients at the Plant is more effective when influent temperatures are higher. Ruidoso supports this approach coupled with the other approaches described in this Section.

E. Ruidoso Sewer Line Relocation Project – As the Draft TMDL points out (pp. 33-34), Ruidoso is in the process of designing the project, which will relocate the main sewer line away from its current location in, or immediately adjacent to, the Rio Ruidoso in the Village of Ruidoso and in the City of Ruidoso Downs. An expected benefit is a substantial decrease in infiltration and inflow into the main sewer line, which will correspondingly decrease wastewater flows to the Plant. Additionally, the new main line will be linked to an expanded wastewater collection system replacing septic systems, as described below. As noted in the TMDL, construction is scheduled to begin in 2017. Ruidoso estimates that construction will be completed by 2020.

F. Wastewater Collection System Master Plan – This ongoing project, not discussed in the Draft TMDL, provides another basis for Ruidoso to support NMED's recommendations for TMDL implementation. The Village of Ruidoso has directed Molzen Corbin to analyze the existing wastewater collection system within the existing Village limits and a one (1) mile buffer bordering the Village and provide for a 20-year planning period. The analysis will lead to a plan to eliminate septic systems that cumulatively may be contributing significant amounts of TN and TP to the Rio Ruidoso. Molzen Corbin expects the Master Plan to be completed by December 2016. Future trunk and lateral lines will be connected to the relocated main sewer line.

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SWQB response: *Thank you for your input on TMDL implementation strategies suggested by SWQB in the TMDL document. As noted in Section 5.1 of the TMDL, due to the chronic rather than acute nature of nutrient impairments, SWQB agrees that the TN and TP effluent limits should be implemented as a 30-day average, or longer averaging period, rather than a daily maximum limit in the future permit. Similarly, SWQB suggests that the next permit could only include loading limits that would be based on a 30-day average (or longer averaging period) rather than a daily maximum. The permit could also include a compliance schedule to allow the facility time to meet the new WLA. As previously noted, SWQB is committed to continuing to work with the City/Village and EPA Region 6 to draft a new NPDES permit that uses permitting tools, such as compliance schedules and Temporary Standards, and also protects the aquatic life uses in the Rio Ruidoso. SWQB believes the Ruidoso Sewer Line Relocation Project and the Wastewater Collection System Master Plan will be important in the reduction of non-point sources of plant nutrients in the watershed.*

4. **It is premature for the Renewed Permit to Establish a Final Effluent Limit for Total Nitrogen Based on the Proposed Wasteload Allocation.**

In addition to supporting NMED's recommendations for implementing the TMDL in the Renewed Permit, Ruidoso suggests that it is premature for EPA to determine a final effluent limit for TN in the Permit Renewal. There are at least two efforts underway that could change the water quality objectives for nutrients in the Rio Ruidoso. First, NMED is developing revisions to the Nutrient Assessment Protocol, which translates the narrative nutrient standard for TN into quantitative thresholds. Second, Ruidoso is performing a Use Attainability Analysis ("UAA") for aquatic life uses in the Rio Ruidoso that could lead to changed water quality standards in the Rio Ruidoso.

A. Nutrient Assessment Protocol – The discussion of load allocations in the TMDL uses "unimpaired concentration" targets that were identified in the recently released *Refinement of Stream Nutrient Impairment Thresholds in New Mexico* summary report. (p.20). This document also describes extensive data analyses for determining the response variables and thresholds that indicate nutrient impairment. From the recent stakeholders' meeting with NMED, we understand that NMED intends to make significant changes in the Nutrient Assessment Protocol in 2017, based on the results of this study. For example, the study concludes that periphyton chlorophyll *a* concentrations, a measure of algal biomass, are not reliably predicted by nutrient concentrations, and diel fluctuation in dissolved oxygen is a more reliable indicator of nutrient impairment than minimum dissolved oxygen concentrations. Thus the current Nutrient Assessment Protocol is not based on the best available science, and until the Protocol is revised, the measures for success in meeting the narrative standard for TN are moving targets.

B. Use Attainability Analysis – Ruidoso has observed that the current aquatic life use designation of the segment of the Rio Ruidoso into which the Plant discharges may not be accurate. That segment is currently designated for a "coldwater aquatic life" use. NMED agreed that the current use designation of the Rio Ruidoso segment justified further investigation and performed a fishery survey in September 2015. The survey found no trout in the segment. Consequently, NMED agreed that a UAA of the segment would be reasonable.

Ruidoso has appreciated the guidance of NMED in developing a Work Plan for the UAA. Earlier this month Ruidoso transmitted the Work Plan to EPA for review, with copies to NMED and the New Mexico Department of Game and Fish. Upon completion of the UAA, Ruidoso will confer with NMED to determine if the UAA supports a change in the aquatic life use designation of the Rio Ruidoso. If the UAA supports such a change, then a proposed change of standards would be presented to the Water Quality Control Commission ("WQCC"). Such a change of standards would be highly relevant to whether the Rio Ruidoso is impaired for nutrients and consequently to a final effluent limit for TN in a future Permit.

5. **Conclusion**

Although we remain concerned that further TN reduction would be unlikely to improve water quality in the Rio Ruidoso, Ruidoso generally supports the Draft TMDL and its approval by the WQCC. Because our state-of-the-art Plant is not capable of meeting TN effluent limits based on the TN WLA, our primary concern is with how that WLA will be implemented in the Renewed Permit. We support the suggestions for implementation discussed in the TMDL. Finally, we urge NMED and EPA to not include a final effluent limit for TN in the Renewed Permit. Such a determination of a final effluent limit would be premature due to efforts now underway that could change water quality objectives for nutrients in the Rio Ruidoso.

Ruidoso appreciates your consideration of our comments on the Draft TMDL.

Sincerely,

Gary Williams,
Mayor
City of Ruidoso Downs

Tom Battin,
Mayor
Village of Ruidoso

Enclosure:
(A) Memorandum from Dr. David Stensel and Mr. Jim Good

SWQB response: *SWQB recognizes that results in the Refinement of Stream Nutrient Impairment Thresholds in New Mexico summary report*[9] *will result in changes to the 2017 Assessment Protocols for nutrients. However, a comparison of existing TN and TP data to the new, proposed threshold values will still result in a determination of impairment for plant nutrients for the Rio Ruidoso. Additionally, SWQB recognizes the current work on the UAA for the Rio Ruidoso and received a draft UAA to review from Jim Good at Environmental Science Associates on September 22, 2016. However, the UAA proposes a change in aquatic life use from coldwater to coolwater aquatic life with a corresponding change in the dissolved oxygen criteria from 6.0 mg/L to 5.0 mg/L. The proposed change to the dissolved oxygen criteria will itself alone not result in a delisting of the Rio Ruidoso for plant nutrients because the assessment protocol for nutrients relies on a weight-of-evidence approach that integrates causal variables such as TN and TP and response variables such as dissolved oxygen.*

[9] https://www.env.nm.gov/swqb/Nutrients/

Sincerely,

Sincerely,

Gary Williams,
Mayor
City of Ruidoso Downs

Tom Battin,
Mayor
Village of Ruidoso

Enclosure:
(A) Memorandum from Dr. David Stensel and Mr. Jim Good

ATTACHMENT A – to Ruidoso's 9/29/16 Comments on TMDL

H David Stensel, Inc.
H. David Stensel, PhD, PE, BCEE
7631 E Mercer Way
Mercer Island, WA 98040

To: Regional Wastewater Treatment Plant Joint Use Board

From: H. David Stensel, PhD
Jim Good (Environmental Science Associates)

Re: Comments on Public Comment Draft TMDL for the Rio Ruidoso

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Recent literature reviews and site-specific information on the lower Rio Ruidoso indicate that there are significant risks that reducing total nitrogen waste loads from the treatment plant and imposing stricter effluent limits for nitrogen would not reduce periphyton productivity and improve water quality.

In a review of numerous long-term studies of lake ecosystems, Schindler et al. (2016) found that controlling algal blooms and other symptoms of eutrophication depends on reducing inputs of a single nutrient: phosphorus. The evidence supporting these conclusions came from long-term case histories, multiyear whole lake experiments, experiments where chemical treatments were used to remove phosphorus, and chemical additions to inhibit phosphorus release from sediments. In contrast, they found that small-scale experiments of short duration, where nutrients are added rather than removed, often give spurious and confusing results that bear little relevance to solving the problem. Whether or not small-scale nutrient enrichment experiments show nitrogen limitation does not appear to matter, because such methods can only measure short-term nutrient limitation, whereas controlling eutrophication requires reducing inputs of nutrients that provide long-term control. The authors emphasized that if decreasing eutrophication of freshwaters is the objective, policies must focus on reducing inputs of phosphorus, and there is no ecosystem-scale evidence that removing nitrogen is effective in reducing algal biomass. Schindler et al. (2016) stated that removing nitrogen at wastewater treatment facilities is not an effective way to address the harmful impacts of nitrogen.

Schindler et al. (2016) have warned against using short-term algal growth assays to draw conclusions about nutrient limitation and extrapolate results to prioritize nitrogen control. This is particularly true in the conclusions from algal assay results in the Rio Ruidoso TMDL. There is no recognition that limiting nutrient conditions may be different between the headwaters at the Mescalero Apache Reservation boundary and below the wastewater treatment plant, river reaches that have very different geomorphic and ecological settings. In fact, while Figure 3.1 shows that algal growth generally continued to increase with increasing TN:TP ratio at the headwaters site, below the wastewater treatment plant algal growth decreased above a TN:TP ratio of about 16 (see Figure 3.2). The algal assay reported a TN:TP ratio at the highway 70 bridge site as 14.7, indicating phosphorus limitation. While we disagree with using 2002 algal assay results to indicate today's limiting nutrient conditions in the lower Rio Ruidoso, we also observe that the TMDL's finding that nitrogen is the primary limiting nutrient driving the productivity of algae and macrophytes in the lower river is not well supported by the information presented.

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 analysis of limiting nutrients used to support the 10:1 TN:TP ratio and 1.0 mg/L TN target 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 from Plant effluent compared to nitrogen.

- For the 19 Parametrix sampling 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 TMDL.

- The TN:TP ratio in effluent samples from these 19 events was 93.5.

We have discussed the SWQB's conclusion that this extensive nutrients data set is not eligible for use in regulatory decisions due to the change in sample preservation methods, and the SWQB has acknowledged that the use of freezing likely resulted in the necessary preservation of nutrients within the samples and the results can be used for informational purposes. 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 use of an N:P ratio equal to 10.0 for the nutrient waste load allocation for the Ruidoso wastewater treatment plant (WWTP) effluent is not technically supported and is fundamentally flawed. The ratio was given on page 15 of the draft TMDL and referenced an algal growth potential assay in Appendix D, which stated that at a 10:1 ratio neither P or N were limiting and the system was in balance. However, there was no supporting data to establish the 10:1 ratio in a meaningful way. In the referenced study there were very limited algal bottle test results reported. There was no experimental effort to study the effect of N:P ratios over a wide range.

Another flawed statement appears in this draft TMDL at the top of page 27 as follows: "*.. the stoichiometry of N and P supply and demand must generally be in close balance in most ecosystems.*" This again implies some special importance of a 10:1 N to P ratio. Again the total concentration of nutrients is important in affecting stream water quality, but the idea of some N and P close balance is of no fundamental consequence.

The draft TMDL recognizes that the discharge of less N and P from the WWTP will result in less algae growth in the stream, but it does not recognize that lowering only the

P load can have a beneficial effect. In lowering effluent N and P concentrations the draft TMDL recognizes the EPA position on a dual limitation of both nutrients. The importance of the dual limitation effect in streams is related to the uptake rates of N and P within a given critical stream segment. The amount of algae in a given segment is related to N and P concentration according to the following common biokinetic equation for dual limitation. The algae growth varies with the stream concentration, and not all the P and N entering a given stream segment is used.

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

$$\frac{dA}{dt} = k'\left(\frac{P}{K_P + P}\right)\left(\frac{N}{K_N + N}\right)A$$

where:

dA/dt	= rate of algae growth, mg/L-d
A	= algae concentration, mg/L
P	= stream phosphorus concentration, ug/L
N	= stream nitrogen concentration, ug/L
K_p and K_N	= kinetic constants specific to P and N respectively, ug/L
K'	= stream and conversion coefficient

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. If the phosphorus concentration is decreased and the nitrogen concentration is unchanged, the amount of algae growth will be less.

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).

The question of limiting nutrient is critical not only for the development of this TMDL and consequent effluent limits for the treatment plant, but also for the health of the Rio Ruidoso. The Rio Ruidoso nutrient assessments have shown that since completion of the WWTP, 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. Data from 19 Parametrix 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 WWTP became fully operational. With these results indicating phosphorus limitation, a ratio greater than 10:1 could be used to establish the TMDL target concentration for TN resulting in achievable TN effluent limits with no effect on algal productivity. Ruidoso recognizes that the lower Rio Ruidoso currently is listed as impaired for nutrients, but the evidence does not indicate that further reductions in nitrogen loading from the treatment plant will be effective in reducing periphyton growth and improving water quality. 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 treatment plant 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.

References

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SWQB. 2014. Nutrient reduction strategy for protecting and improving water quality. New Mexico Environment Department Surface Water Quality Bureau. Santa Fe, New Mexico. February, 2014. Available at: http://www.nmenv.state.nm.us/swqb/Nutrients/NutrientReductionStrategy-2014.pdf.

Comment Set C
Aquatic Consultants, Inc.

AquaticConsultants Inc.

"Your Lake & Stream Experts"

Comments on Public Comment Draft – Total Maximum Daily Load (TMDL) for the Rio Ruidoso (August 22, 2016)

These comments are in response to the recent Public Comment Draft of the Total Maximum Daily Load (TMDL) for the Rio Ruidoso (NMED 2016), hereafter referred to as the *Document*. As a coalition of land owners downstream of the City of Ruidoso Downs and Village of Ruidoso Wastewater Plant (WWTP) - NPDES Permit NM0029165, we have concerns involving the *Document* (NMED 2016) as well as concerns with potential pursuant actions that may reference the *Document* for scientific support in regards to fish.

Our properties are located in the region of the Rio Ruidoso from the US 70 Bridge downstream to the confluence with Eagle Creek. The stretch of the Rio Ruidoso upstream of the confluence with Eagle Creek has a Coldwater Designation. Furthermore, designated uses include "fish culture, irrigation, livestock watering, wildlife habitat, coldwater aquatic life and primary contact. 20.6.4 NMAC 28. (NMED 2016)." While we understand that this *Document* in not a Use Ability Analysis, we are concerned that information may be used from this document to provide support for reclassification of the Rio Ruidoso from the US 70 Bridge downstream to the confluence with Eagle Creek from a coldwater to coolwater designation.

In the *Document* (NMED 2016), NMED provides information on fish species distribution in the Rio Ruidoso. However, the fisheries sampling effort conducted by the NMED/SWQB staff does not provide representative information on fish species distribution in the Rio Ruidoso above the confluence with Eagle Creek. Using the data from the fish survey conducted by NMED/SWQB to provide management information about distribution of fish species would be irresponsible due several reasons including small sample size (n=4 locations) and non-representative site selection. The limited sample size does not provide enough information on fish use or distribution on the Rio Ruidoso, especially since the most downstream site was selected "just below" the WWTP (NMED 2016). This downstream location is not likely representative of the reach downstream from this sampling location, considering effluent from the plant enters at this location. It is likely that temperature and chemical water constituents exist between the effluent and the receiving water in the Rio Ruidoso. Therefore, sampling immediately below the WWTP effluent would not provide representative information on fish species that occur downstream in reaches that are not immediately influenced by effluent.

Furthermore, the *Document* (NMED 2016) stated that "trout are classified as cold water species; longnose dace and Rio Grande chub are cool water species." Both brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) were found upstream of the WWTP sampling location; however, the absence of these trout species in the sampling effort at the WWTP does not mean they do not exist downstream of the effluent input. Rather, trout species are sessile, often moving large distance both upstream and downstream in rivers. The NMED sampling found brown trout, a no longer stocked species, as small as 88 mm total length in the sampling locations upstream. This indicates that there is natural reproduction of trout species in the Rio Ruidoso. In addition, several landowners downstream of the WWTP have caught trout throughout the year on their properties, further indicating that there is suitable habitat for trout downstream of the WWTP.

These comments should warrant further explanation of the purpose of fish data presented in the TMDL Document (NMED 2016). Furthermore, it should be noted that fisheries data collected in the *Document* does not represent actual distribution of fish species in the Rio Ruidoso and should not be used to provide scientific data about fish in the Rio Ruidoso.

Sincerely,

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Aquatic Consultants, Inc.
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References

New Mexico Environmental Department. 2016. Total Maximum Daily Load (TMDL) for the Rio Ruidoso. August 22, 2016. Santa Fe, NM.

<u>SWQB response:</u> *Thank you for your comments. The collection of fish data is a typical component of all water quality surveys conducted by the Monitoring, Standards, and Assessment Section of the SWQB. The fish sampling described in Section 2.4 of the TMDL was performed in concurrence with the 2012-2014 water quality sampling of the Rio Ruidoso at the request of the City of Ruidoso/Village of Ruidoso Downs. The fish sampling and data described in Section 2.4 is provided for background informational purposes only and was not used in the calculation of the TMDL. Your public comments note the Use Attainability Analysis (UAA) process; the fish data collected by SWQB in 2014 may be collated with other available fish and water quality data for the Rio Ruidoso to support development of a UAA. Currently, a third-party UAA is being drafted by Environmental Science Associates and could be released for public comment as early as 2017.*

Comment Set D
Steve Sugarman on behalf of Rio Hondo Land & Cattle Co, LP and WildEarth Guardians

STEVEN
SUGARMAN ATTORNEY AT LAW

September 29, 2016

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 on the August 22, 2016 Public Comment Draft of the Nutrient Total Maximum Daily Load in the Rio Ruidoso

Dear Ms. Henderson:

I. Introduction

I submit the following comments on the August 22, 2016 Public Comment Draft of the Total Maximum Daily Load ("TMDL") for nutrients in the Rio Ruidoso. These comments are submitted on behalf of Rio Hondo Land & Cattle Co., LP and WildEarth Guardians (hereafter collectively referred to as "Rio Hondo Land"). 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 New Mexico Administrative Code and the federal Clean Water Act, and impermissibly contemplates prohibited backsliding in the effluent limitations

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currently governing the quality of discharges from the Village of Ruidoso wastewater treatment plant.

The nutrient TMDLs proposed in the August 22, 2016 Public Comment Draft are substantially similar to the nutrient TMDLs that were proposed in the July 7, 2014 draft, and the 2014 draft nutrient TMDLs were the subject of an August 7, 2014 comment letter submitted by Rio Hondo Land. (Copy attached.) In light of the substantial overlap between the two sets of draft nutrient TMDLs – the 2014 draft and the 2016 draft - Rio Hondo Land incorporates by reference into this letter all the comments that it previously made to the New Mexico Environment Department ("NMED") in its August 7, 2014 comment letter as if they were fully set out herein.

Rio Hondo Land is submitting this supplemental comment letter because it is particularly concerned that the nutrient TMDLs for the Rio Ruidoso are fundamentally flawed by NMED's characterization of the relevant stream segments' loading capacity for Total Nitrogen in a way that is not justified in law or in fact. NMED's legally and factually erroneous characterization of the stream segments' loading capacity for Total Nitrogen leads inevitably to the calculation of target loads – both Load Allocations and Wasteload Allocations – which *will not* assure compliance with relevant New Mexico water quality standards taking seasonal variations into account. Accordingly, the nutrient TMDLs violate Section 303(d)(1)(C),33 U.S.C. § 1313(d)(1)(C), of the Clean Water Act. For this reason, Rio Hondo Land urges NMED to withdraw the draft nutrient TMDLs – or, at the least, the Total Nitrogen TMDL – and to redraft the TMDLs in a manner that complies with all state and federal regulatory and statutory requirements.

<u>SWQB response:</u> *Thank you for your comments. Responses to many of your comments submitted in response to the 2014 Sacramento Mountains TMDL document are included in Appendix D of the EPA-Approved TMDL available online at: https://www.env.nm.gov/swqb/TMDL/SacramentoMnts/SacramentoMnts-FinalDraftTMDL.pdf*

Responses to remaining comments are addressed either as responses to your following 2016 or 2014 comments.

II. New Mexico regulations require that NMED utilize 4Q3 flows to calculate Rio Ruidoso's Total Nitrogen loading capacity

NMED has stated the year round loading capacity of the Rio Ruidoso for nutrients as the annual median flow during the period January 1, 2004 to December 31, 2015. Utilization of the annual median flow as the year round critical flow is arbitrary and capricious, and is impermissible.

A. The requirements of the New Mexico Administrative Code

NMED asserts, without any legal support or justification, that it is not required to use the 4Q3 flow as the critical flow for Total Nitrogen loading capacity because this pollutant is subject to a narrative – as opposed to numerical – standard. This assertion is incorrect. New Mexico regulations on this issue clearly and affirmatively require the use of 4Q3 flows as the critical flow in this case.

New Mexico regulations state the general rule with respect to the characterization of critical flows as follows:

> The critical low flow of a stream at a particular site shall be used in developing point source discharge permit requirements to meet numeric criteria set in 20.6.4.97 through 20.6.4.900 NMAC and Subsection F of 20.6.4.13 NMAC.

NMAC 20.6.4.11(B). Apparently, NMED believes that this provision of the New Mexico water quality regulations somehow permits it to calculate Total Nitrogen loading capacity based on something other than "critical low flow." NMED is incorrect in this regard, as is obvious from a more complete reading of the relevant regulatory provisions. Specifically, with respect to critical flow calculations, the New Mexico water quality regulations go on to state – at NMAC 20.6.4.11(B)(2) – that "*[f]or all . . . narrative and numeric criteria* [other than human-health organism only criteria][1], the critical low flow is the minimum average four consecutive day flow that occurs with a frequency of once in three years (4Q3)." (Emphasis added.)

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[1] For human-health organism only criteria, New Mexico regulations prescribe the use of the "harmonic mean flow." NMAC 20.6.4.11(B)(1). This section of the regulations does not apply to the development of nutrient TMDLs.

Despite the pellucidly clear language of New Mexico's water quality regulations, NMED posits in the Draft TMDLs that the "regulations do not require a specific low flow condition." Obviously, NMED's reading of the regulatory requirements cannot be squared with the plain language of the regulations which state that the critical low flow to be used for planning purposes – such as TMDL development – is the 4Q3 flow "for *all* narrative *and* numeric criteria." This language does not contain any exception to the 4Q3 requirement, other than the limited exception for human-health organism only criteria which does not apply here. For this reason, the NMED committed legal error when it departed from the plain language of the requirements of the New Mexico regulations and utilized an annual median flow to determine the Rio Ruidoso's loading capacity for nutrients.

Furthermore, it is *not* the case that there is no numeric standard for nitrogen in the Rio Ruidoso. While the WQCC has not formally adopted numeric criteria for nitrogen in the Rio Ruidoso, NMED has set the phosphorous standard in the relevant stream reaches at 0.1 mg/L and – upon its review of "regional studies from the Rocky Mountain West as well as site-specific data from the Rio Ruidoso" – has consistently stated that the appropriate numeric translator for determination of the nitrogen standard is 10:1 nitrogen:phosphorous. In other words, NMED has determined that the appropriate numeric standard for nitrogen in the stream reaches is 1.0 mg/L. Accordingly, even if NMED were correct that it need not use 4Q3 flows as the critical flows for narrative criteria – which is clearly not the case, as the plain language of the relevant regulation makes absolutely clear – this circumstance would not excuse the NMED's failure to use 4Q3 as the critical flow for nitrogen because there *are* numeric criteria for nitrogen that are based on the numeric criteria for phosphorous.[2]

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[2] NMED's use of two vastly different critical flows for phosphorous and nitrogen is arbitrary and capricious, as this approach "delinks" the calculated phosphorous and nitrogen loads for the Rio Ruidoso nutrient TMDLs in such a way that the 10:1 nitrogen:phosphorous ratio will inevitably be exceeded. Since NMED has determined that the Rio Ruidoso is nitrogen limited, the loading of nitrogen at rates predicated on annual median flow as the critical flow and of phosphorous at rates predicted on 4Q3 will lead to serious imbalances in nutrient

B. NMED provides no evidence whatsoever that it is rational to use the annual median flow as the critical flow for TMDL development

Even if it were permissible for NMED to depart from the requirements of New Mexico regulations which prescribe the use of 4Q3 flows as the critical flows for nutrients – and Rio Hondo Land specifically states that this is *not* permissible – NMED would still have to establish that its use of the annual median flow as the critical flow for TMDL development is rational and based on a reasoned consideration of the relevant scientific factors. NMED has not cleared this crucial hurdle To the contrary, NMED has not provided any reasoned explanation whatsoever for its use of annual median flow as the critical flow for the Total Nitrogen TMDL.

In the latest iteration of the TMDL document, NMED states that it chose to use annual median flow as the critical flow condition for Total Nitrogen "after careful consideration of a number of critical flow conditions." To Rio Hondo Land's knowledge, NMED has *never* before used annual median flow to calculate nutrient loading for TMDL purposes and NMED's decision to institute such a practice in this case must be supported by a credible and scientifically defensible explanation as to why annual median flow is the appropriate critical flow for development of a nitrogen TMDL in this case.[3]

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loading.

[3] In preparing these comments, Rio Hondo Land reviewed the PowerPoint presentation that Shelly Lemon, NMED Surface Water Quality Bureau Chief, delivered at an EPA-sponsored conference in February of 2011. In that presentation, Ms. Lemon discussed three case studies: the Rio Ruidoso nutrient TMDLs developed in 2006, the Mora River nutrient TMDLS developed in 2007, and the Cieneguilla Creek nutrient TMDLs developed in 2010. In each of those cases, NMED used the 4Q3 flow value as the critical flow for the calculation of the relevant stream reaches' nutrient loading capacity. Likewise, in the November

In fact, all the available evidence shows that the selection of annual median flow as critical flow is inconsistent with the scientific evidence and clearly at odds with the Clean Water Act's express requirements that TMDLs account for the seasonality in the calculation of TMDLs. In the EPA's July 2000 publication entitled "Nutrient Criteria Technical Guidance Manual: Rivers and Streams," the EPA discusses the myriad factors that must be taken into account in the development of nutrient TMDLs – including the biological, ecological, physical, and chemical characteristics of the relevant stream. The EPA also states that a variety of flow conditions should be considered, including not only "[l]ow and stable flow conditions," but also the "frequency and timing of floods":

> Low and stable flow conditions should be considered in addition to frequency and timing of floods when physically classifying stream systems. Flood frequency and scouring may be greater in steep-gradient (steep slope) and/or channelized streams and in watersheds subject to intense precipitation events or rapid snow melt. Periods of drying can also reduce algal biomass to low levels (Dodds et al. 1996). A stream may flood frequently during certain seasons, but also remain stable for several months at a time. The effects of eutrophication may be evident during stable low flows. Also, stable flow periods are generally associated with low flow conditions, resulting in the highest nutrient concentration from point source

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2011 Updated TMDL for sediment/siltation in the Mora River, NMED used the 4Q3 flow value as the critical flow. The June 2015 Updated TMDL for nutrients in the Mora River are based on seasonal median flows – *not* annual median flows – in recognition of the variability of flow conditions over the course of the year. Likewise, nutrient TMDLs for the Rio Hondo in the Upper Rio Grande Basin are based on seasonal 4Q3 flows. The important point here is that NMED's use of annual median flow to determine the year round nutrient loading capacity in the relevant stream reaches in this case is novel and untested. If NMED desires to adopt this approach in this case, it has an affirmative obligation to suuport its decision with credible scientific evidence.

> loading. Hence, low-flow periods often present ideal conditions for achieving maximum algal biomass. *For these reasons, nutrient control plans may require strategies that vary seasonally (e.g., criteria for a specific system may differ with season or index period).*

(Emphasis added.) The EPA publication goes on to discuss the fact that desert streams in the southwest present a particularly nettlesome problem for nutrient TMDL development:

> The nutrient regime of streams in general can be complex, however, desert streams present particular complexities not found in more homogeneous, mesic landscape stream ecosystems. Spatial and temporal variability in physical structure, community composition, materials availability and the interactions between these elements strongly control nutrient processes in desert streams. Dent and Grimm (in press) found a high coefficient of variability (as high as 145%) in the spatial distribution of nutrients in Sycamore Creek, Arizona, with coefficients of variation increasing over successional time. Part of this is due to hydrologic variability, in all its temporal, spatial and amplitude scales.

In particular, the EPA discusses that the variability in flows and wetted surface over the course of a year is a significant factor that must be taken into account in the assessment of and planning for nutrients in southwestern streams. NMED has swept this annual variability under the rug in an effort to justify its selection of the annual median flow value as the year round critical flow. In the draft TMDL document, NMED states that "there is no significant difference between the summer and annual median flows."[4] In fact, monthly median flow

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[4] NMED concludes, without citing to any evidentiary or scientific support, that "summer months are the critical time period for nutrient growth as this is when stream temperature, and this stream metabolism, is greatest." However, NMED does not cite to any *actual* data on the Rio Ruidoso to support its supposition that summer months are the critical time for nutrient growth in the

values in the Rio Ruidoso vary quite widely over the course of a year. Over the 2004-2014 period selected by NMED for TMDL planning in this case, the highest monthly median flow was observed in August (10 cfs) and the lowest monthly median flow was observed n June (5 cfs). Looking at the complete period of record, the monthly variability in flows is even more pronounced – from a high of 22 cfs in April to a low of 7.9 cfs in January. The essential point here is that NMED's choice of an annual median flow as the critical flow for nitrogen overlooks the fact that the Rio Ruidoso is *not* a "steady state" stream. There is high annual variability in monthly precipitation over the course of any given year, and there is also high annual variability in the accrual period over the course of any given year. Any TMDL that does not take this variability into account is arbitrary and capricious.

There is an additional legal infirmity in the choice of annual median flow as the critical flow for nitrogen. As the NMED states in the draft document, "[a] TMDL defines the amount of a pollutant that a waterbody can assimilate without exceeding the state's water quality standard for that waterbody." Thus, in this case, the proposed TMDL for phosphorous is based on a 4Q3 critical flow so that there will not be an exceedance of the phosphorous standard more than once every three years on average. On the other hand, and impermissibly, using the annual median flow as the critical flow for nitrogen means that – over the course of any given year – the water quality standard for nitrogen will be exceeded 50% of the

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Rio Ruidoso. In fact, it is just as likely that nutrient growth is most problematic during those times of year when the nutrient "accrual period" – *i.e.*, the period of time between hydrologic scouring events in which there is a "reset" in the nutrient level in a stream – tends to be longest: the period between the end of summer monsoons and peak springtime snowmelt and the period after peak springtime snowmelt and before the onset of summer monsoons. NMED's draft TMDL document – and, in particular, its choice of the annual median flow to determine the nitrogen loading capacity in the Rio Ruidoso – sweeps the critical issue of "accrual period" under the rug, as it treats annual precipitation rates (precipitation/unit of time) as constant over the year. This is *not* the condition that obtains in the Rio Ruidoso.

time. This circumstance is simply inconsistent with the essential nature of a TMDL which is to *plan for compliance* with applicable water quality standards, not to *plan for 50% compliance.* This issue becomes even more critical when taking into account flows on a month-by-month basis over the course of a year. Over the 2004-2014 period used by NMED in the development of the subject TMDL, the percentages of days in the following months that fell *below* the annual median flow are as follows: January (77%), November (73%), June (72%), February (67%), December and October (65%). (See attached table.) Accordingly, NMED's approach to the nitrogen TMDL for the Rio Ruidoso essentially "writes off" compliance for these months were daily flows are generally *below* the annual median flow – *i.e.*, NMED tacitly concedes that the standard for nitrogen will *not* be obtained on the large majority of days during those months. A TMDL that concedes non-compliance with water quality standards on 50% of the days in the year (and on up to 77% of the days in some months of the year) – like the proposed TMDL for nitrogen in the Rio Ruidoso – simply does not pass muster under the Clean Water Act.

C. NMED incorrectly calculated annual median flow

As explained above, (1) New Mexico regulations require NMED to use the 4Q3 flow as the critical flow value for nutrients in TMDL development and (2) annual median flow would not be an appropriate critical flow for a year round TMDL even if 4Q3 was not the required critical flow (which is not the case). However, even if NMED could use the annual median flow as the critical flow for the nitrogen TMDL in this instance, it has incorrectly calculated the annual median flow in the relevant stream reach. NMED's calculation was flawed by a number of errors, all of which combine to render the annual median flow calculated by NMED (9.13 cfs) irrational.

First, rather than calculate the annual median flow for the period 2004-2015 – as NMED suggests that it did in the draft TMDL document – NMED calculated the annual median flow for each year of that period and then averaged each of those annual median flows. If NMED had correctly calculated the annual median flow over the 2004-2015 period – rather than averaging fifteen annual medians – it would have determined that the annual median flow over the chosen analysis period is 7.4 cfs and *not* 9.13 cfs. (See attached graph.) This is significant for a number of reasons. First, NMED's incorrect calculation of the annual median flow overstates annual median flow over the period of interest by more than 23%. This means that NMED's load calculations for nitrogen calculate a permissible load that is more than 23% higher than a load based on the *actual* annual median.[5] Second, the percentage of days with flows *below* the annual median flow as incorrectly calculated by NMED over the period of interest – that is 9.13 cfs – is approximately 60%, and not 50%. Thus, the TMDL has been calculated so that there will be exceedances of water quality standards on about 60% of the days in each year.

Second, NMED's calculation of the annual median flow for use in development of the nitrogen TMDL for the Rio Ruidoso entirely fails to account for stream flow depletions between the Hollywood gage and the downstream gage in Glencoe towards the bottom of the impaired reach. While NMED used the Thomas equation to extrapolate annual median flows below the wastewater treatment plan from the observed flows at the Hollywood gage – and, in so doing, accounted for the increase in drainage – it entirely failed to consider both the natural and the man-made depletions that occur below the wastewater treatment plant. These depletions are significant, and they cannot be ignored by NMED since the TMDL must be drafted to assure compliance with standards *throughout* an impaired reach, and not just at the *top* of an impaired reach.[6]

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[5] Of course, as previously stated in this comment letter, NMED does not have the authority to use the annual median flow as the critical flow for nitrogen, even if that annual median flow were correctly calculated.

[6] Of course, the fact that NMED *increased* the annual median flow at Hollywood to account for the larger drainage area of the impaired reaches but did not concurrently *decrease* that same flow to account for corresponding nautral and manmade depletions in the larger drainage area is evidence of a flawed and biased assessment which was intended to state the maximum possible critical flow for

D. Scientifically defensible alternatives to 4Q3

As discussed above, Rio Hondo Land asserts that NMED does not have the authority to depart from the New Mexico water quality regulations' mandate to use the 4Q3 flow as the critical flows for development of the nutrient TMDL in the Rio Ruidoso. However, if NMED *did* have such authority, it would be obligated to use a scientifically defensible critical flow value – as opposed to the apparently random and scientifically *indefensible* annual median flow – for the nitrogen TMDL. The most appropriate critical flow value for the nitrogen TMDL (if it is not 4Q3) is beyond the scope of these comments, but Rio Hondo land asserts that TMDLs developed in New Mexico and other states provide frameworks and concepts that can be applied in the case of Ruidoso.

For example, some states have used 30Q10 flow values for the development of nutrient TMDLs to reflect the fact that nutrient exceedances do not present an acute – but rather a chronic – problem. Use of a 30Q10 flow value is the critical flow focuses TMDL development on the chronic and long-term nature of nutrient exceedances, and implicitly accounts for the fact that accrual time and frequency of scouring are essential factors to consider in the selection of an appropriate critical flow. For the period of interest (January 1, 2004 through December 21, 2015) the 30Q10 flow value at the Hollywood gage is 2.1 cfs. Another similar approach would be to utilize the 30Q3 flow as the critical flow for development of a nitrogen TMDL. Using a 30Q3 flow rather than a 30Q10 flow as the critical flow will yield a higher loading capacity, but will of course be associated with more frequent exceedances of standards – but still exceedances that are *far less* frequent than use of an annual median flow as the critical flow. For the period of interest (January 1, 2004 through December 21, 2015) the 30Q3 flow value at the Hollywood gage is 3.01 cfs.[7]

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nitrogen TMDL purposes – notwithstanding legal requirements and the facts.

[7] Rio Hondo land concedes that these flow values must be summed with flow from the wastewater treatment plant in order to calculate the actual

Another option would be to develop the nitrogen TMDL for the Rio Ruidoso on the basis of a critical flow curve (or "loading curve") that takes into account varying hydrologic conditions in the Rio Ruidoso over the course of a year. NMED used this approach in the development of a TMDL for fecal coliform in Cieneguilla Creek. The advantages of this approach are that it complies with the Clean Water Act's statutory mandate to incorporate seasonality considerations into the TMDL, and it accounts for the broad range in monthly median flows over the course of the year.

The essential point here is that regulatory bodies have developed a range of scientifically defensible approaches to the definition of critical flow in the nutrient TMDL context, and these approaches could be used in the case of the Rio Ruidoso for the nitrogen TMDL. However, instead of defining a rational and scientifically-based critical flow for the nutrient TMDL in the Rio Ruidoso, NMED has randomly selected the annual median flow as the critical flow in an apparent effort to "reverse engineer" a loading capacity that will accommodate the existing chemical characteristics of the effluent from the wastewater treatment plant for the most part. This "backwards" approach to TMDL development – where the regulator's object becomes calculation of a sufficiently large loading capacity to accommodate existing water quality standard exceedances rather than the attainment of water quality standards – is clearly and patently irrational and illegal.

<u>SWQB response:</u> *The definition of critical flow in 20.6.4.11(B)(2) NMAC applies only to the criteria in 20.6.4.97 through 20.6.4.900 and 20.6.4.13(F), as stated in 20.6.4.11(B) NMAC. The narrative criteria for plant nutrients is outlined in 20.6.4.13(E) and therefore not subject to the definition of critical flow in 20.6.4.11(B)(2) NMAC. However, the segment-specific criteria for total phosphorus in 20.6.4.208 and 20.6.4.209 is subject to the definition of critical flow in 20.6.4.11(B)(2) NMAC.*

Selection of the annual median flow as the critical flow was not "randomly selected." In New Mexico, the critical flow parameters used in TMDL development can vary depending on the effluent-dominated nature of the stream, the seasonal nature of flow, and the specific parameter for which the TMDL is written. As noted in Section 3.2, SWQB explored other flow statistics besides the 4Q3 flow (such as 7Q10 and 1B3) for the calculation of the 2016 plant nutrient TMDLs and came to the conclusion that the annual median flow was the most appropriate critical flow value for the Rio Ruidoso given the nature of the pollutant, expected stream response, hydrologic conditions, and watershed characteristics.

Different pollutants affect aquatic environments differently in that some have an acute affect, some have a chronic, and others have both. The narrative standard for plant nutrients addresses nuisance algal growth. The growth of algae is not immediate and is a chronic rather than an acute impairment. Flows such as 4Q3 represent a short time period (4 days) and do not account for the longer time period (weeks or months) necessary for the growth of algae. SWQB evaluated seasonal differences in flow as well as differences in monthly flows and found that while streamflow may vary from month to month, seasonal flows were not significantly different, therefore it was concluded that the use of an annual median flow is more appropriate in this case, and is consistent with the growth cycle of algae.

In response to the assertion that SWQB is not calculating the annual median properly, SWQB recognizes the confusion. The annual median flow is calculated as an "average annual median flow." In other words, SWQB calculated the annual median flow for each year from 2004-2015 and then averaged those values to get critical flow. In this regard, the integrity of an annual time period was maintained in the TMDL calculation as opposed to a decadal or longer timeframe being represented. SWQB has changed the terminology in the TMDL document to indicate an "average annual median flow" is being used.

Finally, as discussed in Section 3.7 of the TMDL, exceedences were observed during all seasons, which captures flow variations related to snowmelt, the growing season, and summer monsoonal rains. The critical condition used for calculating the TMDL is considered to be conservative and protective of the water quality standard under all flow conditions. Based on SWQB's flow evaluation, there is no significant difference between the growing season and annual median flow values, so the annual median flow was chosen as the critical condition for the TN TMDL calculations. SWQB maintains that calculations made at the critical flow in addition to using other conservative assumptions included as part of the Margin of Safety (MOS) are expected to be protective of the water quality standards designed to preserve aquatic life in the stream.

For these reasons the TMDL addresses seasonality and that the target loads presented in the TMDL are protective of the narrative criterion for plant nutrients outlined in 20.6.4.13(E) NMAC.

III. The Rio Ruidoso nitrogen draft TMDL should include a table of projected TN effluent limits at the wastewater treatment plant

The 2014 iteration of the draft nitrogen TMDL for the Rio Ruidoso contains a table that projects the Total Nitrogen effluent limits that will apply to the discharge at the wastewater treatment plant at different discharge volume levels, given the nitrogen wasteload allocation assigned to the wastewater treatment plant in that draft. (See Table 8.1) The current draft TMDL omits this crucial table.

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critical flow downstream of the plant.

The inclusion of a table similar to Table 8.1 from the 2014 draft is crucial in this case, because the table displays the practical effect of the TMDL. That is, the table enables the reviewer to understand how the proposed wasteload allocation relates to the wastewater treatment plant's current NPDES permit limitations on nutrient discharges.

The existing NPDES permit for the wastewater treatment plant has a Total Nitrogen effluent limit of 1.0 mg/L. The 2014 draft TMDL proposed a nitrogen wasteload allocation for the wastewater treatment plant of 41.3 pounds/day. At that allocation (and assuming Total Nitrogen discharge at that allocated level), the effluent from the wastewater treatment plant when the plant discharges at 1.75 mgd – the approximate median discharge flow – was projected to contain Total Nitrogen at a concentration of 2.6 mg/L, or 260% of the currently permitted concentration. The current draft of the TMDL increases the Total Nitrogen wasteload allocation to 53.3 pounds per day (taking into account future growth) – an increase of 29% over the 2014 proposed Total Nitrogen wasteload allocation. Of course, the increase in the Total Nitrogen wasteload allocation over the proposed 2014 level will also result in the discharge of effluent from the wastewater treatment plant that has an even higher concentration of Total Nitrogen, but the current draft obfuscates that face through omission of a table similar to Table 8.1 in the 2014 draft TMDL.

In the interests of public transparency, and to provide assurances that the proposed TMDL for nitrogen will not lead to illegal backsliding or degradation, NMED should restore the table to the current draft TMDL, and inform the public of the relationship between the proposed wasteload allocation and the wastewater treatment plant's effluent characteristics.

SWQB Response: *Thank you for the suggestion. While a similar table was included in the 2014 draft of the TMDL, a revised approach to the calculation of the WLA was included in the 2016 draft of the TMDL which makes a similar table unnecessary. The Total WLA in lbs/day was calculated as follows: Total WLA = Total TMDL – Total LA – MOS. Back-calculating the Total WLA (lbs/day) of 2.37 lbs/day TP and 54.3 lbs/day TN using the WWTP design capacity of 2.70 mgd results in associated nutrient concentrations of 0.11 mg/L TP and 2.41 mg/L TN. These concentrations remain constant when dividing up the Total WLA into the Current WLA and Future Growth WLA. Language related to this as been added to Section 5.*

IV. The draft TMDL will result in illegal backsliding and degradation

NMED apparently believes adoption of the draft TMDL will justify a "next generation" NPDES permit for the wastewater treatment plant that contains *only* a mass loading limitation for Total Nitrogen and that dispenses with the concentration limit currently in place. NMED is incorrect in this regard, as such a hypothetical NPDES permit would impermissibly violate the statutory prohibition on backsliding. In support of this erroneous position, NMED cites to Section 303(d)(4) of the Clean Water Act, 33 U.S.C. § 1313(d)(4), which allows for the revision of NPDES permits affecting impaired streams when the existing permit contains "an effluent limitation based on a total maximum daily load or other wasteload allocation." While it is true that the currently-in-place 2006 TMDL for nutrients in the Rio Ruidoso contains a Total Nitrogen wasteload allocation for the wastewater treatment plant, it is *decidedly not the case* that the current NPDES permit for the wastewater treatment plant contains a nitrogen limit that is based on a TMDL or other wasteload allocation. To the contrary, the nitrogen effluent limitation in the current NPDES permit is water quality standard based and was adopted to assure attainment of water quality standards below the wastewater treatment plant. For this reason, Section 303(d)(4) of the Clean Water Act is inapplicable in this case and the backsliding that is contemplated by the draft nutrient TMDL is unauthorized and is illegal. In short, even adoption of the proposed TMDL would not – and legally could not – provide any relief from the current 1.0 mg/L nitrogen limitation in the current NPDES permit.

V. Conclusion

For the reasons set forth in this comment letter and in Rio Hondo Land's previous comment letter of August 7, 2014, the proposed TMDL for nutrients in the Rio Ruidoso fails to comply with state and federal regulatory and statutory requirements. The draft TMDL cannot be approved in its current state.

Respectfully submitted,

/s/ Steven Sugarman

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

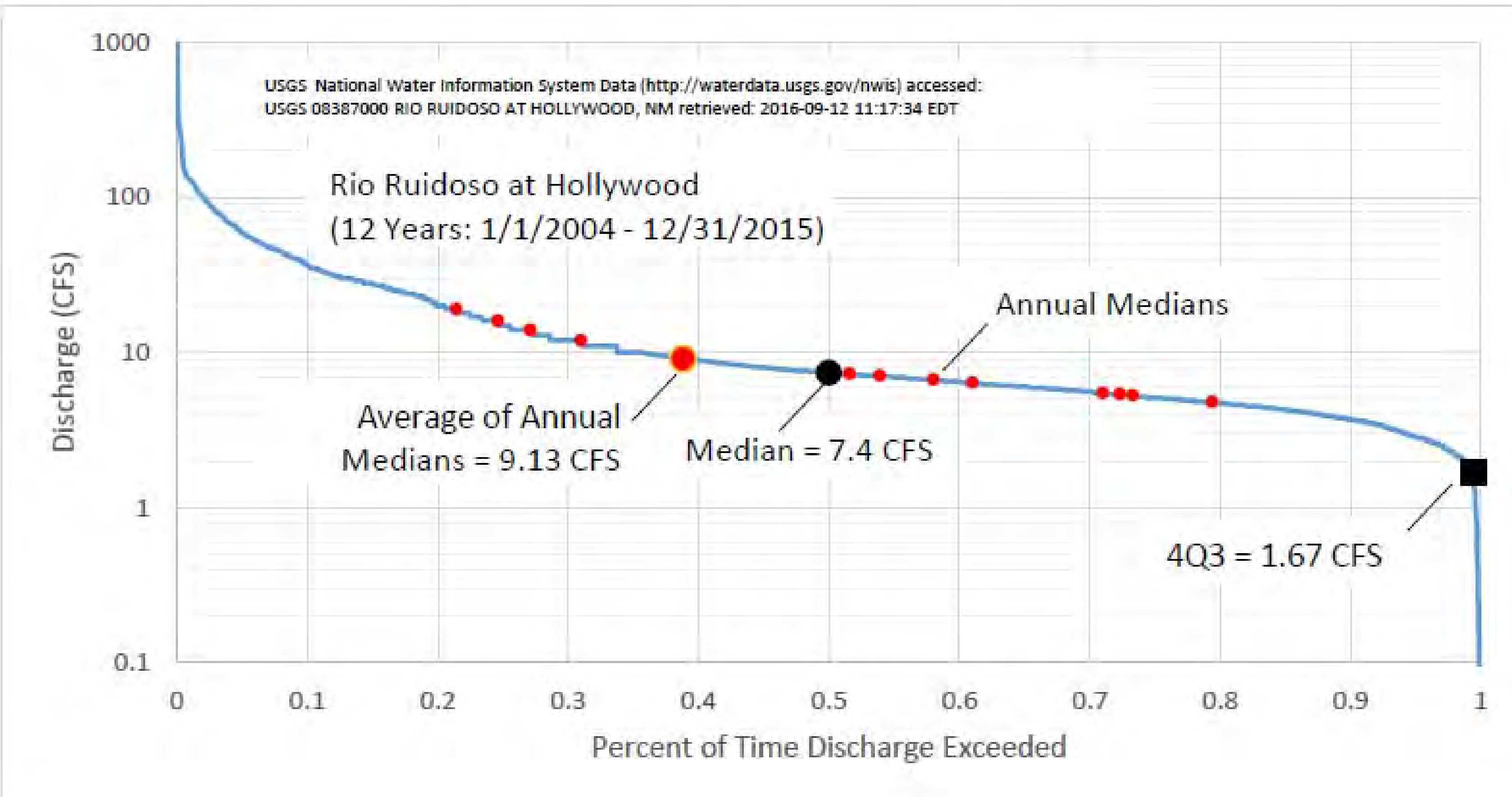
SWQB Response: *The General Prohibition in 33 U.S.C. § 1342(o)(1) allows for a permit to be modified or renewed to contain effluent limits that are less stringent than effluent limits in the previous permit if the new limits are based on a TMDL as stated in 33 U.S.C. § 1313 (d)(4)(A)(i). The revised waste load (effluent limits) and load (nonpoint sources) allocations in the 2016 TMDL will meet the narrative plant nutrient and segment-specific TP water quality standards for the Rio Ruidoso.*

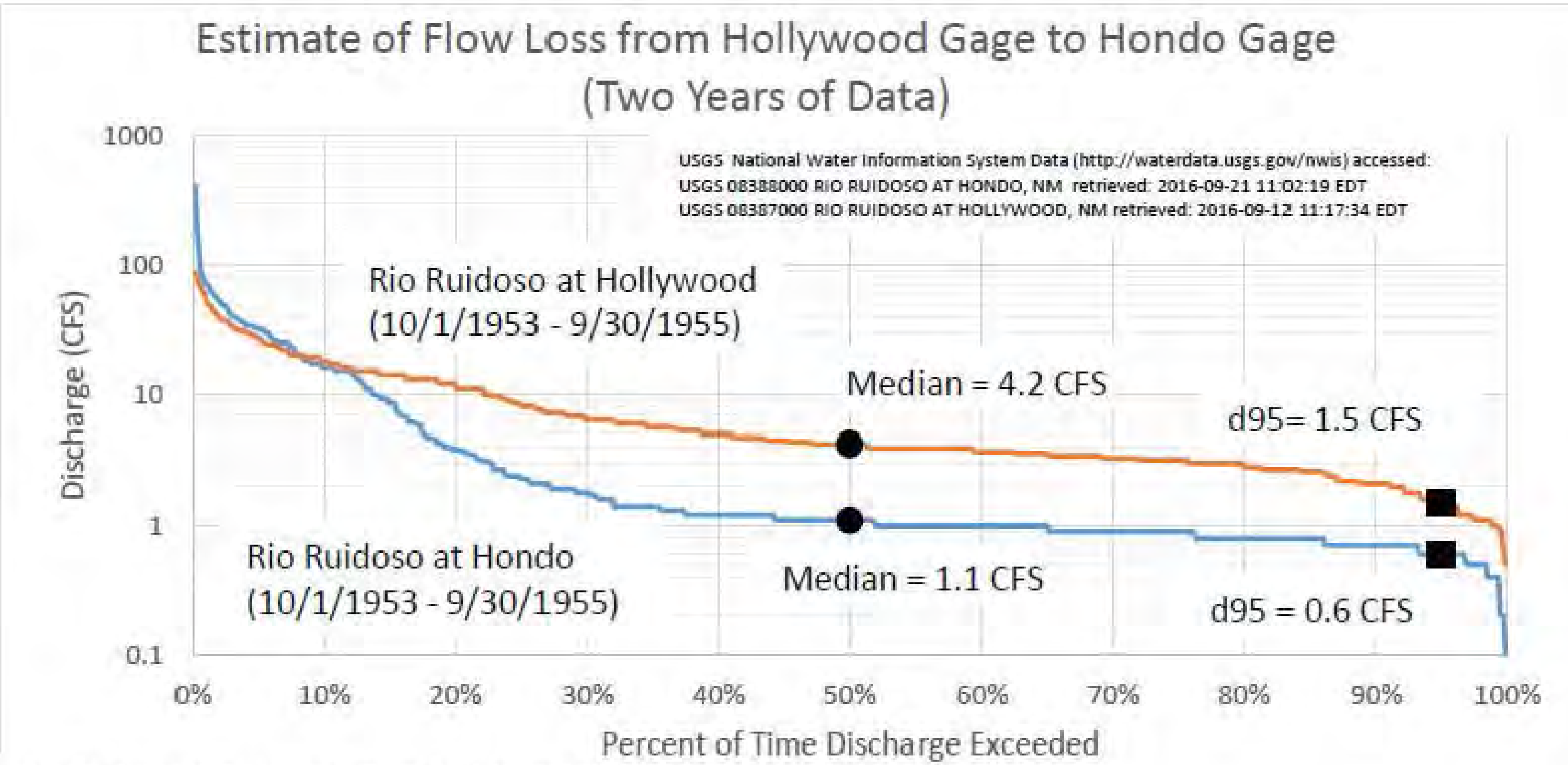
Rio Ruidoso at Hollywood Flow Characteristics During Time Period Used for NMED/SWQB Critical Flow Calculations (January 1, 2004 - December 31, 2015)

Month	Median Discharge (CFS)	Percent of Days Where Discharge was Less than 9.13 CFS Critical Flow
January	6.5	77%
February	6.6	67%
March	9.15	50%
April	8.35	52%
May	7.3	56%
June	5	72%
July	6.7	60%
August	9.95	45%
September	8.6	54%
October	7.4	65%
November	7.6	73%
December	7.5	65%
Entire Period	7.4	61%

Rio Ruidoso at Hollywood Flow Characteristics for Period of Record (October 1, 1953 - September 11, 2016)

Month	Median Discharge (CFS)	Percent of Days Where Discharge was Less than 9.13 CFS Critical Flow
January	7.9	62%
February	9.2	50%
March	15	34%
April	22	25%
May	16	34%
June	7.9	56%
July	8.6	53%
August	14	30%
September	13	34%
October	9.3	49%
November	8.3	59%
December	8.1	59%
Entire Period	10.00	45%


USGS National Water Information System Data (http://waterdata.usgs.gov/nwis) accessed:
USGS 08387000 RIO RUIDOSO AT HOLLYWOOD, NM retrieved: 2016-09-12 11:17:34 EDT
Rio Ruidoso at Hollywood
(12 Years: 1/1/2004 - 12/31/2015)
Annual Medians
Average of Annual
Medians = 9.13 CFS
Median = 7.4 CFS
4Q3 = 1.67 CFS
Discharge (CFS)
1000
100
10
1
0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percent of Time Discharge Exceeded



Note: Flow loss from Hollywood gage to Glencoe is scaled by catchment to the data above.

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.

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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 comform 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

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Assessment Unit is shorter than the 2006 Assessment Unit.

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.

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: *See response in 2015 Sacramento Mountain TMDL document at:*
https://www.env.nm.gov/swqb/TMDL/SacramentoMnts/index.html

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

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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.

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.

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

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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.

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.

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: *See response to Section II of the 2016 TMDL comments.*

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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: *The Ruidoso Downs Racetrack appears to meet the definition of a CAFO in 40 CFR 122.23. Although the Racetrack does not currently have a permit, based on communication with EPA Region 6 permit staff, the NPDES permitting authority in New Mexico, they expect that the Ruidoso Downs Racetrack will be included in the upcoming Confined Animal Feeding Operation (CAFO) General Permit. The TMDL does not include a Waste Load Allocation for the Racetrack because no discharges are permitted from a CAFO except for events that exceed the 25 year/24 hour retention capacity. The CAFO is addressed in Section 3.5.2 and Section 5.1 of the 2016 TMDL.*

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 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: *See response in 2015 Sacramento Mountain TMDL document at: https://www.env.nm.gov/swqb/TMDL/SacramentoMnts/index.html*

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

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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.

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 addressed in Section 3.5.1 and Section 5.2 of the 2016 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 applies specifically to the 2014 Sacramento Mountains nutrient TMDLs and does not apply to the 2016 draft TMDL.*

7. <u>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</u>

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.

<u>SWQB Response:</u> *Due to the lack of permits for non-point sources (NPS) of pollution, it is challenging to provide assurance that LAs, as stated in the TMDL, will be achieved. However, in the Rio Ruidoso, there are several NPS projects that will likely result in a positive reduction in NPS pollution. The TMDL now includes a discussion of the connection of septic systems in the Rio Ruidoso watershed and the planned replacement of the City sewer interceptor, which are both important steps toward reducing non-point source pollution. Additionally, the targets used in the calculation of the Load Allocation are based on measured background values from upstream AUs when they were not impaired for plant nutrients or TP and are therefore realistic and achievable goals for the non-point source portion of the TMDL.*

The Watershed Protection Section of SWQB cooperatively works to educate others and implement best management practices to reduce nonpoint source pollutants from entering the surface and ground water resources of New Mexico. Workplans developed and funded under Clean Water Act §319(h) comprise a variety of efforts, including watershed association development, riparian area restoration, spill response, and treatment of abandoned mines.

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: *SWQB's analysis for TN and TP is based on median and 4Q3 flows, respectively, which are calculated from daily stream gage measurements. The WWTP does not report daily flow, only a maximum flow and a 30 day average flow. However, discharge from the WWTP is relatively constant and seasonal variation between the median 30-day average and the median daily max values are minimal. The numbers below are based on 30-day average WWTP values, since this is what the permit is based on.*

In summary, when river median flows are lowest (summer, 4.26 mgd) the WWTP median flows are highest (1.81 mgd). When flows in the river are highest (winter, 4.59 mgd), the WWTP flows are lowest (1.47 mgd). Total summer flow is 6.07 mgd and total winter flow is 6.06 mgd; 0.01 mgd does not constitute a significant seasonal variation in flow.

	WWTP Winter (mgd)	*WWTP Summer (mgd)*	*WWTP Annual (mgd)*	*Rio Ruidoso Winter (mgd)*	*Rio Ruidoso Summer (mgd)*	*Rio Ruidoso Annual (mgd)*
Median	*1.47*	*1.81*	*1.51*	*4.59*	*4.26*	*4.59*
Max	*1.73*	*1.85*	*1.88*	*149*	*643*	*643*
Min	*1.35*	*1.48*	*1.35*	*0.54*	*0*	*0*
Average	*1.49*	*1.74*	*1.56*	*9.94*	*11.07*	*10.76*

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: *See response to Section IV of the 2016 TMDL comments.*

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