PUBLIC COMMENT DRAFT

TOTAL MAXIMUM DAILY LOAD

FOR

BLUEWATER LAKE

JANUARY 20, 2016

Prepared by

New Mexico Environment Department, Surface Water Quality Bureau

Monitoring, Assessments, and Standards Section

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Cover Photo: Dam at Bluewater Lake, SWQB 2015

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LIST OF ABBREVIATIONS

4Q3	4-Day, 3-year low-flow frequency
ACWA	Association of Clean Water Administrators
AU	Assessment Unit
BLM	Bureau of Land Management
CWA	Clean Water Act
DO	Dissolved Oxygen
EQIP	Environmental Quality Incentive Program
LA	Load Allocation
MA	Million years / million years ago
MOS	Margin of Safety
MOU	Memorandum of Understanding
N+N	Nitrate + Nitrite
N_2	Nitrogen gas
NH_3	Ammonia
NH_4^+	Ammonia
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NM WQMP	New Mexico Water Quality Management Plan
NO_2^-	Nitrite
NO_3^-	Nitrate
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
QAPP	Quality Assurance Project Plan
RFP	Request for Proposal
SWQB	Surface Water Quality Bureau
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste Load Allocation
WBP	Watershed Based Plan
WWTP	Wastewater Treatment Plant

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Water Pollution Control Act , a.k.a., Clean Water Act, 33 U.S.C. §§ 1251 to 1388, requires states to develop Total Maximum Daily Load (TMDL) management plans for waterbodies determined to be impaired. A TMDL defines the amount of a pollutant that a waterbody can assimilate without exceeding the state's water quality standard for that waterbody and allocates loads to known point sources and nonpoint sources. It further identifies potential methods, actions, or limitations that could be implemented to achieve water quality standards. "Total Maximum Daily Load" is defined as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint source and background conditions; see 40 C.F.R. §130.2(i)[1]. TMDLs also include a Margin of Safety (MOS), a required component that acknowledges and counteracts uncertainty.

The New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) conducted a water quality survey at Bluewater Lake in west-central New Mexico in 2011. Water quality monitoring stations were located in the lake itself, as well as upstream and downstream, to evaluate ambient water quality conditions and the impact of tributaries. As a result of assessing data generated during these monitoring efforts, the following impairment of water quality standards was found:

- Plant Nutrients

This TMDL addresses the above impairment and is summarized in **Table ES-1**. If additional impairments in the reservoir are found, subsequent TMDLs or TMDL alternatives will be developed for those impairments. The SWQB has previously prepared nutrient and temperature TMDLs for the segments of Bluewater Creek that are immediately upstream and downstream of Bluewater Lake, approved in 2007 (NMED/SWQB 2007). Bluewater Creek is the major tributary, as well as receiving water, of Bluewater Lake.

The SWQB's Monitoring, Assessment, and Standards Section (MASS) is scheduled to collect water quality data in the Rio San Jose watershed in 2019 and 2020. TMDLs will be re-examined and potentially revised at those times as this document is considered to be an evolving management plan. In the event that the new data indicate that the targets used in the analyses are not appropriate and/or if new standards are adopted, the TMDLs will be adjusted accordingly. When attainment of applicable water quality standards has been achieved, the impairment will be removed from New Mexico's CWA §303(d) List of Impaired Waters (§303(d) List).

SWQB's Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans (WBP) to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the WBP will be done with participation of all interested and affected parties. Further information on WBPs is in Section 5.

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

ES-1 Summary for Bluewater Lake

New Mexico Standards Segment	20.6.4.135 NMAC	
Waterbody Identifier	NM-2107.B_00	
Segment Area	609 acres	
Parameters of Concern	Plant Nutrients – Total Phosphorus and Total Nitrogen	
Uses Affected	Coldwater Aquatic Life	
Geographic Location	Rio San Jose USGS Hydrologic Unit Code13020207	
Scope/size of Watershed	201 square miles	
Land Type	Arizona/New Mexico Mountains (Ecoregion 23e)	
Probable Sources*	Drought-related impacts, gravel or dirt roads, grazing, low water crossings, stream channel incision	
IR Category	5/5A	
Priority Ranking	High	
	Total Phosphorus (lbs/day)	Total Nitrogen (lbs/day)
WLA	0	0
LA	809	7,283
MOS	143	1,285
TMDL	952	8,568

* Additional Probable Sources noted during 2015 field visit are listed in **Table 3.12**

1.0 INTRODUCTION

Under Section (§) 303 of the CWA, individual states establish water quality standards, which are subject to the approval of the U.S. Environmental Protection Agency (USEPA). Under §303(d)(1) of the CWA (33 U.S.C. §1313(d)[2]), states are required to develop a list of waters within a state that are impaired and establish a TMDL for each pollutant. A TMDL is defined as "*a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standard including consideration of existing pollutant loads and reasonably foreseeable increases in pollutant loads* (USEPA 1999)." A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standard. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in the Code of Federal Regulations (40 C.F.R. §130[3]) as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint sources and natural background conditions, and include a margin of safety (MOS). This document provides plant nutrient TMDLs for an assessment unit (AU) in the Rio San Jose that has been determined to be impaired based on a comparison of measured concentrations and conditions with water quality standards.

This document is divided into several sections. Section 2.0 provides background information on the Rio San Jose and Bluewater Lake, including water quality survey and water quality standards information. Section 3.0 presents TMDLs developed for nutrients. Pursuant to CWA §106(e)(1), Section 4.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 5.0 discusses implementation of the TMDL and the relationship between it and other management strategies; Section 6.0 discusses assurance; Section 7.0 discusses public participation in the TMDL process; and Section 8.0 provides references for this document. Appendices are referenced throughout and are found at the end of the document.

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

2.0 BACKGROUND

2.1 Rio San Jose

2.1.1 Physical Setting

The Rio San Jose is a tributary to the Rio Puerco, which is a tributary to the Middle Rio Grande. The Rio San Jose watershed, HUC13020207, is located primarily in Cibola and McKinley Counties, and smaller areas in Valencia, Bernalillo, Socorro, and Catron Counties (**Figure 2.1)**. The watershed is sparsely populated and dominated by shrubland, forest, and grasslands. The Rio San Jose watershed is located at the southern end of the Colorado Plateau Physiographic Province and is characterized by relatively flat-lying sedimentary rocks and igneous rocks that both pre-date and post-date sedimentary deposition.

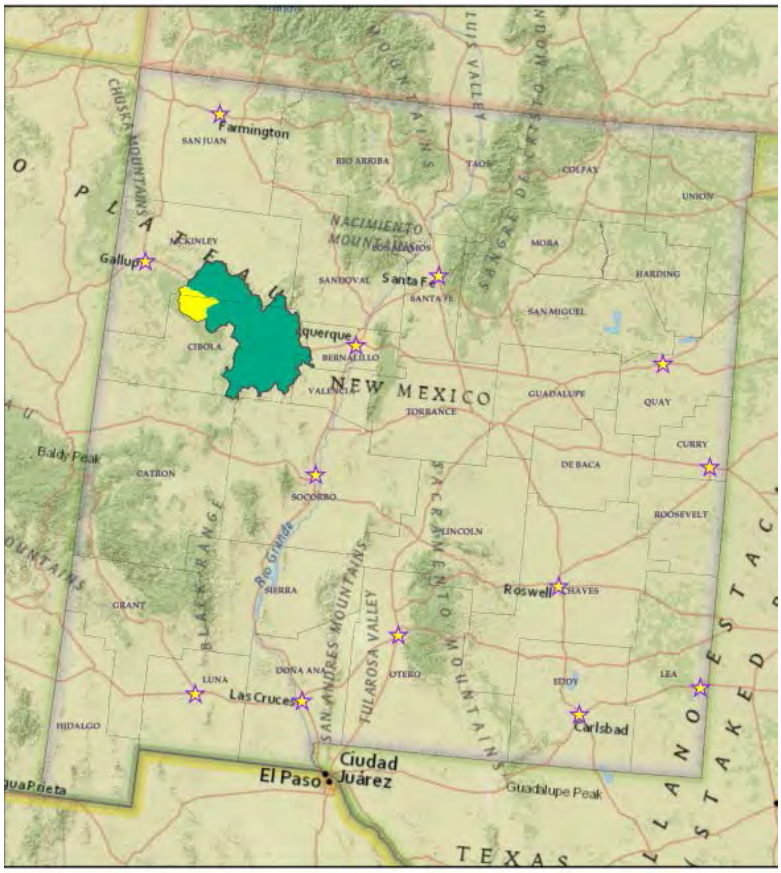

Figure 2.1 General location of the Rio San Jose watershed

Several species in this watershed are listed as either threatened or endangered by state and/or federal agencies (**Table 2.1)**. Federally listed threatened species in HUC 13020207 include the Mexican Spotted Owl (*Strix occidentalis lucida*) and Pecos Sunflower (*Helianthus paradoxus*). The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is federally listed as endangered. Species listed by the State as threatened include the American Peregrine Falcon (*Falco peregrinus anatum*) and the Spotted Bat (*Euderma maculatum*). Species listed as endangered by the State include the aforementioned flycatcher and sunflower, in addition to Parish's Alkali Grass (*Puccinellia parishii*) (NMCIRC 2015).

Table 2.1 Threatened and Endangered Species in HUC 13020207

Lister	Threatened	Endangered
U.S. Fish and Wildlife Service	Mexican Spotted Owl Pecos Sunflower	Southwestern Willow Flycatcher
State of New Mexico	American Peregrine Falcon Spotted Bat	Southwestern Willow Flycatcher Pecos Sunflower Parish's Alkali Grass

2.1.2 Water Quality Surveys

The most recent SWQB water quality survey that included water quality stations in the Rio San Jose was in 2011. This survey encompassed the greater Rio Puerco and Zuni watersheds, including Bluewater Creek. Bluewater Lake was also surveyed in 2011.

2.2 Bluewater Lake

2.2.1 Physical Setting

Bluewater Lake is a manmade reservoir dammed in 1925 by the Bluewater-Toltec Irrigation District. The dam is an 80 ft tall concrete arch structure located in the Las Tuces Valley of northwestern New Mexico, near the Continental Divide and west of Grants (EMNRD 2015). The reservoir is on the northern edge of the Zuni Mountains in a landscape dominated by mesas and cuestas; it is the dominant feature of the Bluewater Lake State Park. The lake is located in Ecoregion 23e, Conifer Woodlands and Savannas, and the contributing watershed has portions lying in 23c, Montane Conifer Forests (Griffith *et al*. 2006).

The Zuni Mountains are an uplifted core of Precambrian granite and metamorphic rocks, surrounded by Permian sandstone and the Triassic Chinle group (**Figure 2.2)**. The range was formed through uplift of the Paleoproterozoic basement and more recent sedimentary rocks during the Laramide orogeny, approximately 75 MA. Bluewater Lake is located along the north-south trending Bluewater fault zone in Triassic, Permian, and recent units. More specifically, the San Andres Formation bounds the lake to the east, the Bluewater Creek, Moenkopi, and Petrified Forest formations are to the north, and the Glorieta formation and recent valley slope alluvium and floodplain deposits lie to the south and west of the lake (NMBGMR 1998).

Soils in the watershed are typically well-drained with the exception of some units found on the valley floor. Parent material for modern soils is typically bedrock or the alluvium and colluvium derived from it. Bedrock varies in depth from surface outcrops to greater than 60 in below the surface, and where soils are well developed, they are typically loams with varying sand and clay content (Soil Survey Staff 2015).

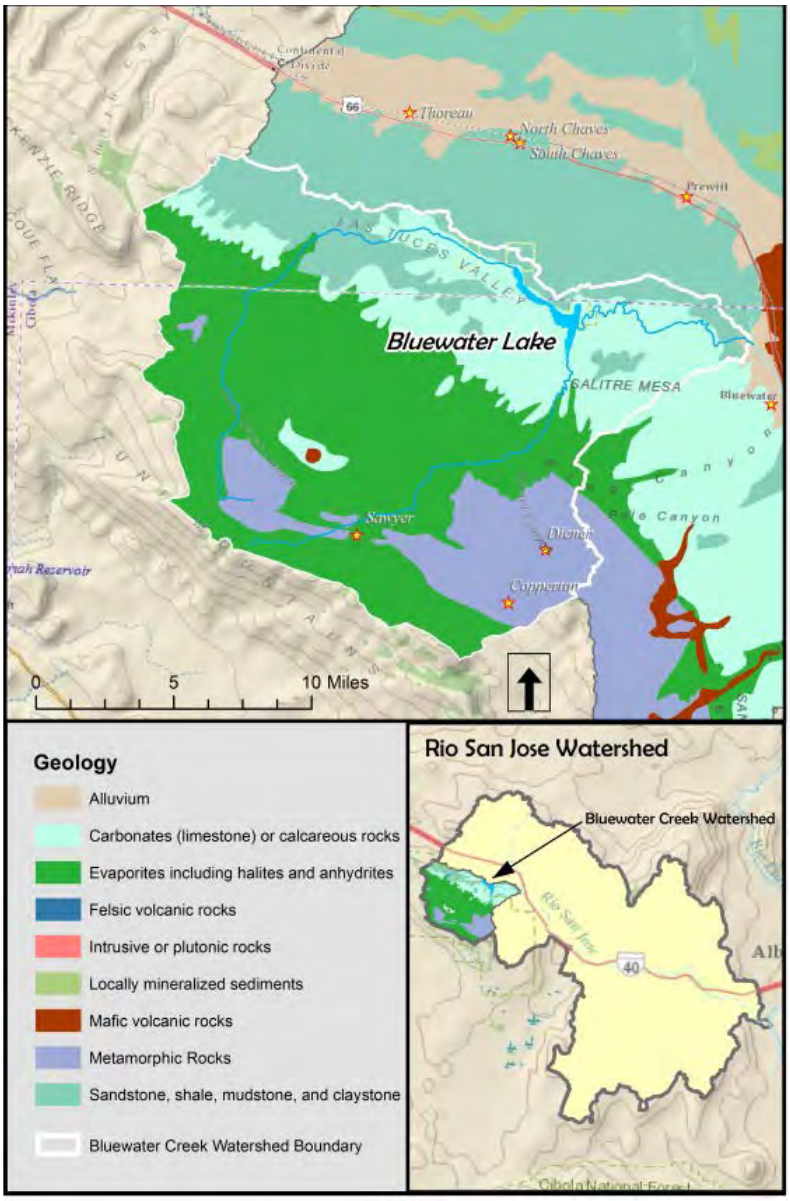

Figure 2.2 Geologic Map of Bluewater Lake vicinity

The reservoir is approximately 3,020 acres at the spillway, and has a storage capacity of 38,500 acre-feet. The reservoir drains approximately 201 sq miles in the Zuni Mountains. Runoff from stormwater and snowmelt is inconsistent and typically low, resulting in limited input to the lake. The Bluewater-Toltec Irrigation District maintains the lake at a minimum pool of 320 surface acres, corresponding to an elevation of 7,365 feet and approximately 3,500 acre-feet, although the park's management plan maintains that the reservoir's average surface area is 1,500 acres, or storage of 16,000 acre-feet. Below the minimum pool, the State Game Commission maintains water rights for conservation. Above the minimum pool, the Bluewater-Toltec Irrigation District maintains the water rights for irrigation purposes (EMNRD 2015). As of October 14, 2015, the U.S. Geological Survey (USGS) estimates that there are approximately 2,140 acre-feet in reservoir storage, well below average, and the surface elevation is 7,361 feet. According to park staff, the reservoir is below the required conservation pool and no releases are

occurring at the time of this draft. Releases are not tracked by the state park, and efforts to contact the Bluewater-Toltec Irrigation District were unsuccessful. Therefore, any discharge information must be tied to the inactive USGS gage downstream of the dam, the active gage on the reservoir itself, or through second-hand accounts.

2.2.2 Land Use and Ownership

Bluewater Lake is located in a state park, although land surrounding the lake itself is held by a number of different entities. Land uses in the area include recreation, including camping, boating, and fishing, and livestock grazing (**Figure 2.3)**, and cover in the watershed is primarily forest land and range land. Ownership in the watershed is varied, although it is primarily private and state-held immediately surrounding the reservoir, with larger areas of USFS and tribal lands in the larger watershed (**Figure 2.4)**.

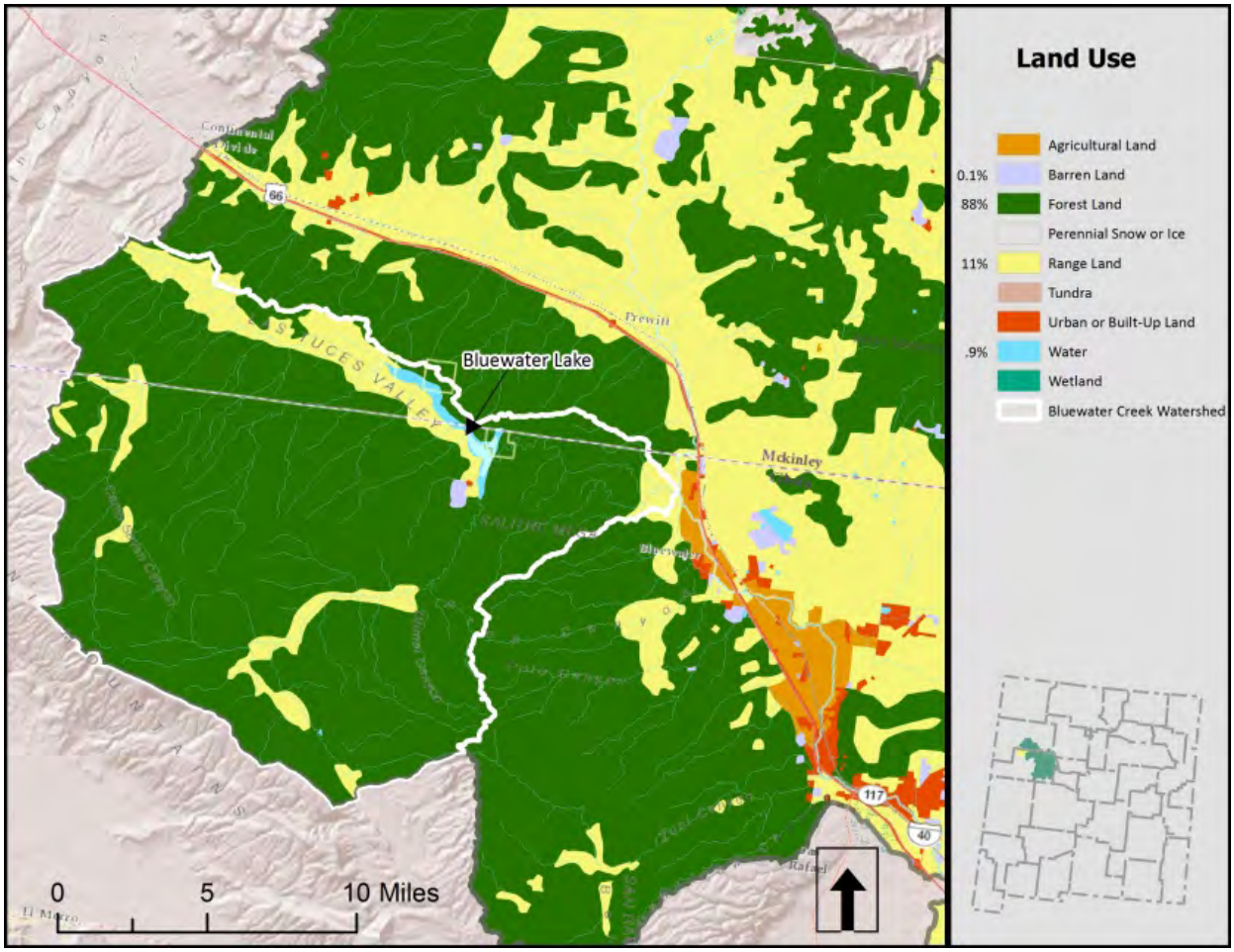

Figure 2.3 Land use in Bluewater Lake vicinity

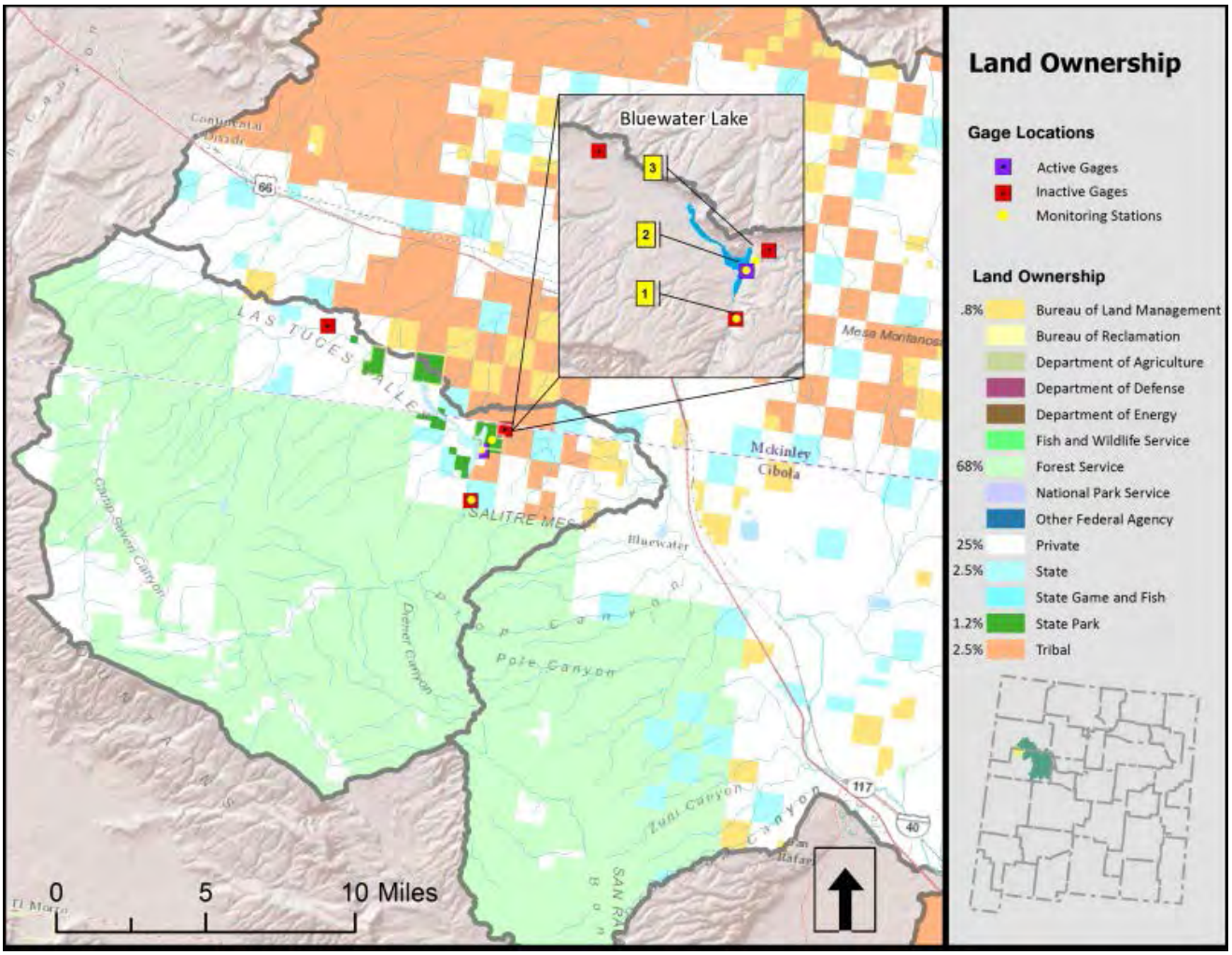

Figure 2.4 Land Ownership in Bluewater Lake vicinity

The Zuni Mountain Landscape Restoration Project received $7.6 million in funding from the USFS Collaborative Forest Landscape Restoration Program. Cibola National Forest is partnered with several stakeholders, including the National Wild Turkey Federation, the Forest Stewards Guild, and the Wood Industries Network to complete work. The project area does not include Bluewater Lake, but does encompass the majority of the Bluewater Creek watershed upstream of the reservoir, and restoration activities are aimed at reducing fire risk and restoring the ecosystem structure, composition, and function; increasing forest resiliency; and stabilizing the local restoration-oriented businesses. Treatments include mechanical thinning, prescribed burns, and potentially meadow restoration (Forest Stewards Guild 2015).

2.2.3 Water Quality Surveys

SWQB performed intensive water quality sampling at Bluewater Lake and immediate upstream and downstream AUs during 2011. One station was located on the reservoir itself, and one station each was located on the upstream and downstream AUs. See **Figure 2.4** and **Table 2.2** for station location and identification. One additional nutrient sample was collected in May 2014 at the Bluewater Lake at Dam and Bluewater Creek below Dam stations.

Table 2.2 Stations of Interest – Bluewater Lake

Number	Station Name
1	Bluewater Creek above Bluewater Lake at USGS Gage 8341300 (Inlet)
2	Bluewater Lake at Dam
3	Bluewater Creek below Dam (Outlet)

2.2.4 Water Quality Standards and Designated Uses

Water quality standards (WQS) for Bluewater Lake are set forth in section 20.6.4.135 of the *Standards for Interstate and Intrastate Surface Waters*, 20.6.4 New Mexico Administrative Code (NMAC), as amended through June 5, 2013 (NMAC 2013)[4]. These standards have been approved by USEPA for CWA purposes. The following is the relevant NMAC code section:

> **20.6.4.135 RIO GRANDE BASIN – Bluewater lake**
>
> **A. Designated Uses:** coldwater aquatic life, irrigation, domestic water supply, primary contact, livestock watering and wildlife habitat.
>
> **B. Criteria:** the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses except that the following segment-specific criteria apply: phosphorus (unfiltered sample) 0.1 mg/L or less; the monthly geometric mean of *E. coli* bacteria 126 cfu/100mL or less, single sample 235cfu/100mL or less.

NM's *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC)[5] establish surface water quality standards that consist of designated uses of surface waters of the State, the water quality criteria necessary to protect the uses, and an antidegradation policy. NM's antidegradation policy, which is based on the requirements of 40 CFR Part 131.12[6], describes how waters are to be protected from degradation (Subsection A of 20.6.4.8 NMAC) while the *Antidegradation Policy Implementation Procedures* establish the process for implementing the antidegradation policy (NMED/SWQB, 2011). At a minimum, the policy mandates that "the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state." In addition, whether or not a segment is impaired, the State's antidegradation policy requirements, as detailed in the *Antidegradation Policy Implementation Procedures* (NMED/SWQB, 2011) must be met. TMDLs are consistent with the policy because implementation of a TMDL restores water quality so that existing uses are protected and water quality criteria are achieved. The *Antidegradation Policy Implementation Procedure* can be found in Appendix A of the *Statewide Water Quality Management Plan and Continuing Planning Process* document[7].

2.3 Hydrologic Conditions

There is one active gaging station on Bluewater Lake, USGS 08341400 Bluewater Lake near Bluewater, NM which records reservoir elevation and reservoir storage. The period of record for reservoir storage is from 1988 to present; the period of record for elevation is from 2007 to present. There are additional gages on Bluewater Creek upstream and downstream of the reservoir, although neither of these gages is presently active. Inactive gages can provide information on basic hydrologic function, presuming that conditions have not changed substantially since the period of record. USGS Gage 08341300 Bluewater

[4] http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0004.pdf
[5] http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0004.pdf
[6] http://www.gpo.gov/fdsys/pkg/CFR-2002-title40-vol18/pdf/CFR-2002-title40-vol18.pdf
[7] http://www.nmenv.state.nm.us/swqb/Planning/WQMP-CPP/

Creek above Bluewater Dam Bluewater, NM has a period of record from 1989 to 2001, and USGS Gage 08341500 Bluewater Creek below Bluewater Dam has a period of record from 1951 to 2001. Also inactive, USGS 08341365 Cottonwood Creek near Thoreau, NM has a period of record from 1989 to 2001. Gage location is represented in **Figure 2.4**.

Water surface elevation and storage data from the Bluewater Lake gage are represented in **Figures 2.5 and 2.6**.

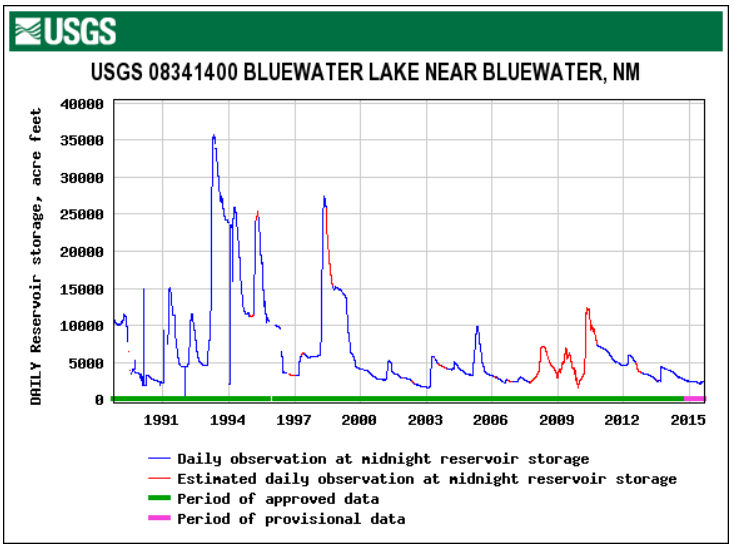

Figure 2.5 Daily Reservoir Storage at Bluewater Lake – 1989- present

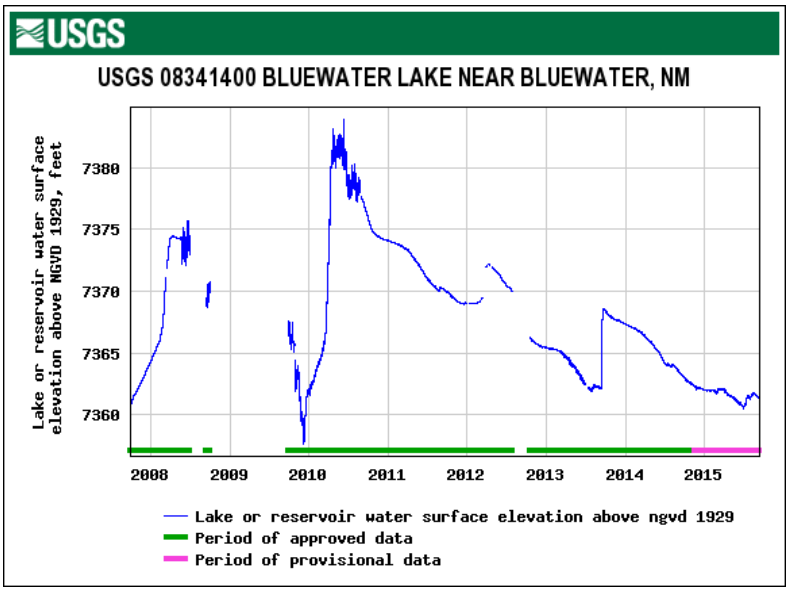

Figure 2.6 Daily Surface Water Elevation at Bluewater Lake – 2008-present

Evaporation from Bluewater Lake is high as a result of its ecoregional location. In addition, there is low input to the reservoir due to low precipitation and overall snowmelt. As is evident by the gage on Bluewater Creek above Bluewater Dam (**Figure 2.7)**, as well as a recent site visit, the creek's input is lower than would be expected to maintain the reservoir at average levels. In typical years, the creek's perennial reach ends prior to reaching the reservoir. The inlet could be characterized as a wide marshy area.

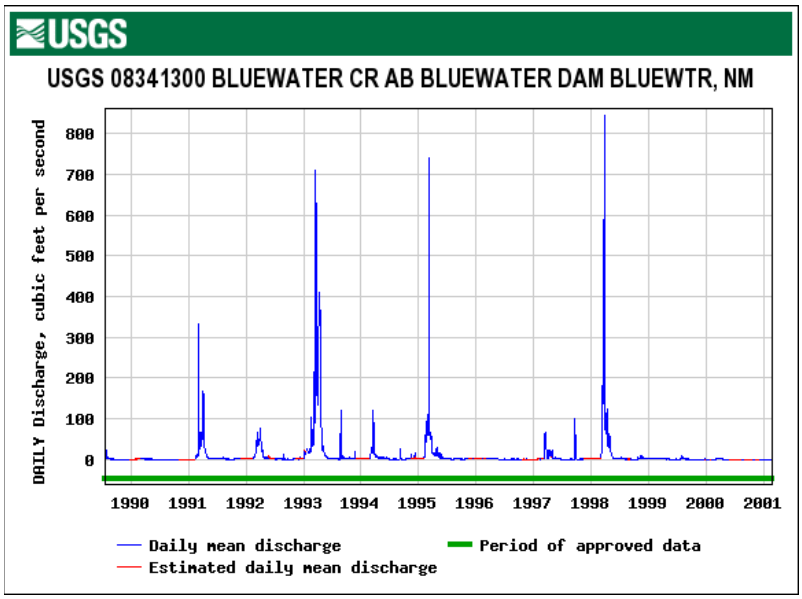

Figure 2.7 Bluewater Creek above Bluewater Dam – 1989-2001

It is not clear how often discharge from Cottonwood Creek reaches Bluewater Lake, although it is unlikely to be a substantial contributor based on its clearly ephemeral nature (**Figure 2.8)**. A site visit in 2015 confirmed that Cottonwood Creek is not a regular input of water or pollutants to the reservoir based on field observations of channel characteristics and gage data.

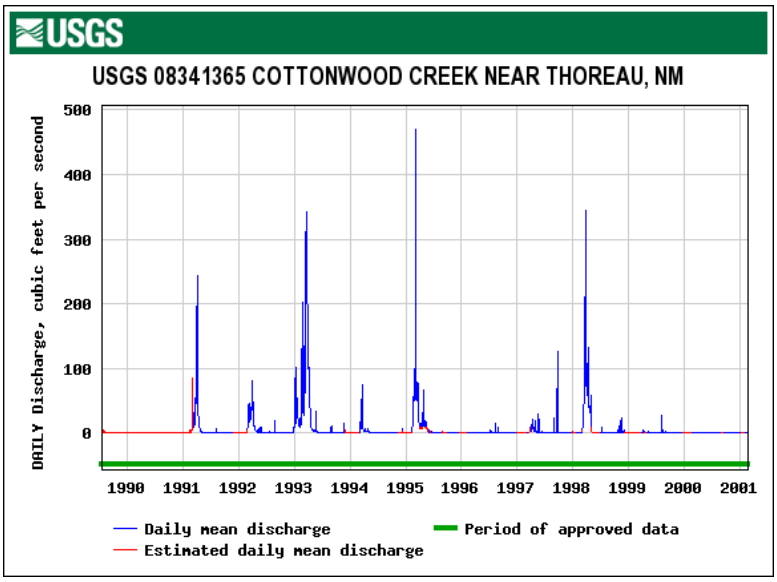

Figure 2.8 Cottonwood Creek near Thoreau, NM – 1989-2001

3.0 PLANT NUTRIENTS

Nutrient assessments for Bluewater Lake were included in the 2014-2016 Clean Water Act Integrated §303(d)/§305(b) List of Assessed Waters (NMED/SWQB 2014). Assessment of water quality data indicated total nitrogen impairment, but did not identify exceedences of the segment-specific New Mexico water quality total phosphorus (TP) criterion of 0.1 mg/L for TP in the reservoir. However, the following TP TMDL was developed as a protective TMDL, to work in parallel with the total nitrogen (TN) TMDL to effect water quality improvement in the reservoir.

Nitrogen and phosphorus are essential for proper functioning of aquatic ecosystems. However, nuisance levels of algae and other aquatic vegetation can develop rapidly in response to nutrient enrichment when other factors (e.g., light, temperature, substrate) are not limiting.

3.1 Target Loading Capacity

Among others, there are two potential causes of nutrient enrichment in a given stream upon which this document will focus: excessive total nitrogen (TN) and/or total phosphorus (TP). Nutrient criteria, whether numeric or narrative, control the excessive growth of attached algae and higher aquatic plants. Controlling algae and plant growth preserves 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.

While conceptually there may be a number of possible combinations of TN and TP concentrations that are protective of water quality, the application of simple chemical limitation concepts to a complex biologic system to determine these combinations, where the goal is to control the excessive growth of attached algae and higher aquatic plants, is challenging. One of the primary reasons for this is that different species of algae and higher aquatic plants will have different nutritional needs. Some species may exhibit nitrogen limitation while others will exhibit phosphorous limitation or co-limitation by both nutrients. Because of the diversity of nutritional needs amongst organisms, numeric thresholds for both TN and TP are required to preserve the aesthetic and ecologic characteristics along a waterway. Focusing on one nutrient or trading a decrease in one for an increase in the other may simply favor a particular species without achieving water quality standards (USEPA 2015).

A segment-specific TP criterion of 0.1 mg/L in 20.6.4.135 NMAC applies to Bluewater Lake. As described below, TP is a component of the plant nutrient assessment process. For this TMDL, the target values are based on the numeric criterion for TP and numeric translators for the narrative criterion for TN as 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 for Lakes and Reservoirs* (NMED/SWQB 2013) to assist in meeting these challenges. It addresses both cause (TN and TP) and response variables (dissolved oxygen (DO), periphyton chlorophyll *a*, and percent cyanobacteria) and uses a weight-of-evidence approach to determine impairment. Water quality assessments for nutrients are based on quantitative measurements of these causal and response indicators. If these measurements exceed the numeric nutrient threshold values, indicate excessive primary production (e.g., large DO and pH fluctuation and/or high chlorophyll *a* concentration), and/or demonstrate an unhealthy biological community (e.g., high cyanobacteria counts), the waterbody is considered to be impaired.

Phosphorous is found in water primarily as orthophosphate. In contrast nitrogen may be found as several dissolved species, all of which must be considered in nutrient loading. Total nitrogen is defined as the sum of Nitrate+Nitrite (N+N), and Total Kjeldahl Nitrogen (TKN). At the present time, there is no EPA-approved method to test for total nitrogen, however a combination of EPA methods 351.2 (TKN) and 353.2 (N+N) is appropriate for estimating total nitrogen (APHA 1989). The applicable threshold values for cause (phosphorus and nitrogen) and response (DO, pH, chlorophyll *a*, and cyanobacteria) variables in Bluewater Lake are shown in **Table 3.1**. These threshold values were used for water quality assessments (NMED/SWQB 2015) and as a starting point for TMDL development.

Table 3.1 Applicable nutrient-related thresholds for Bluewater Lake

Ecoregion	23-Arizona/New Mexico Mountains
WQS segment	20.6.4.135
Aquatic Life Use	Coldwater
Total Phosphorus	0.1 mg/L[(a)]
Total Nitrogen	0.9 mg/L[(b)]
Dissolved Oxygen	6.0 mg/L
Chlorophyll *a*	≤ 7.5 μg/cm^2
Cyanobacteria	≤ 38%

Notes: *(a)* segment-specific TP criteria in 20.6.4.135 NMAC
(b) TN threshold value is based on the value identified for coldwater lakes in the 2014-2016 Assessment Protocol.

The target value for the phosphorus TMDL is based on the segment-specific criteria in 20.6.4.135 NMAC: 0.1 mg/L or less. There were no exceedences of this criterion during the 2011 SWQB water quality survey; TP data are included in **Table 3.2**.

There were 2/4 of exceedences of the 0.9 mg/L nitrogen threshold during the 2011 SWQB water quality survey; nitrogen data are included in **Table 3.3**

Table 3.2 Observed Phosphorus - 2011

Station	April 2011 (mg/L)	June 2011 (mg/L)	August 2011 (mg/L)	May 2014 (mg/L)
Bluewater Lake at Dam	0.035	0.029	0.094	0.017
Bluewater Creek above Bluewater Lake (Inlet)	0.034	MDP	MDP	MDP
Bluewater Creek below Dam (Outlet)	0.023	MDP	0.056	0.013

Notes: MDP = Missing Data Point

Table 3.3 Observed Nitrogen - 2011

Station	April 2011 (mg/L)	June 2011 (mg/L)	August 2011 (mg/L)	May 2014 (mg/L)
Bluewater Lake at Dam	0.69	*1.04*	*1.62*	0.53
Bluewater Creek above Bluewater Lake (Inlet)	0.59	.35	.78	.21
Bluewater Creek below Dam (Outlet)	0.3	.51	0.3	0.3

Notes: MDP = Missing Data Point

Italics font indicates an exceedence of threshold

3.2 TMDL Development

TMDLs are calculated for a specific flow, and nutrient concentrations can vary as a function of flow. Determining the critical flow in a stream is typically done using the 4Q3 of an AU. The 4Q3 is the four consecutive day low flow that occurs with a frequency of once in three years. However, determining a critical flow in a reservoir is a less straightforward proposition. An attempt was made to develop this TMDL with the support of the steady-state reservoir modeling program BATHTUB. BATHTUB was developed and is maintained by the US Army Corps of Engineers for modeling nutrients in lakes and reservoirs. Unfortunately the conditions in the reservoir, both historically and at present, are not appropriate to meet the model assumptions. Based on an estimated hydraulic retention time of 5.8 years (USEPA 1975), the assumed nutrient loading, and the limited output from the reservoir, conditions likely exist to contradict the steady-state assumptions of the model, creating serious issues with its application to

the reservoir (Walker 2006). The underlying equations of BATHTUB were also investigated for their use in developing a target concentration for TN. However, the calculated concentrations were substantially lower than the ecoregional thresholds identified in the Assessment Protocols, and further research indicates that BATHTUB's nitrogen modeling capabilities are not particularly robust without extensive calibration (MPCA 2011).

3.3 Target Loading Capacity

As noted in Table 3.1, the target value for the phosphorus TMDL is based on the segment-specific criteria in 20.6.4.135 NMAC: 0.1 mg/L or less. The target value for the nitrogen TMDL is based on the threshold identified in the SWQB Assessment Protocols of 0.9 mg/L (NMED/SWQB 2013). Exceedences are listed in **Tables 3.4 and 3.5**. There were no exceedences of the phosphorus criteria during the survey; there were 2 exceedences of the nitrogen threshold during the survey. In addition to the TN and TP measurements, the response variable chlorophyll-a indicates impairment. Cyanobacteria and DO concentration measurements did not exceed the applicable thresholds.

Table 3.4 Causal Variable Exceedences of Applicable Water Quality Criteria

Parameter	Associated Criterion/Threshold	Exceedence Ratio[(a)]
Total Phosphorus	0.1 mg/L	0/4
Total Nitrogen	0.9 mg/L	2/4

(a) Exceedence ratio is the number of exceedences to the total number of samples.

Table 3.5 Response Variable Exceedences of Applicable Water Quality Criteria

Parameter	Associated Criterion/Threshold	Exceedence Ratio
Secchi Depth[(a)]	2 m	0/5
Chlorophyll-a	≤ 7.5 µg/L	2/4
Cyanobacteria	≤ 38%	1/5
DO Concentration	See Assessment Protocols	N/A[(b)]

(a) Secchi depth is not used in the current Assessment Protocol; however, it was in use at the time that impairment of Bluewater Lake was determined.

(b) N/A = Not Applicable

3.4 Flow

The critical flow condition for a New Mexico TMDL is typically based on the 4-day, 3-year low-flow frequency (4Q3) as a result of language included in the state water quality standards. However, determining the critical flow condition for a lake is more complex. During the survey in 2011, reservoir levels were declining from average historical levels, and ranged from a volume of 6,530 acre-feet in April to 4,620 acre-feet in November. At the time of this draft, the primary input to Bluewater Lake, namely Bluewater Creek, rarely flows to the lake. The reservoir itself is below the conservation pool (see Section 2.2.1), and the only outputs are due to seepage from the dam.

Rather than using a specific flow to determine the TMDL for Bluewater Lake, the volume of the lake at its conservation pool was used in the calculations. Loadings were developed for the growing period when the reservoir is at conservation pool. Because conservation pool suggests there will be negligible outflow from the dam in the form of seepage, as well as inconsistent and brief inflow in the form of input from Bluewater Creek, stormwater runoff, and potentially Cottonwood Creek, the loading represents the

amount allowable *in* the reservoir, rather than the amount allowed to *enter* the reservoir via the above vectors. Target nutrient loads for Bluewater Lake are located in **Table 3.6**. Nutrient TMDLs for both the upstream and downstream Bluewater Creek AUs were adopted into the New Mexico Water Quality Management Plan (NM WQMP) and approved by USEPA Region 6 in 2007 (NMED 2007), and the upstream AU of Bluewater Creek was delisted for nutrients on the 2014-2016 Integrated List (NMED 2014).

Table 3.6 Target/TMDL Loads

Parameter	Reservoir Volume (acre-feet)	Criteria (mg/L)	Unit Conversion Factor[(a)]	TMDL (lbs/day)
Total Phosphorus	3,500	0.1	2.72	952
Total Nitrogen	3,500	0.9	2.72	8,568

(a) Details can be found in Appendix A. The conversion factor converts volume and concentration into loading units; in this case, lbs/day.

The measured loads for total phosphorus and total nitrogen were calculated in the same manner as the target loads. The reservoir volume at the time of the 2011 sampling was used instead of the conservation pool volume, and the arithmetic mean of the collected data was substituted for the numeric targets in **Equation 3.1**. The reservoir volume is based on the USGS gage data between April and August 2011, which correlates with the dates of the assessed samples; the arithmetic mean of storage was utilized. The same unit conversion factor was utilized. The calculated measured loads are in **Table 3.7**.

Equation 3.1 $$Reservoir\ Volume\ \times Criteria/Threshold \times Unit\ Conversion\ Factor = Target\ Loading\ Capacity\ (TMDL)$$

Table 3.7 Measured Loads

Parameter	Reservoir Volume (acre-feet)	Arithmetic Mean Concentration (mg/L)	Unit Conversion Factor	Measured Load (lbs/day)
Total Phosphorus	5,667	0.04	2.72	674
Total Nitrogen	5,667	1.33[(b)]	2.72	20,501

(a) Arithmetic mean concentration comprises SWQB TP and TN data collected in the reservoir in 2011 and 2014
(b) TN mean concentration calculated using exceedences

In order to make the target loads and the measured loads comparable since they have been calculated based on different reservoir volumes, a per acre-foot loading was developed for the target load, then used to calculate the measured load per acre-foot. Per acre-foot loadings can be found in **Tables 3.8 and 3.9**. The calculated percent reductions are in **Table 3.10**. **Equation 3.2** shows how this was calculated:

Equation 3.2 $$Target\ per\ acre - foot\ = \frac{Criteria \times Reservoir\ Volume \times Conversion\ Factor}{Reservoir\ Volume}$$

Table 3.8 Target Load per acre-foot

Parameter	Reservoir Volume (acre-foot)	Criteria (mg/L)	Conversion Factor	Target Load (lbs/acre-foot/day)
Total Phosphorus	3,500	0.1	2.72	0.27
Total Nitrogen	3,500	0.9	2.72	2.45

Table 3.9 Measured Load per acre-foot in 2011

Parameter	Reservoir Volume (acre-foot)	Arithmetic Mean Concentration (mg/L)	Unit Conversion Factor	Measured Load (lbs/acre-foot/day)
Total Phosphorus	5,667	0.04	2.72	0.11
Total Nitrogen	5,667	1.33[(a)]	2.72	3.62

(a) TN mean concentration calculated using exceedences

Table 3.10 Percent Reduction

Parameter	Target Load (lbs/acre-foot/day)	Measured Load (lbs/acre-foot/day	Percent Reduction[(a)]
Total Phosphorus	0.27	0.14	0%
Total Nitrogen	2.45	3.62	32.32%

(a) Percent reduction is the amount that the existing measured load must be reduced to achieve the TMDL and is calculated as follows: (Measured Load – TMDL) / Measured Load x 100

3.5 Waste Load Allocations and Load Allocations

3.5.1 Waste Load Allocation

There are no National Pollutant Discharge Elimination System (NPDES) permits in the Bluewater Lake watershed. As such, the waste load components of the nutrients TMDLs are zero.

3.5.2 Load Allocation

Since the WLA for Bluewater Lake is zero, the load allocation is simply the TMDL, less the MOS. The TMDL allocations are located in **Table 3.11**. Details on the MOS are located in Section 3.8

Table 3.11 TMDL Allocations

Parameter	Target Concentration	TMDL (lbs/day)	Load Allocation (lbs/day)	Waste Load Allocation (lbs/day)	Margin of Safety (15%) (lbs/day)
Total Phosphorus	0.1 mg/L	952	809	0	143
Total Nitrogen	0.9 mg/L	8,568	7,283	0	1,285

3.6 Identification and Description of Pollutant Sources

SWQB fieldwork typically includes an assessment of the probable sources of impairment. The approach includes solicitation of 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. However, a formal process has not been identified to assess the probable sources of impairment to lakes and reservoirs in New Mexico. In this case, an informal probable source survey of the lake was performed during a field visit in 2015. A draft probable source list is in **Table 3.12** and can be reviewed and modified, as necessary, with watershed group/stakeholder input during the TMDL public meeting and comment period.

Table 3.12 Probable Sources for Total Phosphorus and Total Nitrogen

Assessment Unit	Probable Sources
Bluewater Lake	Angling pressure, atmospheric deposition, campgrounds, drought-related impacts, gravel or dirt roads, low water crossing, rangeland grazing, waterfowl, wildlife other than waterfowl

Notes: Probable sources were identified during a 2015 site visit.
Probable sources are listed in alphabetical order.

3.7 Linkage between Water Quality and Pollutant Sources

Phosphorus and nitrogen generally drive the productivity of algae and macrophytes in aquatic ecosystems, therefore they are regarded as the primary limiting nutrients in freshwater. 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, including humans and livestock, and reabsorbed by plants or algae to restart the cycle (Nebel and Wright 2000).

The largest reservoir of nitrogen is the atmosphere. About 80% of the atmosphere by volume consists of nitrogen gas (N_2). Although nitrogen is plentiful in the environment, it is not readily available for biological uptake. Nitrogen gas must be converted to other forms, such as ammonia (NH_3 and NH_4^+), nitrate (NO_3^-), or nitrite (NO_2^-) before plants and animals can use it. Conversion of gaseous nitrogen into usable mineral forms occurs through three biologically mediated processes of the nitrogen cycle: nitrogen fixation, nitrification, and ammonification (USEPA 1999). Mineral forms of nitrogen can be taken up by plants and algae and incorporated into 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, continuing the cycle (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, there

are several mechanisms by which they can enter the cycle. They can be taken up by algae, macrophytes, and microorganisms either in the water column or 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.

As noted above, phosphorus and nitrogen are essential for proper functioning of ecosystems. However, excess nutrients can cause conditions unfavorable for the proper functioning of aquatic ecosystems. Nuisance levels of algae and other aquatic vegetation such as macrophytes can develop rapidly in response to nutrient enrichment when other factors (e.g., light, temperature, substrate) are not limiting. Unfortunately, the magnitude of nutrient concentration that constitutes an "excess" is difficult to determine and varies by ecoregion.

The effective impact of plant nutrients in a reservoir can vary as a function of water volume. As volume decreases through diversions and/or drought-related stressors, the reservoir 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 it because the hydrological pathways are shorter and have fewer obstacles than more distant land uses. During the growing season (i.e., in agricultural return flow) and in stormwater runoff, distant land uses can become hydrologically connected to the reservoir, thus transporting nutrients from the hillslopes to the stream during these time periods. Drought conditions in western New Mexico have resulted in a continued lowering of lake levels. This lowering of lake levels, combined with the high rates of evaporation associated with the ecoregion, is likely to have resulted in increased concentrations of nutrients in the reservoir.

In addition to agriculture, there are several other human-related activities that influence nutrient concentrations in waterbodies. Residential areas contribute nutrients from septic tanks, landscape maintenance, pet wastes, and backyard livestock (e.g., cattle, horses). Development contributes nutrients by disturbing the land and consequently increasing soil erosion, increasing the impervious area within the watershed, and by directly applying nutrients to the landscape. Near Bluewater Lake, recreational activities such as hiking, biking, camping, ATV use, and boating can also contribute nutrients to the reservoir by reducing plant cover, increasing soil erosion (e.g., trail network, streambank destabilization), increasing direct application of human waste, campfires and/or wildfires, improper waste disposal, and contaminated bilge water from boats. Camping and RV use is common on the beach of the reservoir and have been observed by MASS staff. Cattle and wild horses were also observed in very close proximity to the lake during a 2015 site visit; waste from these animals may be increasing the nutrient load to the reservoir.

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 natural sources are generally considered to represent background levels, although anthropogenic sources are common and can result in long-distance transport.

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 phosphorus and nitrogen released into gaining streams from aquifers contaminated by septic systems can contribute to eutrophic conditions in downstream reservoirs.

3.8 Margin of Safety

TMDLs should reflect a MOS based on the uncertainty or variability in the data, the 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 TMDLs, the MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors. Therefore, this MOS is the sum of the following two elements:

- Conservative Assumptions
  - Treating phosphorus and nitrogen as pollutants that do not readily degrade in the environment (i.e., persistent).
  - The TMDL is based on the conservation pool rather than the average volume, which provides a more conservative loading.
  - Calculating the measured load with the arithmetic mean rather than the geometric mean of the sample results produces a greater mean and therefore a more conservative load estimate (Muirhead 1903).
- Explicit Recognition of Potential Errors
  - Uncertainty exists in sampling nonpoint sources of pollution. A conservative MOS for this element is 5%.
  - Nutrient cycling in reservoirs is complex. A conservative MOS for this element is 10%.

3.9 Consideration of Seasonal Variability

Section 303(d)(1) of the CWA requires TMDLs to be "established at a level necessary to implement the applicable WQS with seasonal variation." Data used in the calculation of this TMDL were collected during the spring and summer to ensure coverage of seasonal variation within the growing season when nutrient concentrations are expected to be at their highest. Exceedences of nitrogen were observed during the growing season. The phosphorus criterion was not exceeded during the sampling events.

3.10 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2040. Bluewater Lake and its contributing watershed boundaries lie within Cibola and McKinley Counties. The Cibola County population is projected to grow by an estimated 18%, from approximately 27,000 in 2010 to approximately 32,000 in 2040. The McKinley County population is projected to decrease in population by less than 1%, from approximately 71,800 in 2010 to approximately 71,600 in 2040 (NMBBER 2012).

Estimates of future growth in Cibola and McKinley Counties are not anticipated to lead to a significant increase in nutrients that cannot be controlled with Best Management Practices (BMPs). However, it is imperative that BMPs continue to be utilized to improve road conditions and industrial activities covered

under the general permit. Any future growth would be considered part of the existing load allocation, assuming persistence of the hydrologic conditions used to develop these TMDLs.

3.11 Reasonable Assurance

In the cases of TMDLs developed for waters that contain both point and nonpoint sources of pollution, a state must provide reasonable assurance that nonpoint source load controls, in combination with reasonable WLAs, will result in achievement of expected load reductions. In the case of TMDLs containing only nonpoint sources of pollutant loading, similar to those contained in this document, this type of reasonable assurance is not required.

However, as stated below in Section 6.0, NMED and SWQB make every effort to provide these assurances. In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including federal, state, and private entities, NMED has established Memoranda of Understanding (MOU) with various federal agencies, in particular the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). A MOU has also been developed with other state agencies, such as the New Mexico Department of Transportation. These MOUs provide for coordination and consistency in dealing with nonpoint source issues.

4.0 MONITORING PLAN

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

The monitoring strategy establishes the methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments.

The SWQB was actively involved in national conversations with USEPA and the Association of Clean Water Administrators (ACWA) regarding the Long Term Vision for the Clean Water Act Section 303(d) program. The goals of the Vision are prioritization of watershed or waters for restoration and protection; assessment of priority waters; protection of unimpaired waters; alternative approaches to restoration and protection; engagement with the stakeholders; and integration with other CWA programs. As a result of the new Vision and goals, the monitoring and TMDL programs in New Mexico are being revised to allow a greater focus on state water quality priorities, encourage TMDL alternatives, and emphasize the value of protecting waterbodies that are not impaired. This document, referred to as a "Prioritization Framework," summarizes the prioritization of monitoring and TMDL activities in New Mexico. The list of monitoring and TMDL priorities through 2020 was determined using the process outlined in the Framework and is available on the SWQB TMDL website.

The SWQB utilizes a rotating basin system approach to water quality monitoring. In this system, a select number of watersheds are intensively monitored for two years with an established return frequency of approximately every eight years after the first year of monitoring. The next scheduled monitoring years for Bluewater Lake and the Rio San Jose watershed is 2019-2020. The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities that it may perform. This document, called the Quality Assurance Project Plan (QAPP), is updated and certified by USEPA Region 6 (NMED/SWQB 2013). In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program.

Prior to assessment, the SWQB requests data from outside entities. If that dataset meets all SWQB quality requirements, it will be used for assessment. Assessment of Bluewater Lake is based solely on SWQB data as no external data were received. Those reaches showing impacts and requiring a TMDL will be targeted for more intensive monitoring and examination. Both long-term and intensive field studies can contribute to the State's Integrated §303(d)/§305(b) listing process for waters requiring TMDLs.

5.0 IMPLEMENTATION OF TMDLS

5.1 Point Sources – NPDES permitting

There are no permitted point sources or municipal separate stormwater sewer systems in the Bluewater Lake watershed.

5.2 Nonpoint Sources – WBP and BMP Coordination

Public awareness and involvement will be crucial to the successful implementation of these plans and improved water quality. A Watershed Based Plan (WBP) is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies to reduce and prevent nonpoint source impacts to water quality. This long-range strategy will be instrumental in coordinating efforts to achieve water quality standards in the watershed. The WBP is essentially the Implementation Plan, or Phase II 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. A restoration project on the Bluewater Creek (Bluewater Lake to headwaters) AU was conducted by the Wild Earth Guardians in cooperation with the New Mexico State Land Office that included grazing exclosures and riparian vegetation plantings to address a temperature impairment. Effectiveness monitoring is ongoing by SWQB's Watershed Protection Section.

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

5.3 Clean Water Act §319(h) Funding

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

5.4 Other Funding Opportunities

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

Bureau of Land Management (BLM) has several programs in place to provide assistance to improve unpaved roads and grazing allotments.

The New Mexico Legislature appropriated $2.3 million in state funds for the River Stewardship Program during the 2014 Legislative Session and $1 million during the 2015 Special Session. The River Stewardship Program has the overall goal of addressing the root causes of poor water quality and stream habitat. Objectives of the River Stewardship Program include: "restoring or maintaining hydrology of streams and rivers to better handle overbank flows and thus reduce flooding downstream; enhancing economic benefits of healthy river systems such as improved opportunities to hunt, fish, float or view wildlife; and providing state matching funds required for federal CWA grants." A competitive request for proposals was conducted for 2014 funding and twelve projects located throughout the state were selected. Responsibility for the program is assigned to NMED, and SWQB staff administers the projects. SWQB expects to issue a request for proposals for the 2015 funding in early 2016.

6.0 APPLICABLE REGULATIONS AND STAKEHOLDER ASSURANCES

New Mexico's Water Quality Act (Act) authorizes the WQCC to "promulgate and publish regulations to prevent or abate water pollution in the state" (NMSA 1978, § 74-6-4 (E)) 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 nonpoint source (NPS) water pollution. The Water Quality Act also provides that:

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

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

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

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

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

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

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

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

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

7.0 PUBLIC PARTICIPATION

Public participation was solicited in development of this TMDL. The draft Bluewater Lake TMDL was first made available to the public for a 30-day comment period beginning January 20in , 2016 and ending on February 19, 2016. The draft document notice of availability was advertised via email distribution lists, webpage postings, and press releases to area newspapers. Public meetings will be held on February 2, 2016 at the Eichwald Center in Cuba, NM from 6-8pm and on February 4, 2016 at the Cibola County Courthouse in Grants, NM from 6-8pm.

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APPENDIX A

CONVERSION FACTORS

Volume

Volume (as acre-feet [af]) and concentration values (milligrams per liter [mg/L]) must be multiplied by a conversion factor in order to express the load in units "pounds per day." The following expressions detail how the conversion factor was determined.

TMDL Calculation:

$$Volume\ (af) \times Concentration\ \left(\frac{mg}{L}\right) \times CF\left(\frac{L - lb}{af - mg}\right) = Load\ (lbs)$$

Conversion Factor Derivation:

$$CF = \frac{1.233E6\ L}{af} \times \frac{1\ lb}{454{,}000\ mg} = 2.72\left(\frac{L - lb}{af - mg}\right)$$