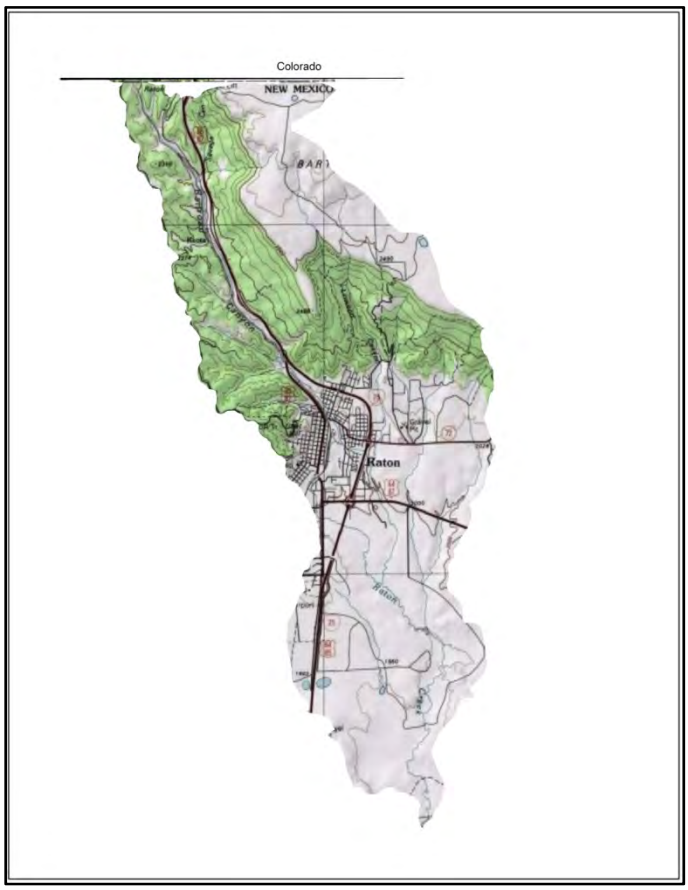
FINAL DRAFT

TOTAL MAXIMUM DAILY LOAD (TMDL)

FOR

RATON CREEK

(CHICORICA CREEK TO HEADWATERS)



MARCH 28, 2012

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COVER PHOTO*: Raton Creek watershed. 1:24,000 USGS Quadrangles (Tin Pan Canyon Quad, Raton Quad, Clifton House Quad)*

LIST OF ABBREVIATIONS

4Q3	4-Day, 3-year low-flow frequency
BMP	Best management practices
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CGP	Construction general storm water permit
CWA	Clean Water Act
^{o}C	Degrees Celsius
^{o}F	Degrees Fahrenheit
HUC	Hydrologic unit code
$j/m^2/s$	Joules per square meter per second
km^2	Square kilometers
LA	Load allocation
lbs/day	Pounds per day
mgd	Million gallons per day
mg/L	Milligrams per Liter
mi^2	Square miles
mL	Milliliters
MOS	Margin of safety
MOU	Memorandum of Understanding
MS4	Municipal separate storm sewer system
MSGP	Multi-sector general storm water permit
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source
QAPP	Quality Assurance Project Plan
RFP	Request for proposal
SEE	Standard Error of the Estimate
SSTEMP	Stream Segment Temperature Model
SWPPP	Storm water pollution prevention plan
SWQB	Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WQCC	Water Quality Control Commission
WQS	Water quality standards (NMAC 20.6.4 as amended through August 31, 2007)
WBP	Watershed-based plan
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop Total Maximum Daily Load (TMDL) management plans for water bodies determined to be water quality limited. 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 Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint source and background conditions. TMDLs also include a Margin of Safety (MOS).

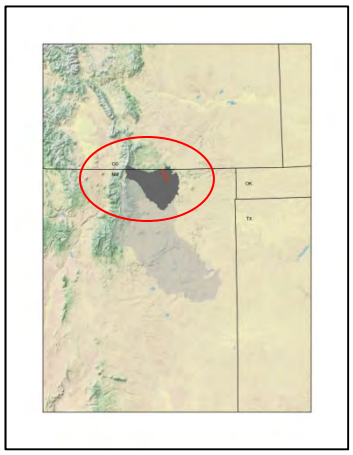
The Surface Water Quality Bureau (SWQB) conducted a water quality survey of the Canadian River basin of northeastern New Mexico in 2006. Water quality monitoring stations were located within the Canadian River watershed to evaluate the impact of tributary streams and ambient water quality conditions. As a result of assessing data generated during this monitoring effort, impairment determinations of New Mexico water quality standards included *E.coli* and plant nutrients for Raton Creek (Chicorica Creek to headwaters).

This TMDL document addresses the above noted impairments as summarized in the table below. The SWQB has prepared separate TMDL bundles for other surface waters in the Canadian Headwaters, Canadian River Part 2, Mora River, and Cimarron River subwatersheds. The 2006 study identified other potential water quality impairments which are not addressed in this document. Additional data needs for verification of those impairments are being identified and data collection will follow. If these impairments are verified, subsequent TMDLs will be prepared in a separate TMDL document.

The SWQB's Monitoring and Assessment Section will collect water quality data during the next rotational cycle. The next scheduled monitoring date for the Canadian Watershed is 2015, at which time TMDL targets will be re-examined and potentially revised as this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate and/or if new standards are adopted, the load capacity will be adjusted accordingly. When water quality standards have been achieved, the reach will be moved to the appropriate category in the Integrated Report.

The SWQB's Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the Watershed-Based Plans will be done with participation of all interested and affected parties.

TOTAL MAXIMUM DAILY LOAD FOR
RATON CREEK (CHICORICA TO HEADWATERS)



New Mexico Standards Segment	20.6.4.305
Waterbody Identifier	NM-2305.A_253 formerly known as NM-CR1-10410
Segment Length	17.66 miles
Parameters of Concern	*E. coli*; Plant Nutrients
Uses Affected	Primary Contact; Marginal Warmwater Aquatic Life
Geographic Location	Canadian Headwaters USGS Hydrologic Unit Code 11080001
Scope/size of Watershed	45 square miles
Land Type	Southwestern Tablelands (Ecoregion 26); Southern Rockies (21)
Land Use/Cover	59% Rangeland; 35% Forest; 5% Urban; 1% Agriculture
Probable Sources	Municipal (urbanized high density area); municipal point source dischargers; rangeland grazing
Land Management	100% Private
IR Category	5/5A
Priority Ranking	High
TMDL for:	**WLA + LA + MOS = TMDL**
E. coli	**4.30×10^9 + 3.63×10^8 + 6.41×10^7 = 4.73×10^9 cfu/day**
Plant Nutrients*:	
Total Phosphorus	**0.230 + 0.015 + 0.003 = 0.248 lbs/day**
Total Nitrogen	**3.38 + 0.289 + 0.051 = 3.72 lbs/day**

** A settlement agreement was negotiated in 1997 as a result of a lawsuit filed against EPA. It required the development of TMDLs for all water bodies identified as impaired on the 1996 CWA Section 303(d) list by 2016. Raton Creek was listed for nutrients on the 1996 list. This Nutrient TMDL addresses the settlement agreement.*

1.0 INTRODUCTION

Under Section 303 of the federal Clean Water Act (CWA), 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, 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 impairment. 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 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 assessment units within the Raton Creek portion of the Canadian watershed 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 Canadian River watershed, provides applicable water quality standards for the assessment units addressed in this document, and briefly discusses the water quality survey that was conducted in the Canadian River watershed in 2006. Section 3.0 presents the TMDL developed for *E. coli* and Section 4.0 provides plant nutrient TMDLs. Pursuant to CWA Section 106(e)(1), Section 5.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 6.0 discusses implementation of TMDLs (phase two) and the relationship between TMDLs and Watershed-Based Plans (WBPs). Section 7.0 discusses assurance, Section 8.0 public participation in the TMDL process, and Section 9.0 provides references.

2.0 CANADIAN WATERSHED CHARACTERISTICS

The Canadian River basin was intensively sampled by the Surface Water Quality Bureau (SWQB) from March to October 2006. The Canadian River basin includes perennial reaches of the Canadian River from the Texas/New Mexico Border to Colorado/New Mexico, as well as tributaries that enter the Canadian River along those perennial reaches. Surface water quality monitoring stations were selected to characterize water quality of the stream reaches.

2.1 Location Description

The Canadian River watershed (US Geological Survey [USGS] Hydrologic Unit Codes [HUC] 11080001, 11080002, 11080003, 11080004, 11080005, 11080006, 11080007, 11080008, and 11090101) is part of the vast drainage system of the Arkansas River. The Canadian River watershed encompasses about one-sixth the land area of New Mexico or about 1720 square miles (1.1 million acres). Canadian River tributaries flow east and southeast from their origins on the east slopes of the Sangre de Cristo Mountains of northern New Mexico and southern Colorado. As it traverses the Great Plains in a southerly and then easterly direction, several perennial tributaries, including the Vermejo, Cimarron, Mora, and Conchas Rivers join the Canadian River before it exits New Mexico toward Texas near Logan, New Mexico. The Canadian River flows generally east through the Texas panhandle into Oklahoma, where it drains a sizeable portion of that state before reaching its confluence with the Arkansas River just west of Fort Smith, Arkansas. The entire drainage system encompasses approximately 47,700 square miles in the three states.

The Canadian River is a braided, meandering system fed by the numerous streams and creeks and drains semi-deserts, plains, prairies, forests, and mountains. The Canadian River watershed in New Mexico is located in Omernick Level III Ecoregion 21 (Southern Rockies) in the headwaters and Level III Ecoregion 26 (Southwestern Tablelands) in the lowlands. The elevation range for the various sampling sites in the survey was 3517 to 7119 feet above sea level. As presented in Figure 2.1, land use along the mainstem of the Canadian River is approximately 73% rangeland; 25% forest; 1% agriculture; and <1% urban.

Historic and current land uses in the watershed include farming, ranching, recreation, and municipal related activities (Raton, Springer, Tucumcari, Logan). Much of the land ownership adjacent to the river is private with the exceptions of Maxwell National Wildlife Refuge, Fort Union National Monument near Watrous, and national forest land at higher elevations in the headwaters. The State of New Mexico also owns and manages tracts of public lands in the eastern portions of the watershed (Figure 2.2).

Several species within this watershed are listed as either threatened or endangered by both State and Federal agencies. Endangered species include the Southern redbelly dace (*Phoxinus erythrogaster*), Southwestern willow flycatcher (*Empidonax traillii extimus*), Least tern (*Sterna antillarum*), Black-footed ferret (*Mustela nigripes*), and Holy Ghost ipomopsis (*Holy Ghost ipomopsis*). Threatened species include the Arkansas River shiner (*Notropis girardi*), Suckermouth minnow (*Phenacobius mirabilis*), Arkansas River speckled chub (*Macrhybopsis tetranema*), Bald eagle (*Haliaeetus leucocephalus*), Mexican spotted owl (*Strix occidentalis lucida*), and Piping plover (*Charadrius melodus*).

According to the New Mexico Incident Management Team, the Track Fire burned 27,792 acres (19,970 in New Mexico and 7,822 in Colorado) north of Raton during June 12-18, 2011. The fire burned within the Raton municipal watershed that includes Lake Maloya, the drinking water supply for the City.

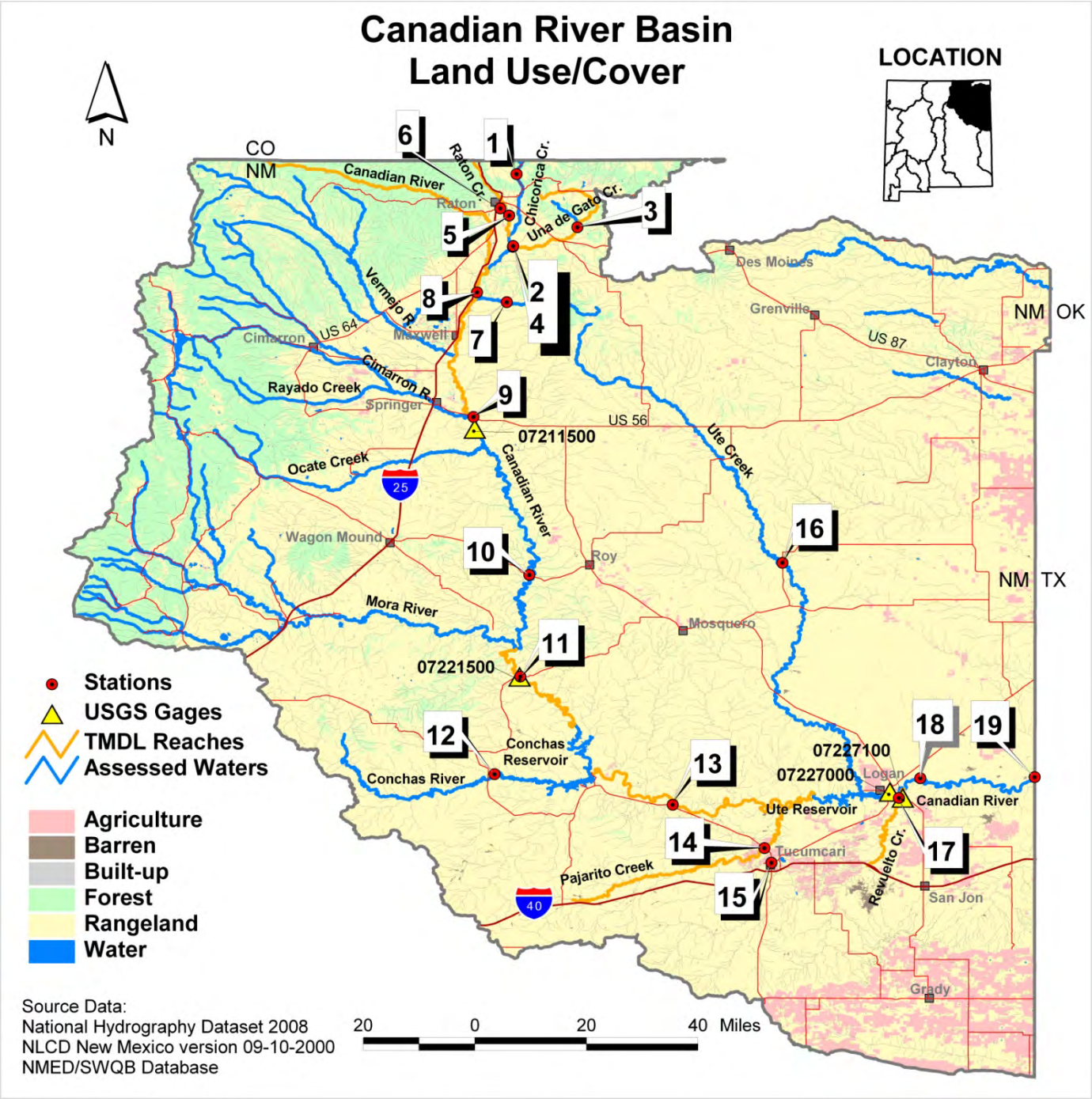


Figure 2.1 Land use and sampling stations in the Canadian River Watershed.
See Table 2.1 for station information.

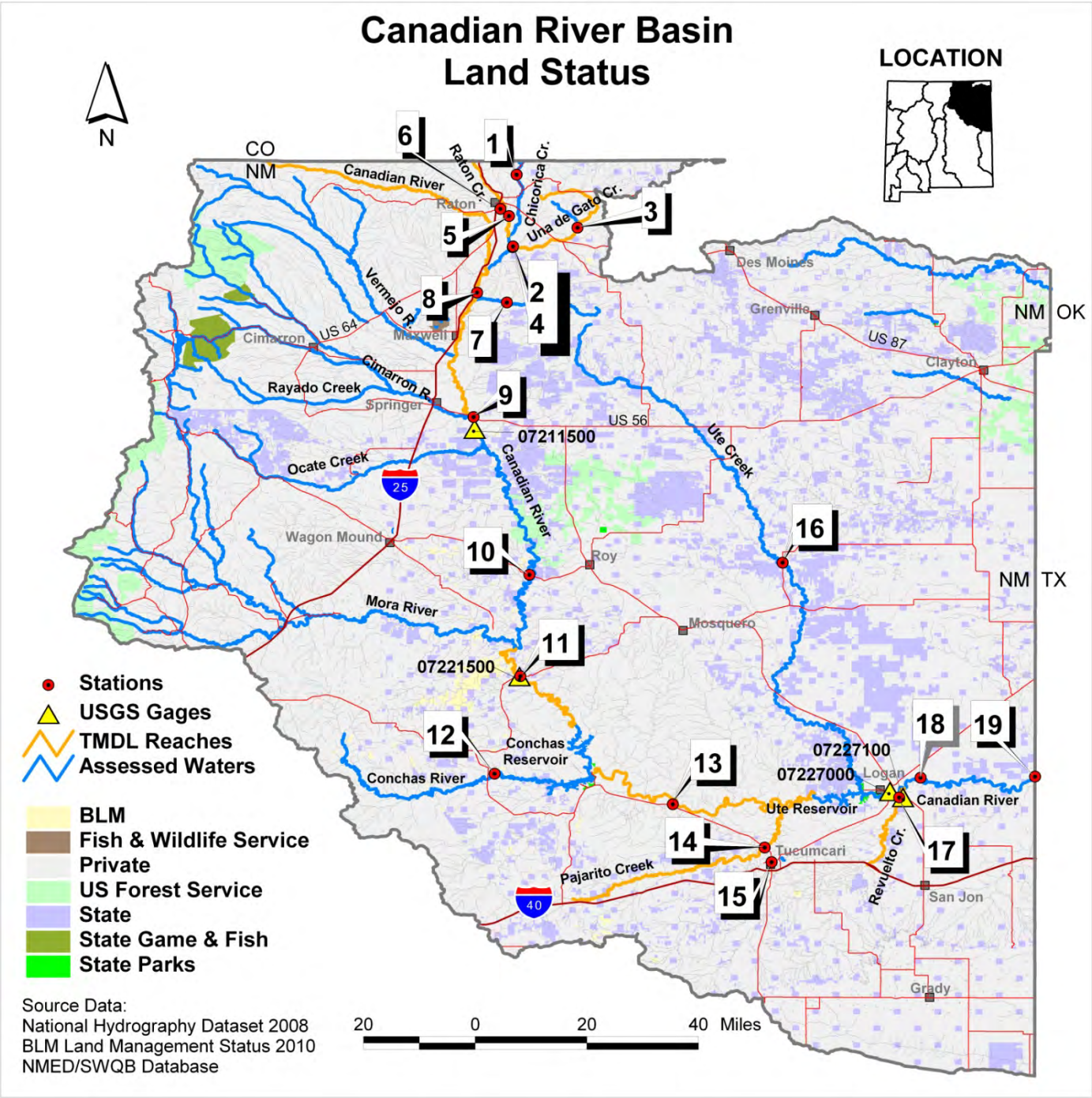


Figure 2.2 Land management and sampling stations in the Canadian River Watershed

2.2 Geology and Land Use

The laterally extensive pediments, topographically inverted basalt-capped mesas, and stripped structural surfaces of the Las Vegas Plateau of northeastern New Mexico gradually slope to the southeast away from the eastern flank of the Sangre de Cristo Mountains, which represent both the southern Rocky Mountain front in New Mexico as well as the eastern flank of the Rio Grande rift. The Canadian River has carved a deep bedrock canyon into the gently warped strata of the Las Vegas Plateau in response to a complex interaction of rock-uplift processes (characterized by domes, arches, and basins) and downstream base level fall caused by evaporite dissolution (Wisniewski & Pazzaglia 2002). The Las Vegas Plateau terminates to the south in a 250–300 meter high, embayed line of cliffs known as the Canadian escarpment. The canyon is deepest (~400 m) and widest (~1.5 km) where it breaches the escarpment north of Conchas Lake near Sabinoso, New Mexico.

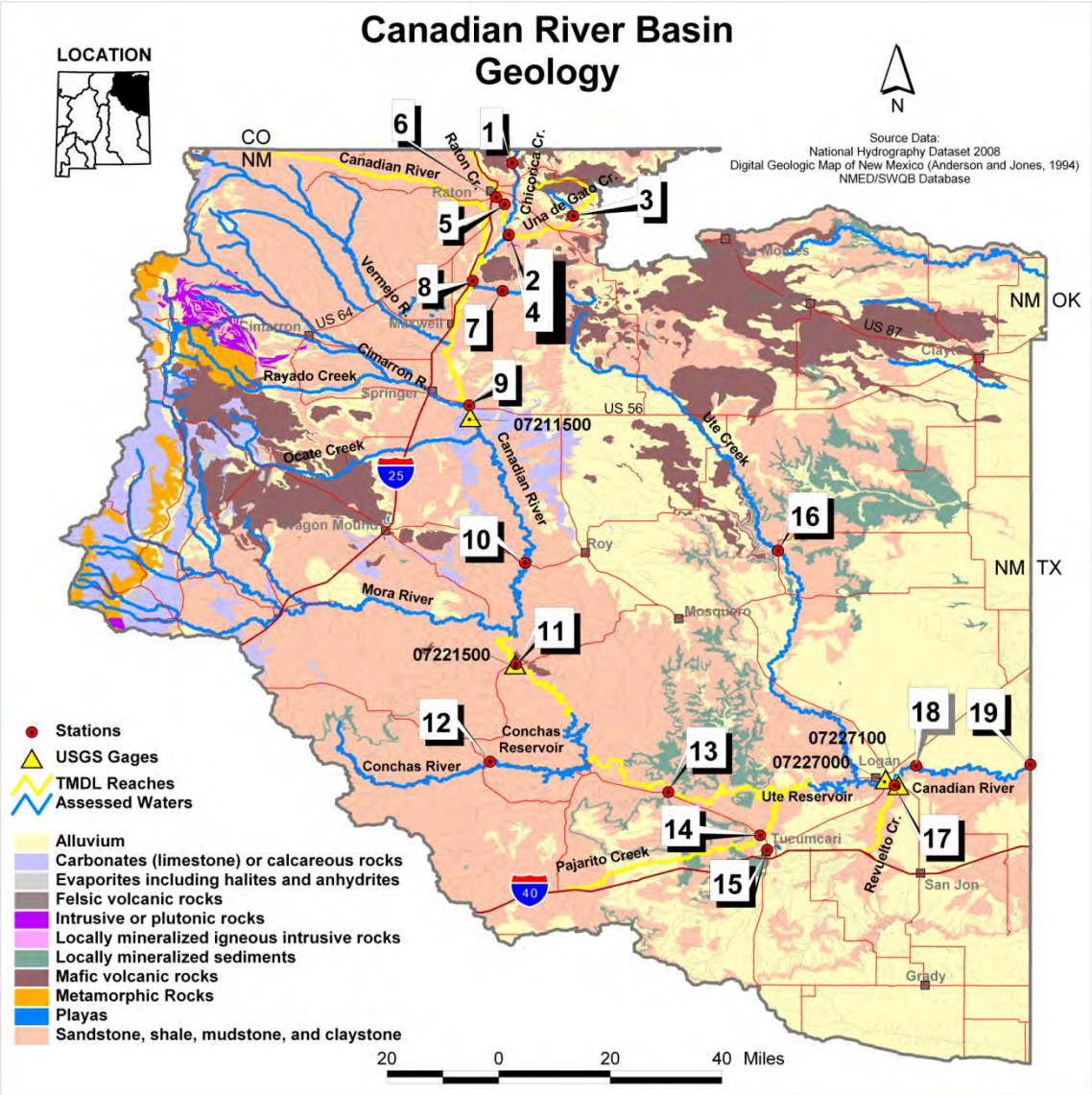


Figure 2.3 Geologic map of the Canadian River Watershed and sampling stations

2.3 Water Quality Standards and Designated Uses

Water quality standards (WQS) for all assessment units in this document are set forth in section 20.6.4.305 of the *Standards for Interstate and Intrastate Surface Waters*, 20.6.4 New Mexico Administrative Code, as amended through January 14, 2011 (NMAC 2011). These standards have been approved by the WQCC and the EPA for Clean Water Act purposes.

20.6.4.305 CANADIAN RIVER BASIN - The main stem of the Canadian River from the headwaters of Conchas Reservoir upstream to the New Mexico – Colorado line, perennial reaches of the Conchas River,… and perennial reaches of Raton, Chicorica (except Lake Maloya and Lake Alice) and Uña de Gato Creeks.

***Designated Uses**: irrigation, marginal warmwater aquatic life, livestock watering, wildlife habitat and primary contact.*

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

Current impairment listings for the Canadian River watershed and subwatersheds are included in the 2010-2012 State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List (NMED/SWQB 2010a). 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 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 2010-2012 Integrated List available on the SWQB website.

New Mexico's antidegradation policy is articulated in Subsection A of 20.6.4.8 NMAC. It 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." TMDLs are consistent with this policy because implementation of a TMDL restores water quality so that existing uses are protected and water quality criteria achieved.

2.4 Water Quality Sampling

The Canadian River Watershed was sampled by the SWQB in 2006. 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 Canadian River Water Quality Survey Summary (NMED/SWQB 2010b).

2.4.1 Survey Design

The Monitoring and Assessment Section (MAS) of the SWQB conducted a water quality survey of the Canadian River Watershed between March and November, 2006. The water quality survey in the headwaters and along the mainstem included 19 sampling sites (Figure 2.1 and Table 2.1). Most sites were sampled 8 times, whereas 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 were uploaded to USEPA's Storage and Retrieval (STORET) database.

All temperature and chemical/physical sampling and assessment techniques are detailed in the *Quality Assurance Project Plan* (NMED/SWQB 2011a) and the SWQB assessment protocols (NMED/SWQB 2007). As a result of the 2006 monitoring effort and subsequent assessment of results, several surface water impairments were determined. Accordingly, these impairments were added to New Mexico's Integrated CWA §303(d)/305(b) List in 2008 (NMED/SWQB 2010a).

Table 2.1 SWQB 2006 Canadian River watershed sampling stations

MAP #	STATION NAME	STATION ID
1	Chicorica Creek above Lake Alice	04Chicor034.4
2	Chicorica Creek below Uña de Gato Creek	04Chicor010.9
3	Uña de Gato Creek below T O dam	04UnaGat020.9
4	Uña de Gato Creek above Chicorica Creek	04UnaGat000.1
5	Raton Creek 5 miles abv Chicorica Creek	04RatonC007.8
6	Raton WWTP	NM0020273
7	Tinaja Creek above Canadian River	04Tinaja010.1
8	Canadian River at Tinaja	04Canadi402.9
9	Canadian River above Cimarron River at NM 56	04Canadi352.7
10	Canadian River at State HWY 120 Bridge	06Canadi274.8
11	Canadian River at NM 419 near Sanchez	06Canadi232.6
12	Conchas River at gage on NM 104	08Concha025.1
13	Canadian River at NM 104 at milemarker 88	09Canadi144.5
14	Pajarito Creek at NM 104	09Pajari020.0
15	Tucumcari WWTP	NM0020711
16	Ute Creek above Highway 102 near Bueyeros	10UteCre104.3
17	Revuelto Creek at NM 469 above Canadian R	11Revuel003.9
18	Canadian River below Ute Dam at the Gravel Pit	09Canadi049.2
19	Canadian River above NM/TX State Line	09Canadi001.2

2.4.2 Hydrologic Conditions

There are four active USGS gaging stations in the Canadian River: the Canadian River near Taylor Springs, the Canadian River near Sanchez, the Canadian River at Logan, and Revuelto Creek near Logan. The annual mean streamflows for the Canadian River over the periods of record are 73.0 cubic feet per second (cfs) near the headwaters (Taylor Springs), 169.5 cfs near Sanchez, and 35.8 cfs near the Texas border (Logan) (Figures 2.4 – 2.6). Streamflow near the Texas border is considerably lower than the upstream flows because it is controlled by releases from Ute Reservoir. The annual mean streamflow for Revuelto Creek based on the period of record is 41.1 cfs (Figure 2.7).

During the 2006 watershed survey, daily flows in the Canadian River were below average most of the year (except during the monsoon season – July through September) with annual mean streamflows of 17.2 cfs near Taylor Springs, 69.4 cfs near Sanchez, and 29.8 cfs at Logan approximately 75%, 60%, and 15% below "normal," respectively. Likewise, daily flows in Revuelto Creek were below average and erratic for most of the year with flows peaking during the monsoon season (July through September). Revuelto Creek had an annual mean streamflow of 19.3 cfs approximately 50% below "normal".

As stated in the Assessment Protocol (NMED/SWQB 2011b), data collected during all flow conditions, including low flow conditions (i.e., flows below 4-day, 3-year flows [4Q3]), will be used to determine designated use attainment status during the assessment process. For the purpose of assessing designated use attainment in ambient surface waters, WQS apply at all times under all flow conditions.

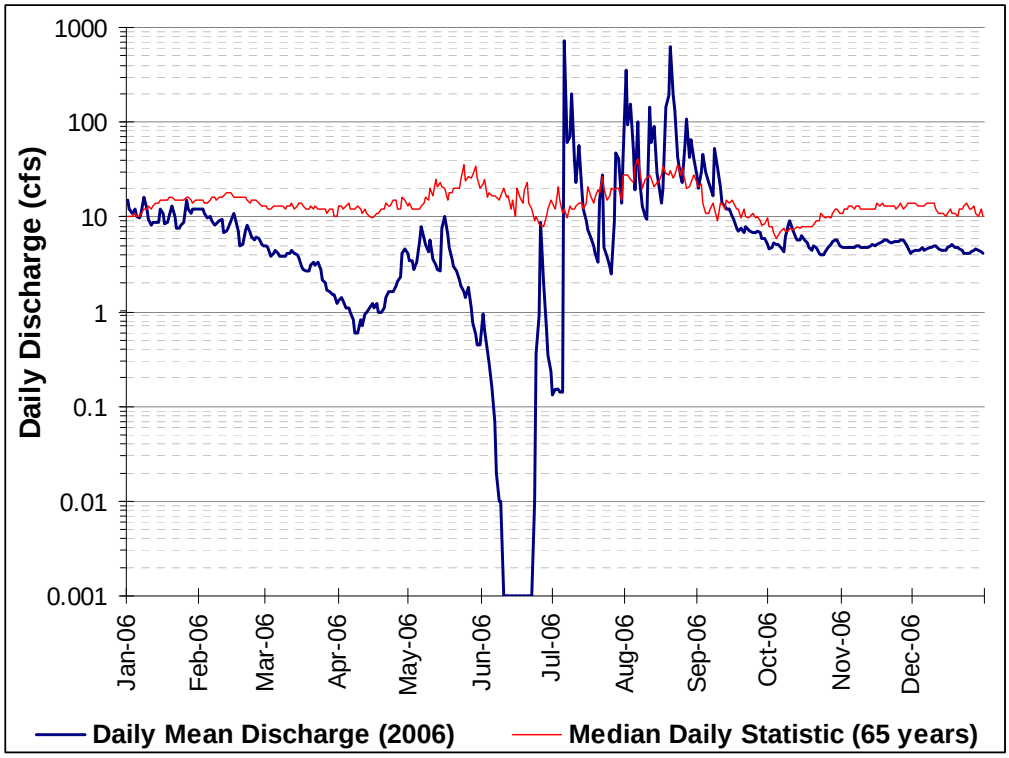


Figure 2.4 USGS 07211500 Canadian River near Taylor Springs, NM

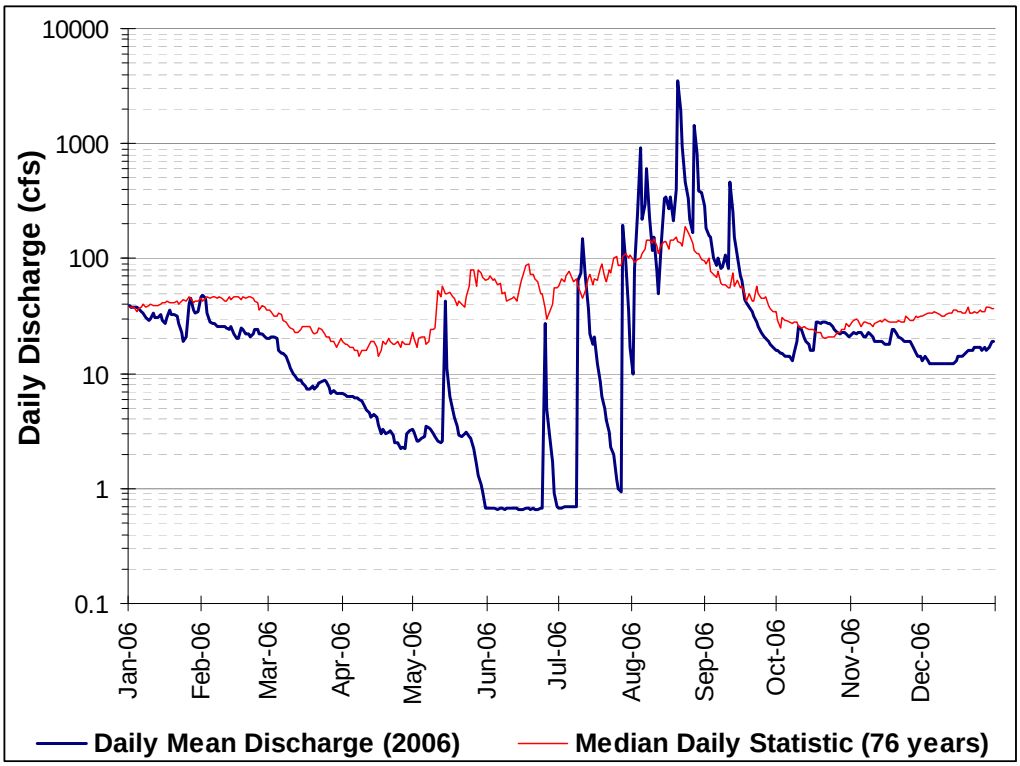


Figure 2.5 USGS 07221500 Canadian River near Sanchez, NM

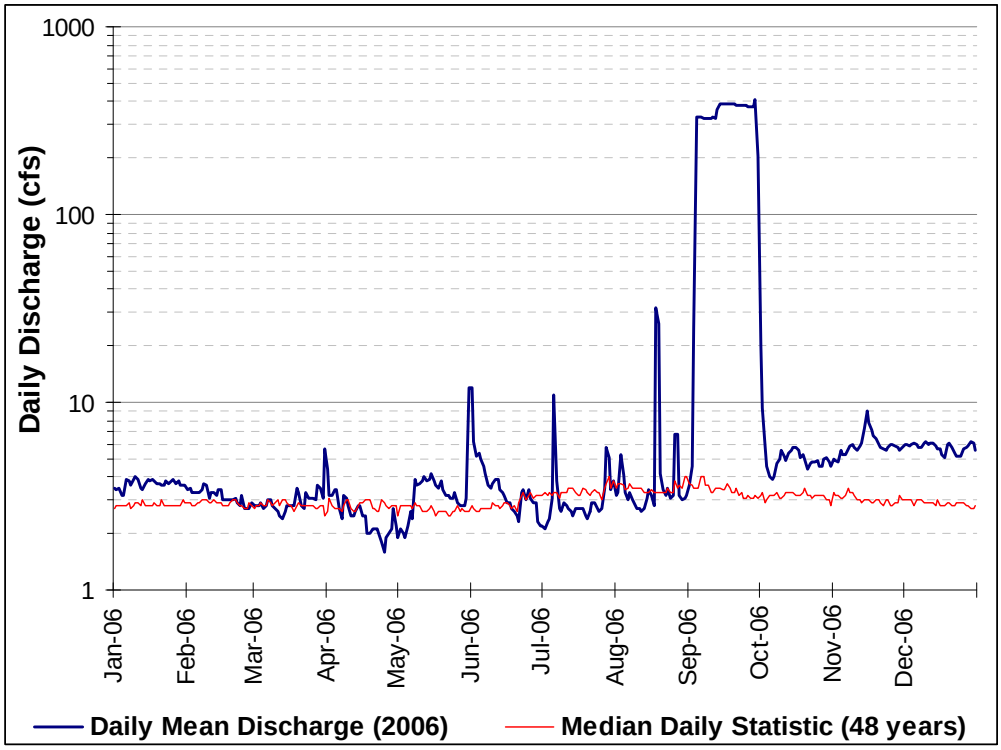


Figure 2.6 USGS 07227000 Canadian River near at Logan, NM
*****flow dependent on dam releases from Ute Reservoir*****

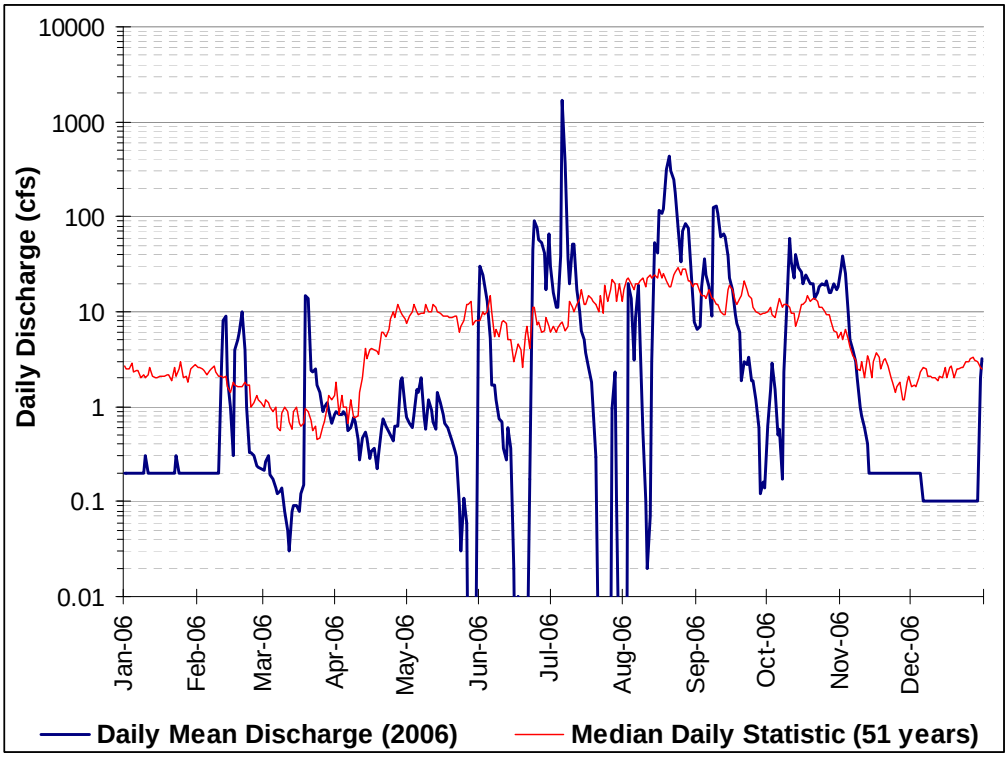


Figure 2.7 USGS 07227100 Revuelto Creek near Logan, NM

3.0 BACTERIA

Assessment of the data from the 2006 SWQB water quality survey in the Canadian River watershed identified exceedences of the New Mexico water quality standards for *E. coli* bacteria in Raton Creek (Chicorica Creek to headwaters).

As a result, these assessment units were listed on the Integrated CWA §303(d)/§305(b) List with *E. coli* as a pollutant of concern (NMED/SWQB 2010a). When water quality standards have been achieved, the reach will be moved to the appropriate category on the Clean Water Act Integrated §303(d)/§305(b) List of assessed waters.

3.1 Target Loading Capacity

For this TMDL document, target values for bacteria are based on the reduction in bacteria necessary to achieve the numeric criterion associated with the primary contact use for this waterbody:

> *20.6.4.900 NMAC Subsection D – Primary Contact: The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL or less.*

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

Table 3.1 *E. coli* exceedences

Assessment Unit	Designated Use Affected	Associated Criterion* (cfu/100mL)	Exceedence Ratio (# exceedences / total # samples)
Raton Creek (Chicorica Creek to headwaters)	PC	410	2/5

Notes: * = single sample criterion
PC = Primary Contact
cfu = colony forming units
mL = milliliters

3.2 Flow

TMDLs are calculated at a specific flow and bacteria concentrations can vary as a function of flow. SWQB determined streamflow during the 2006 sampling season either by using the active USGS gage network or by taking direct in-stream flow measurements utilizing standard procedures. Water quality standard exceedences for Raton Creek occureed *only* during lower flows. When available, USGS gages are used to estimate flow using DFLOW software (USEPA 2006a); however, the 4Q3 derivation for Raton Creek, which is ungaged, will be based on analysis methods described by Waltemeyer (2002). In Waltemeyer's analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e.,

statewide and mountainous regions above 7,500 feet in elevation). The following statewide regression equation is based on data from 50 gaging stations with non-zero discharge:

$$4Q3 = 1.2856 \times 10^{-4}\ DA^{0.42}\ P_w^{3.16} \qquad \text{(Eq. 3-1)}$$

where,

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

The average standard error of estimate (SEE) and coefficient of determination are 126 and 48 percent, respectively, for this regression equation (Waltemeyer 2002). The 4Q3 for Raton Creek was estimated using the statewide regression equation (Eq. 3-1) because the mean elevations for these assessment units were below 7,500 feet in elevation (Table 3.2).

Table 3.2 Calculation of 4Q3 low-flow frequencies

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean Winter Precipitation (in.)	4Q3 (cfs)
Raton Creek (Chicorica Creek to headwaters)	6903	45.4	5.47	0.14

The critical streamflow value for Raton Creek was converted from cubic feet per second (cfs) to units of million gallons per day (mgd) as follows:

$$0.14\ \frac{ft^3}{\sec} \times 1{,}728 \frac{in^3}{ft^3} \times 0.004329 \frac{gal}{in^3} \times 86{,}400\ \frac{\sec}{day} \times 10^{-6} = 0.09 mgd$$

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

3.3 Calculations

Bacteria standards are expressed as colony forming units (cfu) per unit volume. The *E. coli* criterion used to calculate the allowable stream loads for the impaired assessment units is listed in Table 3.3. Total maximum daily loads (TMDLs), or target loading capacities, for bacteria are calculated based on flow values, water quality standards, and a conversion factor (Equation 3-2). The more conservative monthly geometric mean criterion is utilized in TMDL calculations to provide an implicit MOS. Furthermore, if the single sample criterion was used as a target, the geometric mean criterion may not be achieved.

*C as cfu/100 mL * 1,000 mL/1 L * 1 L/ 0.264 gallons * Q in 1,000,000 gallons/day = cfu/day* (Eq. 3-2)

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

Table 3.3 Calculation of TMDLs for *E.coli*

Assessment Unit	Critical Flow (mgd)	*E.coli* geometric mean criterion (cfu/100mL)	Conversion Factor[(a)]	TMDL (cfu/day)
Raton Creek (Chicorica Creek to headwaters)	0.99*	126	3.79×10^{7}	4.73×10^{9}

Notes: * Combined flow based on design flow of Raton WWTP (0.90 mgd) and 4Q3 of stream (0.09 mgd)
(a) Based on equation 3-2.

The measured loads for *E.coli* were similarly calculated. The arithmetic mean of the data used to determine the impairment was substituted for the criterion in Equation 3-2. The same conversion factor was used. Results are presented in Table 3.6.

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

Assessment Unit	Critical Flow (mgd)	*E.coli* Arithmetic Mean[(a)] (cfu/100mL)	Conversion Factor[(b)]	Measured Load (cfu/day)
Raton Creek (Chicorica Creek to headwaters)	0.99*	910	3.79×10^{7}	3.41×10^{10}

Notes: * Combined flow based on design flow of Raton WWTP (0.90 mgd) and 4Q3 of stream (0.09 mgd)
(a) Arithmetic mean of the measured values.
(b) Based on equation 3-2.

3.4 Waste Load Allocations and Load Allocations

3.4.1 Waste Load Allocation

There is an existing point source with an individual NPDES permit on Raton Creek. The City of Raton WWTP (NM0020273) has a batch discharge to Raton Creek and as such has a wasteload allocation (WLA) included in this TMDL (Table 3.5).

There are no Municipal Separate Storm Sewer System (MS4) storm water permits in this AU. However, excess bacteria concentrations may be a component of some storm water discharges covered under general NPDES permits, so the load for these dischargers should addressed.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices (BMPs) and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids, 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 waste load allocations (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 load allocation (LA).

Table 3.5 Waste Load allocations for *E. coli*

Assessment Unit	Facility	Design Flow (mgd)	*E. coli* Effluent Limit[(a)] (cfu/100mL)	Conversion Factor[(b)]	Waste Load Allocation (cfu/day)
Raton Creek (Chicorica Creek to headwaters)	**NM0020273** City of Raton WWTP (November 30, 2013 expiration)	0.90	126	3.79×10^7	4.30×10^9

Notes: *(a)* Based on monthly geometric mean WQS for primary contact (20.6.4.900 NMAC).
(b) Based on equation 3-2.

3.4.2 Load Allocation

In order to calculate the load allocation (LA), the WLA and margin of safety (MOS) were subtracted from the target capacity TMDL following Equation 3-3:

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

The MOS is estimated to be 15 percent of the target load calculated in Table 3.3. Results are presented in Table 3.6. Additional details on the MOS chosen are presented in Section 3.7.

The extensive data collection and analyses necessary to determine background *E.coli* loads for the Canadian River watershed were beyond the resources available for this study. It is therefore assumed that a portion of the LA is made up of natural background loads.

The load reductions necessary to meet the target loads were calculated to be the difference between the calculated target loads (Table 3.3) and the measured loads (Table 3.4), and are shown in Table 3.6. These load reduction tables are presented for informational purposes only. It is important to note that WLAs and LAs are estimates based on a specific flow condition. Under differing hydrologic conditions, the loads will change. For this reason the load allocations given here are less meaningful than are the relative percent reductions. Successful implementation of this TMDL will be determined based on achieving the *E. coli* standards.

Table 3.6 TMDL for *E.coli*

Assessment Unit	WLA (cfu/day)	LA (cfu/day)	MOS (15%)* (cfu/day)	TMDL (cfu/day)
Raton Creek (Chicorica Creek to headwaters)	4.30×10^9	3.63×10^8	6.41×10^7	4.73×10^9

NOTE: * The MOS was calculated as 15% of the nonpoint source Load Allocation, or MOS = 0.15 × (TMDL – WLA).

Table 3.7 Calculation of load reduction for *E.coli*

Assessment Unit	Target Load[(a)] (cfu/day)	Measured Load (cfu/day)	Load Reduction (cfu/day)	Percent Reduction[(b)]
Raton Creek (Chicorica Creek to headwaters)	4.66×10^9	3.41×10^{10}	2.95×10^{10}	86%

Note: 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.
(a) Target Load = TMDL - MOS
(b) 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

3.5 Identification and Description of Pollutant Source(s)

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

Probable sources that may be contributing to the observed load are displayed in Table 3.8:

Table 3.8 Pollutant source summary for *E.coli*

Assessment Unit	Pollutant Sources	Magnitude[(a)] (lbs/day)	Probable Sources[(b)] (% from each)
Raton Creek (Chicorica Creek to headwaters)	Point: NM0020273	4.30×10^{9}	13% Municipal point source discharge
	Nonpoint:	2.98×10^{10}	87% Municipal (urbanized high density area), rangeland grazing

Notes:
(a) Measured Load (Table 4.6). *Point source* magnitude is based on the WLA calculation from NPDES permit (Table 4.7).
(b) From the Integrated CWA 303(d)/305(b) List (NMED/SWQB 2010a). This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

The Probable Source Identification Sheets in Appendix A provide an approach for a visual analysis of potential pollutant sources 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. Table 3.8 displays probable sources of impairment along the reach as determined by field reconnaissance and assessment. Probable sources of *E.coli* will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

3.6 Linkage of Water Quality and Pollutant Sources

In general, among the probable sources of bacteria are municipal point source discharges such as wastewater treatment facilities, poorly maintained or improperly installed (or missing) septic tanks, livestock grazing of valley pastures and riparian areas, upland livestock grazing, in addition to wastes from pets, waterfowl, and other wildlife. Howell et al. (1996) found that bacteria concentrations in underlying sediment increase when cattle (*Bos taurus*) have direct access to streams, such as the waters in the Raton Creek watershed. Natural sources of bacteria are also present in the form of other wildlife such as elk, deer, and any other warm-blooded mammals. In addition to direct input from grazing operations and wildlife, *E. coli* concentrations may be subject to elevated levels as a result of resuspension of bacteria laden sediment during

storm events. Temperature can also play a role in bacteria concentrations. Howell et al. (1996) observed that bacteria growth increases as water temperature increases, which may be a contributing factor in this watershed as well.

The bacteria loading in the Raton Creek watershed probably originates from a combination of drought-related impacts, municipal point source discharges, and livestock and wildlife wastes. Habitat modifications such as loss of riparian habitat, road maintenance and runoff, and land development or redevelopment as well as other recreational pollution sources may also be important contributors of bacteria.

In order to determine exact sources and relative contributions, further study is needed. One method of characterizing sources of bacteria is a Bacterial, or Microbial, Source Tracking (BST) study. The extensive data collection, analyses, and funding necessary to determine bacterial sources were beyond the resources available for this study.

3.7 Margin of Safety

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

- *Conservative Assumptions*

  E.coli bacteria does not readily degrade in the environment.

  Using the monthly geometric mean criterion rather than the single sample criterion, which allows for higher concentrations in individual grab samples, to calculate target loading values.

  Using the design capacity for calculating the point source loading even though under most conditions the treatment plants do not discharge continuously and are not operating at full capacity.

  Using the 4Q3 critical low flow “worst case scenario” to calculate the allowable loads.

- *Explicit recognition of potential errors*

  A level of uncertainty exists in sampling nonpoint sources of pollution. Accordingly, an explicit MOS of **10 percent** of the nonpoint source Load Allocation (LA) was assigned to this TMDL.

Techniques used for measuring flow in water have a ± 5 percent precision. Accordingly, an explicit MOS of **5 percent** of the nonpoint source LA was assigned to this TMDL.

Therefore, based on the potential errors described above an explicit MOS of 15% of the LA was assigned to these TMDLs.

3.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Data used in the calculation of these TMDLs were collected during the spring, summer, and fall of 2006 in order to ensure coverage of any potential seasonal variation in the system. Bacteria exceedences occurred during both low flow events. Higher flows may flush more nonpoint source runoff containing bacteria. It is possible the criterion may be exceeded under a low flow condition when there is insufficient dilution. Evaluation of seasonal variability for potential nonpoint sources is difficult due to limited available data.

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 2035. Growth estimates for Colfax County project an 11% growth rate through 2035.

According to the data, bacteria loading is due to both point sources and diffuse nonpoint sources. Estimates of future growth are not anticipated to lead to a significant increase in bacteria concentrations that cannot be controlled with best management practices (BMPs) in this watershed. However, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit.

4.0 PLANT NUTRIENTS

The potential for excessive nutrients in Raton Creek was noted through visual observation during the 2006 SWQB watershed survey. Detailed assessment of various water quality parameters indicated nutrient impairment in Raton Creek (Chicorica Creek to headwaters), confirming the historic 1998 listing.

4.1 Target Loading Capacity

For this TMDL document the target value for plant nutrients is based on numeric translators of the narrative criterion 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. Therefore, SWQB (with the assistance from EPA and the USGS), developed a *Nutrient Assessment Protocol* (NMED/SWQB 2011b) to assist in meeting these challenges. The protocol was developed for wadeable streams because they represent the majority of assessed surface waters in the state. It addresses both cause (total nitrogen and total phosphorus) and response variables (dissolved oxygen (DO), pH, and periphyton chlorophyll *a*) and uses a weight-of-evidence approach. Threshold values for each of the cause and response variables are used to translate the narrative nutrient criterion into quantifiable endpoints (Table 4.1).

Water quality assessments for nutrients are based on quantitative measurements of select indicators. If these measurements exceed the numeric nutrient threshold values, indicate excessive primary production (i.e., large DO and pH fluctuation and/or high chlorophyll *a* concentration), and/or demonstrate an unhealthy biological community, the reach is considered to be impaired.

There are two potential causes of nutrient enrichment in a given stream: excessive nitrogen and/or phosphorus. The intent of criteria, or targets, for phosphorus and nitrogen is to control the excessive growth of attached algae and higher aquatic plants that can result from the introduction of these plant nutrients into streams. The reason for controlling plant growth is to preserve aesthetic and ecologic characteristics along the waterway. 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.

Phosphorous is found in water primarily as ortho-phosphate. In contrast nitrogen may be found as several dissolved species all of which must be considered in 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 EPA-approved method to test for Total Nitrogen, however a combination of EPA method 351.2 (TKN) and EPA method 353.2 (Nitrate + Nitrite) is appropriate for estimating Total Nitrogen. The applicable threshold values for cause (phosphorus and nitrogen)

and response (DO, pH, and chlorophyll *a*) variables are shown in Table 4.1. These threshold values are used for water quality assessments and TMDL development.

Table 4.1 Applicable nutrient targets for the Raton Creek watershed (in mg/L)

Ecoregion →	26-Southwestern Tablelands
Aquatic Life Use →	Warmwater
Total Phosphorus	0.03 mg/L
Total Nitrogen	0.45 mg/L
Dissolved Oxygen	5.0 mg/L
pH	6.6 – 9.0
Chlorophyll *a*	8.2 – 14 $\mu g/cm^2$

Raton Creek (Chicorica Creek to headwaters) is located in Ecoregion 26 (Southwestern Tablelands) with a marginal warmwater aquatic life use (20.6.4 NMAC). According to Table 4.1, Raton Creek has in-stream nutrient targets of 0.03 mg/L for total phosphorus and 0.45 mg/L for total nitrogen.

Table 4.2 In-stream nutrient target concentrations for Raton Creek

Assessment Unit	**Total Phosphorus**	**Total Nitrogen**
Raton Creek (Chicorica Creek to headwaters)	0.03 mg/L	0.45 mg/L

4.2 Flow

The presence of plant nutrients in a stream can vary as a function of flow. Higher nutrient concentrations typically occur during low-flow conditions because there is reduced stream capacity to assimilate discharges due to less streamflow available for dilution. In other words, as flow decreases, the stream cannot effectively dilute its constituents causing the concentration of plant nutrients to increase. Thus, a TMDL is calculated at a specific flow.

The critical flow condition for this TMDL occurs when the ratio of nutrient concentrations to stream flow is the greatest and was obtained using a 4Q3 regression model. The 4Q3 is the minimum average four consecutive day flow that occurs with a frequency of at least once every 3

years. Low flow was chosen as the critical flow because of the adverse effect low flows have on water quality due to increased nutrient concentrations and algal growth.

When available, USGS gages are used to estimate flow using DFLOW software (USEPA 2006a); however, the 4Q3 derivation for Raton Creek, which is ungaged, will be based on analysis methods described by Waltemeyer (2002). In Waltemeyer's analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e., statewide and mountainous regions above 7,500 feet in elevation). The following statewide regression equation is based on data from 50 gaging stations with non-zero discharge:

$$4Q3 = 1.2856 \times 10^{-4}\ DA^{0.42}\ P_w^{\ 3.16} \qquad \text{(Eq. 4-1)}$$

where,

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

The average standard error of estimate (SEE) and coefficient of determination are 126 and 48 percent, respectively, for this regression equation (Waltemeyer 2002). The 4Q3 for Raton Creek was estimated using the statewide regression equation (Eq. 4-1) because the mean elevation for this assessment unit is below 7,500 feet in elevation (Table 4.3).

Table 4.3 Calculation of 4Q3 low-flow frequency for Raton Creek

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean Winter Precipitation (in.)	4Q3 (cfs)
Raton Creek (Chicorica Creek to headwaters)	6903	45.4	5.47	0.14

The 4Q3 value for Raton Creek was converted from cubic feet per second (cfs) to units of million gallons per day (mgd) as follows:

$$0.14\ \frac{ft^3}{\sec} \times 1{,}728\ \frac{in^3}{ft^3} \times 0.004329\ \frac{gal}{in^3} \times 86{,}400\ \frac{\sec}{day} \times 10^{-6} = 0.09 mgd$$

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

4.3 Calculations

This section describes the relationship between the numeric target and the allowable pollutant-level by determining the waterbody's total assimilative capacity, 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 low-flow conditions without violating the target concentration for that constituent. These TMDLs were developed based on simple dilution calculations using 4Q3 flow, the numeric target, and a conversion factor. The specific carrying capacity of a receiving water for a given pollutant, may be estimated using Eq. 4-2.

4Q3 (in mgd) x Numeric Target (in mg/L) x 8.34 = TMDL (pounds per day [lbs/day]) (Eq. 4-2)

The daily target loads for TP and TN are summarized in Table 4.4.

Table 4.4 Daily target loads for TP & TN in Raton Creek

Assessment Unit	Parameter	4Q3 Flow (mgd)	Numeric Target (mg/L)	Conversion Factor	TMDL (lbs/day)
Raton Creek (Chicorica Creek to headwaters)	Total Phosphorus	0.99*	0.03	8.34	0.248
	Total Nitrogen	0.99*	0.45	8.34	3.72

* Combined flow based on design flow of Raton WWTP (0.90 mgd) and 4Q3 of stream (0.09 mgd)

The measured loads for TP and TN were similarly calculated. In order to achieve comparability between the target and measured loads, the same flow value was used for both calculations. The arithmetic mean of the collected data was substituted for the target in Equation 4-2. The same conversion factor of 8.34 was used. The results are presented in Table 4.5.

Table 4.5 Measured loads for TP and TN in Raton Creek

Assessment Unit	Parameter	4Q3 Flow (mgd)	Arithmetic Mean Conc.^ (mg/L)	Conversion Factor	Measured Load (lbs/day)
Raton Creek (Chicorica Creek to headwaters)	Total Phosphorus	0.99*	0.992	8.34	8.19
	Total Nitrogen	0.99*	8.80	8.34	72.7

* Combined flow based on design flow of Raton WWTP (0.90 mgd) and 4Q3 of stream (0.09 mgd)
^ Arithmetic mean of TP and TN concentrations from SWQB's 2006 water quality survey.

4.4 Waste Load Allocations and Load Allocations

4.4.1 Waste Load Allocation

There are no Municipal Separate Storm Sewer System (MS4) storm water permits in these AUs. However, excess nutrient loading may be a component of some storm water discharges covered under general NPDES permits, so the load from these dischargers should be addressed.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices (BMPs) and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids, 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 waste load allocations (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 load allocation (LA).

There is an existing point source with individual NPDES permit that has a batch discharge to Raton Creek. The City of Raton WWTP (NM0020273) is authorized to discharge to Raton Creek. Currently, this WWTP was upgraded in 2007. SWQB collected TN and TP from the effluent channel as part of the 2006 water quality survey and the current NPDES permit requires quarterly monitoring for TN and TP. Monitoring results from both sources are displayed in Table 4.6 and demonstrate a significant improvement in effluent water quality, particularly for TN. The facility may need to develop and implement advanced treatment to remove nutrients and improve water quality depending on the success of the upgrades. It is the policy of the Water Quality Control Commission to allow schedules of compliance in NPDES permits when facility modifications are necessary to meet new water quality based requirements.

Table 4.6 TN and TP effluent monitoring results for NM0020273

2006 SWQB monitoring of City of Raton WWTP effluent		
Date	**TP (mg/L)**	**TN (mg/L)**
3/28/2006	2.0	11.1
4/25/2006	2.3	21.1
7/25/2006	2.8	23.1
9/27/2006	1.8	21.4
10/25/2006	2.0	19.4
2008-2011 City of Raton NPDES quarterly monitoring data		
Date	**TP (mg/L)**	**TN (mg/L)**
Dec 2008-Feb 2009	1.1	8.2
March-May 2009	0.88	5.2
June-August 2009	1.7	8.3
Sept-Nov 2009	1.2	8.5
Dec 2009-Feb 2010	2.0	7.7
March-May 2010	0.3	7.7
June-August 2010	1.7	8.8
Sept-Nov 2010	1.9	12.0
Dec 2010-Feb 2011	2.1	8.9
March-May 2011	n/a	n/a
June-August 2011	2.5	9.9
Sept-Nov 2011	3.2	13.0
Dec 2011-Feb 2012	1.5	9.3

Nutrient removal is one of the most pressing challenges 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 total phosphorus (TP) and 3 mg/L for total nitrogen (TN) (Jeyanayagam 2005). More recent studies by USEPA show that the limit of technology for total phosphorus 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 total phosphorus 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). The cost of applying tertiary treatment for phosphorus removal can be 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.

NMED believes that a TMDL should be written to targets that are protective of the stream and scientifically defensible however there should also be recognition of the limits of technology for nutrient removal and economic feasibility. Even though the limits of technology preclude the attainment of the target concentrations defined in this TMDL, advanced treatment would significantly reduce the load of TP and TN that is introduced into the stream. After implementation of effluent limits based on improved treatment and given enough time to allow the aquatic to system to respond, NMED will reevaluate the condition of Raton Creek. At that time, if the waterbody is still impaired for plant nutrients and there is no substantial improvement observed in water quality, the WWTP may be required to enhance the treatment of the effluent by adding more effective treatment or find other means of disposal (Figure 4.1; Table 4.7).

A phased strategy is an iterative process and will require future data collection and analysis to determine if the load reductions achieved using effluent limits that are based on alternative target concentrations actually lead to attainment of water quality standards. Please refer to "Clarification Regarding "Phased" Total Maximum Daily Loads," an August 2, 2006 memorandum from the USEPA, for more information on this topic (USEPA 2006b). SWQB monitoring in 2015 will evaluate the impact of the Phase 1 actions and limits (Figure 4.1; Table 4.7) by re-examining water quality in this watershed, re-assessing designated use attainment, and re-evaluating target concentrations and waste load allocations.

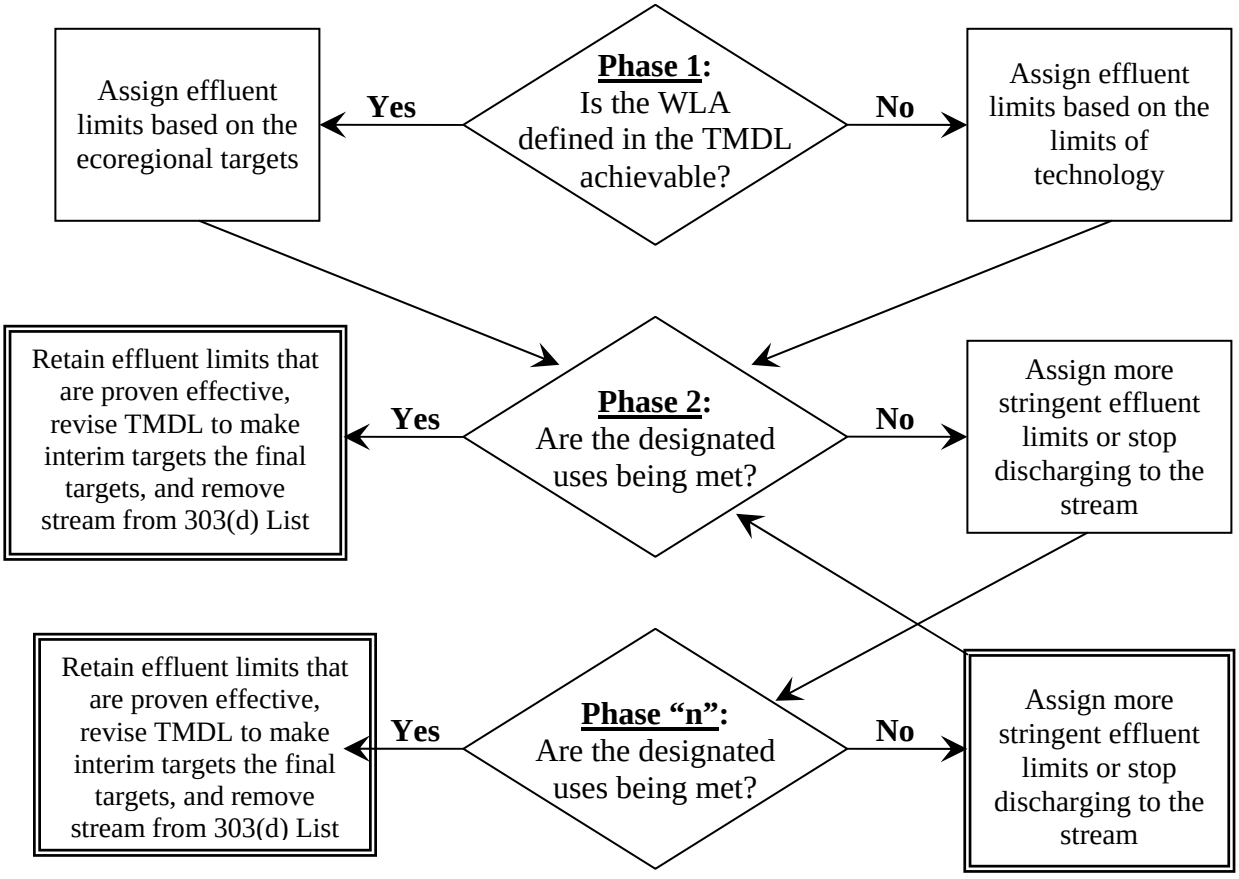


Figure 4.1 Decision process for assigning effluent limits in a phased TMDL

Table 4.7 Nutrient Wasteload Allocations *over time* for Raton WWTP (NM0020273)*

Phase	Parameter	Design Capacity (mgd)	Effluent Limit[(a)] (mg/L)	Conversion Factor	Wasteload Allocation[(d)] (lbs/day)
1st	Total Phosphorus	0.90	1.0[(a)]	8.34	7.51
	Total Nitrogen	0.90	8.0[(a)]	8.34	60.0
2nd	Total Phosphorus	0.90	0.1[(b)]	8.34	0.75
	Total Nitrogen	0.90	3.0[(b)]	8.34	22.5
nth	Total Phosphorus	0.90	0.03[(c)]	8.34	0.23
	Total Nitrogen	0.90	0.45[(c)]	8.34	3.38

* **Permit expires November 30, 2013.**

(a) **Phase 1** effluent limits are technology based (i.e., achievable) annual averages that are designed to help communities begin the process of converting their WWTPs for nutrient removal. These limits are similar to the effluent limits adopted by the state of Virginia for existing facilities to implement their permitting program. (http://www.deq.virginia.gov/bay/NOIRANutPermitLimits.pdf).

(b) **Phase 2** effluent limits are based on annual averages for the limits of technology. Biological treatment is highly temperature dependent therefore the permit may need to consider seasonal targets based on WWTP design.

(c) **Phase "n"** effluent limits based on in-stream nutrient target concentrations from Table 4.2. As of 2011, these values are technologically unachievable.

(d) WLA = (design capacity) x (effluent limit) x (conversion factor)

4.4.2 Load Allocation

In order to calculate the load allocation (LA) for phosphorus and nitrogen, the WLA and margin of safety (MOS) were subtracted from the target load (TMDL) using the following equation:

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

The MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors. Results using an explicit MOS of 15% (see Section 4.7 for details) are presented in Table 4.8.

Table 4.8 Calculation of TMDLs for TP and TN

Assessment Unit	Parameter	WLA (lbs/day)	LA (lbs/day)	MOS* (15%)	TMDL (lbs/day)
Raton Creek (Chicorica Creek to headwaters)	Total Phosphorus	0.23	0.015	0.003	0.248
	Total Nitrogen	3.38	0.289	0.051	3.72

NOTE: * The MOS was calculated as 15% of the nonpoint source Load Allocation, or MOS = 0.15 × (TMDL – WLA).

The load reductions that would be necessary to meet the target loads were calculated to be the difference between the calculated annual target load (Table 4.4) and the measured load (Table 4.5), and are shown in Table 4.9.

Table 4.9 Calculation of load reduction for TP and TN

Assessment Unit	Parameter	Target Load(1) (lbs/day)	Measured Load (lbs/day)	Load Reduction (lbs/day)	Percent Reduction(2)
Raton Creek (Chicorica Creek to headwaters)	Total Phosphorus	0.245	8.19	7.95	97%
	Total Nitrogen	3.67	72.7	69.0	95%

Note: 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.

(1) Target Load = TMDL – MOS (refer to Table 4.5)

(2) 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.

4.5 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 recently 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 will be reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period.

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. Table 4.10 and Table 4.11 display probable sources of impairment along each reach as determined by field reconnaissance and assessment. Probable sources of nutrients will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

Table 4.10 Pollutant source summary for Total Phosphorus

Assessment Unit	Pollutant Sources	Magnitude (lbs/day)	Probable Sources[(1)] (% from each)
Raton Creek (Chicorica Creek to headwaters)	Point: NM0020273	7.85[(2)]	96% Municipal Point Source Discharge
	Nonpoint:	0.34[(2)]	4% Municipal (urbanized high density area), rangeland grazing

(1) From the Integrated CWA §303(d)/§305(b) List (NMED/SWQB 2010a). This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

(2) The **magnitude for Raton WWTP** was calculated by multiplying the average effluent TP concentration (2.2 mg/L), the average monthly discharge for 2006 (0.432 mgd), and the 8.34 conversion factor to get the results in lbs/day.

Table 4.11 Pollutant source summary for Total Nitrogen

Assessment Unit	Pollutant Sources	Magnitude (lbs/day)	Probable Sources[(1)] (% from each)
Raton Creek (Chicorica Creek to headwaters)	Point: NM0020273	70.7[(2)]	97% Municipal Point Source Discharge
	Nonpoint:	2.00[(2)]	3% Municipal (urbanized high density area), rangeland grazing

(1) From the Integrated CWA §303(d)/§305(b) List (NMED/SWQB 2010a). This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

(2) The **magnitude for Raton WWTP** was calculated by multiplying the average effluent TN concentration (19.6 mg/L), the average monthly discharge for 2006 (0.432 mgd), and the 8.34 conversion factor to get the results in lbs/day. The **magnitude for nonpoint sources** is the measured load minus any point source contributions.

4.6 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. The following information serves to

provide general background and all of the information may not apply to the Raton Creek watershed.

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 percent 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 plant or algal 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 4.2).

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, etc.) are not limiting (Figure 4.2). 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.

As described in Section 4.2, 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. However, 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. The contributions from these natural sources are generally considered to represent background levels.

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.

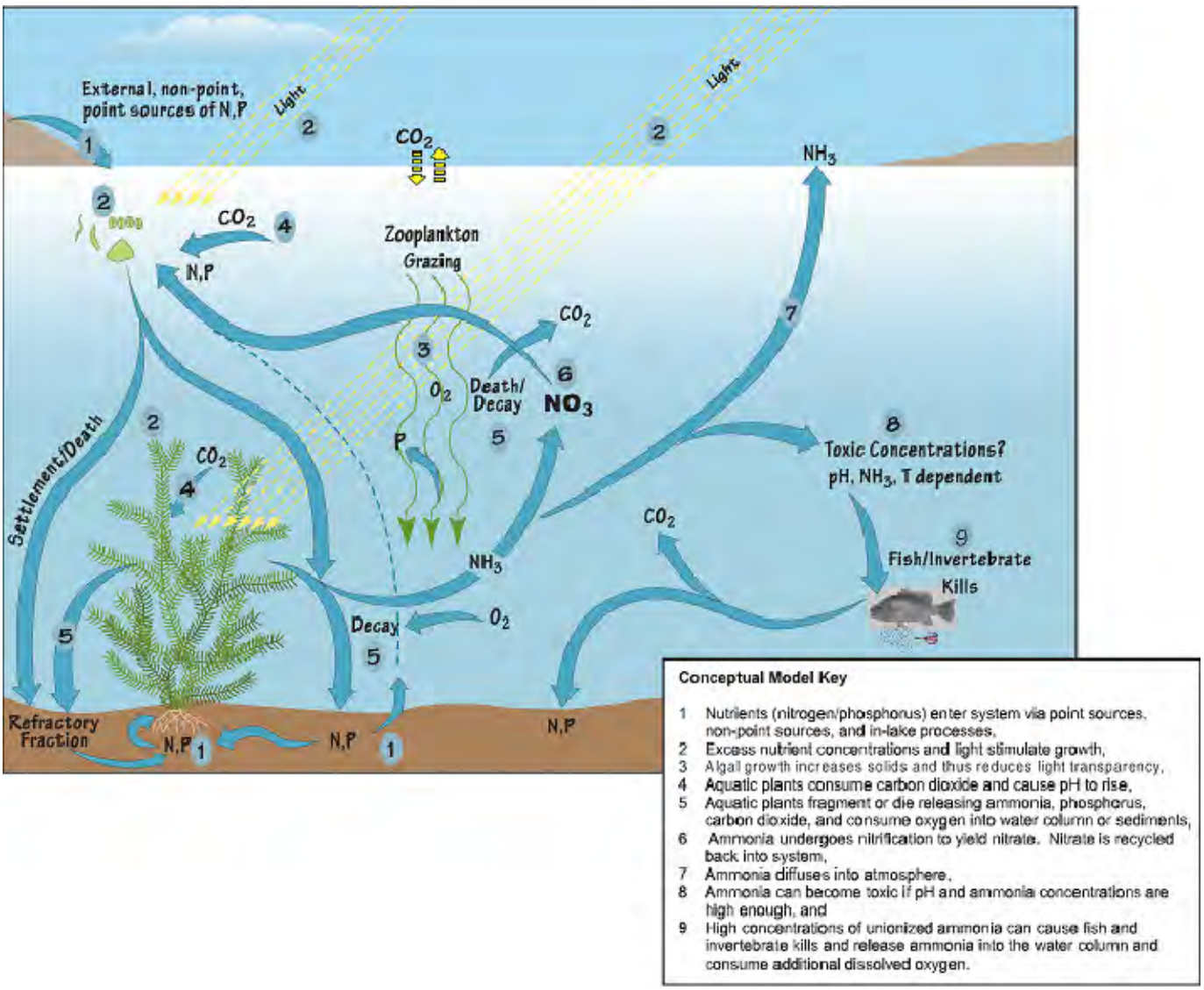


Figure 4.2 Nutrient conceptual model (USEPA 1999)

4.7 Margin of Safety (MOS)

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 "conservative" pollutants that do not readily react in the environment.

  Using the 4Q3 critical low flow "worst case scenario" to calculate the allowable loads.

  Using the design capacity for calculating the point source loading even though under most conditions the treatment plant does not discharge continuously and is not operating at full capacity.

- *Explicit recognition of potential errors*

  A level of uncertainty exists in sampling nonpoint sources of pollution. Accordingly, an explicit MOS of **10 percent** of the nonpoint source Load Allocation (LA) was assigned to this TMDL.

  Flow was based on the estimation of the 4Q3 for ungaged streams and compared to actual flows and cross-sectional information taken in the field. Techniques used for measuring flow in water have a ± 5 percent precision. Accordingly, an explicit MOS of **5 percent** of the nonpoint source LA was assigned to this TMDL.

Therefore, based on the potential errors described above an explicit MOS of 15% of the LA was assigned to this TMDL.

4.8 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 spring, summer, and fall in order to ensure coverage of any potential seasonal variation in the system. Exceedences of the TN and TP target values were observed from March through October, 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 was low-flow. Calculations made at the critical low-flow (4Q3), 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.

4.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2035. Growth estimates for Colfax County project an 11% growth rate through 2035.

Nutrient loading in this watershed is due to both point and nonpoint sources. Since future projections indicate that nonpoint sources of nutrients will more than likely increase as the region continues to grow and develop, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit.

5.0 MONITORING PLAN

Pursuant to CWA Section 106(e)(1), 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, the SWQB has developed and implemented a 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.

The SWQB utilizes a rotating basin system approach to water quality monitoring. In this system, a select number of watersheds are intensively monitored each year with an established return frequency of every eight years. The next scheduled monitoring date for the Canadian River watershed is 2016 (NMED/SWQB 2010c). The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities. This document, called the QAPP, is updated annually by SWQB and certified by USEPA Region 6 (NMED/SWQB 2011a). 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. 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 Assessment Protocols (NMED/SWQB 2011b).

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 limited monitoring resources;
- information at a scale where implementation of corrective activities is feasible;
- an established order of rotation and predictable sampling in each basin which allows for enhanced coordinated efforts with other programs; and
- program efficiency and improvements in the basis for management decisions.

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

6.0 IMPLEMENTATION OF TMDLS

6.1 Point Sources and NPDES Permitting

The current NPDES permit for the City of Raton contains a daily maximum limit of 2507cfu/100mL and 30-day average limit of 548 cfu/100mL for *E. coli* bacteria that is greater than the limit of 126 cfu/100mL as defined in this TMDL based on current standards. Federal regulations (40 CFR 130.12(a) and 40 CFR 122.44(d)(1)(vii)) clearly require that NPDES permits must be consistent with the wasteload allocation (WLA) of an adopted and approved TMDL.

The City of Raton Wastewater Treatment Plant (WWTP) discharges to Raton Creek under authorization of an NPDES permit, but the facility is currently not designed to treat effluent for total phosphorus. However, the new WWTP does have the capabilities for some total nitrogen removal. The existing WWTP was brought online in April 2007 and is a sequential batch reactor (SBR) treatment system consisting of solids removal, activated sludge treatment, effluent storage and UV disinfection. Disk filters and chlorination are also utilized for reuse purposes. Representatives from the City claim that the new WWTP can treat down to 10 mg/L total nitrogen on a daily basis. This is also a requirement in their current discharge permit from the NMED Ground Water Quality Bureau. However, there is no mechanism at this facility to treat total phosphorus, and the city would likely have to consider pollution prevention efforts similar to other facilities in the state. The Village of Ruidoso Downs enacted an ordinance to prevent any phosphorus-containing detergents from being sold in their jurisdiction. The City may need to consider a similar ordinance, or at least enact a phosphorus reduction plan within the city limits. The City currently utilizes reuse of the effluent during the summer months, which can be up to 0.62 MGD of their 0.9 MGD design flow, with the rest being discharged to Raton Creek. The reuse is currently used on up to 250 acres of city-owned property, as well as for various purposes on the WWTP grounds themselves.

Nutrient removal is one of the most pressing challenges facing wastewater treatment facilities today. Several technologies for nutrient removal exist. Phosphorus and nitrogen can be removed from wastewater via biological, chemical, or combined biological and chemical processes. There are theoretical limits for the lowest levels that can be achieved with different removal mechanisms. The choice of technology to be used depends on site-specific conditions and economic feasibility.

Funding of treatment facility modification or replacement needs some consideration in this TMDL. One potential source of funding to carry out a project that embraces the intent of the wasteload allocation (WLA) is the New Mexico Clean Water State Revolving Loan Fund program administered by NMED's Construction Program Bureau. The State of New Mexico *Statewide Water Quality Management Plan and Continuing Planning Process* Work Element VI (adopted by the WQCC May 10, 2011 and currently pending approval by the USEPA) notes that "…[a]s specified at 40 CFR 130.12(b), CWA Section 201 funding can only be awarded to DMAs [Designated Management Agencies] that are in conformance with the statewide WQMP." The City of Raton is a Designated Management Agency (WQMP Work Element VI), thus the first part above requirement has been met. As this WLA is a part of the WQMP, funding will

among other factors, be contingent on conformance with this part of the plan as well. The implementation of this WLA recognizes the technological and economic challenge of meeting the nutrient effluent limitations presented herein and as discussed below and therefore provides several implementation options for the WWTP; nonetheless the options presented below are not exclusive and other options may be explored.

Three options for implementing Phase 1 of the TMDL are discussed in detail below. Although the effluent limits in these options would not meet the targets of the TMDL as defined in Table 4.5, they would significantly reduce the loads of TP and TN that are introduced into Raton Creek. After implementation of Phase 1 and given enough time to allow the aquatic to system to respond, NMED would then reevaluate the condition of Raton Creek and the nutrient TMDL based on not meeting the causative factors (Total nitrogen and phosphorous concentration) and response variables (dissolved oxygen, pH and periphyton chlorophyll a concentration) as specified in Table 4.1. At the time that NMED reevaluates the conditions in Raton Creek, if it is found to still be impaired for plant nutrients, the City of Raton WWTP would be required to increase the treatment of the effluent by incorporating additional treatment technologies or find another means of disposal (Figure 4.1; Table 6.1).

Table 6.1 General Timeline of Events

Date	Activity
Pre-1998	Raton Creek (Chicorica Creek to headwaters) listed as impaired due to nutrients
2006	SWQB Water Quality Survey
April 2007	New Raton WWTP brought online
Dec 2008	Current NPDES permit issued to Raton WWTP (NM0020273)
Fall 2011	TMDL drafted; Implement Phase 1
2013	NPDES permit reissued (with Phase 1 limits/implementation)
2015	SWQB Water Quality Survey
2018	Evaluate and assess data to determine success of Phase 1 implementation

OPTION 1 – Year Round Limits

The plant would be required to meet the Phase 1 limits as stated in Table 4.7 year round. This may require the City of Raton to enhance the treatment over the currently planned WWTP (e.g. one that has both biological and chemical treatment processes).

- TP = 1.0 mg/L (30-day average)
- TN = 8.0 mg/L (30-day average)

OPTION 2 – No Discharge (100% Re-Use)

The WWTP would permanently discontinue discharge to Raton Creek and 100% of the WWTP effluent would be used for irrigation and other purposes pursuant to Raton's ground water Discharge Permit (DP-254) and other ground water Discharge Permits issued to separate users under the Ground and Surface Water Protection Regulations of the Water Quality Control Commission (WQCC; 20.6.2 NMAC). The City would need to implement a cohesive strategy for storing and reusing all of its effluent, which would likely include the construction of

substantial lined storage impoundments so that the effluent could be stored at times when irrigation was inappropriate (cold weather, precipitation events, etc.). Sufficient uses for the effluent would have to be developed with some safety margin included. The reuse practices would have to ensure that non-point source pollution from the reuse did not result in continued impairment of Raton Creek.

OPTION 3 – Combination of Approaches (Seasonal Limits)
Biological treatment is highly temperature dependent therefore the new NPDES permit may need to consider seasonal targets based on the facility's design. Below is an example of a possible seasonal component that could be incorporated into the new permit:

From October 1 through April 30 each year, when in-stream biological activity is generally at its lowest due to lower temperatures and shorter periods of daylight, the effluent limits would be based on the capabilities of the upgraded Raton facility. Although these effluent limits are relatively high and substantially higher than the in-stream target concentrations in this TMDL, they would reduce the loading from the facility by roughly half during these months.

- TP = 3.0 mg/L (30-day average)
- TN = 10.0 mg/L (30-day average)

From May 1 through September 30 each year, when in-stream biological activity is generally at its highest due to higher temperatures and longer periods of daylight, the WWTP would not discharge to Raton Creek. During this period, 100% of the WWTP effluent would be used for irrigation and other purposes pursuant to Raton's ground water Discharge Permit (DP-254) and other ground water Discharge Permits issued to separate users under the WQCC Regulations. The construction of additional lined storage impoundments may be necessary (for times when irrigation is not appropriate) and the reuse practices would have to ensure that non-point source pollution from the reuse did not result in continued impairment of Raton Creek.

As noted above, the City of Raton WWTP discharges into Raton Creek under authorization of an NPDES permit. Federal regulations (40 CFR 130.12(a) and 40 CFR 122.44(d)(1)(vii)) clearly require that NPDES permits must be consistent with the WLA of an adopted and approved TMDL. This facility will need to develop and implement treatment to meet the new effluent requirements that will result from this TMDL; however it is the policy of the EPA to allow schedules of compliance in NPDES permits on a case-by-case basis where facility modifications need to be made to meet new water quality based requirements (20.6.4.12 NMAC). ***It should be noted that these are only recommendations. EPA Region 6, in consultation with the City of Raton and NMED staff, will determine which option to implement including the associated permit language and effluent limitations.***

6.2 Nonpoint Sources – WBP and BMP Coordination

Public awareness and involvement will be crucial to the successful implementation of these plans and improved water quality. Staff from SWQB will work with stakeholders to provide guidance in developing a Watershed-Based Plan (WBP). The 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.

The Watershed Protection Section of the SWQB provides Clean Water Act (CWA) §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 each year through a Request for Proposal (RFP) process and require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Funding is available for both watershed group formation (which includes WBP development) and on-the-ground projects to improve surface water quality and associated habitat. Further information on funding from the CWA §319 (h) can be found at the SWQB website: http://www.nmenv.state.nm.us/swqb/.

SWQB staff will assist with any 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. Stakeholders in this process will include SWQB and other members of the WBP.

WBP staff met frequently with City of Raton, Army Corps of Engineers, and New Mexico Office of the State Engineer staff during June and July 2011 in response to the Track Fire, particularly in an effort to develop the Track Fire Response Project. This Project involved construction of four impoundments in ephemeral drainages that enter Lake Maloya. Sediment retention structures include an armored spillway to protect against headcutting when water/sediment yield exceeds storage capacity. The retention structure will not be dredged when full; instead it will be brought back to original grade, dressed with stockpiled soil, and reseeded. Another impoundment would then be constructed adjacent to the rehabilitated structure if sediment yield continued to be high. Additional erosion control measures in upland areas are being implemented and include contour log felling, brush and rock checks, wattles, sediment fence, and seeding. WBP staff will continue to works closely with other agency staff, as needed, during the post-fire rehabilitation of the Chicorica and Raton Creek watersheds.

7.0 APPLICABLE REGULATIONS and STAKEHOLDER ASSURANCES

New Mexico's Water Quality Act (Act) authorizes the WQCC to "promulgate and publish regulation to prevent or abate water pollution in the state" 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 states in §74-6-12(a):

> *The Water Quality Act (this article) 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.*

In addition, the State of New Mexico Surface Water Quality Standards (see Subsection C of 20.6.4.6 NMAC) (NMAC 2011) states:

> *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*.

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

> *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 Act. It is the further policy of Congress that nothing in this Act 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.*

New Mexico's CWA §319 Program has been developed in a coordinated manner with the State's 303(d) process. All 319 watersheds that are targeted in the annual RFP process coincide with the State's biennial impaired waters list as approved by USEPA. The State has given a high priority for funding, assessment, and restoration activities to these watersheds.

As a constituent agency, NMED has the authority under Chapter 74, Article 6-10 NMSA 1978 to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard including a violation caused by a NPS. The NMED NPS water quality management program has historically strived for and will continue to promote voluntary compliance to NPS water pollution concerns by utilizing a voluntary, cooperative approach. The State provides technical support and grant monies for implementation of BMPs and other NPS prevention mechanisms through §319 of the Clean Water Act. 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 land, NMED has established Memoranda of Understanding (MOUs) with various federal agencies, in particular the Forest Service and the Bureau of Land Management. MOUs have 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 10-20 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 SWQB, and other parties identified in the WBP. The cooperation of watershed stakeholders will be pivotal in the implementation of these TMDLs as well.

8.0 PUBLIC PARTICIPATION

Public participation was solicited in development of this TMDL (see **Appendix B**). The draft Raton Creek TMDL was first made available for a 30-day comment period beginning on June 6, 2011 and a public meeting was scheduled for June 21, 2011 in Raton. Raton officials requested that SWQB cancel the June 21 TMDL public meeting as residents and government officials were attending to issues surrounding the Track Fire. SWQB agreed to cancel the meeting and sent an email to the SWQB mailing list and posted a notice about the cancellation on the SWQB website on June 20. The City requested an extension of the public comment period for the Raton Creek TMDLs on June 27. SWQB granted the request due to the extraordinary and unforeseen circumstances related to the fire. Correspondence regarding the public meeting cancellation and re-release of the Raton Creek TMDL was included as Comment Set D in the Canadian Part 2 Watershed TMDLs.

Public participation was re-solicited in development of this TMDL (see **Appendix B**). The draft TMDL was again made available for a 30-day comment period beginning on October 12, 2011 and ending on November 14, 2011. Response to comments are attached as **Appendix C** to the final draft of this document. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, webpage postings (www.nmenv.state.nm.us), and press releases to area newspapers. A public meeting was held on October 19 from 6-8pm at the City of Raton Commission Room.

Once the TMDL is approved by the Water Quality Control Commission, the next step for public participation is revision of the WBP 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. The WBP development process is open to any member of the public who wants to participate.

9.0 REFERENCES

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APPENDIX A

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.

Literature Cited:

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Figure A1. Probable Source Development Process and Public Participation Flowchart

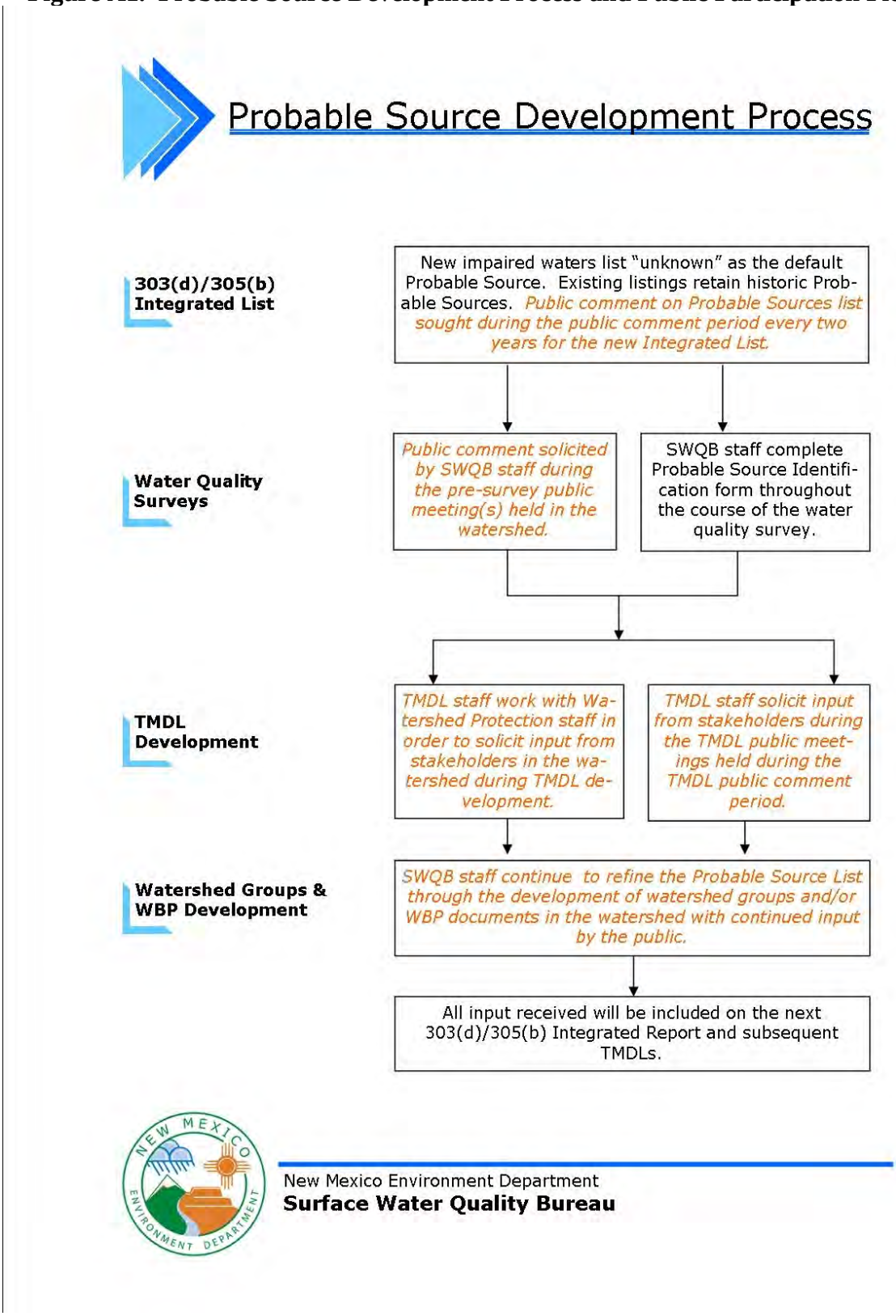

Figure A2. Probable Source Identification Sheet for the Public

Help Us Identify Probable Sources of Impairment

Name:
Phone Number (optional):
Email or Mailing Address (optional):
Date:
Waterbody Name/ Watershed Name/ Location of concern:

From the list below, please check the items you believe are sources of water quality impairment in the watershed or waterbody of concern. In the spaces next to each item you check, please use the following scale to indicate how much of a concern that item is to you by specifying a number between 1 and 3.

(1 - Slight Concern) (2 – Moderate Concern) (3 – High Concern)

✓	ACTIVITY	Scale of Concern			✓	ACTIVITY	Scale of Concern		
☐	Feedlots	1	2	3	☐	Pavement and Other Impervious Surfaces	1	2	3
☐	Livestock Grazing	1	2	3	☐	Roads/Bridges/Culverts	1	2	3
☐	Agriculture	1	2	3	☐	Habitat Modification(s)	1	2	3
☐	Flow Alterations (water withdrawal)	1	2	3	☐	Mining/Resource Extraction	1	2	3
☐	Stream/River Modification(s)	1	2	3	☐	Logging/Forestry Operations	1	2	3
☐	Storm Water Runoff	1	2	3	☐	Housing or Land Development	1	2	3
☐	Flooding	1	2	3	☐	Exotic species	1	2	3
☐	Landfill(s)	1	2	3	☐	Waterfowl	1	2	3
☐	Industry/Wastewater Treatment Plant	1	2	3	☐	Wildlife and domesticated animals other than waterfowl	1	2	3
☐	Inappropriate Waste Disposal	1	2	3	☐	Recreational Use	1	2	3
☐	Improperly maintained Septic Systems	1	2	3	☐	Natural Disturbances *(please describe)*	1	2	3
☐	Other: *(please describe)*	1	2	3	☐	Other: *(please describe)*	1	2	3

Comments:

Figure A3. Probable Source Identification Sheet for NMED and Other Agencies

16 Mar 09

Probable Source Field Sheet & Site Condition Class Verification

Ver. 2

Station ID:	Station Name/Description:
Field Crew:	Comments:
Date:	Watershed protection staff reviewer: Date of WPS review:
WQS Segment from 20.6.4 NMAC:	Assessment Unit:

Score the proximity and certainty of occurance of the following activities in the watershed upstream of the site. Consult with the appropriate staff at NMED and other agencies to score shaded cells. Fill out after recon during 1st or 2nd site visit, review and revise at the end of the survey, and have it reviewed by Watershed Protection Staff with knowledge of the particular watershed. Maintain completed forms in Survey Binder.

Activity Checklist

Agriculture					Silviculture				
Permitted CAFOs	0	1	3	5	Logging Ops – Active Harvesting	0	1	3	5
Crop Production (Cropland or Dry Land)	0	1	3	5	Logging Ops – Legacy	0	1	3	5
Drains	0	1	3	5	Fire Suppression (Thinning/Chemicals)	0	1	3	5
Irrigated Crop Production (Irrigation Equip)	0	1	3	5	Other:	0	1	3	5
Permitted Aquaculture	0	1	3	5	**Hydromodifications**				
Other:	0	1	3	5	Channelization	0	1	3	5
Rangeland					Dams/Diversions	0	1	3	5
Livestock Grazing or Feeding Operation	0	1	3	5	Draining/Filling Wetlands	0	1	3	5
Rangeland Grazing (dispersed)	0	1	3	5	Dredging	0	1	3	5
Other:	0	1	3	5	Irrigation Return Drains	0	1	3	5
Industrial/ Municipal					Riprap/Wall/Dike/Jetty Jack -- circle	0	1	3	5
Industrial Stormwater Discharge (permitted)	0	1	3	5	Flow Alteration (from Water Diversions/Dam Ops – circle)	0	1	3	5
Storm water Runoff due to Construction	0	1	3	5	Highway/Road/Bridge Runoff	0	1	3	5
Industrial Point Source Discharge	0	1	3	5	Other:	0	1	3	5
Landfill	0	1	3	5	**Miscellaneous**				
Municipal Point Source Discharge	0	1	3	5	Angling Pressure	0	1	3	5
On-Site Treatment Systems (Septic, etc.)	0	1	3	5	Dumping/Garbage/Trash/Litter	0	1	3	5
Pavement/ /Impervious Surfaces	0	1	3	5	Exotic Plant Species	0	1	3	5
Inappropriate Waste Disposal	0	1	3	5	Fish Stocking	0	1	3	5
RCRA/Superfund Site	0	1	3	5	Hiking Trails	0	1	3	5
Residences/Buildings	0	1	3	5	Campgrounds (Dispersed/Defined – circle)	0	1	3	5
Site Clearance (Land Development)	0	1	3	5	Surface Films/Odors	0	1	3	5
Urban Runoff/Storm Sewers	0	1	3	5	Pesticide Application (Algaecide/Insecticide)	0	1	3	5
Power Plants	0	1	3	5	Waste From Pets (high concentration)	0	1	3	5
Other:	0	1	3	5	Other:	0	1	3	5
Resource Extraction					**Habitat Modification**				
Abandoned Mines (Inactive)/Tailings	0	1	3	5	Exotics Removal	0	1	3	5
Acid Mine Drainage	0	1	3	5	Incised	0	1	3	5
Active Mines (Placer/Potash/Other -- circle)	0	1	3	5	Mass Wasting	0	1	3	5
Oil/Gas Activities (Permitted/Legacy – circle)	0	1	3	5	Restoration	0	1	3	5
Reclamation of Inactive Mines	0	1	3	5	Other:	0	1	3	5
Other:	0	1	3	5	**Natural Disturbance or Occurrence**				
Roads					Waterfowl	0	1	3	5
Bridges/Culverts/RR Crossings	0	1	3	5	Drought-related Impacts	0	1	3	5
Low Water Crossing	0	1	3	5	Watershed Runoff Following Forest Fire	0	1	3	5
Paved Roads	0	1	3	5	Recent Bankfull or Overbank Flows	0	1	3	5
Gravel or Dirt Roads	0	1	3	5	Wildlife other than Waterfowl	0	1	3	5
Other:	0	1	3	5	Other Natural Sources:	0	1	3	5

Legend – Proximity Score

Activity believed to be Absent	0	Activity observed or known to be present within 1 km of the channel	3
Activity believed to be present in Watershed	1	Activity observed or known to be present in the riparian zone	5

APPENDIX B
PUBLIC PARTICIPATION FLOWCHART

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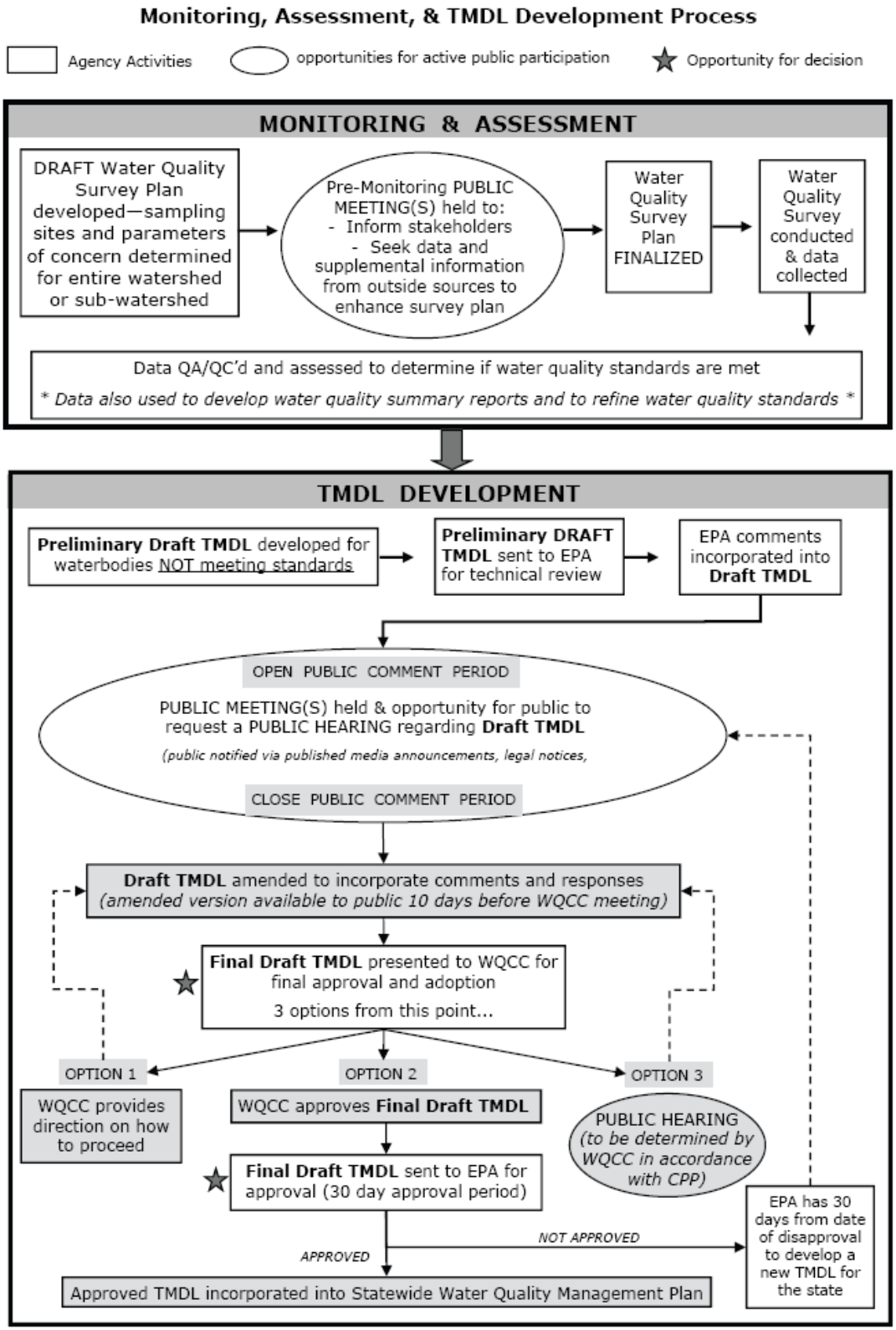
Monitoring, Assessment, & TMDL Development Process
Agency Activities
opportunities for active public participation
Opportunity for decision
MONITORING & ASSESSMENT
DRAFT Water Quality Survey Plan developed—sampling sites and parameters of concern determined for entire watershed or sub-watershed
Pre-Monitoring PUBLIC MEETING(S) held to:
- Inform stakeholders
- Seek data and supplemental information from outside sources to enhance survey plan
Water Quality Survey Plan FINALIZED
Water Quality Survey conducted & data collected
Data QA/QC'd and assessed to determine if water quality standards are met
* Data also used to develop water quality summary reports and to refine water quality standards *
TMDL DEVELOPMENT
Preliminary Draft TMDL developed for waterbodies NOT meeting standards
Preliminary DRAFT TMDL sent to EPA for technical review
EPA comments incorporated into Draft TMDL
OPEN PUBLIC COMMENT PERIOD
PUBLIC MEETING(S) held & opportunity for public to request a PUBLIC HEARING regarding Draft TMDL
(public notified via published media announcements, legal notices,
CLOSE PUBLIC COMMENT PERIOD
Draft TMDL amended to incorporate comments and responses
(amended version available to public 10 days before WQCC meeting)
Final Draft TMDL presented to WQCC for final approval and adoption
3 options from this point...
OPTION 1
OPTION 2
OPTION 3
WQCC provides direction on how to proceed
WQCC approves Final Draft TMDL
PUBLIC HEARING
(to be determined by WQCC in accordance with CPP)
Final Draft TMDL sent to EPA for approval (30 day approval period)
NOT APPROVED
APPROVED
EPA has 30 days from date of disapproval to develop a new TMDL for the state
Approved TMDL incorporated into Statewide Water Quality Management Plan

APPENDIX C
RESPONSE TO COMMENTS

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The 30-day public comment period for the draft Raton Creek TMDLs opened on October 12, 2011 and closed on November 14. NMED hosted a public meeting in Raton, NM on October 19, 2011 to discuss the Public Comment Draft Raton Creek TMDL. NMED also met with City of Raton and Molzen Corbin staff on November 1, 2011 in Santa Fe. All those who submitted comments during the public comment period were contacted via email on November 29, 2011 acknowledging receipt of their comments and informing them of the upcoming WQCC schedule. Appendix D was provided to those that submitted public comment during the 30-day public comment period. The following changes were made to the Final Draft document in response to public comment:

1. Section 8 was updated with information about the public comment period and public meeting.

2. Table 4.6 was updated to include September-November 2011 DMR data that was available after the development of the Public Comment Draft of the TMDL.

3. The dates for the seasonal option in Section 6.1 were changed based on Comment Set F.

Written comments received during the 30-day public comment period:

A. Amy Ewing, Daniel B. Stephens & Associates
B. Anne McDiarmid, Raton resident
C. Charles Starkovich, City of Raton, City Commissioner
D. Linda Adams, EPA Region 6
E. K.S. Berry Engineering
F. City of Raton
G. New Mexico Municipal League

Public comments submitted after the public comment period were considered but a formal response is not included in this Appendix.

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Comment Set A:

Henderson, Heidi, NMENV

From: Ewing, Amy [AEwing@dbstephens.com]
Sent: Friday, October 21, 2011 5:07 PM
To: Henderson, Heidi, NMENV
Cc: 'Dan Campbell'
Subject: Raton watershed outlook over the next 5 years
Attachments: Fire restoration_826_8-pg.pdf; Tillery et al., 2011_OF11-1257.pdf

Heidi,

I am sending a summary of the City of Raton's municipal watershed issues and outlook as a comment on the Raton Creek TMDL. I am also attaching a fact sheet that was prepared late this summer discussing the post-Track fire efforts, as well as a recent USGS paper detailing the post wildfire debris flow hazard assessment they conducted for the area burned by the Track fire (the file sizes for the plates associated with the USGS paper are really large, so I'll put those on our FTP site in case you're interested in seeing them - I'll send you information on how to access that).

A summary of the City of Raton's watershed outlook and need for funding over the next five years follows.

Lake Maloya, the City of Raton's primary drinking water source for its approximately 9,000 residents, has long been recognized to be at risk in the event of a catastrophic forest fire. Such a fire, the Track Fire, occurred during June 12 through 27, 2011, burning through the majority of the City of Raton watershed on Monday, June 13. The total acreage burned by the Track Fire was 27,792 acres.

Post-fire flood events can result in catastrophic debris flows and associated deposition of sediments that impair water quality and severely impact the storage capacity of a reservoir. Indeed, since July 10, 2011, the City has been relying primarily on its backup water supply, which comes from Eagle Nest Lake west of Cimarron, New Mexico, because the Lake Maloya water has increased turbidity levels. The U.S. Geological Survey recently completed a post wildfire debris flow hazard assessment for the area burned by the Track Fire in response to a 10-year recurrence, 30-minute duration rainstorm of 38.0 millimeters. Probabilities of debris flow greater than 80 percent and debris-flow volumes greater than 100,000 cubic meters were identified for Segerstrom and Schwachheim Creeks (two of the three Lake Maloya tributaries), indicating the potential for a considerable impact to Lake Maloya and significant hazards to life and property downstream (Tillery et al., 2011).

To mitigate such sedimentation, the City has been engaged in multiple post-fire emergency efforts focused on protecting Lake Maloya from erosion following the fire. These efforts have included the interception of sediment (using the upstream reservoir Lake Dorothey as a catchment basin, as well as construction of 7 other sediment catchment basins), HydroAx mulching of dead trees (1,000 acres), contour tree felling (400 acres), installation of waddles on slopes (30,000 feet), and aerial seeding (4,200 acres). The City's aim is to protect water quality and the City's water supply, by minimizing erosion, the potential for debris flow, and reservoir sedimentation.

The City of Raton received Emergency Watershed Protection (EWP) Program funding from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) that became effective on July 12, 2011. This project was completed on August 1, 2011, and these funds totaled approximately $540,000, with the NRCS covering 75 percent of project costs, and a 25 percent City cost share. Additional work has been

completed using remaining funds in a City Water Trust Board grant, funds from the Colorado State Forest Service, an emergency authorization of $200,000 from Governor Susana Martinez, and Raton Water Works capital funds.

As demonstrated by sedimentation in the Los Alamos Reservoir following the Cerro Grande fire in 2000, post fire sedimentation is the greatest during the two first years following a catastrophic fire, and so the City needs implement treatments on as much of the watershed as possible before June 2013. The City has delayed numerous other projects, re-routing all available funding to pay for emergency erosion control efforts in the municipal watershed and is seeking additional funding to pay for additional post-fire restoration activities, but no other funding has been secured.

The City is committed to continuing its post-fire emergency efforts in order to protect Lake Maloya. So far, the City's mulching efforts have been applied to less than 10 percent, and reseeding efforts have been applied to approximately 30 percent of the Lake Maloya watershed. The restoration activities are far from complete, and the scope of their implementation to date has been limited by the cost of the treatments. Gambel oak, New Mexico locust, and aspens are beginning to regenerate, and the grasses are returning to the valleys; however, the Track fire caused almost complete mortality of large trees, and the recovery of ponderosa pine and xeric mixed-conifer stands after crown fire is very slow, taking 40 to 60 years or more.

Ongoing restoration will involve expanding the same techniques employed to date into new areas, focusing on the Segerstrom and Schwachheim drainages, which contribute the greatest volume of water to the lake and were most severely burned. Within the next year, the City plans to construct one additional sediment catchment basin, perform HydroAx mulching of dead trees and contour tree felling (500 acres), aerial seeding (2,100 acres), hand application of seed and mulch, and planting of seedlings, although completion of this work will be dependent on whether 2012 Water Trust Board funding is received. Over the next five years, the City will need to continue to seek funding to pay for additional post-fire watershed restoration efforts (including dredging Lake Dorothey and Lake Maloya). Due to the severity of the fire and the scope of the necessary treatments, future restoration efforts will continue to be limited by available funding.

Thanks,

Amy

Amy Ewing, P.G.
Hydrogeologist
Daniel B. Stephens & Associates
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400
aewing@dbstephens.com

NMED Response:

The NMED acknowledges the City's significant efforts to protect the water quality of Lake Maloya and its watershed following the Track Fire. We understand that the City received emergency funds from a number of sources in July 2011 to address the emergency needs in the watershed following the Track Fire. The NMED is also aware that the City is currently working on Community Development Block Grant (CDBG) and Water Trust Board applications, and that Sugarite Canyon State Park is working on a USDA Collaborative Forest Restoration Program (CFRP) grant application. The NMED will continue to support these requests and work with the City and other agencies to advance post-fire rehabilitation of the Sugarite, Chicorica, and Raton Creek watersheds. The NMED will also work with the City, as requested, to help the City secure additional funding for restoration of the affected watersheds.

Comment Set B:

OCTOBER 28TH, 2011

RECEIVED
OCT 31 2011
SURFACE WATER QUALITY BUREAU

TO: HEIDI HENDERSON, NMED-SWQB

FROM: ANNE McDIARMID, RATON RESIDENT

RE: RATON CREEK WATERSHED PROPOSAL

THIS LETTER IS TO GIVE YOU RESIDENT INPUT REGARDING THE RECENT NMED-SWQB PROPOSAL AND OUR TREATMENT PLANT.

FOUR SHORT YEARS AGO CITY RESIDENTS WENT INTO DEBT TO PAY FOR A $7 MILLION PLANT THAT EXCEEDED ALL EPA REQUIREMENTS. WE WILL BE PAYING FOR THAT PROJECT FOR 26 MORE YEARS!

IT IS NOT REASONABLE OR REALISTIC FOR YOU TO IMPOSE EVEN MORE COSTS ONTO THE CUSTOMER JUST BECAUSE THE EPA AND NMED WANT TO CHANGE THE RULES AGAIN.

YOU SHOULD TAKE INTO CONSIDERATION THE FACT OF A STRUGGLING CITY THAT ALREADY HAS SERIOUS FINANCIAL UTILITY ISSUES. ADDING MORE AND MORE COSTLY REGULATIONS MAY JUST BE THE FINAL NAIL IN THE COFFIN OF OUR LITTLE CITY.

THE REGULATIONS SET IN 2007, THAT WE WENT TO TREMENDOUS EFFORT AND EXPENSE TO SURPASS,

SHOULD LAST FOR THE BETTER PART OF THE TIME IT TAKES US TO PAY OFF THE COST OF COMPLIANCE BEFORE MANDATING NEW EXPENSIVE ONES.

THIS UNFAIRLY ASSAULTS OUR UTILITY BILLS AND DESTROYS OUR ECONOMIC HEALTH FOR SOMETHING THAT WILL HAVE AN UNSURE IMPACT ON OUR WATERWAY.

YOU STATED YOU "WANT TO START SOMEWHERE." HOW ABOUT WHERE WE GET TO PAY THE BILL FOR THE FIRST PLANT AND REGULATIONS BEFORE ADDING MORE? PLEASE, PLEASE CONSIDER THE CUSTOMERS WHO HAVE TO PAY FOR IT ALL.

THANK YOU FOR YOUR CONSIDERATION

ANNE MCDIARMID
PO BOX 954
RATON, NM 87740-0954

NMED Response: The nutrient impairment listing under the Clean Water Act (CWA)§303(d) for Raton Creek dates back to 1996; the General Criteria for Plant Nutrients at 20.6.4.13(E) to August 1973.
See ftp://ftp.nmenv.state.nm.us/www/NMED/Standards/2011/20.6.4NMAC-IntegratedStandards-CWAStatus2011-04-18.pdf and Table 6.1. Data collected during the 2006 water quality survey of the Canadian River watershed confirmed the nutrient impairment. In recognition of this impairment, the NPDES permit issued by the U.S. Environmental Protection Agency (EPA) for the City of Raton WWTP (NM0020273) effective in 2008 includes quarterly sampling requirements for Total Nitrogen and Total Phosphorus.

The NMED appreciates the community's commitment to improving water quality by upgrading the wastewater treatment plant. NMED also recognizes the City's financial situation and is recommending to EPA a phased implementation of this TMDL. NMED has specifically developed a first phase of implementation that should minimize any additional financial burden to the City (see Table 4.7 and Section 6.1). Water quality will be evaluated by NMED during the next watershed survey in 2015, after Phase 1 has been implemented, to assess the effectiveness of the new wastewater treatment system and other management strategies.

As the City is aware, several sources of funding exist to address impairments discussed in the TMDL document. For point source pollution, the New Mexico Environment Department's Construction Program Bureau (NMED/CPB) assists communities in need of funding for WWTP upgrades. Raton is eligible for the Clean Water State Revolving Fund (CWSRF) and would likely qualify for a reduced interest rate of 2% with a repayment period of up to 20 years; however the City did not apply for CWSRF this year and they are not on the 2012 integrated projects priority list (IPPL) at this time. NMED/CPB encourages the City of Raton to apply as soon as possible so that the City may be placed on the IPPL and be eligible to possibly receive funding in 2013. In addition to the CWSRF program CPB offers a Rural Infrastructure Revolving Loan Program or RIP. The base rate is 3% with a repayment schedule of up to 20 years. Applications for the RIP Loan are accepted throughout the year.

For nonpoint source pollution, monies are available through the CWA §319(h) for on-the-ground projects aimed at improving surface water quality and associated habitat, such as implementing best management practices that reduce runoff and/or capture stormflow. CPB can also provide matching funds for appropriate CWA §319(h) projects using CWSRF monies. NMED is committed to work with the City and EPA to help provide the necessary resources to implement this TMDL and improve water quality.

Comment Set C:

NOV 01 2011
SURFACE WATER QUALITY BUREAU

10-31-2011

Heidi Henderson - TMDL
NMED-SWQB
P.O. Box 5469
Santa Fe, NM 87502

Charles Starkovich
729 Galisteo Ave
Raton, NM
87740

To: NMED-SWQB
Subject: TMDL's Proposed Regulations

As a Raton City Commissioner, I am opposed to this unfunded mandate.

From a science-based perspective, it is not realistic nor feasible to restore and maintain the chemical, physical and biological integrity of the nation's waters. Current or future standards are man-made thus arbitrary and capricious. Frankly, there is no such thing as clean water unless we discuss distilled water.

I recommend in the least no action by the NMED-SWQB on TMDL's until after the November, 2012 Presidential elections. I would also recommend to my fellow public officials in other municipalities a position of passive resistance and active non-compliance while court cases work through our Judicial System.

Charles Starkovich
Raton City Commissioner

NMED Response: The CWA § 303 require states to establish water quality standards and develop a list of waters within each state that are impaired and establish a TMDL for each impairment. See also Section 1.0 of the TMDL. A court case such as that you describe occurred in New Mexico when the EPA was sued in 1996 to require New Mexico to establish TMDLs. After expensive and protracted litigation, the case was settled through a court-ratified Consent Decree and Settlement Agreement requiring New Mexico to adhere to a schedule of TMDL development that runs through 2016.

Additionally, 40 CFR 131.4 states that "States are responsible for reviewing, establishing, and revising water quality standards." http://www.access.gpo.gov/nara/cfr/waisidx_08/40cfr131_08.html . New Mexico Water Quality Standards are approved by the New Mexico Water Quality Control Commission (WQCC). The WQCC adopts "...water quality standards based on credible scientific data and other evidence..." according to the New Mexico Water Quality Act. The process for adopting water quality standards is a public process that provides for public input and public hearings. Once approved by the WQCC, the NM Water Quality Standards are approved by EPA. New Mexico has no discretion not to assess its waters, list impairments, and develop TMDLs.

Comment Set D:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

May 12, 2011

MEMORANDUM

Subject: Comments on the Pre-Draft Main Stem of the Canadian River and Select Tributary Streams Total Maximum Daily Load

From: Linda K. Adams, Environmental Scientist
TMDL Section (6WQ-PT)

Thru: Randall Rush, Section Chief
TMDL Section (6WQ-PT)

Thank you for the opportunity to review the Draft Main stem of the Canadian River and Select Tributary Streams Total Maximum Daily Load for Boron, Bacteria, and Nutrients. EPA offers the following comment on the draft TMDLs.

Nutrient TMDLs for Pajarito Creek and Raton Creek

1. Section 5.4.1, Page 46, Paragraph 6, This paragraph cites an article by Jeyanayagam (2005), which indicates that the limit of technology (LOT) for total phosphorus and total nitrogen removal is generally considered 0.1 mg/l and 3 mg/L, respectively. Currently, there are two EPA studies which suggest that a lower limit of technology for phosphorus removal. The EPA publications entitled, "Advance Wastewater Treatment to Achieve Low Concentration of Phosphorus" (2007), and "Office of Wastewater – Municipal Nutrient Removal Technology" which show that the limit of technology for total phosphorus was less than 0.01 mg/l. EPA suggests that this section be updated to consider more recent studies on nutrient removal. These documents can be found at the following web addresses: http://www.epa.gov/owm/mtb/mnrt-volume1.pdf , and http://yosemite.epa.gov/r10/water.nsf/Water+Quality+Standards/AWT-Phosphorus/$FILE/AWT+Report.pdf).

Bacteria TMDLS for two segments of the Canadian River, Pajarito Creek, and Raton Creek

2. Section 4.6, Page 38, Paragraph 3. Suggest this paragraph be further emphasized. The quite variable Bacterial Source Tracking (BST) methodology, extremely expensive BST testing, and variable techniques yield questionable results.

<u>NMED Response</u>: These comments were originally submitted in response to the Canadian River Part 2 TMDL document and before the Raton Creek TMDLs were removed from that document at the request of the City of Raton. The comments were resubmitted on November 9, 2011 during the Raton Creek TMDL public comment period.

NMED provided the requested updates to Sections 4.6 and 5.4.1 of the Canadian Part 2 TMDL. Sections 3.6 and 4.4.1 of the Raton TMDL include the same requested edits.

Comment Set E:

K.S. BERRY ENGINEERING LIMITED COMPANY
CIVIL ENGINEERING
808 SOUTH SECOND STREET
RATON, NEW MEXICO 87740
PHONE: (575) 445-1632

November 10, 2011

Ms. Heidi Henderson
TMDL Coordinator
New Mexico Environment Department
1190 St. Francis Drive, P.O. Box 5469
Santa Fe, NM 87502

The following comments are submitted in response to the New Mexico Environment Department's (NMED) proposal for Total Maximum Daily Loads (TMDLs) for the Raton Creek Watershed. These comments follow a review of the draft TMDL document, attendance at the October 19, 2011 community meeting conducted by NMED in Raton, as well as the November 1, 2011 meeting in Santa Fe. The comments also reflect my observations resulting from 25 years of civil engineering experience in northeastern New Mexico, experience as former City Commissioner and Interim City Manager in Raton, as well as being a life-long resident of Raton.

Streams and drainages in the Colfax County area are a product of a combination of factors that include the Raton Basin geology and arid/ semi-arid precipitation climate. The geology of the area results in a typically fine-grained, alluvial clay soil throughout the region, in which the parent material is typically sedimentary beds. The clay soils are typically colloidal, and do not readily settle when transported by runoff to lakes and streams. The northeastern New Mexico climate is affected by orographic effects, which can result in extended periods without measurable precipitation. The orographic mechanism may also result in deep and severe convection, creating intense seasonal precipitation in the form of snow or rainfall. This arid/semi-arid, seasonal precipitation pattern ultimately impacts land usage, vegetative ground cover, and fish, wildlife and plant populations.

The combination of climate and soils characteristics result in conditions in which the primary drainages in the region, generally considered perennial, may experience lengthy stream reaches that are dry during periods when precipitation is not received. Major drainages in Colfax County that periodically dry in reaches include the Canadian River, Chicorica Creek, and Una de Gato Creek. Precipitation cycles may limit vegetative cover, and also result in intense periodic precipitation. Runoff from moderate to significant precipitation in the region is typically turbid due to natural erosion of colloidal clay soils. Runoff from intense precipitation events can result in unstable, erodible channels that exhibit bank instability. Stream flow rates can vary significantly, and water quality can fluctuate due to natural erosive characteristics and high turbidity in high flow circumstances.

As documented in other NMED TMDL documents, a strong correlation between turbidity and total phosphorus is possible and is verified in other area streams.

NMED Response:
The NMED agrees that nutrient enrichment is not strictly a point source problem. Other sources are likely contributing to the nutrient load in Raton Creek; including sedimentation from the watershed. Therefore the impairment should be addressed through the NPDES permitting process to reduce contributions from the WWTP as well as through Best Management Practices (BMPs) to reduce contributions from the surrounding landscape.

Using available data (see Table C-1), there is no relationship between total phosphorus and turbidity at the 04RatonC007.8 site as the r^2 value is 0.0014. These data imply that the elevated total phosphorus concentrations below the WWTP are likely not sediment related.

Table C-1: Total phosphorus and turbidty data for 04RatonC007.8

Date	TP (mg/L)	Turbidity (NTU)
4/9/2002	0.848	55.9
4/25/2006	0.89	n/a
7/26/2006	0.982	12.5
8/30/2006	0.149	15.5
9/20/2006	1.67	20
10/4/2006	1.64	10.8
10/25/2006	0.762	6.5

Raton Creek is tributary to Chicorica Creek, and no impairment of Chicorica Creek is documented. The document entitled "**Water Quality Survey Summary for the Canadian River & Select Tributaries** (Canadian Headwaters To The Texas Border & Cimarron River, Conchas River, Ute Creek, And Revuelto Creek) 2006; Prepared by Surface Water Quality Bureau, New Mexico Environment Department; states *"quality sampling in Chicorica Creek (Canadian River to headwaters), Conchas River (Conchas Lake to headwaters), and Ute Creek (Ute Reservoir to headwaters) found no exceedences of applicable water quality criteria."* The Raton Creek TMDL implies that Raton Creek subsequently contributes to flow in the Canadian River, however, it fails to document that the flow of Chicorica Creek, except when flowrate exceeds 300 cubic feet per second in response to a significant stormwater runoff condition, is diverted into the Vermejo Conservancy District diversion canal and subsequently into "Maxwell Lake No. 13". No impairment of Maxwell Lake No. 13 is documented, and it has been stated that no evaluation protocol currently exists. Also, as documented, water quality standard exceedences for Raton Creek occurred only during lower flows when all available flow is diverted to Maxwell Lake No. 13 and is not channeled to the Canadian River. The diversion is forced through an existing siphon structure to the canal.

NMED Response: *As you noted, Raton Creek is a tributary to Chicorica Creek. It was also correctly noted that Chicorica Creek (Canadian River to East Fork Chicorica), Chicorica Creek*

(East Fork Chicorica to headwaters) and Maxwell Lakes 12-14 are listed as Fully Supporting for all designated uses on the 2010-2012 §303(d)/ §305(b) List of Impaired Waterbodies. Whether flow from Raton Creek reaches Chicorica Creek or the Canadian River and the impairment status of these receiving waters is not relevant to the Raton Creek TMDL calculations; the document only states that Raton Creek is within the Canadian River watershed. Based on data from the 2006 water quality survey in the Canadian River watershed, Raton Creek is impaired for plant nutrients and E.coli regardless of source. NMED therefore must develop a TMDL document to address the impairment..

NMED's priority of Raton Creek TMDL's is not adequately discussed in the document, given the regional characteristics discussed herein. A range of factors may be considered in the development of the priority rankings. These factors include immediate programmatic needs, vulnerability of particular waterbodies as aquatic habitats, recreational, economic and aesthetic importance of particular waterbodies, degree of public interest and support, and State, Territorial, authorized Tribal, or national policies and priorities. In consideration of the lack of industrial activity in the region, declining population, declining volume of treated effluent discharge from a WWTP classified as a minor discharger, significant improvement of the quality of treated effluent since the 2006 water quality monitoring process due to the construction of a new WWTP by the City of Raton, lack of public interest and support in favor of the stringent TMDL standards, and the important impact of natural processes on regional water quality, the high priority assignment does not appear justified.

NMED Response: *The high priority ranking noted in the Executive Summary table on page 3 of the TMDL document is based on the fact that Raton Creek (Chicorica Creek to headwaters) is included on the 1997 Settlement Agreement between USEPA and Forest Guardians. This Settlement Agreement requires all waterbodies included on the 1996 303(d) List of Impaired Waterbodies that are not addressed in the Consent Decree be addressed by 2016.*
http://www.nmenv.state.nm.us/NMED/Settlement_Agreement-Master.pdf

Additionally, this is the appropriate time for the development of the Raton Creek TMDLs. As described in Table 6.1, the NMED conducted a water quality survey in the Raton Creek watershed in 2006, the City of Raton upgraded its WWTP in 2007, and the WWTP was issued a new NPDES permit by EPA with TN and TP limits in 2008. The E.coli impairment was added and the plant nutrient impairment was confirmed on the 2008-2010 §303(d)/ §303(b) List of Impaired Waterbodies that was approved by EPA in July 2010. The TMDL development schedule for the Raton Creek TMDLs follows the same general timeline as NMED follows for other watersheds. The Raton Creek TMDLs were originally released for public comment as part of the Canadian River Part 2 TMDLs in June 2011, but the Raton Creek TMDLs were removed from that document at the request of the City of Raton in June 2011.

Stringent nutrient load standards and allocations for Wastewater Treatment Plants (WWTP), as are found in the Raton Creek TMDL as well as similar TMDL documents, anticipate scheduling implementation of advanced treatment processes to support designated uses through renewal of NPDES permits. The cost of constructing, operating and maintaining facilities for advanced treatment is an important issue at a time when a significant economic downturn affects Raton, as well as many municipal entities nationwide. However, additional environmental consequences should be evaluated when considering the nature of advanced treatment alternatives. Such processes demand significant increases of electrical energy and chemical usage.

While a marginal improvement to water quality may be achieved, increased energy and chemical demand may produce an overall adverse environmental impact. A small municipality such as Raton would be very challenged to meet the financial obligation of such advanced treatment, and may experience negative socio-economic impacts that affect the community's stability.

In consideration of the characteristics of the watershed area, soils, precipitation and climate patterns, it is questionable whether such advanced nutrient treatment processes would result in meaningful improvement to water quality in Raton Creek, or any receiving waterbodies. Effluent discharge from a point source is a minor portion of volume from all sources contributing flow to Raton Creek on an annual basis. Local conditions such as ecological, political, and economic conditions have not been considered in the development of the TMDL document. The process may be improved by evaluating costs and benefits of the implementation of standards proposed under Phase 1, Phase 2, and Phase N.

The evaluation may consist of a life cycle cost model, and may compare cumulative benefits and implementation construction, operation and maintenance costs. Such an evaluation would be beneficial to balance realistic environmental improvements at sustainable costs using application of existing technology.

NMED Response: The NMED appreciates the City's commitment to improving water quality by upgrading the wastewater treatment plant. In recognition of the City's economic circumstance, and while still complying with federal law and the aforementioned Settlement Agreement, the NMED is recommending to EPA a phased implementation of this TMDL. The NMED has specifically developed a first phase of implementation that should minimize additional financial burden to the City (see Table 4.7 and Section 6.1). Water quality will be evaluated by NMED during the next watershed survey in 2015, after Phase 1 has been implemented, to assess the effectiveness of the new wastewater treatment system and other water quality management strategies.

In the EPA document, Guidance for Water Quality-based Decisions: The TMDL Process (Second Edition), it is suggested that States discuss the economic impact of TMDLs with permittees during the Implementation stage of TMDL development:

"Point source facilities generally have mechanisms in place to secure funds needed for implementing the retrofits, process modifications, and additional pollutant controls that may be required to meet the load allocations required within a TMDL. Whether they are affected individually or as part of a category of sources, facilities should be consulted about how to best fund required actions. EPA anticipates that the economic feasibility of various allocation strategies will be discussed at this stage of TMDL establishment."

NMED staff have met with the City regarding the new WWTP and continue to be available to discuss funding opportunities. Development of the TMDL includes balancing the limits of treatment technology, the need to improve water quality, and compliance with federal and state law and the Settlement Agreement. Nevertheless, the ultimate decision about established effluent limits will be by EPA Region 6 during the permit development process.

See also previous responses regarding funding in Comment Set B on page 10.

My conclusions and summary comments to the draft TMDL document for the Raton Creek watershed include the following;

1. Proposed standards written into the TMDL document will likely result in an implementation process through an upcoming NPDES renewal. As standards appear to be based upon limited analysis under conditions that have significantly changed, I would recommend that Phase 1 standards be modified to allow operational modifications to the Raton WWTP, and that Phase 2 and Phase N standards (which would require unjustified construction expense) be removed from the current document.

2. Additional monitoring of Raton Creek should be implemented prior to inclusion of Phase 2 or Phase N standards. Additional monitoring should evaluate the impact of the effluent discharge from the current Raton WWTP, which was reconstructed following the 2006 water quality survey. The process should include an adequate database of actual streamflow measurement, to replace the regression equation estimates of streamflow due to the importance of accurate streamflow rates and volumes in the allocation process. The process should evaluate the impact of runoff and recovery of the Track Fire burn area to receiving waterbody quality. The process should evaluate related impacts on Raton Creek and receiving waterbodies, including dissolved oxygen and chlorophyll a, and the current level of eutrophication. The evaluation should justify stringent standards for nutrients if conditions indicate lack of impairment for dissolved oxygen, excessive growth of attached algae and higher aquatic plants, and eutrophication.

   The evaluation should include assessment of possible impairment of Maxwell Lake No. 13, and other irrigation storage lakes that may receive inflow of treated effluent.

3. A life cycle assessment of the direct and indirect impacts of imposition of Phase 2 and Phase N standards should be completed prior to those standards being formalized in the TMDL document, of subsequent permit. The assessment should reflect considerations for costs compared to benefits, the increased "carbon footprint" of the WWTP, and construction, operation and maintenance funding options. The assessment should also consider the availability of current and future technological applications for advanced treatment.

Thank you consideration of the comments listed herein. The implication of the action currently considered is of high importance to the community of Raton, the northeastern New Mexico region, and the stakeholders concerned with the utilization of surface water in the region. I believe that water quality improvement may be achieved through a pragmatic, comprehensive and sustainable process.

Sincerely;

Kenneth Scott Berry, P.E.
Principal Engineer

Copy: City of Raton Mayor Neil Segotta
Raton City Commission
Raton City Manager Jeff Condrey
Mr. Dan Campbell – Raton Water Works General Manager
City of Raton Water Board

<u>NMED Response</u>: The narrative criterion to determine nutrient impairment is codified at [20.6.4.13(E)], which states:

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

This narrative nutrient criterion can be challenging to assess because the relationships between nutrient levels and impairment of designated uses are poorly defined. Therefore, the NMED (with assistance from EPA and the U.S. Geological Survey), developed a Nutrient Assessment Protocol. The protocol addresses both cause (total nitrogen and total phosphorus) and response variables (dissolved oxygen, pH, and chlorophyll-a) and uses a weight-of-evidence approach. Analysis of existing data and literature reviews were utilized to develop impairment threshold values for each of the cause and response variables to translate the narrative nutrient criterion into quantifiable endpoints.

TMDLs should address targets that are protective of the stream and scientifically defensible, while recognizing the limits of technology for nutrient removal. Even though the limits of wastewater treatment technology preclude the attainment of the target concentrations defined in this TMDL (TP of 0.03 mg/L and TN of 0.45 mg/L), advanced treatment would significantly reduce the load of TP and TN that is introduced into the stream. As such, the NMED recommended to EPA a phased strategy to implement this TMDL (see Figure 4.1 and Table 4.7) recognizing that the in-stream targets are unachievable with current nutrient removal technology. After implementation of the new nutrient removal system and any reuse/storage options, and given enough time to allow the aquatic

to system to respond, NMED will reevaluate the condition of Raton Creek. If the stream is found to no longer be impaired then the nutrient impairment would be removed and the TMDL modified accordingly.

Comment Set F:

RATON
NEW MEXICO
P.O. BOX 910 RATON, NEW MEXICO 87740 (575) 445-9451/9551

November 11, 2011

Ms. Heidi Henderson
TMDL Coordinator
New Mexico Environment Department
1190 St. Francis Drive, P.O. Box 5469
Santa Fe, NM 87502

RE: Public Comment Draft – TMDL for Raton Creek (Chicorica Creek to Headwaters)

Dear Ms. Henderson:

First, we would like to thank you and the other staff from the New Mexico Environment Department (NMED) for meeting with the City of Raton and our consultant, Molzen Corbin, on November 1st, 2011 to review and discuss the contents of the Draft Total Maximum Daily Load (TMDL) study and report completed for Raton Creek (Chicorica Creek to Headwaters). This letter is intended to convey the City of Raton's comments on that document and our discussions during the meeting. As it has been mentioned to the NMED on numerous occasions, our comments and concerns are related to the potential impact on the discharge limits for the City's municipal wastewater treatment plant (WWTP) and the significant economic impact that they would entail for implementation.

The City of Raton's wastewater treatment facility, constructed in 2007, is a Sequencing Batch Reactor (SBR) with a design capacity for up to 0.90 million gallons per day (MGD) average day flow. The facility was designed for removal of pollutants typical for most municipal WWTPs such as biochemical oxygen demand (BOD), total suspended solids (TSS), and bacteria. The City's treatment facility has been capable of treating all these contaminants and has been in compliance with the discharge limits established in the current NPDES permit NM0020273. Currently, the facility is producing effluent with single digit concentrations of BOD and TSS. The new WWTP has also reduced the nitrogen concentrations in half. However, the information used for calculations in the TMDL are based on 2006 samples, which were taken before the new WWTP was online and do not reflect present day nitrogen concentrations or loads in Raton Creek. It is unfortunate the TMDL document does not accurately reflect the reduced nitrogen load in Raton Creek from the new plant. It is our understanding that the new condition will be measured in the next round of sampling in the Canadian River Watershed which is scheduled for 2015.

<u>NMED Response</u>: The NMED recognizes the reduction in Total Nitrogen (TN) in effluent discharged by the City of Raton WWTP since the 2006 water quality survey and the completion of the new WWTP in 2007. The average Total Phosphorus (TP) concentration in 2006 was 2.2 mg/L and the average TN concentration was 19.2 mg/L. Quarterly TN and TP concentrations reported in the City of Raton's Discharge Monitoring Reports (DMR) since 2008 (which are included in Table

4.6 of the TMDL) indicate that that the average TP and TN concentrations are now 1.7 and 8.9 mg/L, respectively.

The present, and significantly lower concentration, of effluent still exceeds the ecoregion thresholds as listed in Table 4.7; given the limited dilution of Raton Creek it is likely that it too still exceeds the ecoregion thresholds. See also previous response in Comment Set E on page 20.

It is also unfortunate that stream flows measured at the time the 2006 samples were taken were not used to accurately calculate the total stream loads; only the measured concentrations were used in the TMDL document to characterize stream loads at 4Q3 critical low flows. This approach underestimates the total stream loads. The City recommends that stream flows be measured and used to calculate total stream loads with the next round of sampling in 2015.

<u>NMED Response</u>: As noted in Section 4.2, the 4Q3 low flow was used as the critical flow condition for the Raton Creek TMDLs. There is no USGS gage on Raton Creek, so the 4Q3 was calculated using the Waltemeyer statewide regression model. The calculated 4Q3 for Raton Creek is 0.14 cfs. The 4Q3is necessary and appropriate to establish the critical flow condition for most TMDLs in order to ensure the attainment and protection of the State Water Quality Standards. Additionally, this is the same critical flow condition used by the EPA in issuing NPDES permits for New Mexico.

Flow measurements were taken at Raton Creek and are included in Table C-2 below. The NMED will continue to take flow measurements during water quality sampling events.

Table C-2: Flow, TP, and TN data for 04RatonC007.8

Date	Discharge (cfs)	TN (mg/L)	TP (mg/L)
4/9/2002	n/a	6.55	0.848
4/25/2006	0.5	5.61	0.89
7/26/2006	n/a	14.82	0.982
8/30/2006	1.5	2.08	0.149
9/20/2006	0.82	13.25	1.67
10/4/2006	n/a	12.21	1.64
10/25/2006	1.5	7.08	0.762

The WWTP discharges treated and disinfected effluent into Doggett Creek thence to Raton Creek, thence to Chicorica Creek, thence into to the Eagle Tail Canal, which conveys water across the Canadian River through an inverted siphon to the lakes of the Vermejo Conservancy/Maxwell National Wildlife Refuge. Only during extreme high runoff conditions when flow through the siphon exceeds 300 cfs, does water from Raton and Chicorica Creeks enter the Canadian River. Refer to Figure 1 – Raton Discharge Drainage.

Doggett Creek is intermittent, but is classified as perennial. Furthermore, there are times when it is dry or not wet enough to support aquatic life. During irrigation season, the City has been reusing 50 to 75% of reclaimed effluent. This has significantly reduced the flow discharged into the creek during warm/summer months. It is likely that the stringent nutrient limits proposed in the TMDL will force the City into zero discharge (100% reuse) for a large portion of the year. This intermittent and low flow condition would jeopardize the health of aquatic life in Doggett and Raton Creeks.

NMED Response: Whether flow from Raton Creek reaches Chicorica Creek or the Canadian River is not relevant to the Raton Creek TMDL calculations; the document only states that Raton Creek is within the Canadian River watershed. Based on data from the 2006 water quality survey in the Canadian River watershed, Raton Creek is impaired for plant nutrients and E.coli. Likewise NMED observations indicate that Raton Creek is perennial; Doggett Creek's flow status is not in question for this TMDL.

Both water quality and water quantity are essential components to a healthy aquatic ecosystem, a condition Raton Creek is currently not supporting. Development of the Raton Creek TMDLs is one of the first steps towards improving the aquatic ecosystem in Raton Creek.

The existing NPDES permit, which will expire on November 30, 2013, includes a monitoring and reporting requirement for total nitrogen (TN) and total phosphorus (TP). At the time that the plant was designed and upgraded, these two constituents were not included in the NPDES permit, thus they were not considered in the design criteria of the existing facilities. As such, without major and costly process modifications and inclusion of tertiary treatment facilities, the WWTP is not capable of removing these constituents. The existing WWTP can remove total nitrogen to some extent, but only to slightly less than 10.0 mg/L, under optimal conditions such as temperate environmental conditions.

NMED Response: For activated sludge wastewater treatment plants such as the City of Raton's Sequencing Batch Reactor (SBRs), it is reasonable to expect TN removal to 10 mg/L. A typical SBR is not designed to remove TP and tertiary treatment is likely necessary. Treatment for TP could be accomplished with some modifications to the biological treatment, chemical addition such as alum flocculation and or filtration, or a combination of all three.

Table 4.6 includes the quarterly TN and TP concentrations reported in the City of Raton's Discharge Monitoring Reports (DMR) since 2008. The average TP concentration is 1.7 mg/L and the average TN concentration is 8.9 mg/L. This is a significant reduction from the effluent data collected by NMED in 2006 before the construction of the new WWTP. The average TP concentration in 2006 was 2.2 mg/L and the average TN concentration was 19.2 mg/L. The Phase 1 effluent limits in Table 4.7 are therefore reasonable targets for the City based on its current TN

and TP concentrations. NMED agrees that optimization or modifications may be necessary to consistently meet the Phase 1 limits in Table 4.7.

The City of Raton believes that the TMDL prepared for Raton Creek (Chicorica Creek to Headwaters) is unrealistically restrictive. The TMDL appears to be based on EPA Ecoregion Criteria for establishing the in-stream TN and TP target concentrations for Raton Creek in combination with a low flow 4Q3 stream condition. The nutrient target concentrations for Raton Creek, which *eventually* is the receiving waters for the WWTP's discharge, are those applicable to a perennial stream in Ecoregion 26 – Southwestern Tablelands, which are TN of 0.45 mg/L and TP of 0.03 mg/L. The effect of TMDLs formulated in this manner is that the selected in-stream target concentrations for plant nutrients based on Ecoregion criteria essentially become end-of-pipe effluent concentration limits. Both the TN of 0.45 mg/Land TP of 0.03 mg/L are based on criteria for Ecoregion 26, and are included in the TMDL as target or Phase "*n*" concentrations for the WWTP discharge. These concentrations are significantly below the limits achievable by current state-of-the-art treatment technologies. In practical terms, those limits would require zero discharge from the City's WWTP to this surface water. This may be very deleterious to maintaining streamflows during low flow periods because it forces the treated effluent out of the stream. We do not believe this is the correct approach to improving water quality in the watershed.

NMED Response: This impairment listing and this TMDL are not based on EPA Ecoregion Criteria. The NMED uses a weight-of-evidence approach to nutrient assessment that evaluates various conditions in the steam and includes both cause (nitrogen and phosphorus) and response (dissolved oxygen, pH, chlorophyll-a) variables. The TN and TP threshold concentrations are based on NMED's analysis that used a similar ecoregion approach but also included a larger dataset and considered additional factors such as local geology. Based on NMED's analysis, these concentrations are protective of aquatic life and for this reason they are used as the "phase n" targets in this TMDL.

The TMDL targets are applied at the "end-of-pipe" in this TMDL because the critical dilution of the plant is 100% because there is little dilution capacity from the receiving steam.

NMED has used a phase approach in this TMDL both in recognition of the fact that the in-stream targets are unachievable with current nutrient removal technology and to allow for evaluation of impairment status as the nutrient load in Raton Creek is reduced. NMED has recommended Phase 1 effluent limits of 1.0 mg/L TP and 8.0 mg/L TN. These values are considerably higher than the concentrations measured by DBS&A in 2009 from Chicorica Creek (discussed below) as well as NMED's ecoregion thresholds.

The proposed TP concentration of 0.03 mg/L set to maintain unimpaired conditions in Raton Creek is unnecessarily restrictive. A water quality monitoring report of waters in Sugarite State Park prepared by Daniel B. Stephens & Assoc. in 2009 measured background levels of TP near the headwaters of Chicorica Creek and tributaries to Lake Dorothey and Lake Maloya, as high as 0.10 to 0.26 mg/L. These samples were collected in the City's pristine drinking water watershed that is protected from grazing and development. The quality of drinking water collected from this watershed has shown no signs of impairment.

<u>NMED Response</u>: Thank you for providing a brief data summary of Chicorica Creek headwaters. Table C-3 displays 2002 and 2006 NMED monitoring of Chicorica Creek upstream of Lake Alice (04Chicor034.4). The values in bold are above the ecoregion criteria of 0.03 mg/L TP and 0.45 mg/L TN. The elevated levels of nutrients were generally associated with high flow events when the system was moving large quantities of sediment, possibly related to the operation of Lake Maloya upstream. The average of the concentrations provided by DBS&A is 0.048 mg/L TP which is higher than the Ecoregion 26 TP threshold, but is half the values measured in Raton Creek by the NMED .

Table C-3: TN and TP data at 04Chicor034.4

Date	TN (mg/L)	TP (mg/L)
4/9/2002	0.34	0.03
5/8/2002	0.29	**0.035**
3/28/2006	**0.59**	**0.045**
4/25/2006	**0.61**	**0.045**
5/23/2006	**1.02**	**0.104**
7/25/2006	**0.85**	**0.077**
8/30/2006	0.41	0.032
9/27/2006	**0.95**	**0.046**
10/26/2006	0.44	0.019

As stated previously, the NMED has developed thresholds for TP and TN (a.k.a. TMDL target concentrations) by analyzing existing regional data and are assigned based on the ecoregion and designated aquatic life use (e.g. coldwater, warmwater) of the stream. These threshold values are used to translate the narrative nutrient criterion into quantifiable endpoints. It is possible that, given that the Chicorica Watershed is unimpaired for nutrients, these values may provide suitable phase "n" targets. However, additional data collection to demonstrate that they are protective of aquatic life use would first be necessary.

The NMED recommended a phased strategy to implement this TMDL recognizing that the in-stream targets are unachievable with current nutrient removal technology. NMED recommended Phase 1 effluent limits of 1.0 mg/L TP and 8.0 mg/L TN. These Phase 1 concentrations, as well as the concentrations NMED has measured in Raton Creek, are an order of magnitude greater than the concentrations reported by DBS&A in 2009 for Chicorica Creek.

The WWTP discharge concentration limits included in **Phase 2** of the TMDL are **TN of 3 mg/L and TP of 0.1 mg/L,** which are indeed the limits of state-of-the-art technologies based on annual averages. It is well known that nitrogen removal by biological processes is highly temperature dependent, thus creating an additional challenge for Raton's WWTP to achieve such a low effluent concentration during cold months. At an elevation of 6,680 ft above sea level, temperatures in Raton during the winter/cold months are very low and could have a significant impact on consistently achieving biological removal of plant nutrients during this period. As an example, Table 1 shows a summary of historical temperatures and snowfall.

Table 1

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temperature (°F)	45.3	47.7	52.8	60.6	69.5	78.5	82.8	80.4	74.7	65.5	53.7	46.2	63.1
Avg. Min. Temperature (°F)	19.2	21.2	25.6	32.9	42.2	51.0	55.5	54.3	47.3	37.6	27.5	20.7	36.2
Avg. Total Snowfall (in.)	5.8	5.4	7.0	3.5	0.5	0.0	0.0	0.0	0.1	1.4	4.2	6.1	33.9

(Data obtained from the Western Regional Climate Center)

With regard to the limits included for **Phase 1 of 8 mg/L TN and 1 mg/L TP,** those concentrations are technically feasible under optimal environmental conditions, such as moderate to warm temperatures for nitrogen removal. However, to consistently achieve total nitrogen of less than 8 mg/l during cold/winter months, major process modifications will be needed. Furthermore, the existing facilities are not capable of biological or chemical phosphorus removal, thus new facilities and equipment will have to be designed and constructed.

<u>NMED Response</u>: The NMED understands that optimization or additional modifications could be necessary to consistently meet the Phase 1 limits of 8 mg/L TN and 1 mg/L TP. NMED encourages the City to consider the three implementation options discussed in Section 6.1 of the TMDL; for example, Option 3 includes seasonal limits of 10 mg/L TN and 3.0 mg/L TP.

The EPA allows schedules of compliance in NPDES permits where facility modifications need to be made to meet new water quality based requirements. A compliance schedule will therefore likely be included in the new NPDES permit to meet any new effluent requirements.

Additional discussion of seasonal limits is provided below.

The TMDL (Section 4.4.1, page 28) recognizes that *"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 <u>in combination with the economic feasibility</u>."***

<u>NMED Response</u>: This statement in the TMDL refers to the implementation options for the City and EPA to consider when evaluating the most feasible option for meeting the TMDL requirements. However, in the EPA document, Guidance for Water Quality-based Decisions: The TMDL Process

(Second Edition), it is suggested that states discuss the economic impact of TMDLs with permittees during the Implementation stage of TMDL development:

"Point source facilities generally have mechanisms in place to secure funds needed for implementing the retrofits, process modifications, and additional pollutant controls that may be required to meet the load allocations required within a TMDL. Whether they are affected individually or as part of a category of sources, facilities should be consulted about how to best fund required actions. EPA anticipates that the economic feasibility of various allocation strategies will be discussed at this stage of TMDL establishment."

NMED's TMDL approach also specifically recognizes the financial impact that nutrient TMDLs may have on municipal waste water facilities. It is, in part, for this reason that NMED recommended a phased strategy to implement this TMDL (see Figure 4.1 and Table 4.7). NMED recognizes that phased implementation is an iterative process and will require future data collection and analysis by NMED to determine if the load reductions achieved using effluent limits that are based on alternative target concentrations actually lead to attainment of water quality standards. NMED will continue to monitor and evaluate the water quality conditions in the watershed and the impact of the phased-TMDL permit limits after implementation. At that time, if the waterbody is found to be no longer impaired for nutrients, then current stream nutrient concentrations would be protective of the aquatic life use and the TMDL would be revised accordingly.

See also previous response in Comment Set E on page 20.

Section 6.1 of the **Raton Creek TMDL includes three options for implementing Phase 1 nutrient limits.** In summary, the alternatives presented are:

1) **Option 1:** Year Round Limits, 30-day average: TN = 8.0 mg/L and TP = 1.0 mg/L
2) **Option 2:** No Discharge (100% Re-Use)
3) **Option 3:** Seasonal Limits:
    a. October 1 through March 31: TN = 10.0 mg/L and TP = 3.0 mg/L
    b. April 1 through September 30: No Discharge (100% Re-Use)

Option 1 – Year Round Limits: the proposed concentrations of 8 mg/L TN and 1.0 mg/L TP are not feasible for the current City of Raton WWTP. The existing process is capable of achieving TN of less than 10 mg/L, but because biological processes are highly temperature dependent, consistently meeting TN of 8 mg/L during winter time will be very challenging and will likely require the installation of additional treatment units (i.e. denitrification filters). In addition, the existing facilities do not have any unit operations or equipment for phosphorus removal. Chemical phosphorus removal is needed to consistently achieve less than 1 mg/L TP. The financial implications for both construction and operation and maintenance of such facilities will be significant.

Option 2 – No Discharge: this alternative is technically impractical for the City. The City is making all efforts to implement an effluent reuse program during the summer time, but year-round zero-discharge alternatives are very difficult to implement, particularly in cold climates. Storage facilities will be needed to hold the effluent during the winter months. However, in addition to the capital cost for construction of such facilities, there is concern about the quality of the water at the end of the winter season, when land application can commence. Contamination of the treated water in open air lagoons is likely to occur, which could result in the stored effluent not meeting standards for land application, thus re-treatment may be necessary.

Option 3 – Seasonal Limits: the proposed seasonal limits included in the Raton Creek TMDL as Option 3 could potentially benefit the City of Raton by allowing for an increase in effluent nitrogen and phosphorus concentrations during winter months or cold conditions, when nutrient removal is more difficult to achieve by biological processes. Furthermore, during cold months biological activity in streams is at its minimum, thus the impact of nutrients would be reduced. However, as it can be seen in Table 1, minimum temperatures during the month of April are still very low. This would make it difficult for the City to implement a 100% effluent re-use strategy during April. With regard to zero discharge during summer/warm months, the City will still have to conduct a study or preliminary engineering report (PER) to find alternatives for 100% reuse, which will likely result in costly improvements to expand the reuse distribution system to new locations.

Seasonal limits for nutrients have recently been included in TMDLs for the Rio Chama Watershed (August 2011), which affected the discharge for the Village of Chama WWTP, and in

the Final Draft TMDL for the Mainstem of the Canadian River (September 2011), which affected the discharge from the City of Tucumcari WWTP. A summary of seasonal limits included as options in the TMDLs for these two streams is presented Table 2.

Table 2

Facility	Cold Season			Warm Season		
	Period	TN	TP	Period	TN	TP
Village of Chama WWTP [a]	October 1 through April 30	**10 mg/L**	**1 mg/L**	May 1 through September 30	**4 mg/L**	**0.4 mg/L**
City of Tucumcari WWTP [b]	October 1 through March 31	**10 mg/L**	**3 mg/L**	April 1 through September 30	**100% Effluent Reuse** – Zero Discharge to Surface Waters	

[a] US EPA – Approved Total Maximum Daily Load (TMDL) for the Rio Chama Watershed [Abiquiu Reservoir to Headwaters], 2011.

[b] Final Draft Total Maximum Daily Load (TMDL) for the Mainstem of the Canadian River [From Texas to Colorado] and Select Tributary Streams, 2011.

NMED Response: Thank you for reviewing the benefits and limitations of the three implementation options in Section 6.1. NMED notes in Section 6.1 that these options are only recommendations. EPA Region 6, in consultation with the City and NMED staff, will determine which option to implement including the associated permit language and effluent limitations. The seasonal limits listed in Table 2 (above) reflect the results of consultations with the respective municipalities through meetings and public comments. Likewise, NMED considered the City's comments in developing the final Raton Creek TMDL.

With regard to bacteria impairments, the TMDL (Table 3.8) attributes only 13% of the Raton Creek *E. coli* load to the WWTP. However, a **new limit for *E. coli* of 126 cfu/100 ml monthly geometric mean is likely to be included in the next NPDES permit.** Even though the existing ultraviolet (UV) disinfection system was not designed to achieve this level of disinfection, the effluent from the WWTP has a significantly lower concentration than the current limits in the NPDES permit of 548 cfu/100 ml 30-day average and 2,507 cfu/100 ml daily maximum. In order to consistently meet the new standard, major modifications to the UV system will be required, including the addition of another bank of lamps.

NMED Response: *Based on data collected during the 2006 water quality survey, Raton Creek is impaired for E.coli. The water quality criteria and designated uses in NMAC 20.6.4.305 apply to Raton Creek. The use-specific criteria for primary contact in 20.6.4.900(D) apply to Raton Creek per 20.6.4.305.*

> *"**Primary Contact**: the monthly geometric mean of E. coli bacteria of 126 cfu/100 mL and single sample of 410 cfu/100 mL and pH within the range of 6.6 to 9.0 apply to this use."*

As noted in Section 3.1, the Raton Creek E.coli TMDL was calculated using the monthly geometric mean E.coli criterion in 20.6.4.900(D). The values presented in Table 3.8 are the amount of load allocated to the point and non-point sources.

The City of Raton WWTP NPDES permit (NM0020273) indicates the receiving water for the WWTP is Doggett Creek in 20.6.4.97 NMAC. The water quality standards applied by EPA during the development of the permit in 2008 were the E.coli bacteria criteria of 548 cfu/100mL (geometric mean) and 2507 cfu/100mL (single sample). The NMED disagrees with the application of 20.6.4.97 in this situation. As Doggett Creek is currently an unassessed but perennial water, the E.coli criteria in 20.6.4.99 should apply. NMED believes that the 20.6.4.97 standard was misapplied by EPA in this permit; in fact, this segment of the water quality standards was not approved by EPA for CWA purposes until April of 2011. However, the limits in the WWTP are required to be protective of downstream water quality standards. In the case of the Raton WWTP, the primary contact E.coli criterion applicable to Raton Creek should apply.

Table C-4 lists the 2011 DMR data from the City of Raton WWTP (NM0020273). As you note, the effluent data has a lower concentration than the current NPDES permit limits. However this data is included to compare existing effluent data to the primary contact E.coli criteria. During this recent 12-month period, the effluent had a 30-day average concentration below 126 cfu/100mL for all 12 months. The daily maximum value for the 12 month period exceeded 410 cfu/100mL in 6 of the 12 months.

Table C-4: 2011 DMR data for NM0020273

Month	30-day average (cfu/100mL)	Daily Max (cfu/100mL)
January 2011	53.5	300
February 2011	82.4	500
March 2011	34.2	>1600
April 2011	31.1	900
May 2011	7.1	130
June 2011	53.8	220
July 2011	36.6	900
August 2011	15.4	50
September 2011	59	300
October 2011	58.3	170
November 2011	54.1	170
December 2011	54.8	500

NMED understands that additional modifications could be necessary to meet the primary contact E.coli criteria for the Raton WWTP. However, the inclusion of the primary contact E.coli criterion in NPDES permits is not uncommon in New Mexico. NMED encourages the City of Raton to evaluate the effectiveness of UV treatment and study recent UV upgrades performed by other New Mexico municipalities.

A timeline of events is presented in Table 6.1 of the Raton Creek TMDL. The City is very concerned about the schedule for implementation of the Phase 1 TMDL limits for nutrients. As previously mentioned, the existing permit expires on November 30, 2013. There are numerous steps that have to happen before improvements can be made, most of which are funding dependent.

NMED Response: The current NPDES permit expires and will be up for renewal on November 30, 2013. If this TMDL is approved by the WQCC and EPA, the upcoming NPDES permit will incorporate it. This is outlined in Table 6.1 of the Implementation Section of the TMDL. The New Mexico Water Quality Standards 20.6.4.12(J) NMAC allows for compliance schedules in NPDES permits in order for permittees to meet effluent limits for water quality based pollutants on a case by case basis. The length of the compliance schedule will be determined by EPA during the permit renewal process. Typically monitoring requirements will be included in the permit during the compliance schedule before the effluent limits become required.

The City of Raton respectfully proposes the following phasing approach and limits to be included in the TMDL for Raton Creek:

1. **Cold/winter months will begin on October 1 and end on April 30**
2. **Warm/summer months will begin on May 1 and end on September 30**

NMED Response: NMED considers this a reasonable approach and ***will change the months for the seasonal limits listed in Option 3 in Section 6.1 from "October 1 through March 31 and April 1 through September 30" to "October 1 through April 30 and May 1 through September 30."***

3. The City is requesting that a reasonable and realistic schedule for implementation of Phase 1 alternatives be prepared. The compliance deadline for meeting the Phase 1 limits should be postponed until in the next NPDES permit renewal cycle. The proposed phasing is as follows:
   a. **Initial Phase (2013–2018 NPDES PERMIT):** Year-Around 10 mg/L TN and 3 mg/L TP
      – These limits can be achieved by process optimization without significant capital expenditure.
      – The City will need to secure the funding and procure technical assistance to identify and implement process optimization alternatives to consistently achieve TN of 10.0 mg/L and TP of 3.0 mg/L or less during cold/winter months
      – Secure funding for process upgrades at the WWTP to consistently achieve effluent limits during winter time, if necessary
   b. **Phase 1 (2018 – 2023 NPDES PERMIT):**
      – **Summer Season:** May 1 to September 30, 100% reuse
        - The City will need to secure the funding to prepare a study or PER to identify and evaluate alternatives for effluent disposal during warm/summer months to achieve zero discharge to Doggett Creek during this period
      – **Winter Season:** October 1 to April 30, 10 mg/L TN and 3 mg/L TP
        - Same as Phase 1 Option 3 described on p. 42 of the TMDL, except one month longer season
      – Prior to this permit cycle, the City will have to secure funding and complete studies or PERs to evaluate and identify recommended improvements and secure funding and procure an engineer for design of the recommended improvements. Design will likely include expansion of the reuse distribution system and effluent storage facilities. Additionally, the City will need to secure funding for construction of the recommended improvements and be allowed sufficient time to complete the projects.
4. **Phase 2** limits included in the TMDL are TN of 3 mg/L and TP of 0.1 mg/L. An implementation schedule for this Phase and limits should be re-evaluated as part of future monitoring and TMDL studies. The next scheduled monitoring date for the Canadian Watershed is 2015, at which time TMDL targets will be re-examined and potentially revised. The effect of the new plant that started operating in 2007 may be noticeable at that time in the quality of the stream.
5. **Phase *n*** limits are not technologically achievable in the foreseeable future. The City is respectfully requesting to delete Phase *n* limits from the TMDL for Raton Creek
6. ***E. coli* limits of 126 cfu/100 ml** cannot be consistently achieved by the existing UV disinfection system. **A compliance schedule of no less than 3-years is respectfully requested by City to comply with this new standard.** This will be a capital improvements project, which will require the following steps:
   – Detailed evaluation of the existing equipment and hydraulics
   – Procurement of Engineer and design of improvements needed to achieve the required level of disinfection
   – Secure funding for construction

<u>NMED Response</u>: Comments #3-4 address the issue of modifications to the Implementation Section of the TMDL; the timeline included is based on the NMED's understanding from EPA and on its own experience of when particular actions related to permitting are planned to occur. The NMED encourages the City to continue discussions with EPA Region 6 and NMED regarding the future permit and any compliance schedules.

Comment #5 addresses the Phase n limits in Table 4.7. As previously stated, TMDLs should address targets that are protective of the stream and that are scientifically defensible. The inclusion of Phases 1 and 2 are provided in recognition of the recent reductions to nutrient loading in Raton Creek due to upgrades to the WWTP facility and the limits of technology for nutrient removal. The development of these thresholds is outlined in Section 4.1 of the TMDL. See also responses in Comment Set E on page 20.

Comment #6 addresses the E.coli TMDL. See also responses in Comment Set F on page 31.

The City of Raton understands and recognizes the efforts of the NMED to improve the quality of the streams in our State. As such, the City is committed to produce the highest quality of effluent possible from the existing WWTP. However, recent natural disasters such as the Track Fire, which burned 27,792 acres and affected the watershed and drinking water supply for the City, will likely require that most of our funding be dedicated for many years to address the impact caused by such events. We respectfully request that the economic feasibility of adopting the effluent limits in this document be considered when finalizing the TMDL for the Raton Creek, and in particular, those that will directly affect the City of Raton WWTP and the City's residents.

If you have any questions, please feel free to contact us at (575) 445-3861.

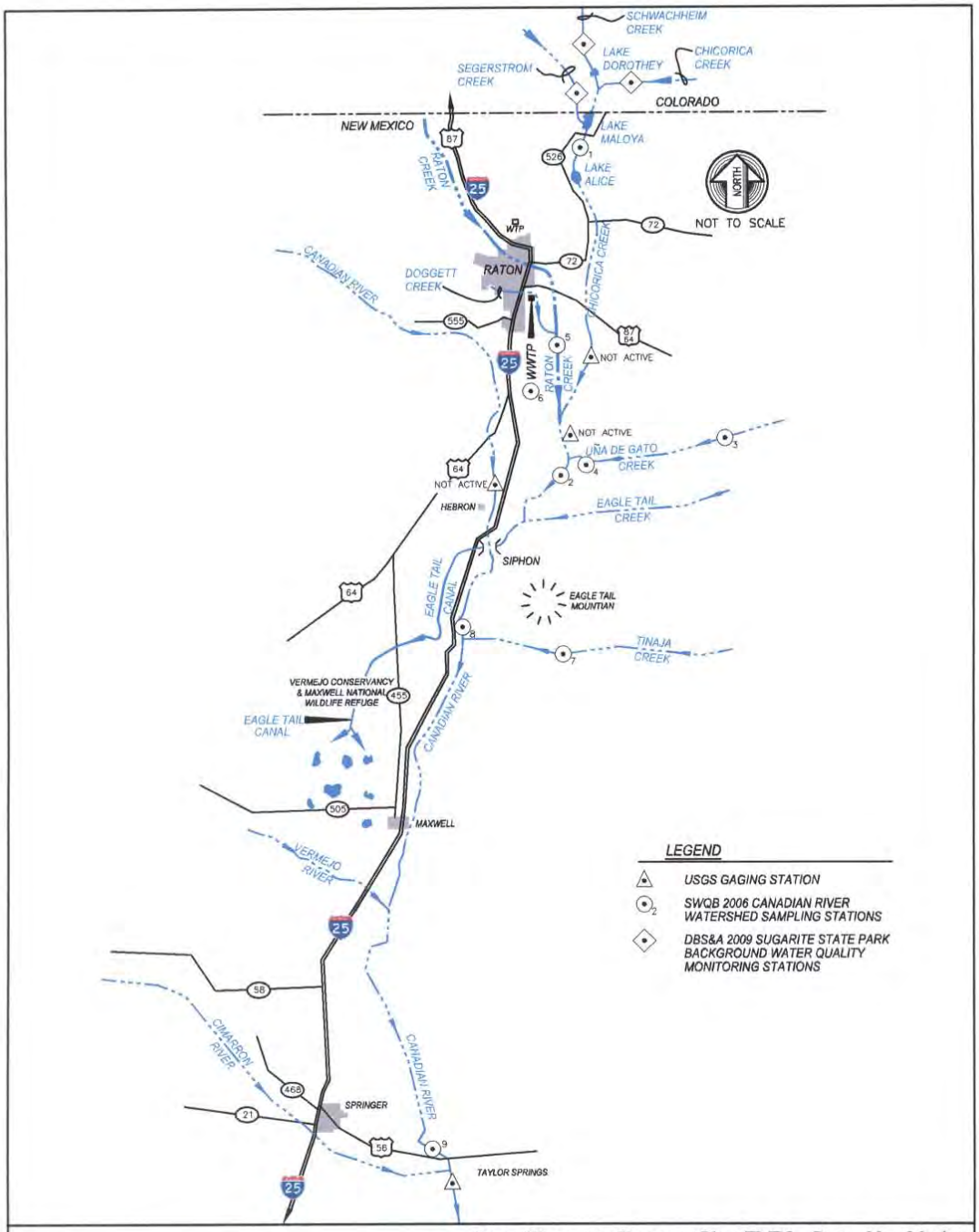
Sincerely,

Neil Segotta
Mayor

Allen Litchfield
Chairman Raton Water Board

CITY OF RATON

<u>NMED Response</u>: *NMED notes the improvement in the City's effluent water quality since the completion of the WWTP in 2007. NMED will reassess the water quality of Raton Creek and its watershed during the upcoming 2015 water quality survey of the Canadian River watershed.*



Raton Wastewater Treatment Plant TMDL - Raton, New Mexico

MOLZENCORBIN

Figure 1
Raton Discharge Drainage

Comment Set G:

New Mexico Municipal League

November 14, 2011

Heidi Henderson
TMDL Coordinator
Surface Water Quality Bureau
New Mexico Environment Department
PO Box 5469
Santa Fe, New Mexico 87502-5469

RE: Comments on Proposed Total Maximum Daily Loads for the Raton Creek Watershed

Dear Ms. Henderson,

The New Mexico Municipal Environmental Quality Association (NMMEQA) and the New Mexico Municipal League (NMML) are deeply concerned about the New Mexico Environment Department's (NMED) implementation of the narrative nutrient standards in the Standards for Interstate and Intrastate Surface Waters 20.6.4 NMAC in developing the Total Maximum Daily Loads (TMDLs) for the Raton Creek Watershed. The NMMEQA/NMML submits these comments on NMED's protocol for assessing nutrient impairments, developing TMDLs for nutrient impaired waters, and subsequent effluent limits in National Pollutant Discharge Elimination System (NPDES) permits.

NMED issued the "Procedures of Assessing Standards Attainment for the State of New Mexico CWA §303(d) /§305(b) Integrated Report" (Assessment Protocol) in May 2011. Appendix D of this document is the "Nutrient Assessment Protocol for Wadeable Perennial Streams". This protocol makes impairment designations based primarily on comparisons of concentrations of nitrogen, phosphorus and chlorophyll a (Chl a) to "ecoregion-aquatic life use threshold values". The impairment decisions are followed by TMDLs that assign wasteload and load allocations based on the same "ecoregion- aquatic life use threshold values". The "ecoregion" approach to nutrients is simplistic and results in extremely low levels for nutrients. The allocations for nitrogen and phosphorus are translated into discharge limits in the NPDES permits of our municipal dischargers. NMED recognized that the ecoregion derived limits are not technically achievable in this statement: "*Even though the limits of wastewater treatment technology preclude the attainment of the target concentrations defined in this TMDL (TP of 0.03 mg/L and TN of 0.45 mg/L)…".* (Response to Public Comments, TMDL for the Canadian River Watershed – Part 2, September 30, 2011).

Although NMED selected U.S. Environmental Protection Agency's (U.S. EPA) ecoregion approach for the assessment protocol for nutrient criteria, this approach has been widely criticized. Several researchers have demonstrated the shortcomings of the ecoregion approach, which uses ambient nutrient concentrations within a waterbody alone to predict eutrophication, particularly in streams (Heiskary and Markus, 2001; Parkhurst, et al, 2005; Prairie, et al, 1989; Chételat, et al, 1999; Dodds, et al, 2002; Fevold, 1998; Van Nieuwenhuyse and Jones, 1996; Warren-Hicks, et al, 2006; Welch, et al, 1989). The limitations of using the ecoregions are summarized in Parkhurst, et al (2005, p. 3):

- "Because 75% of all water bodies in the U.S. EPA's nutrient database exceed the ecoregional criteria, if extrapolated to all water bodies, use of the U.S. EPA's percentile approach potentially could result in non-attainment of about 75% of all water bodies, within any direct determination of nutrient impairments or non-attainment of designated uses. It is likely that these water bodies are unimpaired by nutrients and/or are attaining designated uses potentially affected by nutrients."
- "The U.S. EPA's approach for setting nutrient criteria does not require the determination of causal relationships between nutrients and attainment of designated uses. As a result, efforts to reduce nutrient concentrations can result in adverse effects to some designated uses, such as recreational or commercial fishing. Such efforts may result in decreases in fish populations caused by decreases in primary production."
- "Casual relationships between nutrients and response variables, such as Chl *a* , dissolved oxygen, and pH, are not determined using U.S. EPA's approach. Consequently, in waters where such relationships are weak or may not exist because of confounding factors, changes in nutrient concentrations may not produce the expected changes in Chl *a* concentrations or other response variables."

The U.S. EPA, states and national organizations are advocating the use of other approaches for developing nutrient criteria. The U.S. EPA has developed a guidance

document, *Empirical Approaches for Nutrient Criteria Derivation* (U.S. EPA, 2009) which is currently undergoing technical review. However, the draft reviewed by the Science Advisory Board did not use or suggest the ecoregion approach. This is an implicit indication that EPA does not promote the use of the ecoregion approach. Other states do not use the ecoregion approach and have developed their own approaches to numeric criteria; for example California has established an approach described in: *Technical Approach to Develop Nutrient Numeric Endpoints for California* (Creager at al, 2006). The Water Environment Research Foundation (WERF) recognized the limitations of the ecoregion approach and funded a study, the results of which are published as *Technical Approaches for Setting Site-Specific Nutrient Criteria* (Warren-Hicks, et al, 2005).

NMED Response: *The commenter is incorrect, in that NMED does not use the EPA's ecoregion approach for assessment. NMED's nutrient assessment protocol uses a weight-of-evidence approach that considers both cause (nitrogen and phosphorus concentrations) and response variables (dissolved oxygen, pH, and periphyton chlorophyll a) to determine impairment. The TN and TP thresholds used for assessment were calculated based on an ecoregion approach however the 50th percentile of all stream not the 75% was used in our analysis; furthermore in order for a stream to be listed for nutrient impairment it* ***must also*** *exceed the thresholds for chlorophyll a, dissolved oxygen, or pH. NMED's approach is an appropriate and scientifically sound protocol to ensure that where TN and TP concentrations exceed threshold concentrations they have in fact resulted in an impairment of the aquatic life designated use.*

While NMED is not familiar with all of the documents listed above we certainly are aware of the ever-growing literature on the topic of developing numeric nutrient criteria. It is largely for the reasons outlined in the summary comments from Parkhust et al. that NMED's approach deviates from EPA guidance that states adopt numeric nutrient criteria. In order to addressthe issues raised in these comments (1) NMED requires biological confirmation of a causal response in the aquatic ecosystem and (2) the TMDL has been developed in a phased implementation such that if an interim limit is found to be meet the goals of the narrative criterion and be protect of the stream aquatic life then the TMDL can be revised and this target.

When a TMDL is developed, water quality standards continue to have regulatory effect. Water quality criteria under section 303(c) are set at levels necessary to support designated uses. Section 303(d) requires the development of TMDLs for waters that still do not meet water quality standards after technology based effluent limitations have been met. Standards set under section 303(c) are not wasteload and load allocations. However, "Such standards serve the dual purposes of establishing the water quality goals for a specific water body and serving as the **regulatory basis** for the establishment of water quality-based treatment controls and strategies beyond the technology-based level of treatment required by sections 301(b) and 306 of the Act." 40 C.F.R. 130.3 (emphasis added); 40 C.F.R. 131.2.

Wasteload and load allocations that implement TMDLs should not be set without site specific cause and effect relationships of nutrients. Under EPA's TMDL regulations: "TMDLs shall be established at levels necessary to attain the applicable narrative and

numerical WQS" in the particular water quality limited segment. 40 C.F.R. 130.7(c)(1). "Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters" and "[s]ite-specific information should be used wherever possible." Thus, NMED is proposing loading allocations that do not meet the requirements of the TMDL regulations.

NMED Response: *NMED disagrees that it "is proposing loading allocations that do not meet the requirements of the TMDL regulations." In fact, the opposite is true.*

The intent of TMDL targets for phosphorus and nitrogen is to control undesirable aquatic life, such as the excessive growth of attached algae and higher aquatic plants, which can result from the introduction of these plant nutrients into streams. This goal is codified into the water quality standards [NMAC 20.6.4.13(E)] and serves to protect the existing and attainable uses of surface waters of the state. The phase "n" thresholds for TP and TN (a.k.a. assessment target concentrations) were developed by analyzing existing regional data and are assigned based on the ecoregion and designated aquatic life use (e.g. coldwater, warmwater) of the stream. These threshold values are used to translate the narrative nutrient criterion into quantifiable endpoints. NMED has nevertheless developed a phased TMDL both in recognition of the fact that the in-stream targets are unachievable with current nutrient removal technology and to allow for evaluation of impairment status as the nutrient load in Raton Creek is reduced. NMED has recommended Phase 1 effluent limits of 1.0 mg/L TP and 8.0 mg/L TN. These values are considerably higher than the concentrations (see response to Village of Raton above) from a pristine neighboring creek as well as NMED's ecoregion thresholds. After implementation of Phase 1 and given enough time to allow the aquatic to system to respond, NMED will again evaluate the condition of Raton Creek. At that time, if the waterbody is found to be no longer impaired for nutrients, then current stream nutrient concentrations would be protective of the aquatic life use and the TMDL would be revised accordingly.

We also have concerns about the feasibility and cost of treatment to meet the wasteload allocations in the TMDL. The ambient concentrations in the Raton Watershed are above these ecoregion criteria levels, so there is no assimilative capacity available in the receiving water. The effect of TMDLs formulated in this manner is that the selected in-stream targets for total phosphorus (TP) and total nitrogen (TN) based on ecoregion criteria essentially become end-of-pipe effluent limits. Both the TP and TN values selected based on ecoregion criteria are at, or below, the limits of treatment technology if applied as end-of-pipe limits. So, in effect, the assumption made in selecting the ecoregion criteria results in a TMDL that requires zero discharge to surface water. This may be very deleterious to maintaining streamflows during low flow periods because it forces the treated effluent out of the stream. The costs associated with trying to meet these limits are prohibitive. This is particularly true when the treatment technology is not capable of meeting those limits, as noted above in NMED's statement.

NMED Response: *The TMDL targets are applied directly to the Waste Load Allocation (WLA) for the Raton WWTP because there is essentially no dilution provided by Raton Creek.*

TMDLs should address targets that are protective of the stream and scientifically defensible, while balancing the limits of technology for nutrient removal and requirements under federal law and other legal requirements (i.e., the Settlement Agreement pursuant to the 1997 Forest Guardians lawsuit against EPA concerning TMDLs in New Mexico). Even though the limits of wastewater treatment technology preclude the attainment of the phase "n" target concentrations defined in this TMDL (TP of 0.03 mg/L and TN of 0.45 mg/L), additional treatment would significantly reduce the load of TP and TN that is introduced into the stream. In addition, NMED recommended to EPA a phased strategy to implement this TMDL (see Figure 4.1 and Table 4.7) recognizing that the in-stream targets are unachievable with current nutrient removal technology.

We recognize the funding constraints that NMED has on data collection and analysis that could be used to develop nutrient assessment and load calculation protocols. However, the result of using the easiest and less expensive ecoregion approach means that municipalities bear the cost burden of system upgrades. We believe this approach unfairly shifts the costs onto the municipalities and urge NMED to revise the assessment and TMDL protocols for nutrients.

NMED Response: *The commenter has mischaracterized the assessment protocol. See above response. NMED's combined approach that considers both causal variables and response variables is prudent, scientifically robust, and complies with federal law and other legal requirements. It is worth noting that TN and TP concentrations in Raton Creek are roughly an order of magnitude greater than NMED's ecoregion thresholds and DO concentrations were below the 5 mg/L criteria in 19% of the measurements during July 2006 sonde deployment. Based on the data, Raton Creek is currently not supporting a healthy aquatic ecosystem due to excessive nutrients. NMED is compelled to address the situation through development of TMDLs.*

Additionally, NMED's TMDL approach specifically recognizes the financial impact that nutrient TMDLs may have on municipal waste water facilities. It is, in part, for this reason that NMED recommended a phased strategy to EPA to implement this TMDL (see Figure 4.1 and Table 4.7). The NMED recognizes that phased implementation is an iterative process and will require future data collection and analysis by NMED to determine if load reductions achieved using interim targets result in attainment of water quality standards. The NMED will continue to monitor and evaluate the water quality conditions in the watershed during this process. At that time, if the waterbody is found to no longer be impaired for nutrients, then current stream nutrient concentrations would be protective of the aquatic life use and the TMDL would be revised accordingly.

We appreciate the opportunity to provide these comments to the proposed Raton Creek TMDL and request you and the WQCC consider the issues identified and the impacts to the City of Raton and other New Mexico municipalities that will be affected in the future.

Sincerely Yours,

Tim McDonough

Tim McDonough, President

New Mexico Municipal Environmental Quality Association

Cc: Bill Fulginiti, Executive Director, New Mexico Municipal League

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