WATER QUALITY SURVEY SUMMARY
FOR THE
LOWER RIO GRANDE
(FROM THE TEXAS BORDER TO ELEPHANT BUTTE DAM)
2004

Prepared by

Surface Water Quality Bureau
New Mexico Environment Department

April 2006

Acknowledgements

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ADB	Assessment Database
Al	Aluminum
C	Celsius
CWA	Clean Water Act
DO	Dissolved Oxygen
GIS	Geographic Information Systems
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
QAPP	Quality Assurance Project Plan
STORET	Storage and Retrieval System
SWQB	Surface Water Quality Bureau
USC	United States Code
EPA	United States Environmental Protection Agency

1.0 EXECUTIVE SUMMARY

Water quality surveys and assessments are completed in fulfillment of Section 106 of the Clean Water Act (CWA) [33 USC 1251 et seq.], *Work Program for Water Quality Management.* The purpose of the water quality survey is to collect water quality data to identify and prioritize water quality problems within a watershed and to evaluate the effectiveness of water quality based controls. The data collected as part of the survey are compared to current United States Environmental Protection Agency (EPA) approved water quality standards to determine if waterbodies throughout the watershed are supporting their designated uses, such as the fishable and swimmable goals set forth in the CWA §102(a).

Water Quality Survey Summary Reports focus on information and data collected by the New Mexico Environment Department's (NMED) Surface Water Quality Bureau (SWQB) pertaining to stream reaches that were identified as NOT meeting water quality standards. All data collected as part of a survey are available upon request to the SWQB and can be downloaded from EPA's computerized environmental data system known as STORET (http://www.epa.gov/storet/). The data collected as part of this study are later combined with all other readily available or submitted data that meet state quality assurance/quality control requirements to form the basis of designated use attainment determinations summarized in the biennial *State of New Mexico Integrated CWA §303(d)/§305(b) Report* (NMED/SWQB 2004a).

The only water quality impairments identified as part of this study of the Lower Rio Grande watershed between the Texas Border and Elephant Butte Reservoir were for bacteria with the Rio Grande being considered biologically impaired from the Texas Border to Percha Dam. Waters in the Rio Grande (Texas Border to Leasburg Dam) also fail Texas water quality standards for bacteria.

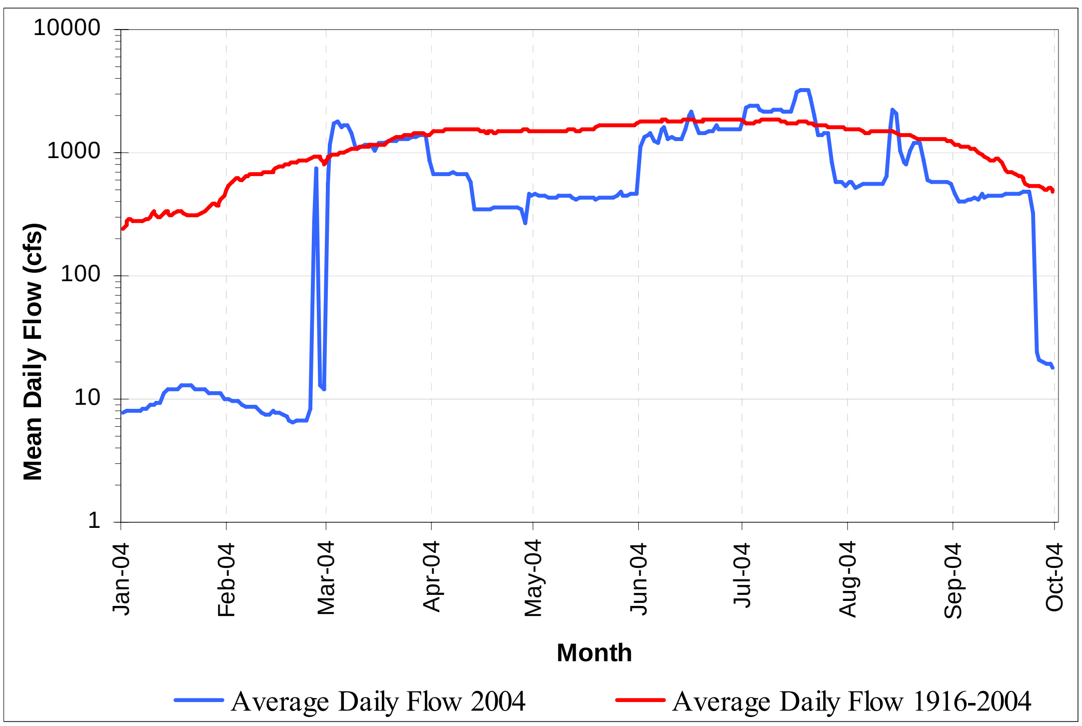
There were several exceedences for temperature along the Rio Grande (Texas Border to Leasburg Dam), however, with an exceedence ratio of 3%, there were not enough to be qualified as impaired due to temperature. This assessment unit also had gross alpha exceedences, but Radium Hot Springs, near Leasburg Dam State Park and Fort Selden, is the hottest, strongest natural radium springs in the world according to Lund (2002). The gross alpha exceedences were therefore attributed to this natural source since there are no industrial sources in the region.

No metal (total or dissolved) for which the there is a numeric criterion and no cyanide samples were found to be in exceedence of their respective water quality standards. Furthermore, no organic compounds (volatile or semi-volatile) were found above detection limits. Numerous volatile organic compounds (VOCs) were impossible to assess because the detection limits for the methods of analysis are above the assigned numeric criteria. According to SWQB's thermograph and sonde data, there were no criteria exceedences for pH or dissolved oxygen along the Lower Rio Grande. Furthermore, there were no ambient toxicity results that were significantly different from the endpoint observed in the laboratory control, thus indicating no toxic effects at any of the Lower Rio Grande sites that were sampled for toxicity.

2.0 INTRODUCTION

The Monitoring and Assessment Section of the SWQB conducted an intensive water quality survey of the Lower Rio Grande watershed between February 24, 2004 and November 18, 2004. Sample events were conducted to capture different portions of the hydrograph and were designed to coincide with the significant cyclical flow events of the river's historic flow regime (Fig. 1). The survey included the geographic area draining into a portion of the Rio Grande located from Elephant Butte Dam to the Texas Border. At this point, the Rio Grande drains approximately 39,600 square miles. Water quality was studied to characterize the streams and determine impairment. Water samples were analyzed for plant nutrients, ions, total and dissolved metals, and on a more limited basis bacteria, radionuclides, and anthropogenic organic compounds. In addition, field parameters such as dissolved oxygen, pH, and temperature were measured using a YSI multi-parameter Sonde. Water and sediment samples were collected on a limited basis from select sites and were tested for ambient toxicity.

Figure 1. Stream flow at Rio Grande below Elephant Butte Dam (USGS Gage 08361000)



The Spanish Empire's *entradas* for colonization and conversion first made their way up the Rio Grande led by explorer Alvar Nuñez Cabeza de Vaca in 1536. Wandering inland in search of the mythic "Seven Cities of Cibola," Cabeza de Vaca and his band never found gold, but they did uncover an unexpected surprise. The conquistadors and priests found Pueblo Indians irrigating and cultivating almost 30,000 acres of maize, beans, and calabashes. The Spanish arrival instigated a hundred year test of wills between the Europeans and the Pueblos. At the beginning of the seventeenth century, a mission established by fathers at El Paso del Norte (modern Juarez, Mexico) began schooling the Indians in more advanced methods of growing crops, aided by water provided by the Acequia Madre (Main Canal). In 1680, an Indian revolt drove the Spanish and Christianized Indians south from New Mexico to present-day Juarez, Mexico and Yselta, Texas. Don Diego de Vargas began the reconquest of New Mexico twelve years later and the Spanish influence over the Rio Grande was cemented into place (Autobee 1994).

In the following 150 years, up to 40,000 acres of land were tilled along the river. Around 1890, extensive settlement and irrigation development in southern Colorado, in addition to that which had already taken place in central New Mexico, depleted the normal summer flow of the Rio Grande, causing the river to be dry at El Paso for more frequent and longer periods. To resolve this issue, Elephant Butte Dam and Reservoir and its companion structure, Caballo Dam and Reservoir, were constructed and started storing water for irrigation purposes as early as 1916. The Lower Rio Grande offers a 247-day growing season where temperatures can soar to 111 degrees Fahrenheit (°F) and plummet to –16 °F. Two-thirds of the annual precipitation (7.8 inches) is packed into the late summer and early fall (La Mar 1984).

Historic and current land uses in the watershed include agriculture, recreation, and municipal related activities (Las Cruces, El Paso). Much of the land ownership adjacent to the river is private with the exception of state parks near Elephant Butte Lake, Caballo Lake, Percha Dam, and Leasburg Dam. The Bureau of Land Management and the State of New Mexico also own and manage sizable tracts of public lands in the upland portions of the watershed. The Lower Rio Grande watershed is located in Omernick Level III Ecoregion 24 (the Chihuahuan Deserts) contained within Aggregate Ecoregion 3 (the Xeric West). The elevation range for the various sampling sites in the survey was 3720' to 4500'. The surrounding geology was shaped by the Rio Grande Rift system. The Rio Grande Rift system is a series of grabens (fault-bounded basins) that extend from central Colorado southward through New Mexico and into western Texas and Mexico. Continental rifting was associated with crustal stretching and uplift of the southwestern United States. Grabens dropped down thousands of meters relative to adjacent uplifts, and alluvial sediment accumulated to great thickness in the basins. Intrusions and volcanic eruptions also took place within the rift valleys and throughout the surrounding region.

This water quality survey included 15 sampling sites (Figure 2 and Table 1). The sites were generally sampled 8-10 times, with one site being sampled only once and two other sites associated with the SWQB Elephant Butte 104(b)(3) Study being sampled 24 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 (i.e. irrigation, storage, and diversion of Rio Grande waters). Table 1 details location descriptions of sampling stations in each assessment unit (AU), station numbers, STORET identification codes, the current listings on the Integrated CWA §303(d)/§305(b) Report, and the associated water quality segment number. The reader should bear in mind that these are the listings for the Lower Rio Grande Watershed prior to the survey. The type of monitoring done at each site is summarized in Table 2. The survey and assessment was completed in fulfillment of work plan commitments of the *FY 2004 Section 106 Work Program for Water Quality Management* and was partially funded by a grant from the EPA.

Figure 2. Lower Rio Grande Study Area and Sampling Stations

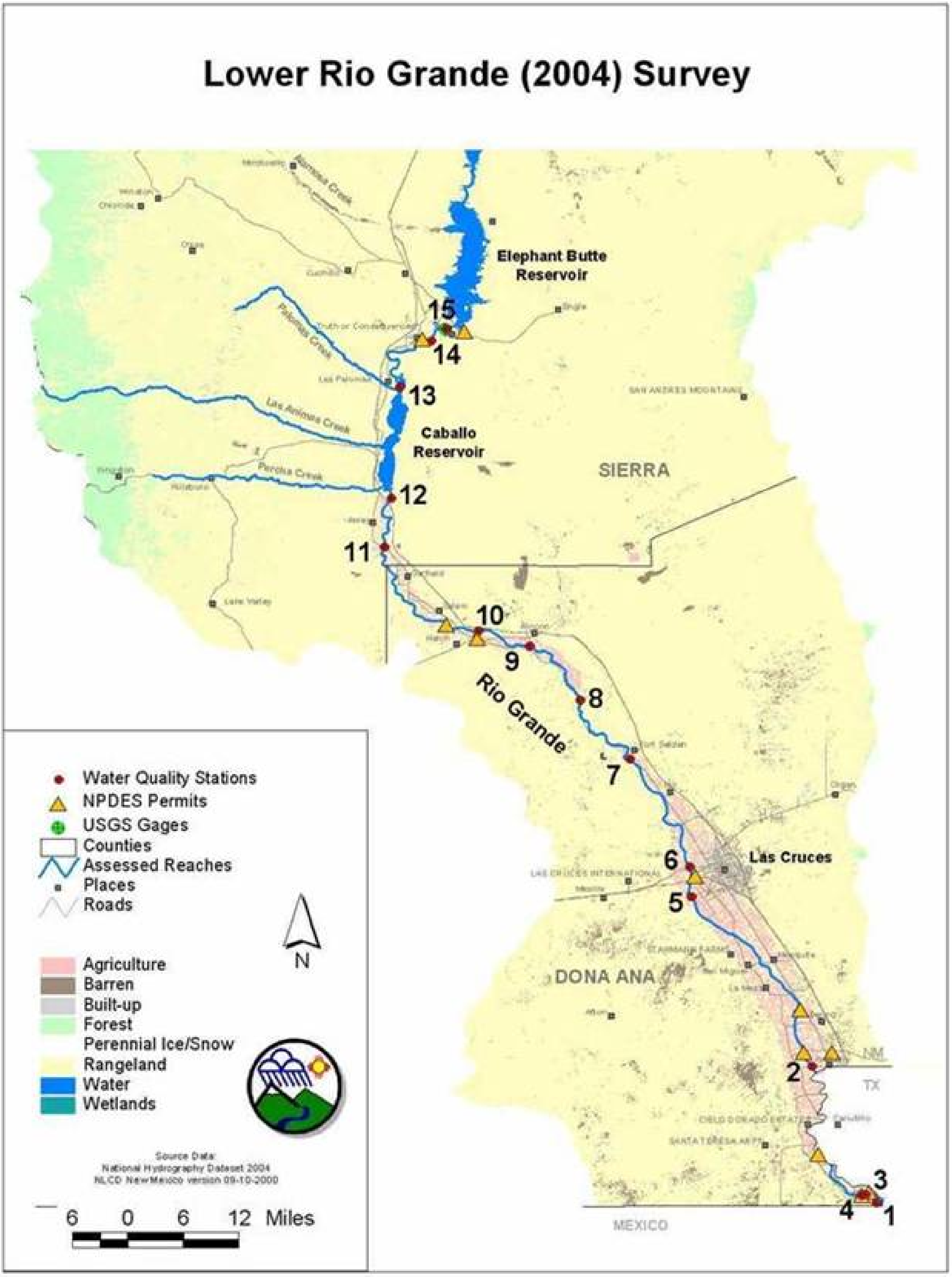


Table 1. Summary of Assessment Units and Associated Sampling Stations

Assessment Unit	Station No.	STORET Code	Sampling Station	2004-2006 Integrated List	WQS (July 2005) reference
Rio Grande (Texas border to Leasburg Dam)	1	42RGrand000.5	Rio Grande below Sunland Park	Fecal Coliform	20.6.4.101
	2	42RGrand001.1	Rio Grande at NM-225 Bridge near Anthony, NM		
	3	42RGrand004.1	Rio Grande at Bridge below Sunland Park		
	4	42RGrand004.7	Rio Grande above Sunland Park WWTF outfall		
	5	42RGrand038.7	Rio Grande at Bridge near La Mesilla		
	6	42RGrand044.2	Rio Grande at Picacho Ave. in Las Cruces		
	7	42RGrand084.8	Rio Grande below Leasburg Dam, NM		
Rio Grande (Leasburg Dam to Percha Dam)	8	42RGrand101.2	Rio Grande above Rincon Drain, near Rincon, NM	---	20.6.4.101
	9	42RGrand115.0	Rio Grande near Rincon at NM 140		
	10	42RGrand124.0	Rio Grande near Hatch at NM 26		
	11	42RGrand149.5	Rio Grande near Derry, NM		
Rio Grande (Percha Dam to Caballo Res.)	12	42RGrand160.3	Rio Grande below Caballo Dam, NM	---	20.6.4.102
Rio Grande (Caballo Res. to Elephant Butte Dam)	13	41RGrand184.1	Rio Grande above Caballo Reservoir	---	20.6.4.103
	14	41RGrand201.0	Rio Grande below Cuchillo Negro		
	15	41RGrand204.5	Rio Grande below E.Butte Dam at USGS Gage		

3.0 NM WATER QUALITY STANDARDS

General standards and standards applicable to attainable or designated uses for portions of the Lower Rio Grande watershed that were surveyed in this study are set forth in sections 20.6.4.13, 20.6.4.97, 20.6.4.98, 20.6.4.99, and 20.6.4.900 of the *Standards for Interstate and Intrastate Surface Waters* (NMAC 2005). Segment specific standards for the Lower Rio Grande watershed are set forth in sections 20.6.4.101, 20.6.4.102, and 20.6.4.103 and read as follows:

20.6.4.101 RIO GRANDE BASIN - The main stem of the Rio Grande from the international boundary with Mexico upstream to one mile below Percha dam.

A. Designated Uses: irrigation, marginal warmwater aquatic life, livestock watering, wildlife habitat and secondary contact.
B. Criteria:
(1) In any single sample: pH: within the range of 6.6 to 9.0 and temperature 34°C (93.2°F) or less. The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.
(2) The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL (see Subsection B of 20.6.4.14 NMAC).
(3) At mean monthly flows above 350 cfs, the monthly average concentration for: TDS 2,000 mg/L or less, sulfate 500 mg/L or less and chlorides 400 mg/L or less.
C. Remarks: Sustained flow in the Rio Grande below Caballo reservoir is dependent on release from Caballo reservoir during the irrigation season; at other times of the year, there may be little or no flow. [20.6.4.101 NMAC - Rp 20 NMAC 6.1.2101, 10-12-00; A, 12-15-01; A, 05-23-05]

20.6.4.102 RIO GRANDE BASIN - The main stem of the Rio Grande from one mile below Percha dam upstream to Caballo dam.

A. Designated Uses: irrigation, livestock watering, wildlife habitat, primary contact and warmwater aquatic life.
B. Criteria:
(1) At any sampling site: pH within the range of 6.6 to 9.0 and temperature 32.2°C (90°F) or less. The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.
(2) The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 235 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).
C. Remarks: Sustained flow in the Rio Grande below Caballo reservoir is dependent on release from Caballo reservoir during the irrigation season; at other times of the year, there may be little or no flow. [20.6.4.102 NMAC - Rp 20 NMAC 6.1.2102, 10-12-00; A, 05-23-05]

20.6.4.103 RIO GRANDE BASIN - The main stem of the Rio Grande from the headwaters of Caballo reservoir upstream to Elephant Butte dam and perennial reaches of tributaries to the Rio Grande in Sierra and Socorro counties.

A. Designated Uses: fish culture, irrigation, livestock watering, wildlife habitat, marginal coldwater aquatic life, secondary contact and warmwater aquatic life.
B. Criteria:
(1) In any single sample: pH within the range of 6.6 to 9.0 and temperature 25°C (77°F) or less. The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.
(2) The monthly geometric mean of E. coli bacteria 548 cfu/100 mL or less, single sample 2507 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).
C. Remarks: Flow in this reach of the Rio Grande main stem is dependent upon release from Elephant Butte dam. [20.6.4.103 NMAC - Rp 20 NMAC 6.1.2103, 10-12-00; A, 05-23-05]

4.0 METHODS

Water quality sampling methods were in accordance with the approved *Quality Assurance Project Plan (QAPP) for Water Pollution Control Programs* (NMED/SWQB 2004b). Water chemistry (nutrients, anion-cations, metals) along with accompanying physical measurements (temperature, pH, conductivity, turbidity, and dissolved oxygen) were done each time at all sites while bacteria samples for fecal coliform and *Escherichia coli* were collected 7 to 12 times at select sites. Water samples submitted for cyanide, organics/pesticides, radionuclides, and ambient toxicity were also collected only at select sites (Table 2). The process for evaluating and/or assessing all data collected in this survey for the purposes of the Integrated §303(d)/§305(b) Report (listing and de-listing) can be found in *State of New Mexico Procedures for Assessing Standards Attainment for §303(d) List and § 305(b) Report, New Mexico Standards for Interstate and Intrastate Surface Water,* and selected assessment protocols (i.e. temperature and stream bottom deposits).

5.0 SAMPLING SUMMARY

A map of the study area is provided in Figure 2. The station numbers, STORET identification codes, and location descriptions of sampling stations selected for this survey are provided in Table 1. The rational for selecting each sample station is listed below:

Rio Grande below Sunland Park was selected to assess Sunland Park WWTP outfall, which is located a couple hundred yards above the Sunland Park Bridge, and to assess the West and Montoya Drain outfalls. Bacteria and nutrients were collected to bracket the West and Montoya Drains. *These waters fail Texas WQS for bacteria.*

Rio Grande at NM-225 Bridge near Anthony, NM was selected to evaluate waters entering Texas. The site is about 0.5 miles above where Rio Grande first enters Texas. The site is below the South Central Regional WWTP near Vado and Alto de las Flores WWTP near San Miguel. The site is above the East Drain, which drains "dairy row" and two Anthony WWTPs, as well as Gadsden Schools NPDES and several other Mesilla Drains.

Rio Grande at Bridge below Sunland Park is at the bottom of the assessment unit, water quality segment, and study. It is also below Sunland Park WWTP, the West and Montoya Drains, El Paso Electric, and Gadsden Schools NPDES. The USGS performs integrated sampling at this site.

Rio Grande above Sunland Park WWTF outfall- Ssampling was started at this station in June 2004 to bracket Sunland Park WWTP. The site is downstream of Texas, but above Sunland Park WWTP and Santa Teresa and Montoya Drains.

Rio Grande at Bridge near La Mesilla is below Las Cruces urban area (stormwater), Las Cruces WWTP, and the Mesilla Diversion, which diverts water out of the river channel. The site is also above the South Central Regional and Alto de las Flores WWTPs.

Rio Grande at Picacho Ave. in Las Cruces is above Las Cruces WWTP and Las Cruces urban runoff. SWQB also wants to evaluate a proposal to move the WQS break from Leasburg to this site. The downstream segment would be "urban" with 9 WWTPs, whereas the upstream segment would be primarily "agricultural" with only 2 WWTPs.

Rio Grande below Leasburg Dam, NM is at the WQS break. The site is at the bottom of Hatch Valley and the top of Mesilla Valley (bedrock control). The site is below Rincon and Tonuco

Drains on the east side and Hatch WWTP and Angostura Drain on the west side. It is also below Sheldon Canyon, which has groundwater inflows. The State Park is immediately below Leasburg Diversion. NMSU also reported finding up to 6 mg/L nitrate in river near here.
Rio Grande above Rincon Drain, near Rincon, NM was selected to characterize surface water contributions (ions profile) above Sheldon Canyon in order to estimate groundwater inflow.
Rio Grande near Rincon at NM 140 is near the bottom of the AU (data from Leasburg Dam would also apply to this WQS/AU). The station is above Rincon and Tonuco Drains on the east side and Angostura Drain on the west side. It is also below the Hatch Drain and Hatch WWTP.
Rio Grande near Hatch at NM 26 is above Hatch WWTP and below the new Salem WWTP.
Rio Grande near Derry, NM is at the top of the AU. This station had an impressive algal mat and clamshell substrate in the fall of 2003, which needed to be investigated further.
Rio Grande below Caballo Dam, NM was selected to characterize reservoir-influenced waters.
Rio Grande above Caballo Reservoir was selected to evaluate Truth or Consequences WWTP as well as other anthropogenic inputs.
Rio Grande below Cuchillo Negro- This station was sampled monthly for two consecutive years as part of SWQB's 104(b)(3) Elephant Butte study. This site was selected to evaluate the availability/suitability of existing data and to help develop a nutrient protocol.
Rio Grande below E.Butte Dam at USGS Gage was selected to help evaluate the availability and suitability of existing data and to help develop a nutrient protocol.

Table 2 summarizes data collected in each assessment unit and at each station. The number of times each parameter (or suite of parameters) was sampled for is indicated. Field data include temperature, specific conductance, pH, dissolved oxygen, and turbidity. YSI Sondes were deployed at select sites in each AU from September 9 through September 16, 2004. Thermographs were deployed from September 17 through November 18, 2004.

Table 2. SWQB Sampling Summary

Assessment Unit / Stations	**Field Data**	**Ions (full suite)**	**Nutrients**	**Total Metals (full suite)**	**Dissolved Metals (full suite)**	**Fecal Coliform**	**E. Coli**	**Cyanide**	**Radionuclides**	**Organics**	**Ambient Toxicity**	**Sonde Deployment**	**Thermograph**
Rio Grande (Texas Border to Leasburg Dam)													
Rio Grande below Sunland Park	9	8	8	-	-	12	12	-	-	-	3	-	-
Rio Grande at NM-225 Bridge near Anthony, NM	12	9	9	8	8	10	10	7	11	16	1	Yes	Yes
Rio Grande at Bridge below Sunland Park	1	-	1	-	-	-	-	-	-	-	-	-	-
Rio Grande above Sunland Park WWTF outfall	3	4	-	-	-	8	8	-	-	-	-	-	-
Rio Grande at Bridge near La Mesilla	9	8	8	8	8	9	9	-	-	-	1	-	-
Rio Grande at Picacho Ave. in Las Cruces	10	8	8	8	8	8	8	-	-	-	-	-	-
Rio Grande below Leasburg Dam, NM	10	8	8	8	8	8	8	7	-	24	1	-	-
Rio Grande (Leasburg Dam to Percha Dam)													
Rio Grande above Rincon Drain, near Rincon, NM	8	8	-	-	-	-	-	-	-	-	-	-	-
Rio Grande near Rincon at NM 140	12	9	9	8	8	8	8	8	10	16	-	Yes	Yes
Rio Grande near Hatch at NM 26	9	7	8	-	-	8	8	-	-	-	-	-	-
Rio Grande near Derry, NM	9	8	8	8	7	9	8	-	-	-	1	-	-
Rio Grande (Percha Dam to Caballo Res.)													
Rio Grande below Caballo Dam, NM	10	9	9	8	8	8	7	-	10	-	-	Yes	-
Rio Grande (Caballo Res. to Elephant Butte Dam)													
Rio Grande above Caballo Reservoir	10	8	8	8	8	9	8	7	10	8	-	-	-
Rio Grande below Cuchillo Negro	24	18	23	-	-	-	-	-	-	-	-	-	-
Rio Grande below E.Butte Dam at USGS Gage	24	18	23	-	-	-	-	-	-	-	-	-	-

6.0 WATER QUALITY ASSESSMENT

6.1 Water Quality Standards Exceedences

For many water quality parameters, the State of New Mexico maintains numeric water quality standards. However, for several parameters (e.g., plant nutrients, stream bottom deposits), only narrative standards exist. Data are assessed for designated use attainment status for both numeric and narrative water quality standards by application of the *Procedures for Assessing Standards Attainment for the Integrated CWA §303(d)/§305(b) Water Quality Monitoring and Assessment Report* (a.k.a. the *Assessment Protocol*) and associated appendices (NMED/SWQB 2006).

The following discussion includes information pertaining to all exceedences of water quality standards found during the intensive watershed survey. The purpose of this section of the report is to provide the reader with information on where current water quality standards are being exceeded within the watershed. These exceedences are used to determine designated use impairment status. Final assessment determinations as to whether or not a stream reach is considered to be meeting its designated uses depend on the overall amount and type of data available during the assessment process (Refer to SWQB's *Assessment Protocol* for additional information on the assessment process, NMED/SWQB 2006). When available, outside sources of data that meet quality assurance requirements are combined with data collected by SWQB during intensive watershed survey to determine final impairment status. Final designated use impairment status is housed in the Assessment Database (ADB) and is reported in the biennial *State of New Mexico Integrated CWA §303(d)/§305(b) Report* (NMED/SWQB 2004a).

6.1.1 Physicochemical Data

Physicochemical water quality criteria exceedences are provided in Table 3. Details of assessment procedures are available in the *Assessment Protocol* (NMED/SWQB 2006). A complete data set can be obtained by contacting the SWQB.

Table 3. Physicochemical Water Quality Standards Exceedences

Assessment Unit	Radionuclides (Gross Alpha)	E. coli
Rio Grande (Texas border to Leasburg Dam)	5/16	16/53
Rio Grande (Leasburg Dam to Percha Dam)	FS	4/23
Rio Grande (Percha Dam to Caballo Res.)	FS	FS
Rio Grande (Caballo Res. to Elephant Butte Dam)	FS	FS

FS=Full Support

No metal (total or dissolved) for which the there is a numeric criterion and no cyanide samples were found to be in exceedence of their respective water quality standards. Furthermore, no organic compounds (volatile or semi-volatile) were found above detection limits. Numerous volatile organic compounds (VOCs) were impossible to assess because the detection limits for the methods of analysis are above the assigned numeric criteria.

6.1.2 Data from Continuous Monitoring Devices

Temperature data loggers (thermographs) were deployed at selected stations within the study area. Table 4 summarizes temperature data from thermographs in degrees Celsius (°C). YSI multi-parameter sondes were also deployed at selected stations to examine pH and dissolved oxygen (DO). Tables 5a and 5b summarize sonde data collected from the Lower Rio Grande watershed. The thermographs and sondes were programmed to record temperature, DO, and pH once per hour over their respective collection intervals.

Large data sets generated from data loggers (i.e., sondes and thermographs) are assessed according to protocols developed specifically for such data sets (with few exceptions). This is because, unlike grab sample data, it is not reasonable to list as not supporting on the basis of one or a few exceedences out of several hundred or thousand data points.

Temperature (given in °C) and pH assessment criteria are tied to the criteria in the *New Mexico Standards for Interstate and Intrastate Surface Waters* (NMAC 2005). Dissolved oxygen assessment criteria are based on season (i.e., if early life stages of fish are likely present) and designated use (warmwater or marginal warmwater aquatic life use). Details of large data set assessment procedures are available in the *Assessment Protocol* (NMED/SWQB 2006).

Table 4. Summary of Thermograph Data

Station	Data Collection Interval	WQS Temperature Criterion (°C)	Maximum Recorded Temperature (°C)	Total # of data points (n)	Exceedence Ratio = % Exceedences
Rio Grande at NM 225 Bridge near Anthony, NM	17 Sept - 18 Nov 2004	34.0	45.311	1500	**49/1500 = 3%**
Rio Grande near Rincon at NM 140	17 Sept - 18 Nov 2004	32.2	24.629	1477	**0/1477 = 0%**

Table 5a. Summary of pH Data Collected from Sondes

Station	Data Collection Interval	WQS pH Criteria	Min / Max Recorded pH	Total # of data points (n)	Exceedence Ratio = % Exceedences
Rio Grande at NM 225 Bridge near Anthony, NM	Sept 9-16, 2004	6.6 - 9.0	8.02 / 8.20	169	**0/169 = 0%**
Rio Grande near Rincon at NM 140	Sept 9-16, 2004	6.6 – 9.0	8.02 / 8.47	171	**0/171 = 0%**
Rio Grande below Caballo Dam, NM	Sept 9-16, 2004	6.6 – 9.0	7.87 / 8.44	169	**0/169 = 0%**

Table 5b. Summary of DO Data Collected from Sondes

Station	Data Collection Interval	WQS DO Criteria	Minimum Recorded DO; % Saturation	Total # of data points (n)	Exceedence Ratio = % Exceedences
Rio Grande at NM 225 Bridge near Anthony, NM	Sept 9-16, 2004	≥ 5 mg/L	6.83 mg/L; 95.3%	169	**0/169 = 0%**
Rio Grande near Rincon at NM 140	Sept 9-16, 2004	≥ 5 mg/L	6.63 mg/L; 89.1%	171	**0/171 = 0%**
Rio Grande below Caballo Dam, NM	Sept 9-16, 2004	≥ 5 mg/L	6.86 mg/L; 90.8%	169	**0/169 = 0%**

6.1.3 Ambient Toxicity

The ambient toxicity monitoring program is designed to (1) identify waterbodies with the potential for aquatic life use impairment attributable to toxicants, and (2) identify needs for follow-up studies or corrective actions. SWQB collected water and sediment samples from select sites (Table 2), which were then analyzed by the EPA's Regional laboratory. The Regional laboratory conducted standard tests by evaluating the response of organisms exposed to municipal and industrial effluents. Standard chronic toxicity tests are conducted using embryolarval fish (*Pimephales promelas*, or Fathead Minnow) and *Ceriodaphnia dubia*. Because the primary objective of the program is to identify waterbodies that may be affected by toxicity, "toxic effects" include any test endpoint that differs significantly from the endpoint observed in a laboratory control. Ambient water samples are analyzed without dilution, based on the assumption that this approach best represents instream conditions.

There were no ambient toxicity results that were significantly different from the endpoint observed in the laboratory control, thus indicating no toxic effects at any of the Lower Rio Grande sites that were sampled for toxicity. Results from these tests can be found on the web at: http://www.epa.gov/region6/6wq/ecopro/watershd/monitrng/toxnet/index.htm

7.0 Conclusions

Due to the large volume of data collected during this survey, it will not be included in this report. Those persons requiring a complete dataset or data from a specific site should contact the Surface Water Quality Bureau or search EPA's STORET database. All of the monitoring that was conducting by the SWQB is summarized in Table 2. Those parameters that exceeded the State's Water Quality Standards are shown in Table 3.

The only water quality impairments identified as part of this study of the Lower Rio Grande watershed between the Texas Border and Elephant Butte Reservoir were for bacteria with the Rio Grande being considered biologically impaired from the Texas Border to Percha Dam. Waters in the Rio Grande (Texas Border to Leasburg Dam) also fail Texas water quality standards for bacteria. There also were several exceedences for temperature along this AU, however, with an exceedence ratio of 3%, there were not enough to be qualified as impaired due to temperature. This assessment unit also had gross alpha exceedences, but Radium Hot Springs, near Leasburg Dam State Park and Fort Selden, is the hottest, strongest natural radium springs in the world according to Lund (2002). The gross alpha exceedences were therefore attributed to this natural source.

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8.0 References

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