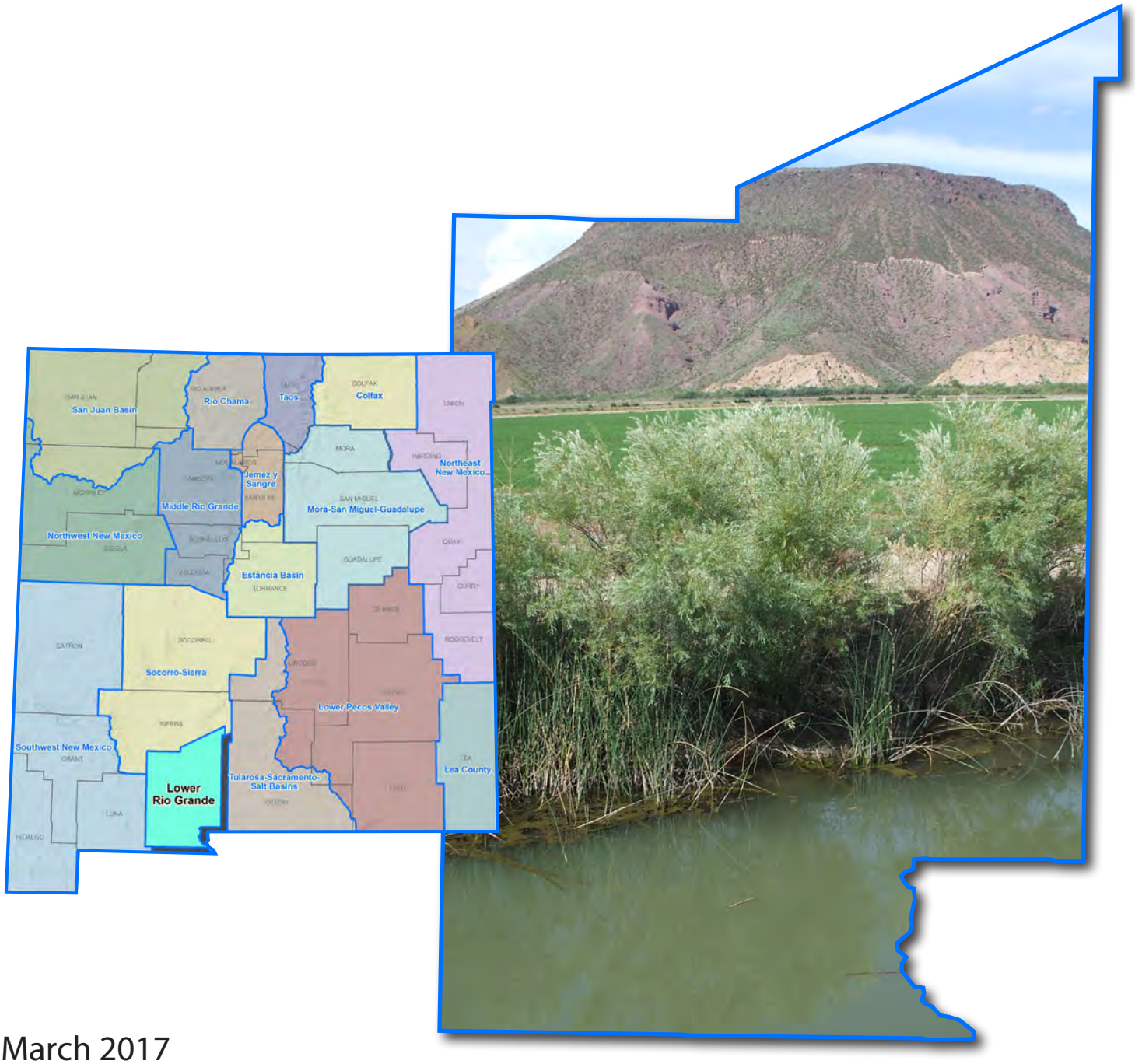
Lower Rio Grande Regional Water Plan



March 2017

State of New Mexico
Interstate Stream Commission
Office of the State Engineer

Cover photograph: Tonuco Drain, Tonuco Mountains south of Rincon, north of Radium Springs, New Mexico

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Note: Appendix designations indicate corresponding section in plan

List of Acronyms

°F	degrees Fahrenheit
ac-ft/yr	acre-feet per year
AMO	Atlantic multidecadal oscillation
AWRM	Active Water Resource Management
BBER	Bureau of Business and Economic Research
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
cfu/100 mL	colony-forming units per 100 milliliters
CID	Carlsbad Irrigation District
CRRWUA	Camino Real Regional Water Utility Authority
CWA	Clean Water Act
DBS&A	Daniel B. Stephens & Associates, Inc.
DWS	Domestic Well Statute
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
ft bgs	feet below ground surface
FY	fiscal year
GIS	geographic information system
gpcd	gallons per capita per day
gpm	gallons per minute
GWQB	Ground Water Quality Bureau [New Mexico Environment Department]
ICIP	Infrastructure Capital Improvement Plan
IPCC	Intergovernmental Panel on Climate Change
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDWCA	mutual domestic water consumers association
mgd	million gallons per day
MSGP	Multi-Sector General Permit
NASS	National Agricultural Statistics Service
NCDC	National Climatic Data Center

NEPA	National Environmental Policy Act
NMAC	New Mexico Administrative Code
NMBGMR	New Mexico Bureau of Geology & Mineral Resources
NMED	New Mexico Environment Department
NMISC	New Mexico Interstate Stream Commission
NMOSE	New Mexico Office of the State Engineer
NMSA	New Mexico Statutes Annotated
NMSU	New Mexico State University
NMWQCC	New Mexico Water Quality Control Commission
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDO	Pacific decadal oscillation
PDSI	Palmer Drought Severity Index
PPP	project, program, and policy
PSTB	Petroleum Storage Tank Bureau (NMED)
PVACD	Pecos Valley Artesian Conservancy District
RWP	regional water plan
SDWA	Safe Drinking Water Act
SSPA	S.S. Papadopulos & Associates, Inc.
SWCD	soil and water conservation district
TDS	total dissolved solids
TMDL	total maximum daily load
U.S. EPA	U.S. Environmental Protection Agency
UNM	University of New Mexico
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
UST	underground storage tank
UWB	underground water basin
WQA	Water Quality Act (New Mexico)
WRCC	Western Regional Climate Center
WRRI	Water Resources Research Institute

Executive Summary

The Lower Rio Grande Water Planning Region, which includes all of Doña Ana County (Figure ES-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary purpose being to protect New Mexico water resources and to ensure that each region is prepared to meet future water demands. Between 1987 and 2008, each of the 16 planning regions, with funding and oversight from the New Mexico Interstate Stream Commission (NMISC), developed a plan to meet regional water needs over the ensuing 40 years. The Lower Rio Grande Regional Water Plan was completed and accepted by the NMISC in 2003.

The purpose of this document is to provide new and changed information related to water planning in the Lower Rio Grande region and to evaluate projections of future water supply and demand for the region using a common technical approach applied to all 16 planning regions statewide. Accordingly, this regional water plan (RWP) update summarizes key information in the 2003 plan and provides updated information regarding changed conditions and additional data that have become available.

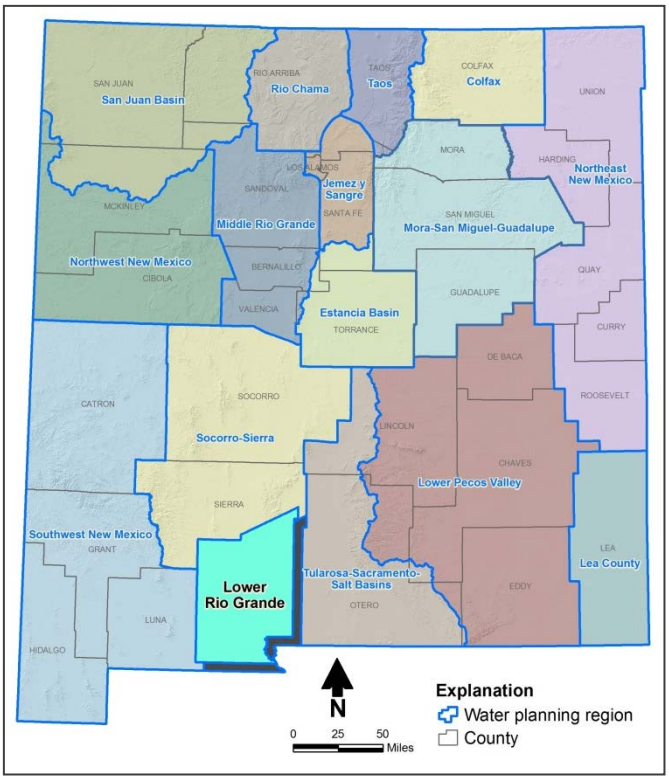


Figure ES-1. Lower Rio Grande Water Planning Region

Based on updated water use (Figure ES-2) data from 2010, Figure ES-3 illustrates the total projected regional water demand under high and low demand scenarios, and also shows the administrative water supply and the drought-adjusted water supply. The administrative water supply is based on 2010 withdrawals of water and is an estimate of future water supplies that considers both physical availability and compliance with water rights policies. The Lower Rio Grande planning region includes several mined basins that could be impacted by reductions to recharge resulting from long-term drought. The region also relies on surface water supplies that are vulnerable to drought. Also important is the predicted decline of the aquifers in the closed basins due to continued pumping. The estimated shortage in 2060 during a drought year is expected to range from 217,000 to 243,000 acre-feet. The Lower Rio Grande region would like to see a balanced approach to dealing with these shortfalls by promoting regional values (such as preserving the agriculture industry, sustaining rural communities, and restoring the river) while

increasing and protecting supply (through desalination, pollution control, and stormwater capture) and reducing and managing demand (through adjudication of water rights and improving system efficiency).

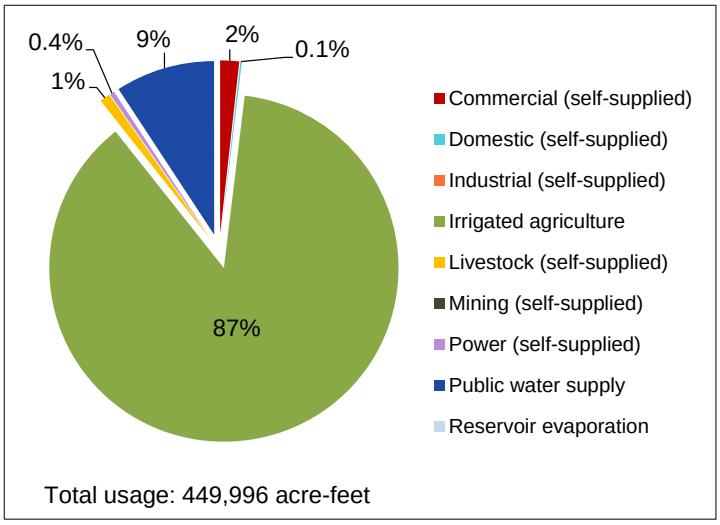


Figure ES-2. Total Regional Water Use, 2010

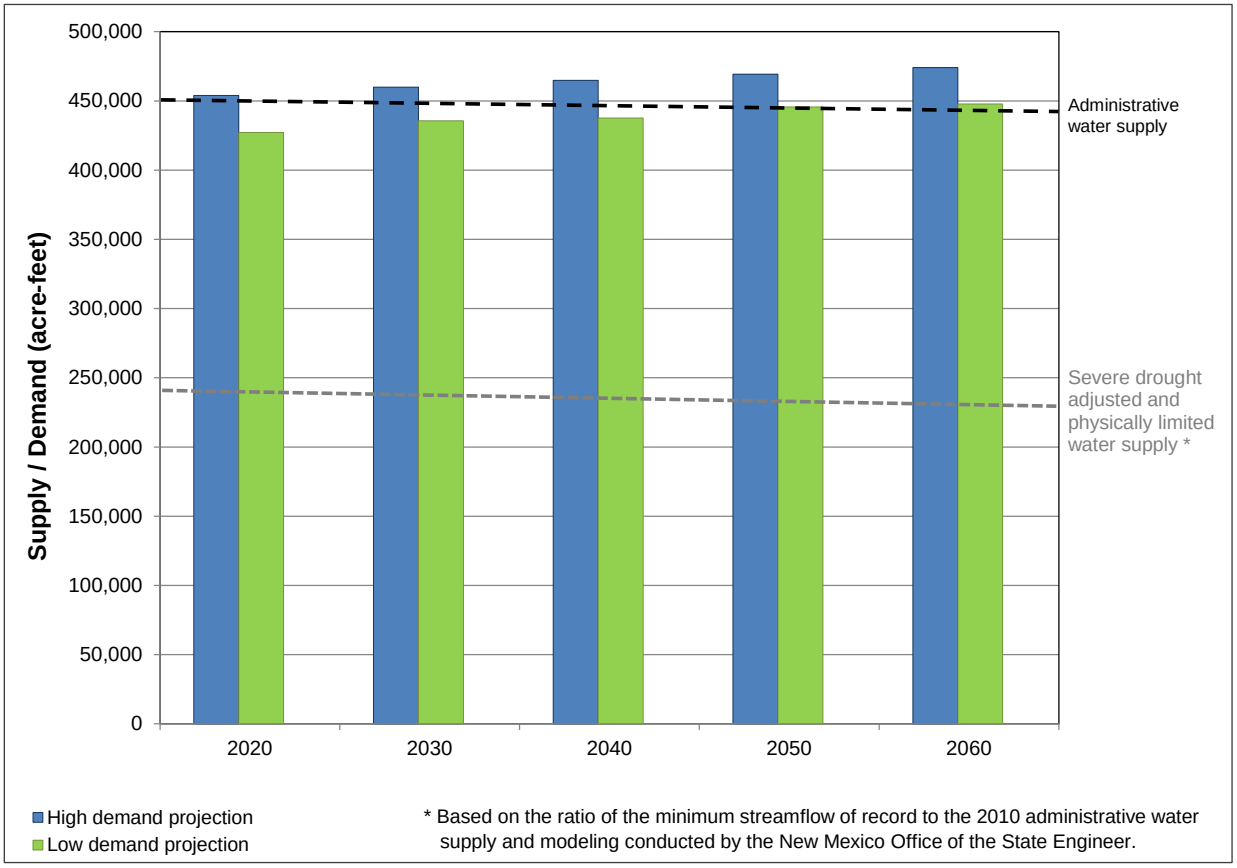


Figure ES-3. Available Supply and Projected Demand

Planning Method

For this RWP, water supply and demand information was assessed in accordance with a common technical approach, as identified in the *Updated Regional Water Planning Handbook: Guidelines to Preparing Updates to New Mexico Regional Water Plans* (where it is referred to as a common technical *platform*) (Handbook). This common technical approach outlines the basis for defining the available water supply and specifies methods for estimating future demand in all categories of water use:

- The method to estimate supply (referred to as the *administrative water supply* in the Handbook) is based on withdrawals of water as reported in the *New Mexico Water Use by Categories 2010* report prepared by the New Mexico Office of the State Engineer (NMOSE). Use of the 2010 data provides a measure of supply that considers both physical supply and legal restrictions (i.e., the water is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region.

- An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts.

Common Technical Approach

To prepare both the regional water plans and the state water plan, the State has developed a set of methods for assessing the available supply and projected demand that can be used consistently in all 16 planning regions in New Mexico. The objective of applying this common technical approach is to be able to efficiently develop a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the State's pressing water issues.

- Projections of future demand in nine water use categories are based on demographic and economic trends and population projections. Consistent methods and assumptions for each category of water use are applied across all planning regions.

Public Involvement

The updated Handbook specifies that the RWP update process "shall be guided by participation of a representative group of stakeholders," referred to as the steering committee. Steering committee members provided direction for the public involvement process and relayed information about the planning effort to the water user groups they represent and other concerned or interested individuals.

In addition to the steering committee, the water planning effort included developing a master stakeholder list of organizations and individuals interested in the water planning update. This list was developed from the previous round of water planning and then expanded through efforts to

identify representatives from water user groups and other stakeholders. Organizations and individuals on the master stakeholder list were sent announcements of meetings and the RWP update process and progress.

Over the two-year update process, eight meetings were held in the Lower Rio Grande region. These meetings identified the program objectives, presented draft supply and demand calculations for discussion and to guide strategy development, and provided an opportunity for stakeholders to provide input on the strategies that they would like to see implemented. All steering committee meetings were open to the public and interested stakeholders, and participation from all meeting attendees was encouraged.

Key Water Issues

The key water supply updates and issues currently impacting the Lower Rio Grande region include the following:

- The Rio Grande stream system is fully appropriated. In general, any new water uses that impact the flow of the Rio Grande must be offset through return flow, the transfer of existing water rights, and/or supplementation by a new source of water. No mechanism is presently in place to allow transfers of Rio Grande Project water from the Elephant Butte Irrigation District (EBID) to non-agricultural uses.

- Groundwater pumping and depletions in New Mexico and Texas impact the flows of the Rio Grande and affect the operations of the Rio Grande Project. This issue continues to be a source of controversy and conflict among New Mexico, Texas, the U.S. Bureau of Reclamation (USBR), and the two U.S. irrigation districts supplied by the Rio Grande Project (EBID in New Mexico and El Paso County Water Improvement District #1 [EPCWID#1] in Texas).

- In 2013 the State of Texas initiated a lawsuit in the U.S. Supreme Court over the Rio Grande Compact, specifically water management and water use by New Mexico below Elephant Butte Dam, that names New Mexico and Colorado as defendants. The United States has joined in this lawsuit. The outcome of this lawsuit, whether through settlement or court order, may have significant impacts on water management in the Lower Rio Grande region.

- An Operating Agreement for the Rio Grande Project was finalized in 2008 as part of the settlement of litigation between EBID, EPCWID #1, and USBR in Texas Federal District Court and has been implemented since that time. Implementation of this agreement has reduced EBID's allocation of Rio Grande Project water in full-supply years by more than 150,000 acre-feet, and this large decrease has led to increased dependence on groundwater for farmers seeking to utilize their adjudicated water rights. Many questions

persist regarding the fairness and sustainability of the Operating Agreement as it has been implemented. The New Mexico Attorney General sued the USBR in 2011 regarding this Operating Agreement and the USBR's unauthorized release of New Mexico Compact credit water in Elephant Butte Reservoir to EPCWID#1. The judge in the case has stayed, or suspended, any action in this lawsuit pending action by the U.S. Supreme Court in *Texas v. New Mexico, Original No. 141*. Continued conflict associated with this Agreement is likely.

- Under the National Environmental Policy Act, on January 4, 2017, the Bureau of Reclamation issued a Record of Decision (ROD) implementing one of the alternatives it examined in its Final Environmental Impact Statement on the 2008 Operating Agreement. The alternative adopted provides for continued Rio Grande Project operations under the terms of the 2008 Operating Agreement. The outcome implemented by the ROD remains controversial and should continue to be monitored as it relates to water supply in the region.

- Recent drought and high levels of groundwater pumping may cause increased concentration of salts in the soils and aquifers of the Rincon and Mesilla valleys, and increased groundwater salinity may limit the usefulness of this water for some applications in the future.

- The demand for water in the Lower Rio Grande region has increased through time due to increasing population and increasing cultivation of high-water-demand crops such as alfalfa and pecans.

    - The population of the Lower Rio Grande planning region is expected to expand from approximately 209,000 in 2010 to almost 350,000 in 2060. The increasing demand for municipal water is likely to result in water rights transfers from agriculture through willing seller-willing buyer agreements.

    - The great majority of water use in the Lower Rio Grande surface water basin is for irrigation, but the feasibility of fallowing otherwise irrigated lands during drought periods is complicated by the fact that about 30 percent of irrigated lands in the Lower Rio Grande basin are planted in permanent crops such as pecan orchards that would be severely stunted or lost if not irrigated.

- Salinity of Rio Grande Project water has long been a source of controversy between New Mexico and Texas. In 2008 the Rio Grande Compact Commission, together with NMISC and the New Mexico Environment Department (NMED), assisted in the formation of a multi-state Río Grande Project Salinity Management Coalition (Coalition). The Coalition conducted studies to assess the source and location of salts entering the surface water system. They found that natural and localized sources of salinity were the primary

contributors of salt. Given that information, the Coalition evaluated possible ways to reduce the salinity concentrations and impacts in the Rio Grande Project area in order to increase usable water supplies for agricultural, urban, and environmental purposes in the critical Texas-New Mexico border region. Results of that work indicated that none of the alternatives considered would be cost effective.

- The Lower Rio Grande stream system adjudication—the largest ongoing adjudication in the state—is underway, with close to 45 percent of the 13,979 water right subfiles now adjudicated. Major water rights issues are now before the adjudication court or in the process of implementation pursuant to an earlier order from the court.

- Given the growing population in the region, there is likely to be an increased municipal and commercial market for water rights. Transfer of irrigation water rights associated with the Rio Grande Project into non-irrigation uses will involve coordination with USBR and EBID and development of a transfer mechanism and set of rules for such transfers. Special water user associations have been created in anticipation of future use of Rio Grande Project water for drinking supplies and other non-irrigation uses.

- The risk of flooding from the Rio Grande and its tributaries is a key concern in the region. Much of the original flood control infrastructure was installed decades ago and requires maintenance and upgrades. Recently, the International Boundary and Water Commission completed improvements on more than 200 miles of infrastructure including Rio Grande levees, floodwalls, floodgates, and ancillary structures. However, full implementation of all the necessary flood control improvements is expected to be very expensive, due in part to required removal of sediment deposited within the Rio Grande channel and issues associated with aging infrastructure.

- Endangered species and environmental restoration issues may increase in importance. Large populations of southwestern willow flycatcher and yellow billed cuckoo, both listed species under the federal Endangered Species Act, reside in the dry portion of the reservoir pool of Elephant Butte Reservoir. Operations of Elephant Butte and Caballo reservoirs may be impacted by habitat protection for these species. Furthermore, a number of non-governmental organizations have taken an interest in the potential for aquatic and related wetland restoration in and along the main channel of the Rio Grande within the EBID and Lower Rio Grande basin.

- The Jornada del Muerto Basin is primarily an alluvial basin that is being mined through groundwater pumping of its finite freshwater supply, and demand is tending to outpace supply in parts of the southernmost extent of the basin, where population growth and development have increased rapidly in recent years. Other parts of the Jornada del Muerto Basin are also the subject of keen interest, including the central area in which the newly constructed Spaceport America resides.

- High levels of *E. coli* in the Rio Grande exceed total maximum daily load (TMDL) criteria and are a threat to public health.
- Under Section 72-12-25 NMSA, notices of intent to drill deep wells in the eastern Mimbres Basin, within Doña Ana County and about 15 miles from the Rio Grande, for the withdrawal of 25,000 acre-feet per year of nonpotable water have been filed, including a notice to drill five deep wells for the withdrawal of 5,000 acre-feet per year filed by the City of Las Cruces prior to changes in state law.
- The many small rural drinking water systems within the region face challenges in financing infrastructure maintenance and upgrades and complying with water quality monitoring and training standards. Though the source water for these systems is generally good-quality groundwater, the maintenance, upgrades, training, operation, and monitoring that is required to ensure delivery of water that meets drinking water quality standards is a financial and logistical challenge for these small systems. The water systems in Garfield, Hatch, and Mesilla recently received New Mexico Water Trust Board funding for upgrading waterlines and other infrastructure improvements for fiscal year 2015.

Strategies to Meet Future Water Demand

An important focus of the RWP update process is to both identify strategies for meeting future water demand and facilitate their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2003 Lower Rio Grande Regional Water Plan recommended the following strategies for meeting future water demand:

- Increase and protect supply:
  - Rainfall augmentation (cloud seeding)
  - Desalination
  - Aquifer storage and recovery
  - Las Cruces sustainable water project
  - Stormwater capture
  - Importation of water
  - Purchase water rights
  - Water rights leasing and transfers

- Reduce and manage demand:
  - Farm delivery metering
  - Laser leveling
  - Pressurized irrigation
  - High flow turnouts
  - Low water use crops
  - Deficit irrigation
  - Cultural practices
  - Canal lining
  - Irrigation rate structure
  - Charges to constituents to unused water delivery requests
  - Manage reservoir releases to maximize efficiency
  - Public education
- Promote regional values:
  - Remove invasive/non-native plants
  - Passive use of water for restoration

The steering committee reviewed each of the strategies and indicated that most are still relevant, though some are being refocused as new recommended strategies.

During the two-year update process the Lower Rio Grande Steering Committee and stakeholders identified projects, programs, and policies (PPPs) to address their water issues. Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan, Water Trust Board, Capital Outlay, and NMED funding processes; these projects are also included in a comprehensive table of PPP needs. The information was not ranked or prioritized; it is an inclusive table of all of the PPPs that regional stakeholders are interested in pursuing. In the Lower Rio Grande region, projects identified on the PPP table include:

- Increase and protect supply:
  - Residential rain water harvesting
  - Full treatment of domestic water
  - Jornada hydrology study
  - Update the LRG hydrologic model
  - Evaluate new water sources for the Percha Creek area

- Reduce and manage demand:
  - Irrigation apps
  - Promote low impact design
  - Landscape irrigation audits
  - Limit water use to renewable supply
  - Expand Las Cruces water reclamation system
  - Low flow conversion incentive
  - Water leak detection
  - Ensure compliance with existing policies
  - Enhanced SCADA
  - Priority call impact study
- Promote regional values:
  - Fund climate research
  - Fund planning
  - Stormwater capture
  - Floodplain management
  - Environmental water needs assessment
  - Living River Program
  - Restore fish habitat

At steering committee meetings held in 2015 and 2016, the group discussed projects that would have a larger regional or sub-regional impact and for which there is interest in collaboration to seek funding and for implementation. The following key collaborative projects were identified by the steering committee and Lower Rio Grande region stakeholders:

- Improve agricultural system efficiency
- Water reuse
- Desalination
- Stormwater capture
- Rangeland and upland restoration
- Rio Grande habitat restoration

- Expand water sections in regional comprehensive plans
- Regional collaboration for drinking water systems
- Non-point source pollution reduction
- Incentivize arid region business
- Coordinate border development with water resources
- Adjudication of water rights
- Develop and maintain comprehensive water budget
- Explore alternative water sources
- Develop a State policy on importation of water
- Modify NMED regulations on reclaimed and produced water reuse

The 2016 RWP characterizes supply and demand issues and identifies strategies to meet the projected gaps between water supply and demand. This plan should be added to, updated, and revised to reflect implementation of strategies, address changing conditions, and continue to inform water managers and other stakeholders of important water issues affecting the region.

1. Introduction

The Lower Rio Grande Water Planning Region, which includes all of Doña Ana County (Figure 1-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary purpose being to protect New Mexico water resources and to ensure that each region is prepared to meet future water demands. Between 1987 and 2008, each of the 16 planning regions, with funding and oversight from the New Mexico Interstate Stream Commission (NMISC), developed a plan to meet regional water needs over the ensuing 40 years. The *New Mexico Lower Rio Grande Regional Water Plan* (Terracon et al., 2003) was completed and accepted by the NMISC in December 2003.

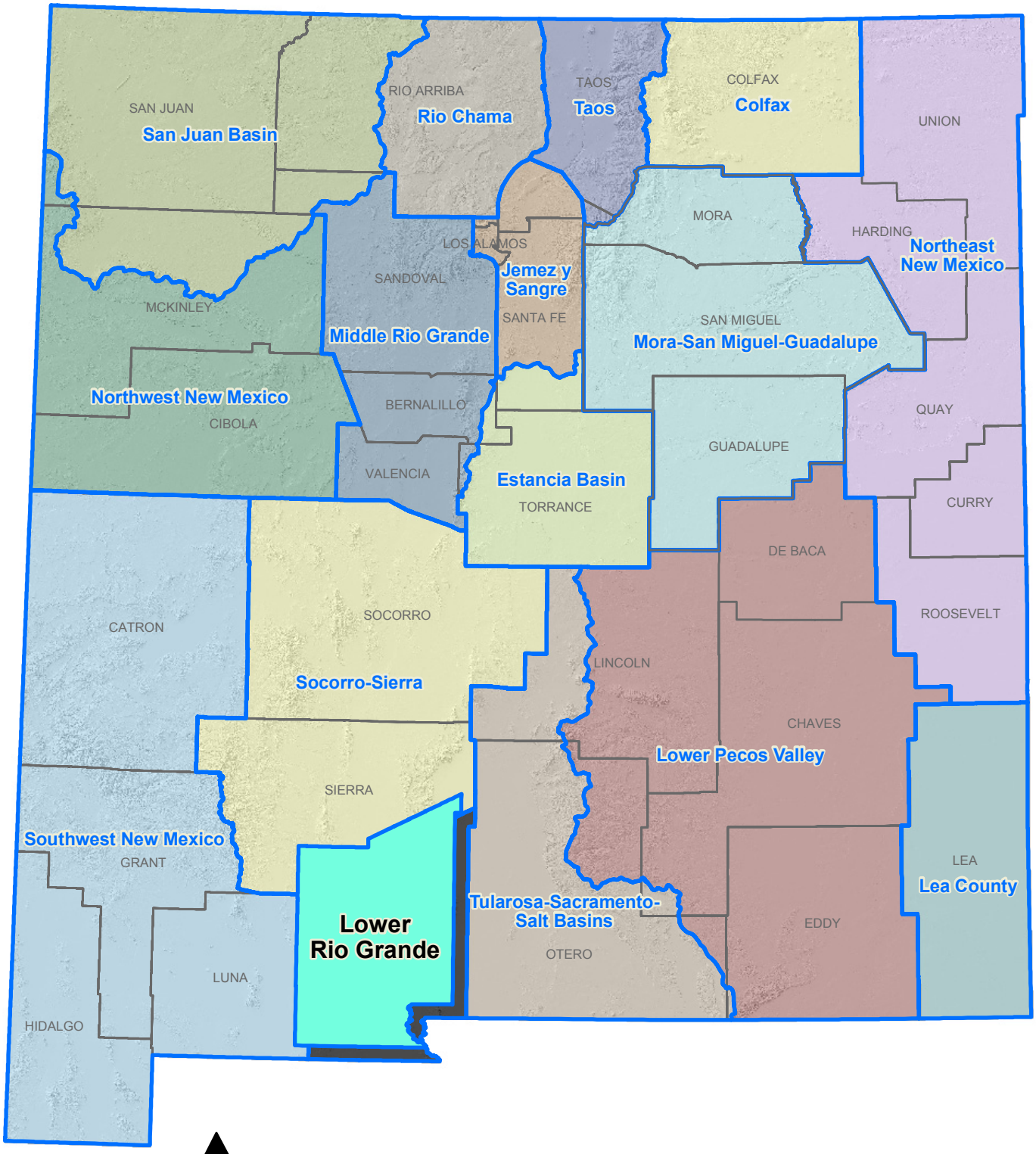
The purpose of this document is to provide new and changed information related to water planning in the Lower Rio Grande region, as listed in the bullets below, and to evaluate projections of future water supply and demand for the region using a common technical approach applied to all 16 planning regions statewide. Accordingly, the following sections summarize key information in the 2003 plan and provide updated information regarding changed conditions and additional data that have become available. Specifically, this update:

- Identifies significant new research or data that provide a better understanding of current water supplies and demands in the Lower Rio Grande region.
- Presents recent water use information and develops updated projections of future water demand using the common technical approach developed by the NMISC, in order to facilitate incorporation into the New Mexico State Water Plan.
- Identifies strategies, including infrastructure projects, conservation programs, watershed management policies, or other strategies that will help to balance supplies and projected demands and address the Lower Rio Grande region's future water management needs and goals.
- Discusses other goals or priorities as identified by stakeholders in the region.

The water supply and demand information in this regional water plan (RWP) is based on current published studies and data and information supplied by water stakeholders in the region.

The organization of this update follows the template provided in the *Updated Regional Water Planning Handbook: Guidelines to Preparing Updates to New Mexico Regional Water Plans* (NMISC, 2013) (referred to herein as the Handbook):

- Information regarding the public involvement process followed during development of this RWP update and entities involved in the planning process is provided in Section 2.



LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Location of Lower Rio Grande Water Planning Region

Figure 1-1

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- Section 3 provides background information regarding the characteristics of the Lower Rio Grande planning region, including an overview of updated population and economic data.
- The legal framework and constraints that affect the availability of water are briefly summarized in Section 4, with recent developments and any new issues discussed in more detail.
- The physical availability of surface water and groundwater and water quality constraints was discussed in detail in the 2003 RWP; key information from that plan is summarized in Section 5, with new information that has become available since 2003 incorporated as applicable. In addition, Section 5 presents updated monitoring data for temperature, precipitation, drought indices, streamflow, groundwater levels, and water quality, and an estimate of the administrative water supply including an estimate of drought supply.
- The information regarding historical water demand in the planning region, projected population and economic growth, and projected future water demand was discussed in detail in the 2003 RWP. Section 6 provides updated population and water use data, which are then used to develop updated projections of future water demand.
- Based on the current water supply and demand information discussed in Sections 5 and 6, Section 7 updates the projected gap between supply and demand of the planning region.
- Section 8 outlines new strategies (water programs, projects, or policies) identified by the region as part of this update, including additional water conservation measures

Common Technical Approach

To prepare both the regional water plans and the state water plan, the State has developed a set of methods for assessing the available supply and projected demand that can be used consistently in all 16 planning regions in New Mexico. This common technical approach outlines the basis for defining the available water supply and specifies methods for estimating future demand in all categories of water use:

- The method to estimate the available supply (referred to as the *administrative water supply* in the Handbook) is based on withdrawals of water as reported in the *NMOSE Water Use by Categories 2010* report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the diversion is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region. An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts.
- Projections of future demands in nine categories of water use are based on demographic and economic trends and population projections. Consistent methods and assumptions for each category of water use are applied across all planning regions.

The objective of applying this common technical approach is to be able to efficiently develop a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the State's pressing water issues.

Water supply and demand information (Sections 5 through 7) is assessed in accordance with a common technical approach, as identified in the Handbook (NMISC, 2013) (where it is referred to as a common technical *platform*). This common technical approach is a simple methodology that can be used consistently across all regions to assess supply and demand, with the objective of efficiently developing a statewide overview of the balance between supply and demand for planning purposes.

Four terms frequently used when discussing water throughout this plan have specific definitions related to this RWP:

- *Water use* is water withdrawn from a surface or groundwater source for a specific use. In New Mexico water is accounted for as one of the nine categories of use in the *New Mexico Water Use by Categories 2010* report prepared by the New Mexico Office of the State Engineer (NMOSE).
- *Water withdrawal* is water diverted or removed from a surface or groundwater source for use.
- *Administrative water supply* is based on the amount of water withdrawals in 2010 as outlined in the *New Mexico Water Use by Categories 2010* report.
- *Water demand* is the amount of water needed at a specified time.

2. Public Involvement in the Planning Process

During the past two years, the regional water planning steering committees, interested stakeholders, NMISC, and consultants to the NMISC have worked together to develop regional water plan updates. The purpose of this section is to describe public involvement activities during the regional water plan update process, guided by the Handbook, which outlined a public involvement process that allowed for broad general public participation combined with leadership from key water user groups.

2.1 The New Mexico Interstate Stream Commission's Role in Public Involvement in the Regional Water Plan Update Process

The NMISC participated in the public involvement process through a team of contractors and NMISC staff that assisted the regions in conducting public outreach. The NMISC's role in this process consisted of certain key elements:

- Setting up and facilitating meetings to carry out the regional water plan update process.
- Working with local representatives to encourage broad public involvement and participation in the planning process.

- Working to re-establish steering committees in regions that no longer had active steering committees.
- Supporting the steering committees once they were established.
- Facilitating input from the stakeholders and steering committees in the form of compiling comments to the technical sections drafted by the State and developing draft lists of projects, programs, and policies (PPPs) based on meeting input, with an emphasis on projects that could be implemented.
- Finalizing Section 8, Implementation of Strategies to Meet Future Water Demand, by writing a narrative that describes the key collaborative strategies based on steering committee direction.

This approach represents a change in the State's role from the initial round of regional water planning, beginning in the1990s through 2008, when the original regional water plans were developed. During that phase of planning, the NMISC granted regions funding to form their own regional steering committees and hire consultants to write the regional water plans, but NMISC staff were not directly involved in the process. Over time and due to lack of resources, many of the regional steering committees established for the purpose of developing a region's water plan disbanded. Funding for regional planning decreased significantly, and regions were not meeting to keep their plans current.

In accordance with the updated Handbook (NMISC, 2013), the NMISC re-established the regional planning effort in 2014 by working with existing local and regional stakeholders and organizations, such as regional councils of government, water providers, water user organizations, and elected officials. The NMISC initiated the process by hosting and facilitating meetings in all 16 regions between February and August of 2014. During these first months, through its team of consultants and working with contacts in the regions, the NMISC prepared "master stakeholder" lists, comprised of water providers and managers, local government representatives, and members of the public with a general interest in water, and assisted in developing updated steering committees based on criteria from the Handbook and recommendations from the stakeholders. (The steering committee and master stakeholder lists for the Lower Rio Grande are provided in Section 2.2.1 and Appendix 2-A, respectively.) These individuals were identified through research, communication with other water user group representatives in the region, contacting local organizations and entities, and making phone calls. Steering committee members represent the different water users groups identified in the Handbook and have water management expertise and responsibilities.

The steering committee was tasked with four main responsibilities:

- Provide input to the water user groups they represent and ensure that other concerned or interested individuals receive information about the water planning process and meetings.
- Provide direction on the public involvement process, including setting meeting times and locations and promoting outreach.
- Identify water-related PPPs needed to address water management challenges in the region and future water needs.
- Comment on the draft *Lower Rio Grande Water Plan 2016*, as well as gather public comments. (Appendix 2-B includes a summary of comments on the technical and legal sections of the document that were prepared by the NMISC [Sections 1, 3, 4, 5, 6, and 7].)

In 2016, the NMISC continued to support regional steering committees by facilitating three additional steering committee meetings open to the public in each of the 16 regions. The purpose of these meetings was to provide the regions with their draft technical sections that the NMISC had developed and for the regions to further refine their strategies for meeting future water challenges.

Throughout the regional water planning process all meetings were open to the public. Members of the public who have an interest in water were invited directly or indirectly through a steering committee member to participate in the regional water planning process.

Section 2.2 provides additional detail regarding the public involvement process for the Lower Rio Grande 2017 regional water plan.

2.2 Public Involvement in the Lower Rio Grande Region Planning Process

This section documents the steering committee and public involvement process used in updating the plan and documenting ideas generated by the region for future public involvement in the implementation of the plan.

2.2.1 Identification of Regional Steering Committee Members

The Handbook (NMISC, 2013) specifies that the steering committee membership include representatives from multiple water user groups. Some of the categories may not be applicable to a specific region, and the regions could add other categories as appropriate to their specific region. The steering committee representation listed in the Handbook includes:

- Agricultural – surface water user
- Agricultural – groundwater user
- Municipal government

- Rural water provider
- Extractive industry
- Environmental interest
- County government
- Local (retail) business
- Tribal entity
- Watershed interest
- Federal agency
- Other groups as identified by the steering committee

Steering committee members were identified and asked to participate through interviews, public meetings, recommendations, and outreach to specific interests. Through this outreach, the Lower Rio Grande Water Planning Region established a representative steering committee, the members of which are listed in Table 2-1. The process included filling gaps throughout the process and/or changing representatives as notified and or appropriate. As in other regions, some of the changes occurred because of employment, elections, or changes in availability to donate time to this effort.

The steering committee includes several state and federal agency representatives who participate as technical resources to the region. These individuals are generally knowledgeable about water issues in the region and are involved with many of the PPPs related to water management in the region. The list also includes non-profit groups who are involved in and/or have expertise with local water-related initiatives such as watershed restoration or mutual domestic concerns and issues. The steering committee identified Wayne Miller as the chair of the regional water planning effort in 2015; however, Wayne was unable to continue in this role and resigned from the position in 2016. Greg Daviet was named interim chair for the 2016 fiscal year efforts.

The steering committee discussed the value of developing subcommittees/working groups and determined that working groups would be helpful to identify issues and develop strategies to address supply and demand.

- Agriculture
- Domestic and Civic
- Commercial & Industrial
- Environmental
- Quality of Life
- Public Engagement

Table 2-1. Steering Committee Members, Lower Rio Grande Water Planning Region

Water User Group	Name	Organization / Representation
Agricultural – groundwater user	Greg Daviet	Chair of the steering committee FY2016 Chair Agriculture Workgroup
County government	Billy Garrett	Doña Ana County Commissioner
	Angela Roberson	Doña Ana County
	Luis Marmolejo	Doña Ana County
Environmental interest	Kevin Bixby	Southwest Environmental Center Chair, Environmental Workgroup
Extractive industry		
Federal agency	Bill Childress	Area Director, Bureau of Land Management
	Michele Estrada-Lopez	Bureau of Reclamation
	Jose Nunez	Office of the Commissioner, International Boundary and Water Commission
State agency	Chris Canavan	New Mexico Environment Department
	Ryan Ward	New Mexico Department of Agriculture
	Lacy Levine	New Mexico Department of Agriculture
Local (retail) business	Steve Chavira	Las Cruces Home Builders Association
	Wayne Miller	Chair of Steering Committee FY2015 Earthwise Corp (Green Business Development)
Municipal government	Adrienne Widmer	Las Cruces Utility
	Gill Sorg	Las Cruces City Council
	Olga Pedroza	Las Cruces City Council
		Mesilla
	Pat Banegas	Hatch
Other Groups/Organizations Identified by the Steering Committee		
Public utilities	Jose Terrones	Anthony Water District
Rural water provider	Kurt Anderson	Doña Ana Mutual Domestic Water Consumers Association
	Josh Orozco	Camino Real Regional Utility Authority
Watershed interest	Conrad Keyes	Chair, Paso del Norte Watershed Council
Academic institution	Sam Fernald	Water Resources Research Institute
	Blane Sanchez	Water Resources Research Institute

- Technical Advisory Group
- Domestic Water Providers Working Group

The role of the working groups or committees was to provide stakeholders an opportunity to review the 2003 plan and provide input into the new plan. The work groups were led by steering committee members. The Public Engagement Committee conducted surveys and interviews of various constituencies in the planning region to gain a better understanding of the public's perspectives. Results of this outreach effort are provided in Appendix 2-C. The work of the Environmental Committee is described in Section 6.1. Information about the other working groups' activities was not available.

2.2.2 Regional Water Plan Update Meetings

All steering committee meetings and NMISC -facilitated water planning meetings were open to the public and interested stakeholders. Meetings were announced to the master stakeholder list by e-mail for NMISC-facilitated meetings, and participation from all meeting attendees was encouraged. Steering committee members served as a conduit of information to others and, through their own organizational communications with other agencies, encouraged participation in the process. Steering committee members were also asked to share information about the process with other stakeholders in the region. Generally, steering committee members ensured that other concerned or interested individuals received the announcements and recommended key contacts to add to the master stakeholder list throughout the planning process.

The steering committee discussed and made the following recommendations regarding meeting times and locations that would maximize public involvement:

- Meetings should be held in Las Cruces, a central point for the region.
- Doña Ana County or City of Las Cruces facilities will be used as needed.
- Weekdays during the day were the best meeting times; however, the group felt that weekends or evenings could increase participation.
- Chairs of each working group will organize meetings with working group members. These meetings will not be facilitated by NMISC contractors.
- Steering committee members will continue to assist with outreach.

Over the two-year update process, the NMISC held eight meetings (and one conference call) in the Lower Rio Grande region. In addition, the steering committee held three meetings during fiscal year 2015 of the two-year period that were facilitated by Wayne Miller, chair of the steering committee. Wayne's expertise as an organizational development expert helped to initially guide the steering committee toward specific goals and objectives. A summary of each of the NMISC-facilitated and steering committee meetings is provided in Table 2-2.

Table 2-2. Lower Rio Grande Region Public Meetings

Date	Location	Purpose	Meeting Summary
FY 2014			
05/21/2014	Dona Ana County Commission Chambers, Las Cruces, NM	NMISC-facilitated meeting – Kickoff meeting: Present the regional water planning update process to the region; discuss roles of the region and conduct outreach to begin building the steering committee.	Representatives from many of the water user groups attended the meeting and were instrumental in identifying other individuals as potential representatives for a particular group. Many of the meeting attendees were not on the master stakeholder list, and those individuals were added to the list.
FY 2015			
01/13/2015	Dona Ana County Commission Chambers, Las Cruces, NM	NMISC-facilitated meeting – Present the technical data compiled and synthesized for the region.	Data presented included population and economic trends through a series of tables, the administrative water supply, the projected future water demand, and the gap between supply and demand for both normal and drought years. In addition, the presentation reaffirmed the development of a steering committee to guide the process as outlined in the Handbook.
02/12/2015	City of Las Utility Bldg., Las Cruces, NM	Steering committee meeting – Review of the update process, development of the steering committee, and discussion about principles of the planning effort.	The group reviewed the survey from past and future projects and projects, programs, and policies (PPPs) that would be included as well as the timeline for the update.
04/08/2015	Women's Improvement Association Bldg., Las Cruces, NM	Steering committee meeting – Review the steering committee makeup and lawsuits affecting the region. Develop surveys to gather information from stakeholders as well as one-on-one interviews. Discuss public involvement plan for future implementation.	The group reviewed the steering committee makeup and made suggestions for new members. Subcommittees/ working groups were developed at the meetings and the working groups reported on their work. The steering committee developed ideas for additional outreach.
FY 2016			
04/23/2015	Las Cruces Community Enterprise Center Classroom, Las Cruces, NM	Steering committee meeting – Develop a work plan to complete the update in the NMISC timeline.	The group reviewed and discussed the alternatives developed in the 2003 plan and discussed any potential updates or revisions.

Table 2-2. Lower Rio Grande Region Public Meetings

Date	Location	Purpose	Meeting Summary
05/07/2015	Las Cruces City Hall, Las Cruces, NM	NMISC-facilitated meeting – Review strategies from previous planning effort; review new project ideas and timeline for completion and public involvement strategies.	The group continued to review the alternatives from the 2003 plan. The group further discussed potential collaborative projects such as agriculture/acequia projects, water system regionalization/cooperation, monitoring/data collection, watershed restoration, drought contingency planning, municipal conservation and reuse, local and state water policy recommendations, endangered species projects, and water quality protection.
5/27/2015	Las Cruces City Hall, Las Cruces, NM	NMISC-facilitated meeting – Discuss the public involvement chapter and ideas for FY 2016.	The group participated in a brainstorming activity that helped to identify overarching concerns with the planning process and how to make the process as beneficial as possible. Next steps were affirmed and a general idea for meeting again in FY 2016.
02/24/2016	Dona Ana County Commission Chambers, Las Cruces, NM	NMISC-facilitated meeting – Brief review of update roles, process, timeline, and objectives, steering committee roles and responsibilities, public involvement (Section 2), process for completing all tasks and commenting on the draft plan. Projects, programs, and policies (Section 8) next steps.	Reviewed state-developed sections and the role of NMISC and contractors in the development of specific sections, and affirmed the role of the steering committee in the update process. Reviewed key collaborative projects, PPP list and additions. Reviewed process for commenting on the technical approach and next steps.
03/14/2016	Conference call with NMISC and consultants	Conference call on process for completing all tasks and commenting on the draft plan.	Followup to February meeting to clarify process for moving forward, specific questions regarding the role of the steering committee.
04/05/2016	Dona Ana County Commission Chambers, Las Cruces, NM	NMISC-facilitated meeting – Collect feedback on PPP lists; refine collaborative project recommendations • Discuss process and next steps for comments on draft updates • Refine collaborative project recommendations	The group identified a number of projects that would potentially have greater interest and benefit multiple stakeholders, and added additional information in a small group format using worksheets. The final meeting was scheduled for June 7, 2016.

Table 2-2. Lower Rio Grande Region Public Meetings
Page 3 of 3

Date	Location	Purpose	Meeting Summary
06/07/2016	Las Cruces City Hall, Las Cruces, NM	NMISC-facilitated meeting – Reach consensus on Sections 2 and 8; review comments received on the technical approach and develop ideas for implementation and next steps.	The group added comments and edits to Sections 2 and 8, and selected presenters of the plan to the NMISC.

2.2.3 Current and Future Ideas for Public Outreach during Implementation of the Regional Water Plan Update

The steering committee identified the following process for additional public outreach:

- The local governments will continue to post information about RWP activities on their websites. The group also suggested that regular updates be made to the various governing bodies.
- Meetings will continue to be in Las Cruces.

3. Description of the Planning Region

This section provides a general overview of the Lower Rio Grande Water Planning Region. Detailed information, including maps illustrating the land use and general features of the region, was provided in the 2003 RWP (except for some of the region's declared underground water basins [UWBs]); that information is briefly summarized and updated as appropriate here, including a description of the other declared UWBs in the planning region . Additional detail on the climate, water resources, and demographics of the region is provided in Sections 5 and 6.

3.1 General Description of the Planning Region

The Lower Rio Grande Water Planning Region is located in south-central New Mexico and includes all of Doña Ana County. The region is bounded on the north by Sierra County, on the west by Sierra and Luna counties, on the south by the international border with Mexico and the Texas state line, and on the east by Otero County (Figure 1-1). The total area of the planning region is approximately 3,814 square miles.

The current area of the Lower Rio Grande Water Planning Region differs somewhat from the area addressed in the accepted plan (Terracon et al., 2003). For the 2003 plan, the region coincided with NMOSE's Lower Rio Grande surface water basin, which extends to Elephant Butte Dam, and the previously drawn region therefore included the area within Sierra County downstream of Elephant Butte Reservoir. The northern boundary of the current water planning region is the Doña Ana County-Sierra County line. The region includes a number of areas outside the Lower Rio Grande surface water basin that provide water to users in Doña Ana County.

Agriculture is the predominant land use in the Lower Rio Grande region. Las Cruces is the major city. There has been a small amount of historical mining in the region, primarily in the Organ Mountains. New Mexico State University in Las Cruces is also an important asset to the region.

3.2 Climate

The climate of the Lower Rio Grande region is arid continental, characterized by low annual precipitation (8 to 10 inches) in the valleys and more than 20 inches in the higher terrain. Precipitation falls mostly as rain during the summer monsoon season, but winter temperatures are low enough for occasional snowfall events. Average annual temperatures are around 61 to 75 degrees Fahrenheit (°F).

3.3 Major Surface Water and Groundwater Sources

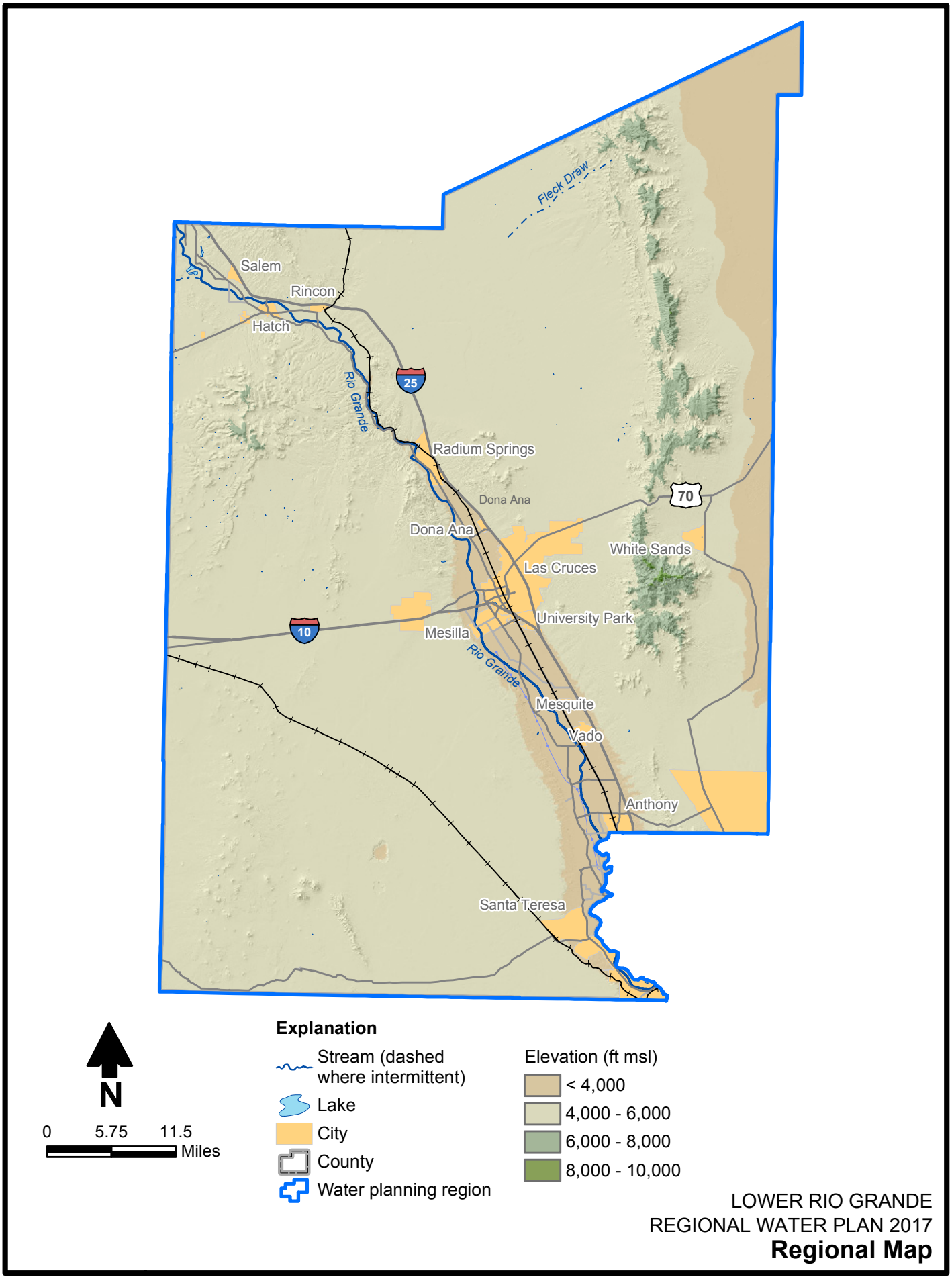
The predominant water supply in the Lower Rio Grande region is the Rio Grande (Figure 3-1), which flows through the center of the planning region and provides 60 percent of the water supply, predominantly for irrigation. Groundwater is derived primarily from the alluvial and basin fill aquifers that have formed in the rift valleys of the Lower Rio Grande and the non-stream connected aquifers of the Tularosa, Jornada, Hueco, Nutt-Hockett, Mimbres and Mount Riley groundwater basins. The Nutt-Hockett Basin is stream-connected, but it is treated as non-stream connected for planning purpose due to the relatively high rates of drawdown observed in this basin.

The Lower Rio Grande Water Planning Region overlies parts of the Tularosa, Lower Rio Grande, Nutt-Hockett, Hueco, Mimbres, and Mount Riley Declared Underground Water Basins (UWBs). (A declared UWB is an area of the state proclaimed by the State Engineer to be underlain by a groundwater source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of groundwater from the source.) These basins are shared with the following water planning regions:

- Tularosa: Estancia Basin, Socorro-Sierra, and Tularosa-Salt-Sacramento Basins
- Lower Rio Grande: Socorro-Sierra
- Nutt-Hockett: Socorro-Sierra, Southwest New Mexico
- Mimbres: Southwest New Mexico, Socorro-Sierra

The Hueco UWB falls almost entirely within the Lower Rio Grande region, with just a small section extending into the Tularosa-Salt-Sacramento Basins region, and the Mount Riley UWB falls entirely within the Lower Rio Grande region. A map showing the UWBs in the region is provided in Section 4.1.2.2.

Additional information on administrative basins and surface and groundwater resources of the region is included in Section 4 and Sections 5.2 and 5.3, respectively.



LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Regional Map

Figure 3-1

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3.4 Demographics, Economic Overview, and Land Use

The Lower Rio Grande Water Planning Region is composed of one county, Doña Ana, located in south-central New Mexico. The federal government owns 75 percent of the land in the planning region. Most of the County's private land is located in the agricultural valley along the Rio Grande and within the City of Las Cruces (Viva Doña Ana, 2013).

Doña Ana County is the second most populous county in New Mexico; the total 2013 population of the county was 213,460 (U.S. Census Bureau, 2014a). As shown in Table 3-1, between 2010 and 2013 the population of Doña Ana County increased by 2.0 percent.

The largest employment categories in Doña Ana County are education/healthcare, retail trade, arts, entertainment, recreation, accommodation, professional, scientific, and management, construction, and government. Current statistics on the economy and land use in the county, compiled from the U.S. Census Bureau and the New Mexico Department of Workforce Solutions, are summarized in Table 3-1. Additional detail on demographics and economics within the region is provided in Section 6.

Land in the Lower Rio Grande Water Planning Region is owned by various federal, state, and private entities, as illustrated on Figure 3-2 and outlined below:

- Federal agencies: 2,852 square miles
- State agencies: 357 square miles
- Private entities: 605 square miles

4. Legal Issues

4.1 Relevant Water Law

4.1.1 State of New Mexico Law

Since the accepted regional water plan for the Lower Rio Grande Water Planning Region was published in 2003, there have been significant changes in New Mexico water law through case law, statutes, and regulations. These changes address statewide issues including, but not limited to, domestic well permitting, the State Engineer's authority to regulate water rights, administrative and legal review of water rights matters, use of settlements to allocate water resources, the rights appurtenant to a water right, and acequia water rights. New law has also been enacted to address water project financing and establish a new strategic water reserve. These general state law changes are addressed by topic area below. State law more specific to the Lower Rio Grande region is discussed in Section 4.1.2.

Table 3-1. Summary of Demographic and Economic Statistics for the Lower Rio Grande Water Planning Region

a. Population

County	2000	2010	2013
Doña Ana	174,690	209,233	213,460
Total Region	174,690	209,233	213,460

Source: U.S. Census Bureau, 2014a

b. Income and Employment

County	2012 Income [a]		Labor Force Annual Average 2013 [b]		
	Per Capita ($)	Percentage of State Average	Number of Workers	Number Employed	Unemployment Rate (%)
Doña Ana	19,517	82.2	92,830	85,859	7.5

[a] U.S. Census Bureau, 2014c

[b] New Mexico Department of Workforce Solutions, 2014

c. Business Environment

County	Industry	Number Employed	Number of Businesses
	2008-2012 [a]		*2012* [b]
Doña Ana	Education/Healthcare	27,395	3,567
	Retail trade	10,201	
	Arts, entertainment, recreation, accommodation	8,026	
	Professional, scientific, management	7,451	
	Construction	7,368	
	Government	5,649	

[a] U.S. Census Bureau, 2014b

[b] U.S. Census Bureau, 2014c

Table 3-1. Summary of Demographic and Economic Statistics for the Lower Rio Grande Water Planning Region

d. Agriculture

County [a]	Farms / Ranches			Most Valuable Agricultural Commodities
	Number	Acreage		
		Total	Average	
Doña Ana	2,184	659,970	302	Milk from cows Fruits, tree nuts, berries Vegetables, melons Other crops and hay

[a] USDA NASS, 2014 (some sales data withheld to avoid disclosure for individual operations)

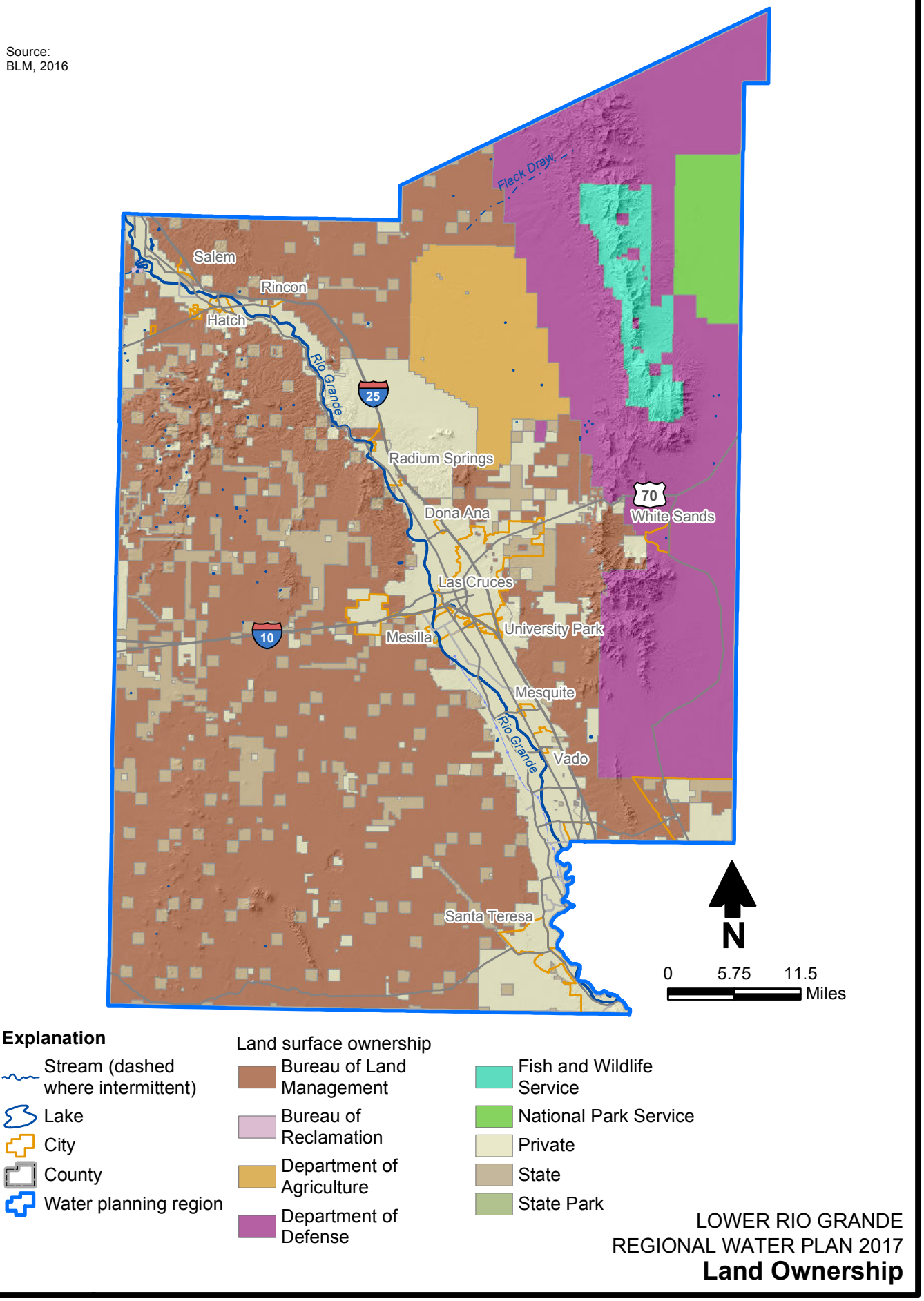

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Figure 3-2

4.1.1.1 Regulatory Powers of the NMOSE

Several cases have addressed the regulatory powers of the NMOSE. In 2003, the New Mexico Legislature enacted NMSA 1978, § 72-2-9.1, relating to the administration of water rights by priority date. The legislature recognized that "the adjudication process is slow, the need for water administration is urgent, compliance with interstate compacts is imperative and the state engineer has authority to administer water allocations in accordance with the water right priorities recorded with or declared or otherwise available to the state engineer." Section 72-2-9.1(A). The statute authorized the State Engineer to adopt rules for priority administration in a manner that does not interfere with future or pending adjudications, creates no impairment of water rights other than what is required to enforce priorities, and creates no increased depletions.

Based on Section 72-2-9.1, the State Engineer promulgated the Active Water Resource Management (AWRM) regulations in December 2004. The regulation's stated purpose is to establish the framework for the State Engineer "to carry out his responsibility to supervise the physical distribution of water to protect senior water right owners, to assure compliance with interstate stream compacts and to prevent waste by administration of water rights." 19.25.1.6 NMAC. In order to carry out this purpose, the AWRM regulations provide the framework for the promulgation of specific water master district rules and regulations. No district-specific AWRM regulations have been promulgated in the Lower Rio Grande region at the time of writing.

The general AWRM regulations set forth the duties of a water master to administer water rights in the specific district under the water master's control. Before the water master can take steps to manage the district, AWRM requires the NMOSE to determine the "administrable water rights" for purposes of priority administration. The State Engineer determines the elements, including priority date, of each user's administrable water right using a hierarchy of the best available evidence, in the following order: (A) a final decree or partial final decree from an adjudication, (B) a subfile order from an adjudication, (C) an offer of judgment from an adjudication, (D) a hydrographic survey, (E) a license issued by the State Engineer, (F) a permit issued by the State Engineer along with proof of beneficial use, and G) a determination by the State Engineer using "the best available evidence" of historical beneficial use. Once determined, this list of administrable water rights is published and subject to appeal, 19.25.13.27 NMAC, and once the list is finalized, the water master may evaluate the available water supply in the district and manage that supply according to users' priority dates.

The general AWRM regulations also allow for the use of replacement plans to offset the depletions caused by out-of-priority water use. The development, review, and approval of replacement plans will be based on a generalized hydrologic analysis developed by the State Engineer.

The general AWRM regulations were unsuccessfully challenged in court in *Tri-State Generation and Transmission Ass'n, Inc. v. D'Antonio*, 2012-NMSC-039. In this case, the New Mexico Supreme Court analyzed whether Section 72–2–9.1 provided the State Engineer with the authority to adopt regulations allowing it to administer water rights according to interim priority determinations developed by the NMOSE.

In *Tri-State* the Court held that (1) the Legislature delegated lawful authority to the State Engineer to promulgate the AWRM regulations, and (2) the regulations are not unconstitutional on separation of powers, due process, or vagueness grounds. Specifically, the Court found that establishing such regulations does not violate the constitutional separation of powers because AWRM regulations do not go beyond the broad powers vested in the State Engineer, including the authority vested by Section 72–2–9.1. The Court further found that the AWRM regulations did not violate the separation of powers between the executive and the judiciary despite the fact that the regulations allow priorities to be administered prior to an *inter se* adjudication of priority. Rather, the Legislature chose to grant quasi-judicial authority in administering priorities prior to final adjudication to the NMOSE, which was well within its discretion to do.

The Court further held that the AWRM regulations do not violate constitutional due process because they do not deprive the party challenging the regulations of a property right. As explained by the Court, a water right is a limited, usufructuary right providing only a right to use a certain amount of water established through beneficial use. As such, based on the long-standing principle that a water right entitles its holder to the use of water according to priority, regulation of that use by the State does not amount to a deprivation of a property right.

In addition to *Tri-State*, several cases that address other aspects of the regulatory powers of the NMOSE have been decided recently. Priority administration was addressed in a case concerning the settlement agreement entered into by the United States, New Mexico (State), the Carlsbad Irrigation District (CID), and the Pecos Valley Artesian Conservancy District (PVACD) related to the use of the waters of the Pecos River. *State ex rel. Office of the State Engineer v. Lewis*, 2007-NMCA-008, 140 N.M. 1. The issues in the case revolved around (1) the competing claims of downstream, senior surface water users in the Carlsbad area and upstream, junior groundwater users in the Roswell Artesian Basin and (2) the competing claims of New Mexico and Texas users. Through the settlement agreement, the parties sought to resolve these issues through public funding, without offending the doctrine of prior appropriation and without resorting to a priority call.

The settlement agreement was, in essence, a water conservation plan designed to augment the surface flows of the lower Pecos River in order to (1) secure the delivery of water within the CID, (2) meet the State's obligations to Texas under the 1948 Pecos River Compact (Compact) and the 1988 U.S. Supreme Court Decree, and (3) limit the circumstances under which the United States and CID would be entitled to make a call for the administration of water right

priorities. The agreement included the development of a well field to facilitate the physical delivery of groundwater directly into the Pecos River under certain conditions, the purchase and transfer to the well field of existing groundwater rights in the Roswell UWB by the State, and the purchase and retirement of irrigated land within PVACD and CID.

The Court of Appeals framed the issue as whether the priority call procedure is the exclusive means under the doctrine of prior appropriation to resolve existing and projected future water shortage issues. The Court held that Article XVI, Section 2 of the Constitution, which states that "[p]riority of appropriation shall give the better right," and Article IX of the Compact, which states that "[i]n maintaining the flows at the New Mexico-Texas state line required by this compact, New Mexico shall in all instances apply the principle of prior appropriation within New Mexico," do not require a priority call as the sole response to water shortage concerns. The Court found it reasonable to construe these provisions to permit flexibility within the prior appropriation doctrine in attempting to resolve longstanding water issues. Thus, the more flexible approach pursued by the settling parties through the settlement agreement was not ruled out in the Constitution, the Compact, or case precedent.

In relation to the NMOSE's regulatory authority over supplemental wells, in *Herrington v. State of New Mexico ex rel. State Engineer*, 2006-NMSC-014, 139 N.M. 368, the New Mexico Supreme Court clarified certain aspects of the *Templeton* doctrine. The *Templeton* doctrine allows senior surface water appropriators impaired by junior wells to drill a supplemental well to offset the impact to their water right. (See *Templeton v. Pecos Valley Artesian Conservancy District*, 1958-NMSC-131, 65 N.M. 59. According to *Templeton*, drilling the supplemental well allows the senior surface right owner to keep their surface water right whole by drawing upon groundwater that originally fed the surface water supply. Although the New Mexico prior appropriation doctrine theoretically does not allow for sharing of water shortages, the *Templeton* doctrine permits both the aggrieved senior surface appropriator and the junior user to divert their full share of water. The requirements for a successful *Templeton* supplemental well include (1) a valid surface water right, (2) surface water fed in part by groundwater (baseflow), (3) junior appropriators intercepting that groundwater by pumping, and (4) a proposed well that taps the same groundwater source of the applicant's original appropriation.

In *Herrington* the Court clarified that the well at issue would meet the *Templeton* requirements if it was dug into the same aquifer that fed the surface water. The Court also clarified whether a *Templeton* well could be drilled upstream of the surface point of diversion. The Court determined that the proper placement of a *Templeton* well must be considered on a case-by-case basis, and that these supplemental wells are not necessarily required to be upstream in all cases.

Lastly, the Court addressed the difference between a *Templeton* supplemental well and a statutory supplemental well drilled under NMSA 1978, Sections 72–5–23, -24 (1985). The Court found that a statutory transfer must occur within a continuous hydrologic unit, which

differs from the narrow *Templeton* same-source requirement. Although surface to groundwater transfers require a hydrologic connection, this may be a more general determination than the *Templeton* baseflow source requirement. Further, *Templeton* supplemental wells service the original parcel, while statutory transfers may apply to new uses of the water, over significant distances.

Also related to the NMOSE's regulatory authority, the Court of Appeals addressed unperfected water rights in *Hanson v. Turney*, 2004-NMCA-069, 136 N.M. 1. In *Hanson*, a water rights permit holder who had not yet applied the water to beneficial use sought to transfer her unperfected water right from irrigation to subdivision use. The State Engineer denied the application because the water had not been put to beneficial use. The permit holder argued that pursuant to NMSA 1978, Section 72-12-7(A) (1985), which allows the owner of a "water right" to change the use of the water upon application to the State Engineer, the State Engineer had wrongly rejected her application. The Court upheld the denial of the application, finding that under western water law the term "water right" does not include a permit to appropriate water when no water has been put to beneficial use. Accordingly, as used in Section 72-12-7(A) the term "water right" requires the perfection of a water right through beneficial use before a transfer can be allowed.

4.1.1.2 Legal Review of NMOSE Determinations

In *Lion's Gate Water v. D'Antonio*, 2009-NMSC-057, 147 N.M. 523, the Supreme Court addressed the scope of the district court's review of the State Engineer's determination that no water is available for appropriation. In *Lion's Gate*, the applicant filed a water rights application, which the State Engineer rejected without publishing notice of the application or holding a hearing, finding that no water was available for appropriation. The rejected application was subsequently reviewed in an administrative proceeding before the State Engineer's hearing examiner. The hearing examiner upheld the State Engineer's decision on the grounds that there was no unappropriated water available for appropriation.

This ruling was appealed to the district court, which determined that it had jurisdiction to hear all matters either presented or that might have been presented to the State Engineer, as well as new evidence developed since the administrative hearing. The NMOSE disagreed, arguing that only the issue of whether there was water available for appropriation was properly before the district court. The Supreme Court agreed with the NMOSE. The Court found that the comprehensive nature of the water code's administrative process, its mandate that a hearing must be held prior to any appeal to district court, and the broad powers granted to the State Engineer clearly express the Legislature's intent that the water code provide a complete and exclusive means to acquire water rights. Accordingly, the NMOSE was correct that the district court's *de novo* review of the application was limited to what the State Engineer had already addressed administratively, in this case whether unappropriated water was available.

The Court also held that the water code does not require publication of an application for a permit to appropriate if the State Engineer determines no water is available for appropriation, because no third-party rights are implicated unless water is available. If water is deemed to be available, the State Engineer must order notice by publication in the appropriate form.

Based in large part on the holding in *Lion's Gate*, the New Mexico Court of Appeals in *Headon v. D'Antonio*, 2011-NMCA-058, 149 N.M. 667, held that a water rights applicant is required to proceed through the administrative process when challenging a decision of the State Engineer. In *Headon* the applicant challenged the NMOSE's determination that his water rights were forfeited. To do so, he filed a petition seeking declaratory judgment as to the validity of his water rights in district court, circumventing the NMOSE administrative hearing process. 2011-NMCA-058, ¶¶ 2-3. The Court held that the applicant must proceed with the administrative hearing, along with its *de novo* review in district court, to challenge the findings of the NMOSE.

Legal review of NMOSE determinations was also an issue in *D'Antonio v. Garcia*, 2008-NMCA-139,145 N.M. 95, where the Court of Appeals made several findings related to NMOSE administrative review of water rights matters. *Garcia* involved an NMOSE petition to the district court for enforcement of a compliance order after the NMOSE hearing examiner had granted a motion for summary judgment affirming the compliance order. 2008-NMCA-139, ¶¶ 2-5. The Court first found that the right to a hearing granted in NMSA 1978, § 72-2-16 (1973), did not create an absolute right to an administrative hearing. Rather, the NMOSE hearing contemplated in Section 72-2-16 could be waived if a party did not timely request such a hearing. *Id*. ¶ 9. In *Garcia* the defendant had not made such a timely request and therefore was not entitled to a full administrative hearing prior to issuance of an order by the district court.

The Court also examined the regulatory powers of the NMOSE hearings examiner, specifically, whether 19.25.2.32 NMAC allows the hearing examiner to issue a final order without the express written consent of the State Engineer. *Id*. ¶¶ 11-15. The Court held that the regulation allowed the hearing examiner to dismiss a case without the express approval of the State Engineer. *Id*. ¶ 14. Finally, the Court held that the NMOSE hearing examiner may dismiss a case without full hearing when a party willfully fails to comply with the hearing examiner's orders. *Id*. ¶¶ 17-18. Accordingly, the Court in *Garcia* upheld the NMOSE hearing examiner's action to issue a compliance order without a full administrative hearing or final approval by the State Engineer. As such, the district court had the authority to enforce that compliance order.

4.1.1.3 Beneficial Use of Water – Non-Consumptive Use

Carangelo v. Albuquerque-Bernalillo County Water Utility Authority, 2014-NMCA-032, addressed whether a non-consumptive use of water qualifies as a beneficial use under New Mexico law and, accordingly, can be the basis for an appropriation of such water. In *Carangelo*, the NMOSE granted the Albuquerque-Bernalillo County Water Utility Authority's (Authority's) application to divert approximately 45,000 acre-feet per year of Rio Grande surface water, to

which the Authority had no appropriative right. The Authority intended to use the water for the non-consumptive purpose of "carrying" the Authority's own San Juan-Chama Project water, Colorado River Basin water to which the Authority had contracted for use of, to a water treatment plant for drinking water purposes. The Court of Appeals found the NMOSE erred in granting the application because the application failed to seek a new appropriation. The Authority's application sought to divert water, to which the Authority asserted no prior appropriative right, which required a new appropriation. Moreover, the Authority affirmatively asserted no beneficial use of the water. The Court remanded the matter to the NMOSE to issue a corrected permit.

The Court's decision included the following legal conclusions:

- A new non-consumptive use of surface water in a fully appropriated system requires a new appropriation of water. A "non-consumptive use" is a type of water use where either there is no diversion from a source body or there is no diminishment of the source. Neither the New Mexico Constitution nor statutes governing the appropriation of water distinguish between diversion of water for consumptive and non-consumptive uses. Because both can be beneficial uses, New Mexico's water law applies equally to either.

- The Authority did not need to file for a change in place or purpose of use for the diversion of its San Juan-Chama Project water. The Court stated that the San Juan-Chama Project water does not come from the Rio Grande Basin, and the Authority's entitlement to its beneficial use is not within the administrative scope of the Rio Grande Basin. Accordingly, the Authority already had an appropriative right to that water and did not need to file an application with the NMOSE for its use.

4.1.1.4 Impairment

Montgomery v. Lomos Altos, Inc., 2007-NMSC-002, 141 N.M. 21, involved applications to transfer surface water rights to groundwater points of diversion in the fully appropriated Rio Grande stream system. In order for a transfer to be approved, an applicant must show, among other factors, that the transfer will not impair existing water uses at the move-to location. In *Lomos Altos*, several parties protested the NMOSE's granting of the applications, arguing that surface depletions at the move-to location caused by the applications should be considered *per se* impairment of existing rights. The Court found that questions of impairment are factual and cannot be decided as a matter of law, but must be determined on a case-by-case basis. In doing so, the Court held that surface depletions in a fully appropriated stream system do not result in *per se* impairment, but the Court noted that under some circumstances, even *de minimis* depletions can lead to a finding of impairment. The Court further found that in order to determine impairment, all existing water rights at the "move-to" location must be considered.

4.1.1.5 Rights Appurtenant to Water Rights

The New Mexico Supreme Court has issued three recent opinions dealing with appurtenancy. *Hydro Resources Corp. v. Gray*, 2007-NMSC-061, 143 N.M. 142, involved a dispute over ownership of water rights developed by a mining lessee in connection with certain mining claims owned by the lessor. The Supreme Court held that under most circumstances, including mining, water rights are not considered appurtenant to land under a lease. The sole exception to the general rule that water rights are separate and distinct from the land is water used for irrigation. Therefore, a lessee can acquire water rights on leased land by appropriating water and placing it to beneficial use. Those developed rights remain the property of the lessee, not the lessor, unless stipulated otherwise in an agreement.

In a case examining whether irrigation water rights were conveyed with the sale of land or severed prior to the sale (*Turner v. Bassett*, 2005-NMSC-009, 137 N.M. 381), the Supreme Court examined New Mexico's transfer statute, NMSA 1978, Section 72-5-23 (1941), along with the NMOSE regulations addressing the change of place or purpose of use of a water right, 19.26.2.11(B) NMAC. The Court found that the statute, coupled with the applicable regulations and NMOSE practice, requires consent of the landowner and approval of the transfer application by the State Engineer for severance to occur. The issuance of a permit gives rise to a presumption that the water rights are no longer appurtenant to the land. A landowner who holds water rights and follows the statutory and administrative procedures to effect a severance and initiate a transfer may convey the land severed from its former water rights, without necessarily reserving those water rights in the conveyance documents.

In *Walker v. United States*, 2007-NMSC-038, 142 N.M. 45, the New Mexico Supreme Court examined the issue of whether a water right includes an implicit right to graze. After the U.S. Forest Service canceled the Walkers' grazing permits, the Walkers filed a complaint arguing that the United States had taken their property without just compensation in violation of the Fifth Amendment to the United States Constitution. The Walkers asserted a property right to the allotments under New Mexico state law. Specifically, the Walkers argued that the revocation of the federal permit resulted in the loss of "water, forage, and grazing" rights based on New Mexico state law and deprived them of all economically viable use of their cattle ranch.

The Court found that a stock watering right does not include an appurtenant grazing right. In doing so, the Court addressed in depth the long understood principle in western water law that water rights, unless utilized for irrigation, are not appurtenant to the land on which they are used. The Court also clarified that the beneficial use for which a water right is established does not guarantee the water right owner an interminable right to continue that same beneficial use. The Walkers could have transferred their water right to another location or another use if they could not continue with the original uses. For these reasons, the Court rejected the Walkers attempt to make an interest in land incident or appurtenant to a water right.

4.1.1.6 Deep, Non-Potable Aquifers

In 2009 the New Mexico Legislature amended NMSA 1978, Section 72-12-25 (2009), to provide for administrative regulation of deep, non-potable aquifers. These groundwater basins are greater than 2,500 feet deep and contain greater than 1,000 parts per million of total dissolved solids. Drilling wells into such basins had previously been unregulated. The amendment requires the NMOSE to conduct hydrologic analysis on well drilling in these basins. The type of analysis required by the NMOSE depends on the use for the water.

4.1.1.7 Domestic Wells

New Mexico courts have recently decided several significant cases addressing domestic well permitting, and the NMOSE also recently amended its regulations governing domestic wells.

In *Bounds v. State ex rel. D'Antonio*, 2013-NMSC-037, the New Mexico Supreme Court upheld the constitutionality of New Mexico's Domestic Well Statute (DWS), NMSA 1978, § 72-12–1.1 (2003). Bounds, a rancher and farmer in the fully appropriated and adjudicated Mimbres basin, and the New Mexico Farm and Livestock Bureau (Petitioners), argued that the DWS was facially unconstitutional. The DWS states that the NMOSE "shall issue" domestic well permits, without determining the availability of unappropriated water or providing other water rights owners in the area the ability to protest the well. The Petitioners argued that this practice violated the New Mexico constitutional doctrine of prior appropriation to the detriment of senior water users, as well as due process of law. The Court held that the DWS does not violate the doctrine of prior appropriation set forth in the New Mexico Constitution. The Court also held that Petitioners failed to adequately demonstrate any violation of their due process rights.

In addressing the facial constitutional challenge, the Court rejected the Petitioners' argument that the New Mexico Constitution mandates that the statutory requirements of notice, opportunity to be heard, and a prior determination of unappropriated waters or lack of impairment be applied to the domestic well application and permitting process. The Court reasoned that the DWS creates a different and more expedient permitting procedure for domestic wells and the constitution does not require a particular permitting process, or identical permitting procedures, for all appropriations. While holding that the DWS was valid in not requiring the same notice, protest, and water availability requirements as other water rights applications, the court confirmed that domestic well permits can be administered in the same way as all other water rights. In other words, domestic wells do not require the same rigors as other water rights when permitted but, when domestic wells are administered, constitutionally mandated priority administration still applies. Thus the DWS, which deals solely with permitting and not with administration, does not conflict with the priority administration provisions of the New Mexico Constitution.

The Court also found that the Petitioners failed to prove a due process violation because they did not demonstrate how the DWS deprived them of their water rights. Specifically, Bounds failed to show any actual impairment, or imminent future impairment, of his water rights. Bounds

asserted that any new appropriations must necessarily cause impairment in a closed and fully appropriated basin, and therefore, granting any domestic well permit had the potential to impair his rights. The Court rejected this argument, finding that impairment must be proven using scientific analysis, not simply conclusory statements based on a bright line rule that impairment always occurs when new water rights are permitted in fully appropriated basins.

Two other significant domestic well decisions addressed domestic well use within municipalities. In *Smith v. City of Santa Fe*, 2007-NMSC-055, 142 N.M. 786, the Supreme Court examined the authority of the City of Santa Fe to enact an ordinance restricting the drilling of domestic wells. The Court held that under the City's home rule powers, it had authority to prohibit the drilling of a domestic well within the municipal boundaries and that this authority was not preempted by existing state law.

Then in *Stennis v. City of Santa Fe*, 2008-NMSC-008, 143 N.M. 320, Santa Fe's domestic well ordinance was tested when a homeowner (Stennis) applied for a domestic well permit with the NMOSE, but did not apply for a permit from the City. In examining the statute allowing municipalities to restrict the drilling of domestic wells, the Court found that municipalities must strictly comply with NMSA 1978, Section 3–53–1.1(D) (2001), which requires cities to file their ordinances restricting the drilling of domestic water wells with the NMOSE. On remand, the Court of Appeals held that Section 3-53-1.1(D) does not allow for *substantial* compliance. *Stennis v. City of Santa Fe*, 2010-NMCA-108, 149 N.M. 92. Rather, strict compliance is required and the City must have actually filed a copy of the ordinance with the NMOSE.

In addition to the cases addressing domestic wells, the regulations governing the use of groundwater for domestic use were substantially amended in 2006 to clarify domestic well use pursuant to NMSA 1978, Section 72-12-1.1. 19.27.5.1 et seq. NMAC. The regulations:

1. Limit the amount of water that can be used pursuant to a domestic well permit to:

    - 1.0 acre-feet per year (ac-ft/yr) for a single household use (can be increased to up to 3.0 ac-ft/yr if the applicant can show that the combined diversion from domestic wells will not impair existing water rights).

    - 1.0 ac-ft/yr for each household served by a well serving more than one household, with a cap of 3.0 ac-ft/yr if the well serves three or more households.

    - 1.0 ac-ft/yr for drinking and sanitary purposes incidental to the operations of a governmental, commercial, or non-profit facility as long as no other water source is available. The amount of water so permitted is subject to further limitations imposed by a court or a municipal or county ordinance.

    The amount of water that can be diverted from a domestic well can also be increased by transferring an existing water right to the well. 19.27.5.9 NMAC.

2. Require mandatory metering of all new domestic wells under certain conditions, such as when wells are permitted within a domestic well management area, when a court imposes a metering requirement, when the water use is incidental to the operations of a governmental, commercial, or non-profit facility, and when the well serves multiple households. 19.27.5.13(C) NMAC.

3. Allow for the declaration of domestic well management areas when hydrologic conditions require added protections to prevent impairment to valid, existing surface water rights. In such areas, the maximum diversion from a new domestic well cannot exceed, and may be less than, 0.25 ac-ft/yr for a single household and up to 3.0 ac-ft/yr for a multiple household well, with each household limited to 0.25 ac-ft/yr. The State Engineer has not declared any domestic well management areas in the planning region.

4.1.1.8 Water Project Financing

The Water Project Finance Act, Chapter 72, Article 4A NMSA 1978, outlines different mechanisms for funding water projects in water planning regions. The purpose of the Act is to provide for water use efficiency, resource conservation, and the protection, fair distribution, and allocation of New Mexico's scarce water resources for beneficial purposes of use within the state. The Water Project Finance Act creates two funds: the Water Project Fund, NMSA 1978, Section 72-4A-9 (2005), and the Acequia Project Fund, NMSA 1978, Section 72-4A-9.1 (2004). Both funds are administered by the New Mexico Finance Authority. The Water Trust Board recommends projects to the Legislature to be funded from the Water Project Fund.

The Water Project Fund may be used to make loans or grants to qualified entities (broadly defined to include public entities and Indian tribes and pueblos). To qualify for funding, the project must be approved by the Water Trust Board for one of the following purposes: (1) storage, conveyance or delivery of water to end users, (2) implementation of federal Endangered Species Act of 1973 collaborative programs, (3) restoration and management of watersheds, (4) flood prevention, or (5) water conservation or recycling, treatment, or reuse of water as provided by law. NMSA 1978, § 72-4A-5(B) (2011). The Water Trust Board must give priority to projects that (1) have been identified as being urgent to meet the needs of a regional water planning area that has a completed regional water plan accepted by the NMISC, (2) have matching contributions from federal or local funding sources, and (3) have obtained all requisite state and federal permits and authorizations necessary to initiate the project. NMSA 1978, § 72-4A-5.

The Acequia Project Fund may be used to make grants to acequias for any project approved by the Legislature.

The Water Project Finance Act directed the Water Trust Board to adopt regulations governing the terms and conditions of grants and loans recommended by the Board for appropriation by the

Legislature from the Water Project Fund. The Board promulgated implementing regulations, 19.25.10.1 et seq. NMAC, in 2008. The regulations set forth the procedures to be followed by the Board and New Mexico Finance Authority for identifying projects to recommend to the Legislature for funding. The regulations also require that financial assistance be made only to entities that agree to certain conditions set forth in the regulations.

4.1.1.9 The Strategic Water Reserve

In 2005, the New Mexico Legislature enacted legislation to establish a Strategic Water Reserve, NMSA 1978, Section 72-14-3.3 (2007). Regulations implementing the Strategic Water Reserve statute were also implemented in 2005. 19.25.14.1 et seq. NMAC.

The statute authorizes the Commission to acquire water rights or storage rights to compose the reserve. Section 72-14-3.3(A). Water in the Strategic Water Reserve can be used for two purposes: (1) to comply with interstate stream compacts and (2) to manage water for the benefit of endangered or threatened species or to avoid additional listing of species. Section 72-14-3.3(B). The NMISC may only acquire water rights that have sufficient seniority and consistent, historical beneficial use to effectively contribute to the purpose of the Reserve. The NMISC must annually develop river reach or groundwater basin priorities for the acquisition of water rights for the Strategic Water Reserve. The Lower Rio Grande basin has been designated as a priority basin.

4.1.1.10 Ditch and Acequia Water Use

Two recent cases by New Mexico courts address the issue of acequia water use. *Storm Ditch v. D'Antonio,* 2011-NMCA-104, 150 N.M. 590, examined the process for transferring a landowner's water rights from a community acequia to a municipality. The Court found that actual notice of the transfer application to the acequia was not mandated by statute; instead, publication of the landowner's transfer application provided sufficient notice to the acequia to inform it of the proposed transfer. Further, the statute requiring that the transfer applicant file an affidavit stating that no rules or bylaws for a transfer approval had been adopted by the acequia was not intended to prove notice. Rather, the statute was directed at providing the State Engineer with assurance that the applicant had met all requirements imposed by acequia bylaws before action was taken on the application, not in providing notice.

Pena Blanca Partnership v. San Jose Community Ditch, 2009-NMCA-016, 145 N.M. 555, involved attempts to transfer water rights from agricultural uses appurtenant to lands served by two acequias to non-agricultural uses away from the acequias. The acequias denied the water rights owners' (Owners) requests to make these changes pursuant to their authority under NMSA 1978, Section 73-2-21(E) (2003). The Owners appealed the acequias decision to district court. On appeal, the standard of review listed in Section 73–2–21(E) only allowed reversal of the acequia commissioners if the court found they had acted fraudulently, arbitrarily or capriciously, or not in accordance with law.

The Owners challenged this deferential standard of review in the Court of Appeals based on two grounds. First, the Owners argued that the *de novo* review standard in Article XVI, Section 5 of the New Mexico Constitution applied to the proposed transfers at issue, not the more deferential standard found in Section 73-2-21(E). The Court disagreed and found that the legislature provided for another review procedure for the decisions of acequia commissioners by enacting Section 73–2–21(E).

The Owners second assertion was that the deferential standard of review in Section 73-2-21(E) violated the equal protection clause of Article II, Section 18 of the New Mexico Constitution. The Owners argued that their equal protection guarantees were violated because water rights transfers out of acequias were treated differently than other water rights transfers. The court again disagreed, finding that although other determinations of water rights are afforded a *de novo* hearing in the district court, since the Owners still had access to the courts and the right of appeal, there were no equal protection violations.

4.1.1.11 Water Conservation

Guidelines for drafting and implementing water conservation plans are set forth in NMSA 1978, Section 72-14-3.2 (2003). By statute, neither the Water Trust Board nor the New Mexico Finance Authority may accept an application from a covered entity (defined as municipalities, counties, and any other entities that supply at least 500 acre-feet per annum of water to its customers, but excluding tribes and pueblos) for financial assistance to construct any water diversion, storage, conveyance, water treatment, or wastewater treatment facility unless the entity includes a copy of its water conservation plan.

The water conservation statute primarily supplies guidance to covered entities, as opposed to mandating any particular action. For example, the statute provides that the covered entity determines the manner in which it will develop, adopt, and implement a water conservation plan. The statute further states that a covered entity "shall consider" either adopting ordinances or codes to encourage conservation, or otherwise "shall consider" incentives to encourage voluntary compliance with conservation guidelines. The statute then states that covered entities "shall consider, and incorporate in its plan if appropriate, . . . a variety of conservation measures," including, in part, water-efficient fixtures and appliances, water reuse, leak repairs, and water rate structures encouraging efficiency and reuse. Section 72-14-3.2(D). Also, pursuant to NMSA 1978, §§ 72-5-28(G) (2002) and 72-12-8(D) (2002), when water rights are placed in a State Engineer-approved water conservation program, periods of nonuse of the rights covered in the plan do not count toward the four-year forfeiture period.

4.1.1.12 Municipal Condemnation

NMSA 1978, Section 3-27-2 (2009) was amended in 2009 to prohibit municipalities from condemning water sources used by, water stored for use by, or water rights owned or served by

an acequia, community ditch, irrigation district, conservancy district, or political subdivision of the state.

4.1.1.13 Subdivision Act

The Subdivision Act, NMSA 1978, Section 47-6-11.2 (2013), was amended in 2013 to require proof of water availability prior to final approval of a subdivision plat. Specifically, the subdivider must present the county with (1) NMOSE-issued water use permits for the subdivision or (2) proof that the development will hook up to a water provider along with an opinion from the State Engineer that the subdivider can fulfill the water use requirements of the Subdivision Act. Previously the county had discretion to approve subdivision plats without such proof that the water rights needed for the subdivision were readily available. These water use requirements apply to all subdivisions of ten or more lots. The Act was also amended to prohibit approval of a subdivision permit if the water source for the subdivision is domestic wells.

4.1.2 State Water Laws and Administrative Policies Affecting the Region

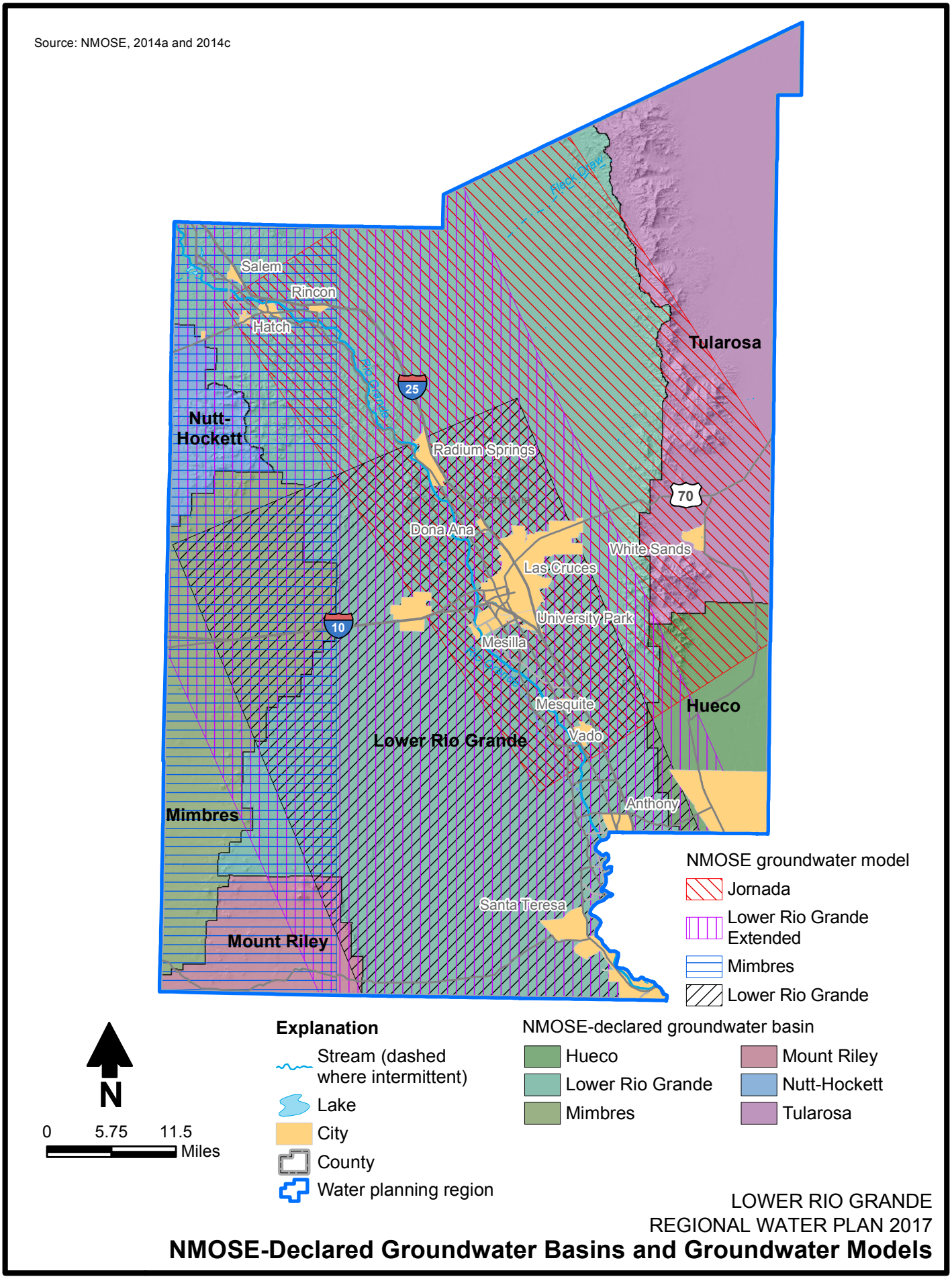
In New Mexico, water is administered generally by the State Engineer, who has the "general supervision of waters of the state and of the measurement, appropriation, distribution thereof and such other duties as required." NMSA 1978, § 72-2-1 (1982). To administer water throughout the state the State Engineer has several tools at its disposal, including designation of water masters, declaration of UWBs, and use of the AWRM rules, all of which are discussed below, along with other tools used to manage water within regions.

4.1.2.1 Water Masters

The State Engineer has the power to create water master districts or sub-districts by drainage area or stream system and to appoint water masters for such districts or sub-districts. NMSA 1978, § 72-3-1 (1919). Water masters have the power to apportion the waters in the water master's district under the general supervision of the State Engineer and to appropriate, regulate, and control the waters of the district to prevent waste. NMSA 1978, § 72-3-2 (2007). Currently, two water masters and two assistant water masters are assigned to the Lower Rio Grande.

4.1.2.2 Groundwater Basin Guidelines

The NMOSE has declared UWBs and implements guidelines in those basins for the purpose of carrying out the provisions of the statutes governing underground waters. See NMAC 19.27.48.6. There are six UWBs in the Lower Rio Grande region (Figure 4-1): the Hueco, Lower Rio Grande, Mimbres, Mount Riley, Nutt Hockett, and Tularosa. The Lower Rio Grande Underground Water Basin is the largest basin in the region and is governed by the *Mesilla Valley Administrative Guidelines for Review of Water Right Applications* (NMOSE, 1999). These guidelines were discussed at length in the 2003 RWP, Section 5.6.1. There are no specific basin guidelines for the Hueco, Mimbres, Mount Riley, and Nutt Hockett UWBs.



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LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

NMOSE-Declared Groundwater Basins and Groundwater Models

Figure 4-1

For the Lower Rio Grande UWB, two State Engineer Orders on administration were issued in 2004.

- One order creates a Water Master District located in Sierra and Doña Ana counties for the administration of groundwater in the Lower Rio Grande UWB. The water master has the power to appropriate, regulate, and control the waters of the District to prevent impairment of senior water right owners and the waste of water. *In the Matter of the Creation of the Lower Rio Grande Water Master District for the Administration of Rights to the Use of Ground Water from the Lower Rio Grande Groundwater Basin of New Mexico*, December 3, 2004.

- The second order requires the metering and reporting by March 1, 2006 of all groundwater withdrawals except for domestic and livestock uses. The order included metering of all lands within the Lower Rio Grande, Hot Springs, and Las Animas Creek UWBs. *In the Matter of the Requirements for Metering Groundwater Withdrawals in the Lower Rio Grande Watermaster District*, December 3, 2004.

The Tularosa UWB was extended in 2005. 19.27.64.1 et seq. NMAC. In 2014, the NMOSE put forth an *Update to the Alamogordo-Tularosa Administrative Guidelines for Review of Water Right Applications* (NMOSE, 2014e). The update provides guidelines on the procedures for processing pending and future water rights applications filed within the Alamogordo-Tularosa Administrative Area, a portion of which is within the Lower Rio Grande region. The updated guidelines replace the Tularosa Basin Administrative Criteria adopted by the NMOSE in 1997.

4.1.2.3 AWRM Implementation in the Basin

Although the Lower Rio Grande Basin has been designated a priority basin, AWRM regulations have not yet been issued for the basin.

4.1.2.4 Special Districts in the Basin

Special districts are various districts within the region having legal control over the use of water in that district. All are subject to specific statutes or other laws concerning their organization and operation, found in Chapter 73 of the New Mexico Statutes. In the Lower Rio Grande region, special districts include the Doña Ana and Caballo Soil and Water Conservation Districts, the Elephant Butte Irrigation District (EBID), and the Town of Mesilla Special Water Users Association. Because of its size, the EBID and its water management practices are particularly important to the region.

4.1.2.5 State Court Adjudications in the Basin

The Lower Rio Grande stream system adjudication, *State of New Mexico ex rel. State Engineer v. Elephant Butte Irrigation Dist., et al.*, No. CV-96-888 (3rd Jud. Dist.), is an ongoing adjudication with close to 45 percent of the 13,979 water right subfiles now adjudicated

(NMOSE, 2015). Major water rights issues are now before the adjudication court or in the process of implementation pursuant to an earlier order from the court. The parties currently are litigating the interests of the United States in the Rio Grande Project. To date, the court has determined the source and the amount of water for the Project but has not decided the Project's priority date.

In August 2011, the adjudication court set the irrigation water requirements for all crops in the Lower Rio Grande. That ruling is now being applied in adjudicating subfiles. The court established a basin-wide farm delivery requirement (FDR) of 4.5 acre-feet per acre per year, but allowed claimants to prove an FDR up to 5.5 acre-feet based on evidence showing greater historical use. Evidence from more than 600 claimants is now being evaluated.

In addition, two major expedited *inter se* proceedings are in progress, one to adjudicate claims to water rights associated with the Copper Flat mine and the other to adjudicate claims to pre-1906 water rights derivative of the Rio Grande Dam and Irrigation Company.

4.1.3 Federal Water Laws

The law of water appropriation has been developed primarily through decisions made by state courts. Since the accepted plan was published in 2003 several federal cases have been decided examining various water law questions. These cases are too voluminous to include here, and many of the issues in the cases will not apply directly to the region. However, New Mexico is a party to one original jurisdiction case in the U.S. Supreme Court involving the Rio Grande Compact and waters of the Lower Rio Grande.

In *Texas v. New Mexico and Colorado*, No. 141 Original (U.S. Supreme Court, 2014), Texas alleges that New Mexico has violated the Rio Grande Compact by intercepting water Texas is entitled to under the Compact through groundwater pumping and surface water diversions downstream of Elephant Butte Reservoir but upstream of the New Mexico-Texas state line. Colorado is also a defendant in the lawsuit as it is a signatory to the Rio Grande Compact. The United States has intervened as a Plaintiff in the case. EBID and El Paso County Water Improvement District Number One (EPCWID #1) have both sought to intervene in the case as well, claiming that their interests are not fully represented by the named parties. At the time of writing, the Special Master for the case has issued a first interim report denying New Mexico's motion to dismiss Texas's complaint, granting in part New Mexico's motion to dismiss the United States' complaint in intervention and denying EBID's and EPCWID #1's motions to intervene. The report is not a final ruling and it is unclear if the U.S. Supreme Court will accept the Special Master's ruling. Because the litigation is ongoing, users of this RWP should update themselves on the status of this case, as well as others discussed below and in other sections of the plan.

Another federal court case, *State of New Mexico v. U.S. Bureau of Reclamation, et al.,* No. 1:2011-cv-00691-JB-ACT (D.N.M. filed August 8, 2011), also has the potential to greatly impact water planning for the region. It is summarized in Section 4.3.1.

4.1.3.1 Federal Reservations

The doctrine of federally reserved water rights was developed over the course of the 20th Century. Simply stated, federally reserved rights are created when the United States sets aside land for specific purposes, thereby withdrawing the land from the general public domain. In doing so, there is an implied, if not expressed, intent to reserve an amount of water necessary to fulfill the purpose for which the land was set aside. Federally reserved water rights are not created, or limited, by state law.

Federally reserved lands within the Lower Rio Grande planning region include the following:

- Jornada Experimental Range
- Fort Bliss
- Organ Mountain National Recreation Area
- Organ Mountain Desert Peaks National Monument
- Prehistoric Trackways National Monument
- San Andreas National Wildlife Refuge
- White Sands National Monument
- White Sands Missile Range

4.1.3.2 Interstate Stream Compacts

Interstate compacts become federal law once ratified by Congress. The Rio Grande Compact is important in the Lower Rio Grande region. Signed in 1938, with Colorado, New Mexico, and Texas as parties, and approved by Congress in 1939, the Rio Grande Compact apportions among the three states the waters of the Rio Grande above Fort Quitman, Texas. The Compact is discussed in depth in the 2003 RWP, Section 5.1.2. The Compact is the topic of the above-discussed case currently pending before the U.S. Supreme Court, *Texas v. New Mexico and Colorado,* No. 141 Original (U.S. Supreme Court, 2014).

4.1.3.3 Treaties

The 1906 Convention between the United States and Mexico distributes the waters of the Rio Grande between the two nations in the international reach of the river between the El Paso-Juárez Valley and Fort Quitman, Texas. Under the Convention, Mexico is entitled to 60,000 acre feet of water a year at El Paso, adjusted for drought conditions. The International Boundary and Water Commission is the international agency charged with upholding the

convention's terms. The terms of the 1906 Convention were expanded on in the Mexican Water Treaty of 1944. *Utilization of the Waters of Colorado and Tijuana Rivers and of the Rio Grande,* Feb. 3, 1944, U.S.-Mexico, T.S. No. 994.

4.1.3.4 Federal Water Projects

The Rio Grande Project is a federal water project in the Lower Rio Grande region. The project is extremely important to the region and furnishes irrigation water to approximately 178,000 acres of land and electric power for communities and industries in New Mexico and Texas. Project lands occupy the river bottom land of the Rio Grande Valley in south-central New Mexico and west Texas. Water is also provided for diversion to Mexico by the International Boundary and Water Commission-United States Section to irrigate about 25,000 acres in the Juarez Valley. The project includes Elephant Butte and Caballo dams. The project has been the source of conflict over the years between EBID, EPCWID #1, and the U.S. Bureau of Reclamation (USBR). Much of the past conflict is discussed in Section 5.2 of the 2003 RWP.

Currently, the Rio Grande Project is the subject of litigation between the State of New Mexico and the USBR, as discussed in Section 4.3.1.

The Rio Grande Canalization Project was authorized by Congress in 1936 to facilitate compliance with the 1906 Mexican Water Treaty, which provided for the equitable division of the waters of the Rio Grande between the U.S. and Mexico, and to regulate and control the water supply for use in the two countries. The project was constructed between 1938 and 1943 and includes a normal-flow rectified river channel within a floodway bordered by levees on either side. The Project extends 105.6 miles (170 km) along the Rio Grande from the Percha Diversion Dam at Caballo (located 2.0 miles downstream of Caballo Dam) to the American Dam in El Paso, Texas. The normal flow channel has a depth of 3 to 5 feet, a width ranging from 110 to 500 feet, and a capacity ranging from 2,500 cubic feet per second (cfs) above Leasburg Dam to 1,200 cfs at El Paso. The floodway varies between 50 and 2,100 feet in width. The bordering levees range from 3 to 15 feet in height and have a total length of 130 miles—57 miles on the west side and 73 miles on the east side. In some areas, the floodway is bounded by natural high ground, and in the section near Canutillo, Texas, a railroad embankment forms the east levee. The Project provides flood protection against a 100-year flood and assures releases of waters to Mexico from the upstream reservoirs.

4.1.3.5 Federal Adjudications in the Basin

Not applicable.

4.1.4 Tribal Law

Not applicable.

4.1.5 Local Law

Local laws addressing water use have been implemented by both municipalities and counties within the planning region.

4.1.5.1 Doña Ana County

Water use in Doña Ana County is guided by two planning documents and its ordinances.

One Valley, One Vision 2040, Doña Ana County, New Mexico Regional Plan (Doña Ana County and City of Las Cruces, 2012) is the comprehensive planning document guiding growth in the County. The Plan outlines the regional water goals of (1) ensuring the availability of a safe, dependable, affordable, and sustainable water supply to meet or exceed the needs of all reasonable beneficial uses and (2) protecting existing surface water and groundwater from pollution and ensuring that it meets or exceeds water quality standards. The Plan then sets forth strategies to meet these goals including, but not limited to, ensuring that 40-year water plans are updated, promoting green infrastructure and low-impact development, planning and creating additional water supplies, encouraging low-water use industry and development, and encouraging the installation of systems to help track water usage as a way to conserve water and prevent over-appropriation.

The *Doña Ana Snapshot Report* (Doña Ana County, 2013) identifies key issues related to water supply and consumption in the County, including an increase in municipal water demand and a decline in groundwater levels, a need for additional storage or supply to provide for a buffer supply during drought, the ongoing adjudication process, competing demands on the watershed, the impact of climate change on long-term water supply, and an ongoing need to address groundwater pollutants. The goal of the report is to improve livability in the county.

The Doña Ana County Code and related Water Supply Guidelines regulate water use for developments in the County. All new developments in the County must have a water supply plan that quantifies the water demand for the development and requires conservation measures (Section 300.22). Pursuant to the County's water rights acquisition policy, developers must provide water rights in sufficient quantity and quality to supply developments for 40 years (Section 324-46), with the maximum amount of water that can be allocated per lot limited to 0.75 acre-foot per year (Section 157.33). The Water Supply Guidelines also address water conservation measures. The County also has the power to restrict the drilling of new domestic wells within its designated service area.

4.1.5.2 City of Las Cruces

Water use in City of Las Cruces is guided by several planning documents and its ordinances.

The City of Las Cruces *Comprehensive Plan: Administrative Update 2040* (City of Las Cruces, 2013) outlines several goals relating to water use, including promoting water conservation and

reuse of resources (such as treated wastewater) through innovation and best practices, and providing an adequate and reliable supply of safe, clean drinking water at an affordable cost. The plan encourages sustainable growth and a sustainable water supply through identification of new sources of water, wellhead protection, and water conservation.

The *Las Cruces Utilities Water Conservation Plan* (City of Las Cruces, 2012), was adopted primarily for regulatory compliance; the NMOSE requires the City to develop and implement a water conservation plan as a permit condition. However, the plan recognizes additional benefits of water conservation, such as benefits to customers and the environment, cost savings, and reliability of supply. The plan provides a framework for the development of measures to achieve water conservation. Goals outlined in the plan include:

- Evaluate current water usage.
- Evaluate mandatory, voluntary, and other conservation measures for the plan.
- Determine resource levels for the plan.
- Determine sources of funding for the water conservation program.
- Develop priorities.
- Set measured goals and criteria for evaluation of these goals.
- Improve baseline information on the City's usage and update annually.
- Develop appropriate ordinances from the plan.
- Increase enforcement of the water conservation ordinances.
- Develop a summer month surcharge for users exceeding some multiplier of the average delivery amount in each rate class.
- Establish indoor and outdoor water audits for each rate class.

The City of Las Cruces also regulates water use by ordinance and regulations. Ordinance No. 2722 (August 18, 2014) enacted a revised water conservation ordinance (Section 28-301 *et seq*.) which mandates that the City's Utilities Board submit a water conservation plan and develop and approve regulations to enforce that plan. The Ordinance further specifies that the Utilities Board update the City's Drought and Emergency Management Plan to provide for a number of factors, including measurable criteria for determining the severity of a water emergency and response measures for each level of water emergency. Water conservation regulations passed by the Utility Board pursuant to the ordinance specify outdoor watering restrictions, including time of day and day of the week watering restrictions, water wasting restrictions, and violation compliance procedures.

4.1.5.3 Camino Real Regional Water Utility Authority

The Camino Real Regional Water Utility Authority (CRRWUA) serves southern Doña Ana County. It regulates water use through its Water Ordinance No. 2011-01, which mandates that new developments within the CRRWUA service area connect to the system and that developers provide CRRWUA with water rights for new developments. The ordinance also allows CRRWUA to restrict the drilling of domestic wells.

4.1.5.4 City of Sunland Park

Water use in the City of Sunland Park is guided by the CRRWUA regulations and the *One Valley, One Vision 2040, Doña Ana County, New Mexico Regional Plan* discussed in Section 4.1.5.1.

4.1.5.5 Village of Hatch

Water use in the Village of Hatch is governed by regulations. Section 13.04.030 of the Hatch Village Code is the Village's water conservation ordinance, and it prohibits the waste of water, imposes time of day and day of the week outdoor watering restrictions, and outlines water emergency stages with various restrictions for water use during each stage. Water use in the Village is also guided by the *One Valley, One Vision 2040, Doña Ana County, New Mexico Regional Plan* discussed in Section 4.1.5.1.

4.1.5.6 City of Anthony

Water use in the City of Anthony is guided by the *One Valley, One Vision 2040, Doña Ana County, New Mexico Regional Plan* discussed in Section 4.1.5.1.

4.1.5.7 Town of Mesilla

Water use in the Town of Mesilla is governed by regulations. Section 13.26.020 of the Mesilla Town Code requires the conveyance of water rights as a prerequisite for land development. The Town's water conservation ordinance is found at Chapter 13.25 of the Code and prohibits the waste of water, imposes time of day and day of the week outdoor watering restrictions, and allows for the declaration of a water emergency and implementation of water restrictions during an emergency. Water use in the Village is also guided by the *One Valley, One Vision 2040, Doña Ana County, New Mexico Regional Plan,* discussed in Section 4.1.5.1.

4.2 Relevant Environmental Law

4.2.1 Species Protection Laws

4.2.1.1 Federal Endangered Species Act

The Endangered Species Act (ESA) can have a tremendous influence on the allocation of water, especially of stream and river flows. 16 U.S. C. §§ 1531 to 1544. The ESA was enacted in 1973

and, with limited exceptions, has remained in its current form since then. The goal of the Act is to protect threatened and endangered species and the habitat on which they depend. 16 U.S.C. § 1531(b). The Act's ultimate goal is to "recover" species so that they no longer need protection under the Act.

The ESA provides several mechanisms for accomplishing these goals. It authorizes the U.S. Fish and Wildlife Service (USFWS) to list "threatened" or "endangered" species, which are then protected under the Act, and to designate "critical habitat" for those species. The Act makes it unlawful for anyone to "take" a listed species unless an "incidental take" permit or statement is first obtained from the Department of the Interior. 16 U.S.C. §§ 1538, 1539. To "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19).

In addition, federal agencies must use their authority to conserve listed species. 16 U.S.C. § 1536(a)(1). They must make sure, in consultation with USFWS, that their actions do not jeopardize the continued existence of listed species or destroy or harm habitat that has been designated as critical for such species. 16 U.S.C. § 1536(a)(2). This requirement applies whenever a private or public entity undertakes an action that is "authorized, funded, or carried out," wholly or in part by a federal agency. *Id*. As part of the consultation process, federal agencies must usually prepare a biological assessment to identify endangered or threatened species and determine the likely effect of the federal action on those species and their critical habitat. 16 U.S.C. § 1536(c). At the end of the consultation process, the USFWS prepares a biological opinion stating whether the proposed action will jeopardize the species or destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(c)(4). USFWS may also recommend reasonable alternatives that do not jeopardize the species. *Id*.

The species in the Lower Rio Grande Water Planning Region that are subject to protection under the ESA are as follows:

- Southwestern willow flycatcher (endangered)
- Yellow-billed cuckoo (threatened)
- Northern aplomado falcon (experimental population, non-essential)
- Least tern (endangered, final recovery plan)
- Sprague's pipit (candidate)

Of the threatened and endangered species found in the Lower Rio Grande region, the protection and recovery of the southwestern willow flycatcher and yellow-billed cuckoo are most likely to affect water planning within the region. Both birds rely on riparian habitat for survival. Any actions that are likely to harm the habitat used by these species will be subject to strict review and possible limitation.

4.2.1.2 New Mexico Wildlife Conservation Act

The New Mexico Wildlife Conservation Act, enacted in 1974, provides for the listing and protection of threatened and endangered wildlife species in the state. NMSA 1978, §§ 17-2-37 to 17-2-46. In enacting the law, the Legislature found that indigenous New Mexico species that are threatened or endangered "should be managed to maintain and, to the extent possible, enhance their numbers within the carrying capacity of the habitat." NMSA 1978, § 17-2-39(A).

The Act authorizes the New Mexico Department of Game and Fish to conduct investigations of indigenous New Mexico wildlife species suspected of being threatened or endangered to determine if they should be listed. NMSA 1978, § 17-2-40(A). Based on the investigation, the director then makes listing recommendations to the Game and Fish Commission. *Id*. The Act authorizes the Commission to issue regulations listing wildlife species as threatened or endangered based on the investigation and recommendations of the Department. NMSA 1978, § 17-2-41(A). Once a species is listed, the Department of Game and Fish, "to the extent practicable," is to develop a recovery plan for that species. NMSA 1978, § 17-2-40.1. The Act makes it illegal to "take, possess, transport, export, process, sell or offer for sale[,] or ship" any listed endangered wildlife species. NMSA 1978, § 17-2-41(C).

Pursuant to the Act, the Commission has listed over 100 wildlife species—mammals, birds, fish, reptiles, amphibians, crustaceans, and mollusks—as endangered or threatened. 19.33.6.8 NMAC. As of August 2014, 62 species were listed as threatened, and 56 species were listed as endangered. *Id*. In the Lower Rio Grande region, all of the federally listed species discussed above are protected also under the New Mexico Act, along with several others.

4.2.2 Water Quality Laws

4.2.2.1 Federal Clean Water Act

The most significant federal law addressing water quality is the Clean Water Act (CWA), 33 U.S.C. §§ 1251 to 1387, which Congress enacted in its modern form in 1972, overriding President Nixon's veto. The stated objective of the CWA is to "restore and maintain the chemical, physical and biological integrity" of the waters of the United States. 33 U.S.C. § 1251(a).

4.2.2.1.1 NPDES Permit Program (Section 402)

The CWA makes it unlawful for any person to discharge any pollutant into waters of the United States without a permit. 33 U.S.C. § 1311(a). Generally, a "water of the United States" is a navigable water, a tributary to a navigable water, or an adjacent wetland, although the scope of the term has been the subject of considerable controversy as described below.

The heart of the CWA regulatory regime is the National Pollutant Discharge Elimination System (NPDES) permitting program under Section 402 of the Act. Any person—including a

corporation, partnership, state, municipality, or other entity—that discharges a pollutant into waters of the United States from a point source must obtain an NPDES permit from the U.S. Environmental Protection Agency (EPA) or a delegated state. 33 U.S.C. § 1342. A point source is defined as "any discernible, confined, and discrete conveyance," such as a pipe, ditch, or conduit. 33 U.S.C. § 1362(14). NPDES permits include conditions setting effluent limitations based on available technology and, if needed, effluent limitations based on water quality.

The CWA provides that each NPDES permit issued for a point source must impose effluent limitations based on application of the best practicable, and in some cases the best available, pollution control technology. 33 U.S.C. § 1311(b). The Act also requires more stringent effluent limitations for newly constructed point sources, called new source performance standards. 33 U.S.C. § 1316(b). EPA has promulgated technology-based effluent limitations for dozens of categories of new and existing industrial point source dischargers. 40 C.F.R. pts. 405-471. These regulations set limits on the amount of specific pollutants that a permittee may discharge from a point source.

The CWA requires the states to develop water quality standards for individual segments of surface waters. 33 U.S.C. § 1313. Water quality standards have three components. First, states must specify designated uses for each body of water, such as public recreation, wildlife habitat, water supply, fish propagation, or agriculture. 40 C.F.R. § 131.10. Second, they must establish water quality criteria for each body of water, which set a limit on the level of various pollutants that may be present without impairing the designated use of the water body. *Id.* § 131.11. And third, states must adopt an antidegradation policy designed to prevent the water body from becoming impaired such that it cannot sustain its designated use. *Id.* § 131.12.

Surface water segments that do not meet the water quality criteria for the designated uses must be listed as "impaired waters." 33 U.S.C. § 1313(d)(l)(C). For each impaired water segment, states must establish "total maximum daily loads" (TMDLs) for those pollutants causing the water to be impaired, allowing a margin of safety. 33 U.S.C. § 1313(d)(1). The states must submit to EPA for approval the list of impaired waters and associated TMDLs. 33 U.S.C. § 1313(d)(2). The TMDL process, in effect, establishes a basin-wide budget for pollutant influx to a surface water. The states must then develop a continuing planning process to attain the standards, including effluent limitations for individual point sources. 33 U.S.C. § 1313(e).

New Mexico has taken steps to implement these CWA requirements. As discussed in Section 4.2.2.3, the New Mexico Water Quality Control Commission has adopted water quality standards for surface waters. The standards include designated uses for specific bodies of water, water quality criteria, and an antidegradation policy. 20.6.4 NMAC. The New Mexico Environment Department (NMED) has prepared a report listing impaired surface waters throughout the state. *State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report – 2014-2016* (Nov. 18, 2014). In the Lower Rio Grande planning region, a

number of segments of the Rio Grande, Las Animas Creek, and both Elephant Butte and Caballo reservoirs are on the impaired list.

EPA can delegate the administration of the NPDES program to individual states. 33 U.S.C. § 1251(b). New Mexico is one of only a handful of states that has neither sought nor received delegation to administer the NPDES permit program. Accordingly, EPA administers the NPDES program in New Mexico.

4.2.2.1.2 Dredge and Fill Permit Program (Section 404)

The CWA establishes a second important permitting program under Section 404, regulating discharges of "dredged or fill material" into waters of the United States. 33 U.S.C. § 1344. Although the permit requirement applies to discharges of such material into all waters of the United States, most permits are issued for the filling of wetlands. The program is administered primarily by the Army Corps of Engineers, although EPA has the authority to veto permits and it shares enforcement authority with the Corps.

Like the Section 402 NPDES permit program, the CWA allows the Section 404 permit program to be delegated to states. 33 U.S.C. § 1344(g). Again, New Mexico has not received such delegation, and the program is implemented in New Mexico by the Corps and EPA.

4.2.2.1.3 Waters of the United States

The term "waters of the United States" delineates the scope of CWA jurisdiction, both for the Section 402 NPDES permit program, and for the Section 404 dredge and fill permit program. The term is not defined in the CWA, but is derived from the definition of "navigable waters," which means "waters of the United States including the territorial seas." 33 U.S.C. § 1362(7). In 1979, EPA promulgated regulations defining the term "waters of the United States." *See* 40 C.F.R. § 230.3(s) (2014) (between 1979 and 2014, the term remained substantially the same). This definition, interpreted and implemented by both EPA and the Corps, remained settled for many years.

In 2001, however, the Supreme Court began to cast doubt on the validity of the definition as interpreted by EPA and the Corps. The Court took up a case in which the Corps had asserted CWA jurisdiction over an isolated wetland used by migratory birds, applying the Migratory Bird Rule. The Court ruled that the Corps had no jurisdiction under the CWA, emphasizing that the CWA refers to "navigable waters," and that the isolated wetland had no nexus to any navigable-in-fact water. *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers,* 531 U.S.159 (2001).

The Court muddied the waters further in its 2006 decision in *Rapanos v. United States,* 547 U.S. 715 (2006) (consolidated with *Carabell v. U.S. Army Corps of Engineers*). Both these cases challenged the Corps' assertion of CWA jurisdiction over wetlands separated from traditional

navigable waters by a man-made ditch. In a fractured 4-1-4 decision, the Court ruled that the Corps did not have CWA authority to regulate these wetlands. The plurality opinion, authored by Justice Scalia, held that CWA jurisdiction extends only to relatively permanent standing or flowing bodies of water that constitute rivers, streams, oceans, and lakes. *Id.* at 739. Nevertheless, jurisdiction extends to streams or lakes that occasionally dry up, and to streams that flow only seasonally. *Id.* at 732, n.3. And jurisdiction extends to wetlands with a continuous surface connection to such water bodies. *Id.* at 742. The concurring opinion, written by Justice Kennedy, stated that CWA jurisdiction extends to waters having a "significant nexus" to a navigable water, but the Corps had failed to show such nexus in either case. *Id.* at 779-80. In dissent, Justice Stevens would have found CWA jurisdiction in both cases. *Id.* at 787.

There has been considerable confusion over the proper application of these opinions. Based on this confusion, EPA and the Corps recently amended the regulatory definition of "waters of the United States" to conform to the *Northern Cook County* and *Rapanos* decisions. Final Rule, 80 Fed. Reg. 37054 (June 29, 2015) codified at 33 C.F.R. pt 328; 40 C.F.R. pts 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401. The new definition covers (1) waters used for interstate or foreign commerce, (2) interstate waters, (3) the territorial seas, (4) impounded waters otherwise meeting the definition, (5) tributaries of the foregoing waters, (6) waters, including wetlands, adjacent to the foregoing waters, (7) certain specified wetlands having a significant nexus to the foregoing waters, and (8) waters in the 100-year floodplain of the foregoing waters. 40 C.F.R. § 302.3.

Several states and industry groups have challenged the new definition in federal district courts and courts of appeal. In one such challenge, the district court granted a preliminary injunction temporarily staying the rule. *North Dakota v. EPA*, 127 F. Supp. 3d 1047 (D.N.D. 2015). Because the NMED and the NMOSE are plaintiffs in this case, the stay is effective—and the new definition does not now apply—in New Mexico. The United States has filed a motion asking the district court to dissolve the injunction and dismiss the case. This case is likely to be appealed.

4.2.2.2 Federal Safe Drinking Water Act

Enacted in 1974, the Safe Drinking Water Act (SDWA) regulates the provision of drinking water in the United States. 42 U.S.C. §§ 300f to 300j-26. The act's overriding purpose is "to insure the quality of publicly supplied water." *Arco Oil & Gas Co. v. EPA*, 14 F.3d 1431, 1436 (10th Cir. 1993). The SDWA requires EPA to promulgate national primary drinking water standards for protection of public health and national secondary drinking water standards for protection of public welfare. 42 U.S.C. § 300g-1. To provide this protection, the SDWA requires EPA, as part of the national primary drinking water regulations, to establish maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for drinking water contaminants. 42 U.S.C. § 300g-1(b)(1). The regulations apply to all "public water systems." 42 U.S.C. § 300g.

EPA has promulgated primary and secondary drinking water regulations. 40 C.F.R. pts. 141, 143. Most significantly, the agency has set MCLGs and MCLs for a number of drinking water contaminants, including 16 inorganic chemicals, 53 organic chemicals, turbidity, 6 microorganisms, 7 disinfectants and disinfection byproducts, and 4 radionuclides. 40 C.F.R. §§ 141.11, 141.13, 141.61-66. As noted above, New Mexico has incorporated these primary and secondary regulations into the state regulations. 20.7.10.100 NMAC, 20.7.10.101 NMAC.

4.2.2.3 Federal Comprehensive Environmental Response, Compensation and Liability Act

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or the "Superfund" law, in 1980 to address the burgeoning problem of uncontrolled hazardous waste sites. 42 U.S.C. §§ 9601 to 9675. CERCLA authorizes EPA to prioritize hazardous waste sites according to the degree of threat they pose to human health and the environment, including surface water and groundwater. EPA places the most serious sites on the National Priorities List (NPL). 42 U.S.C. § 9605. Sites on the NPL are eligible for federal funds for long-term remediation, which most often includes groundwater remediation.

4.2.2.4 New Mexico Water Quality Act

The most important New Mexico law addressing water quality is the New Mexico Water Quality Act (WQA). NMSA 1978, §§ 74-6-1 to 74-6-17. The New Mexico Legislature enacted the WQA in 1967. The purpose of the WQA is "to abate and prevent water pollution." *Bokum Res. Corp. v. N.M. Water Quality Control Comm'n*, 93 N.M. 546, 555, 603 P.2d 285, 294 (1979).

The WQA created the Water Quality Control Commission to implement many of its provisions. NMSA 1978, § 74-6-3. The WQA authorizes the Commission to adopt state water quality standards for surface and groundwaters and to adopt regulations to prevent or abate water pollution. NMSA 1978, § 74-6-4(C) and (D). The WQA also authorizes the Commission to adopt regulations requiring persons to obtain from the NMED a permit for the discharge into groundwater of any water contaminant. NMSA 1978, § 74-6-5(A). The Department must deny a discharge permit if the discharge would cause or contribute to contaminant levels in excess of water quality standards "at any place of withdrawal of water for present or reasonably foreseeable future use." NMSA 1978, § 74-6-5(E)(3). The WQA also authorizes the Commission to adopt regulations relating to monitoring and sampling, record keeping, and Department notification regarding the permit. NMSA 1978, § 74-6-5(I). Permit terms are generally limited to five years. NMSA 1978, § 74-6-5(H).

Accordingly, the Commission has adopted groundwater quality standards, regulations requiring discharge permits, and regulations requiring abatement of groundwater contamination. 20.6.2 NMAC. The water quality standards for groundwater are published at Sections 20.6.2.3100 through 3114 NMAC, and the regulations for discharge permits are published at Sections 20.6.2.3101 to 3114 NMAC.

An important part of these regulations are those addressing abatement. 20.6.2.4101 - .4115 NMAC. The purpose of the abatement regulations is to "[a]bate pollution of subsurface water so that all groundwater of the State of New Mexico which has a background concentration of 10,000 milligrams per liter or less total dissolved solids is either remediated or protected for use as domestic or agricultural water supply." 20.6.2.4101.A(1) NMAC. The regulations require that groundwater pollution must be abated to conform to the water quality standards. 20.6.2.4103.B NMAC. Abatement must be conducted pursuant to an abatement plan approved by the Department, 20.6.2.4104.A NMAC, or pursuant to a discharge permit, 20.6.2.3109.E NMAC.

In addition, the Commission has adopted standards for surface water. 20.6.1 NMAC. The objective of these standards, consistent with the federal Clean Water Act (Section 4.2.2.1) is "to establish water quality standards that consist of the designated use or uses of surface waters of the [S]tate, the water quality criteria necessary to protect the use or uses[,] and an antidegradation policy." 20.6.4.6.A NMAC. The standards include designated uses for specific bodies of water within the state, 20.6.4.50 to 20.6.4.806 NMAC; general water quality criteria, 20.6.4.13 NMAC; water quality criteria for specific designated uses, 20.6.4.900 NMAC; and water quality criteria for specific bodies of water, 20.6.4.50 to 20.6.4.806 NMAC. The standards also include an antidegradation policy, applicable to all surface waters of the state, to protect and maintain water quality. 20.6.4.8 NMAC. The antidegradation policy sets three levels of protection, closely matched to the federal regulations.

Lastly, the Commission has also adopted regulations limiting the discharge of pollutants into surface waters. 20.6.2.2100 to 2202 NMAC.

Because copper mining may impact water resources in the basin it is also important to note that in 2009 the Legislature amended the WQA to require the Commission to adopt regulations particular to the copper industry that would specify the measures to be taken to prevent water pollution and to monitor water quality. NMSA 1978, § 74-6-4(K). Effective December 2013, the Commission adopted the Copper Mine Rule. 20.6.7 NMAC. The stated purpose of the Copper Mine Rule is "to control discharges of water contaminants specific to copper mine facilities and their operations to prevent water pollution."(20.6.7.6 NMAC. However, the rule also allows for contamination of groundwater at copper mines in excess of groundwater quality standards (*e.g.*, 20.6.7.17 NMAC, 20.6.7.20 NMAC, 20.6.7.21 NMAC, 20.6.7.22 NMAC, 20.6.7.28 NMAC). The legality of these provisions has been questioned. For example, the New Mexico Attorney General has challenged the Copper Mine Rule in an appeal. Although the Court of Appeals upheld the rule, *Gila Res, Info. Project v. N.M. Water Quality Control Comm'n*, 2015-NMCA-076, 355 P.3d 36, the New Mexico Supreme Court granted *certiorari* on July 13, 2015 (Nos. S-1-SC-35,279, 35,289, & 35,290).

4.2.2.5 New Mexico Drinking Water Standards

The New Mexico Environmental Improvement Act created an Environmental Improvement Board, and it authorizes the Board to promulgate rules and standards for water supply. NMSA 1978, § 74-1-8(A)(2). The Board has accordingly adopted state drinking water standards for all public water systems. 20.7.10 NMAC. The state regulations incorporate by reference the federal primary and secondary drinking water standards, 40 C.F.R. parts 141 and 143, established by the EPA under the Safe Drinking Water Act (Section 4.2.2.2). 20.7.10.100 NMAC, 20.7.10.101 NMAC.

4.2.2.6 Tribal Law

Not applicable.

4.3 Legal Issues Unique to the Region and Local Conflicts Needing Resolution

4.3.1 Ongoing or Threatened Litigation that May Affect Water Management

State of New Mexico v. U.S. Bureau of Reclamation, et al., No. 1:2011-cv-00691-JB-ACT (D.N.M. filed August 8, 2011) involves the 2008 Operating Agreement for the Rio Grande Project. The Operating Agreement was developed during settlement of litigation between the EBID, EPCWID #1, and the USBR. The State of New Mexico asserts that implementation of this agreement, to which the State is not a party, appears to have reduced EBID's allocation of Rio Grande Project water in full-supply years by more than 150,000 acre-feet. Furthermore, the State of New Mexico asserts that in implementing the 2008 Operating Agreement the USBR illegally took New Mexico Credit Water as allocated and accounted under the Rio Grande Compact and violated the National Environmental Policy Act (NEPA), as well as other federal laws, in implementing the agreement. The case is currently stayed pending action by the U.S. Supreme Court in *Texas v. New Mexico and Colorado*, No. 220141 Original (Section 4.1.3). The Operating Agreement dispute will continue to cause water management issues in the region until resolved.

4.3.2 Local Conflicts Needing Resolution

There continues to be conflict among EBID, other local farmers, and the State of New Mexico regarding issues related both to the Lower Rio Grande adjudication and the 2008 Operating Agreement for the Rio Grande Project. These issues will continue to evolve as the related lawsuits move forward and will have a large impact on water management in the region.

4.3.3 Legal Issues Unique to the Region

The outcome of *Texas v. New Mexico and Colorado,* No. 220141 Original, may greatly impact the region because it deals with water allocation and groundwater pumping in the Lower Rio Grande.

5. Water Supply

This section provides an overview of the water supply in the Lower Rio Grande Water Planning Region, including climate conditions (Section 5.1), surface water and groundwater resources (Sections 5.2 and 5.3), water quality (Section 5.4), and the administrative water supply used for planning purposes in this regional water plan update (Section 5.5). Additional quantitative assessment of water supplies is included in Section 7, Identified Gaps between Supply and Demand.

The Handbook specifies that each of the 16 regional water plans briefly summarize water supply information from the previously accepted plan and provide key new or revised information that has become available since submittal of the accepted regional water plan. The information in this section regarding surface and groundwater supply and water quality is thus drawn largely from the accepted *New Mexico Lower Rio Grande Regional Water Plan* (Terracon et al., 2003) and, where appropriate, updated with more recent information and data from a number of sources, as referenced throughout this section.

The Lower Rio Grande region has both groundwater and surface water, and in some cases these supplies are closely linked and necessitate conjunctive management. Due to the flourishing agricultural community, supported in large measure by New Mexico State University, and the proximity of the Las Cruces, El Paso, and Ciudad Juarez metropolitan areas, competition for water supplies has been intense for over a century. In the late 1890s the Mexican government filed a claim for damages against the United States alleging that the water shortages in Juarez were due to increasing diversions upstream (West, 1995). Thus began a series of agreements that led to construction of the Rio Grande Project as it exists today and, ultimately, negotiation of the Rio Grande Compact. They include, but are not limited to, the 1896 Federal Embargo on water development, the 1929 Temporary Rio Grande Compact, the Rio Grande Canalization Project, and a number of associated investigations into the hydrology of the Rio Grande. Water supply shortages continue to be a major issue during extended drought.

Currently, some of the key water supply updates and issues impacting the Lower Rio Grande region are:

- The Rio Grande stream system is fully appropriated. In general, any new water uses that impact the flow of the Rio Grande must be offset through return flow, the transfer of existing water rights, and/or supplementation by a new source of water. No mechanism is presently in place to allow transfers of Rio Grande Project water from the Elephant Butte Irrigation District (EBID) to non-agricultural uses.

- Groundwater pumping and depletions in New Mexico and Texas impact the flows of the Rio Grande and affect the operations of the Rio Grande Project. This issue continues to be a source of controversy and conflict among New Mexico, Texas, the U.S. Bureau of Reclamation (USBR), and the two U.S. irrigation districts supplied by the Rio Grande

Project (EBID in New Mexico and El Paso County Water Improvement District #1 [EPCWID#1] in Texas).

- In 2013 the State of Texas initiated a lawsuit in the U.S. Supreme Court over the Rio Grande Compact, specifically water management and water use by New Mexico below Elephant Butte Dam, that names New Mexico and Colorado as defendants. The United States has joined in this lawsuit. The outcome of this lawsuit, whether through settlement or court order, may have significant impacts on water management in the Lower Rio Grande region.

- An Operating Agreement for the Rio Grande Project was finalized in 2008 as part of the settlement of litigation between EBID, EPCWID #1, and USBR in Texas Federal District Court and has been implemented since that time. Implementation of this agreement has reduced EBID's allocation of Rio Grande Project water in full-supply years by more than 150,000 acre-feet, and this large decrease has led to increased dependence on groundwater for farmers seeking to utilize their adjudicated water rights. Many questions persist regarding the fairness and sustainability of the Operating Agreement as it has been implemented. The New Mexico Attorney General sued the USBR in 2011 regarding this Operating Agreement and the USBR's unauthorized release of New Mexico Compact credit water in Elephant

Rio Grande Compact

Signed in 1938 between Colorado, New Mexico, and Texas, and approved by Congress in 1939, the Rio Grande Compact apportions the surface waters of the Rio Grande Basin above Ft. Quitman, Texas, among the three states. The Rio Grande Compact establishes, among other things, annual water delivery obligations and depletion entitlements for Colorado and New Mexico. The Compact is administered by a commission consisting of one representative from each state and one from the federal government.

The Compact provides for debits and credits to be carried over and accrued from year to year until extinguished under provisions of the Compact. Annual Compact accounting, based on flows at index gaging stations and changes in reservoir storage determines Colorado's and New Mexico's delivery obligations each year.

The Compact affects water planning in New Mexico in several ways:

- The Compact established limitations on the amount of water available for depletion in the northern portion of the Basin in New Mexico. It also requires that a portion of the water that enters the Middle Rio Grande valley be delivered to Elephant Butte Reservoir. These requirements limit depletions in the Rio Chama, Taos, Jemez y Sangre, Middle Rio Grande, and Socorro-Sierra planning regions.
- When the stored water in Elephant Butte drops below specified levels, certain provisions of the Compact restrict storage in reservoirs upstream of Elephant Butte constructed after 1929, thus impacting water operations in the region. Additionally, should New Mexico end the year with an accrued debit balance, it is required to retain in storage an amount of water equivalent to that total debit.

In 1938, in *Hinderlider v La Plata River and Cherry Creek Ditch Co*., the U.S. Supreme Court ruled that compliance with the terms of an interstate stream compact have the highest priority within a stream system. Thus, from a regional water planning perspective, the waters of the Rio Grande Basin above Elephant Butte Reservoir are a singular supply shared among the Rio Chama, Taos, Jemez y Sangre, Middle Rio Grande, and Socorro-Sierra planning regions, the use of which is constrained by the terms of the Compact.

Butte Reservoir to EPCWID#1. The judge in the case has stayed, or suspended, any action in this lawsuit pending action by the U.S. Supreme Court in *Texas v. New Mexico, Original No. 141*. Continued conflict associated with this Agreement is likely.

- Under the National Environmental Policy Act (NEPA), on January 4, 2017, the Bureau of Reclamation issued a Record of Decision (ROD) implementing one of the alternatives it examined in its Final Environmental Impact Statement on the 2008 Operating Agreement. The alternative adopted provides for continued Rio Grande Project operations under the terms of the 2008 Operating Agreement. The outcome implemented by the ROD remains controversial and should continue to be monitored as it relates to water supply in the region.

- Recent drought and high levels of groundwater pumping may cause increased concentration of salts in the soils and aquifers of the Rincon and Mesilla valleys, and increased groundwater salinity may limit the usefulness of this water for some applications in the future.

- The demand for water in the Lower Rio Grande region has increased through time due to increasing population and increasing cultivation of high-water-demand crops such as alfalfa and pecans.

    - The population of the Lower Rio Grande planning region is expected to expand from approximately 209,000 in 2010 to almost 350,000 in 2060. The increasing demand for municipal water is likely to result in water rights transfers from agriculture through willing seller-willing buyer agreements.

    - The great majority of water use in the Lower Rio Grande surface water basin is for irrigation, but the feasibility of fallowing otherwise irrigated lands during drought periods is complicated by the fact that about 30 percent of irrigated lands in the Lower Rio Grande basin are planted in permanent crops such as pecan orchards that would be severely stunted or lost if not irrigated.

- Salinity of Rio Grande Project water has long been a source of controversy between New Mexico and Texas. In 2008 the Rio Grande Compact Commission, together with NMISC and the New Mexico Environment Department (NMED), assisted in the formation of a multi-state Río Grande Project Salinity Management Coalition (Coalition). The Coalition conducted studies to assess the source and location of salts entering the surface water system. They found that natural and localized sources of salinity were the primary contributors of salt. Given that information, the Coalition evaluated possible ways to reduce the salinity concentrations and impacts in the Rio Grande Project area in order to increase usable water supplies for agricultural, urban, and environmental purposes in the critical Texas-New Mexico border region. Results of that work indicated that none of the alternatives considered would be cost effective.

- The Lower Rio Grande stream system adjudication—the largest ongoing adjudication in the state—is underway, with close to 45 percent of the 13,979 water right subfiles now adjudicated (Knowles, 2015). Major water rights issues are now before the adjudication court or in the process of implementation pursuant to an earlier order from the court. See Section 4.1.2.5 for additional discussion.

- Given the growing population in the region, there is likely to be an increased municipal and commercial market for water rights. Transfer of irrigation water rights associated with the Rio Grande Project into non-irrigation uses will involve coordination with USBR and EBID and development of a transfer mechanism and set of rules for such transfers. Special water user associations have been created in anticipation of future use of Rio Grande Project water for drinking supplies and other non-irrigation uses.

- The risk of flooding from the Rio Grande and its tributaries is a key concern in the region. Much of the original flood control infrastructure was installed decades ago and requires maintenance and upgrades. Recently, the International Boundary and Water Commission (IBWC) completed improvements on more than 200 miles of infrastructure including Rio Grande levees, floodwalls, floodgates, and ancillary structures (USBR, 2016). However, full implementation of all the necessary flood control improvements is expected to be very expensive, due in part to required removal of sediment deposited within the Rio Grande channel and issues associated with aging infrastructure.

- Endangered species and environmental restoration issues may increase in importance. Large populations of southwestern willow flycatcher and yellow billed cuckoo, both listed species under the federal Endangered Species Act, reside in the dry portion of the reservoir pool of Elephant Butte Reservoir. Operations of Elephant Butte and Caballo reservoirs may be impacted by habitat protection for these species. Furthermore, a number of non-governmental organizations have taken an interest in the potential for aquatic and related wetland restoration in and along the main channel of the Rio Grande within the EBID and Lower Rio Grande basin.

- The Jornada del Muerto Basin is primarily an alluvial basin that is being mined through groundwater pumping of its finite freshwater supply, and demand is tending to outpace supply in parts of the southernmost extent of the basin, where population growth and development have increased rapidly in recent years. Other parts of the Jornada del Muerto Basin are also the subject of keen interest, including the central area in which the newly constructed Spaceport America resides.

- High levels of E. coli in the Rio Grande exceed total maximum daily load (TMDL) criteria (Section 5.4) and are a threat to public health.

- Under Section 72-12-25 NMSA, notices of intent to drill deep wells in the eastern Mimbres Basin, within Doña Ana County and about 15 miles from the Rio Grande, for the withdrawal of 25,000 acre-feet per year of nonpotable water have been filed, including a notice to drill five deep wells for the withdrawal of 5,000 acre-feet per year filed by the City of Las Cruces prior to changes in state law.

- The many small rural drinking water systems within the region face challenges in financing infrastructure maintenance and upgrades and complying with water quality monitoring and training standards. Though the source water for these systems is generally good-quality groundwater, the maintenance, upgrades, training, operation, and monitoring that is required to ensure delivery of water that meets drinking water quality standards is a financial and logistical challenge for these small systems. The water systems in Garfield, Hatch, and Mesilla recently received New Mexico Water Trust Board funding for upgrading waterlines and other infrastructure improvements for fiscal year 2015.

5.1 Summary of Climate Conditions

The 2003 regional water plan (Terracon et al., 2003) included an analysis of historical temperature and precipitation in the region. This section provides an updated summary of temperature, precipitation, snowpack conditions, and drought indices pertinent to the region (Section 5.1.1). Studies relevant to climate change and its potential impacts to water resources in New Mexico and the Lower Rio Grande region are discussed in Section 5.1.2.

5.1.1 Temperature, Precipitation, and Drought Indices

Table 5-1 lists the periods of record for weather stations in Doña Ana County and identifies two stations that were used for analysis of weather trends. These stations were selected based on location, how well they represented conditions in their respective counties, and completeness of their historical records. The locations of the climate stations for which additional data were analyzed are shown in Figure 5-1.

Long-term minimum, maximum, and average temperatures for the two climate stations are detailed in Table 5-2, and average summer and winter temperatures for each year of record are shown on Figure 5-2.

The average precipitation distribution across the entire region is shown on Figure 5-3, and Table 5-2 lists the minimum, maximum, and long-term average annual precipitation (rainfall and snowmelt) at the two representative stations in the planning region. Total annual precipitation for the selected climate stations is shown in Figure 5-4. Average annual precipitation ranges from 8 inches in the valley to 23 inches in the Organ Mountains.

Table 5-1. Lower Rio Grande Climate Stations

Climate Stations [a]	Latitude	Longitude	Elevation	Precipitation		Temperature	
				Data Start	Data End	Data Start	Data End
Dona Ana County							
Afton 6 NE	32.12	–106.87	4,189	7/1/1942	5/31/1999	9/1/1987	9/30/1987
Garfield	32.75	–107.27	4,104	1/1/1920	6/30/1948	1/1/1920	9/30/1942
Hatch 2 W	32.67	–107.18	4,051	4/1/1894	4/30/2008	3/1/1894	4/30/2008
Jornada Exp Range	32.62	–106.74	4,266	6/1/1914	Present	6/1/1914	Present
Las Cruces	32.30	–106.77	—	11/1/1944	Present	11/1/1944	Present
State University [b]	32.28	–106.76	3,881	1/1/1892	Present	1/1/1892	Present

Source: WRCC, 2014

— = Information not available

[a] Stations in **bold** type were selected for detailed analysis.

[b] Station formerly called “Agricultural College” from 1892 to 1959.

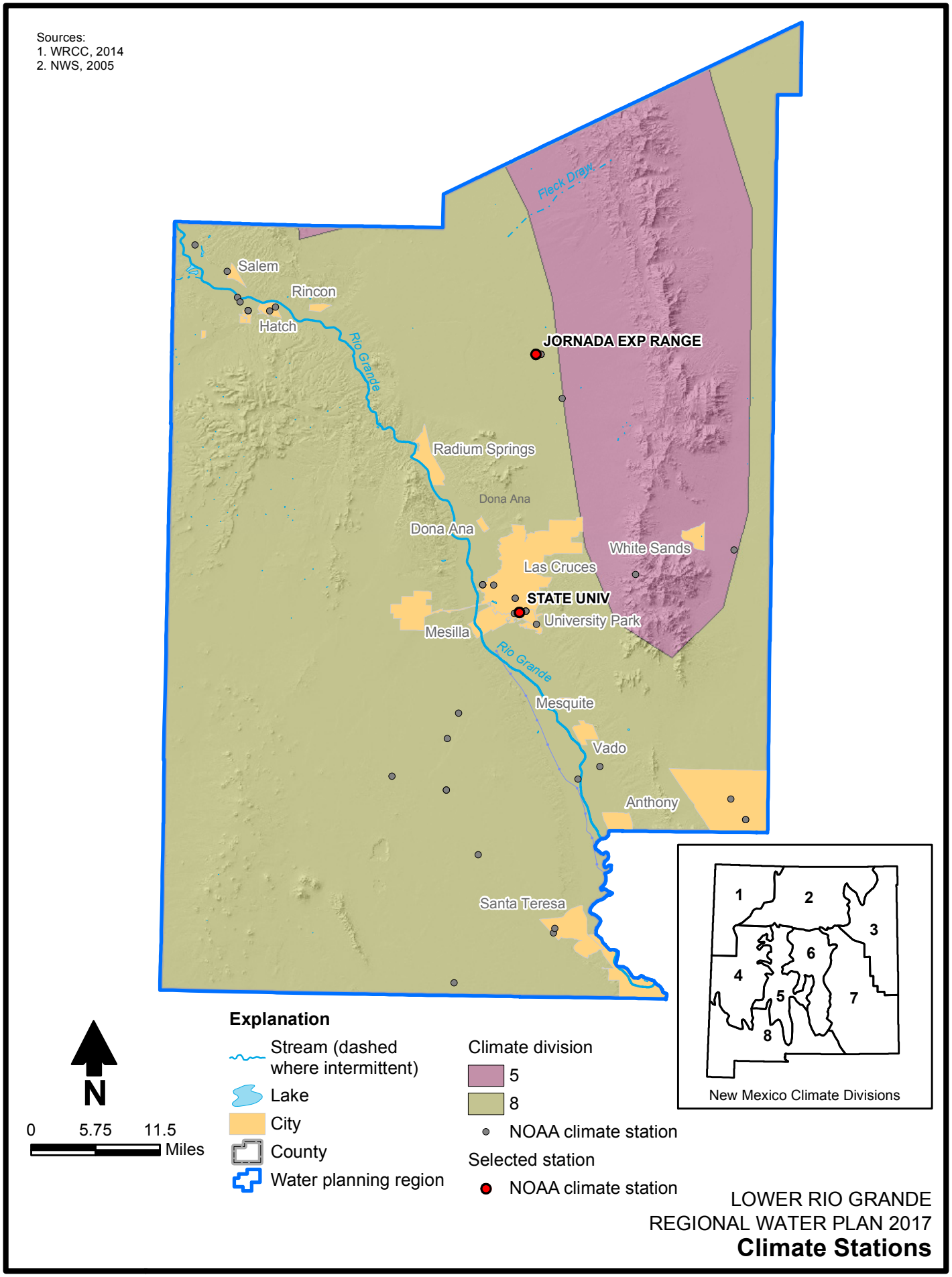

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Figure 5-1

Table 5-2. Temperature and Precipitation for Selected Climate Stations Lower Rio Grande Water Planning Region

Station Name	Precipitation (inches)				Temperature			
	Average Annual [a]	Minimum [b]	Maximum [b]	% of Possible Observations [c]	Average (°F)			% of Possible Observations [c]
					Annual [d]	Minimum [e]	Maximum [e]	
Jornada Exp Range, NM	9.77	3.10	19.97	90.4	75.3	40.0	76.5	60.2
State University, NM	9.28	3.44	14.83	99.6	61.8	46.3	77.4	99.6

Source: Statistics computed by Western Regional Climate Center (2014)

ft amsl = Feet above mean sea level

°F = Degrees Fahrenheit

[a] Average of annual precipitation totals for the period of record at each station.

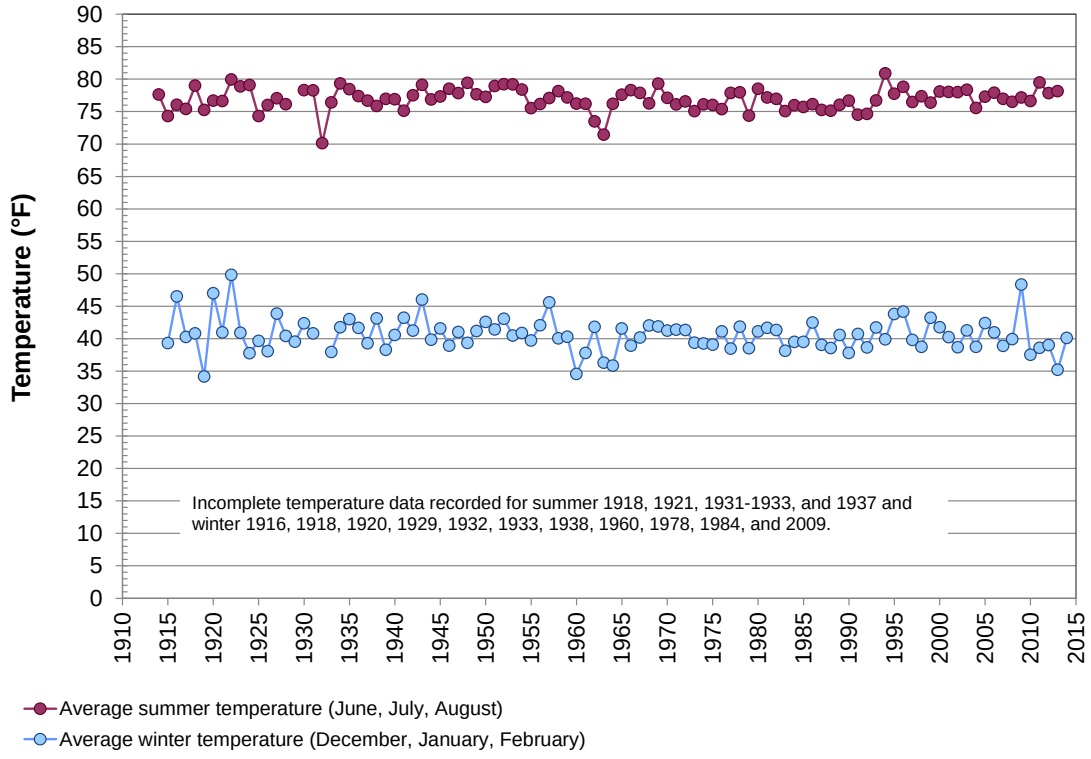
[b] Minimum and maximum recorded annual precipitation amounts for each station.

[c] Amount of completeness in the daily data set that was recorded at each station (e.g., 99% complete means there is a 1% data gap).

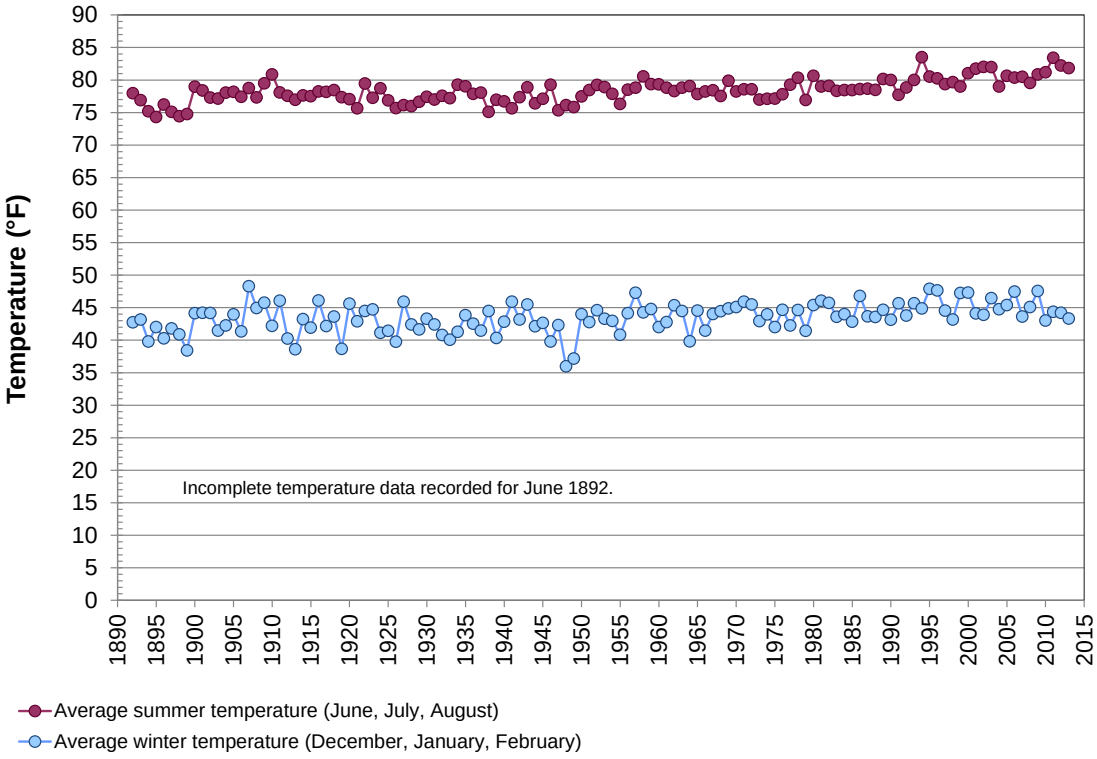
[d] Average of the daily average temperatures calculated for each station.

[e] Average of the daily minimum (or maximum) temperature recorded daily for each station.

Jornada Exp Range, NM



State University, NM



LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Average Temperature, Jornada Exp Range and State University Climate Stations

Figure 5-2

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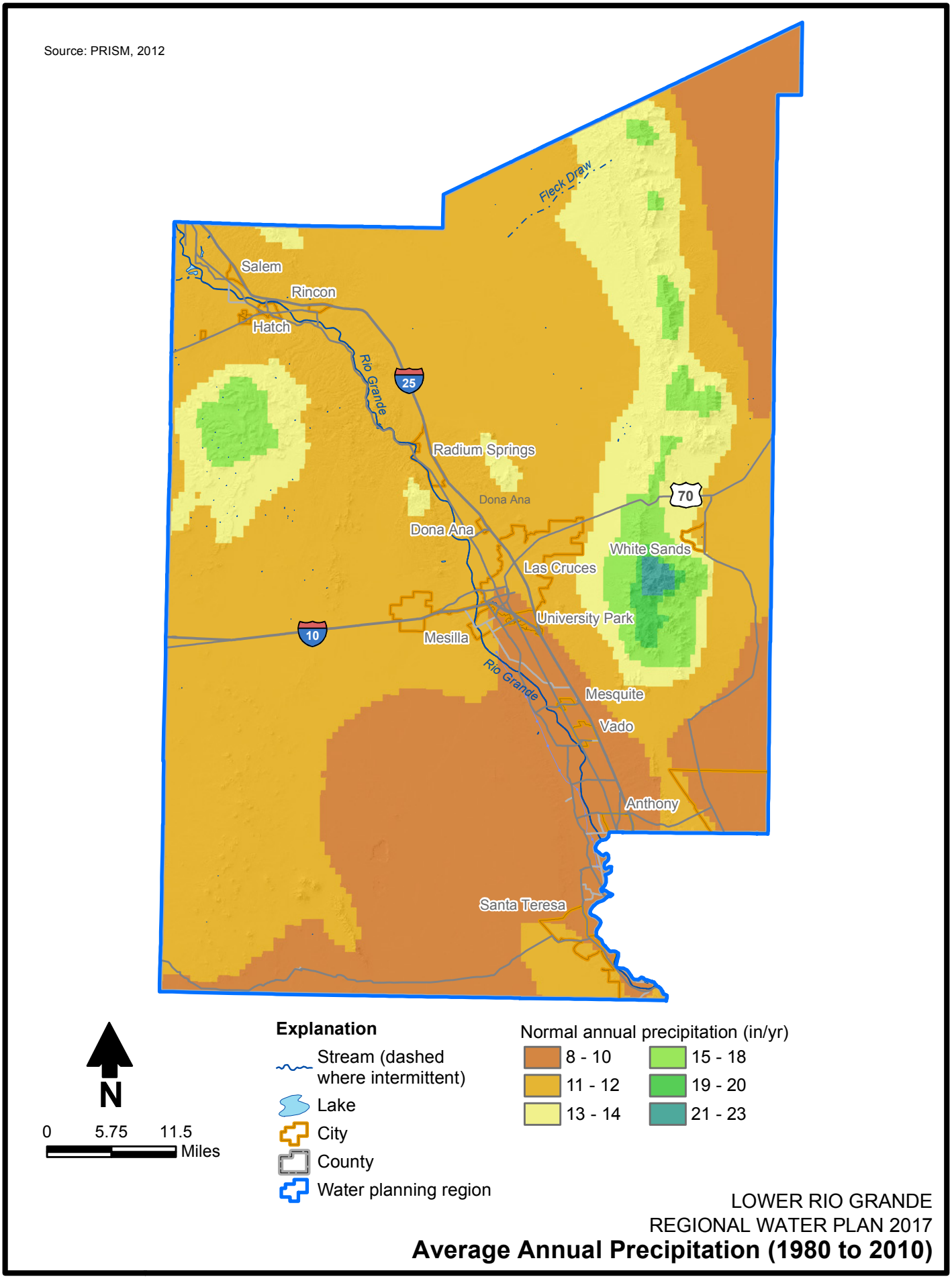

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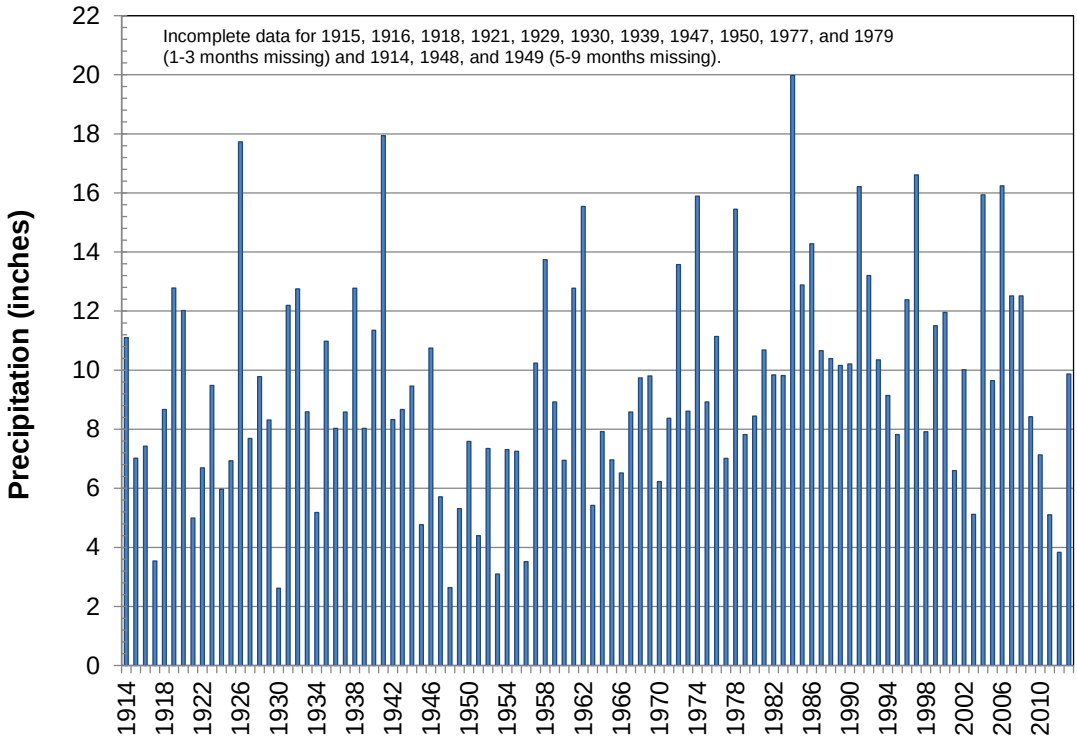
LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

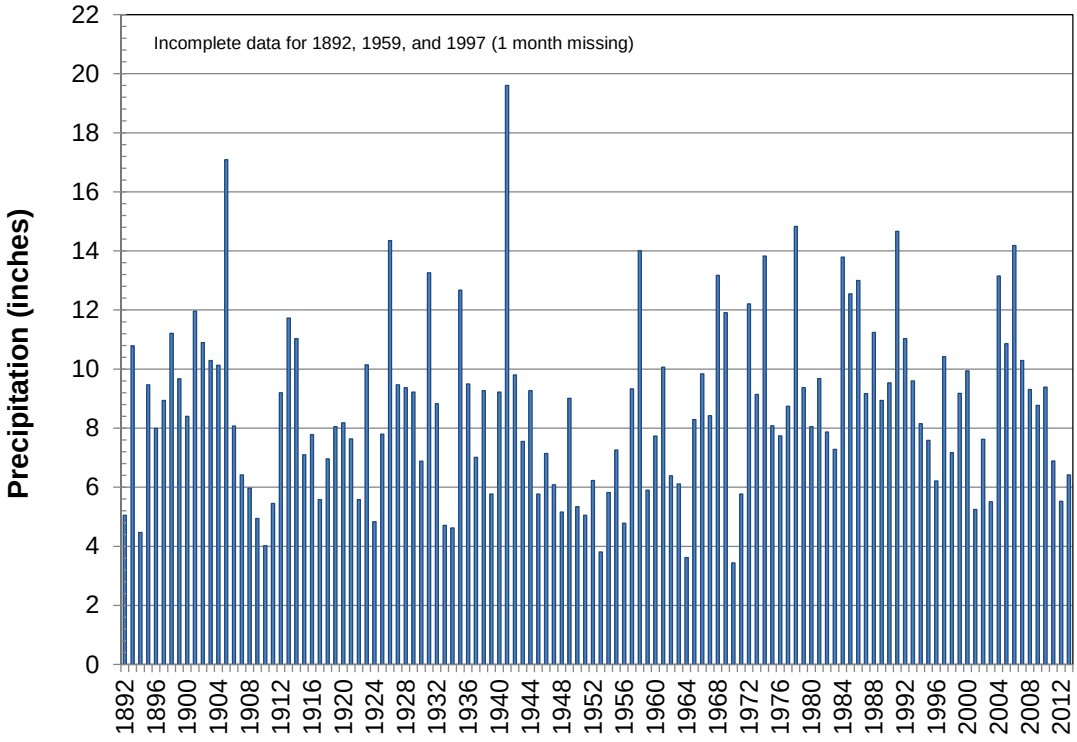
Average Annual Precipitation (1980 to 2010)

Figure 5-3

Jornada Exp Range, NM



State University, NM



LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Annual Precipitation, Jornada Exp Range and State University Climate Stations

Figure 5-4

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Another way to review long-term variations in climate conditions is through drought indices. A drought index consists of a ranking system derived from the assimilation of data—including rainfall, snowpack, streamflow, and other water supply indicators—for a given region. The Palmer Drought Severity Index (PDSI) was created by W.C. Palmer (1965) to measure the variations in the moisture supply and is calculated using precipitation and temperature data as well as the available water content of the soil. Because it provides a standard measure that allows comparisons among different locations and months, the index is widely used to assess the weather during any time period relative to historical conditions. The PDSI classifications for dry to wet periods are provided in Table 5-3.

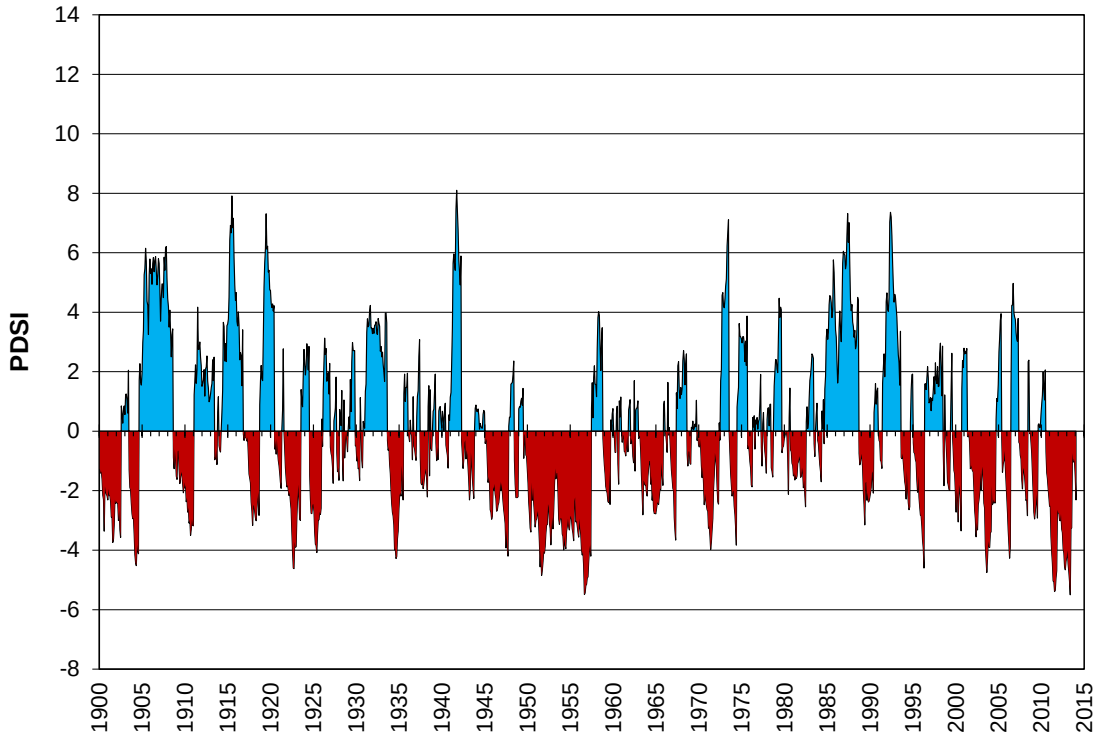
Table 5-3. Palmer Drought Severity Index Classifications

PDSI Classification	Description
+ 4.00 or more	Extremely wet
+3.00 to +3.99	Very wet
+2.00 to +2.99	Moderately wet
+1.00 to +1.99	Slightly wet
+0.50 to +0.99	Incipient wet spell
+0.49 to –0.49	Near normal
–0.50 to –0.99	Incipient dry spell
–1.00 to –1.99	Mild drought
–2.00 to –2.99	Moderate drought
–3.00 to –3.99	Severe drought
–4.00 or less	Extreme drought

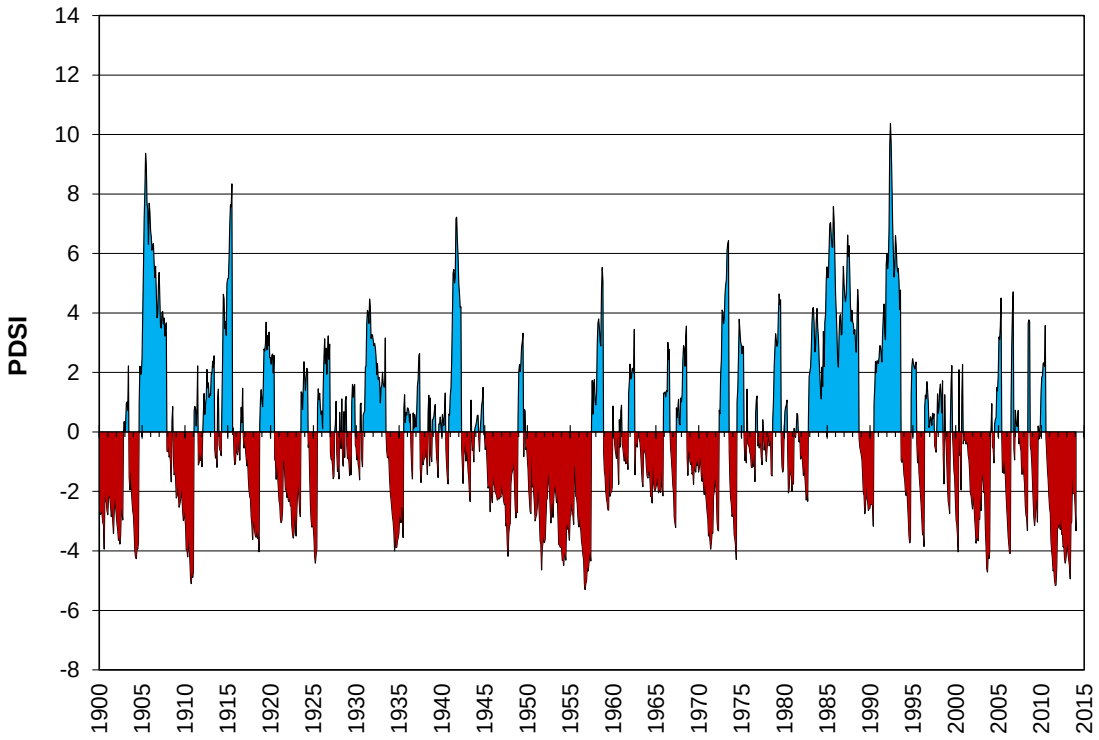
There are considerable limitations when using the PDSI, as it may not describe rainfall and runoff that varies from location to location within a climate division and may also lag in indicating emerging droughts by several months. Also, the PDSI does not consider groundwater or reservoir storage, which can affect the availability of water supplies during drought conditions. However, even with its limitations, many states incorporate the PDSI into their drought monitoring systems, and it provides a good indication of long-term relative variations in drought conditions, as PDSI records are available for more than 100 years.

The PDSI is calculated for climate divisions throughout the United States. Doña Ana County falls primarily within New Mexico Climate Division 8 (the Southern Desert Climate Division) with a portion of Division 5 (the Central Valley Climate Division) extending about halfway into the eastern side of the region (Figure 5-1). Figure 5-6 shows the long-term PDSI for these two regions. Of interest are the large variations from year to year in both divisions, which are similar in pattern though not necessarily in magnitude.

Climate Division 5



Climate Division 8



Note: Blue indicates wetter than average conditions and red indicates drier than average conditions, as described on Table 5-3.

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Palmer Drought Severity Index
New Mexico Climate Divisions 5 and 8

Figure 5-6

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The chronological history of drought, as illustrated by the PDSI, indicates that the most severe droughts in the last century occurred in the early 1900s, the 1950s, the early 2000s, and in recent years (2011 to 2013) (Figure 5-6).

The likelihood of drought conditions developing in New Mexico is influenced by several weather patterns:

- *El Niño/La Niña:* El Niño and La Niña are characterized by a periodic warming and cooling, respectively, of sea surface temperatures across the central and east-central equatorial Pacific. Years in which El Niño is present are more likely to be wetter than average in New Mexico, and years with La Niña conditions are more likely to be drier than average, particularly during the cool seasons of winter and spring.

- *The Pacific Decadal Oscillation (PDO):* The PDO is a multi-decadal pattern of climate variability caused by shifting sea surface temperatures between the eastern and western Pacific Ocean that cycle approximately every 20 to 30 years. Warm phases of the PDO (shown as positive numbers on the PDO index) correspond to El Niño-like temperature and precipitation anomalies (i.e., wetter than average), while cool phases of the PDO (shown as negative numbers on the PDO index) correspond to La Niña-like climate patterns (drier than average). It is believed that since 1999 the planning region has been in the cool phase of the PDO.

- *The Atlantic Multidecadal Oscillation (AMO):* The AMO refers to variations in surface temperatures of the Atlantic Ocean which, similarly to the PDO, cycle on a multi-decade frequency. The pairing of a cool phase of the PDO with the warm phase of the AMO is typical of drought in the southwestern United States (McCabe et al., 2004; Stewart, 2009). The AMO has been in a warm phase since 1995. It is possible that the AMO may be shifting to a cool phase but the data are not yet conclusive.

- *The North American Monsoon* is characterized by a shift in wind patterns in summer, which occurs as Mexico and the southwest U.S. warm under intense solar heating. As this happens, the flow reverses from dry land areas to moist ocean areas. Low-level moisture is transported into the region primarily from the Gulf of California and eastern Pacific. Upper-level moisture is transported into the region from the Gulf of Mexico by easterly winds aloft. Once the forests of the Sierra Madre Occidental green up from the initial monsoon rains, evaporation and plant transpiration can add additional moisture to the atmosphere that will then flow into the region. If the Southern Plains of the U.S. are unusually wet and green during the early summer months, that area can also serve as a moisture source. This combination causes a distinct rainy season over large portions of western North America (NWS, 2015).

5.1.2 Recent Climate Studies

New Mexico's climate has historically exhibited a high range of variability. Periods of extended drought, interspersed with relatively short-term, wetter periods, are common. Historical periods of high temperature and low precipitation have resulted in high demands for irrigation water and higher open water evaporation and riparian evapotranspiration. In addition to natural climatic cycles (i.e., El Niño/La Niña, PDO, AMO [Section 5.1.1]) that affect precipitation patterns in the southwestern United States, there has been considerable recent research on potential climate change scenarios and their impact on the Southwest and New Mexico in particular.

The consensus on global climate conditions is represented internationally by the work of the Intergovernmental Panel on Climate Change (IPCC), whose Fifth Assessment Report, released in September 2013, states, "Warming of the climate system is unequivocal, and since the 1950s many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC, 2013). Atmospheric concentrations of greenhouse gases are rising so quickly that all current climate models project significant warming trends over continental areas in the 21st century.

In the United States, regional assessments conducted by the U.S. Global Change Research Program (USGCRP) have found that temperatures in the southwestern United States have increased and are predicted to continue to increase, and serious water supply challenges are expected. Water supplies are projected to become increasingly scarce, calling for trade-offs among competing uses and potentially leading to conflict (USGCRP, 2009). Most of the major river systems in the southwestern U.S. are expected to experience reductions in streamflow and other limitations to water availability (Garfin et al., 2013).

Although there is consensus among climate scientists that global temperatures are warming, there is considerable uncertainty regarding the specific spatial and temporal impacts that can be expected. To assess climate trends in New Mexico, the NMOSE and NMISC (2006) conducted a study of observed climate conditions over the past century and found that observed wintertime average temperatures had increased statewide by about 1.5°F since the 1950s. Predictions of annual precipitation are subject to greater uncertainty "given poor representation of the North American monsoon processes in most climate models" (NMOSE/NMISC, 2006).

A number of other studies predict temperature increases in New Mexico from 5° to 10°F by the end of the century (Forest Guild, 2008; Hurd and Coonrod, 2008; USBR, 2011). Predictions of annual precipitation are subject to greater uncertainty, particularly regarding precipitation during the summer monsoon season in the southwestern U.S.

Based on these studies, the effects of climate change that are likely to occur in New Mexico and the planning region include (NMOSE/NMISC, 2006):

- Temperature is expected to continue to rise.
- Higher temperatures will result in a longer and warmer growing season, resulting in increased water demand on irrigated lands and increased evapotranspiration from riparian areas, grasslands and forests, and thus less recharge to aquifers.
- Reservoir and other open water evaporation are expected to increase. Soil evaporation will also increase.
- Precipitation is expected to be more concentrated and intense, leading to increased projected frequency and severity of flooding.
- Streamflows in major rivers across the Southwest are projected to decrease substantially during this century (e.g., Christensen et al., 2004; Hurd and Coonrod, 2008; USBR, 2011, 2013) due to a combination of diminished cold season snowpack in headwaters regions and higher evapotranspiration in the warm season. The seasonal distribution of streamflow is projected to change as well: flows could be somewhat higher than at present in late winter, but peak runoff will occur earlier and be diminished. Late spring/early summer flows are projected to be much lower than at present, given the combined effects of less snow, earlier melting, and higher evaporation rates after snowmelt.
- Forest habitat is vulnerable to both decreases in cold-season precipitation and increases in warm-season vapor pressure deficit (Williams et al., 2010). Stress from either of these factors leave forests increasingly susceptible to insects, forest fires, and desiccation. Greater temperatures increase insect survivability and fire risk. While there are no upland forest areas within the Lower Rio Grande Regional Water Planning region, impacts to forests just upstream of the region may impact water resources within the region.

To minimize the impact of these changes, it is imperative that New Mexico plan for variable water supplies, including focusing on drought planning and being prepared to maximize storage from extreme precipitation events while minimizing their adverse impacts.

5.2 Surface Water Resources

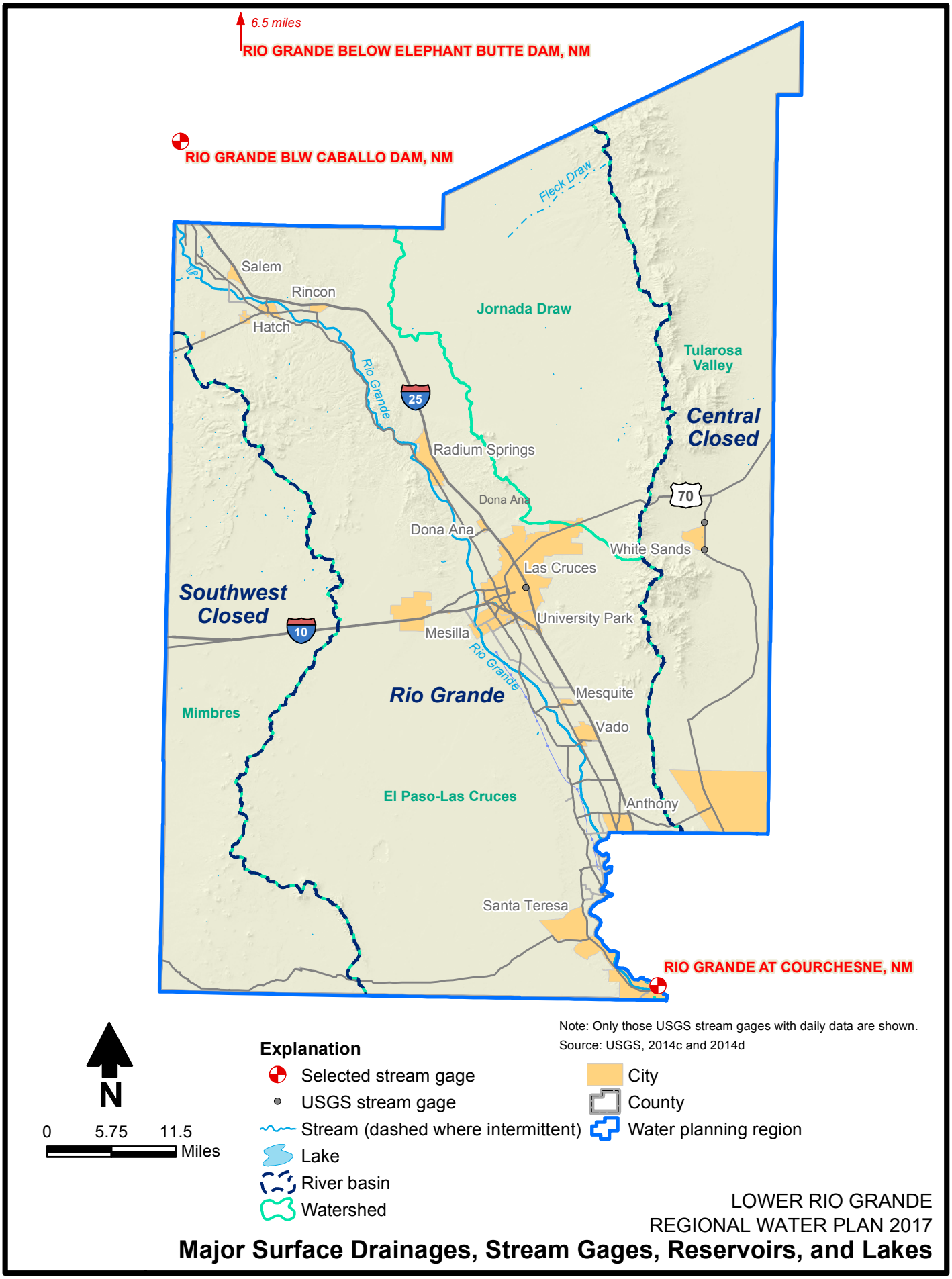
Surface water supplies approximately 60 percent of the water currently diverted in the Lower Rio Grande Water Planning Region, with its primary uses being for irrigated agriculture. The dominant waterway flowing in the region is the Rio Grande.

Major surface drainages (including both perennial and intermittent streams) and watersheds in the planning region are shown on Figure 5-7. The water planning region consists of parts of four distinct drainage basins, but only one of these, the Rio Grande, has a through-flowing river. The other three basins—the Jornada del Muerto, Tularosa, and Mimbres —are closed basins. When evaluating surface water information, it is important to note that streamflow does not represent available supply, as there are also water rights and interstate compact limitations. The administrative water supply discussed in Section 5.5 is intended to represent supply considering both physical and legal limitations, but excluding potential compact limitations. The information provided in this section is intended to illustrate the variability and magnitude of streamflow, and particularly the relative magnitude of streamflow in recent years.

Tributary flow is not monitored in every subwatershed in the planning region. However, streamflow data are collected by the U.S. Geological Survey (USGS) and various cooperating agencies at stream gage sites in the planning region. Table 5-4a lists the locations and periods of record for data collected at stream gages in the region, as well as the drainage area and estimated irrigated acreage for surface water diversions upstream of the station. Table 5-4b provides the minimum, median, and maximum annual yield for all gages that have 10 or more years of record. In addition to the large variability in annual yield, streamflow also varies from month to month within a year, and monthly variability or short-term storms can have flooding impacts, even when annual yields are low. Table 5-5 provides monthly summary statistics for each of the stations with 10 or more years of record.

For this water planning update, two stream gages, Rio Grande at Elephant Butte and Rio Grande below Caballo, shown on Figure 5-8, were analyzed in more detail. These stations were chosen because of their locations in the hydrologic system, completeness of record, and representativeness as key sources of supply. Figure 5-8 shows the minimum and median annual water yield for these gages. Figures 5-9a and 5-9b show the annual water yield from the beginning of the period of record through 2013 for the two gages. As shown in these figures, the gages are both upstream of Lower Rio Grande planning region and measure flow from Elephant Butte and Caballo Reservoirs; thus the annual flow is controlled by dam operations, except in years when the reservoirs spilled (1942, 1985, 1986, 1987, 1988, and 1995 [NMOSE, 2017]). The minimum flow of 168,757 acre-feet was recorded in 2013 at the gage below Elephant Butte dam and the average is 652,400 acre-feet per year (ac-ft/yr).

Several small lakes are present in the planning region (Figure 5-7) but the two main reservoirs on the Rio Grande (Elephant Butte and Caballo Reservoirs) are outside of the region and not shown on Figure 5-7. The *New Mexico Water Use by Categories* reports track usage in the larger lakes and reservoirs (i.e., storage capacity greater than 5,000 acre-feet), although Lake Lucero, an intermittent playa lake in the planning region (Figure 5-7) with an area of 5,500 acres, is not included in the latest report (Longworth et al., 2013).



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LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Major Surface Drainages, Stream Gages, Reservoirs, and Lakes

Figure 5-7

Table 5-4a. USGS Stream Gage Stations

USGS Station [a]							Period of Record	
Name [b]	Number	Latitude	Longitude	Elevation (ft amsl)	Drainage Area (sq mi)	Irrigated Upstream Land [c] (acres)	Start Date	End Date
Dona Ana County								
Las Cruces Arr near Las Cruces, NM	08363600	32.3153714	–106.750559	4,035	14	—	10/1/1958	9/30/1966
Tularosa Valley Tr near White Sands, NM	08486250	32.4031472	–106.479994	4,230	17	—	10/1/1965	6/30/1974
Tularosa Valley Tr at White Sands, NM	08486260	32.3681480	–106.479438	4,230	21	—	10/1/1965	6/30/1974
Selected Streams Outside of Region								
Rio Grande below Elephant Butte Dam, NM	08361000	33.1485111	–107.206783	4,241	29,450	800,000	10/1/1916	Present
Rio Grande below Caballo Dam, NM [d]	08362500	32.8849111	–107.292697	4,141	30,700	800,000	1/1/1938	Present
Rio Grande at Courchesne	—	31.802778 [e]	– 106.54000 [e]	3,760 [e]	—	—	1/1/1889 [f]	Present

Source: USGS, 2014c (unless otherwise noted)

[a] Only those USGS stream gages with daily data are shown.

[b] **Bold** indicates gages in key locations selected for additional analysis.

[c] Source: Terracon et al., 2003; USGS, 2014a

[d] U.S. Bureau of Reclamation gaging station (data provided byUSGS [2014c]).

[e] Source: TCEQ, 2013

[f] Source: NMISC, 2016

USGS = U.S. Geological Survey

ft amsl = Feet above mean sea level

sq mi = Square miles

— = Data not available from current source(s).

Table 5-4b. USGS Stream Gage Annual Statistics for Stations with 10 or More Years of Record

USGS Station Name [a]	Annual Yield [b] (acre-feet)			Number of Years [c]
	Minimum	Median	Maximum	
Selected Streams Outside of Region				
Rio Grande below Elephant Butte Dam, NM	168,757	692,402	1,818,605	97
Rio Grande below Caballo Dam, NM [d]	205,534	651,606	1,395,808	46
Rio Grande at Courchesne, NM [e,f]	50,749	453,635	2,011,847	124

Source: USGS, 2014c

[a] Stations with complete years of data only
Bold indicates gages in key locations selected for additional analysis.

[b] Based on calendar years;

[c] Number of years used in calculation of annual yield statistics

[d] U.S. Bureau of Reclamation gaging station (data provided byUSGS [2014c]).

[e] Data points from years 1894-1896 showed zero flow and were excluded from this analysis

[f] Source: NMISC, 2016

Table 5-5. USGS Stream Gage Average Monthly Streamflow for Stations with 10 or More Years of Record

USGS Station [a]	Complete Years [b]	Average Monthly Streamflow [c] (acre-feet)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Selected Streams Outside of Region													
Rio Grande below Elephant Butte Dam, NM	97	17,962	38,488	71,919	89,739	95,111	108,679	105,489	84,591	45,436	19,671	13,366	16,448
Rio Grande below Caballo Dam, NM [d]	46	5,877	15,357	95,491	72,462	78,019	109,612	115,023	97,229	53,066	12,404	2,041	3,404

Source: USGS, 2014c

[a] **Bold** indicates gages in key locations selected for additional analysis.

[b] Monthly statistics are for complete months with locations where 10 or more years of complete data were available.

[c] Data from USGS monthly statistics averaged over the entire period of record, converted to acre-feet (from cubic feet per second) and rounded to the nearest acre-foot.

[d] U.S. Bureau of Reclamation gaging station (data provided by USGS [2014c]).

USGS = U.S. Geological Survey

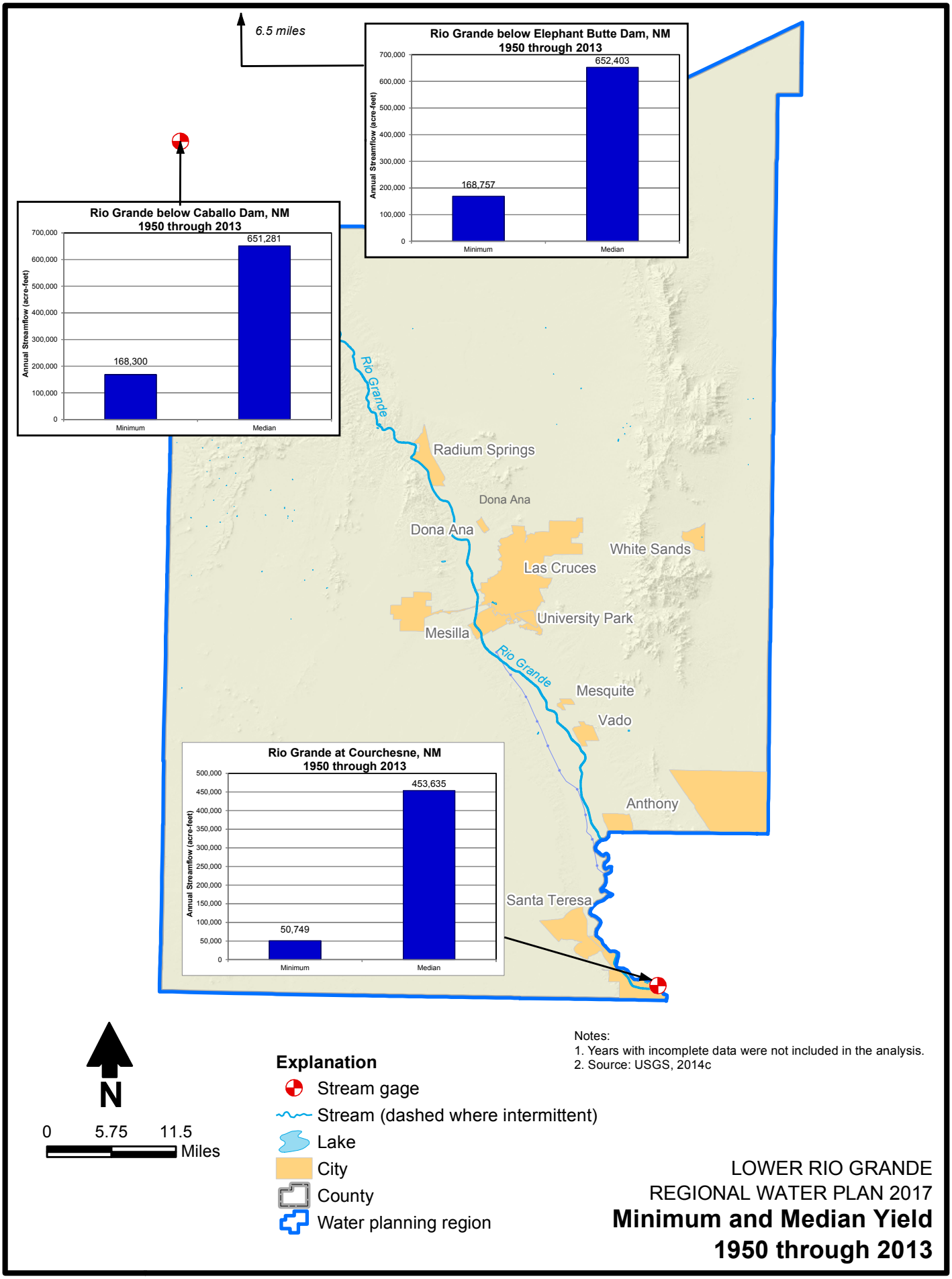
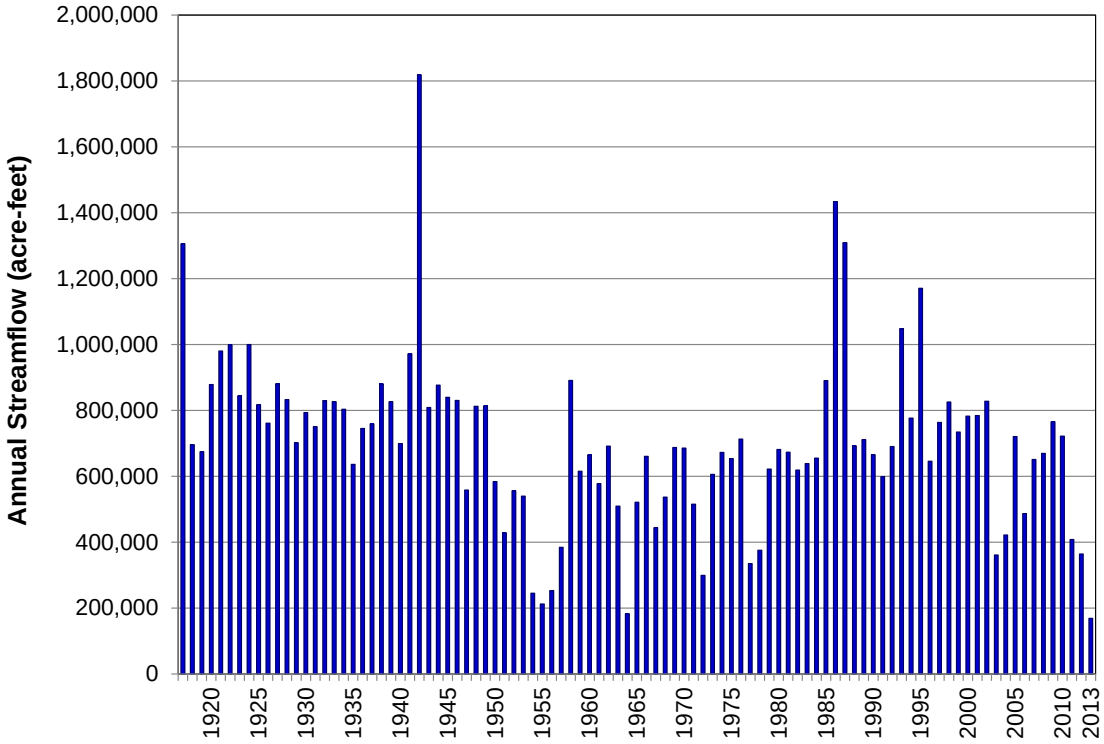
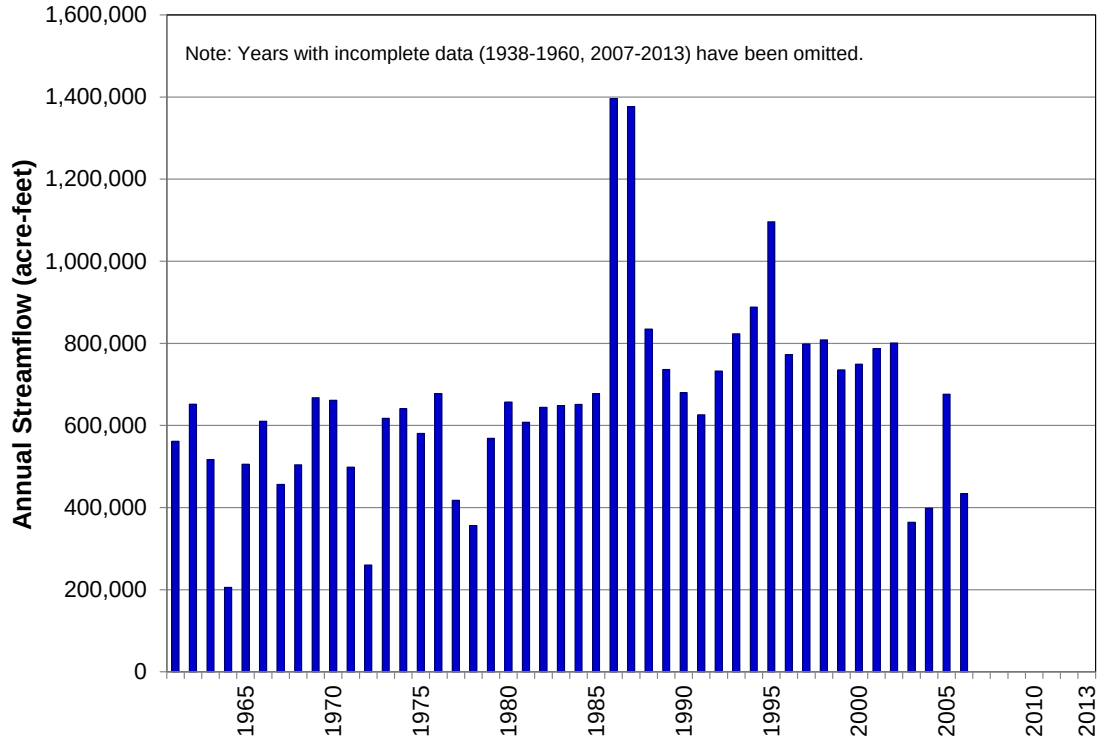

6.5 miles
Rio Grande below Elephant Butte Dam, NM
1950 through 2013
Annual Streamflow (acre-feet)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
652,403
168,757
Minimum
Median
Rio Grande below Caballo Dam, NM
1950 through 2013
Annual Streamflow (acre-feet)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
651,281
168,300
Minimum
Median
Rio Grande
Radium Springs
Dona Ana
Dona Ana
White Sands
Las Cruces
University Park
Mesilla
Rio Grande
Mesquite
Vado
Anthony
Santa Teresa
Rio Grande at Courchesne, NM
1950 through 2013
Annual Streamflow (acre-feet)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
453,635
50,749
Minimum
Median
N
0
5.75
11.5
Miles
Explanation
Stream gage
Stream (dashed where intermittent)
Lake
City
County
Water planning region
Notes:
1. Years with incomplete data were not included in the analysis.
2. Source: USGS, 2014c
LOWER RIO GRANDE
REGIONAL WATER PLAN 2017
Minimum and Median Yield
1950 through 2013
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\LOWER_RIO_GRANDE\FIG5-8_STREAMFLOW.MXD 12/21/2016

Figure 5-8

Rio Grande below Elephant Butte Dam, NM



Rio Grande below Caballo Dam, NM



LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Annual Streamflow for Selected Gaging Stations on the Rio Grande

Figure 5-9a

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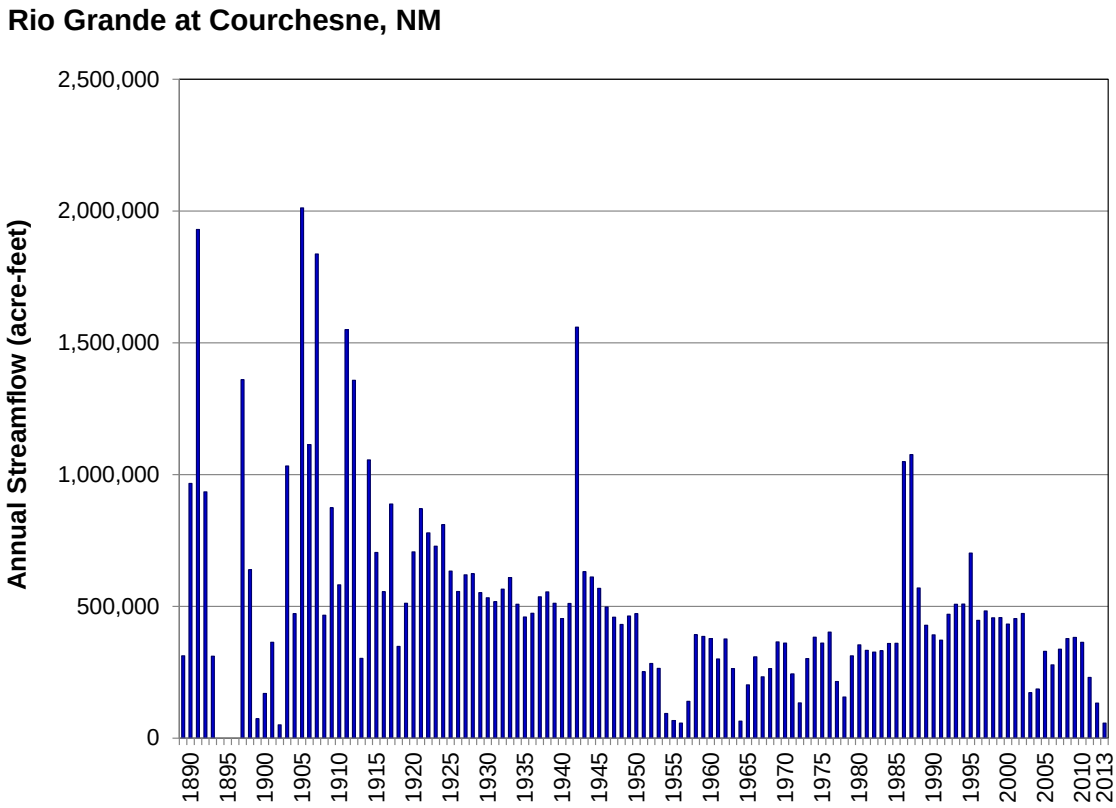

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Annual Streamflow for Selected Gaging Stations on the Rio Grande

Figure 5-9b

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Within the Lower Rio Grande Basin, a number of drainages channel storm runoff, snowmelt, and minor spring flow from both sides of the river to the Rio Grande. In addition, the 2002 water plan estimated that an average of about 11,000 acre-feet, or 10 million gallons per day (mgd), of treated wastewater is discharged to the Rio Grande from wastewater treatment systems in Doña Ana County (Section 5.4.1.1; Terracon et al., 2003). This water originated as groundwater pumped from wells in the Lower Rio Grande and southern Jornada del Muerto basins by municipal supply systems.

Rio Grande Project water is the primary supply of surface water to the Lower Rio Grande region. It is the basis of the agricultural sector in this part of New Mexico, Texas, and northern Mexico and serves both flood control and power generation purposes as well. USBR releases water from the Rio Grande Project reservoirs to furnish, through the EBID and EPCWID #1, stored water to downstream irrigable land in New Mexico and Texas and delivers up to 60,000 acre-feet of water annually to the Republic of Mexico. At this time, the Rio Grande Project water allocated to EBID is used for primarily irrigation purposes. The primary reservoirs of the Rio Grande Project, Elephant Butte Reservoir and Caballo Reservoir (Table 5-6), are located in the Socorro-Sierra planning region but are described here because the water that is stored in the reservoirs is primarily for the benefit of water users within the Lower Rio Grande planning region.

- A 2007 reservoir capacity survey determined that Elephant Butte Dam and Reservoir (originally called Engle Dam), 125 miles north of El Paso, Texas, can store 2,024,586 acre-feet of water to provide irrigation and year-round power generation. The dam was completed in 1916, but storage operation began in 1915. The power system consists of a 24,300-kilowatt hydroelectric power plant at Elephant Butte Dam. Elephant Butte Reservoir is the delivery point for New Mexico's Rio Grande Compact annual delivery obligation.

- Caballo Reservoir has a maximum capacity of 324,934 acre-feet (determined in the 2007 survey), which includes space for conservation storage and floodwater. It is about 25 miles downstream from Elephant Butte Dam, and the operations of the two are coordinated for hydroelectric power generation and irrigation releases.

In addition to these reservoirs, the Lower Rio Grande contains a number of smaller reservoirs used primarily for either flood control or recreation; information on these smaller reservoirs was included in the accepted plan (Terracon et al., 2003).

During the summer months, water is released at Elephant Butte Dam, within certain limits, to generate electricity, and the released water is stored farther downstream behind Caballo Dam until it is needed for irrigation. Little or no water is released from either reservoir during the winter months.

The USBR controls the operation of Elephant Butte and Caballo Dams. The U.S. Section of the IBWC maintains the river floodway and levees of the Rio Grande from the Percha diversion dam south to the borders with Texas and Mexico.

Table 5-6. Reservoirs and Lakes (greater than 5,000 acre-feet) Supplying the Lower Rio Grande Water Planning Region

River	Reservoir [a]	Primary Purpose	Operator	Date Completed	Total Storage Capacity (acre-feet)	Surface Area (acres)	Dam Height (feet)	Dam Length (feet)
Sierra County								
Rio Grande	Elephant Butte Reservoir	Conservation storage (irrigation)	Bureau of Reclamation	1915	2,024,586	36,643	301	1,674
	Caballo Reservoir	Re-regulation for irrigation	Bureau of Reclamation	1937	324,934	9,353	96	4,558

Source: USACE, 1999

[a] Reservoirs are upstream of Lower Rio Grande region, but are included because of their relevance to the region.

The NMOSE conducts periodic inspections of non-federal dams in New Mexico to assess dam safety issues. Dams that equal or exceed 25 feet in height that impound 15 acre-feet of storage or dams that equal or exceed 6 feet in height and impound at least 50 acre-feet of storage are under the jurisdiction of the State Engineer. These non-federal dams are ranked as being in good, fair, poor, or unsatisfactory condition. Dams with unsatisfactory conditions are those that require immediate or remedial action. Dams identified in recent inspections as being deficient, with high or significant hazard potential, are summarized in Table 5-7. The 40 dams listed in this table are primarily for operation of the EBID or are used for flood control.

5.3 Groundwater Resources

In the Lower Rio Grande region groundwater accounted for about 40 percent of all water diversions in the year 2010 (Longworth et al., 2013). Groundwater not only supplies all the water demands for public, domestic, commercial, power, mining and industry, it also supplies a significant, but variable percent of the irrigated agriculture water demands.

5.3.1 Regional Hydrogeology

The geology that controls groundwater occurrence and movement within the planning region was described in the accepted *Lower Rio Grande Regional Water Plan* (Terracon et al., 2003), based on studies by Conover (1954), Leggat et al. (1962), King et al. (1971), Hawley (1984), Wilson and White (1984), Nickerson (1986), Hawley and Lozinski (1992), Weeden and Maddock (1999). A map illustrating the surface geology of the planning region, derived from a geologic map of the entire state of New Mexico by the New Mexico Bureau of Geology & Mineral Resources (2003), is included as Figure 5-10.

Two physiographic regions exist within the planning region (Hawley, 1986). From the west to the east, these are:

- Basin and Range (Mexican Highland, Rio Grande Subsection)
- Basin and Range (Mexican Highland Section)

Figure 5-10 shows the approximate extents of these areas within the planning region.

Groundwater resources for the Lower Rio Grande region include parts of six UWBs (Figure 4-1): the Lower Rio Grande, Tularosa (western portion), Nutt Hockett (eastern portion), Hueco, Mount Riley, and Mimbres (eastern portion). The Lower Rio Grande UWB is characterized according to location into two sub-basins: the Rincon Valley and Mesilla. In addition, the NMOSE has developed a groundwater model for the Jornada del Muerto hydrogeologic basin, the southern portion of which falls in the planning region.

Table 5-7. Dams with Dam Safety Deficiency Rankings

Page 1 of 4

Dam	Condition Assessment [a]	Deficiency	Hazard Potential [b]	Estimated Cost to Repair ($)
Doña Ana County				
Anthony Arroyo Dam No. 1	Poor	Spillway capacity 88% of required flood Severe erosion on embankment Lack of design information	High	100,000
Apache Brazito Mesquite Dam No. 1	Poor	Spillway capacity 50% of required flood Severe erosion on embankment Lack of design information	High	2,500,000
Apache Brazito Mesquite Dam No. 2	Poor	Spillway capacity 64% of required flood Erosion of spillway slopes Lack of design information	High	2,500,000
Apache Brazito Mesquite Dam No. 3	Poor	Spillway capacity ~43% of required flood Erosion of slopes Lack of design information	High	2,500,000
Apache Brazito Mesquite Dam No. 4	Poor	Erosion of slopes Lack of design information	High	2,500,000
Apodaca Arroyo Dam	Poor	Spillway capacity 50% of required flood Maintenance needed Severe erosion	Significant	2,500,000
Breedlove Flood Control Dam	Poor	Lack of design information	High	100,000
Caballo Arroyo Dam No. 2	Poor	Spillway capacity 82% of required flood Partially plugged outlet Lack of design information	High	100,000
Caballo Arroyo Dam No. 3	Poor	Spillway capacity 60% of required flood Lack of design information	High	2,500,000
Caballo Arroyo Dam No. 4	Poor	Spillway capacity 48% of required flood Cracks on dam crest Lack of design information	Significant	2,500,000
Caballo Arroyo Dam No. 5	Poor	Spillway capacity 58% of required flood Lack of design information	Significant	2,500,000
Crow Broad Placitas Dam No. 1	Poor	Spillway capacity 35% of required flood Lack of design information	High	2,500,000
Crow Broad Placitas Dam No. 2A	Poor	Spillway capacity ~20% of required flood Lack of design information	High	2,500,000

Source: NMOSE, 2014b

[a] Assessment criteria are attached at the end of this table.

[b] Hazard potential classifications are attached at the end of this table.

PMP = Probable maximum precipitation

Table 5-7. Dams with Dam Safety Deficiency Rankings

Dam	Condition Assessment [a]	Deficiency	Hazard Potential [b]	Estimated Cost to Repair ($)
Dona Ana Site 1	Fair	Spillway capacity 72% of required flood Portion of downstream toe removed Homes in flood pool	High	150,000
Fillmore Site 1 Dam	Poor	Spillway capacity 20% of required flood Erosion Conduit joints	High	2,500,000
Fillmore Site 2 Dam	Poor	Spillway capacity 48% of required flood Lack of design information	Significant	2,500,000
Fillmore Site 3 Dam	Poor	Spillway capacity 64% of required flood Lack of design information	Significant	2,500,000
Gardner Dam	Unsatisfactory	No spillway or outlet Severe erosion Woody vegetation Excessive seepage	High	2,500,000
Hatch Valley Arroyo Dam No. 1	Poor	Spillway capacity ~75% of required flood Lack of design info	High	200,000
Hatch Valley Arroyo Dam No. 2	Poor	Spillway capacity 45% of required flood Lack of design information	High	2,500,000
Hatch Valley Arroyo Dam No. 6	Poor	Spillway capacity 85% of required flood Lack of design info	High	150,000
Hatch Valley Arroyos Dam No. 3	Poor	Spillway capacity ~80% of required flood Lack of design information	High	
Hatch Valley Arroyos Dam No. 4	Poor	Lack of design information	High	100,000
Hatch Valley Arroyos Dam No. 5	Poor	Lack of design information	High	100,000
Kight Flood Retard Dam	Poor	Lack of design information Inoperable outlet gate	High	200,000
Lauson Arroyo Flood Detention Dam	Poor	Lack of design information	High	200,000
Leasburg Arroyo Dam	Poor	Lack of design information	Significant	200,000
Lucero Detention Dike	Poor	Spillway capacity 20% of required flood Maintenance needed	High	2,500,000

Source: NMOSE, 2014b

[a] Assessment criteria are attached at the end of this table.

[b] Hazard potential classifications are attached at the end of this table.

PMP = Probable maximum precipitation

Table 5-7. Dams with Dam Safety Deficiency Rankings

Page 3 of 4

Dam	Condition Assessment [a]	Deficiency	Hazard Potential [b]	Estimated Cost to Repair ($)
McClernon Dam	Poor	No maintenance Spillway headcut Woody vegetation Scour near outlet	Low	500,000
McLead Flood Control Dam	Poor	Spillway capacity ~15% of required flood Maintenance needed Lack of design information	Significant	3,000,000
North Fork Dam	Poor	Maintenance needed Woody vegetation Potential sediment in outlet Lack of design information	Low	2,500,000
Picacho North Dam	Poor	Spillway capacity 18% of required flood Poor intake design Erosion Lack of design information	High	2,500,000
Picacho South Dam	Poor	Spillway capacity 5% of required flood Poor intake design Erosion Lack of design information	High	2,500,000
Porter Whisenhunt Dam	Poor	Severe headcut on downstream slope Susceptible to breach	Significant	200,000
Rhodes Arroyo Retard Dam	Poor	Maintenance needed Lack of design information	Significant	200,000
Sand Hill Arroyo Dam	Poor	Spillway capacity ~65% of COE envelope curve PMF Lack of design information	High	2,500,000
South Fork Dam	Poor	Maintenance needed Outlet headcut Clogged inlet Lack of design information	Low	2,500,000
Spring Canyon Dam	Poor	Spillway capacity 83% of required flood Lack of design information	High	200,000
Tortugas Site 1 Dam	Poor	Severe erosion Woody vegetation Lack of design information	High	50,000
Tortugas Site 2 Dam	Poor	Lack of design information	High	100,000

Source: NMOSE, 2014b

[a] Assessment criteria are attached at the end of this table.

[b] Hazard potential classifications are attached at the end of this table.

PMP = Probable maximum precipitation

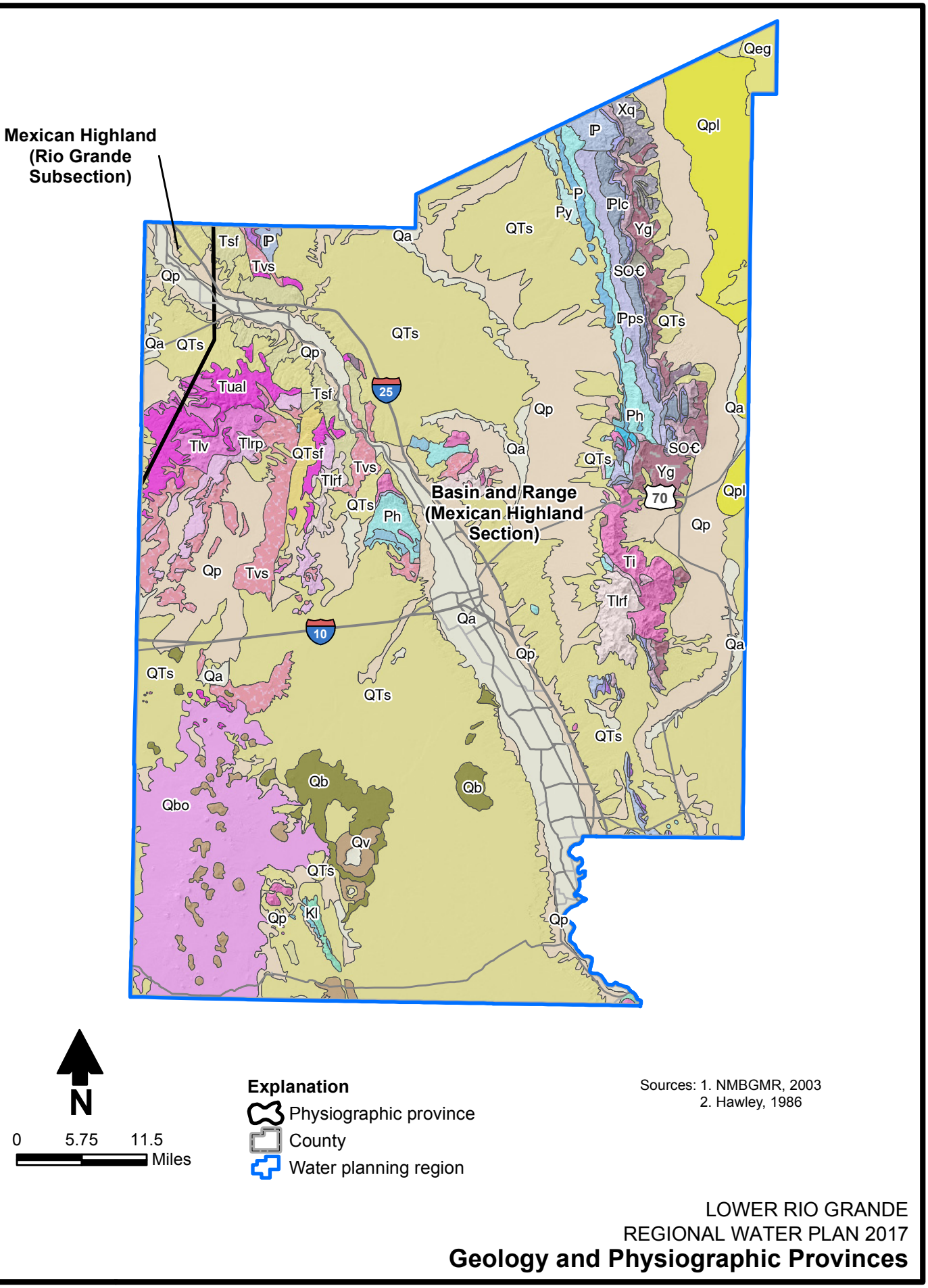
Table 5-7. Dams with Dam Safety Deficiency Rankings
Page 4 of 4

[a] Condition assessment:

	2008 US Army Corps of Engineers Criteria (adopted by NM OSE in FY09)	*NMOSE Spillway Risk Guidelines*
Fair:	No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range [for the owner] to take further action.	Spillway capacity < 70% but ≥ 25% of the SDF.
Poor:	A dam safety deficiency is recognized for loading conditions, which may realistically occur. Remedial action is necessary. A poor condition is also used when uncertainties exist as to critical analysis parameters, which identify a potential dam safety deficiency. Further investigations and studies are necessary.	Spillway capacity < 25% of the SDF.
Unsatisfactory:	A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.	

[b] Hazard Potential Classifications:

High:	Dams where failure or mis-operation would likely result in loss of human life.
Significant:	Dams where failure or mis-operation would likely not result in loss of human life but could cause economic loss, environmental damage, disruption of lifeline facilities, or could impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but may be located in populated areas with significant infrastructure.
Low:	Dams where failure or mis-operation would likely not result in loss of life but may result in minimal economic or environmental losses. Losses would be principally limited to the dam owner's property



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LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Geology and Physiographic Provinces

Figure 5-10a

Source: NMBGMR, 2003

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Geology Explanation

Figure 5-10b

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The *Rincon Valley* of the Lower Rio Grande UWB is the narrow valley of the Rio Grande from Caballo Dam (just upstream of the planning region) to Selden Canyon. The primary aquifer in the Rincon Valley is a narrow band of alluvium that follows the present channel of the Rio Grande. This alluvial aquifer (Rio Grande alluvium) is highly transmissive; well yields over 1,000 gallons per minute (gpm) have been reported for many irrigation wells, with some as high as 2,500 gpm (Terracon et al., 2003). Groundwater pumped from the Rio Grande alluvium is replaced quickly with seepage of surface water from the Rio Grande and irrigated farmland (Terracon et al., 2003). In most situations pumping from the Rio Grande alluvium probably has a greater effect on surface flow in the Rio Grande than on groundwater levels (Terracon et al., 2003).

The major geologic unit underlying the Rio Grande alluvium in the Rincon Valley is the Santa Fe Group, with the Upper and Middle Santa Fe Group forming the bulk of exposed deposits adjacent to the valley. Unlike many parts of the state, the Santa Fe Group in the Rincon Valley is composed predominantly of fine-grained particles, and as a result, it does not serve as a major aquifer in this area.

The primary use of groundwater in the Rincon Valley is for irrigation. To a much lesser extent, groundwater is also used to supply municipal uses, including Hatch and Rincon, and domestic wells.

The *Mesilla Basin* is in the southern portion of the Lower Rio Grande Basin and encompasses about 1,110 square miles. It extends south from near Leasburg into the Republic of Mexico. The major aquifers of the Mesilla Basin are the unconsolidated basin-fill sediments of the Santa Fe Group and the alluvial valley fill in the channel and floodplain of the Rio Grande (Terracon et al., 2003). The alluvial aquifer is also highly transmissive and is connected to the surface water system, although in areas where considerable groundwater pumping has occurred, such as near Las Cruces, cones of depression have formed, and in those areas groundwater flows toward the pumping wells. Water quality in the upper part of the alluvial aquifer is strongly influenced by surface water, including river infiltration and irrigation return flows.

A complex sequence of stratigraphy beneath the valley fill in the Santa Fe Group, described in detail by Hawley and Kennedy (2004), is a source of recharge to the alluvial aquifer and wells. The most productive unit is the upper Santa Fe hydrostratigraphic subdivision. It consists primarily of the sand and gravel deposited by the ancestral Rio Grande.

Groundwater in the Mesilla Basin is used primarily for agricultural purposes in and near the EBID service area. Additionally, the basin supplies a wide range of municipal and industrial users, including the City of Las Cruces, New Mexico State University, Mesilla, and Santa Teresa, and to a much lesser extent, mutual domestic water association and domestic wells.

The *southern Jornada del Muerto Basin*, about 600 square miles in area, is located in the northern and east-central parts of the planning region. The Jornada del Muerto Basin is one of several topographically closed basins in the central part of New Mexico, although some groundwater discharges into other basins, in particular the Mesilla Basin; little or no groundwater is thought to discharge from the basin at the surface. Variability in well yields can be significant, ranging from a few gallons per minute (gpm) to 1,160 gpm in the vicinity of Highway 70 (Wilson et al., 1981). Water quality at the southern end of the basin is generally good with dissolved solids of less than 500 milligrams per liter (mg/L). In 1975 saturated thicknesses of the freshwater zone were estimated to be up to 2,000 feet near Highway 70 in the vicinity of the town of Organ (Wilson et al., 1981).

Current groundwater pumping (about 13,535 acre-feet in 2010 [(Longworth et al., 2013]) represents a significant outflow from the southern Jornada del Muerto Basin. The majority of that water supplies users in the Lower Rio Grande Basin. The Jornada del Muerto Basin has become an important additional source of groundwater supply for the planning region. Because of its limited connection with the Rio Grande, stream offsets are much lower than they would be within the Rincon or Mesilla valleys. Stream offsets, which are difficult to obtain, can also be met with return flow of treated wastewater.

The *western Tularosa Basin* is present on the east side of the planning region. Quaternary-age alluvial, piedmont, aeolian, and pluvial deposits cover the basin surface and are underlain by the Santa Fe Group sediments, all considered basin fill deposits. The basin fill is highly mineralized and yields low quantities, of groundwater very high in total dissolved solids (TDS), particularly within the central portion of the basin. However, alluvial deposits along the mountain front contain freshwater (Orr and Myers, 1986) and high yields. The sediments are coarse-grained near the mountain front, with yields up to 1,000 gpm (Livingston and JSAI, 2002) and become finer-grained toward the center of the basin where the wells have low yields. Orr and Myers (1986) report thicknesses of these freshwater zones in the western Tularosa Basin of as much as 1,500 feet.

The *Hueco Basin,* in the southeastern corner of the water planning region, is part of the Hueco Bolson, which extends into Otero County and into Texas and Mexico where it forms the El Paso Valley. The Tertiary to Pleistocene-age Santa Fe Group fills the basin, with aquifer thicknesses up to 8,000 feet. The aquifer characteristics of the Hueco Bolson vary greatly: coarser-grained sediments (such as alluvial fan deposits) near the mountain fronts have higher hydraulic conductivity than the finer-grained lake deposits at the center of the basin (Orr and Risser, 1992). Orr and Risser (1992) show freshwater in the western portion of the basin, primarily where it is recharged by runoff from the Franklin and Organ mountains.

The eastern portion of the *Nutt-Hockett UWB,* located in the western part of the planning region, is within the Mimbres surface water basin, a closed basin. The basin fill consists of Quaternary alluvium and contains groundwater of good quality at depths ranging from 130 to 220 feet below

land surface (NMOSE, 1998). This groundwater is used for domestic and stock water and for irrigation. Relatively high rates of decline have been observed in some parts of the basin.

The *Mount Riley UWB* was declared two years after the 2003 water plan was prepared and is located in the southwestern portion of the Lower Rio Grande planning region. Very little is published on the hydrology of the Mount Riley UWB. Only two wells in the basin are in the NMOSE WATERS database, one of which has a depth of 510 feet (a depth is not reported for the other); these wells are associated with Laredo Farms, a dairy operation. King et al. (1969) list details of several ranch wells in the area including a well in the center of Mount Riley UWB that penetrates over 500 feet of basalt, with a 7-foot layer of sand at the bottom of the well.

The eastern side of the *Mimbres UWB* falls within southwestern Doña Ana County. The aquifer within the Mimbres Basin is composed primarily of Quaternary and upper Tertiary sediments and interbedded basalts (Hanson et al., 1994). The aquifer is recharged by Mason Draw, which flows during intense thunderstorms.

5.3.2 Aquifer Conditions

As reported in the accepted regional water plan (Terracon et al., 2003), basin fill sediments, primarily from the Santa Fe Group and overlying Rio Grande alluvium, supply water to wells in the Rincon Valley and Mesilla sub-basins. Water levels are shallow near the Rio Grande (10 to 25 feet below ground surface [ft bgs]) and more than 300 ft bgs near the basin fill boundaries (Terracon et al., 2003). In general, groundwater flows from higher elevations to lower elevations and then roughly parallels the Rio Grande in the Rincon Valley and Mesilla sub-basins. Basin-fill sediments in the closed basins are primarily derived from erosion and deposition from the mountains that surround the basins.

In order to evaluate changes in water levels over time, the USGS monitors groundwater wells throughout New Mexico (Figure 5-11). Hydrographs illustrating groundwater levels versus time, as compiled by the USGS (2014b), were selected for seven monitor wells with longer periods of record and are shown on Figure 5-12. In the Rincon Valley and Mesilla sub-basins, groundwater is hydrologically connected to surface water such that seepage from the Rio Grande and irrigation return flows recharge the aquifer and groundwater pumping can deplete surface flows in drains and the Rio Grande. Thus water levels in wells near the Rio Grande fluctuate with the irrigation seasons and availability of streamflow (Figure 5-12). Water levels in these wells and most of the wells near the Rio Grande (Figure 5-11) show a decline from the recent drought and increased pumping from farm wells in EBID. In the other basins that are not stream connected, groundwater is slowly replenished through recharge from intermittent flows in arroyos and mountain-front recharge. The hydrographs for the wells in the Hueco and Nutt-Hockett UWBs show a steady decline in water levels. Water levels are declining at a high rate in the Nutt-Hockett (average 3 feet per year [ft/yr] in three USGS wells), Jornada (average 2.7 ft/yr in 18 wells), and Hueco (1.1 ft/yr in 5 wells) basins (USGS, 2014b).

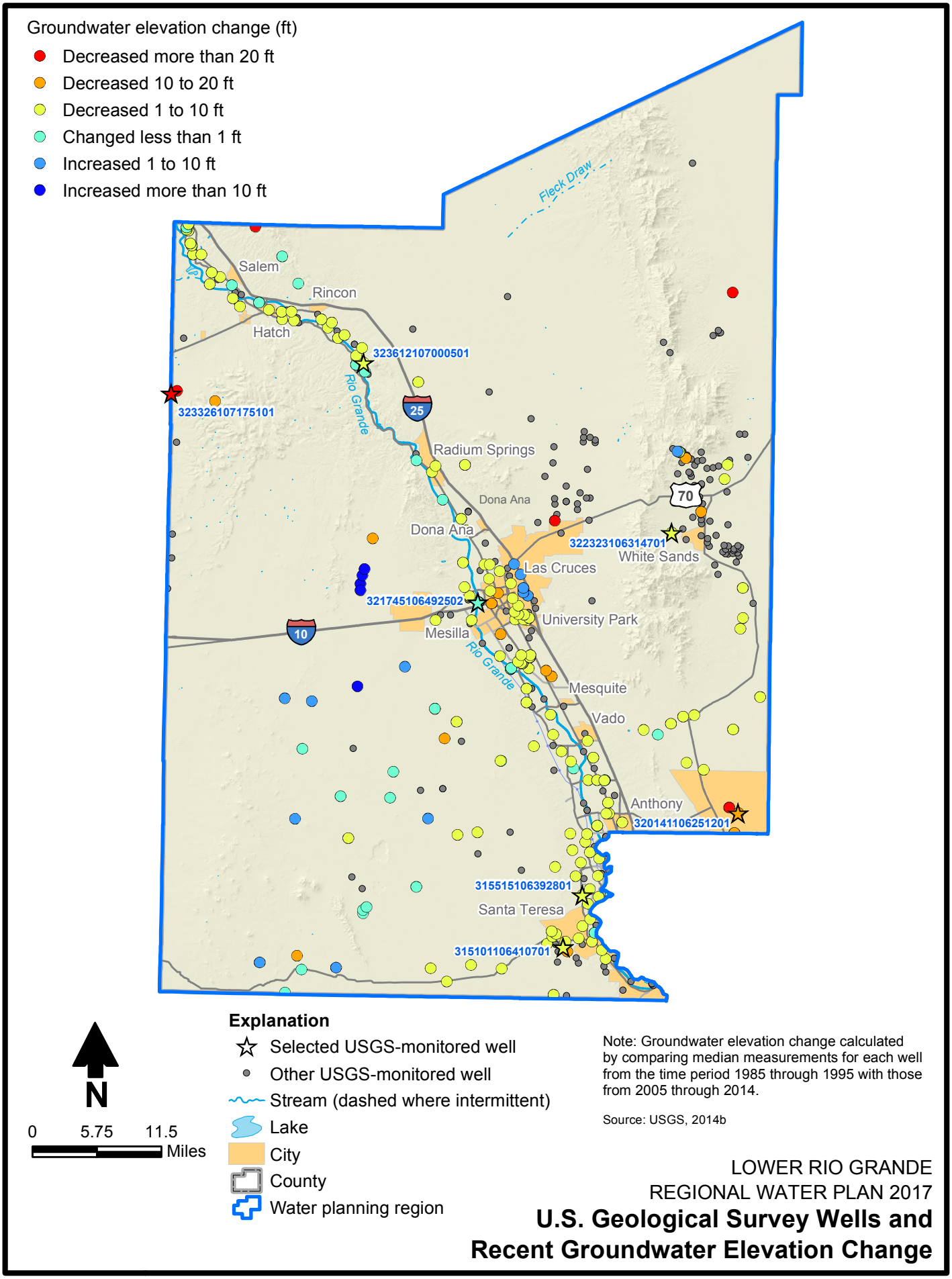

Groundwater elevation change (ft)
Decreased more than 20 ft
Decreased 10 to 20 ft
Decreased 1 to 10 ft
Changed less than 1 ft
Increased 1 to 10 ft
Increased more than 10 ft
Fleck Draw
Salem
Rincon
Hatch
323612107000501
323326107175101
Rio Grande
25
Radium Springs
Dona Ana
Dona Ana
70
322323106314701
White Sands
Las Cruces
321745106492502
University Park
10
Mesilla
Rio Grande
Mesquite
Vado
Anthony
320141106251201
315515106392801
Santa Teresa
315101106410701
N
0
5.75
11.5
Miles
Explanation
Selected USGS-monitored well
Other USGS-monitored well
Stream (dashed where intermittent)
Lake
City
County
Water planning region
Note: Groundwater elevation change calculated by comparing median measurements for each well from the time period 1985 through 1995 with those from 2005 through 2014.
Source: USGS, 2014b
LOWER RIO GRANDE
REGIONAL WATER PLAN 2017
U.S. Geological Survey Wells and Recent Groundwater Elevation Change
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\LOWER_RIO_GRANDE\FIG5-11_USGS_WELLS.MXD 12/21/2016

Figure 5-11

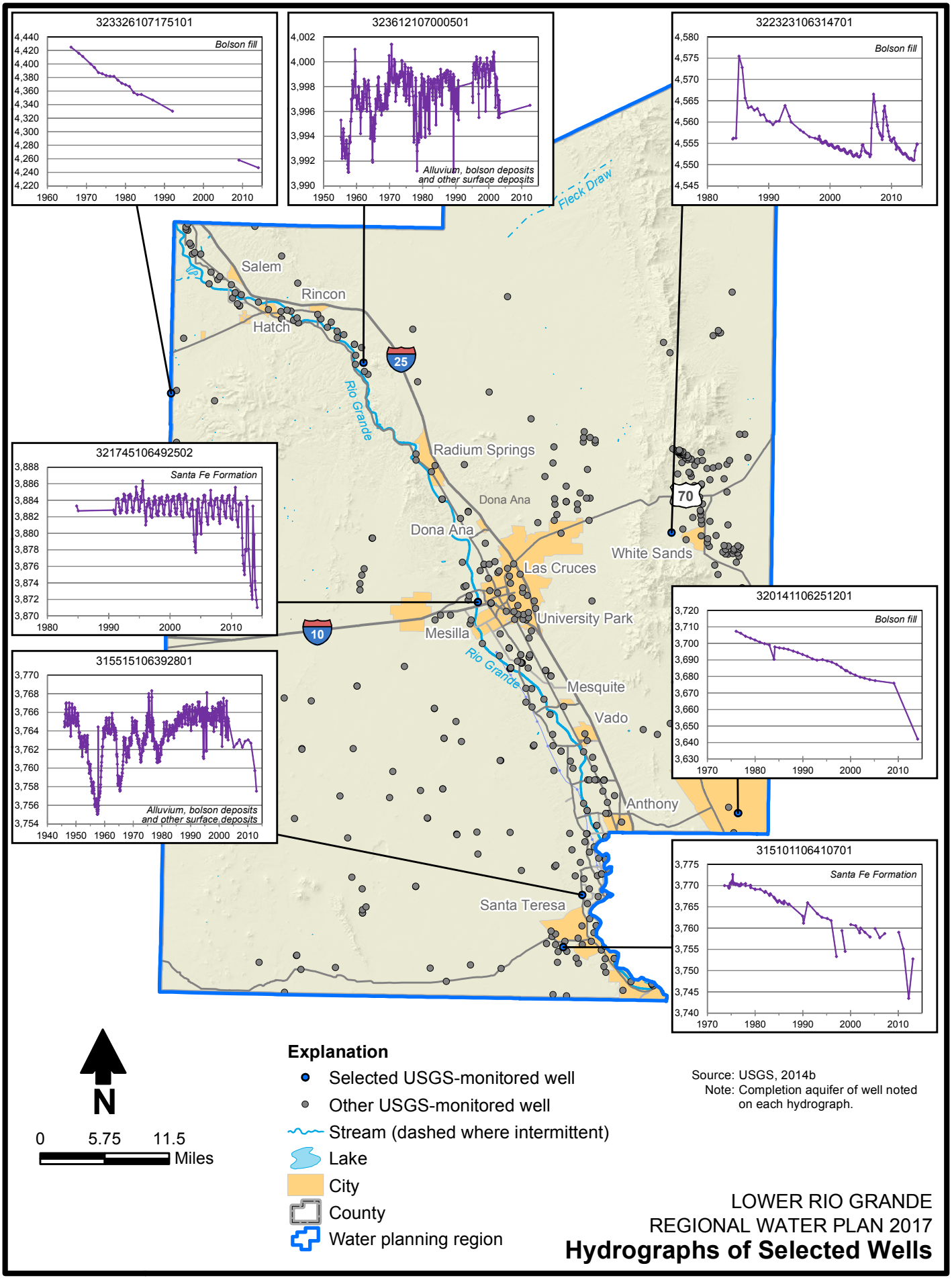

323326107175101
Bolson fill
323612107000501
Alluvium, bolson deposits and other surface deposits
322323106314701
Bolson fill
321745106492502
Santa Fe Formation
315515106392801
Alluvium, bolson deposits and other surface deposits
320141106251201
Bolson fill
315101106410701
Santa Fe Formation
Fleck Draw
Salem
Rincon
Hatch
Rio Grande
Radium Springs
Dona Ana
Dona Ana
White Sands
Las Cruces
University Park
Mesilla
Rio Grande
Mesquite
Vado
Anthony
Santa Teresa
25
10
70
N
0
5.75
11.5
Miles
Explanation
Selected USGS-monitored well
Other USGS-monitored well
Stream (dashed where intermittent)
Lake
City
County
Water planning region
Source: USGS, 2014b
Note: Completion aquifer of well noted on each hydrograph.
LOWER RIO GRANDE
REGIONAL WATER PLAN 2017
Hydrographs of Selected Wells
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\LOWER_RIO_GRANDE\FIG5-12_USGS_WELLS_HYDROGRAPHS.MXD 12/21/2016

Figure 5-12

The aquifers in the planning region are recharged naturally through mountain front recharge, irrigation return flow, seepage from the Rio Grande, and seepage from ephemeral streams channels during precipitation events and inter-basin flow. The accepted regional water plan provided ten published estimates of recharge in the region:

- Mountain-front recharge to the Mesilla Basin (Frenzel and Kaehler, 1990): 11,084 ac-ft/yr
- Mountain-front recharge to the Mesilla Basin (Weeden and Maddock (1999): 12,967 ac-ft/yr
- Mountain-front recharge to the Rincon Valley (Frenzel and Kaehler, 1990): 4,542 ac-ft/yr
- Seepage from the Rio Grande between Las Cruces and Anthony (Wilson et al., 1981): 20,300-97,400 ac-ft/yr
- Mountain-front recharge in the Jornada del Muerto Basin (Shomaker and Finch, 1996): 5,200 ac-ft/yr
- Seepage from arroyos to the Hueco Basin (Orr and Risser, 1992): 4,300 ac-ft/yr
- Inflow from the Tularosa Basin to the Hueco Basin (Meyer, 1976): 5,600 ac-ft/yr
- Recharge from the West Potrillo Mountains to the Mimbres Basin (Hanson et al., 1994): 3,400 ac-ft/yr
- Seepage from Mason Draw to the Mimbres Basin (Hanson et al., 1994): 500 ac-ft/yr
- Seepage from arroyos to the Western Tularosa Basin (Livingston and JSAI, 2002): 9,291 ac-ft/yr

More recently, the NMOSE's administrative model for the Lower Rio Grande (SSPA, 2007) includes three recharge components: mountain-front, slope-front, and deep percolation of applied irrigation water. For the mountain-front and slope-front recharge estimates S.S. Papadopulos & Associates, Inc. (SSPA) used two precipitation-based methods for estimating the annual recharge (the Maxey-Eakin and Hearne-Dewey methods) by sub-basins. Using the Maxey-Eakin method, recharge is estimated to be 71,700 ac-ft/yr, while the Hearne-Dewey method resulted in an estimate of about 24,000 ac-ft/yr. SSPA applied the Hearne-Dewey method to the model input in the Rincon Valley and Mesilla sub-basins and reduced the rate in

specific locations to obtain a calibrated model. Calibrated values for mountain-front and slope front recharge within the modeled area are:

- West Rincon Valley: 8,822 ac-ft/yr
- East Rincon Valley: 1,055 ac-ft/yr
- West Mesilla near Selden Canyon: 70 ac-ft/yr
- West Mesilla outside Selden Canyon: 1,566 ac-ft/yr
- East Mesilla – Jornada: 880 ac-ft/yr
- East Mesilla outside Jornada: 1,888 ac-ft/yr
- Slope front: 440 ac-ft/yr
- Franklin Mountains: 542 ac-ft/yr

The major public water supply well fields in the planning region, along with the basins they draw from, are:

- Lake Section Water Company (Hueco Basin)
- White Sands Missile Range Well Field (western Tularosa Basin, completed in the western edge of the valley fill and yielding approximately 100 to 1,000 gpm [Livingston and JSAI, 2002]).
- Anthony Water & Sanitation (Mesilla sub-basin)
- Dona Ana Mutual Domestic Water Consumers Association (MDWCA) (Mesilla sub-basin)
- Las Cruces Municipal Water System (Mesilla sub-basin and Jornada del Muerto Basin)
- Lower Rio Grande Public Water Works Authority (Mesilla sub-basin)
- Moongate Water System (Jornada del Muerto Basin)
- Sunland Park Water System (Mesilla sub-basin)
- Jornada Water Co (Jornada del Muerto Basin)

5.4 Water Quality

Assurance of ability to meet future water demands requires not only water in sufficient quantity, but also water that is of sufficient quality for the intended use. This section summarizes the water quality assessment that was provided in the 2003 regional water plan and updates it to

reflect new studies of surface and groundwater quality and current databases of contaminant sources. The identified water quality concerns should be a consideration in the selection of potential projects, programs, and policies to address the region's water resource issues.

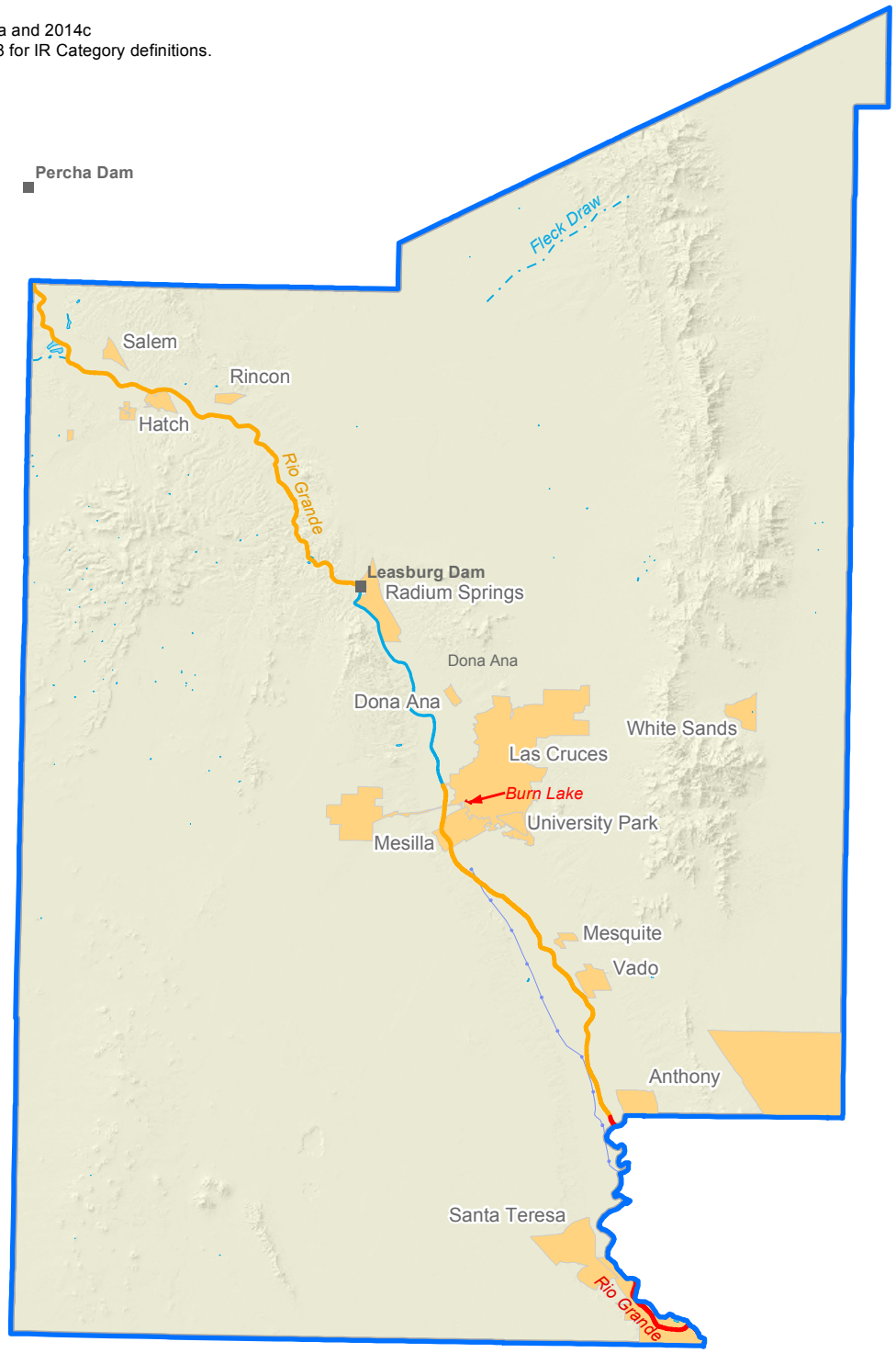
Surface water quality in the Lower Rio Grande Water Planning Region is evaluated through periodic monitoring and comparison of sample results to pertinent water quality standards. Several reaches of the Rio Grande have been listed on the 2014-2016 New Mexico 303(d) list (NMED, 2014a). This list is prepared every two years by NMED and approved by the New Mexico Water Quality Control Commission (NMWQCC) to comply with Section 303(d) of the federal Clean Water Act, which requires each state to identify surface waters within its boundaries that do not meet water quality standards (see Section 4.2.2.1.1). E.coli levels top 560,000 colony-forming units per 100 milliliters (cfu/100 mL) (PdNWC_WBP, 2014) in surface water samples. Sources of contamination were identified by NMED to be

- Impervious surface/parking lot runoff
- Municipal point source discharges
- Urbanized high density areas
- On-site treatment systems
- Permitted runoff from confined animal feeding operations
- Rangeland grazing
- Waste from pets
- Waste from waterfowl
- Waste from wildlife other than waterfowl

Section 303(d) further requires the states to prioritize their listed waters for development of total maximum daily load (TMDL) management plans, which document the amount of a pollutant a waterbody can assimilate without violating a state water quality standard and allocates that load capacity to known point sources and nonpoint sources at a given flow. Figure 5-13 shows the locations of lakes and stream reaches included in the 303(d) list. Table 5-8 provides details of impairment for those reaches.

In evaluating the impacts of the 303(d) list on the regional water planning process, it is important to consider that impairments are tied to designated uses. Some problems can be very disruptive to a healthy aquatic community, while others reduce the safety of water recreation or increase the risk of fish consumption. Impairments will not necessarily make the water unusable for irrigation or even for domestic water supply, but the water may need treatment prior to use and the costs of this should be recognized.

Source: NMED, 2014a and 2014c
Note: See Table 5-8 for IR Category definitions.



Explanation

- Impaired stream (IR category 4)
- Impaired stream (IR category 5)
- Impaired lake (IR category 5)
- Other stream (dashed where intermittent)
- Other lake
- City
- County
- Water planning region

N

0 5.75 11.5 Miles

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Water Quality-Impaired Reaches

Figure 5-13

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Table 5-8. Total Maximum Daily Load Status of Streams in the Lower Rio Grande Water Planning Region

Waterbody Name (basin, segment)	Assessment Unit ID	Affected Reach (miles [a])	Probable Sources of Pollutant	Uses Not Fully Supported [b]	Specific Pollutant	IR Category [c]
Doña Ana County						
Burn Lake (Dona Ana)	NM-9000.B_024	7 [d]	Source unknown	WWAL	Aluminum	5/5A
Davies Tank	NM-9000.B_034	1280 [d]	Not assessed	—	—	3/3A
Lake Lucero (North)	NM-9000.B_068	3420.7 [d]	Not assessed	—	—	3/3A
Lake Lucero (South)	NM-9000.B_069	1988.27 [d]	Not assessed	—	—	3/3A
Rio Grande (Anthony Bridge to NM192 bridge W of Mesquite)	NM-2101_01	13.32	Municipal point source discharges Waterfowl On-site treatment systems (septic) Confined animal feeding operations (CAFOs) Wildlife other than waterfowl Wastes from pets Municipal (high density area) Impervious surface/parking lot runoff Rangeland grazing	PC	Escherichia coli	4A
Rio Grande (International Mexico bnd to Anthony Bridge)	NM-2101_00	8.71	Municipal point source discharges Waterfowl On-site treatment systems (septic) Source unknown Confined animal feeding operations (CAFOs) Wildlife other than waterfowl Wastes from pets Municipal (high density area) Impervious surface/parking lot runoff Rangeland grazing	PC IRR	Boron Escherichia coli	5/5A

Source: NMED, 2014a

[a] Unless otherwise noted.

[b] PC = Primary contact
IRR = Irrigation
WWAL = Warm water aquatic life

[c] Impairment (IR) category definitions are provided at the end of this table.

[d] Acres

— = No information provided (reach was not assessed).

Table 5-8. Total Maximum Daily Load Status of Streams in the Lower Rio Grande Water Planning Region

Waterbody Name (basin, segment)	Assessment Unit ID	Affected Reach (miles [a])	Probable Sources of Pollutant	Uses Not Fully Supported [b]	Specific Pollutant	IR Category [c]
Rio Grande (Leasburg Dam to one mile below Percha Dam)	NM-2101_10	42.22	Municipal point source discharges Waterfowl On-site treatment systems (septic) Confined animal feeding operations (CAFOs) Wildlife other than waterfowl Wastes from pets Impervious surface/parking lot runoff Rangeland grazing	PC	Escherichia coli	4A
South Fork Las Cruces Arroyo (Las Cruces Arroyo to hwtrs)	NM-98.A_013	6.5	Not assessed	—	—	3/3A

Source: NMED, 2014a

[a] Unless otherwise noted.

— = No information provided (reach was not assessed).

[b] PC = Primary contact
IRR = Irrigation
WWAL = Warm water aquatic life

[c] Impairment (IR) categories are determined for each assessment unit (AU) by combining individual designated use support decisions. The applicable unique assessment categories for New Mexico (NMED, 2013b) are described as follows:

Category 3: No reliable monitored data and/or information to determine if any designated or existing use is attained. AUs are listed in this category where data to support an attainment determination for any use are not available, consistent with requirements of the assessment and listing methodology.

Category 3A:

Category 4A: Impaired for one or more designated uses, but does not require development of a TMDL because TMDL has been completed. AUs are listed in this subcategory once all TMDL(s) have been developed and approved by USEPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of an AU, the AU remains in IR Category 5A (see below) until all TMDLs for each pollutant have been completed and approved by USEPA.

Category 5A: Impaired for one or more designated or existing uses and a TMDL is underway or scheduled. AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant. Where more than one pollutant is associated with the impairment of a single AU the AU remains in Category 5A until TMDLs for all pollutants have been completed and approved by U.S. EPA.

Although it is not on New Mexico's 303(d) list, salinity in the Rio Grande has long been a source of concern and controversy within the Rio Grande Project in both New Mexico and Texas. Rio Grande salinity is discussed in 5.4.1.5.

Generally the quality of groundwater in the planning region is excellent, except in the central portions of the closed basins where minerals are concentrated in the groundwater through evaporation and in the Rio Grande Valley where salinity is high due to natural and man-made conditions. Water quality in the eastern Mimbres Basin is generally suitable for irrigation, with the best quality in the northern portion by Mason Draw (Hanson et al., 1994).

In the Mesilla Valley, many of the domestic wells and sewage disposal systems have been poorly constructed. In some areas, the depth to water is less than 4 feet and residents can cheaply obtain water through hand dug wells that have little or no protection at the surface. The shallow depth to water and poorly constructed wells combined with the lack of proper sanitation create a serious set of circumstances that may not only cause aquifer contamination, but may also promote the spread of disease. Yet unlike municipal systems that are sampled quarterly for a full suite of parameters, the quality of domestic well water is not monitored unless the user can afford to have it tested.

Because of these conditions, the Border Health Office contracted with DBS&A (1996) to sample 135 shallow domestic wells throughout the Mesilla and Rincon Valleys to determine the impact of agriculture and other sources of pollution on water quality. Water samples collected from the 135 shallow wells, mostly in the Mesilla Valley, indicate that the water quality is generally moderate to poor due to high concentrations of total dissolved solids (TDS) and sulfate. Health concerns related to the water quality arise from five factors: (1) naturally high levels of uranium, arsenic, and selenium, (2) high levels of lead, most likely from household plumbing, (3) possible fecal and nitrate contamination due either to poorly constructed wells or septic systems, (4) nitrate and enterococci contamination, possibly from dairy lagoons and chicken farms, and (5) organic contamination from pesticides and solvents.

Several types and sources of contaminants that have the potential to impact either surface or groundwater quality are discussed below. Sources of contamination are considered as one of two types: (1) point sources, if they originate from a single location, or (2) nonpoint sources, if they originate over a more widespread or unspecified location. Information on both types of sources is provided below.

5.4.1 Potential Sources of Contamination to Surface and Groundwater

Specific sources that have the potential to impact either surface or groundwater quality in the future are discussed below. These include municipal and industrial sources, leaking underground storage tanks, landfills, and nonpoint sources.

5.4.1.1 Municipal and Industrial Sources

As discussed in Section 4.2.2, a person or facility that discharges a pollutant from a point source to a surface water that is a water of the United States must obtain an NPDES permit. An NPDES permit must assure compliance with the New Mexico Water Quality Standards. A person or facility that discharges contaminants that may move into groundwater must obtain a groundwater discharge permit from the New Mexico Environment Department. A groundwater discharge permit ensures compliance with New Mexico groundwater quality standards. The NMWQCC regulations also require abatement of groundwater contamination that exceeds standards.

NPDES-permitted discharges in the planning region are summarized in Table 5-9 and shown on Figure 5-14; details regarding NPDES permits in New Mexico are available on the NMED's website (http://www.nmenv.state.nm.us/swqb/Permits/).

A summary list of current groundwater discharge permits in the planning region is provided in Table 5-10; their locations are shown in Figure 5-14. Details indicating the status, waste type, and treatment for discharge permits for industrial and domestic waste can be obtained from the NMED Ground Water Quality Bureau website (https://www.env.nm.gov/gwb/NMED-GWQB-PollutionPrevention.htm#PPSlist).

5.4.1.2 Remediation Sites

The 2003 regional water plan (Terracon et al., 2003) identified one Superfund site in the planning region that was listed on the National Priorities List by the U.S. EPA (2004). Information regarding this site is provided in Table 5-11. The Griggs & Walnut Groundwater Plume is on the National Priorities List due to a perchloroethylene plume that contaminated City of Las Cruces wells (U.S. EPA, 2014).

Sites undergoing investigation or cleanup pursuant to other federal authorities or state authority can be found on the EPA website (https://www.epa.gov/superfund/national-priorities-list-npl-sites-state#NM).

5.4.1.3 Leaking Underground Storage Tanks

Leaking underground storage tank (UST) sites present a potential threat to groundwater, and the NMED maintains a database of registered USTs. Many of the facilities included in the UST database are not leaking, and even leaking USTs may not necessarily have resulted in groundwater contamination or water supply well impacts. These USTs could, however, potentially impact groundwater quality in and near the population centers in the future. UST sites in the Lower Rio Grande region are identified on Figure 5-14. Many of the UST sites listed in the NMED database require no further action and are not likely to pose a water quality threat. Sites that are being investigated or cleaned up by the State or a responsible party, as identified on Table 5-12, should be monitored for their potential impact on water resources. Additional details regarding any groundwater impacts and the status of site investigation and cleanup efforts for individual sites can be obtained from the NMED database, which is accessible on the NMED website (https://www.env.nm.gov/ust/lists.html).

Table 5-9. Municipal and Industrial NPDES Permittees in the Lower Rio Grande Water Planning Region

Permit No	Municipality/Industry [a]	Permit Type [b]
Dona Ana County		
NM0029629	Anthony Water And Sanitation District/WWTP [c]	Municipal (POTW)
NM0029483	CRRUA -Sunland Park WWTP	Municipal (POTW)
NM0030457	Dona Ana County Salem WWTP [c]	Municipal (POTW)
NM0030490	Dona Ana County South Central Regional WWTP	Municipal (POTW)
NM0000108	El Paso Electric Company [d]	Utility
NM0028487	Gadsden Independent School District	Private domestic
NM0020010	Hatch, Village of/WWTP	Municipal (POTW)
NM0030872	Las Cruces, City of/East Mesa Water Reclamation Facility [c]	Municipal (POTW)
NM0023311	Las Cruces, City of/Jacob Hands WWTP [c]	Municipal (POTW)

Source: NMED, 2014d

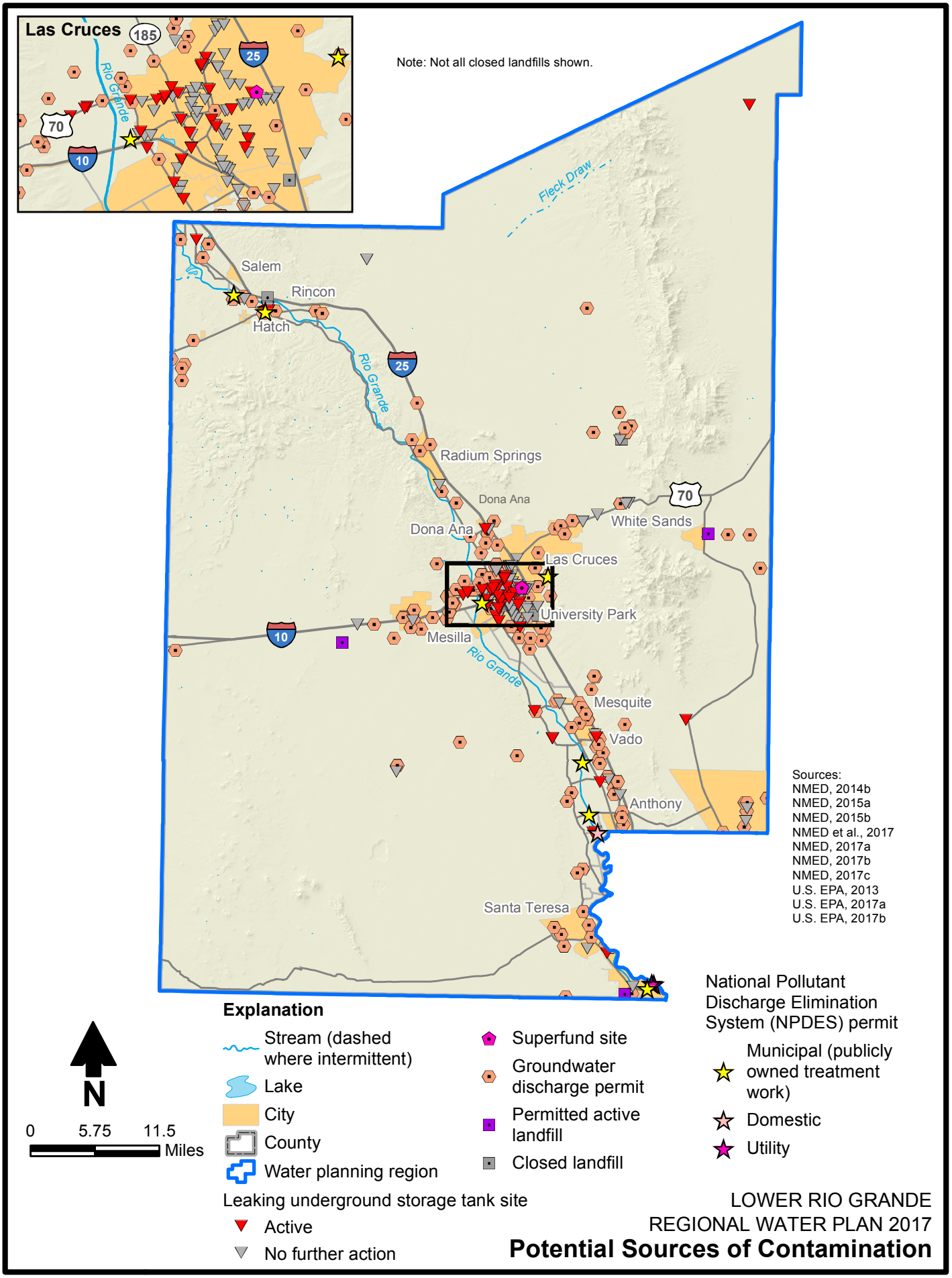
[a] Names appear as listed in the NMED database.

[b] Facilities and activities covered under the 2015 U.S. EPA NPDES Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity (e.g., mining, timber products, scrap recycling facilities, as listed in Appendix D of the MSGP [U.S. EPA, 2015]) are not included due to the large number of facilities.

[c] Major discharger, classified as such by the Regional Administrator, or in the case of approved state programs, the Regional Administrator in conjunction with the State Director. Major municipal dischargers include all facilities with design flows of greater than 1 million gallons per day and facilities with U.S. EPA/State approved industrial pretreatment programs. Major industrial facilities are determined based on specific ratings criteria developed by U.S. EPA/State.

[d] NMED lists multiple outfall locations

NPDES = National Pollutant Discharge and Elimination System
WWTP = Wastewater treatment plant
POTW = Publicly owned treatment works



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LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Potential Sources of Contamination

Figure 5-14

Table 5-10. Groundwater Discharge Permits in the Lower Rio Grande Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Dona Ana	Admiral Beverage Industrial Park	DP-38	Active	10,000
	Adobe Acres North Mobile Home Park	DP-6	Active	5,250
	Afton Generating Station	DP-1345	Active	79,200
	Aldershot of New Mexico	DP-807	Active	25,000
	Alex R Masson Inc	DP-500	Active	39,000
	Anthony Water and Sanitation District	DP-450	Active	980,000
	Biad Chili LTD Co - Mesilla	DP-671	Active	90,000
	Biad Chili LTD Co.-Leasburg	DP-423	Active	90,000
	Big Sky Dairy	DP-833	Active	80,000
	Border Foods	DP-436	Active	860,000
	Bright Star Dairy	DP-340	Active	60,000
	Buena Vista 2	DP-74	Active	55,000
	Casa de Oro Care Center	DP-247	Active	16,875
	Casuco	DP-1392	Active	1,000
	Centennial High School	DP-1819	Active	150,000
	Cervantes Enterprises Inc	DP-1152	Active	9,123
	Chaparral New Elementary School	DP-1832	Active	12,000
	Chaparral Wastewater Treatment Plant	DP-1602	Active	750,000
	Cottonbloom Adult Living Facility	DP-1124	Active	5,000

Source: NMED, 2014b, 2016b, NMED et al., 2016

gpd = Gallons per day

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

Table 5-10. Groundwater Discharge Permits in the Lower Rio Grande Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Dona Ana (cont.)	Del Norte Dairy	DP-126	Active	40,000
	Del Oro Dairy	DP-692	Active	20,000
	Desert Hills Mobile Home Park	DP-303	Active	7,200
	Dominguez Dairy	DP-624	Active	33,200
	Dominguez Dairy #2	DP-42	Active	60,000
	Dona Ana (County of) - Las Cruces Animal Shelter	DP-678	Active	2,300
	Dona Ana County Airport	DP-1637	Pending	
	Dona Ana County Fairgrounds	DP-1687	Active	3,300
	Dona Ana Elementary School	DP-1137	Active	9,436
	Dos Lagos Golf Course	DP-1823	Active	400,000
	East Picacho Elementary School	DP-293	Active	15,000
	Escalera Mobile Home Park	DP-1588	Pending	
	F and A Dairy Products	DP-1008	Active	400,000
	HORVAC Environmental	DP-1355	Active	175,000
	Johnny's Septage Disposal Facility	DP-1762	Active	10,000
	Johnson's Mobile Home Park	DP-682	Active	12,500
	Johnson's Mobile Home Park	DP-1427	Active	12,500
	Kit Carson Farms, Inc.	DP-471	Active	35,000
	Las Cruces (City of) - East Mesa Water Reclamation Facility	DP-1536	Active	1,400,000

Source: NMED, 2014b, 2016b, NMED et al., 2016

gpd = Gallons per day

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

Table 5-10. Groundwater Discharge Permits in the Lower Rio Grande Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Dona Ana (cont.)	Las Cruces (City Of) - International Airport	DP-1652	Active	6,015
	Las Cruces (City of) - West Mesa Industrial Park Wastewater Treatment Facility	DP-1174	Active	400,000
	Las Cruces KOA Campground	DP-634	Active	4,000
	Las Cruces National Guard Armory	DP-1431	Active	3,054
	Las Uvas Valley Dairies	DP-967	Active	108,000
	Las Uvas Valley Dairies	DP-342	Active	265,000
	Lou's Mobile Home Park	DP-1663	Active	4,500
	Masson's Southwest Greenhouse	DP-930	Active	4,000
	Mcanally Enterprises Inc	DP-1140	Active	2,500
	Mesa Development Center	DP-957	Active	2,500
	Lower Rio Grande Public Water Works Authority-Mesquite Wastewater Treatment Facility	DP-1036	Active	88,000
	Miller Mobile Manor	DP-754	Active	15,000
	Mini-mobile Village	DP-961	Active	4,500
	Mountain View Dairy	DP-70	Active	60,000
	NASA - White Sands Test Facility	DP-697	Active	25,000
	NASA - White Sands Test Facility	DP-1255	Active	1,872,000
	NASA - White Sands Test Facility	DP-1170	Active	16,805

Source: NMED, 2014b, 2016b, NMED et al., 2016

gpd = Gallons per day

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

Table 5-10. Groundwater Discharge Permits in the Lower Rio Grande Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Dona Ana (cont.)	NASA - White Sands Test Facility	DP-392	Active	33,360
	NASA - White Sands Test Facility	DP-584	Active	8,000
	Organ Water and Sewer Association	DP-915	Active	31,500
	Patricio Tellez Trailer Park	DP-479	Active	2,200
	Picacho Hills Utility Company	DP-47	Active	150,000
	Rezolex Ltd Co	DP-832	Active	5,000
	Rincon Wastewater Treatment Plant	DP-1209	Active	33,000
	River Oaks Mobile Home Park	DP-1721	Active	4,082
	River Valley Dairy	DP-167	Active	35,000
	R-Qubed Energy, Inc.	DP-86	Active	60,000
	San Mateo Enterprises	DP-1525	Active	7,000
	Santa Teresa Wastewater Treatment Plant	DP-1076	Active	532,500
	Sapphire Energy - NM R&D Facility	DP-1718	Active	405,000
	Sonoma Ranch Golf Course	DP-1735	Active	950,000
	St John Mobile Home Park	DP-1015	Active	11,340
	Summerwind Associates MHP LLC	DP-504	Active	49,500
	Sun Valley Dairy LLC	DP-170	Active	35,000
	Sunset Dairy	DP-257	Active	45,000
	Tallmon Dairy	DP-1208	Active	16,945

Source: NMED, 2014b, 2016b, NMED et al., 2016

gpd = Gallons per day

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

Table 5-10. Groundwater Discharge Permits in the Lower Rio Grande Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Dona Ana (cont.)	Tellbrook Subdivision Wastewater System	DP-203	Active	4,650
	Tellbrook/Las Alturas Convenience Store	DP-1470	Active	2,020
	The Lords Ranch	DP-1619	Active	9,880
	Tyson Prepared Foods	DP-1438	Active	21,000
	Vado Travel City	DP-9	Active	4,500
	Vegetable Products Inc	DP-495	Active	57,000
	Villa del Sol Mobile Home Park	DP-1083	Active	50,000
	Vista Middle School	DP-430	Active	4,400
	Vista Real Mobile Home Park	DP-1298	Active	11,640
	Watson Lane Mobile Home Park	DP-1678	Active	24,000
	West Mesa/Santa Teresa Area	DP-1281	Active	300,000
	Western Skies RV Park	DP-45	Active	8,000
	White Sands Missile Range	DP-976	Active	630,000
	Young Guns Inc	DP-1810	Active	68,000

Source: NMED, 2014b, 2016b, NMED et al., 2016

gpd = Gallons per day

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

Table 5-11. Superfund Sites in the Lower Rio Grande Water Planning Region

Site Location	Site Name [a]	Site ID	EPA ID	Status [b]
Dona Ana County				
Las Cruces, NM	Griggs & Walnut Groundwater Plume	605116	NM0002271286	NPL

Source: U.S. EPA, 2016a, 2016b

[a] Names appear as listed in the NMED database.

[b] NPL = National Priorities List

Table 5-12. Leaking Underground Storage Tank Sites in the Lower Rio Grande Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Dona Ana County					
Garfield	Pat Crisouthwestell Store	3720	29865	8980 Hwy 187	Cleanup, Responsible Party
Hatch	Halsell's Groc	287	6053	112 School Street	Cleanup, State Lead With CAF
	Hatch Exxon (B&M)	430	28485	481 W Hall St	Cleanup, State Lead With CAF
	Hatch Valley Public School	3405	28489	407 A North Main Street	Cleanup, Responsible Party
	Pic Quik #234	2627	1647	205 North Franklin Street	Pre-Investigation, Suspected Release
	Pic Quik #234	4530	1647	205 North Franklin Street	Pre-Investigation, Suspected Release
	Sharp Hatch Bulk Plant	4044	52267	Clinic St	Cleanup, Responsible Party
Fairacres	Former Fairacres Post Office	3997	27959	3940 W Picacho Ave	Cleanup, Responsible Party
	Lovelace Property	3506	29164	4050 W Picacho	Aggr Cleanup Completed, Resp Party
	NM 1310 Fairacres Co	4679	1227	20000 Corralitos Rd	Pre-Investigation, Confirmed Release
White Sands Missile Range	HELSTF	904	28500	Environmental Office B 26145	Referred To Hazardous Waste Bureau
	NASA Radar Site	2684	31715	Unknown	Referred To Hazardous Waste Bureau
	Timing Station	2624	31380	R5ET 225 511 QSE	Investigation Federal Facility
	WSMR Bldg 270-2	3684	31696	Stews El N	Investigation Federal Facility
Las Cruces	All About Cars	1665	26475	1695 W Picacho	Investigation, Responsible Party
	Bar F 20/Earls Buy N Fly B	417	27611	901 S Valley Dr	Cleanup, Responsible Party
	Bradley Food Mart	3155	27040	1206 El Paseo Rd	Aggr Cleanup Completed, Resp Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
Pre-Investigation, Confirmed Release: Confirmed release as by definition
Investigation: Ongoing assessment of environmental impact
Cleanup: Physical removal of contamination ongoing
CAF: Corrective action fund
Aggressive Cleanup Completed (Aggr Cleanup Completed): Effective removal of contamination complete
Responsible Party (Resp Party): Owner/Operator responsible for mitigation of release
State Lead: State has assumed responsibility for mitigation of release
Federal Facility: Responsibility under the Federal Govt

Table 5-12. Leaking Underground Storage Tank Sites in the Lower Rio Grande Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Dona Ana County (cont.)					
Las Cruces (cont.)	Chucky's Gas For Less Food Mart, Quik Chek	3128	30095	161 E Madrid	Investigation, Responsible Party
	Dona Ana Cty Trans Dept	2685	27759	2025 E Griggs Ave	Cleanup, Responsible Party
	Fenns Mini Mart	4048	29862	3985 South Main Street	Cleanup, Responsible Party
	Food And Fuel Stores , Midtown Chevron	3515	28069	750 S Main	Cleanup, Responsible Party
	Gene Peugh (Aamco)	2709	29944	1885 W Picacho	Referred To Hazardous Waste Bureau
	Guacamole Cafe	4461	53744	Unknown	Cleanup, Responsible Party
	Highway Texaco	976	28537	400 S Valley Dr	Aggr Cleanup Completed, Resp Party
	Johnson Park	2579	28783	888 N Main	Cleanup, State Lead With CAF
	Lantern Texaco	841	31083	1311 Avenida De Mesilla	Aggr Cleanup Completed, Resp Party
	Las Cruces Travel Center, Truckstps of Am	40	31213	202 N Motel Blvd	Cleanup, Responsible Party
	Lohman Food Mart, Shell	3513	29123	926 E Lohman	Cleanup, Responsible Party
	Pic Quick 1135	4431	1641	3916 W Picacho	Investigation, Responsible Party
	Pic Quick #10	4708	29392	825 Avenida de Mesilla	Pre-Investigation, Confirmed Release
	Pic Quik Stores Inc No 21, Pic Quik 1121	3036	1639	1250 N Valley Dr	Cleanup, Responsible Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

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Table 5-12. Leaking Underground Storage Tank Sites in the Lower Rio Grande Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Dona Ana County (cont.)					
Las Cruces (cont.)	Picacho Shell	2669	1651	1196 W Picacho	Cleanup, Responsible Party
	Pilot Oil / Travel Center 266	4074	29969	2681 W Amador	Pre-Investigation, Confirmed Release
	Pilot Travel Centers LLC 266	4650	29969	2681 W Amador	Investigation, Responsible Party
	Porter Oil, Inc.	4656	30037	306 S Motel Blvd	Pre-Investigation, Confirmed Release
	Porter Oil, Inc.	258	30037	306 S Motel Blvd	Pre-Investigation, Confirmed Release
	QVS Mobile Homes	2779	30108	1600 W Picacho	Aggr Cleanup Completed, Resp Party
	R C Sanders Trucking	2782	30116	1880 W Picacho	Cleanup, Responsible Party
	Sanco Oil Co, Sierra Ice & Water	1185	30604	2855 B West Picacho Ave	Cleanup, Responsible Party
	Sandia Fina	4036	30429	1802 S Espina	Cleanup, Responsible Party
	Sav-O-Mat B	2135	30492	920 El Paseo Rd	Pre-Investigation, Suspected Release
	Sav-O-Mat B	4474	30492	920 El Paseo Rd	Cleanup, Responsible Party
	Sav-O-Mat B	4596	30492	920 El Paseo Rd	Pre-Investigation, Confirmed Release
	Scotts Auto Sales	2675	30518	1835 N Main	Cleanup, Responsible Party
	Silva Sanitation	4661	30611	County B-53	Pre-Investigation, Confirmed Release
	Speedys 121, North Main Self Serve	2662	30717	1875 N Main	Cleanup, Responsible Party
	Southwest Indulgence Cafe	4099	53502	1701 El Paseo Road	Investigation, Responsible Party
	Sunmart 676	4719	29030	601 E Thorpe	Pre-Investigation, Confirmed Release

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
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Table 5-12. Leaking Underground Storage Tank Sites in the Lower Rio Grande Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Dona Ana County (cont.)					
Las Cruces (cont.)	The Lantern	4022	31083	1311 Avenida De Mesilla	Aggr Cleanup Completed, Resp Party
	University Chevron	3234	1974	1600 S Solano	Pre-Investigation, Confirmed Release
	Valley Pic Quik	3481	29963	3810 Valley Dr	Cleanup, State Lead With CAF
	Vickers 2286	1207	27040	1260 El Paseo Rd	Aggr Cleanup Completed, Resp Party
Mesilla	Alvarez Garage	3836	26555	Hwy 292	Cleanup, Responsible Party
	Shorty's of Mesilla, Mesilla 66	3102	29390	2920 S NM 28	Cleanup, Responsible Party
San Miguel	City Market, Eg Borunda	339	27395	19116 South Highway 28	Cleanup, State Lead With CAF
La Mesa	Eagle Grocery	4684	28997	108 Corpening Street	Cleanup, Responsible Party
	Eagle Grocery	2419	28997	108 Corpening Street	Pre-Investigation, Confirmed Release
	La Mesa Chevron	934	28996	16205 & Hwy 28	Cleanup, Responsible Party
	La Mesa Mercantile	2173	28997	108 Corpening Street	Pre-Investigation, Confirmed Release
Mesquite	Hwy 478 and Hannah Ct	4665	54778	12600 Highway 478	Pre-Investigation, Confirmed Release
Vado	Chrome Outlet dba National Truck Stop	4457	29572	16320 Stern Dr	Aggr Cleanup Completed, Resp Party
	National Truck	947	29572	16320 Stern Dr	Cleanup, Responsible Party
Berino	Berino Mini Mart, Four D Country Stores	3161	28146	4500 Hwy 478	Aggr Cleanup Completed, Resp Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
Pre-Investigation, Confirmed Release: Confirmed release as by definition
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Responsible Party (Resp Party): Owner/Operator responsible for mitigation of release
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Federal Facility: Responsibility under the Federal Govt

Table 5-12. Leaking Underground Storage Tank Sites in the Lower Rio Grande Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Dona Ana County (cont.)					
Chaparral	Dona Ana Range, Base Camp	1549	27760	Building 8170	Investigation Federal Facility
Anthony	Boone Transportation	3691	27008	2102 W Washington	Cleanup, Responsible Party
	Boone Transportation	4436	27008	2102 W Washington	Cleanup, Responsible Party
	Border Cowboy Trkstp	2528	27012	20201 Las Alturas	Cleanup, Responsible Party
Anthony (cont.)	Gadsden Independent School District	4645	54702	1325 W Washington Street	Investigation, Responsible Party
Santa Teresa	Charter Hospital of Santa Teresa	3382	27314	100 Charter Lane	Referred To Ground Water Quality Bureau

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
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5.4.1.4 Landfills

Landfills used for disposal of municipal and industrial solid waste often contain a variety of potential contaminants that may impact groundwater quality. Landfills operated since 1989 are regulated under the New Mexico Solid Waste Management Regulations. Many small landfills throughout New Mexico, including landfills in the planning region, closed before the1989 regulatory enactment to avoid more stringent final closure requirements. Other landfills have closed as new solid waste regulations became effective in 1991 and 1995. Within the planning region, there are three operating landfills and six closed landfills (Table 5-13, Figure 5-14).

Table 5-13. Landfills in the Lower Rio Grande Water Planning Region

County	Landfill Name [a]	Landfill Operating Status	Landfill Closure Date
Doña Ana	Camino Real Environmental Center	Open	NA
	Chaparral	Closed	—
	Corralitos Regional Landfill	Open	NA
	Hatch Landfill	Closed	—
	Las Cruces Foothills Landfill	Closed	—
	New Mexico State University	Closed	—
	Nu-Mex Landfill-Camino Real Investment, Camino Real environmental Landfill [b]	Closed	—
	White Sands (Main Post)	Open	NA
	White Sand Missile Range	Closed	—

Sources: Terracon et al., 2003; NMED, 2000, 2014b, 2015a, 2015b

NA = Not applicable

— = Information not available

[a] Names appear as listed in the NMED database.

[b] USA.com, 2014

5.4.1.5 Nonpoint Sources

As noted above, a primary surface water quality concern in the planning region is the increase in salinity that has historically been observed in the downstream direction. In the early 2000s, Texas threatened to sue New Mexico in the U.S. Supreme Court, stating in part that the salinity of the water it receives from the Rio Grande Project had increased. Review of data collected and analyzed by a number of entities indicates that the salinity, while variable, has not changed significantly from historical conditions (Crilley et al., 2013, Hogan et al., 2007).

Historically, the salinity increase was attributed to various mechanisms, including (1) evaporation and concentration during reservoir storage, irrigation, and subsequent reuse, (2) displacement of shallow saline groundwater during irrigation, (3) erosion and dissolution of natural deposits, and/or (4) inflow of deep saline and/or geothermal groundwater (groundwater with elevated water temperature). Relatively recent studies (Witcher et al., 2004; DBS&A,

2010; Dadakis et al., 2004; Phillips et al., 2003) have identified natural sources as the most significant contributor to observed salinity increases. Anthropogenic sources such as agricultural return flows and municipal wastewater discharges also contribute, but play a lesser role. Observed salinity increases are generally localized and are correlated with contributions to the river from such sources as hydrothermal areas and upwelling and discharge of deep, saline groundwater at the terminus of the groundwater basin.

Salinity levels within the Rio Grande Project area are exacerbated in non-irrigation months when there are no reservoir releases and saline inputs from groundwater constitute a greater proportion of river flow. These higher salinity levels during low-flow periods preclude use of Rio Grande water for municipal supply and can adversely impact agricultural and environmental uses (DBS&A, 2010).

The multi-state Rio Grande Project Salinity Management Coalition, under the framework of the Rio Grande Compact Commission, was established in 2008 to address salinity issues from San Acacia, New Mexico to Fort Quitman, Texas. The USGS prepared a report for the Coalition in 2009 that summarized the existing salinity data and information in the basin (Moyer et al., 2009). The report indicates that the concentration of dissolved solids in the Rio Grande doubles (from approximately 500 mg/L to 1,000 mg/L) from below Elephant Butte to El Paso and is commonly twice as high during the non-irrigation season. The USGS study identified natural sources such as the upwelling of deep-circulating groundwater and geothermal waters as the principal contributors of salinity in the region. These natural salinity inputs appear to be localized, suggesting that source control and treatment may be feasible. Phillips et al. (2003) showed that salinity increases from about 40 milligrams per liter (mg/L) to about 2,000 mg/L over a 750-mile stretch of the Rio Grande; the increases occur in a series of steps, with large observed salinity increases localized at the southern ends of sedimentary sub-basins, for example, at San Acacia, Elephant Butte (Truth or Consequences), Selden Canyon, and the El Paso Narrows.

Other nonpoint sources of pollutants that are concerns for surface water quality in the planning region include *E. coli* contamination, which reaches maximal levels in the Rio Grande during the late summer monsoon season. Testing for the source of *E. coli* found that birds were the main contributor (32 percent of the total), with wildlife contributing 17 percent, cattle and other livestock 16 percent, horses 8 percent, pets 9 percent, and sewage 6 percent, with another 13 percent unidentified (PdNWC_WBP, 2014). *E. coli* exceedance in the reach above Leasburg Cable is primarily related to stormwater runoff, whereas the *E. coli* exceedance in the reach from Anthony to the international boundary with Mexico is primarily related to non-stormwater flows (PdNWC_WBP, 2014).

Another nonpoint source of pollutants that is a concern for both groundwater and groundwater-connected surface water in the planning region is contamination of groundwater due to septic tanks. In areas with shallow water tables or in karst terrain, septic system discharges can percolate rapidly to the underlying aquifer and increase concentrations of (NMWQCC, 2002):

- Total dissolved solids (TDS)
- Iron, manganese, and sulfides (anoxic contamination)
- Nitrate
- Potentially toxic organic chemicals
- Bacteria, viruses, and parasites (microbiological contamination)

Because septic systems are generally spread out over rural areas, they are considered a nonpoint source. Collectively, septic tanks and other on-site domestic wastewater disposal systems constitute the single largest known source of groundwater contamination in New Mexico (NMWQCC, 2002), with many of these occurrences in areas with shallow water tables. Concentrations of septic tanks and domestic wells near shallow groundwater along the Rio Grande corridor are found in several parts of the region, including the rural areas within the Rincon and Mesilla Valleys and the border region in southern Doña Ana County. The domestic wells in these areas generally serve homes that are outside municipal water and wastewater system service areas and have the potential to be impacted by septic tank effluent. The NMED periodically conducts water fairs at locations around the state, including Las Cruces, to allow domestic well owners to bring samples of their water to be tested.

One approach to addressing nonpoint source pollution is through Watershed Based Planning or other watershed restoration initiatives that seek to restore riparian health and to address sources of contamination. NMED encourages cooperative planning efforts in watersheds where TMDLS are established (https://www.env.nm.gov/swqb/wps/WBP/index.html). In the Lower Rio Grande region, the Paso Del Norte Watershed Council has identified needed restoration projects in the Lower Rio Grande watershed (http://www.pdnwc.org) to investigate, develop, and recommend projects and activities that address issues related to the establishment and maintenance of a viable watershed, including approximately 430 river miles between Elephant Butte Reservoir in southern New Mexico to the confluence of the Rio Conchos in Presidio County, Texas. These include promoting projects to improve water quality and quantity, ecosystem integrity, the quality of life, and economic sustainability in the Paso del Norte watershed.

The Paso del Norte Watershed Council was awarded a watershed restoration grant to develop a Watershed Based Plan to protect and improve water quality in the reach of the lower Rio Grande from Percha Dam (below Caballo Reservoir) downstream to the American Dam (near the New Mexico, Texas, and international border) that has been impaired by *E.coli* bacteria. Funding has been provided by the U.S. EPA through the NMED under the authority of the Clean Water Act Section 319(h) nonpoint source grant program. The two year grant funded a water quality sampling program to determine the bacterial source (described above) and recommended projects to address the problems (PdNWC_WBP, 2014).

5.5 Administrative Water Supply

The Handbook describes a common technical approach (referred to there as a *platform)* for analyzing the water supply in all 16 water planning regions in a consistent manner. As discussed in the Handbook (NMISC, 2013), many methods can be used to account for supply and demand, but some of the tools for implementing these analyses are available for only parts of New Mexico, and resources for developing them for all regions are not currently available. Therefore, the State has developed a simple method that can be used consistently across all regions to assess supply and demand for planning purposes. The use of this consistent method will facilitate efficient development of a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the regions' and State's pressing water issues.

The method to estimate the available supply, referred to as the *administrative water supply* in the Handbook, is based on withdrawals of water as reported in the *New Mexico Water Use by Categories 2010* report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the water is physically available, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region. An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts, as discussed in Section 5.5.2.

5.5.1 2010 and 2060 Administrative Water Supply

The administrative water supply (i.e., total withdrawals) in 2010 for the Lower Rio Grande region, as reported in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013), was about 450,000 acre-feet. Of this total, 271,700 acre-feet were surface water withdrawals and 178,300 acre-feet were groundwater. The breakdown of the reported 2010 withdrawals among the various categories of use detailed in the *New Mexico Water Use by Categories 2010* report is discussed in Section 6.1.

It is important to note that the administrative supply numbers for 2010 are impacted by the 2008 Operating Agreement, which is the subject of litigation discussed in Section 4.3.1. The Operating Agreement allocates the Rio Grande Project surface water supply between EBID and EPCWID #1. Accordingly, it affects the amount of surface water supply available in the region. Since the Operating Agreement was entered into, EBID's surface water supply has been reduced. This surface water supply reduction, in turn, impacts groundwater use in the region. Nevertheless, the 2010 numbers discussed above are reflective of the system under the Operating Agreement. However, if the Operating Agreement is adjusted based on the pending litigation, these numbers may change to reflect an accurate water supply in the region.

For regions such as the Lower Rio Grande planning region, where the aquifers in closed basins (such as the Tularosa, Jornada del Muerto, Nutt-Hockett, Mimbres, Mount Riley, and Hueco) are being depleted, the administrative water supply may not be sustainable in the future. In these non-stream-connected basins, where the estimated groundwater diversions are currently about 22,800 ac-ft/yr, the future available supply was estimated as described below.

Existing wells with water level hydrographs in these closed basins were used to predict the future decline of the saturated thickness and thus the available supply. This decline rate was compared to the available saturated thickness in existing wells. Using the average rate of water level decline calculated from USGS monitor wells within the non-stream-connected groundwater basins and assuming that this rate will continue, the water level decline to 2060 was predicted as shown in Table 5-14. The percentage of impacted wells was estimated by comparing the predicted drawdown to the available water column in existing wells, and the percentage of impacted wells was assumed to represent the reduction in supply by 2060.

The predicted water level decline in each of the six closed-basin basin fill aquifers ranges from 10 to about 150 feet in 2060, assuming an average water level decline rate between 0.2 and 3.0 feet per year. Depending on the available median water column and predicted decline, between 2 and 77 percent of the wells could be impacted. Assuming that the percentage of impacted wells results in an equal impact on water supply, then the estimated groundwater diversions in 2060 are 70 percent of the 2010 estimated groundwater diversions. Thus the amount of groundwater withdrawn would be 6,800 acre-feet less than the 2010 administrative supply of 22,800 ac-ft/yr, or 16,000 ac-ft/yr for the six closed basins within the Lower Rio Grande planning region.

This approach represents an approximation of the impact on existing wells by 2060. Factors that may affect the accuracy of these predictions include:

- The water columns may not represent the available supply because existing wells could possibly be drilled deeper.
- The shallowest wells that are most impacted may not proportionally represent the distribution of pumping (the deeper wells most likely pump more than the shallow wells).
- New wells could be drilled in other parts of the aquifer, although doing so would require a water right permit.
- The groundwater diversions are estimated and involve a high degree of uncertainty, particularly for irrigation wells that are not metered. No diversion data were available for the Mount Riley UWB, and the 2010 Census shows no population within this subregion. Review of aerial photography shows what appears to be a dairy, but the water use is unknown.

Table 5-14. Projected Groundwater Supply in Closed Basins within Doña Ana County in 2060, Based on Observed Rate of Decline

Row	Calculation Step	Underground Water Basin						Explanation/Source
		Mimbres	Nutt-Hockett	Jornada del Muerto [a]	Tularosa	Hueco	Mount Riley	
1	Estimated ground-water diversions in 2010 (ac-ft/yr)	1,433	1,100	14,731	1,544	3,961	0	Longworth et al., 2013
2	Median water column (feet)	87.0	140	270	292	365	510	Difference between water level at the top of the well and total depth of the well, based on 1 well in the Mimbres, 3 wells in the Nutt-Hockett, 16 wells in the Jornada del Muerto, 11 wells in the Tularosa, 16 wells in the Hueco, and 1 well in the Mount Riley UWBs from WATERS database with post-1997 water level
3	Available water column	60.9	98.0	189	204	255	357	NMISC Handbook (2013) guideline (70% of median water column)
4	Rate of water level decline (ft/yr)	0.20	3.00	2.74	0.50	1.09	0.31	Using the water level data for USGS monitor wells within the non-stream-connected groundwater basin with decreasing water levels (Figure 5-11), the change in water level from the 1980s to the most recent measurement date was calculated and divided by the elapsed time. The results were averaged to determine a single rate.

[a] Jornado Draw portion of Lower Rio Grande Underground Water Basin

ac-ft/yr = Acre-feet per year
UWB = Underground Water Basin

Table 5-14. Projected Groundwater Supply in Closed Basins within Doña Ana County in 2060, Based on Observed Rate of Decline

Row	Calculation Step	Underground Water Basin						Explanation/Source
		Mimbres	Nutt-Hockett	Jornada del Muerto [a]	Tularosa	Hueco	Mount Riley	
5	Estimated decline in 50 years (feet)	10.0	150	137	25.0	54.5	15.5	The average rate of water level decline was multiplied by 50 years to predict the average drawdown by 2060.
6	Percentage of wells impacted	8%	77%	36%	6%	11%	2%	Row 5 divided by Row 3 and multiplied by 50%
7	Groundwater supply from mined sub-basins in 2060 due to continued pumping (ac-ft/yr)	1,315	258	9,392	1,450	3,539	0	Row 1 reduced by Row 6

[a] Jornado Draw portion of Lower Rio Grande Underground Water Basin

ac-ft/yr = Acre-feet per year
UWB = Underground Water Basin

Ideally, the aquifers should be modeled to determine the longevity of wells and to estimate the best distribution of pumping to prolong the supply. NMOSE's existing models could be used if the modeled pumping rate reflects actual use and observed drawdowns.

5.5.2 Drought Supply

The variability in surface water supply from year to year is a better indicator of how vulnerable a planning region is to drought in any given year or multi-year period than is the use of long-term averages. As discussed in Section 5.1.1, in the Lower Rio Grande region, 2010 was a year with below average rainfall (Figure 5-4), but in the headwaters of the Rio Grande and for the Rio Grande Project, which supply the primary source of surface water to the planning region, 2010 was an above average and full supply year, respectively. Further, according to the PDSI for the two main climate divisions present in the Rio Grande region (Figure 5-6), 2010 was a near normal year in Climate Division 5 and an incipient wet spell (slightly wetter than normal) in Climate Division 8. As discussed in Section 5.1, the PDSI is an indicator of whether drought conditions exist and if so, what the relative severity of those conditions is. Given that the water use data for 2010 represent a near normal to slightly above normal year for the two climate divisions present in the region, it cannot be assumed that this supply will be available in all years; it is important that the region also consider potential water supplies during drought periods.

While 2010 was a full-supply year for the Rio Grande Project, EBID's water allocation was smaller than in previous years due to the accounting under the 2008 Operating Agreement. As noted above (Section 5.5.1), the Operating Agreement is a primary reason for the decrease in surface water diversion and increase in groundwater use in 2010 in the planning region. Depending upon the outcome of the litigation regarding the Operating Agreement (Section 4.3.1), it may be necessary to make changes to the calculation of the drought supply. There is no established method or single correct way of quantifying a drought supply given the complexity associated with varying levels of drought and constantly fluctuating water supplies. For purposes of having an estimate of drought supplies for regional and statewide water planning, the State has developed and applied a method for regions with both stream-connected and non-stream-connected aquifers. The method adopted for stream-connected aquifers is described below:

- The drought adjustment is applied only to the portion of the administrative water supply that derives from surface water, as it is assumed that groundwater supplies will be available during drought due to the relatively stable thicknesses of groundwater aquifers that are continuously recharged through their connection to streams. While individual wells may be depleted due to long-term drought, this drought adjustment does not include an evaluation of diminished groundwater supplies.

- The minimum annual yield for key stream gages on mainstem drainages (Table 5-4b) was compared to the 2010 yield, and the gage with the lowest ratio of minimum annual yield to 2010 yield was selected.

- The 2010 administrative surface water supply for the region was then multiplied by that lowest ratio to provide an estimate of the surface water supply adjusted for the maximum drought year of record.

For the Lower Rio Grande region, the gage with the minimum ratio of annual yield to 2010 yield is the Rio Grande below Caballo Dam, with a ratio of 0.23 for minimum annual yield (168,757 acre-feet in 2013) to 2010 yield (722,230 acre-feet) (USGS, 2014c). Based on the region's total administrative surface water supply of 271,717 acre-feet (Section 5.5.1), the drought-adjusted surface water supply is 62,495 acre-feet.

Though the adjustment is based on the minimum year of streamflow recorded to date, it is possible that drought supplies could be even lower in the future. Additionally, water supplies downstream of reservoirs may be mitigated by reservoir releases in early drought phases when storage is available or new groundwater supplies can be developed, while longer-term droughts can potentially have greater consequences. Nonetheless, the adjusted drought supply provides a rough estimate of what may be available during a severe to extreme drought year.

In addition to the variability in surface water supply from year to year, in non-stream-connected basins the change in recharge during a drought is also important, possibly even more so. To estimate the vulnerability of the closed basins within a planning region to a prolonged drought, NMOSE administrative models for other areas of the state were used to predict the potential impact by 2060 of a 20-year drought.

The method adopted by the State for estimating drought supplies for non-stream connected aquifers is as follows:

- The drought adjustment is applied only to the portion of the administrative water supply that derives water from the mined aquifer.

- In basins for which NMOSE has an administrative model, the simulation period is from 2010 to 2060 as described above, with no recharge from 2020 to 2040.

- For a conservative approximation, the drawdown predicted during the drought period is derived from a model cell in a heavily stressed area at the end of the simulation period (2060) to represent the water column that will be lost due to drought and pumping (Table 5-15). For those basins where no model is available or model results were not available, a drought adjustment of 12 percent was used, based on the average of the modeled drawdown from all the NMOSE administrative models for other regions of the state.

Table 5-15. Projected Drought Groundwater Supply in the Closed Basins of the Lower Rio Grande Water Planning Region in 2060

Row	Calculation Step	Underground Water Basin						Explanation/Source
		Mimbres	Nutt-Hockett	Jornada del Muerto [a]	Tularosa	Hueco	Mount Riley	
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	1,433	1,100	14,731	1,544	3,961	0	Longworth et al., 2013
2	Reduction in supply due to drought	12%	12%	12%	12%	12%	12%	Average impact estimated from OSE models
3	Groundwater supply by 2060 with 20-year drought (ac-ft/yr)	1,143	126	7,624	1,264	3,063	0	Row 7 of Table 5-14 reduced by the product of Row 1 and Row 2.

[a] Jornado Draw portion of Lower Rio Grande Underground Water Basin

ac-ft/yr = Acre-feet per year
UWB = Underground Water Basin

- This adjusted predicted drawdown is then compared to the median available water column in 2010 (as described in Section 5.5.1) to determine the percentage of wells that are impacted by the 20-year drought and continued pumping.

- This percentage represents the reduction in supply due to drought. The drought supply will be estimated by multiplying the percentage by the 2060 administrative supply.

The estimated reduction in administrative supply in the six closed basins due to continued pumping and one 20-year drought with no recharge over the 50-year planning period, is 58 percent, resulting in an available water supply for the six closed basins of about 13,200 acre-feet per year (Table 5-15) out of the 2010 pumping of 22,800.

The total projected available supply in 2060 during a prolonged drought is equal to the total groundwater supplies plus drought-impacted surface water supplies:

- Closed basin supply of 13,300 acre-feet

- Groundwater supply in the Rincon and Mesilla valleys (that is assumed by this method to not be impacted by drought) of 155,500 acre-feet

- Drought impacted surface supply of 62,500 acre-feet

The resulting estimated total drought supply in 2060 is about 231,200 acre-feet, or about 51 percent of a normal year administrative water supply.

6. Water Demand

To effectively plan for meeting future water resource needs, it is important to understand current use trends as well as future changes that may be anticipated. This section includes a summary of current water use by category (Section 6.1), an evaluation of population and economic trends and projections of future population (Sections 6.2 and 6.3), a discussion of the approach used to incorporate water conservation in projecting future demand (Section 6.4), and projections of future water demand (Section 6.5).

Four terms frequently used when discussing water throughout this plan have specific definitions related to this RWP:

- *Water use* is water withdrawn from a surface or groundwater source for a specific use. In New Mexico water is accounted for as one of the nine categories of use in the *New Mexico Water Use by Categories 2010* report prepared by the NMOSE.

- *Water withdrawal* is water diverted or removed from a surface or groundwater source for use.

- *Administrative water supply* is based on the amount of water withdrawals in 2010 as outlined in the *New Mexico Water Use by Categories 2010* report.
- *Water demand* is the amount of water needed at a specified time.

6.1 Present Uses

The most recent assessment of water use in the region was compiled by NMOSE for 2010, as discussed in Section 5.5. The *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) provides information on total withdrawals for nine categories of water use:

- Public water supply
- Domestic (self-supplied)
- Irrigated agriculture
- Livestock (self-supplied)
- Commercial (self-supplied)
- Industrial (self-supplied)
- Mining (self-supplied)
- Power (self-supplied)
- Reservoir evaporation

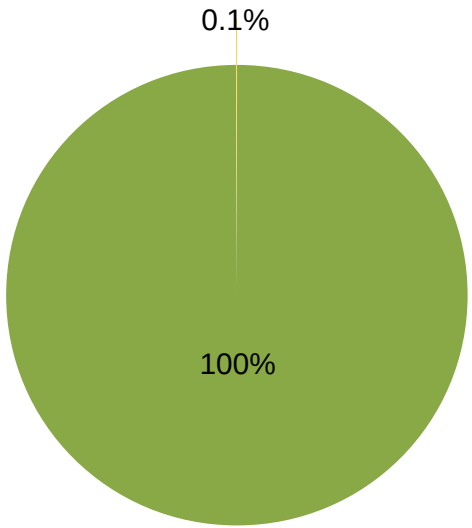
The total surface water and groundwater withdrawals for each category of use, for each county, and for the entire region, are shown on Table 6-1 and Figure 6-1.

Table 6-1. Total Withdrawals in the Lower Rio Grande Water Planning Region in 2010

Water Use Category	Withdrawals (acre-feet)		
	Surface Water	Groundwater	Total
Commercial (self-supplied)	0	7,875	7,875
Domestic (self-supplied)	0	653	653
Industrial (self-supplied)	0	120	120
Irrigated agriculture	271,569	121,911	393,480
Livestock (self-supplied)	148	4,245	4,393
Mining (self-supplied)	0	74	74
Power (self-supplied)	0	1,966	1,966
Public water supply	0	41,434	41,434
Reservoir evaporation	0	0	0
Total	271,717	178,279	449,996

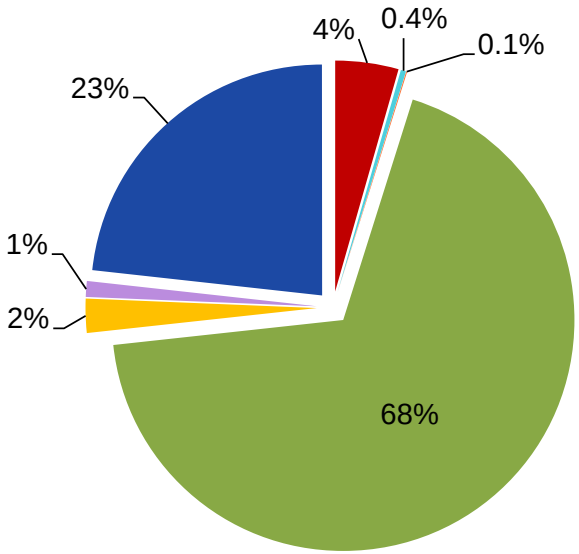
Source: Longworth et al., 2013

Surface Water



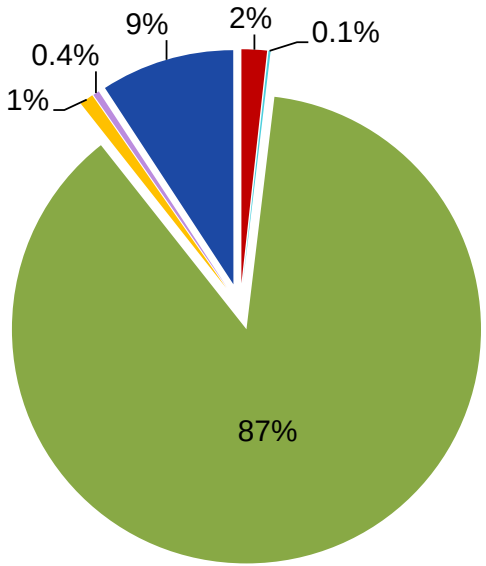
Total usage: 271,717 acre-feet

Groundwater



Total usage: 178,278 acre-feet

Total



Total usage: 449,996 acre-feet

Explanation

- Commercial (self-supplied)
- Domestic (self-supplied)
- Industrial (self-supplied)
- Irrigated agriculture
- Livestock (self-supplied)
- Mining (self-supplied)
- Power (self-supplied)
- Public water supply
- Reservoir evaporation

Source: Longworth et al., 2013

Notes:
1. Only categories with usage above 0.1% are shown.
2. Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

Figure 6-1

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Total Regional Water Demand by Sector, 2010

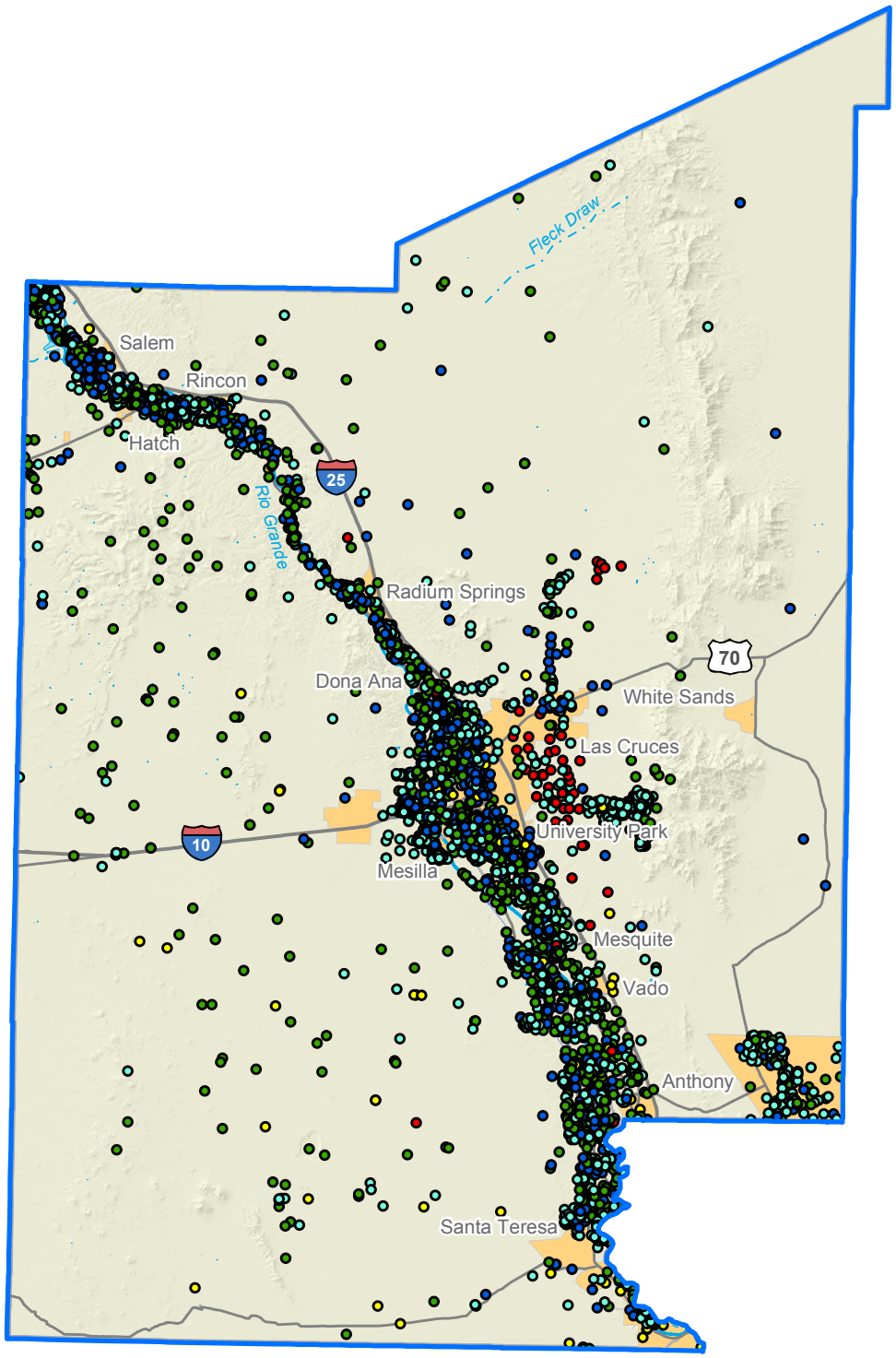
The predominant water use in 2010 in the Lower Rio Grande region was for irrigated agriculture, which used 87 percent of the nearly 450,000 ac-ft/yr of diverted surface and groundwater. Nearly all of the surface water diverted in the region is for irrigated agriculture with a very small fraction for livestock watering.

Most of the groundwater use in the Lower Rio Grande region is also for irrigated agriculture, with 68 percent of the 178,300 acre-foot withdrawals in 2010 applied to crops. Groundwater also supplies public water systems and self-supplied commercial, domestic, industrial, livestock, mining, and power. About 40 percent of the total withdrawals in the region are supplied by groundwater. Groundwater points of diversion are shown in Figure 6-2.

The categories included in the *New Mexico Water Use by Categories 2010* report and shown on Figure 6-1 and Table 6-1 represent the total withdrawals in the planning region. There are also some unquantified additional categories of water use, including riparian evapotranspiration and instream flow.

- *Riparian evapotranspiration:* Some research and estimates have been made for riparian evapotranspiration in selected areas, such as along the middle and lower Rio Grande (Thibault and Dahm, 2011; Coonrod and McDonnell, Undated; Bawazir et al., 2009), but riparian evapotranspiration has not been quantified statewide. The New Mexico Water Resources Research Institute is currently developing those estimates but the results are not yet available. Though riparian evapotranspiration is anticipated to consume a relatively large quantity of water statewide, it is not a large use in the planning region. It will not affect the calculation of the gap between supply and demand using the method in this report, because the gap reflects the difference between future anticipated demands and present uses, and if both present and future uses do not include the riparian evapotranspiration category, then the difference will not be affected. The only impact to the gap calculation would be if evapotranspiration significantly changes in the future. There is potential for such a change due to warming temperatures, but anticipated changes have not been quantified and would be subject to considerable uncertainty. Anticipated changes in riparian and stream evapotranspiration are areas that should be considered in future regional and state water plan updates.

- *Instream flow:* The analysis of the gap between supply and demand relies on the largest use categories that reflect withdrawals for human use or reservoir storage that allows for withdrawals downstream upon release of the stored water. It is recognized that there is also value in preserving instream water for ecosystem and habitat and tourism purposes. Though this value has not been quantified in the supply/demand gap calculation, it may still be an important use in the region, and if the region chooses, it may recommend instream flow protections in its policy, program, and project recommendations.



N

0 5.75 11.5 Miles

Explanation

- Stream (dashed where intermittent)
- Lake
- City
- County
- Water planning region

Well (use)

- Agriculture/irrigation
- Commercial/industrial/recreation
- Domestic
- Mining/oil/gas
- Public water supply

Source: NMOSE, 2014d

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Groundwater Points of Diversion

Figure 6-2

S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\LOWER_RIO_GRANDE\FIG6-2_POINTS_OF_DIVERSION.MXD 12/21/2016

The Environmental Working Group, a subcommittee of the Lower Rio Grande Steering Committee, identified and attempted to quantify the various components of environmental water demand, including baseflows, peak flows, and floodplain vegetation. Their work is included in Appendix 6-A.

In addition to the special conditions listed above, the data provided in the *New Mexico Water Use by Categories 2010* report are available for withdrawals only; depletions have not been quantified. In many cases, some portion of diverted water returns to surface or groundwater, for example from agricultural runoff or seepage or discharge from a wastewater treatment plant. In those locations where there is such return flow, the use of withdrawal data for planning purposes will add a margin of safety; thus the use of withdrawal data is a conservative approach for planning purposes.

6.2 Demographic and Economic Trends

To project future water demands in the region, it is important to first understand demographics, including population growth and economic and land use trends as detailed below. This section provides specific information regarding the population and economic trends in the Lower Rio Grande region. This information was obtained primarily from telephone interviews with government officials and other parties with knowledge of demographic and economic trends in Doña Ana County; the list of interviewees is provided in Appendix 6-B. The information in this section was used to project population, economic growth, and future water demand, as presented in Sections 6.3 and 6.5.

As shown in Table 3-1a, between 2010 and 2013 the population of Doña Ana County increased from 209,233 to 213,460, an increase of 2.0 percent (U.S. Census Bureau, 2014a). The City of Las Cruces, with a 2013 population of 101,324, comprises 47.5 percent of total county population. Doña Ana County has a younger population profile than most other counties in the state, with a higher percentage of people under the age of 18 (25.9 in 2013, compared with 24.3 percent for the state) and a lower percentage of people over 65 years of age (13.6 percent vs. 14.7 percent statewide). Another difference is the percentage of Hispanic population: 66.6 percent in Doña Ana, compared with 47.3 percent for the entire state (U.S. Census Bureau, 2014c). The county has a substantially higher poverty rate than the state as a whole, 25.8 percent compared with 19.5 percent (U.S. Census Bureau, 2014c).

The Doña Ana County economy is heavily dependent on business from contractors and military personnel at the nearby White Sands Missile Range, which comprises 25 percent of the local economy. The Range straddles both Doña Ana and Otero counties, but the residential portion, where most military personnel and their dependents live, is in Doña Ana County. The White Sands Missile Range has its own zip code and the population is roughly 1,730.

Approximately 11,000 commuters travel from Doña Ana County to El Paso for work. In 2010 they represented 16.5 percent of the Doña Ana workforce. Conversely, 8,000 El Paso residents commute to Las Cruces for work (U.S. Census Bureau, 2015). Although Doña Ana County residents held 15,066 more jobs in 2010 than in 2002, 10,952 or 73 percent of them were in El Paso or outside the main urbanized areas of Doña Ana County (Viva Doña Ana, 2013).

Doña Ana County is undergoing a shift from an agricultural community to an industrial economy. One factor that could hold back this change is lack of a skilled workforce. Doña Ana County Community College is offering specialized training to match skills with the needs of the new industries.

Doña Ana County has approved a $2.75 million incentive package for CN Wire, a Turkish company that intends to use the funds to purchase land and renovate an existing manufacturing facility in Santa Teresa for copper wire manufacturing. The plant will create 195 full-time jobs by mid-2017 (Soular, 2014). However another local wire manufacturer is suing the City of Anthony over the City's plan to provide an additional $70 million in bond-funded incentives to the new competitor in Santa Teresa.

A German company, CertoPlast, manufactures tapes for automotive wire harnesses and plans to open its first U.S. manufacturing plant in the new West Mesa Industrial Park in Las Cruces, which is part of the Doña Ana County Foreign Trade Zone. The company may hire as many as 100 employees.

Santa Teresa is a 2,200-acre master planned community that will eventually accommodate industrial, residential, and open space uses. Currently there are over 2,000 residential lots in Santa Teresa, with the possibility of several thousand more. In the first half of 2014, 11 new subdivisions were approved in the County, twice as many as in all of 2013.

In April 2014 the Union Pacific Railroad opened a $400 million inter-modal logistics and warehouse facility in Santa Teresa. When fully operational, the facility will employ 600 permanent workers, all of which should be hired by 2020. However, since the facility is replacing a facility in El Paso, it is expected that the El Paso workers will keep their jobs and commute to Santa Teresa, 13 miles away, so that only a limited number of new jobs will be available in the short-term; 200 of those workers have already transferred. Most of the jobs at the facility will be semi-skilled and pay a minimum of $35,000 a year. The intermodal facility will transfer goods from train to trucks for delivery and will also service trains with a diesel-fueling operation. The site offers border access to imported goods from Mexico that can be trucked elsewhere. At least 10 companies have left El Paso for Santa Teresa since 2011, some because of the new rail facility. In 2014 Franco Whole Foods opened a tortilla-processing center in Las Cruces that brought 160 new jobs.

Two major interstate highways pass through Doña Ana County: I-10 and I-25. With the addition of the Santa Teresa rail hub and the border crossing, there is a good opportunity for the County to become a distribution and logistics hub. Lands along the highway corridors that are now devoted to dairies and cattle grazing will become more valuable and will likely be converted to industrial uses.

Many of the jobs created since 2010 have been construction jobs that are temporary. For instance, 3,000 temporary construction jobs were created during the build-out of the Union Pacific facility. Despite new businesses locating in the County, private sector employment is growing slowly. From September 2013 through September 2014, the private sector added 400 jobs, an increase of 0.8 percent. Between 2012 and 2022, total employment is projected to increase by 9,387 jobs, an annual average percentage change of 1.18 percent. The fastest growing job categories will be professional, scientific, and technical services, healthcare and social assistance, wholesale trade, and accommodation and food services (New Mexico Department of Workforce Solutions, 2014b).

Doña Ana County contains 37 rural communities located within 150 miles of the Mexican border, called colonias, that lack adequate infrastructure such as paved roads, sanitary sewers, housing that meets codes, and basic services. The imbalance between revenues and needs in the colonias impedes the ability to make improvements.

The size of the under 25 population in the county is due to the presence of New Mexico State University (NMSU). However, most college graduates leave the area due to a lack of professional job opportunities.

In the City of Las Cruces, both residential and commercial development is flat. In 2013, 395 residential permits were issued, down considerably from the 1,200 that were the norm before 2008. The City was hoping to get an increase in tourism from the Spaceport north of the region as Las Cruces has upscale hotels that are lacking in Sierra County. However, those prospects are dimming due to the lack of space flights to date and potential future delays. The City has implemented water conservation measures and has a reclamation plant. The Las Cruces economy is stable, but without growth.

The residential real estate supply exceeds demand and loans were down by 14 percent in 2014 from 2013. Commercial loan demand is flat as well.

Doña Ana County is the fourth largest milk producer in New Mexico, although the number of producers has decreased, from 30 in 2003 to 19 in 2013 (NMSU Dairy Extension, 2014). In 2012, there were 43,395 milk cows (84 percent of the cattle inventory) in the County and 8,175 beef cows (USDA NASS, 2014).

In 2012 there were 2,184 farms and ranches in Doña Ana County, a 24 percent increase over 2007. The number of acres increased by 12 percent, from 589,373 to 659,970 acres. Between

2007 and 2012 irrigated acreage declined slightly, from 79,019 acres to 76,347 acres, a decrease of 3.4 percent. Government payments to farmers participating in agricultural support programs declined by 38 percent in the same time frame. The market value of crops fell by 10 percent from 2007 to 2012. The top crop in 2012 was pecans (USDA NASS, 2012).

While Doña Ana County, particularly Hatch, is known for its chiles, increased competition from China has affected how much land is devoted to this crop. Furthermore, the County has too many small (under 50-acre) chile farms. Mechanization is believed to be necessary to lower costs and save the chile industry in New Mexico; however, a minimum of 500 acres is needed to use automated harvesting. On the other hand, pecans are in high demand in foreign markets, especially China, and more acreage is being devoted to this crop. As industrial uses in the County increase, agriculture is likely to become a smaller part of the overall economy.

6.3 Projected Population Growth

The population projections for the 2003 RWP encompassed three forecasts, a low, medium, and high, each covering the period from 2000 through 2040. These projections reflected an overly optimistic economic perspective. For 2010, the forecasts were 220,692 for the low, 243,425 for the medium, and 266,252 for the high projection (Table 6-2). Even the low projection exceeded the actual 2010 population of 209,233.

Table 6-2. Comparison of Projected and Actual 2010 Population

County	2003 Regional Water Plan [a]			2010 U.S. Census [b]
	High	Medium	Low	
Doña Ana	266,252	243,425	220,692	209,233
Total Region	266,252	243,425	220,692	209,233

[a] Terracon et al, 2003
[b] U.S. Census Bureau, 2014a

Due to its large population and the anticipated growth, more data are available for Doña Ana County than for other more rural counties, and several population forecasts exist:

- Forecasts by Woods & Poole, reported in the *Border Area Economic Development Strategy* (AECOM and BE, 2014) project a 2020 population of about 260,000 and a 2030 population of approximately 355,000, based on an annual growth rate of 2.2 percent.
- The January 2012 *One Valley, One Vision 2040, Doña Ana County Regional Plan* offers several population projections for consideration, but settles on a projection of 325,000 for 2040 (Doña Ana County and City of Las Cruces, 2012).

- One of the forecasts in the regional plan was provided by the NMSU Arrowhead Center, which forecasted a 2020 population of 240,000 and a 2040 population of about 310,000. This forecast was lower than another one provided by the University of Texas, El Paso (UTEP), which projected a population of about 350,000 in 2040.

For this regional water planning update cycle, the Bureau of Business and Economic Research (BBER) at the University of New Mexico (UNM) prepared county-level population forecasts through 2040 using data and historical trends from 1960 through to the 2000 Census (Appendix 6-C). The projections for this plan are based in part on the BBER projections, moderated by the continuing recession, expected number of new jobs, and actual population growth rates between 2010 and 2013.

The population projections through 2060 (Table 6-3) encompass two population forecasts: one based on a more optimistic projection of the economy and one on the premise that not all expected new economic development will occur. The population of the County is projected to grow in both the high and low scenarios through 2060 (Table 6-3). Both the high and low projections are below the BBER projections, which are believed to be too optimistic.

Table 6-3. Lower Rio Grande Water Planning Region Population Projections July 1, 2010 to July 1, 2060

a. Annual Growth Rate

County	Projection	Growth Rate (%)				
		2010-2020	2020-2030	2030-2040	2040-2050	2050-2060
Doña Ana	High	0.92	1.29	1.08	1.04	0.81
	Low	0.56	0.56	0.56	0.53	0.45

b. Projected Population

County	Projection	Population					
		2010	2020	2030	2040	2050	2060
Doña Ana	High	209,233	229,250	260,500	290,100	321,630	348,730
	Low	209,233	221,150	233,845	247,350	260,850	272,730

Source: Poster Enterprises, 2014

The BBER's 2012 population projections for Doña Ana County are used as the basis for the high population growth rates in this plan for the period 2020 through 2060, although BBER's forecast for 2020 was reduced to take into account the slower rate of growth that has occurred since 2010. Whereas the BBER projected an average growth of almost 3,400 residents a year between 2010 and 2020, the actual average growth per year between 2010 and 2013 was 1,409.

Between 2020 and 2040, the growth rates shown in Table 6-3a agree with those in the BBER projections (Appendix 6-C). Growth rates are lower for the low projections and take into account the possible closure of White Sands Missile Range after 2020 (although the U.S. government does not discuss military base closures until they are placed on a list, the government has publicly stated that it wishes to reduce the number of bases, and over a 45-year period, it is likely that some New Mexico bases may close). The northern part of Doña Ana County is rural and the only endeavor that could create an economic and population uplift is the Spaceport, which is now in peril due to the lack of a mix of tenants and the postponement of flights by Virgin Galactic.

6.4 Water Conservation

Water conservation is often a cost-effective and easily implementable measure that a region may use to help balance supplies with demands. The State of New Mexico is committed to water conservation programs that encourage wise use of limited water resources. The Water Use and Conservation Bureau of the NMOSE developed the *New Mexico Water Conservation Planning Guide for Public Water Suppliers*. When evaluating water rights transfers or 40-year water development plans that hold water rights for future use, the NMOSE considers whether adequate conservation measures are in place. However, the 40-year water development plans are not incorporated into the RWP updates, as the resources needed to complete this work are not currently available. It is therefore important when planning for meeting future water demand to consider the potential for conservation.

To develop demand projections for the region, some simplifying assumptions regarding conservation have been made. These assumptions were made only for the purpose of developing an overview of the future supply-demand balance in the region and are not intended to guide policy regarding conservation for individual water users. The approach to considering conservation in each category of water use for developing water demand projections is discussed below. Specific recommendations for conservation programs and policies for the Lower Rio Grande region, as identified by the regional steering committee, are provided in Section 8.

Public water supply. Public water suppliers that have large per capita usage have a greater potential for conservation than those that are already using water more efficiently. Through a cooperative effort with seven public water suppliers, the NMOSE developed a GPCD (gallons per capita per day) calculation to be used statewide, thereby standardizing the methods for calculating populations, defining categories of use, and analyzing use within these categories. The GPCD calculator was used to arrive at the per capita uses for public water systems in the region, shown in Table 6-4. These rates are provided to assist the regional steering committee in considering specific conservation measures.

Table 6-4. 2010 Water Withdrawals for Drinking Water Supply Systems and Rural Self-Supplied Homes

OSE Declared Groundwater Basin(s) [a]	Water Supplier	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Doña Ana County					
Hueco	CBG Water Company	993	203	0	226
	Desert Aire	1,000	76	0	85
	Lake Section Water Company	7,980	254	0	2,267
Hueco Tularosa	White Sands Missile Range	1,503	758	0	1,277
Lower Rio Grande	Alameda Mobile Home Park	285	112	0	36
	Alto de Las Flores MDWCA	772	92	0	80
	Anthony Water & Sanitation	8,700	114	0	1,115
	Brazito MDWCA	485	177	0	96
	Camino Real/Summer Winds	551	76	0	47
	Chamberino MDW & SA	485	89	0	48
	Country Mobile Manor	222	113	0	28
	Covered Wagon Mobile Home Park	101	122	0	14
	De La Te Mobile Manor	157	100	0	18
	Dona Ana MDWCA	10,780	124	0	1,502
	Dove Canyon LLC0	157	100	0	18
	El Patio Mobile Home Park #2	86	100	0	10
	Fairview Estates Water System	152	148	0	25
	Fort Selden Water Company	1,000	193	0	217
	Garfield MDWCA	2,268	112	0	285
	High Valley Water Users	71	136	0	11
	La Union MDWCA	568	71	0	45
	Las Cruces Mobile Home Park	174	100	0	19

Source: Longworth et al., 2013, unless otherwise noted.

[a] Determined based on NMED Drinking Water Bureau water supply source locations (NMOSE water use database doesn't distinguish groundwater basin).

gpcd = Gallons per capita per day

Table 6-4 2010 Water Withdrawals for Drinking Water Supply Systems and Rural Self-Supplied Homes

OSE Declared Groundwater Basin(s) [a]	Water Supplier	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Doña Ana County (cont.)					
Lower Rio Grande (cont.)	Las Cruces Municipal Water System	94,398	186	0	19,713
	Leasburg MDWCA	903	116	0	117
	Lower Rio Grande Public Water Works Authority	12,834	99	0	1,424
	Mesa Development Center	900	99	0	100
	Mesilla Water System	2,180	123	0	301
	Miller's Mobile Manor	116	107	0	14
	Moongate Water System	6,840	263	0	2,014
	Picacho Hills Water System	2,183	123	0	301
	Picacho MDWCA	1,200	76	0	102
	Rancho Vista Mobile Home Park	120	107	0	14
	Rincon Water Consumers Co-Op	550	159	0	98
	Santa Teresa Water System [b]	4,335	276	0	1,341
	Silver Spur Mobile Home Park	132	104	0	15
	St John's Mobile Home Park	476	100	0	53
	Summer Wind Mobile Home Park	476	100	0	53
	Sunland Park Water System [b]	14,234	217	0	3,452
	Talavera Water Co-Op	160	115	0	21
	University Estates/San Pablo MDWCA	3,970	210	0	934
	Val Verde Mobile Home Park	188	100	0	21
	Valle de Rio Water System	243	272	0	74
	Villa Del Sol Mobile Home Park	516	143	0	83
	Vista Del Rey Estates MDWCA	42	309	0	15

Source: Longworth et al., 2013, unless otherwise noted.

[a] Determined based on NMED Drinking Water Bureau water supply source locations (NMOSE water use database doesn't distinguish groundwater basin).

[b] Groundwater basin assumed based on geographic location of water supplier.

gpcd = Gallons per capita per day
NA = Information not available

Table 6-4 2010 Water Withdrawals for Drinking Water Supply Systems and Rural Self-Supplied Homes

OSE Declared Groundwater Basin(s) [a]	Water Supplier	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Doña Ana County (cont.)					
Lower Rio Grande (cont.)	Vista Real Mobile Home Park	131	88	0	13
	West Mesa System	1,930	240	0	518
	West Mesa Water Company Inc	255	147	0	42
	Winterhaven MDWA	163	100	0	18
Lower Rio Grande Nutt-Hockett	Hatch Water Supply	2,172	177	0	431
NA	Billy Moreno Water System	59	96	0	6
	Butterfield Park MDWCA	1,132	362	0	459
	Caballo Lake MDWA	83	138	0	13
	CDS Rainmakers Util LLC Rancho Ruidoso	1,000	175	0	196
	Charles Madrid Mobile Home Park	72	101	0	8
	Cielo Dorado Estates Homeowners Assoc	263	158	0	47
	Delara Estates MDWCA	1,320	152	0	225
	Dona Ana County Utilities-Border Region	610	189	0	129
	Evergreen Mobile Home Park	113	539	0	68
	Johnson, Floyd-MHP	250	113	0	32
	Jornada Water Co	7,741	167	0	1,446
	Skoshi Mobile Home Park	171	100	0	19
	Summit Gardens LLC	440	66	0	33
	Terrace Mobile Home Park	10	156	0	2
Doña Ana County public water supply totals		203,401		0	41,434
County-wide public water supply per capita use			182		

Source: Longworth et al., 2013, unless otherwise noted.

[a] Determined based on NMED Drinking Water Bureau water supply source locations (NMOSE water use database doesn't distinguish groundwater basin).

[b] Groundwater basin assumed based on geographic location of water supplier.

gpcd = Gallons per capita per day
NA = Information not available

Table 6-4 2010 Water Withdrawals for Drinking Water Supply Systems and Rural Self-Supplied Homes

OSE Declared Groundwater Basin(s) [a]	Water Supplier	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Doña Ana County (cont.)					
Hueco Lower Rio Grande Mimbres Mount Riley Nutt-Hockett Tularosa	Rural self-supplied homes (Rio Grande) [c]	5,832	100	0	653
	Doña Ana County domestic self-supplied totals	5,832		0	653
	County-wide domestic self-supplied per capita use		100		

Source: Longworth et al., 2013, unless otherwise noted.

[a] Determined based on NMED Drinking Water Bureau water supply source locations (NMOSE water use database doesn't distinguish groundwater basin).

[c] Rural self-supplied homes are located in the river basin specified in parentheses.

gpcd = Gallons per capita per day

The system-wide per capita usage for each water supplier includes uses such as golf courses, parks, and commercial enterprises that are supplied by the system. Hence there can be large variability among the systems. For purposes of developing projections, a county-wide per capita rate was calculated as the total public supply use in the county divided by the total county population (or portion of the county within the region), excluding those served by domestic wells. For future projections (Section 6.5), a consistent method is being used statewide that assumes that conservation would reduce future per capita use in each county by the following amounts:

- For current average per capita use greater than 300 gpcd, assume a reduction in future per capita use to 180 gpcd.
- For current average per capita use between 200 and 300 gpcd, assume a reduction in future per capita use to 150 gpcd.
- For current average per capita use between 130 and 200 gpcd, assume a reduction in future per capita use to 130 gpcd.
- For current average per capita use less than 130 gpcd, no reduction in future per capita use is assumed.

Current per capita use in Doña Ana County is 182 gpcd (Table 6-4), so future per capita use is assumed to be reduced to 130 gpcd. In the projections, these reductions are phased in over time.

Self-supplied domestic. Homeowners with private wells can achieve water savings through household conservation measures. These wells are not metered, and current water use estimates were developed based on a relatively low per capita use assumption (Table 6-4; Longworth et al., 2013). Therefore, no additional conservation savings were assumed in developing the water demand projections. For purposes of developing projections, a county-wide per capita rate was calculated as the total self-supplied domestic use in the county divided by the total county population (or portion of the county within the region), excluding those served by a public water system.

Irrigated agriculture. As the largest water use in the region, conservation in this sector could be beneficial if it reduced actual water consumption. However, doing so is not simple and it is important when considering the potential for improved efficiency in agricultural irrigation systems to consider how potential conservation measures may affect the region's water supply.

Withdrawals in both surface and groundwater irrigation systems include both consumptive and non-consumptive uses and incidental losses:

- Consumptive use occurs when water is permanently removed from the system due to crop evapotranspiration (i.e., evaporation and transpiration). Evapotranspiration is determined by factors that include crop and soil type, climate and growing season, on-farm management, and irrigation practices.

- Non-consumptive use occurs when water is temporarily removed from the stream system for conveyance requirements and is returned to the surface or groundwater system from which it was withdrawn.
- Incidental losses from irrigation are irrecoverable losses due to seepage and evapotranspiration during conveyance that are not directly attributable to crop consumptive use.
    - Seepage losses occur when water leaks through the conveyance channel or below the root zone after application to the field and is either lost to the atmosphere or remains bound in the soil column.
    - Evapotranspiration occurs as a result of (1) evaporation during water conveyance in canals or with some irrigation methods (e.g., flood, spray irrigation) and (2) transpiration by ditch-side vegetation.

Some agricultural water use efficiency improvements (commonly referred to as agricultural water conservation) reduce the amount of water diverted, but may not reduce depletions or may even have the effect of increasing consumptive use per acre on farms (Brinegar and Ward, 2009; Ward and Pulido-Velazquez, 2008). These efforts can result in economic benefits, such as increased crop yield, but may have the adverse effect of reducing return flows and therefore downstream water supply. For example, methods such as canal lining or piping may result in reduction of seepage losses associated with conveyance, but that seepage will no longer provide return flow to other users. Other techniques such as drip irrigation and center pivots may reduce the amount of water diverted, but if the water saved from such reductions is applied to on-farm crop demands, water supplies for downstream uses will be reduced.

Due to the complexities in agricultural irrigation efficiency, no quantitative estimates of savings are included in the projections. However, the regions are encouraged to explore strategies for agricultural conservation, especially those that result in consumptive use savings through changes in crop type or fallowing of land while concentrating limited supplies for greater economic value on smaller parcels. Section 8 outlines strategies developed by the Lower Rio Grande Steering Committee to achieve savings in agricultural water use within the region.

Self-supplied commercial, industrial, livestock, mining, and power. Conservation programs can be applicable to these sectors, but since uses are very low in these categories within the region, no additional conservation savings are assumed in the water demand projections.

Reservoir evaporation. In many parts of New Mexico, reservoir evaporation is one of the highest consumptive water uses, but no reservoir evaporation is estimated for the Lower Rio Grande region. Elephant Butte and Caballo Reservoirs have high evaporation rates, which have been factored into the water delivery requirements under the Rio Grande Compact. To reduce usage in this category, some areas outside of the region have considered aquifer storage and recovery to replace some reservoir storage, and it may also be possible in some circumstances to

gain some reduction in evaporation by storing more water at higher elevations or constructing deeper reservoirs with less surface area for evaporation. However, due to the legal, financial, and other complexities of implementing these techniques, no conservation savings are assumed in developing the reservoir evaporation demand projections for this region.

6.5 Projections of Future Water Demand for the Planning Horizon

To develop projections of future water demand a consistent method was used statewide. Section 6.5.1 provides a comprehensive discussion of the methods applied consistently throughout the state to project water demand in all the categories reported in the *New Mexico Water Use by Categories* reports, and some of the categories may not be applicable to the Lower Rio Grande region. The projections of future water demand determined using this consistent method, as applicable, for the Lower Rio Grande region are discussed in Section 6.5.2.

6.5.1 Water Demand Projection Methods

The Handbook provides the time frame for the projections; that is, they should begin with 2010 data and be developed in 10-year increments (2020, 2030, 2040, 2050, and 2060). Projections will be for withdrawals in each of the nine categories included in the Water *Use by Categories 2010 report* (Longworth et al., 2013) and listed in Section 6.1.

To assist in bracketing the uncertainty of the projections, low- and high-water demand estimates were developed for each category in which growth is anticipated, based on demographic and economic trends (Section 6.2) and population projections (Section 6.3), unless otherwise noted. The projected growth in population and economic trends will affect water demand in eight of the nine water use categories; the reservoir evaporation water use category is not driven by these factors.

The 2010 administrative water supply (Section 5.5.1) was used as a base supply from which water demand was projected forward. As discussed in Section 5.5, the administrative water supply is based on withdrawals of water as reported in the *New Mexico Water Use by Categories 2010* report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the water is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region.

Surface water supplies may be considerably lower in drought years, as discussed in Section 5.5.2, but the demand for water does not necessarily decrease when the supply is diminished (i.e., if water were to be available, there is demand and it would be applied to beneficial use). For example, some water right holders may not have put all their rights to beneficial use in some years due to drought or economic conditions. However, as water becomes available in future wet years or the economic climate improves, these existing rights may once again be exercised. Therefore, for planning purposes, it is assumed that existing rights, reflected

in the administrative water supply, will be exercised by the owner when needed or may be leased to other users.

The assumptions and methods used statewide to develop the demand projections for each water use category follow. Not all of these categories are applicable to every planning region. The specific methods applied in the Lower Rio Grande region are discussed in Section 6.5.2.

Public water supply includes community water systems that rely on surface water and groundwater diversions other than from domestic wells permitted under 72-12-1.1 NMSA 1978 and that consist of common collection, treatment, storage, and distribution facilities operated for the delivery of water to multiple service connections. This definition includes municipalities (which may serve residential, commercial, and industrial water users), mutual domestic water user associations, prisons, residential and mixed-use subdivisions, and mobile home parks.

For regions with anticipated population increases, the increase in projected population (high and low) was multiplied by the per capita use from the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) (reduced for conservation as specified above), times the portion of the population that was publicly supplied in 2010 (calculated from Longworth et al., 2013); the resulting value was then added to the 2010 public water supply withdrawal amount. Current surface water withdrawals were not allowed to increase above the 2010 withdrawal amount unless there is a new source of available supply (i.e., water project or settlement). Both the high and low projections incorporated conservation for counties with per capita use above 130 gpcd, as discussed in Section 6.4, on the assumption that some of the new demand would be met through reduction of per capita use.

For planning purposes, in counties where a decline in population is anticipated (in either the high or low scenario or both), as a conservative approach it was assumed that public water supply would remain constant at 2010 withdrawal levels based on the 2010 administrative water supply (the water is physically available for withdrawal, and its use is in compliance with water rights policies). Likewise, in regions where the population growth is initially positive but later shows a decline, the water demand projection was kept at the higher rate for the remainder of the planning period.

The *domestic (self-supplied)* category includes self-supplied residences with well permits issued by the NMOSE under 72-12-1.1 NMSA 1978 (Longworth et al., 2013). Such residences may be single-family or multi-family dwellings. High and low projections were calculated as the 2010 domestic withdrawal amount plus a value determined by multiplying the projected change in population (high and low) times the domestic self-supplied per capita use from the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) times the calculated proportion of the population that was self-supplied in 2010 (calculated from Longworth et al., 2013). In counties where the high and/or low projected growth rate is negative, the projection was set equal to the 2010 domestic withdrawal amount. This allows for continuing use of existing domestic wells, which is anticipated, even when there are population declines in a county. In

regions where the population growth is initially positive but later shows a decline, the water demand projection was kept at the higher level for the remainder of the planning period, based on the assumption that domestic wells will continue to be used, even if there are later population declines.

The *irrigated agriculture* category includes all withdrawals of water for the irrigation of crops grown on farms, ranches, and wildlife refuges (Longworth et al., 2013). To understand trends in the agricultural sector, interviews were held with farmers, farm agency employees, and others with extensive knowledge of agriculture practices and trends in each county. Additionally, the New Mexico agriculture census data for 2007 and 2012 were reviewed and provided helpful agricultural data such as principal crops, irrigated acreage, farm size, farm subsidies, and age of farmers (USDA NASS, 2014). Comparison of the two data sets shows a downward trend in the agricultural sector across New Mexico. This decline was in all likelihood related at least in part to the lack of precipitation in 2012: in most of New Mexico 2007 was a near normal precipitation year (ranging from mild drought to incipient wet spell across the state), while in 2012 the PDSI for all New Mexico climate divisions indicated extreme to severe drought conditions. Based on the interviews, economic factors are also thought to be a cause of the decline.

In much of the state, recent drought and recession are thought to be driving a decline in agricultural production. However, that does not necessarily indicate that there is less demand for water. In areas where irrigation is supplied by surface water, there are frequent supply limitations, with many ditches having no or limited supply later in the season. This results in large fluctuations in agricultural water use and productivity from year to year. While it is possible that drought will continue over a longer term, it is also likely that drought years will be interspersed with wetter years, and there is some potential for renewed agricultural activity as a result. With infrastructure and water rights in place, there is a demand for water if it becomes available.

The 2010 administrative supply (surface water and groundwater diversions combined) was used as the starting point for the irrigation projections. For the 2020 through 2060 projections, it was assumed that the surface water demand is equal to the 2010 administrative water supply for both the high and low scenarios. Even if some farmers cease operations or plant less acreage, the water is expected to be used elsewhere due to surface water shortages. Conversely, if increased agricultural activity is anticipated, water demand in this sector was still projected to stay at 2010 administrative water supply levels unless there is a new source of available supply (i.e., water project or settlement). As noted in Section 5.5.1, the administrative supply numbers used here may need to be modified based on the 2008 Operating Agreement litigation.

In areas where 10 percent or more of groundwater withdrawals are for agriculture and there are projected declines in agricultural acreage, the low projection assumes that there will be a reduced demand in this sector. The amount of decline projected is based on interviews with individuals knowledgeable about the agricultural economy in each county (Section 6.2). Even in areas

where the data indicate a decline in the agricultural economy, the high projection assumes that overall water demand will remain at 2010 administrative water supply levels since water rights have economic value and will continue to be used.

The *livestock* category includes water used to raise livestock, maintain self-supplied livestock facilities, and support on-farm processing of poultry and dairy products (Longworth et al., 2013). High and low projections for percentage growth or declines in the livestock sector were developed based on interviews with ranchers, farm agency employees, and others with extensive knowledge of livestock trends in each county (Section 6.2). The growth or decline rates were then multiplied by the 2010 water use to calculate future water demand.

The *commercial (self-supplied)* category includes self-supplied businesses (e.g., motels, restaurants, recreational resorts, and campgrounds) and public and private institutions (e.g., public and private schools and hospitals) involved in the trade of goods or provision of services (Longworth et al., 2013). This category pertains only to commercial enterprises that supply their own water; commercial businesses that receive water through a public water system are not included. To develop the commercial self-supplied projections, it was assumed that commercial development is proportional to other growth, and the high and low projections were calculated as the 2010 commercial water use multiplied by the projected high and low population growth rates. In regions where the growth rate is negative, both the high and low projections were assumed to stay at the 2010 administrative supply water level, based on water rights having economic value. In regions where the population growth is initially positive but later shows a decline, the water demand projection will remain at the higher level for the remainder of the planning period, again based on the administrative water supply and the value of water rights. . This method may be modified in some regions to consider specific information regarding plans for large commercial development or increased use by existing commercial water users.

The *industrial (self-supplied)* category includes self-supplied water used by enterprises that process raw materials or manufacture durable or nondurable goods and water used for the construction of highways, subdivisions, and other construction projects (Longworth et al., 2013). To collect information on factors affecting potential future water demand, economists conducted interviews with industrial users and used information from the New Mexico Department of Workforce Solutions (2014) to determine if growth is expected in this sector. Based on these interviews and information, high and low scenarios were developed to reflect ranges of possible growth. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

The *mining* category includes self-supplied enterprises that extract minerals occurring naturally in the earth's crust, including solids (e.g., potash, coal, and smelting ores), liquids (e.g., crude petroleum), and gases (e.g., natural gas). Anticipated changes in water use in this category were based on interviews with individuals involved in or knowledgeable about the mining sector. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

The *power* category includes all self-supplied power generating facilities and water used in conjunction with coal-mining operations that are directly associated with a power generating facility that owns and/or operates the coal mines. Anticipated changes in water use in this category were based on interviews with individuals involved in or knowledgeable about the power sector. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

Reservoir evaporation includes estimates of open water evaporation from man-made reservoirs with a storage capacity of approximately 5,000 acre-feet or more. No large reservoirs are present in Doña Ana County; therefore, no water use is projected for the reservoir evaporation category.

6.5.2 Lower Rio Grande Projected Water Demand

Table 6-5 summarizes the projected water demands for each water use category for Doña Ana County, which were developed by applying the methods discussed in Section 6.5.1. As discussed in Section 6.3, population is projected to increase under both the high and low growth scenarios. The total projected water demand in the region in 2060 ranges from 447,700 to 474,000 acre-feet per year.

Table 6-5. Projected Water Demand, 2020 through 2060 Lower Rio Grande Water Planning Region

Use Sector	Projection	Water Demand (acre-feet)					
		2010 [a]	2020	2030	2040	2050	2060
Doña Ana County							
Public water supply	High	41,434	45,115	50,137	54,019	57,338	61,172
	Low	41,434	43,626	45,612	47,366	48,738	50,419
Domestic (self-supplied)	High	653	716	813	906	1,004	1,089
	Low	653	690	730	772	814	852
Irrigated agriculture	High	393,480	393,480	393,480	393,480	393,480	393,480
	Low	393,480	369,084	375,183	375,183	381,282	381,282
Livestock (self-supplied)	High	4,393	3,514	3,295	3,295	3,295	3,075
	Low	4,393	3,295	3,075	2,855	2,855	2,855
Commercial (self-supplied)	High	7,875	8,494	9,556	10,582	11,674	12,593
	Low	7,875	8,147	8,576	9,023	9,501	9,913
Industrial (self-supplied)	Low/High	120	130	160	160	160	160
Mining (self-supplied)	Low/High	74	74	74	74	74	74
Power (self-supplied)	High	1,966	2,370	2,370	2,370	2,370	2,370
	Low	1,966	2,185	2,185	2,185	2,185	2,185
Reservoir evaporation	High	0	0	0	0	0	0
	Low	0	0	0	0	0	0
Total regional demand	High	449,996	453,894	459,886	464,886	469,395	474,013
	Low	449,996	427,230	435,595	437,619	445,610	447,739

[a] Actual withdrawals (Longworth et al., 2013)

Projected water demand in the *public water supply*, *self-supplied domestic*, and *commercial* categories is projected to increase in Doña Ana County under both the high and low scenarios, proportional to the increasing population projections.

Water use in Doña Ana County occurs primarily in the *agricultural* category, and interviews (Section 6.2) indicated that the sector is relatively stable overall. For the high scenario, the amount of water devoted to irrigated agriculture in Doña Ana County is projected to remain at the 2010 level. The low scenario anticipates a drop in groundwater use to 80 percent of the 2010 level in 2020, with a rebound to 85 percent in the next two decades. By 2050, groundwater usage is projected to be at 90 percent of 2010 levels and remain there through 2060. Under the low scenario, no decline is expected in surface water use, which under the 2008 Operating Agreement was already reduced from historical normal levels.

Livestock in Doña Ana County is expected to be at 80 percent of 2010 levels in 2020 under the high scenario but to decrease over the next 40 years as dairies and cattle ranching give way to industrial and commercial land uses. In the low scenario, water usage is projected to drop to 75 percent of 2010 use in 2020, decline to 70 percent in 2030, and then level off at 65 percent as land uses change

Industrial water use is projected to increase minimally, as most of the new industries use relatively small amounts of water.

Doña Ana County has a few aggregate *mines* that use a small amount of water; this water use is expected to remain steady throughout the forecast period.

Water use in the *power* industry is expected to increase modestly through 2020. The Afton power plant operated by PNM will increase water use in 2020 and then level off. El Paso Electric intends to retire three electricity-generating units within the forecast period, but may install two new plants. The high projection anticipates that the two new plants will be located in Doña Ana County, while the low projection excludes them. In both scenarios, water usage is projected to level off after 2030.

No large reservoirs are present in Doña Ana County; therefore, no water use is projected for the *reservoir evaporation* category.

7. Identified Gaps between Supply and Demand

Estimating the balance between supply and demand requires consideration of several complex issues, including:

- Both supplies and demands vary considerably over time, and although long-term balanced supplies may be in place, the potential for drought or, conversely, high flows and flooding must be considered. In general, storage, including the capture of extreme

flows for future use, is an important aspect of allowing surface water supplies to be used when needed to meet demand during drought periods (i.e., reservoir releases may sustain supplies during times when surface water supplies are inadequate).

- In wet years when more water is available than in 2010, irrigators can increase surface water diversions up to their water right and reservoirs will fill when inflow exceeds downstream demand, provided that compact requirements are satisfied to increase storage for subsequent years. Thus, though not quantified, the withdrawals in wet years may be greater than the high projection.

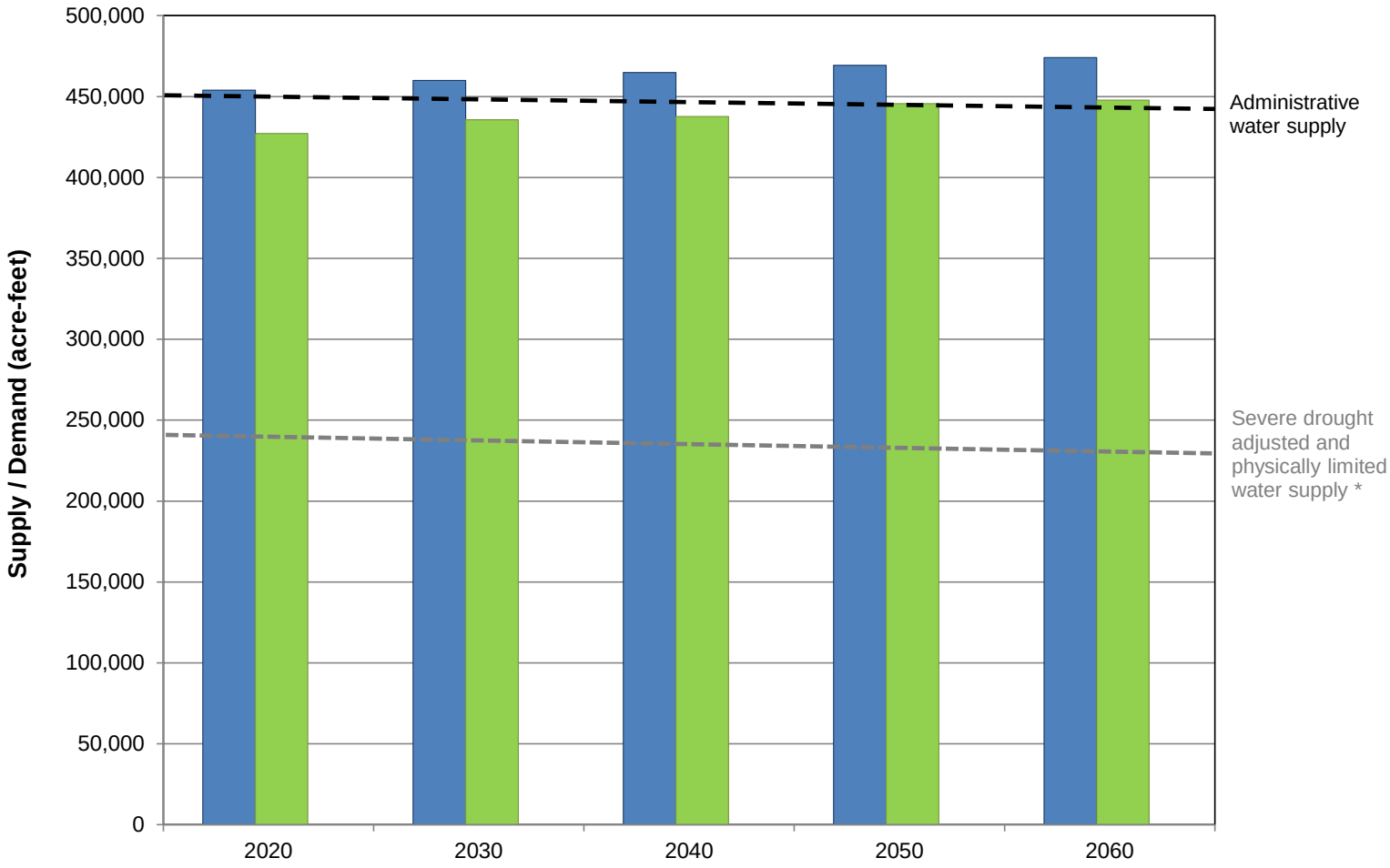
- Supplies in one part of the region may not necessarily be available to meet demands in other areas, particularly in the absence of expensive infrastructure projects. Therefore comparing the supplies to the demands for the entire region without considering local issues provides only a general picture of the balance.

- As discussed in Section 4, there are considerable legal limitations on the development of new surface and groundwater resources, given that surface and surface-connected groundwater supplies are fully appropriated, which affects the ability of the region to prepare for shortages by developing new supplies.

- Besides quantitative estimates of supply and demand, numerous other challenges affect the ability of a region to have adequate water supplies in place. Water supply challenges include the need for adequate funding and resources for infrastructure projects, water quality issues, location and access to water resources, limited productivity of certain aquifers, and protection of source water.

Despite these limitations, it is useful to have a general understanding of the overall balance of the supply and demand. Figure 7-1 illustrates the total projected regional water demand under the high and low demand scenarios, and also shows the administrative water supply and the drought-adjusted water supply. As presented in Section 5.5, the region's administrative water supply is about 450,000 acre-feet and the drought supply is about 231,226 acre-feet, or about 58 percent of a normal year administrative water supply. Future water demand projections reflect steady growth in water demand (Figure 7-1), due to the optimistic economic forecasts discussed in Sections 3 and 6. However, even without significant growth in demand, major supply shortages are indicated in drought years.

The Lower Rio Grande Planning region includes several mined basins that could be impacted by reductions to recharge resulting from long-term drought. The region also relies on surface water supplies that are vulnerable to drought. Also important is the predicted decline of the aquifers in these closed basins due to continued pumping. As discussed in Section 6.5, the water level decline rates were examined to estimate the future supply with and without a 20-year drought where no recharge occurred in the mined basins. This analysis indicated that future water availability may be only 51 percent of the 2010 supply (Table 7-1), and the estimated shortage in



* Based on the ratio of the minimum streamflow of record to the 2010 administrative water supply and modeling conducted by the New Mexico Office of the State Engineer.

Note: Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

Figure 7-1

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Available Supply and Projected Demand

drought years by 2060 is expected to range from 217,000 to 243,000 acre-feet. Consequently, increasing storage, developing shortage-sharing agreements, protecting watershed health for the region's surface water supplies, and identifying alternative groundwater supplies are high priorities for the region.

Table 7-1. Water Use and Estimated Availability in the Lower Rio Grande Water Planning Region

Source Type	Basin Area	2010 Estimated Water Use (ac-ft/yr)	2060 Estimated Water Availability (ac-ft/yr)	
			No Drought	One 20-Year Drought
Non stream-connected	Mimbres	1,433	1,315	1,143
	Nutt-Hockett	1,100	258	126
	Jornada del Muerto[a]	14,731	9,392	7,624
	Tularosa	1,544	1,450	1,264
	Hueco	3,961	3,539	3,063
	Mount Riley	0	0	0
Stream-connected	Rio Grande surface water	271,717	271,717	62,495
	Groundwater connected to Rio Grande	155,510	155,510	155,510
Total		449,996	443,181	231,226
Water use as a percentage of 2010 use			98%	51%

[a] Jornado Draw portion of Lower Rio Grande Underground Water Basin

ac-ft/yr = Acre-feet per year

8. Implementation of Strategies to Meet Future Water Demand

An objective of the regional water planning update process is to identify strategies that will help the region prepare to balance the gap between supply and demand and address other future water management challenges, including infrastructure needs, protection of existing resources and water quality, and the need to maximize limited resources through water conservation and reuse. The Lower Rio Grande Steering Committee developed a set of regional values and key strategies for addressing these water management challenges. These regional values provide a lens through which decision makers can evaluate specific projects. Regional water management requires balancing three key strategies: increasing and protecting supplies, reducing and managing demand, and promoting regional values. The steering committee developed a schematic (Figure 8-1) that shows how most water management issues fall into these three categories.

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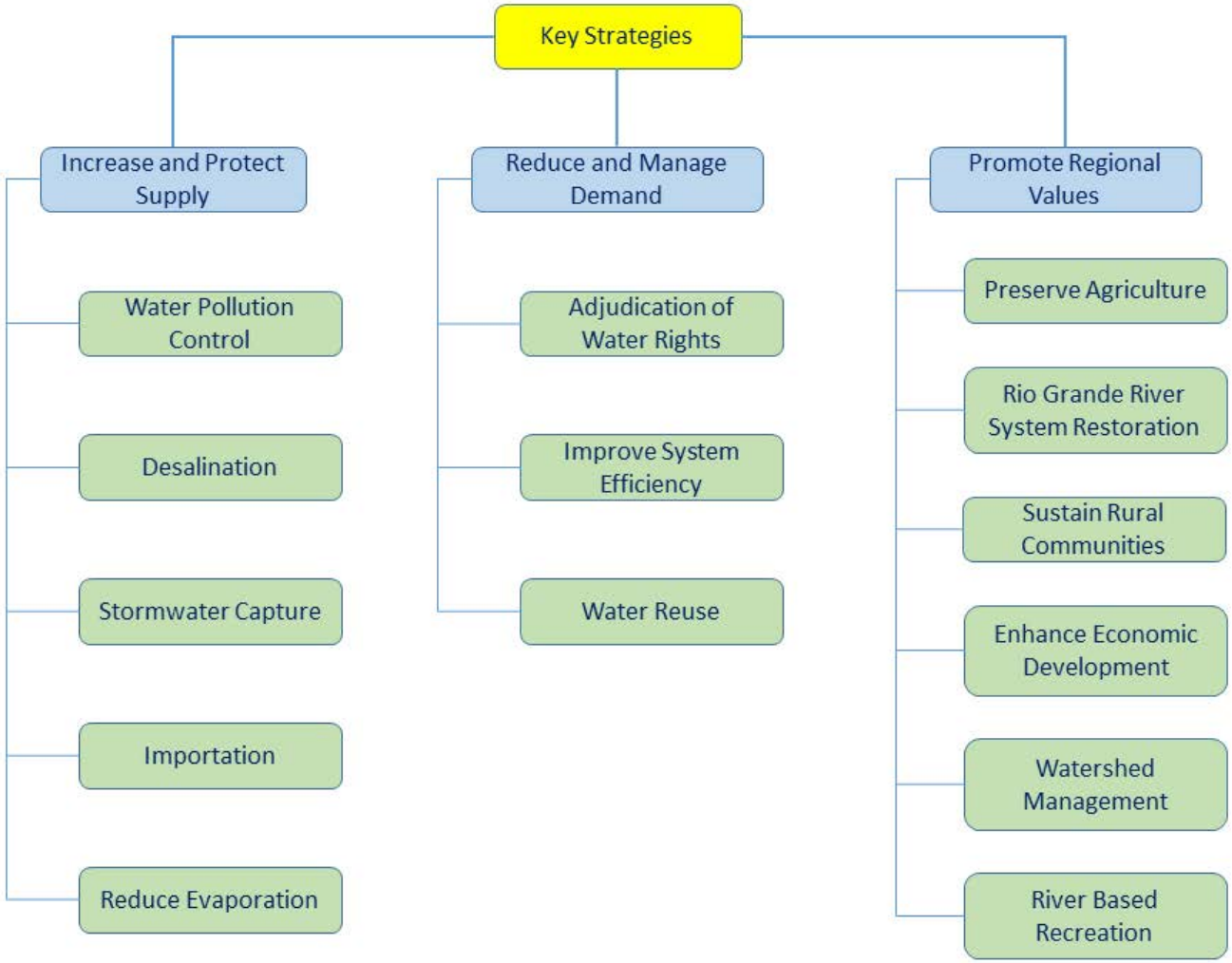

LOWER RIO GRANDE
REGIONAL WATER PLAN 2017

Key Strategies and Regional Values for the Lower Rio Grande Region

Figure 8-1

This RWP is building on the 2003 water plan and is considering strategies that will enhance and update, rather than replace, the strategies identified in the 2003 accepted water plan. The status of strategies from the 2003 water plan is assessed in Section 8.1. Additional strategies recommended in this RWP update—including a comprehensive table of projects, programs, and policies, key collaborative projects, and recommendations for the state water plan —are discussed in Section 8.3.

8.1 Implementation of Strategies Identified in Previously Accepted Regional Water Plan

An important focus of the RWP update process is to review the status and effectiveness of the strategies addressed in the 2003 plan. For the most part these strategies remain valid and important measures for managing water in the region. The steering committee reviewed and discussed the status of these strategies over several meetings in 2015 and 2016. A summary of this discussion is presented in Table 8-1, with the strategies organized under the same three key strategies shown in Figure 8-1. Additional details on these strategies can be found in Appendix 8-A.

8.2 Water Conservation

A generic Water Conservation Plan was included in Appendix I of the 2003 plan that encouraged communities to develop incentives to accompany the conservation plan targets. The City of Las Cruces has made substantial improvements in water conservation since the 2003 plan was finalized, including a sustainable water project. Agricultural conservation was also achieved through irrigation management by the Elephant Butte Irrigation District. Few new water conservation projects are included in this RWP update. However, water providers in the region will continue to implement their existing water conservation programs and drought contingency ordinances.

8.3 Proposed Strategies (Water Programs, Projects, or Policies)

In addition to continuing with strategies from the previous plan, the Lower Rio Grande region discussed and compiled new project, program, and policy (PPP) information, identified key collaborative projects, and provided recommendations for the state water plan. The recommendations included in this section were prepared by the Lower Rio Grande Regional Water Planning Steering Committee and other stakeholders and reflect their interest and intent. The list is inclusive of any ideas submitted to steering committee, including ideas gathered through public surveys conducted by the Community Engagement Workgroup in 2015. They have not been evaluated or approved by the steering committee or the NMISC. Regardless of the NMISCs acceptance of this RWP, inclusion of these recommendations in the plan shall not be deemed to indicate NMISC support for, acceptance of, or approval of any of the recommendations, PPP information, and collaborative strategies included by the regional steering committee and other stakeholders.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Lower Rio Grande Water Planning Region

2003 Plan Alternative	2015 Steering Committee Review
Increase and Protect Supply	
Rainfall augmentation	Cloud seeding could be modestly expected to increase rainfall by 5 to 20%. However, sufficient cloud formation must already occur to have seeding opportunity.
Desalination	This alternative needs continued research into decreasing desalination costs and disposing of the concentrated brine byproduct. This strategy has potential for both economic development and increasing water supply. Desalination plants can be found in El Paso, Texas and Alamogordo, New Mexico.
Aquifer storage and recovery	There are not currently any aquifer storage and recovery projects in the region, but future projects might include Elephant Butte Irrigation District (EBID) stormwater capture, use of flood control structures to augment groundwater recharge, and supporting WRRI's Statewide Water Assessment which includes recharge data compilation and recharge area identification.
Las Cruces Sustainable Water Project	This project is not yet complete, but envisions augmenting groundwater supply from the Mesilla Basin with treated surface water. See the related strategy of stormwater capture.
Stormwater capture	Several stormwater treatment projects are included on the 2016 ICIP list and discussed in the 2003 plan (Las Cruces SWTP, Hatch Area SWTP, Anthony Area SWTP were all included in the 2003 plan and are ongoing projects).
Importation of water	This is a controversial alternative. Many steering committee members are strongly against taking water from other regions, and see it as a delay of the real problem and stealing water from other regions. However, this alternative is also supported by other members of the committee and well-documented research on the impacts of any potential transfer would be welcome.
Purchase water rights	This alternative envisioned the purchase of water rights to secure supply. City of Las Cruces' preference is to lease water rather than purchase the land and water, however, which means the City does not own the water right.
Water rights leasing and transfers	Water policy could be developed to control water use for municipal, agricultural, and environmental/biological habitat reasons. EBID was in the process of establishing regulations to implement special water users associations allowing lease of EBID water for municipal use.
Farm delivery metering	Metering of all water use is very important as there are cases of abuse where a domestic well is used for other purposes. Some of this has definitely been implemented; it is an ongoing program required by the State Engineer and paid for by water rights holders. The reporting system (for both domestic and agricultural meters) needs to be improved, with farmers sometimes falling behind on reporting their meter readings to the NMOSE.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Lower Rio Grande Water Planning Region

2003 Plan Alternative	2015 Steering Committee Review
Increase and Protect Supply (cont.)	
Laser leveling	The increase in efficiency gained from laser leveling often allows for greater production with the same water delivery. Since water rights are administered by diversion, this increased production (from the same delivery) is a decrease in the return flows (through seepage or drainage back to canals) so the net depletion to the shallow aquifer increases.
Pressurized irrigation (drip and sprinkler)	These irrigation options are worth considering and future work needs to address water quality limitations to implementing this method. High salt content can clog drip systems, and windy conditions can decrease the efficiency of sprinkler systems.
High flow turnouts	The difficulty with this alternative is that the high flow turnouts are often designed to work correctly only at high flow rates. When the water supply is low this is problematic.
Low water use crops	Low water use crops are desirable for agricultural conservation but are limited by what the local market will bear. Increased markets for low water use crops need to be developed.
Deficit irrigation	As noted in the 2003 plan, these two strategies are difficult to develop further as they are already used as much as possible.
Cultural practices	
Canal lining	Reduced diversion is attractive; however, reduced canal seepage could mean less return flow or groundwater recharge
Irrigation rate structure	The steering committee felt that this alternative was not appropriate for agriculture water users. The steering committee would like to see this alternative retained for municipal and domestic users however.
Charges to constituents for unused water delivery requests	The steering committee would like to see this alternative removed. This issue is handled internally within the EBID.
Reduce and Manage Demand	
Manage reservoir releases to maximize efficiency	The steering committee indicated that significant work had happened on this alternative since the 2003 plan was written, as an operations agreement is now in place. Unfortunately there is concern that this alternative does not take into account the water needs of wildlife and the river.
Public education	Outreach is critical for all of these alternatives. The City of Las Cruces has several programs and has reduced per capita water use and created a water conservation website. Doña Ana County coordinated with the City of Las Cruces on a program that busses children to the park to learn about water conservation.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Lower Rio Grande Water Planning Region

2003 Plan Alternative	2015 Steering Committee Review
Promote Regional Values	
Remove invasive/non-native plants	Recent studies have shown that water savings from plant replacement are not as dramatic as initially hoped for, but the practice does have other beneficial environmental impacts.
Passive use of water for restoration	Not all restoration needs will have water allocated to them. There are current environmental impact statement studies to re-establish stable channels and floodplains of the river with passive restoration (i.e., simply reducing or eliminating the sources of degradation and allowing recovery time).

8.3.1 Comprehensive Table of Projects, Programs and Policies

Over the two-year update process, several meetings were held with stakeholders in the Lower Rio Grande region. These meetings identified the program objectives, presented draft supply and demand calculations for discussion and to guide strategy development, and provided an opportunity for stakeholders to provide input on the PPPs that they would like to see implemented (Section 2). Information was requested during several open meetings and requests for input were also e-mailed to all stakeholders that had expressed interest in the regional water planning process. The steering committee also conducted public surveys to gather information on desired projects (these project and policy ideas are listed in Appendix 8-A under Community Engagement Workgroup). A summary of all the PPP ideas gathered during the update process is compiled in Table 8-2. Refer to Appendix 8-A for a comprehensive list of these ideas including some thoughts on cost and project leads and funding partners.

Some specific water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan (ICIP) and Water Trust Board (WTB) processes, and those projects are included in the Lower Rio Grande Appendix 8-A. The projects were compiled by NMISC consultants from the 2017-2021 ICIP list (http://nmdfa.state.nm.us/ICIP.aspx, accessed March 2016), and were not evaluated by the steering committee or NMISC. The ICIP and WTB databases are updated annually; therefore, other infrastructure projects that are important to the region may be identified before this RWP is updated again. In general, the region is supportive of water and wastewater, dam safety, and other water-related infrastructure projects.

The PPP list also contains several watershed restoration projects, including some identified in the New Mexico Forest Action Plan. New Mexico State Forestry Division provides annual updates to the recommended watershed restoration projects in the New Mexico Forest Action Plan, and the region is supportive of those ongoing watershed restoration projects, even those that are not specifically identified in the PPP list.

The information in Table 8-2 and Appendix 8-A has not been ranked or prioritized; it is an inclusive table of all of the ideas that regional stakeholders are interested in pursuing. It includes projects both regional in nature (designated R in Appendix 8-A) and those that are specific to one system (designated SS in Appendix 8-A).

8.3.2 Key Strategies for Regional Collaboration

Prioritizing projects for funding is done by each funding agency/program, based on their current criteria, and projects are reviewed in comparison to projects from other parts of the state. Consequently, the regional water planning update program did not attempt to rank or prioritize projects that are identified in Appendix 8-A. The steering committee urges decision makers to refer to the Figure 8-1 and evaluate individual projects on how well they fit with regional values.

Table 8-2. New Project, Policy or Program Ideas Gathered During the Regional Water Plan Update Process

Update Alternative	Alternative Description
Increase and Protect Supply	
Residential Rainwater Harvesting	Promote rooftop rainwater capture for irrigation of residential landscapes and lawns.
Full Treatment of Domestic Wastewater	Treat domestic wastewater to the level where it can be returned directly to the drinking water supply rather than returning it to the river or aquifer. The "toilet to tap" treatment is successfully employed in many other regions.
Jornada Hydrology Study	Conduct a study to determine the sustainable rate at which water can be extracted from the aquifer. This would be used to limit the rate of groundwater pumping to ensure that it would remain a long-term source of water for domestic use.
Update the LRG Hydrologic Model	Update the existing Lower Rio Grande hydrologic model to incorporate drought conditions, the relationship between groundwater and surface water, and estimation of quantity, quality, and availability of water.
Evaluate New Water Sources in Percha Creek Area	Evaluate the relatively undeveloped artesian aquifer in the Percha Creek area as a new water source for use by domestic water users south of Caballo Reservoir.
Reduce and Manage Demand	
Irrigation App	Develop a program, or app, that would assist farmers in determining irrigation needs, such as when to irrigate and how much to apply.
Promote Low Impact Design	Encompass techniques such as rain gardens/bioswales, permeable pavement, cisterns, curb cuts in medians, parking lots, small detention basin-parks. This idea includes rainwater harvesting for landscape irrigation, both on a residential and commercial scale.
Landscape Irrigation Audits	Outdoor irrigation accounts for 30% of water use in Las Cruces. Optimize urban landscape irrigation by subsidizing irrigation audits and irrigation system adjustments, and educating the public on the need for optimization and conservation. Installing landscape-specific meters is also recommended.
Limit Water Use to Renewable Supply	Work with regional stakeholders to cap water use at the calculated renewable supply. If the current trend of mining aquifers continues, the reliable supply of water will diminish, with many associated problems.
Expand Las Cruces Water Reclamation System	Fund the expansion of the water reclamation and delivery system in Las Cruces. Additional wastewater from the City could be treated for landscape irrigation.
Low Flow Conversion Incentive	Fund incentive programs to replace aging indoor residential and commercial toilets, showerheads, dishwashers, washing machines, and other appliances to low water use models. Such programs need to be widely available to the low and moderate income homes.
Water Leak Detection	Fund water system audits to determine the amount of unaccounted losses. Purchase or rent leak detection equipment to narrow down the source of these losses.

Table 8-2. New Project, Policy or Program Ideas Gathered During the Regional Water Plan Update Process

Update Alternative	Alternative Description
Reduce and Manage Demand (cont.)	
Ensure Compliance with Existing Policies	Ensure that policies on wellhead protection and water quality are being upheld as this is a concern for many rural water users/providers. Water use permits should also be scrutinized for compliance.
Enhanced SCADA	Implement enhanced SCADA monitoring to include two-way flows and pressures at critical system distribution points.
Priority Call Impact Study	Conduct an economic impact study associated with a call for water based on water right priority date.
Promote Regional Values	
Fund Climate Research	Increase funding for research on the climate (such as Water Resources Research Institute work and USGS gage data). The research should be supported financially and compiled and disseminated.
Fund Planning	Provide funding for domestic and civic users' current and future master plans, preliminary engineering reports, feasibility studies, infrastructure capital improvement projects, asset management plans, and 40-year water development plans. This includes supporting regional comprehensive planning and assessing the recommendations outlined in the Viva Doña Ana Regional Planning Initiative. Coordinate water policy, projects, and programs with other regional systems in accordance with local "Livability Principles," community values, and preferred development patterns.
Stormwater Capture	Facilitate EBID ideas of creating small linear impoundments to capture rainfall runoff for infiltration and use in irrigation. This has the added benefit of creating wildlife habitat and reducing pollutant load to the river.
Floodplain Management	Shave the floodplain to capture stormflows. Use gage data to determine flood frequency and volumes. Overbank should occur as close to irrigation delivery as practical/possible.
Environmental Water Needs Assessment	Develop an environmental water needs assessment for the Lower Rio Grande that will determine the amount of water needed for year-round base flows to sustain native fish and associated wildlife, peak flows, floodplain vegetation, and recreational boating. Include scenario planning to support environmental water allocation decisions during varying water supplies.
Living River Program	Establish a Living River program to encourage water conservation among urban water users and raise money to acquire water rights for river restoration. This program would give incentive to conserve as reduction in use could benefit the river as opposed to more urban growth.
Restore Fish Habitat	Develop a plan to re-establish self-sustaining populations of native fish in the Rio Grande below Caballo Reservoir. Taking a proactive approach to conserving native fish before they are listed will minimize disruptions to water users while providing greater flexibility in the choice of conservation methods.

While prioritizing specific projects is not the goal of the steering committee, identifying larger regional collaborative projects is helpful to successful implementation of the regional plan. At steering committee meetings held in 2016, the group discussed projects that would have a larger regional or sub-regional impact and for which there is interest in collaboration with entities in other water planning regions to seek funding and for implementation.

The group used an informal process of discussing and refining the definition of potential collaborative projects to determine the projects of greatest interest. Key collaborative projects identified by the steering committee and Lower Rio Grande region stakeholders are shown on Table 8-3. In order to move forward with implementing the key collaborative projects, additional technical, legal, financial, and political feasibility assessment may be required. A detailed feasibility assessment was beyond the scope and resources for this RWP update.

8.3.3 Key Program and Policy Recommendations

The legislation authorizing the state water plan was passed in 2003. This legislation requires that the state plan shall "integrate regional water plans into the state water plan as appropriate and consistent with state water plan policies and strategies" (§ 72-14-3.1(C) (10)). For future updates of the state water plan, NMISC has asked the regions to provide recommendations for larger programs and policies that would be implemented on a state level. These are distinct from the regional collaborative projects listed in Table 8-3 and the PPPs listed on Table 8-2 and in Appendix 8-A in that they would be implemented on both a state and a regional or system-specific level. The State will consider the recommendations from all of the regions, in conjunction with State-level goals, when updating the state water plan.

After group discussion, Lower Rio Grande region identified the following recommendations for PPPs to be considered in the state water plan:

- Adjudication of water rights
- Develop and maintain a comprehensive water budget that is statewide
- Conduct water planning on a water basin level as opposed to 16 political regions
- Explore alternative water sources (e.g., produced brackish water) to identify additional new supplies
- Develop a State policy for importation of water
- Recommend changing the State Constitution to allow for sale of excess water for recharge
- Modify the NMED regulations to allow for reclaimed water to be used at lower water quality standards. Reclaimed water must currently be treated to drinking water standards for aquifer injection or release to the river, which seems counterintuitive when the groundwater and surface water are much poorer quality.

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Preserve Agriculture – Regional Value					
Maintain economic viability of agriculture in the face of increasing demand and decreasing supply.	New Mexico Department of Agriculture	• Thornburg Foundation • New Mexico State University (NMSU) Extension and Agriculture Department • Doña Ana County	• In-kind for government • Grants		• Urban expansion • Increasing demands for municipal water • Increasing demands for environmental uses of water
Improve System Efficiency – Strategy to Preserve Agriculture					
Maximize benefits to water users while decreasing water consumption.	All water system operators	Stakeholders	• Capital Outlay • Water Trust Board • U.S. Department of Agriculture (USDA) • New Mexico Department. of Agriculture • New Mexico Environment Department (NMED) • Private industries • Foundations		• Funding • Changing public perception

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Increase Water Supply – Regional Value					
Water Reuse – Strategy to Increase Water Supply					
Reusing water that has already been applied to a beneficial use. Water can be reused in both small- and large-scale settings. Possible uses for treated water include: • As irrigation water. Leaf level irrigation would be treated to a higher quality than non-leaf level. • Graywater reuse at residential level. • Recreation and environmental water supply. • Indirect potable reuse, where water will be stored below ground prior to being introduced into the potable water system. • Direct potable reuse where highly treated water is introduced directly into the potable water system. This is the most expensive route. These types of projects usually have a high benefit to cost ratio for the volume of water provided.		• City of Las Cruces • City of Hatch • Doña Ana County • NMED • New Mexico Office of the State Engineer (NMOSE) • New Mexico Interstate Stream Commission (NMISC) • Bureau of Reclamation • U.S. Environmental Protection Agency (EPA)	• Water Trust Board • Federal grants • Municipalities • USDA • National Science Foundation	• Millions • A wide range of prices depending on the project size and type of treatment.	• Permitting the project to ensure protection of health • Development of reuse standards by NMED

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Large Scale Desalination – Strategy to Increase Water Supply					
Encourage development of desalination plants, including the recovery of the marketable materials. There is a pilot project in El Paso. Malaga Bend projects in eastern New Mexico produced 72,000 tons of salt in 2015.	City governments	• Private industry in metals, salts, and rare earths • Bureau of Reclamation	• Federal or State grants • Loans	Data on cost per volume are available from existing projects.	The cost of desalination is high, but suitable saline water sources are available in the Mesilla Basin.
Importation of Groundwater – Strategy to Increase Water Supply					
Importation of water from outside the hydrologic basin.	NMISC	Groundwater users	• State • Federal • Local • User rates	Depends on location and legal hurdles	• Public support for this alternative is weak at the moment, but will likely change as aquifer conditions degrade • Legal issues • Construction of the pipeline (right of way, costs) • Funding strategies

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed Management – Regional Value					
Stormwater Capture / Upland Arroyo Management – Strategy for Watershed Management					
Create small check dams at the heads of arroyos for multiple purposes: • Increase groundwater recharge • Sediment control • Promote vegetation growth and wildlife habitat Consistent with many programs listed in Appendix 8-A including: • Watershed restoration/management • Aquifer storage and recovery • Stormwater capture • Promoting low impact design • Rainwater harvesting • Floodplain management	• Bureau of Land Management • New Mexico Forestry Division • Soil and water conservation districts • Doña Ana County • There are multiple current projects in Appendix 8-A for these locations: ▫ City of Anthony ▫ Berino ▫ Doña Ana County	• Elephant Butte Irrigation District • Southwest Environmental Center • Paseo del Norte Watershed Council • Natural Resources Conservation Service (NRCS) • Doña Ana County	• Elephant Butte Irrigation District (EBID) • State of New Mexico • Water Trust Board • Federal	• Multimillions to construct • Environmental compliance surveys: $5,000-$30,000	• Lack of consistent funding • Dams are often not popular solutions for dealing with water • Complicated jurisdictions with checkerboard ownership

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Rangeland and Upland Restoration – Strategy for Watershed Management					
• Removal of invasive plants and encouraging native plants and grasses. • Restore springs • Ensure that livestock grazing is meeting rangeland health standards using the BLM/NRCS/USFWS 17 indicators • Improve upland watershed with all tools in box (i.e., management, regulations, education, research, programs, policies, projects, etc).	Bureau of Land Management	• NRCS • Paseo del Norte Watershed Council	Federal		• Lack of consistent funding • Public education on the benefits of rangeland management

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Rio Grande River System Restoration – Regional Value					
Rio Grande Habitat Restoration and Public Spaces – Strategy for Rio Grande River System Restoration					
Restore the Rio Grande ecosystem and promote river-based recreational opportunities The steps include: • Conduct environmental water needs assessment (see Appendix 8-A) • Develop and implement plan to acquire water, including Living River Program • Develop and implement plan to re-establish self-sustaining native fish populations in the Rio Grande • Establish Living River Program	• USGS • U.S. Section of the International Boundary and Water Commission • U.S. Fish and Wildlife Service • City of Las Cruces	• New Mexico Department of Game and Fish • U.S. Army Corps Engineers • NMED • NMOSE • EBID • Southwest Environmental Center • Doña Ana County			
Enhance Water Security for All – Regional Value					
Address vulnerability and resilience of water users in response to various threats and risks.	State of New Mexico	• EPA • Local communities			• Funding • Environmental Justice

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Sustain Rural Communities – Regional Value					
Expand Water Sections in Regional Comprehensive Plans – Strategy to Sustain Rural Communities					
Integrate planning and implementation with water resources in the County Comprehensive Plan and other related documents generated by the Via Doña Ana Regional Planning Initiative	Doña Ana County	All stakeholders	• Federal • State • Local	Unknown	• Describing the interrelationship between water availability, water demand, and development patterns is challenging but must be more clearly explained • Policies, programs and projects involving community development, recreational areas, and protection of natural areas must be developed with a better understanding of their impact on availability and demand for water resources.

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Regional Collaboration for Drinking Water Systems – Strategy to Sustain Rural Communities					
This project would involve collaboration to help small water systems in the region build capacity by sharing resources on issues such as accounting, use of equipment, planning, and where feasible, water supply, and to create drought contingency plans.	Rural water providers	• County Emergency Manager • NMED • Union of Concerned Scientists	• State • Local	Unknown	• Population is wide-spread across county. • Water treatment issues can make sharing of physical resources difficult. • Funding, capacity to move forward.

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Social Impact Assessment – Strategy to Sustain Rural Communities					
Assess vulnerability and resilience of water users in non-agricultural, unincorporated areas of Doña Ana County to changes in water availability or cost due to natural factors and use, as well as related programs, projects, and policies.	Doña Ana County	• NMED • Lower Rio Grande Public Water Works Authority • New Mexico Department of Health • University of Texas at El Paso • NMSU	• State • Local • Private	Unknown	• Urbanized areas and agriculture are well represented in water programs and have inherent connections between decision makers and users. This is much less so in unincor-porated areas of the county that don't involve agriculture. • The poorest and most marginalized residents are most likely to be adversely affected by water-related decisions, if the impact on them is not well under-stood in advance.

Table 8-3. Key Collaborative Programs, Projects, and Policies
2017 Lower Rio Grande Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed Management – Regional Value					
Nonpoint Source Pollution Reduction – Strategy for Watershed Management					
Identify nonpoint sources of pollution that affects groundwater and surface water supplies. Develop a water sampling program that identifies and establishes a baseline for problem sources. Develop best management practices to reduce stormwater pollution in the watershed. Inventory all industrial/commercial facilities that require a stormwater discharge permit.	• City of Las Cruces • Elephant Butte Irrigation District • Doña Ana County	• City of Las Cruces • Doña Ana County • Mesilla • NMSU • EBID	• EPA 319 Grants • New Mexico River Restoration Grants		• Finding the funding • Collaboration between entities • In favor of this program is the mandate from EPA that requires this type program under the CWA NPDES MS4 permit.
Enhance Economic Development – Regional Value					
Incentivize Arid Region Business – Strategy to Enhance Economic Development					
Attract, develop, and retain economic activity that has low water demand or can utilize non-potable resources.	• City of Las Cruces • Mesilla Valley Economic Development Alliance	• Border Industrial Association • New Mexico Economic Development Department • NMSU • Doña Ana County • Chambers of Commerce	Local		Potential focus on environmental tourism, foreign trade logistics, space-related businesses, social services, communications, etc.

Table 8-3. Key Collaborative Programs, Projects, and Policies
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Coordinate Border Development with Water Resources – Strategy to Enhance Economic Development					
Assess water availability, treatment requirements, and delivery systems for projected increases in Border economic development. Develop funding and project development stream to address needs.	• Doña Ana County • Camino Real Regional Utility Authority	• Border Industrial Association • New Mexico Economic Development Department • NMSU	• State • Federal		Timing of project development, funding, and implementation is critical for economic growth along the border; this has potential statewide impact if not addressed properly.

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Appendix 2-A

Master Stakeholder List

Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Ahadi	Rasool	Citizen
Aguilar	Krysten	Food Planning and Policy Coordinator, La Semilla Food Center
Alderte	Joel A	NM Farm and Livestock Bureau
Alvarado	Alma	Camino Real Regional Utility Authority, Extra Territorial Planning and Zoning Commission
Alvarez	Yolanda	Board member & Chair, Anthony Water & Sanitation District
Anaya	Gilbert	U.S. International Boundary and Water Commission
Anderson	Kurt	New Mexico Geothermal LLC Doña Ana Mutual Domestic Water Consumers Association (DAMDWCA), and Conservation
Anderson	Phelps	NMISC Commissioner
Anton	Sharon	Las Cruces Community Development
Armijo	Jay	Executive Director, South Central Council of Governments (District 7)
Bachman	Kari	Doña Ana County Place Matters
Banegas	Pat	Village of Hatch
Bardwell	Beth	Conservation, Audubon NM
Barraza	Nora	Mayor, Old Mesilla
Basnyat	Srijana	Long Range Planning, City of Las Cruces
Benavidez	Leticia Duarte	County Commissioner, Doña Ana County
Bennett	Peter	City of Las Cruces Public Works/Project Development
Bixby	Kevin	Conservation, SW Environmental Center
Bleveans	John	
Blough	Kelly	Fort Bliss Public Works and Environmental
Boberg	Kevin	New Mexico State University – Economic Development
Boeing	Weibke	Associate Professor, Aquatic Ecology
Bouchard	Carole	Rincon Water
Boykin	Doug	NM State Forestry
Brown	Christopher	New Mexico State University, Associate Professor, Department Head, Spatial Applications and Research Center Director
Brown	Julia	County Manager, Doña Ana County
Budlong	Pamela	
Burt	John	Vice President, Mesilla Park Heritage Association, Condo Association MPHA
Bustamante	Jesse	Pecan Grower
Calhoun	Sam	Doña Ana SWCD
Canavan	Chris	NMED
Casillas	Albert	Community Development, Doña Ana County
Castaneda	Arnulfo	Mayor, Anthony

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region's stakeholders.

Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Castillo	Jorge	Community Development, Doña Ana County
Castillo	Michael	Hatch
Cervantes	Orlando	Camino Real Regional Utility Authority- Extra Territorial Planning and Zoning Commission
Chavira	Steve	Las Cruces Home Builders Association
Childress	Bill	Las Cruces District Office, District Manager BLM
Chrisley	Katherine	
Clark	Carl	City of Las Cruces
Clements	Erin	Bohannon Huston, Inc.
Colquitt	John	Lake Section Water Company
Cooke	Ron	
Corona	Cindy	Executive Director, Ocotillo Institute
Cowley	David	NMSU aquatic biologist
Cranitch	Kevin	
Crider	David	Southwest Expeditions LLC
Chrisley	Katharine	
Cristiani	David	Doña Ana County
Daviet	Greg	New Mexico Pecan Growers
Deason	Paul	
Delk	Joe	Chairman, Doña Ana Soil and Water Conservation District
Diaz	Marisol Bolivar	Ocotillo Institute for Social Justice
Divyak	Janine	Chief Planner, Community Development, Doña Ana County
Dominguez	Ricardo	Community Development, Sunland Park
Donoven	Sandra	Vista Real MHP
Dugan	Tracy	Valley Mutual Domestic Water Consumer Association
Dugie	Paul	Director, Flood Commission, Doña Ana County
Durr	Corey	BLM
Esslinger	Gary	EBID
Estrada-Lopez	Michele	U.S. Bureau of Reclamation
Fernald	Sam	Interim Director, NM Water Resources Research Institute – NMSU
Fierro	Arianna	Los Indigenes de Nuestra Senora de Guadalupe
Finn	Billy	U.S. International Boundary and Water Commission
Flores	Yvonne-Magdalena	
Formica	Amanda	Ocotillo Institute
Frank	Renee	Realtor
Frey	Jennifer	NMSU, Associated Professor, Ecology and Conservation of Mammals

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Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Fuchs	Erek	EBID
Gaglio	Mike	Hi Desert Native Plants, LLC/La Frontera Land Trust
Gagner	Dael	
Gahr	John	USFWS National Wildlife Refuge, Refuge Manager
Garcia	David	County Commissioner, Doña Ana County
Gariano	Jeff	Moongate Water Co., Inc.
Garrett	Billy	County Commissioner, Doña Ana County
Garza	Robert	City Manager, City of Las Cruces
Giove	Kenneth	CRRUA ETZ
Gomez	Bealquin (Bill)	Representative
Goodman	Dael	MG/CC
Goodman	Peter	
Graf-Webster	Erika	Greater Las Cruces League of Women Voters
Gran	Roberta	
Grider	Mary Esther	Doña Ana County SWCD
Griffith	Marilyn	
Grijalva	Leslie	U.S. International Boundary and Water Commission
Guerrero	Angie	Doña Ana County
Gwynne	John	Flood Commission, Doña Ana County
Guy	Ralph	De La Te MHP
Hamblen	Carrie	Executive Director Green Chamber
Hancock	Wayne	County Commissioner, Doña Ana County
Hanson	Brian	
Harbin	Peter	Extractive Industry
Harkey	Warren	Good Shepherd Community Ditch Association, Treasurer
Harris	Buford	Commissioner of the NMISC, businessman and farmer in Doña Ana County
Harris	Randy	Facilitator at Great Conversations
Hartley	Estela	
Haubold	Glen	NMSU
Hearn	Bob	Camino Real Regional Utility Authority- Extra Territorial Planning and Zoning Commission
Hechler	Rolf	NM State Parks
Hendrickson	MaryAnn	
Henne	Lisa	Elephant Butte Irrigation District
Herndon	Lucas	President, Las Cruces Chapter Green Chamber of Commerce
Horton	Jennifer	Doña Ana MDWCA

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Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Hortert	Daniel	Community Development Director, Doña Ana County
Huestis	Charles	Member Doña Ana County P & Z Commission
Hume	Andy	Downtown Planning and Development Coordinator, City of Las Cruces
Jacobs	Win	Greater Las Cruces League of Women Voters
Keyes, Jr.	Conrad	Paso del Norte Watershed Council
Kidd	Jake	City of Las Cruces
King	Phil	
King	Ronald	Camino Real Regional Utility Authority – Extra Territorial Planning and Zoning Commission
Kirwan	Jan	Superintendent, Bosque State Park
Klett	Catherine Ortega	Water Resources Research Institute
Kryder	Leslie	Las Cruces Utilities
Kurtz	Don	
LaRocque	Lisa	City of Las Cruces Sustainability Program
Laumbach	Toni	NM Farm & Ranch Heritage Museum
Leslie	Donald	Hi Tech Consortium
Levine	Lacy	NM Dept. of Agriculture
Levstino	Ceil	City Councilor, City of Las Cruces
Little	William	Hydrology and Geology – From Zia Engineering and Environmental Consulting.
Lopez	Davin	MVEDA CEO
Lopez	Gabriel	Citizen
Lopez	James	White Sands Missile Range
Lopez	Martin	General Manager, Lower Rio Grande Public Water Works Authority
Lopez	Yvette	NMOSE
Low	Walton	Retired hydrologist, USGS
Lucero	Mary	
Lujan	Debbie	Town of Mesilla.
Madrid	Charles	
Madson	Raymond	Citizen
Maitland	Julie	Division Director, NMDA
Marmolejo	Luis	Community Development, Doña Ana County
Martinez	DJ	Doña Ana SWCD
Matthews	Mike	Captain, NM Department of Game and Fish
McClanahan	Anita	
McMahon	Chuck	Assistant County Manager, Doña Ana County

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region's stakeholders.

Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Meadows	Steve	Community Development, Doña Ana County
Medrano	Miguel	Alameda Acres MHP
Melton	James	
Mesa	Gilbert	Camino Real Regional Utility Authority
Miller	David R.	
Miller	Rochelle	Visitors & Convention Center
Miller	Wayne	Design Consultant
Mitchell	Genevieve	
Miyagishima	Ken	Mayor, City of Las Cruces
Moffatt	Kurt	Doña Ana County Utilities
Montgomery	Eric	MVEDA CEO
Montoya	Jennifer	Planning and Environmental Coordinator, Las Cruces District Office, BLM
Morales	Olga	Rural Development Specialist, RCAC
Murray	Ken	
Nava	Luzma Fabiola	Graduate Institute of International Studies, Laval University, Quebec City, Quebec, Canada
Nelson	John	
Newcomer	Joni	Sustainability Officer, NMSU
Nichols	Karen	Projects Manager, Lower Rio Grande Public Water Works Authority
Nieto	Roberto	Lower Rio Grande Public Water Works Authority
Norwood	Kelly	Environmental Compliance, White Sands Missile Range
Nowell	Lisa	Covered Wagon MHP
Nunez	Mayor Andrew	Village of Hatch
Oliver	Nora	Office Manager, Utilities. Doña Ana County
Ortega-Klett	Cathy	Program Manager, Water Resources Research Institute
Ortiz	Fernando	City of Las Cruces
Owen	Ceci	Doña Ana Soil & Water Conservation District
Padilla	Sue	Camino Real Utility
Paladino	Stephanie	University of Oklahoma
Parker	Dara	Field Representative, Senator Martin Heinrich
Peale	Barbara	NMSU
Pedroza	Olga	Councilor, City of Las Cruces
Perea	Lorenzo	
Perea	Javier	Mayor, Sunland Park
Pettes	Steve	Mesa Development Center
Price	Deirde	

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region's stakeholders.

Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Ratliff	Jesslyn	NM Water Resources Research Institute
Rawson	Benjamin	County Commissioner, Doña Ana County
Ricketts	Craig	NMSU
Rivera	Anita	Dove Canyon LLC
Rivera	Jose	UNM Professor
Roberson	Angela	Doña Ana County
Rogers	Dalene	
Rogers	Denny	President, Joranda Water Co.
Roman	Eleazar	Codes Enforcement, Community Development, Anthony
Ruiz	Carlos	OCCAM Consulting
Russo	Bud	
Sally		
Sanchez	Blane	Program Manager, New Mexico Water Resources Research Institute
Sanchez	Pat	Doña Ana County Manager's Office
Sands	Debra	Food Policy Council/Master Gardeners
Santos	Isabel	Camino Real Regional Utility Authority Board Member
Schmickle	Michael	Vista Del Rey MDWCA
Schoonover	Loren	Anthony Water District
Segura	Jose Luis	
Shannon	Larry	Community Development Coordinator, Town of Old Mesilla
Sharratt	Aaron	La Semilla Food Center
Shoup	Jennifer	Doña Ana SWCD
Small	Nathan	City Councilor, Las Cruces
Soules	David	Sportsmen, Southwest Consolidated Sportsmen
Soules	Merrie Lee	
Smith	Gregory	City Councilor, City of Las Cruces
Sorg	Gil	City Councilor, Las Cruces
Stotz	Nancy	Audubon
Stuart	Christy	West Mesa Water
Tafaneli	Bob	Audubon
Tafoya	Adrian	NRCS
Tawney	Lindsay	Villa del Sol MHP
Terrones	Jose	Executive Director, Anthony Water District
Thacker	Cheryl	New Mexico Office of the State Engineer, D4
Thomas	Sharon	South Central Regional Transit District, Viva Doña Ana
Tillery	Suzanne	

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region's stakeholders.

Lower Rio Grande Region 11 RWP Master Stakeholder List

Updated June 30, 2016

Last	First	Affiliation / Category
Tonander	Karl	Souder Miller Associates
Townsend	Dan	
Trueblood	Claudia	Graduate Student--NMSU
Vargas	Joseph	Doña Ana County – IT
Vasconcellos	Ceci	Recreational Users, Ground Work, Executive Director
Verdecchia	Liz	U.S. International Boundary and Water Commission
Ward	Ryan	NM Department of Agriculture
Weir	David	Director, Community Development, City of Las Cruces
Westmoreland	Brent	CRRUA Board Member
Widmer	Adrienne	Las Cruces Utilities & LRGWD
Wilmeth	Steve	Doña Ana SWCD
Winson	Mark	Assistant City Manager, Chief Administrative Officer, City of Las Cruces
Wright	Bobbie	Lake Section Water
Woods	Ben	SVP External Relations / COS, NMSU
Yturralde	Susan	Camino Real Regional Utility Authority Board Member

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region's stakeholders.

Appendix 2-B

Single Comment Document: Summary of Comments on Technical and Legal Sections

Lower Rio Grande Regional Water Plan 2017
Compilation of Comments on Draft Plan

NO.	Comment Souce	Location (Section/ Page/ Paragraph)	COMMENTS
1	Conrad Keyes	Section 1, 1st Paragraph, 1st sentence	Apparently this is Region 11 and would best be labeled that way.
2	Conrad Keyes	Section 1, 2nd Paragraph, 1st sentence	Region 11 throughout the document. The Lower Rio Grande of New Mexico includes all of the Rio Grande Project.
3	Conrad Keyes	Section 2	The title says "Prepared by the Region" but it was only reviewed by the region
4	Conrad Keyes	Section 3.1, 1st Paragraph, 1st Sentence	Designated as Region 11 (not Lower Riog Grande Water Plannig Region), which doesn't include all of the Lower Rio Grande of NM. This is best described in the next paragraph.
5	Conrad Keyes	Section 3.1, 2nd Paragraph, last Sentence	The region includes a number of areas outside the **NMOSE's** Lower Rio Grande surface water basin that provide water to users in Doña Ana County. (insert NMOSE as shown in bold)
6	Conrad Keyes	Section 3.3, 1st paragraph, 1st sentence	The predominant water supply in the **NMOSE's** Lower Rio Grande… (Insert NMOSE as shown bold)

Lower Rio Grande Regional Water Plan 2017
Compilation of Comments on Draft Plan

NO.	Comment Souce	Location (Section/ Page/ Paragraph)	COMMENTS
7	Conrad Keyes	Section 4.1.1.2	Other regulatory powers of the NMOSE include the use of Saline Waters, including the discharge of such, and the NMISC has regulations of projects dealing with the Atmospheric Waters (weather modification). Underground water Regs: These regulations govern the application process, the hydrologic, technical and financial capability report requirements, and the permit terms and conditions for projects authorized under the Ground Water storage and Recovery Act, NMSA 1978, 72-5A-1 through 72-5A-17 (1999 Supp.). These regulations shall not be construed to limit or otherwise alter the jurisdiction, power, or authority of the state engineer. TITLE 19 NATURAL RESOURCES AND WILDLIFE CHAPTER 17 WEATHER MODIFICATION PART 2 WEATHER CONTROL AND PRECIPITATION ENHANCEMENT 19.17.2.1 ISSUING AGENCY: New Mexico Interstate Stream Commission. [19.17.2.1 NMAC - N, 01-15-2005] 19.17.2.2 SCOPE: This rule governs the licensing and application process for weather control operations, research, and development pursuant to the New Mexico Weather Control Act. [19.17.2.2 NMAC - N, 01-15-2005] 19.17.2.3 STATUTORY AUTHORITY: Section 75-3-1 et seq., NMSA 1978, as amended by House Bill 78, 2003 Legislative Session. [19.17.2.3 NMAC - N, 01-15-2005] 19.17.2.4 DURATION: Permanent. [19.17.2.4 NMAC - N, 01-15-2005]
8	Conrad Keyes	Section 4.1.2.2, last sentence of 3rd paragraph	Typo at the end of the sentence. It should read December 3, 2004 not December 3, 20040.
9	Conrad Keyes	Section 4.1.3, bottom of the page	It might be best to move all of the Federal Conflict Cases to be 4.1.3.1; then proceed. Most of such deals with water allocation and not water quality as the CWA, etc.
10	Conrad Keyes	Section 4.1.3, 2nd paragraph	The *Texas v New Mexico and Colorado* This isn't a "Federal Water Law", it is a conflict as mentioned further in this section.
11	Conrad Keyes	Section 4.1.3, 3rd paragraph	The court case of *State of New Mexico v. U.S. Bureau of Reclamation et al* is a Federal Court Case, not "Federal Water Law" as yet.
12	Conrad Keyes	Section 4.1.3.2	Are you sure it is the deliveries from NM waters to the TX waters of the Compact that the case addresses? If so, that would be waters above Elephant Butte not getting to the reservoir in the correct manner.

Lower Rio Grande Regional Water Plan 2017
Compilation of Comments on Draft Plan

NO.	Comment Souce	Location (Section/ Page/ Paragraph)	COMMENTS
13	Conrad Keyes	Section 4.1.3.4 Second Paragraph	"Currently, the Rio Grande Project is the subject of litigation again between the State of New Mexico and the USBR, as discussed in Section 4.3.1." Project's operating agreement?
14	Conrad Keyes	Section 4.1.3.4	There is nothing here about the USIBWC's ROD on the EIS concerning the Canalization project. One outcome will be the River Management Plan (see www.ibwc.org).
15	Conrad Keyes	Section 4.1.5	Should this section be named "Local Law"? ordinances and/or Codes or plans, instead of laws?
16	Conrad Keyes	Section 4.2.1, 1st sentence	The **U.S.** Endangered Species Act...
17	Conrad Keyes	Section 4.2.2.1	The most significant **U.S.** federal law….which **U.S.** Congress….
18	Conrad Keyes	Section 4.2.2.1.1, last paragraph on the page	This paragraph and the next two paragraphs should be moved to 4.2.2.1. They don't deal with the point source of the NPDES portion of the CWA.
19	Conrad Keyes	Section 4.2.2.1.1, 3rd paragraph on the page	"In the Lower Rio Grande planning region, numerous segments…." a number of, is better than numerous for this region
20	Conrad Keyes	Section 4.2.2.1.3	This section should be one of the first subsections of the CWA - this definition is the most important part of the Act.
21	Conrad Keyes	Section 4.3.1, 1st sentence	indicates that it' should be added, this is someone's opinion; but it might not be the U.S. Supreme Court's outcome.
22	Conrad Keyes	Section 4.3.1, 1st sentence	State of New Mexico v. U.S. Bureau of Reclamation, et al., No. 1:2011-cv-00691-JB-ACT (D.N.M. filed August 8, 2011) involves the 2008 Operating Agreement for the Rio Grande Project as well **as** unauthorized releases under the Rio Grande Compact. (Missing the word as, see insertion in bold)
23	Conrad Keyes	Section 4.3.1, last sentence	This sentence shouldn't be used until the devision of the U.S. Supreme Court is determined.
24	Conrad Keyes	Section 4.3.2, 1st sentence	(see the sections that could affect the local conflicts)
25	Conrad Keyes	Section 4.3.2, second sentence	(put description of the issues here): adjudication, operation agreement, 4.5 AF/acre rule?
26	Conrad Keyes	Section 4.3.3	(see which subsection above?)

Lower Rio Grande Regional Water Plan 2017
Compilation of Comments on Draft Plan

NO.	Comment Souce	Location (Section/ Page/ Paragraph)	COMMENTS
27	Conrad Keyes	Section 5.2 Last sentence on the page	Reference to USBR 2009 not found in listed references
28	Conrad Keyes	Section 5.2 first sentence on the page	What was the flow recorded in 2010, the administrative flow year of this planning document?
29	Conrad Keyes	Section 5.2 third on the page	What was the amount of Rio Grande Project Water during 2010, the administrative water year for this planning document?
30	Conrad Keyes	Section 5.2, bullet on Elephant Butte	What year was the reservoir capacity survey?
31	Conrad Keyes	Section 5.2, bullet on Caballo Reservoir	This was a reservoir capacity survey?
32	Conrad Keyes	Section 5.5.1, second paragraph	The March 2016 Rio Grande Project Operating Agreement Draft EIS has some different results provided in Table 4-6, Summary of the No Action Alternative Compared with the Other Alternatives (Alternative 1 through Alternative 5).
33	Conrad Keyes	Section 5.5.1, second paragraph	This (surface water supply reduction) is not shown in the same Table 4-6 of the Draft EIS in March 2016.
34	Conrad Keyes	Section 5.5.2, 2nd paragraph	"….litigation regarding the Operating Agreement (Section 4.3.1 **and the Draft EIS (March 2016)**), may be necessary…." add the reference in bold
35	Conrad Keyes	Section 5.5.2, 2nd paragraph on page	Why can't the 2014 and 2015 data used for calculation of mimimum annual yield?
36	Kurt Anderson	General	This report is useless to the region.

Appendix 2-C

Public Input
Interviews and Surveys

Public Input – Interviews and Surveys

The Public Engagement committee conducted surveys and interviews of various constituencies in the planning region to gain a better understanding of the public's perspectives.

Given the very short time frame for collecting input the Public Engagement team used two strategies. In some cases a small group of in-person interviews was conducted with key informants. This is the approach taken with members of the agriculture community and with county-wide residents in various colonias.

Surveys were collected at the Las Cruces Saturday Market and via an online SurveyMonkey created by the Green Chamber. These surveys express perspectives of people who live in Las Cruces.

Tally of interviews and surveys

Ocotillo Institute volunteers conducted 8 key informant interviews with colonias residents.

Win Jacobs conducted 10 key informant interviews with farmers, people in agricultural institutions, and academics working in related fields.

63 from the Green Chamber online survey.

123 surveys at the Las Cruces Saturday market.

Evaluation of survey responses

Note: The committee is still processing the Green Chamber online survey responses and this section will be amended according to that input.

Many opinions and perspectives are expressed in the responses received. The Public Engagement committee grouped the responses in three categories: a) policy and regulation, b) public education and outreach, and c) conservation strategies.

Policy and regulation

Urban policy suggestions included increasing use of drip irrigation, grey water reuse, and green infrastructure; decreasing use of high-demand vegetation and chemical applications; and improving water infrastructure for delivery and recovery systems during floods.

Agricultural policy suggestions offered recommendations to revisit access to water rights, moratoriums on drilling wells, limitations on pecan orchard development. It was noted that improving rangeland conditions could also increase recharge.

Many respondents encouraged bold long-term approaches that incorporated mandatory water efficiency for agriculture and industry, drought planning, climate change adaptation, and more equitable water use.

Public education and outreach

Public engagement is valued. People want to feel that they are informed. They want to know what our water situation actually is and they want information to know if New Mexico is in a drought. The commenters believe that the state and local government needs to raise awareness about the status of

these issues and invoke public concern. They want positive reinforcement so that they feel confident that their voice matters and that they can influence the situation. People would like to know how they can help with their individual use through conservation outreach programs and be able to confidently know "how many gallons are acceptable each month." People want to know what the worst scenario for "no action" is, how scarce our water is, how it is allocated and what our resource limitations are. People would like to see an open dialogue that encourages communities to be more involved so that there is a group effort to help everyone understand from farmers, major users and the general public. Some people were even interested in hearing a serious debate or discussion about the issues and how water will be used in the future. The other types of education discussed involve news stories, public presentations, public announcements and forums.

Conservation strategies

Many of the opinions expressed in the surveys fall under the broad theme of water conservation.

- **Technologies**: Respondents want to see more efficient irrigation technologies, both in agricultural and urban settings; educational programs and incentives (rebates, tax credits, etc.) for drip irrigation, graywater, rainwater, and stormwater harvesting; requiring that these practices be built into the infrastructure.
- **Education**: Better education of the community as regards the available water supply, levels of use, comprehensive planning that is "fair" to all water users, and how to implement conservation practices. A number of people want more information available about water supply, demand, and constraints.
- **Price Increases**: Some people called for increasing the price of water to promote conservation, including passing on the "true cost" of water to the end users. They want to see high impact fees for new development.
- **Municipal Systems**: More water reuse such as El Paso has. Evaluation of the water distribution infrastructure and upgrading aging municipal water distribution system. Expanded reuse facilities.
- **Regulatory**: Several people proposed a community-wide planning process, one that is comprehensive and ongoing. They want to see the state legislature make water solutions a higher priority. Calls for stronger penalties for water wasters.
- **Agriculture**: There were several calls to develop policies which would move farmers away from high water-use crops or would move farming out of the area altogether. Alternatively, promotion of agricultural practices that maximize efficiency of water use.

Interviews with colonias residents

Water quality and access to safe water are among concerns expressed by colonias residents.

Policy proposals

- Review and implement regulations regarding wells, commercial and residential.
- Ensure compliance with existing policies and regulations.

Education and outreach proposals:

- Public relations campaigns around conservation are needed.
- Interviews with members of the agricultural community

Interviews with agricultural constituents

The 10 interviewees were chosen to be representative of their respective subsets: Pecan Growers and Farm Bureau, Diversified Croppers; large acreage and smaller, with one fallowed for 10 years. All but two were middle-aged or older, and there were no start-ups. One interviewee is the 2015 National Young Farmer of the Year, named by the Farmers and Ranchers Alliance; he grew up farming with his father and is eager to maintain the sustainability of their operation by implementing sub-surface drip irrigation and continuing rotation of their diversified crops. Three of the interviewees worked in ag-related fields.

Interviewees were unanimous on these points:

- Water supply dominant concern; water quality concern varies with location
- Safe drinking water is essential
- Planning – better late than never – imperative
- Fairness in allocation essential
- Community education and spirit of cooperation (rather than competition and litigious postures) needed, urgently
- Optimistic view of future voiced by all, part fact and part faith
- Concern with 'the big picture' must extend beyond revising the water plan!

Additional insights were gleaned by conversations with a professor of hydrological engineering (ret. NMSU), irrigation district administrators, and a leader of USDA/NRCS at Jornada Experimental Range. In summary:

- Dam and levee maintenance hampered by costs of achieving FEMA-mandated "one-size-fits-all" standards;
- Robust watersheds and arroyo protection essential;
- Establishment of "ag zones' and "urban zones" in Dagwood-sandwich style, as has been done for example in San Marin County California, takes not only planning but civic willingness to purchase land or land easements (for example, municipal purchase of LC Country Club property would have been cheap at the price);
- Given climate and soil, "we can grow most anything;" however, lack of distribution network hampers economic viability;
- Farming, whatever the crop, must maintain economic viability; where supplemental financing is needed, assurance stems from land and water assets as well as operational viability—whether finance comes from banks or mothers-in-law;
- Economic profit picture to satisfy the financiers has driven pecans in, cotton and maybe even chiles down if not out; now based on global not just local factors;

- OSE website has technical data in some abundance, as does EBID which accounts for members' use in great detail, so waiting for consultants to deliver is unnecessary;
- Two imponderables—litigation before SCOTUS and pace of climate change—confront and challenge agriculture and the total community;
- Hopefully, the legal fandangos will result in restoration of the 2008 ` operation agreement in the LRG;
- Hopefully, the 3-legged stool of mitigation, adaptation, and (effective) geo-engineering will enable us to live w/ climate change:
    a) GDP and population are up though emissions are down
    b) Human activity and global carbon currently around 400, needs to get down at least to 350 but trends are up
    c) "our adaptability capacity will define our vulnerability" (Dr. Joel Brown, USDA)
    d) Achievement will cost
    e) It's a matter of public health

VOICES OF AG

Herewith, a summary of interviews conducted April 27-May 4, based on questionnaire developed by the Public Engagement work group of LRG; individual responses passed to Ms. Kryder. In keeping with the work group's consensus, the interviewees were chosen to be representative of their respective subsets: Pecan Growers and Farm Bureau, Diversified Croppers; large acreage and smaller, with one fallowed for 10 years. All but two were middle-aged or older, and came to there were no start-ups. One interviewee is the 2015 National Young Farmer of the Year, named by the Farmers and Ranchers Alliance; he grew up farming with his father and is eager to maintain the sustainability of their operation by implementing sub-surface drip irrigation and continuing rotation of their diversified crops.

Interviewees were unanimous on these points:

Water supply dominant concern; water quality concern varies w/ location

Safe drinking water essential;

Planning – better late than never – imperative;

Fairness in allocation essential;

Community education and spirit of cooperation (rather than competition and litigious postures) needed, urgently;

Optimistic view of future voiced by all, part fact and part faith.

Additional insights were gleaned by conversations with a professor of hydrological engineering (ret. NMSU), irrigation district administrators, and a leader of USDA/NRCS at Jornada Experimental Range. In summary:

Dam and levee maintenance hampered by costs of achieving FEMA-mandated "one-size-fits-all" standards;

Robust watersheds and arroyo protection essential;

Establishment of “ag zones’ and “urban zones” in Dagwood-sandwich style, as has been done for example in San Marin County California, takes not only planning but civic willingness to purchase land or land easements (for example, municipal purchase of LC Country Club property would have been cheap at the price);

Given climate and soil, “we can grow most anything;” however, lack of distribution network hampers economic viability;

Farming, whatever the crop, must maintain economic viability; where supplemental financing is needed, assurance stems from land and water assets as well as operational viability—whether finance comes from banks or mothers-in-law;

Economic profit picture to satisfy the financiers has driven pecans in, cotton and maybe even chiles down if not out; now based on global not just local factors;

OSE website has technical data in some abundance, as does EBID which accounts for members’ use in great detail, so waiting for consultants to deliver is unnecessary;

Two imponderables—litigation before SCOTUS and pace of climate change—confront and challenge agriculture and the total community;

Hopefully, the legal fandangos will result in restoration of the 2008 ` operation agreement in the LRG;

Hopefully, the 3-legged stool of mitigation, adaptation, and (effective) geo-engineering will enable us to live w/ climate change:

a) GDP and population are up though emissions are down
b) Human activity and global carbon currently around 400, needs to get down at least to 350 but trends are up
c) “our adaptability capacity will define our vulnerability” (Dr. Joel Brown, USDA)
d) Achievement will cost

e) It’s a matter of public health

CONCERN WITH ‘THE BIG PICTURE’ MUST EXTEND BEYOND REVISING THE WATER PLAN!

Ocotillo Institute Interviews with Residents of Colonias

These are the responses gathered by a volunteer with Ocotillo Institute during interviews with key informants knowledgeable of the colonias in Dona Ana County. There were 8 interviews conducted in May, 2015.

Zip Codes where located
88007
88047
88048
88072
88072
88072
88072
88081

The original surveys are included below.

Green Chamber Survey

These are the responses gathered via a SurveyMonkey survey that the Green Chamber developed based on survey questions developed by the Public Engagement Committee. The Green Chamber made this survey available to its members and some other members of the public were directed to the site to complete the survey. There were 63 respondents, primarily from the Las Cruces area.

Question 1: In what zipcode is your home located?

88001 Count 4

88005 Count 14

88007 Count 6

88011 Count 14

88012 Count 20

88021 Count 1

88046 Count 3

88072 Count 1

Grand Count 63

Question 2: Thinking about water in the planning region (Dona Ana County), which water resource issue is of most concern to you? (circle one)

Answer Choices –	Responses –
Water supply: the total amount of water available to the region	52.31% 34
Water demand: the different user groups and their efficiency of use	33.85% 22
Water quality: concerns such as salinity, hardness or sediments that don't impact health and safety	4.62% 3
Water access: concerns about inadequate infrastructure (well or delivery systems)	1.54% 1
Safe water: concerns with health issues such as bacteria, nitrates, or pesticides	7.69% 5
Total	65

Question 3: With regard to WATER SUPPLY, how much of a problem do you think this is?

–	Not a Problem –	Maybe a Problem –	Don't Know –	Yes, it is a problem –	It's a significant problem –	Total –	Weighted Average –
–	3.08%	6.15%	1.54%	26.15%	63.08%		
(no label)	2	4	1	17	41	65	4.40

Question 4: With regard to WATER DEMAND, how much of a problem do you think it is?

–	Not a problem –	Maybe a problem –	Don't know –	Yes, it is a problem –	It is a significant problem –	Total –	Weighted Average –
–	3.13%	3.13%	10.94%	32.81%	50.00%		
(no label)	2	2	7	21	32	64	4.23

Question 5: With regard to WATER QUALITY, how much of a problem do you think this is?

–	Not a problem –	Maybe a problem –	Don't know –	It is a problem –	It's a significant problem –	Total –	Weighted Average –
–	17.19%	15.63%	28.13%	34.38%	4.69%		
(no label)	11	10	18	22	3	64	2.94

Question 6: With regard to ACCESS TO WATER, how much of a problem do you think this is?

Not a problem –	Maybe a problem –	Don't know –	It is a problem –	It's a significant problem –	Total –	Weighted Average –
–	12.31%	20.00%	27.69%	32.31%	7.69%	
(no label)	8	13	18	21	5	65	3.03

Question 7: With regard to SAFE WATER, how much of a problem do you think this is?

–	Not a problem –	Maybe a problem –	Don't know –	It is a problem –	It's a significant problem –	Total –	Weighted Average –
–	24.62%	16.92%	35.38%	16.92%	6.15%		
(no label)	16	11	23	11	4	65	2.63

Question 8: With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water), please answer the following questions. What do you think is the cause of this issue? Who is the most affected by this issue? Who

has the power to influence this issue? How would you like to see this issue addressed in the short-term and the long-term? Is there anything currently being done to resolve this issue? have you ever been involved in working to resolve this issue?

Note: The responses were evaluated and assigned to the categories listed below. All responses that touched on a category were tagged with that category. Several categories may have been applied to a single response.

Responses categorized:

What do you think is the cause of this issue?

8 desert climate View all • Edit • Delete		5.77%	3
8 do not know View all • Edit • Delete		1.92%	1
8 drought /climate change View all • Edit • Delete		23.08%	12
8 farmers View all • Edit • Delete		25%	13
8 growth of population View all • Edit • Delete		15.38%	8
8 low cost of water View all • Edit • Delete		3.85%	2
8 misuse of water View all • Edit • Delete		23.08%	12
8 not enough water/demand View all • Edit • Delete		21.15%	11
8 other View all • Edit • Delete		15.38%	8
8 people not caring View all • Edit • Delete		3.85%	2
8 policies View all • Edit • Delete		3.85%	2
8 pollutants View all • Edit • Delete		3.85%	2
8 poor management View all • Edit • Delete		5.77%	3

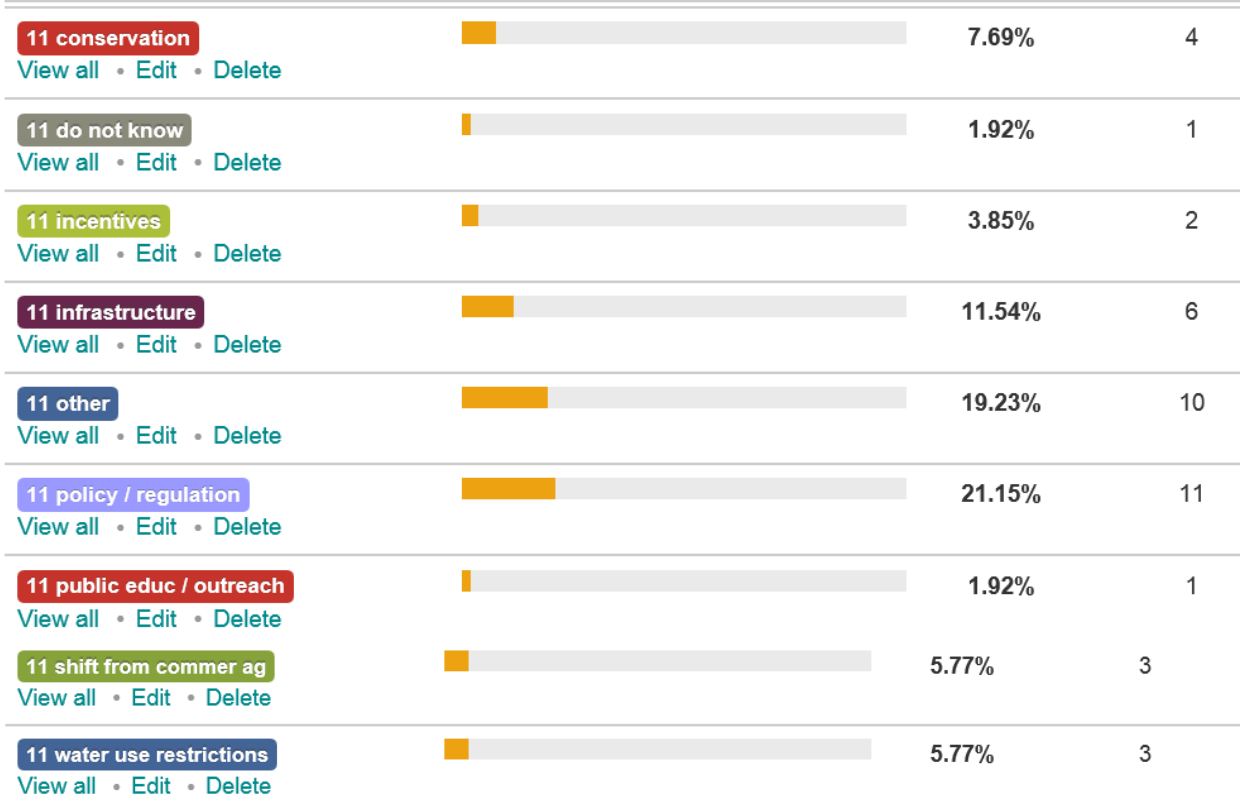
Who is the most affected by this issue?

9 do not know View all • Edit • Delete	1.92%	1
9 everyone View all • Edit • Delete	15.38%	8
9 farmers View all • Edit • Delete	11.54%	6
9 low income people View all • Edit • Delete	1.92%	1
9 public View all • Edit • Delete	5.77%	3

Who has the power to influence this issue?

10 do not know View all • Edit • Delete	1.92%	1
10 everyone View all • Edit • Delete	5.77%	3
10 farmers View all • Edit • Delete	1.92%	1
10 government View all • Edit • Delete	3.85%	2
10 other View all • Edit • Delete	5.77%	3
10 state engineer View all • Edit • Delete	1.92%	1
10 voters / public View all • Edit • Delete	5.77%	3

How would you like to see this issue addressed in the short-term and the long-term?



Is there anything currently being done to resolve this issue?

Have you ever been involved in working to resolve this issue?

Detailed responses to Question 8:

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water), please answer the following questions. What do you think is the cause of this issue? Who is the most affected by this issue? Who has the power to influence this issue? How would you like to see this issue addressed in the short-term and the long-term? Is there anything currently being done to resolve this issue? have you ever been involved in working to resolve this issue?

Response Text	Categories
The origin is excessive population growth. We have to get back to population stabilzation. We need to get Congress out of the way and get media to cover the issue. Very few people are working on this problem - only a few NGOs; Congress and the media are, by and large, actively working against the resolution. I have been a supporter of the few NGOs and I make the point in public talks about the environment.	8 other,8 growth of population, general other,12 yes,13 yes
I am not informed enough to have an opinion regarding resolution, but recent local events show that various interests can influence water distribution through private transactions.	general other
I'm a homeowner, and have no known problems with water. However, obviously the most important issue of all is ALWAYS safe water.	general other
Don't know	general do not know
Las Cruces is ruled by a few businesses, I don't expect fairness	general other
I have no idea.	general do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?

Answer Options	Response Count
	65
answered question	47
skipped question	18
Response Text	**Categories**

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Economic hardship throughout community water associations combined with unrealistic federal demands. This affects 20 about 50 households east of Vado, The water users association is working with State Environment department to attempt change. We would like funds to restore infrastructure. yes. Looking for grants, working with association.	11 infrastructure,9 public,10 other,8 other,12 yes,13 yes
Water is not seen as a valuable commodity - it's cheap and not seen as something precious. An enormous amount of water goes into cattle production, and this is ridiculous. People, too, need to stop wasting -- this is the desert, after all. I am not sure who has the power to influence, honestly. I listen to scientists, but I am not sure a lot of people do. I'd like to see it be more expensive -- like gas, when the price goes up, consumption will drop. Desalination of brackish water under the desert does not strike me as a good idea. Seems like a good way to kill even more of the desert. Like the air, animals, nature...it needs to be seen as valuable. Look at California. Not good.	8 farmers,8 misuse of water,8 desert climate,11 policy / regulation,8 low cost of water,11 other,9 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
All of us are the cause. We are all affected, but the lower class is more affected. We have the power to influence you changing our actions, educating ourselves, and voting. help the issue by raising the cost of water and education (of course, that means people have to be willing to learn, which a great deal of us are not). Resolving the issues are the few of us who speak up, the politicians who listen to their constituents. I am involved with the issue every day!	11 policy / regulation,8 other,11 other,10 voters / public,13 yes,9 low income people
I see so many people and businesses around town wasting water every day, watering in the middle of the afternoon, water flowing onto sidewalks and roads. If people would take more personal responsibility for their immediate surroundings (home & work) we could save so much wasted water.	8 misuse of water
Overuse of irrigation water for high-water-use agriculture such as pecans is squandering water from the aquifer, impacting surface soils and jeopardizing future water resources, and prolonged drought where the Rio Grande is dry for much of the year is shrinking the water table in the valley. All farmers and residents are affected, but the larger tract farmers have most of the political clout. Strict water conservation measures and limited new pecan installations would be a good start.	8 farmers,9 everyone,8 other,11 conservation,11 water use restrictions

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
The origin is excessive population growth. We have to get back to population stabilzation. We need to get Congress out of the way and get media to cover the issue. Very few people are working on this problem - only a few NGOs; Congress and the media are, by and large, actively working against the resolution. I have been a supporter of the few NGOs and I make the point in public talks about the environment.	8 other,8 growth of population,general other,12 yes,13 yes
The cause for demand for water is agriculture and ranching. County residents and the groundwater table are the most affected. Government, water companies, the local agricultural industry and the residents could influence the issue. In the short term, I would like to see more grey water used for irrigation, more permaculture farming, more smart irrigation, then a switch to less water-intensive crops.	8 farmers,11 infrastructure,9 public,10 everyone,11 other,11 shift from commer ag
Am working on the regional water plan. Problem is too little water and too high demand. Farmers are now pumping the ground water b/c there is so little surface water. Some farmers continue to plant pecan trees despite the lack of water. Industries at Santa Teresa need a lot of water. Everyone involved needs to give uup something. More conservation on the part of residents, no more high water need planting by farmers, build a desalination plant in Santa Teresa.	8 farmers,8 not enough water/demand,9 everyone,11 infrastructure,10 everyone,11 conservation,13 yes,11 shift from commer ag

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
I think water is and will be our number one issue. We are facing drought conditions that will probably worsen in the short term and we need to be exacting in our water use and conservancy. Restrictions need to be in place now and we should offer tax credits to those homeowners who change out yards to native foliage and farmers who grow low-water crops	8 drought /climate change,11 policy / regulation,11 conservation,11 water use restrictions,11 incentives
Water demand for farming is being satisfied by pumping. The problem is that since the ground water is not being recharged the water table is dropping. As I understand it the State Engineer is responsible for controlling the use of ground water. I am not sure the local State Engineer office is funded to oversee a program of groundwater pumping limitations. The effect on farming will be significant and a transition to sustainable farming and the use of ground water is important to be planning for now.	8 not enough water/demand,11 policy / regulation,8 other,9 farmers,11 other,11 shift from commer ag,10 state engineer
Carelessness. All users of water. All. The people through elections and publicity. State wide because our water issues are state, national and international issues because of all the compacts for water delivery from the Rio Grande.	9 everyone,8 people not caring,11 other,10 voters / public

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
I think the cause is growing population, both as individual homeowners and pecans. Having attended the City of LC "Lush and Lean" I learned there are other agricultural products we could plant instead of pecans. I think farmers - particularly pecan farmers - are going to have to change their watering methods - maybe going to individual drip? I think manufacturers should offer more faucets with foot controls...that's where I see I waste water. I think water is going to become the new 'gold' that only the wealthy can afford, but I believe it is a human right. I think water is a critical issue.	8 farmers,8 misuse of water,9 everyone,11 policy / regulation,11 other,10 farmers
Drought plus increasing demand. We MUST address this as a long-term issue.	8 drought /climate change,8 not enough water/demand,11 other
Agricultural inefficiency is significant with antiquated irrigation practices	8 farmers
Population growth will continue. Farmers are most affected. Other than conservation (very important) not much is being done and I don't know who can address it.	9 farmers,8 growth of population,12 yes,10 do not know
Maybe we have too many people living in this area for the amount of water that this area gets. I feel the farmers will be most affected by any and all water issues. I am not sure who has any power, and or influence in this area? I would really like to hear some ideas on this matter. I don't think cutting the farms down on water is going to help, we need them, and the more they are pumping out of their wells the lower the water table has gotten in this area. I know of several farms having to drill deeper well because of this issue.	

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Population growth with aquafer decline is a concern. Golf courses using potable water is a concern. Arsenic in City water is a concern.	8 not enough water/demand,8 misuse of water,8 pollutants,8 growth of population
When I see fast food restaurants using water to clean their asphalt; golf courses, sprinklers running water into the streets, toilets running for years (at International Delights, the toilet in the big stall of the Ladies ran continuously for 3 years, really!), it makes me wonky!	8 misuse of water
main cause is drought	8 drought /climate change
New pecan farms and alfalfa fields are horrible wastes of water. More cotton!	8 farmers,8 misuse of water
polluting water systems in the state	8 pollutants
Too much development without concern for future needs.	8 growth of population,8 people not caring
Complex issue: perhaps historical water rights will have to be modified as was the case in Australia.	8 policies,11 policy / regulation
Who decides who gets the resource, we are an agricultural area but does that mean that farmers do not have to be efficient in their use? What about golf courses, homeowners with a lot of grass in their yards?	8 farmers,8 misuse of water
Over development in areas of the valley and pecan farming	8 farmers,8 growth of population
Climate Change, we are all affected, we all have the power to influence, cut carbon emissions, we are not doing enough, yes, I have been involved in resolving climate change	8 drought /climate change,9 everyone
Seems like too many people and areas needing to use all the same water. Worried we will run out! I have no idea how to resolve this issue.	8 not enough water/demand,8 growth of population

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Pecan and chile growers use too much water	8 farmers
We have more and more people using the limited water supply that is available.	8 not enough water/demand,8 growth of population
Too many people. Go home	8 growth of population
This is a desert! Everyone. Everyone. Short-term and long-term are the same: intelligent use of water, recycling of water,	8 desert climate,9 everyone,11 policy / regulation,10 everyone,11 other
Drought caused by global warming. Increased use without increased supply. Possibly fracking.	8 drought /climate change,8 not enough water/demand,8 other
Many factors but primarily drought and farming. Farmers are most directly impacted because of their volume of use and livelihood. The agricultural lobby will be strong, but City Council can control the price of water to users and pass ordinances requiring new building to be low water usage equipped and create rebate programs for residents to turn in high water use toilets for low water ones. Also, provide low cost flow restrictors for faucets etc. Need to require farmers to convert to drip irrigation. Get gov't financial support for this maybe? Short-term better enforcement of water restrictions and fines for abuse after 1 notice. I see water running in the streets all over town, especially from business use. Aside from hydrogeological studies done by the City/County I know of nothing else being done to address the current crisis that will only grow. Do we want to end up like CA???!! Too little, too law. Got to get developers in the game in terms of building and infrastructure. Only involved as a vocal citizen.	8 farmers,8 drought /climate change,11 infrastructure,11 policy / regulation,9 farmers,10 government,11 incentives,12 yes,13 yes

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Cause: Pecan farmers pumping from the aquifer - there is no limit on them and combined with the drought (that will eventually go away) they are taking an unfair share of the water.	8 farmers,8 policies,8 drought /climate change,8 misuse of water
Long term drought will eventually cause problems with supply. We need to be very aware of waste from all users, residential, commercial and government. I am amazed at how much water we waste on landscaping between road lanes.	8 drought /climate change,8 misuse of water,8 poor management
Excessive demand	8 not enough water/demand
We live in a desert and too many demands for too little water. Probably agriculture but residential too.	8 not enough water/demand,8 desert climate,9 everyone
Drought, and water conservation are the cause of water shortage. Farmers are most affected, but everyone is affected. The issue is bigger than city council can handle. The US has 27 percent of the world's freshwater, with only 5% of the population. If we could have water pipelines from the northeastern states that have too much water, that could solve the problem (at a cost)	8 drought /climate change,8 other,9 farmers,11 other
Agriculture must convert to drip irrigation rather than flood irrigation	8 farmers,11 infrastructure,11 policy / regulation
Problem is overuse, inefficient wasteful use and that water is too cheap. I am unaware of any significant efforts to address water issues in the area	8 misuse of water,12 no,8 low cost of water
We have a lot of Calcium deposit when we boil the water plus the hardness means we use more water to do cleansing. If the County could eliminate or, at least, minimize this problem it would be appreciated	10 other,8 other

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Drought conditions;farming/ranching/city dwellers; water planning commission (non-partisan); water conservation; not enough being done; no	8 drought /climate change,9 public,10 other
water supply is challenging during drought, consequently we need to be responsible water users: conservation, restrictions that are enforced, construction regulations with low flow toilets, for example. I see so many sidewalks being watered and wasted water flowing down streets. NMSU is a serious misuser of water. Who is watching?	8 drought /climate change,8 misuse of water,11 policy / regulation,8 poor management,11 conservation,11 water use restrictions
There may not be enough to satisfy agricultural, industrial and residential demands. I think agriculture is the most affected. I think each of these groups must be educated to manage water resources in the most efficient way.	8 not enough water/demand,9 farmers,11 public educ / outreach
I have not been involved in working on this issue nor do I know the cause. I do not believe that most people realize the seriousness of the problem	8 do not know,13 no
Too much water diverted upstream, too much water being pumped by those who can afford deep wells. Small farms, ranches, businesses and residential customers are most negatively impacted. Citizens and their representatives need to influence this issue. Legal action may also be required. I'm not sure what is currently being done to resolve this issue.	8 misuse of water,9 everyone,11 other,8 poor management,10 voters / public,12 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). What do you think is the cause of this issue?	
Water supply issue cause is the drought and demand for more water. All citizens, with farmers being at the top. State government has the power. Move to renewable energy, stop contaminating water in mining and fossil fuel extraction. I don't know of anything other than farmers do not receive surface water. No not ever involved.	8 drought /climate change,8 not enough water/demand,11 infrastructure,11 policy / regulation,9 farmers,13 no,10 government,11 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who is the most affected by this issue?

Answer Options	Response Count
	65
answered question	19
skipped question	46

#	Response Text	Categories
1	Economic hardship throughout community water associations combined with unrealistic federal demands. This affects 20 about 50 households east of Vado, The water users association is working with State Environment department to attempt change. We would like funds to restore infrastructure. yes. Looking for grants, working with association.	11 infrastructure,9 public,10 other,8 other,12 yes,13 yes
2	Water is not seen as a valuable commodity - it's cheap and not seen as something precious. An enormous amount of water goes into cattle production, and this is ridiculous. People, too, need to stop wasting -- this is the desert, after all. I am not sure who has the power to influence, honestly. I listen to scientists, but I am not sure a lot of people do. I'd like to see it be more expensive -- like gas, when the price goes up, consumption will drop. Desalination of brackish water under the desert does not strike me as a good idea. Seems like a good way to kill even more of the desert. Like the air, animals, nature...it needs to be seen as valuable. Look at California. Not good.	8 farmers,8 misuse of water,8 desert climate,11 policy / regulation,8 low cost of water,11 other,9 do not know

	With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who is the most affected by this issue?	
3	All of us are the cause. We are all affected, but the lower class is more affected. We have the power to influence you changing our actions, educating ourselves, and voting. help the issue by raising the cost of water and education (of course, that means people have to be willing to learn, which a great deal of us are not). Resolving the issues are the few of us who speak up, the politicians who listen to their constituents. I am involved with the issue every day!	11 policy / regulation,8 other,11 other,10 voters / public,13 yes,9 low income people
4	Overuse of irrigation water for high-water-use agriculture such as pecans is squandering water from the aquifer, impacting surface soils and jeopardizing future water resources, and prolonged drought where the Rio Grande is dry for much of the year is shrinking the water table in the valley. All farmers and residents are affected, but the larger tract farmers have most of the political clout. Strict water conservation measures and limited new pecan installations would be a good start.	8 farmers,9 everyone,8 other,11 conservation,11 water use restrictions
5	The cause for demand for water is agriculture and ranching. County residents and the groundwater table are the most affected. Government, water companies, the local agricultural industry and the residents could influence the issue. In the short term, I would like to see more grey water used for irrigation, more permaculture farming, more smart irrigation, then a switch to less water-intensive crops.	8 farmers,11 infrastructure,9 public,10 everyone,11 other,11 shift from commer ag
6	Am working on the regional water plan. Problem is too little water and too high demand. Farmers are now pumping the ground water b/c there is so little surface water. Some farmers continue to plant pecan trees despite the lack of water. Industries at Santa Teresa need a lot of water. Everyone involved needs to give uup something. More conservation on the part of residents, no more high water need planting by farmers, build a desalination plant in Santa Teresa.	8 farmers,8 not enough water/demand,9 everyone,11 infrastructure,10 everyone,11 conservation,13 yes,11 shift from commer ag

	With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who is the most affected by this issue?	
7	Water demand for farming is being satisfied by pumping. The problem is that since the ground water is not being recharged the water table is dropping. As I understand it the State Engineer is responsible for controlling the use of ground water. I am not sure the local State Engineer office is funded to oversee a program of groundwater pumping limitations. The effect on farming will be significant and a transition to sustainable farming and the use of ground water is important to be planning for now.	8 not enough water/demand,11 policy / regulation,8 other,9 farmers,11 other,11 shift from commer ag,10 state engineer
8	Carelessness. All users of water. All. The people through elections and publicity. State wide because our water issues are state, national and international issues because of all the compacts for water delivery from the Rio Grande.	9 everyone,8 people not caring,11 other,10 voters / public
9	I think the cause is growing population, both as individual homeowners and pecans. Having attended the City of LC "Lush and Lean" I learned there are other agricultural products we could plant instead of pecans. I think farmers - particularly pecan farmers - are going to have to change their watering methods - maybe going to individual drip? I think manufacturers should offer more faucets with foot controls...that's where I see I waste water. I think water is going to become the new 'gold' that only the wealthy can afford, but I believe it is a human right. I think water is a critical issue.	8 farmers,8 misuse of water,9 everyone,11 policy / regulation,11 other,10 farmers
10	Population growth will continue. Farmers are most affected. Other than conservation (very important) not much is being done and I don't know who can address it.	9 farmers,8 growth of population,12 yes,10 do not know
11	Climate Change, we are all affected, we all have the power to influence, cut carbon emissions, we are not doing enough, yes, I have been involved in resolving climate change	8 drought /climate change,9 everyone
12	This is a desert! Everyone. Everyone. Short-term and long-term are the same: intelligent use of water, recycling of water,	8 desert climate,9 everyone,11 policy / regulation,10 everyone,11 other

	With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who is the most affected by this issue?	
13	Many factors but primarily drought and farming. Farmers are most directly impacted because of their volume of use and livelihood. The agricultural lobby will be strong, but City Council can control the price of water to users and pass ordinances requiring new building to be low water usage equipped and create rebate programs for residents to turn in high water use toilets for low water ones. Also, provide low cost flow restrictors for faucets etc. Need to require farmers to convert to drip irrigation. Get gov't financial support for this maybe? Short-term better enforcement of water restrictions and fines for abuse after 1 notice. I see water running in the streets all over town, especially from business use. Aside from hydrogeological studies done by the City/County I know of nothing else being done to address the current crisis that will only grow. Do we want to end up like CA???!! Too little, too law. Got to get developers in the game in terms of building and infrastructure. Only involved as a vocal citizen.	8 farmers,8 drought /climate change,11 infrastructure,11 policy / regulation,9 farmers,10 government,11 incentives,12 yes,13 yes
14	We live in a desert and too many demands for too little water. Probably agriculture but residential too.	8 not enough water/demand,8 desert climate,9 everyone
15	Drought, and water conservation are the cause of water shortage. Farmers are most affected, but everyone is affected. The issue is bigger than city council can handle. The US has 27 percent of the world's freshwater, with only 5% of the population. If we could have water pipelines from the northeastern states that have too much water, that could solve the problem (at a cost)	8 drought /climate change,8 other,9 farmers,11 other
16	Drought conditions;farming/ranching/city dwellers; water planning commission (non-partisan); water conservation; not enough being done; no	8 drought /climate change,9 public,10 other
17	There may not be enough to satisfy agricultural, industrial and residential demands. I think agriculture is the most affected. I think each of these groups must be educated to manage water resources in the most efficient way.	8 not enough water/demand,9 farmers,11 public educ / outreach
18	Too much water diverted upstream, too much water being pumped by those who can afford deep wells. Small farms, ranches, businesses and residential customers are most negatively impacted. Citizens and their representatives need to influence this issue. Legal action may also be required. I'm not sure what is currently being done to resolve this issue.	8 misuse of water,9 everyone,11 other,8 poor management,10 voters / public,12 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who is the most affected by this issue?

19	Water supply issue cause is the drought and demand for more water. All citizens, with farmers being at the top. State government has the power. Move to renewable energy, stop contaminating water in mining and fossil fuel extraction. I don't know of anything other than farmers do not receive surface water. No not ever involved.	8 drought /climate change,8 not enough water/demand,11 infrastructure,11 policy / regulation,9 farmers,13 no,10 government,11 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who has the power to influence this issue?

Answer Options	Response Count
	65
answered question	14
skipped question	51

#	Response Text	Categories
1	Economic hardship throughout community water associations combined with unrealistic federal demands. This affects 20 about 50 households east of Vado, The water users association is working with State Environment department to attempt change. We would like funds to restore infrastructure. yes. Looking for grants, working with association.	11 infrastructure,9 public,10 other,8 other,12 yes,13 yes
2	All of us are the cause. We are all affected, but the lower class is more affected. We have the power to influence you changing our actions, educating ourselves, and voting. help the issue by raising the cost of water and education (of course, that means people have to be willing to learn, which a great deal of us are not). Resolving the issues are the few of us who speak up, the politicians who listen to their constituents. I am involved with the issue every day!	11 policy / regulation,8 other,11 other,10 voters / public,13 yes,9 low income people

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who has the power to influence this issue?		
3	The cause for demand for water is agriculture and ranching. County residents and the groundwater table are the most affected. Government, water companies, the local agricultural industry and the residents could influence the issue. In the short term, I would like to see more grey water used for irrigation, more permaculture farming, more smart irrigation, then a switch to less water-intensive crops.	8 farmers,11 infrastructure,9 public,10 everyone,11 other,11 shift from commer ag
4	Am working on the regional water plan. Problem is too little water and too high demand. Farmers are now pumping the ground water b/c there is so little surface water. Some farmers continue to plant pecan trees despite the lack of water. Industries at Santa Teresa need a lot of water. Everyone involved needs to give uup something. More conservation on the part of residents, no more high water need planting by farmers, build a desalination plant in Santa Teresa.	8 farmers,8 not enough water/demand,9 everyone,11 infrastructure,10 everyone,11 conservation,13 yes,11 shift from commer ag
5	Water demand for farming is being satisfied by pumping. The problem is that since the ground water is not being recharged the water table is dropping. As I understand it the State Engineer is responsible for controlling the use of ground water. I am not sure the local State Engineer office is funded to oversee a program of groundwater pumping limitations. The effect on farming will be significant and a transition to sustainable farming and the use of ground water is important to be planning for now.	8 not enough water/demand,11 policy / regulation,8 other,9 farmers,11 other,11 shift from commer ag,10 state engineer
6	Carelessness. All users of water. All. The people through elections and publicity. State wide because our water issues are state, national and international issues because of all the compacts for water delivery from the Rio Grande.	9 everyone,8 people not caring,11 other,10 voters / public

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who has the power to influence this issue?		
7	I think the cause is growing population, both as individual homeowners and pecans. Having attended the City of LC "Lush and Lean" I learned there are other agricultural products we could plant instead of pecans. I think farmers - particularly pecan farmers - are going to have to change their watering methods - maybe going to individual drip? I think manufacturers should offer more faucets with foot controls...that's where I see I waste water. I think water is going to become the new 'gold' that only the wealthy can afford, but I believe it is a human right. I think water is a critical issue.	8 farmers,8 misuse of water,9 everyone,11 policy / regulation,11 other,10 farmers
8	Population growth will continue. Farmers are most affected. Other than conservation (very important) not much is being done and I don't know who can address it.	9 farmers,8 growth of population,12 yes,10 do not know
9	This is a desert! Everyone. Everyone. Short-term and long-term are the same: intelligent use of water, recycling of water,	8 desert climate,9 everyone,11 policy / regulation,10 everyone,11 other
10	Many factors but primarily drought and farming. Farmers are most directly impacted because of their volume of use and livelihood. The agricultural lobby will be strong, but City Council can control the price of water to users and pass ordinances requiring new building to be low water usage equipped and create rebate programs for residents to turn in high water use toilets for low water ones. Also, provide low cost flow restrictors for faucets etc. Need to require farmers to convert to drip irrigation. Get gov't financial support for this maybe? Short-term better enforcement of water restrictions and fines for abuse after 1 notice. I see water running in the streets all over town, especially from business use. Aside from hydrogeological studies done by the City/County I know of nothing else being done to address the current crisis that will only grow. Do we want to end up like CA???!! Too little, too law. Got to get developers in the game in terms of building and infrastructure. Only involved as a vocal citizen.	8 farmers,8 drought /climate change,11 infrastructure,11 policy / regulation,9 farmers,10 government,11 incentives,12 yes,13 yes

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Who has the power to influence this issue?

11	We have a lot of Calcium deposit when we boil the water plus the hardness means we use more water to do cleansing. If the County could eliminate or, at least, minimize this problem it would be appreciated	10 other,8 other
12	Drought conditions;farming/ranching/city dwellers; water planning commission (non-partisan); water conservation; not enough being done; no	8 drought /climate change,9 public,10 other
13	Too much water diverted upstream, too much water being pumped by those who can afford deep wells. Small farms, ranches, businesses and residential customers are most negatively impacted. Citizens and their representatives need to influence this issue. Legal action may also be required. I'm not sure what is currently being done to resolve this issue.	8 misuse of water,9 everyone,11 other,8 poor management,10 voters / public,12 do not know
14	Water supply issue cause is the drought and demand for more water. All citizens, with farmers being at the top. State government has the power. Move to renewable energy, stop contaminating water in mining and fossil fuel extraction. I don't know of anything other than farmers do not receive surface water. No not ever involved.	8 drought /climate change,8 not enough water/demand,11 infrastructure,11 policy / regulation,9 farmers,13 no,10 government,11 do not know

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Have you ever been involved in working to resolve this issue?

Answer Options	Response Count
	65
answered question	7
skipped question	58

#	Response Text	Categories
1	Economic hardship throughout community water associations combined with unrealistic federal demands. This affects 20 about 50 households east of Vado, The water users association is working with State Environment department to attempt change. We would like funds to restore infrastructure. yes. Looking for grants, working with association.	11 infrastructure,9 public,10 other,8 other,12 yes,13 yes

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Have you ever been involved in working to resolve this issue?

2	All of us are the cause. We are all affected, but the lower class is more affected. We have the power to influence you changing our actions, educating ourselves, and voting. help the issue by raising the cost of water and education (of course, that means people have to be willing to learn, which a great deal of us are not). Resolving the issues are the few of us who speak up, the politicians who listen to their constituents. I am involved with the issue every day!	11 policy / regulation,8 other,11 other,10 voters / public,13 yes,9 low income people
3	The origin is excessive population growth. We have to get back to population stabilzation. We need to get Congress out of the way and get media to cover the issue. Very few people are working on this problem - only a few NGOs; Congress and the media are, by and large, actively working against the resolution. I have been a supporter of the few NGOs and I make the point in public talks about the environment.	8 other,8 growth of population,general other,12 yes,13 yes
4	Am working on the regional water plan. Problem is too little water and too high demand. Farmers are now pumping the ground water b/c there is so little surface water. Some farmers continue to plant pecan trees despite the lack of water. Industries at Santa Teresa need a lot of water. Everyone involved needs to give uup something. More conservation on the part of residents, no more high water need planting by farmers, build a desalination plant in Santa Teresa.	8 farmers,8 not enough water/demand,9 everyone,11 infrastructure,10 everyone,11 conservation,13 yes,11 shift from commer ag
5	Many factors but primarily drought and farming. Farmers are most directly impacted because of their volume of use and livelihood. The agricultural lobby will be strong, but City Council can control the price of water to users and pass ordinances requiring new building to be low water usage equipped and create rebate programs for residents to turn in high water use toilets for low water ones. Also, provide low cost flow restrictors for faucets etc. Need to require farmers to convert to drip irrigation. Get gov't financial support for this maybe? Short-term better enforcement of water restrictions and fines for abuse after 1 notice. I see water running in the streets all over town, especially from business use. Aside from hydrogeological studies done by the City/County I know of nothing else being done to address the current crisis that will only grow. Do we want to end up like CA???!! Too little, too law. Got to get developers in the game in terms of building and infrastructure. Only involved as a vocal citizen.	8 farmers,8 drought /climate change,11 infrastructure,11 policy / regulation,9 farmers,10 government,11 incentives,12 yes,13 yes

With regard to the water resource issued you said in question 2 is the most concerning (water supply, water demand, water quality, water access, safe water). Have you ever been involved in working to resolve this issue?		
6	I have not been involved in working on this issue nor do I know the cause. I do not believe that most people realize the seriousness of the problem	8 do not know,13 no
7	Water supply issue cause is the drought and demand for more water. All citizens, with farmers being at the top. State government has the power. Move to renewable energy, stop contaminating water in mining and fossil fuel extraction. I don't know of anything other than farmers do not receive surface water. No not ever involved.	8 drought /climate change,8 not enough water/demand,11 infrastructure,11 policy / regulation,9 farmers,13 no,10 government,11 do not know

Question 9: How confident are you that this issue will be resolved?

_	not confident	optimistic	don't know	a little confident	very confident	Total	Weighted Average
(no label)	55.56% 35	12.70% 8	19.05% 12	11.11% 7	1.59% 1	63	1.90

Question 10: If you would like more information on this subject or to be informed about future discussions regarding our water issues, please provide your name, phone number, and contact email. Your information will be used only for these purposes and will not be sold or given to other groups without your permission. Thank you for your time.

1. Lorenzo Perea, lperea@solarsmartliving.com
2. Roberta Gran; 575-650-8490; robertagran@q.com
3. Kevin Cranitch, 575-644-1841, kcranitch@gmail.com
4. roncooke99@hotmail.com
5. Ken Murray kjm03usafresret@gmail.com
6. Dalene Rogers dawoman50@gmail.com
7. Marilyn Griffith, 575-642-7875, MarilynG007@gmail.com
8. Pamela Budlong, 575-526-9121, pklmb@yahoo.com
9. Sorry, I do not trust providing infomaton even though you are well meaning. Just look at the hacking of White House email system. So, why not just proved periodic reporting of the issues to the Sun News and Bulletin?
10. John L Nelson, 575-644-5431, nelson505@earthlink.net
11. drshelley@shelleyeyecenter.com
12. katharinechrisley@yahoo.com
13. Mary Lucero, 575-233-1004, malucero64@gmail.com
14. Sharon Thomas 575 644 2517 skthomas_10@msn.com
15. Deirdre Price - faith88012@gmail.com
16. anita mcclanahan, 575-521-1548, grlriot@yahoo.com
17. Sally, williasl@msn.com
18. Renee Frank, Renee@ReneeFrank.com, 575-496-7727

PAGE 1

Q1 Export

What is your zip code

Answered: 122 Skipped: 1

Responses (122) | Text Analysis | My Categories (9)

+ New Category | Search responses

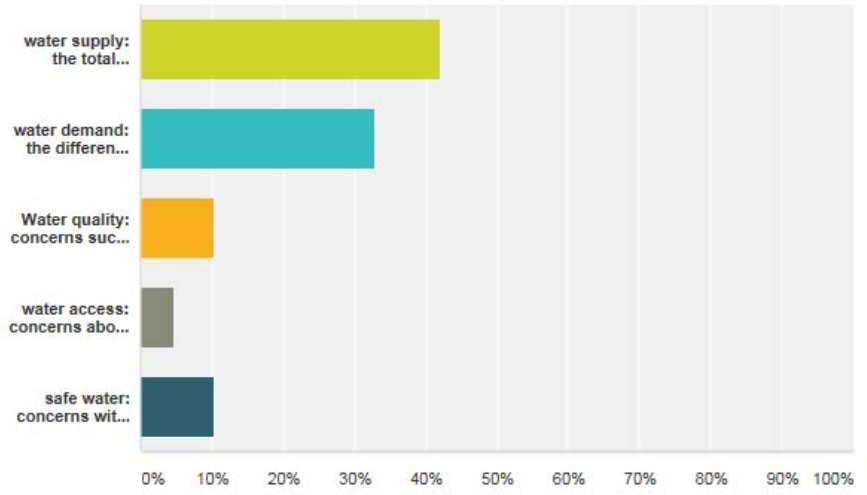
Showing 9 custom categories

88001 View all • Edit • Delete	18.03%	22
88004 View all • Edit • Delete	1.64%	2
88005 View all • Edit • Delete	27.05%	33
88007 View all • Edit • Delete	10.66%	13
88011 View all • Edit • Delete	23.77%	29
88012 View all • Edit • Delete	8.20%	10
88030 View all • Edit • Delete	0.82%	1
88044-88052 View all • Edit • Delete	9.02%	11
88310 View all • Edit • Delete	0.82%	1
Uncategorized View all	0%	0

Q2 Customize Export

Thinking about water in the planning region (Dona Ana County), which water issue is of most concern to you?

Answered: 107 Skipped: 16

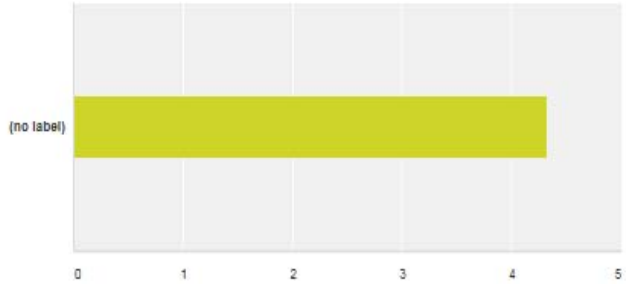


Answer Choices	Responses	
water supply: the total amount of water available in the region	42.06%	45
water demand: the different user groups and their efficiency of use	32.71%	35
Water quality: concerns such as salinity, hardness or sediments that don't impact health and safety	10.28%	11
water access: concerns about inadequate infrastructure (well or delivery systems)	4.67%	5
safe water: concerns with health issues suchas bacteria, nitrates, or pesticides	10.28%	11
Total		107

Q3 Customize Export

With regard to WATER SUPPLY, how much of a problem is this?

Answered: 122 Skipped: 1



	not a problem	(no label)	(no label)	(no label)	significant problem	Total	Weighted Average
(no label)	2.46% 3	1.64% 2	10.66% 13	31.15% 38	54.10% 66	122	4.33

Q4 Customize Export

With regard to WATER DEMAND, how much of a problem is this?

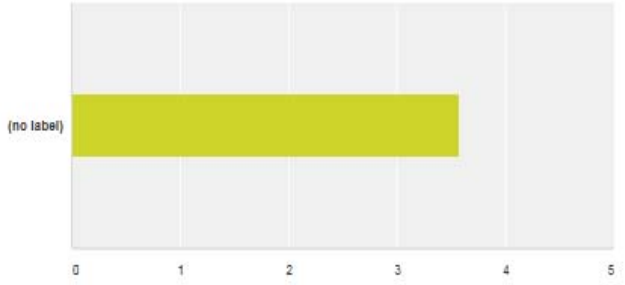
Answered: 121 Skipped: 2

	not a problem	(no label)	(no label)	(no label)	significant problem	Total	Weighted Average
(no label)	1.65% 2	2.48% 3	10.74% 13	27.27% 33	57.85% 70	121	4.37

Q5 Customize Export

With regard to WATER QUALITY, how much of a problem is this?

Answered: 115 Skipped: 4

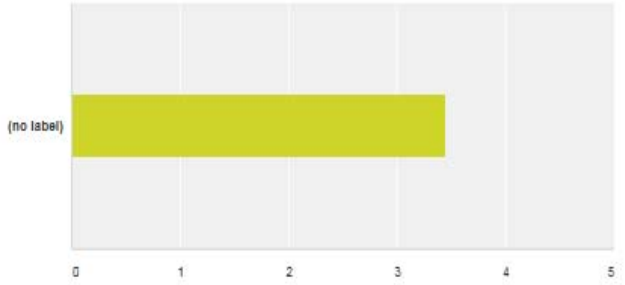


	not a problem	(no label)	(no label)	(no label)	significant problem	Total	Weighted Average
(no label)	5.04% 6	13.45% 16	31.09% 37	20.17% 24	30.25% 36	119	3.57

Q6 Customize Export

With regard to ACCESS TO WATER, how much of a problem is this?

Answered: 122 Skipped: 1

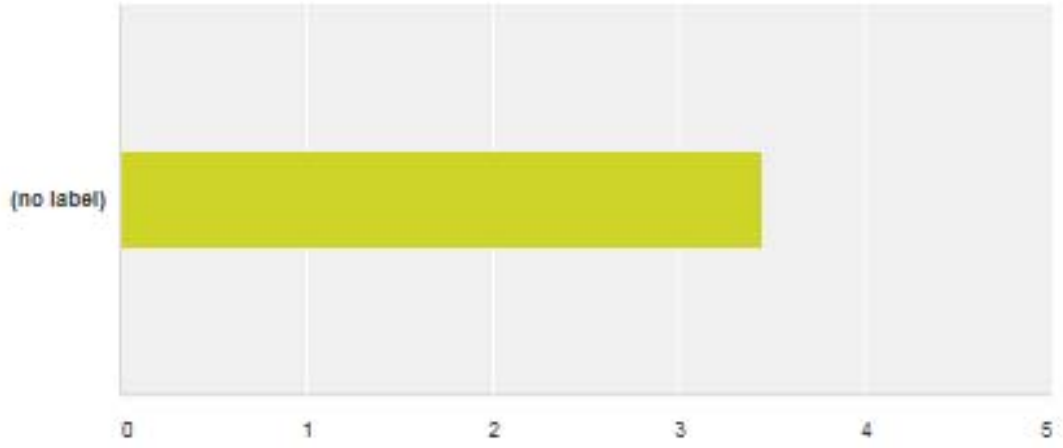


	not a problem	(no label)	(no label)	(no label)	significant problem	Total	Weighted Average
(no label)	8.20% 10	15.57% 19	24.59% 30	27.05% 33	24.59% 30	122	3.44

Q7 Customize Export

With regard to SAFE WATER, how much of a problem is this?

Answered: 118 Skipped: 5



	not a problem	(no label)	(no label)	(no label)	significant problem	Total	Weighted Average
(no label)	5.93% 7	17.80% 21	29.66% 35	18.64% 22	27.97% 33	118	3.45

PAGE 2: With regard to the water resource issue you said in question 2 is the most concerning ...

Q8 Export

What do you think is the cause of this issue?

Answered: 119 Skipped: 4

Responses (119) | Text Analysis | My Categories (15)

+ New Category | Search responses

Showing 15 custom categories

climate change (View all · Edit · Delete)	11.76%	14
desert climate (View all · Edit · Delete)	11.76%	14
do not know (View all · Edit · Delete)	1.68%	2
farmers (View all · Edit · Delete)	22.69%	27
growth of population (View all · Edit · Delete)	11.76%	14
infrastructure related (View all · Edit · Delete)	5.88%	7
lack of education (View all · Edit · Delete)	5.04%	6
low cost of water (View all · Edit · Delete)	1.68%	2
misuse of water (View all · Edit · Delete)	40.34%	48
not enough water (View all · Edit · Delete)	24.37%	29
Other (View all · Edit · Delete)	10.92%	13
people not caring (View all · Edit · Delete)	9.24%	11
policies (View all · Edit · Delete)	16.81%	20
pollutants (View all · Edit · Delete)	7.56%	9
poor management (View all · Edit · Delete)	15.97%	19
Uncategorized (View all)	0%	0

Q9 Export

Who is most affected by this issue?

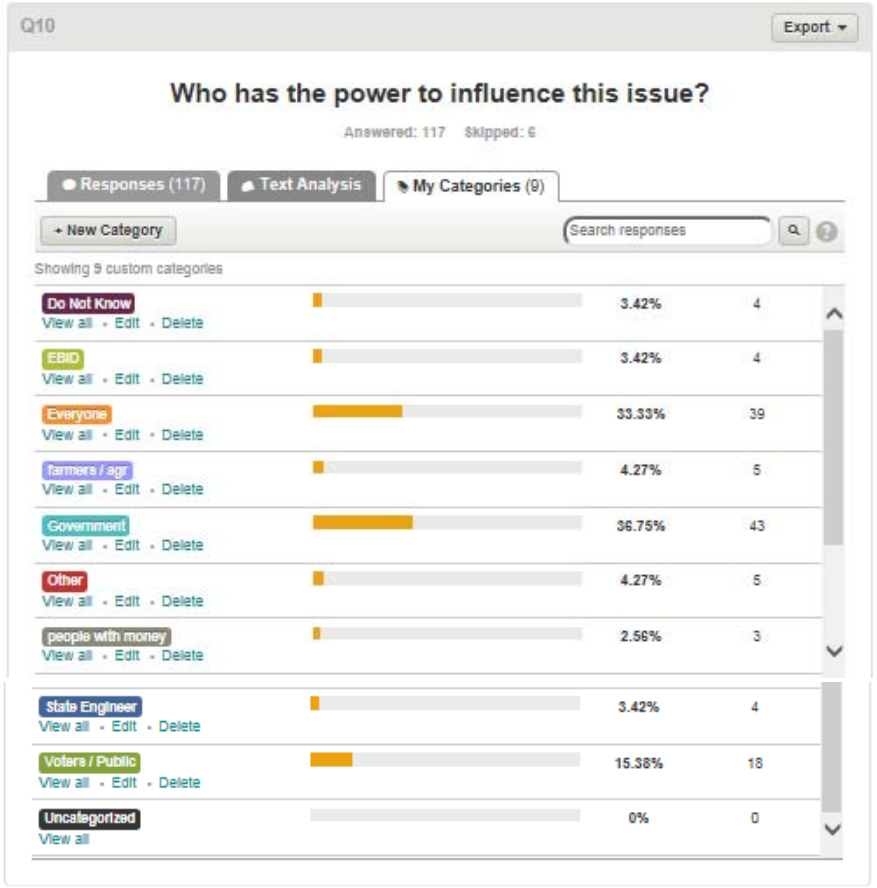
Answered: 116 Skipped: 7

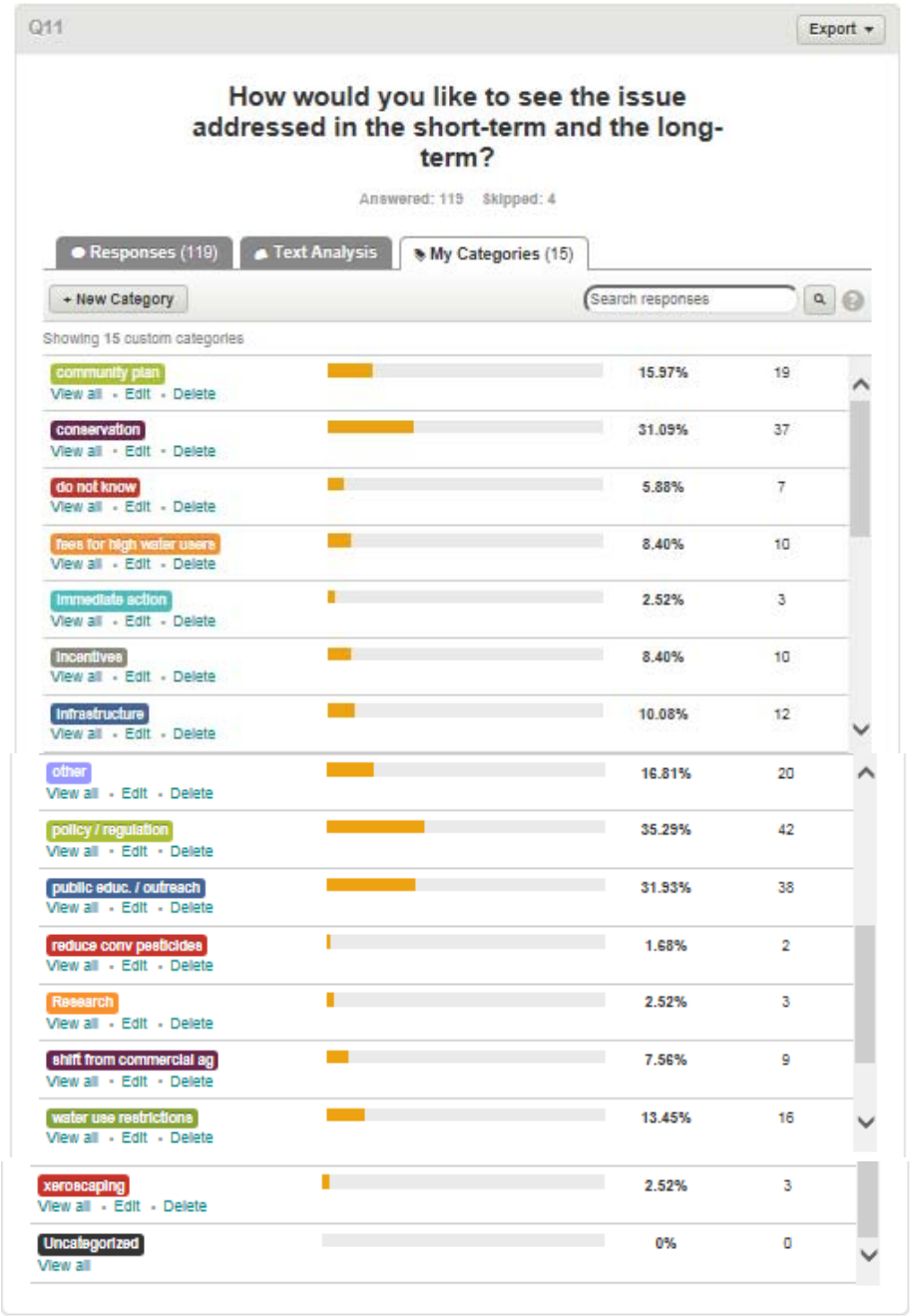
Responses (116) | Text Analysis | My Categories (7)

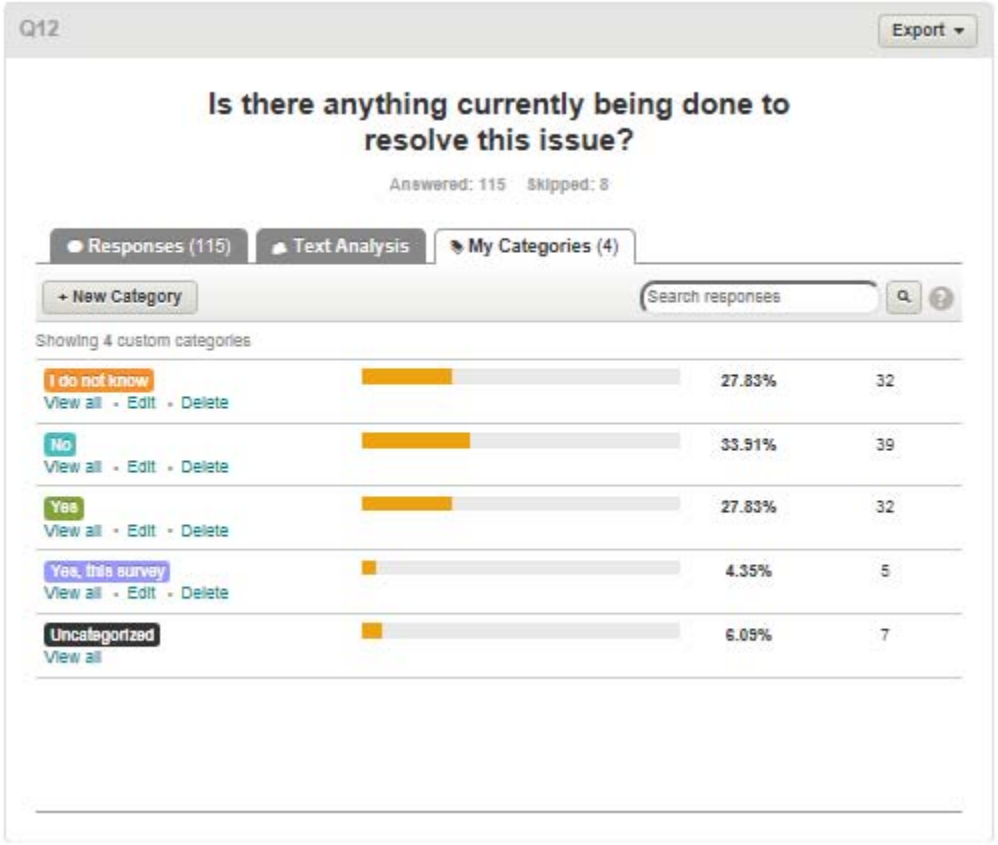
+ New Category | Search responses

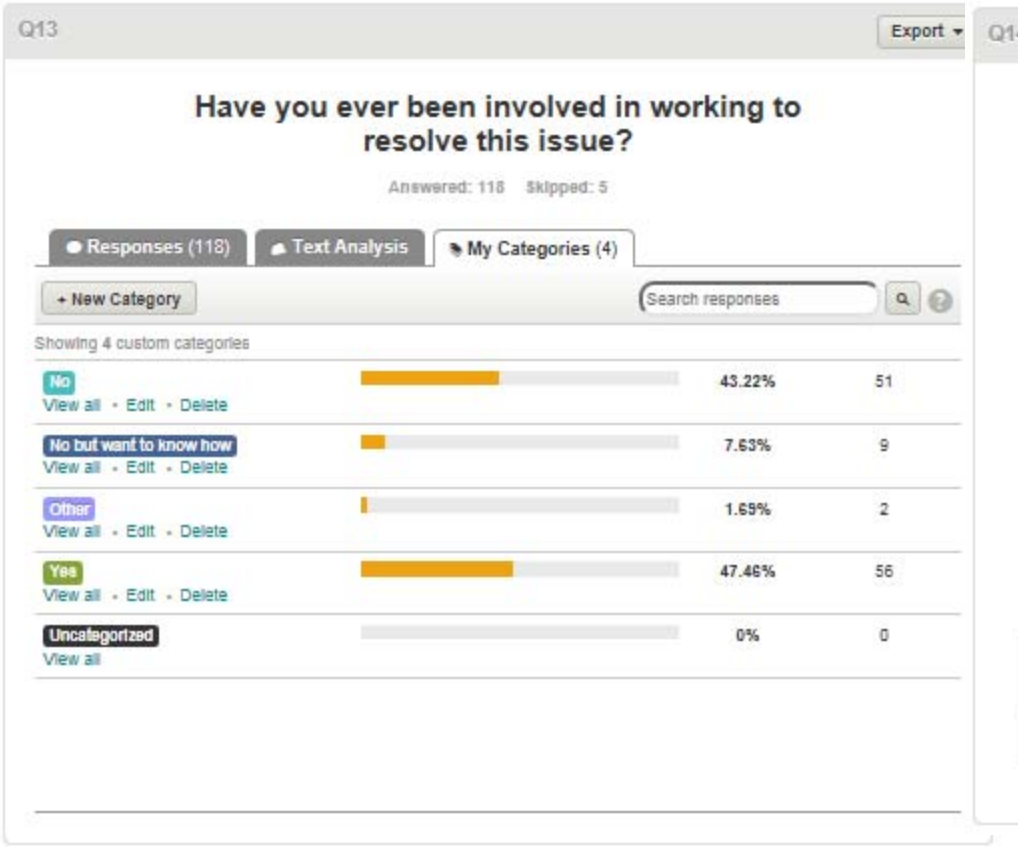
Showing 7 custom categories

Everyone (View all · Edit · Delete)	49.14%	57
Farmers (View all · Edit · Delete)	22.41%	26
Low Income People (View all · Edit · Delete)	4.31%	5
Nature (View all · Edit · Delete)	5.17%	6
Other (View all · Edit · Delete)	4.31%	5
Public (View all · Edit · Delete)	11.21%	13
youth (View all · Edit · Delete)	6.03%	7


Q10
Export
Who has the power to influence this issue?
Answered: 117 Skipped: 6
Responses (117)
Text Analysis
My Categories (9)
+ New Category
Search responses
Showing 9 custom categories
Do Not Know 3.42% 4
View all • Edit • Delete
EBID 3.42% 4
View all • Edit • Delete
Everyone 33.33% 39
View all • Edit • Delete
farmers / agr 4.27% 5
View all • Edit • Delete
Government 36.75% 43
View all • Edit • Delete
Other 4.27% 5
View all • Edit • Delete
people with money 2.56% 3
View all • Edit • Delete
State Engineer 3.42% 4
View all • Edit • Delete
Voters / Public 15.38% 18
View all • Edit • Delete
Uncategorized 0% 0
View all


Q11
Export
How would you like to see the issue addressed in the short-term and the long-term?
Answered: 119 Skipped: 4
Responses (119)
Text Analysis
My Categories (15)
+ New Category
Search responses
Showing 15 custom categories
community plan 15.97% 19
View all • Edit • Delete
conservation 31.09% 37
View all • Edit • Delete
do not know 5.88% 7
View all • Edit • Delete
fees for high water users 8.40% 10
View all • Edit • Delete
immediate action 2.52% 3
View all • Edit • Delete
incentives 8.40% 10
View all • Edit • Delete
infrastructure 10.08% 12
View all • Edit • Delete
other 16.81% 20
View all • Edit • Delete
policy / regulation 35.29% 42
View all • Edit • Delete
public educ. / outreach 31.93% 38
View all • Edit • Delete
reduce conv pesticides 1.68% 2
View all • Edit • Delete
Research 2.52% 3
View all • Edit • Delete
shift from commercial ag 7.56% 9
View all • Edit • Delete
water use restrictions 13.45% 16
View all • Edit • Delete
xeroscaping 2.52% 3
View all • Edit • Delete
Uncategorized 0% 0
View all


Q12
Export
Is there anything currently being done to resolve this issue?
Answered: 115 Skipped: 8
Responses (115)
Text Analysis
My Categories (4)
+ New Category
Search responses
Showing 4 custom categories
I do not know
View all · Edit · Delete
27.83%
32
No
View all · Edit · Delete
33.91%
39
Yes
View all · Edit · Delete
27.83%
32
Yes, this survey
View all · Edit · Delete
4.35%
5
Uncategorized
View all
6.05%
7


Q13
Export
Have you ever been involved in working to resolve this issue?
Answered: 118 Skipped: 5
Responses (118)
Text Analysis
My Categories (4)
+ New Category
Search responses
Showing 4 custom categories
No
View all • Edit • Delete
43.22%
51
No but want to know how
View all • Edit • Delete
7.63%
9
Other
View all • Edit • Delete
1.69%
2
Yes
View all • Edit • Delete
47.46%
56
Uncategorized
View all
0%
0


Q14
Customize
Export
How confident are you that this issue will be resolved?
Answered: 121 Skipped: 2
(no label)
0
1
2
3
4
5
not confident
(no label)
(no label)
(no label)
very confident
Total
Weighted Average
(no label)
26.45%
32
31.40%
38
28.10%
34
9.92%
12
4.13%
5
121
2.34

Appendix 6-A

Environmental Water Demand Statement

Environmental Water Demand Statement

For Inclusion in Lower Rio Grande Regional Water Plan

Prepared by the Environmental Working Group

May 2015

We recognize that "the environment" is a legitimate user of water in our region. Water is needed to keep the Rio Grande flowing, to support fish and wildlife, to sustain wetlands and bosques, and to provide for fishing and boating, to name just a few environmental water uses.

Although no water rights are currently administered explicitly on behalf of the environment, the environment is certainly using water allocated for other purposes. The Rio Grande flows, for example, when irrigation releases occur from Caballo Reservoir. An estimated 25,000 to 90,000 acre-feet per year are consumed by riparian vegetation along the river between Caballo and the state line.[1]

The current situation, however, in which water is only incidentally allocated to the environment is less than ideal. The environment clearly is not getting the water it needs, as evidenced by the dewatering of the river in the non-irrigation season, the disappearance of two-thirds of the original complement of native fish from this reach of the Rio Grande, and the dessication of the floodplain due to the elimination of spring/summer floods and falling groundwater levels.

The current Lower Rio Grande regional water plan does not contain current or projected demand figures for water use by the environment. Authors of the current plan acknowledged this deficiency and recommended that it be remedied in future plan updates. They wrote:

Currently, there is no accurate way to determine a demand value for the environment. This is an important consideration for planning within the region and studies are currently being conducted to assess the amount of water that is used for the environment and how much will be needed in the future.[2]

We are not aware of any comprehensive studies that have been done to assess total environmental demand. Consequently, we have attempted to develop a preliminary environmental water demand figure to include in this plan, recognizing that more research is needed to refine our estimate of how much water the environment needs.

We have defined "the environment" to be a healthy Rio Grande ecosystem that functions much as it did prior to the construction of dams, channelization, and extensive human alteration of its watershed, albeit at a reduced scale. We defined "environmental water demand" to be the amount of water needed to restore and maintain the Rio Grande in this condition.

We adopted the vision statement previously developed by the Alliance for the Rio Grande Heritage:

> *We envision a Rio Grande that sustainably supports both the ecology and the biota of the river, and the needs of the human inhabitants of the region. To sustain the Rio*

[1] The New Mexico Lower Rio Grande Regional Water Plan, August, 2004, p. 7-166.
[2] Ibid. p. 7-166

Grande ecosystem and its native aquatic and riparian biodiversity, we need to promote flows that more closely resemble the historic hydrograph; re-establish the geomorphic processes and other characteristics that maintain the river's channel, floodplain and riparian corridor; control invasive species; and encourage land use and water resource management that promote and maintain such a system.[3]

We identified and attempted to quantify all of the various components of environmental water demand. Drawing upon the limited sources of information that exist, in combination with our informed judgement, we developed an estimated quantity for each demand component for inclusion in the plan until better data are available.

It should be noted that, except for evapotranspiration by floodplain vegetation and evaporation off open water, environmental water is not necessarily lost to the system and is potentially available for other users.

1. Year-round base flows. This is the amount of water that needs to be released annually from Caballo to maintain instream flows in the non-irrigation season. The primary purpose of these releases would be to keep fish and other aquatic organisms alive in the river, and to provide year-round opportunities for water-based recreation.

Given the current lack of aquatic habitat diversity in the river, simply running water down the existing channel will do little to benefit aquatic organisms. The amount of water needed to support aquatic life in the non-irrigation season could be substantially reduced by undertaking projects to increase aquatic habitat diversity, such as creating backwaters and side channels.

The amount of water needed to keep the river flowing in the non-irrigation season is dependent upon groundwater levels. In years of less than full allocation of Rio Grande Project water, farmers pump more groundwater to compensate for the lack of surface water, and groundwater levels drop. Consequently, a greater portion of water released into the river from Caballo Reservoir will soak into the ground to replenish the shallow aquifer, necessitating greater releases to provide base flows through the entire reach.

The amount of water needed for base flows is also complicated by the fact that the duration of the irrigation season depends upon the amount of Rio Grande Project water available in any given year. In a full allocation year, irrigation releases from Caballo Reservoir to the river occur from March into October, leaving four months in which irrigation releases do not occur. In water short years, however, the length of the irrigation season may be drastically reduced. For the purposes of calculating environmental demand, a full Project allocation and a four month non-irrigation season are assumed.

Current base flows in the river below Caballo Dam in the nonirrigation season result from seepage from the dam, groundwater accretion and treated municipal wastewater discharged to the river. Current base flows range (50% exceedance) from 20 cfs at Percha Dam to 100 cfs at the Montoya Drain.[4]

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[3] *Hope for A Living River: A Framework for a Restoration Vision for the Rio Grande, Alliance for the Rio Grande Heritage (2003) at p. v*, retrievable at http://www.fws.gov/bhg/

[4] CH2MHill, March, 2000. Biological Resources Technical Report, Volume 1. El Paso-Las Cruces Regional Sustainable Water Project, Figure 10-4.3

A modest increase in current base flows in tandem with aquatic habitat development would provide significant ecological benefits. Current flows could be increased by 55 cfs through the entire reach during the non-irrigation season by releasing 200 cfs at Caballo Dam, which amounts to 47,000 acre-feet released over four months.[5]

This should be considered a minimum volume. Releases to support boating would be larger, since the ideal flow rate for such activities is 2500 cfs or higher.

2. Peak flows. This is the amount of water needed to be released to mimic peak flows following snowmelt in the late spring and early summer. Such flows are important for flooding the river's banks, maintaining hydrologic connection between the river and its floodplain, recharging the shallow aquifer, regenerating and sustaining floodplain plant communities, providing spawning cues to native fish, reconnecting isolated aquatic floodplain habitats with the river, promoting nutrient cycling, and transporting sediment.

The U. S. Army Corps of Engineers estimates that a peak release of 9500 acre-feet would be needed every 3-5 years (for an annual average of 1900 to 3200 acre-feet) to inundate selected restoration sites within the Canalization Project, if timed to occur on top of normal irrigation releases.[6] This should be considered the minimum amount needed for peak flows, since the total area inundated would be less than 550 acres out of 9000 total acres within the CP.

3. Riparian evapotranspiration and open water evaporation from floodplain features. This includes the amount of water consumed by floodplain plant communities, through sequestration by plant tissues and evapotranspiration. The first is relatively insignificant compared to the latter and can be ignored. It also includes the amount of water evaporated from ponds, sloughs and other bodies of open water that provide important habitat for many species of fish and wildlife.

The current plan estimates that evapotranspiration from riparian vegetation between Caballo and the state line is 25,000-90,000 acre-feet in a full supply year.[7] Much of the floodplain between the levees is mowed annually by the International Boundary and Water Commission—U.S. Section, suppressing the establishment of mature woody vegetation. In addition, existing riparian plant communities are less diverse than they were historically, consisting predominantly of saltgrass and nonnative tamarisk.

One method to calculate consumptive use by floodplain vegetation is to estimate the proportion of various types of plant communities historically, calculate how much acreage each would cover if restored to roughly those same proportions within USIBWC's Canalization Project, and add up the consumptive use for each type of plant community within the entire Canalization Project.

[5] Draft Environmental Impact Statement, El Paso-Las Cruces Regional Sustainable Water Project, April 2000, Table 3.3-3

[6] Conceptual Restoration Plan and Cumulative Effects Analysis, Rio Grande—Caballo Dam to American Dam, New Mexico and Texas. Prepared for United States Section International Boundary and Water Commission (USIBWC), by U.S. Army Corps of Engineers, Albuquerque District, 2009.

[7] The New Mexico Lower Rio Grande Regional Water Plan, 2004, p. 7-166.

Stotz analyzed cadastral survey reports and other sources to determine the proportions of floodplain plant communities historically associated with the Rio Grande in southern New Mexico.[8] Survey reports suggested the following distribution for the Mesilla Valley in 1857:

- Cottonwood timber—34.6 %
- No timber (includes areas dominated by mesquite or other shrubby growth, as well as areas with little or only low vegetation)—25.9%
- Cultivated land—23.8%
- River channel—9.1% (probably a slight overestimation, according to Stotz)
- Willow thicket—4.2%
- Pond, slough, marsh—1.9% (probably a slight underestimation, according to Stotz)
- Dry river channels—0.6%

The total acreage within the Canalization Project--including the levees but excluding the river channel--is approximately 9000 acres.[9] Assuming the levees comprise 10 percent of that acreage, the remaining area is 8100 acres. If we take out the cultivated area and river channel categories from the survey reports (since neither occur today on the floodway between the levees and river channel), and redistribute their acreage to the other categories evenly, and break out a meadow community type equal to half of the "no timber" category, we get a relative distribution of plant communities as indicated in the following table.

Applying ET rates[10] for each plant community type, it is possible to calculate a rough estimate of riparian ET demand. (The pan evaporation rate at NMSU was applied to the open water features.) Using this admittedly crude method, we estimate that floodplain plant communities and open water features would consume about 26,000 acre-feet of water per year. This is in line with the low-end of the estimated range of ET consumption in the current regional water plan. Further analysis is needed.

	Survey %	Adjusted %	Acreage in CP	ET Rate (ft/yr)	ET (af/yr)
Cottonwood timber	35%	42%	3114	4.8	14947
Shrub	13%	21%	1170	3.4	3978
Cultivated land	24%		2142		
River Channel	6%		540		
Willow thicket	4%	12%	378	4.9	1852
Pond, slough, marsh	4%	12%	360	7.8	2808
Dry river channels	1%		54		
Meadow	13%	21%	1170	2.4	2808
Total	100%		9000		26393

[8] Stotz, Nancy. Historic Reconstruction of the Ecology of the Rio Grande/Rio Bravo Channel and Floodplain in the Chihuahuan Desert. Report prepared for the Chihuahuan Desert Program, World Wildlife Fund, 2000.

[9] Elizabeth Verdecchia, USIBWC, personal communication, 2015.

[10] Using rates from USCOE, 2009, op. cit.

4. Groundwater recharge to support floodplain ecological communities. Riparian and wetland communities are dependent upon shallow groundwater. This demand component would be partially met by restoring peak flows. Modeling of surface water/groundwater interactions is required to quantify this aspect of environmental water demand.

5. Habitat needs of various native fish guilds. Most native fish species require areas of slow to moderate velocities for nursery and spawning habitat. These areas are largely lacking in the Rio Grande currently, as flows in the river are alternately too low (or nonexistent) during the non-irrigation months), or too fast during the irrigation season.[11] Further analysis is needed to determine the optimal combination of environmental flows and habitat restoration to sustain native fish.

6. Other ecological needs: mammals, herps, invertebrates, birds, etc.

In summary, we estimate environmental water demand in our region to be a minimum of about 75,000 acre-feet annually, as indicated in the following table.

Demand Component	Quantity (af/yr)
Baseflows during nonirrigation season	47,000
Peak flows	1900
Floodplain vegetation	26000
Total	74,900

[11] CH2MHill, March, 2000. Op. cit., p 10-4.22.

Appendix 6-B

List of Individuals Interviewed

Appendix 6-B. List of Individuals Interviewed Lower Rio Grande Water Planning Region

Name	Title	Organization	City
Tony MacRobert	City Manager	City of Hatch	Hatch
Daniel Hortert	Community Development Director	Dona Ana County	Las Cruces
Adrienne Widmer	Director	Las Cruces Utilities	Las Cruces
Zoe Richmond	Public Affairs Mgr.	Union Pacific Railroad	Phoenix
Jerry Pacheco	Director	International Business Accelerator/Border Industrial Association	Las Cruces
Dodson Dinsmore	Loan Officer	Pioneer Bank	Las Cruces
Julia Brown	County Manager	Dona Ana County	Las Cruces
Adrian Tafoya	District Conservationist	USDA - NRCS	Las Cruces
Bill Allen	CEO, President	Las Cruces Chamber of Commerce	Las Cruces
Jerome Dodson	Sr. VP, Residential Real Estate	Citizens Bank of Las Cruces	Las Cruces
George Ruth	Sr. VP Commercial Real Estate	Citizens Bank of Las Cruces	Las Cruces
David Weir	Community Development Director	City of Las Cruces	Las Cruces
Christopher Erickson	Professor of Economics	NMSU	Las Cruces
Mike Green	Project Manager, Generation Asset Management	PNM	Albuquerque
Eddie Gutierrez	Vice-President, External and Public Affairs	El Paso Electric	El Paso

Appendix 6-C

Projected Population Growth Rates, 2010 to 2040

Appendix 6-C. BBER Projected Five-Year Population Growth Rates, 2010 to 2040 Lower Rio Grande Water Planning Region

County	Five-Year Growth Rate (%)					
	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Doña Ana	7.75	7.19	6.47	5.65	4.86	4.28

Source: New Mexico County Population Projections, July 1, 2010 to July 1, 2040. Geospatial and Population Studies Group, Bureau of Business & Economic Research, University of New Mexico. Released November 2012.

Appendix 8-A

Recommended Projects, Programs, and Policies

Regional Water Planning Update

Projects, Programs, and Policies

Water Planning Region 11: Lower Rio Grande

Planning Region	County	Regional or System Specific (R, SS)	Project, Program, or Policy	Strategy Approach (What issue does strategy address)	Subcategory	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Time Frame (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
Lower Rio Grande	Doña Ana	R	Project	Increase and Protect Supply	Data Collection	Jornada Hydrology Study	Domestic & Civic Users Group (2015-2016 Update)	Hydrological classification of the Jornada Basin aquifer with the aim of determining the sustainable rate at which water can be extracted from this aquifer. This would be used to limit (Policy) the rate of groundwater pumping to ensure that it would remain a long-term source of water for domestic use. The Jornada Basin is recharged by direct rainfall and associated intermittent streamflow's from the adjacent mountain ranges. It is not dependent upon flows in the Rio Grande for its recharge as is the case for the Mesilla Bolson. A proper hydrological study would establish the recharge rate which would determine the withdrawal rates consistent with preserving this resource.	Suggest WRRI with project-specific funding from the State Legislature.	City of Las Cruces, Lower Rio Grande Public Water Works Authority, and the (private) Moongate Water Company.				We don't have accurate recharge information for this bolson, information needed to plan for the sustainable use of this resource.	Previous studies of the Mesilla and Jornada bolsons (the major groundwater sources of Region 11) have provided estimates of supply and recharge. New hydrology studies would improve these numbers.
Lower Rio Grande	State Plan	R	Project	Increase and Protect Supply	Data Collection	Priority Call Impact Study	Domestic & Civic Users Group (2015-2016 Update)	Conduct an economic impact study associated with a call for water based on water right priority date.	Partnerships between ground and surface water users, the OSE, State Legislature for potential statutory/regulatory/policy modifications.	State Legislature Monies, EPA Funds, In-kind funds, Bureau of Reclamation, NMFA, NSF, Water Trust Board, Lower Rio Grande Water Users Organization, South Central Council of Governments.			Initial estimate $300,000.	This project will define what the potential economic effects would be if the OSE made water calls.	A similar study was conducted for the Pecos Basin.
Lower Rio Grande	Doña Ana	R	Project	Increase and Protect Supply	Data Collection	Update the LRG Hydrologic Model	Domestic & Civic Users Group (2015-2016 Update)	Update the existing LRG Hydrologic Model to incorporate drought conditions, the relationship between ground and surface water, estimation of the quantity, quality, and availability of water. This project will be useful for numerous programs and policy development or revision. Lower Rio Grande Water Users Organization has already requested funding previously where Water Resources Research Institute agreed to be the fiscal and project lead. The model will require periodic maintenance and update.	WRRI	OSE. Potential funding sources include State Legislature Monies, EPA Funds, In-kind funds, Bureau of Reclamation, NMFA, NSF, Water Trust Board.	Recurring funding will be required to keep the model up to date. During Phase I, estimates for yearly updates can be developed.		Initial estimate $1,000,000 and can be phased.	This project will define the quantity, quality and availability of water for current and future use. This project will provide sufficient information for the OSE to complete adjudication in addition allow all water right holders to plan for the current and future needs.	Updates to further refine the LRG Hydrologic Model include: an MS thesis by J. Knight of the University of Arizona (2015), the US BoR draft EIS of the 2008 Rio Grande Project Operating Agreement (2016), geologic updated by Hawley (2016), and the USGS (with BoR) is currently working on the most comprehensive version of the LRG Hydrologic Model known to date. Additional economic analysis is underway by researchers at NMSU and UTEP. Additional geophysical studies and expanded monitoring and measurement of aquifer response at various depths to current and ongoing stresses on a field scale to inform and calibrate the modeling parameters are needed. In particular, models need to be updated to reflect more recent aquifer system response to stresses and increasing demands never before seen.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Alternative Water Source	2017-2021 ICIP	Project ID 27665	Hatch, Village of		2017-2018		$ 10,000,000		Project ID 27665
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Anthony Area SWTP	2003 Regional Water Plan Section 8.2.2.7.3	Proposed treatment plant with a capacity of 4 MGD in 2005 and increasing to 16 MGD in phase 3 (2030?)					No costs discussed		This project was evaluated and not deemed feasible
Lower Rio Grande	State Plan	R	Project	Increase and Protect Supply	Water Supply	Desalination	Domestic & Civic Users Group (2015-2016 Update) and 2003 Regional Water Plan Section 8.2.3	The principal groundwater source in Region 11/ Doña Ana County is the Mesilla Bolson. That resource is being "mined" in an unsustainable fashion. As wells are deepened to reach additional groundwater that water grows increasingly saline, especially in the southern portions of the basin. Desalination could render this water suitable for domestic (human) consumption. Desalination (generally by a variant of the reverse-osmosis process) has been widely and successfully used in many parts of the world, especially in regions where seawater is really the only significant source of water. Inland desalination plants or pilot plants can be found near Alamogordo NM, and El Paso TX; the latter may be the largest inland plant in the world. Both utilize saline groundwater as their supply.	Implementation would probably involve funding from federal, state, county, and municipal resources. The City of Las Cruces would likely be the lead agency in Region 11. Success would be measured based on the unit cost of potable water produced.						Domestic water users connected to public water systems are the principal beneficiaries. Desalination remains expensive, mainly because of the associated power costs. (A California nuclear plant uses a significant fraction of its power generation to desalinate seawater for its cooling systems.) However the associated costs are declining with improvements in the technology.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Effluent Reuse	2016-2020 ICIP		Anthony WSD				$ 1,400,000		Project ID 30540

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Water Planning Region 11: Lower Rio Grande

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Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Evaluate Potential New Water Sources for the Percha Creek Area	Domestic & Civic Users Group (2015-2016 Update)	Evaluate/quantify and develop new water source (aquifer) in the Percha Creek area for use by domestic users immediately south of Caballo Reservoir. Utilize this study to establish water rights availability prior to excessive claims. A relatively undeveloped artesian aquifer is known to exist immediately west of Caballo Reservoir roughly in the area of Percha Creek. The extent north and south of this source and the specifics of its source/headwaters has not yet been determined except that it likely is not fed by LRG waters. This project would determine the reserve potential of the aquifer, likelihood of exploitation and potential threats.	Users near Caballo Reservoir would stand to benefit most greatly although conveyance may be possible all the way south to the Rincon area (or perhaps Spaceport USA) if resources are proven available. Funding sources would likely include legislative appropriation, NMBM&MR, WRRI and/or USGS.	Local domestic water providers could manage the project; however, to promote impartiality it would likely best be managed through NMBM&MR or OSE, and could use in-house resources and/or consultants.			Depending on the level of study, estimated costs could range from $50,000 (for basic pump testing, literature review and presentation and sampling) to $500,000 (if including seismic delineation of the aquifer extents).	The good quality artesian aquifer has been accessed for some farming and domestic use in Percha Creek, but its true potential has not yet been evaluated. Recent interest in the area for commercial agriculture water supply and/or mining suggests that this resource may be in jeopardy.	Aquifer studies have been common in NM and the LRG region. However, getting a study completed prior to large scale exploitation would be an opportunity.
Lower Rio Grande	State Plan	R	Project	Increase and Protect Supply	Water Supply	Full Treatment of Domestic Wastewater	Domestic & Civic Users Group (2015-2016 Update)	Full treatment of wastewater to potable levels for domestic use. The intent is to treat wastewater to the level where the result can be returned directly to the domestic drinking water supply rather than returning the product to the river or the aquifer. Wastewater treatment "from toilet to tap" has been widely and successfully employed elsewhere in response to water supply shortages .	Domestic Water Suppliers	State or Federal Funds				Reduce groundwater diversions	The intent is to ensure that domestic water supplies - which are drawn exclusively from groundwater- are returned directly to domestic uses rather than being returned to the Mesilla Basin Aquifer or the Rio Grande. In the first instance most would go to agricultural use, and the second it would al go to agricultural use under present arrangements.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Ground Water Rights	2017-2021 ICIP	Project ID 15774	Dona Ana MDWCA				$ 800,000		
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Hatch Area Water Treatment Plant	2003 Regional Water Plan Section 8.2.2.7.1	Proposed treatment plant with a capacity of 3.5 MGD in 2007 and 4.5 MGD in 2015					no costs discussed		Plant would serve Dona Ana County's North Planning Area (Hatch, Salem, Garfield, Rincon, and the spaceport)
Lower Rio Grande	Doña Ana	R	Project	Increase and Protect Supply	Water Supply	Import Water	Domestic & Civic Users Group (2015-2016 Update)	Import groundwater from basins in adjacent Counties and Regions. The project would initially (a) determine the nature of the resource, (b) provide cost estimates for implementation, (c) define the legal and political obstacles to implementation. It might be possible to "import" sufficient water for domestic use in a sustainable fashion. The financial and political costs, however, might well prove prohibitive	Given the magnitude of these projects they would have to be implemented with a combination of state and federal funds.	The principal beneficiaries would be domestic water users, principally customers of Las Cruces Utilities and other domestic water providers				With the continued depletion of the Mesilla Bolson (principally by agriculture) domestic water providers will need to find additional water resources to sustain their populations – even in the absence of significant growth in demand. Adjacent (not in Doña Ana County) should be considered.	Transport of significant amounts of water from source to use has been fairly common in the Southwest (e.g., the Central Arizona Project) . These projects are expensive, generally requiring large amounts of federal funding. The infrastructure required to move 30,000-100,000 from the Salt Basin to the Mesilla Valley would cost in excess of $1 Billion, base upon the costs of similar projects over similar distances and terrain in other southwestern states.
Lower Rio Grande	Doña Ana	R	Project	Increase and Protect Supply	Water Supply	Importation of Water	2003 Regional Water Plan Section 8.2.2.8	Import water from (1) Gila Project, (2) Nutt-Hockett Basin, (3) Salt Basin					no costs discussed		This is a controversial alternative. Many steering committee members are strongly against taking water from other regions, and see it as a delay of the real problem and stealing water from other regions. However, this alternative might be considered under dire circumstances.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Las Cruces Area SWTP	2003 Regional Water Plan Section 8.2.2.7.2	Proposed treatment plant with a capacity off 20 MGD in 2005 and 34 MGD in 2020-2030					no costs discussed		This project was evaluated and not deemed feasible
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Las Cruces Sustainable Water Project	2003 Regional Water Plan Section 8.2.2.7	Augment ground water supply for the Mesilla Rincon Basin with surface water obtained through the SWUA process.					no costs discussed		The alternative is not complete - in progress. The plan was to have year round releases, but it is based on available water supply in reservoirs
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Mesilla SWTP	2017-2021 ICIP	Project ID 20496. Installation of storm water quality treatment unit	Mesilla		2020		$ 4,000,000		

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Lower Rio Grande	Doña Ana	R	Policy	Increase and Protect Supply	Water Supply	Purchase of Water Rights	2003 Regional Water Plan Section 8.2.2.6.1	Obtain water rights by direct purchase					Price depends on market value. $4.5k in Rincon Valley to $10k per acre in Las Cruces area		This alternative envisioned the purchase of water rights to secure supply. City of Las Cruces' preference is to lease water rather than purchase the land and water however, which means the City does not own the water right. EBID's DROP policy provides forbearance-based offset agreements.
Lower Rio Grande	Doña Ana	R	Program	Increase and Protect Supply	Water Supply	Rainfall Augmentation	2003 Regional Water Plan Section 8.2.2	Add salt or ice crystals to "seed" clouds to increase precipitation formation					No costs discussed		Cloud seeding could be modestly expected to increase rainfall by 5-20%. However, sufficient cloud formation must already occur to have seeding opportunity.
Lower Rio Grande	Doña Ana	R	Policy	Increase and Protect Supply	Water Supply	Rainwater Harvesting	Chris Canavan - NMED (2015-2016 Update)	EBID has conducted a pilot project on a segment of the Seldon Drain north of Las Cruces to capture arroyo stormwater flows. Measurement of the water table from an immediately adjacent shallow monitoring well shows that groundwater recharge has been facilitated with this methodology. Expansion of infrastructure and monitoring equipment at a number of key sites to enable stormwater capture is an excellent opportunity to facilitate shallow aquifer recharge. Effective capture and use of local stormwaters is likely to be an increasingly important part of mitigating water shortages in the Lower Rio Grande.							EBID has conducted a pilot project on a segment of the Seldon Drain north of Las Cruces to capture arroyo stormwater flows. Measurement of the water table from an immediately adjacent shallow monitoring well shows that groundwater recharge has been facilitated with this methodology. Expansion of infrastructure and monitoring equipment at a number of key sites to enable stormwater capture is an excellent opportunity to facilitate shallow aquifer recharge. Effective capture and use of local stormwaters is likely to be an increasingly important part of mitigating water shortages in the Lower Rio Grande.
Lower Rio Grande	Doña Ana	R	Policy	Increase and Protect Supply	Water Supply	Rainwater Harvesting for City Landscaping	Community Engagement Workgroup (2015-2016 Update)	Promote and provide funding for harvesting of stormwater and rainwater (to the extent allowed by the law) for City landscaping. Modify City policies to support stormwater and rainwater harvesting through educational programs and incentives							Rainwater harvesting must follow all appropriate permits
Lower Rio Grande	Doña Ana	R	Program	Increase and Protect Supply	Water Supply	Storm Water Capture	2003 Regional Water Plan Section 8.2.5	This alternative proposes increasing the capture of rainfall runoff to augment Rio Grande Project Water Supply. Project ideas include: plumbing natural drainages into the EBID conveyance system, shallow aquifer recharge ponds, and stormwater quality treatment centers. Limitations include regulations on stormwater capture, and poor timing for irrigators (stormwater can be difficult to use since fields are already soaked when it is available)	EBID	NMED			No costs discussed		Several stormwater treatments projects are included on the 2016 ICIP plans and discussed in the 2003 plan. EBID conducted a pilot project to capture arroyo stormwater flows that showed the methodology was effective for increasing groundwater recharge.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Surface Water Rights	2017-2021 ICIP	Project ID 15820	Dona Ana MDWCA				$ 900,000		
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	SW Treatment Plant, Phase I	2017-2021 ICIP	Project ID 17050	Dona Ana MDWCA				$ 6,810,000		
Lower Rio Grande	Doña Ana	R	Policy	Increase and Protect Supply	Water Supply	Urban Rainwater Harvesting	Domestic & Civic Users Group (2015-2016 Update)	Urban rainwater harvesting would utilize existing paved areas (roads, parking lots) and commercial rooftops as collecting areas. Water would be treated for domestic use or directed to aquifer storage. Rainwater harvesting would locally yield approximately 0.7 acre-ft per year per acre of collection area. Rainwater collection has historically provided the principal domestic water source in the more arid parts of the world (e.g., much of the Middle East). It is practiced on a very small scale (individual residences) in a few instances. Most larger cities in the United States have a storm sewer system to drain streets, mainly for flood control .	City or County Utility						
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Reclamation Plant	2017-2021 ICIP	Project ID 15200	Dona Ana MDWCA				$ 17,178,000		

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Lower Rio Grande	Doña Ana	R	Policy	Increase and Protect Supply	Water Supply	Water Right Lease and Transfer Policies	2003 Regional Water Plan Section 8.2.2.6.1	EBID was in the process of establishing regulations to implement SWUA allowing lease of EBID water for municipal use. The SWUA concept is described on pgs. 188-193 of the 2003 water plan.					No costs discussed		Water policy could be developed to control water use for municipal, agricultural and environmental/biological habitat reasons. EBID's Depletion Reduction Offset Program (DROP) is intended to provide a mechanism for M&I users to mitigate the adverse effect of their groundwater withdrawals on the local hydrologic system.
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Rights Acquisition	2016-2020 ICIP		Anthony WSD				$ 310,000		Project ID 28469
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Rights Purchase	2016-2020 ICIP	Chamberino currently has 55 acre-ft of water rights that they can use and in the past several years they have been using about 54 acre-ft. Chamberino wants to plan for the future and start working on acquiring water rights. This project is part of our long term planning to keep our system in the best condition possible for many more years to come. Chamberino has contacted the Office of the State Engineer to go over the process to buy water rights. There are several owners of water rights that want to sell and their water rights have been verified by the State Engineer	Chamberino MDWCA				$ 250,000		Project ID 23822
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Rights Purchase	2017-2021 ICIP	To purchase water rights for the Lower Rio Grande Public Water Works Authority water system. The Authority will look at the list of people who have water rights they would like to sell. When they have located the water rights they will check with the Office of the State Engineer to make sure they are permitted and to see if they can transfer them to a different site. Project ID 25920	Lower Rio Grande Public Water Works Authority		2021		$ 1,800,000		
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Treatment Plant	2017-2021 ICIP	This project will plan, design, and construct a water treatment plant. A water treatment plant will provide an additional source of water for many uses to the communities served by the Lower Rio Grande Public Water Works Authority. The PER is amended and will be submitted for review. Project ID 21300	Lower Rio Grande Public Water Works Authority		2017		$ 6,024,684		
Lower Rio Grande	Doña Ana	SS	Project	Increase and Protect Supply	Water Supply	Water Well Acquisition (North Arrey)	2016-2020 ICIP	Design, construct, acquire water rights, right of way, and land , complete an EA, and construct new water well for the water system. Includes waterline to tie into existing water system and SCADA	Garfield MDWC & MSWA				$ 1,055,200		Project ID 16420
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Canal Lining	2003 Regional Water Plan Section 8.2.1.5.2	Concrete line the irrigation canals to reduce seepage		EBID			$20 to $115 per linear ft of canal (depending on canal geometry)		Concrete lining and piping of EBID's canals and laterals and likewise farm/community ditches have numerous conservation benefits, specifically improved delivery timing and on-farm irrigation efficiency as well as increasing the supply delivered pro-rata to all EBID members. Efficient delivery of surface water positively impacts the aquifer by reducing the groundwater pumping required and reducing fuel consumed to pump groundwater. Some steering committee members disagree and feel that lining ditches would have the opposite impact and lower groundwater due to reduced seepage.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Agricultural Conservation	Charge to Constituents	2003 Regional Water Plan Section 8.2.1.5.3	Charge customers who order a water delivery but then refuse water at delivery time					No costs discussed		The steering committee would like to see this alternative removed. This issue is handled internally with EBID.
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Cultural Practices	2003 Regional Water Plan Section 8.2.1.5.2	Farmers often develop unique irrigation schemes to save water, such as irrigating every other furrow. This alternative recommended interviewing irrigators to determine the most realistic methods for more detailed evaluation.							This is similar to deficit irrigation and already in practice.

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Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Deficit Irrigation	2003 Regional Water Plan Section 8.2.1.5.2	Deficit irrigation is a technique for dealing with short water supply where less water is applied during irrigation than is required to fully replenish the root zone. This method is frequently used in the region, however the types of crops that can bear this type of stress is limited.					Feasibility depends on market demand for the lower water use crops		As noted in the 2003 plan, this is difficult to develop further as it is already used as much as possible.
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	High Flow Turnouts	2003 Regional Water Plan Section 8.2.1.5.2	High flow turnouts allow for rapid and efficient pulse of irrigation water across a field. The rapid advance decreases the time between the head and tail of the field, allowing more consistent infiltration across the field. The high flow turnouts increase flow from 2 cfs to 25 cfs.					$1,200 to $2,000 per high flow turnout		The difficulty with this alternative is that the high flow turnouts are often designed to only work correctly at high flow rates. When the water supply is low this is problematic.
Lower Rio Grande	Doña Ana	R	Project	Reduce and Manage Demand	Agricultural Conservation	Irrigation App	Chris Canavan - NMED (2015-2016 Update)	Develop an app for farmers to use to assist in determining irrigation needs - such as when and how much to apply etc.							Possibly in development already at NMSU. EBID says this technology already exists and that dissemination of irrigation efficiency, pump efficiency and water conservation knowledge would also be helpful with this suggestion.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Agricultural Conservation	Irrigation Rate Structure	2003 Regional Water Plan Section 8.2.1.5.3	Increasing the price of agricultural water seems like a feasible method for reducing irrigation use/waste at first glance, however, this is an oversimplification of the system. Irrigators own the water rights, they don't pay based on usage, but for maintenance of the canals. Increasing irrigation costs will entice farmers to sell their water rights to municipal developers, or use (uncontrolled) groundwater.					Current water rates based on market value and not for profit		The steering committee felt that this alternative was not appropriate for AG water users. The steering committee would like to see this alternative retained for municipal and domestic users however.
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Laser Leveling	2003 Regional Water Plan Section 8.2.1.5.2	Laser leveling seeks to improve irrigation efficiency by precision grading the field. This reduces the amount of water needed to be delivered for the same amount of crop delivery, ultimately leading to less water lost through evapo-transpiration (ET). This process is used widely throughout New Mexico, especially over the last 10 years, which has driven down the leveling costs. This method is most suitable for annual crops (where the fields get plowed under every year), however, the Lower Rio Grande has a large percentage of perennial crops (pecans) where this method is not needed as frequently.					$350 per acre with $200 -$250 retouch leveling every 3-5 years		The increase in efficiency gained from laser leveling often allows for greater production with the same water delivery. Since water rights are administered by diversion, this increased production (from the same delivery) is a decrease in the return flows (via seepage or drainage back to canals) so the net depletion to the shallow aquifer increases.
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Low Water Use Crops	2003 Regional Water Plan Section 8.2.1.5.2	The "Big Three" crops in the region are pecan, alfalfa, and cotton. Cotton is the only low water use crop (of the three), however it is the least profitable. Sorghum is also low water use, but extremely unprofitable. Common vegetable crops in the area (lettuce, onions, chile, cabbage) are low water consumption crops (they require frequent application of water, but have low depletion).					Feasibility depends on market demand for the lower water use crops		Low water use crops are desirable for agricultural conservation but are limited by what the local market will bear. Increased markets for low water use crops need to be developed. This is a decision made by farmers based on many diverse criteria, including risk, market factors, equipment needs, and infrastructure.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Agricultural Conservation	Manage water releases to maximize system efficiency	2003 Regional Water Plan Section 8.2.1.5.3	Releases from Elephant Butte and Caballo Reservoirs are dictated by irrigation needs or maintaining flood space. These releases are typically June, July, and August. Spring releases would closer mimic natural flows and could be beneficial to off-season crop growers. These releases must be carefully designed to not scour the riverbed and destroy protected habitat.		irrigation districts, BoR, Compact Commissioners from CO, NM, TX			No costs discussed		The steering committee indicated that significant work had happened on this alternative since the plan was written, an Operations Agreement is now in place. Unfortunately there is concern that this alternative does not take into account the water needs of wildlife and the river.
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Agricultural Conservation	Pressurized Irrigation (Drip and Sprinkler)	2003 Regional Water Plan Section 8.2.1.5.2	Surface flooding is the most common and oldest method of irrigation, however, drip irrigation offers lower labor requirements, an ability to irrigate on even land, and improvements in yield and quality. Implementing drip/sprinkler irrigation faces several hurdles, including: 1) high salt and sediment content in the supply water can clog drippers, 2) high wind can hamper sprinkler application. This method is most applicable to the annual crops, the pecan orchards aren't suitable for this technique.					Lots of varied prices for drip and sprinkler irrigation		These irrigation options are worth considering and future work needs to address water quality limitations to implementing this method. High salt content can clog drip systems and windy conditions can decrease the efficiency of sprinkler systems.

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Lower Rio Grande	Doña Ana	SS	Program	Reduce and Manage Demand	Agricultural Conservation	River Channel Maintenance	EBID	Funding for channel maintenance and sediment management projects in the Channelization Project to improve Rio Grande Project efficiency.	EBID, USIBWC, BLM, BOR					Channel maintenance is needed to deliver Project supplies and maintain the function of the levee system. Channel maintenance allows the Project canal headings to function, prevents excessive sediment intake into the Project canal headings, allows the Project drain system to flow as designed, can have positive impact for wildlife, and maintains the flood flow capacity the levees were designed for.	EBID: USIBWC contracted a study for channel maintenance alternatives and sediment transport analyzing the need and alternatives to river channel maintenance.. USIBWC efforts to fund and administer these activities should be supported. Other entities that seek to implement projects recommended within the USIBWC study should also be encouraged.
Lower Rio Grande	State Plan	R	Policy	Reduce and Manage Demand	Agricultural Conservation, Municipal Conservation	Ensure compliance with existing policies and regulations	Community Engagement Workgroup (2015-2016 Update)	Enforce the existing policies on water quality and well head protection						Smaller communities and individuals with private domestic wells often have concerns with contamination from Ag or Commercial neighbors. They want stronger enforcement of well head protection and stricter dumping regulations	
Lower Rio Grande	State Plan	R	Policy	Reduce and Manage Demand	Agricultural Conservation, Municipal Conservation	Review well permit regulations	Community Engagement Workgroup (2015-2016 Update)	Review and implement regulations regarding wells, both commercial and residential						The threats addressed by the proposals are around water access and availability. The results is a multi-faceted approach to water conservation	
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Data Collection	Enhanced SCADA Monitoring	Domestic & Civic Users Group (2015-2016 Update)	Implement enhanced SCADA system monitoring to include measuring two-way flows and pressures at critical system distribution points in combination with radio-read meter networks to better monitor and identify "lost" water and optimize system operation. Intent would be to achieve <3% unaccounted for water usage and reduce power consumption.	Best application would be to start with the larger users/networks (City of Las Cruces, Dona Ana MDWCA, Anthony, LRGPWWA, Garfield and Village of Hatch).	Funding sources will be variable but could include WTB, appropriations, colonias and USDA.			Cost would be variable but likely into the $100k-$200k for the largest users	Water systems often have water losses >15%, sometimes approaching as much as 50%. The costs from these losses can be significant (lost revenue and pumping expense) while simultaneously depleting potable water aquifers. Intended result is significantly higher system efficiency and lessened depletion of potable aquifers.	Enhanced SCADA has been proven in the Middle East (particularly Israel) to very significantly contribute to reduced water loss. Technique utilizes a combination of metering tools (primarily flow and pressure) in combination with analysis software to identify leaks in real time and at small volumes. Each community would need to complete their own implementation. Monitoring and evaluation of success would be fairly easy as the software would monitor successful decline of losses. Ultimate development and integration could result in a 911-style system with central monitoring and dispatch of coordinated response crews across the entire LRG project area.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Data Collection	Farm Delivery Metering	2003 Regional Water Plan Section 8.2.1.5.2	Increase metering of ground water and surface water withdrawals for AG purposes					Cost $1050 per turnout using EBID fabricated pressure transducers (but other prices can range from $700-$2500 each)		Metering of all wells is very important as there are cases of abuse where a domestic well is used for other purposes. Some of this has definitely been implemented, it is an ongoing program required by the State Engineer and paid for by water rights holders. The reporting system (for both domestic and AG meters) needs to be improved, with farmers sometimes falling behind on reporting their meter readings to the ISC.
Lower Rio Grande	Doña Ana	SS	Project	Reduce and Manage Demand	Data Collection	Water Meter Replacement	2016-2020 ICIP	Design and construct the replacement of deterioration existing water meters with new meters	Garfield MDWC&MSWA				$ 410,000		Project ID 29151

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Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Education	Public Education	Community Engagement Workgroup (2015-2016 Update)	Increase public relations campaigns on water conservation						The threats addressed by the proposals are around water access and availability. The results is a multi-faceted approach to water conservation	
Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Education	Public Education	2003 Regional Water Plan Section 8.2.1.1	Public Education is key to success with most of these water saving strategies. The conservation and low-flow conversion projects in particular require public participation.							Outreach is critical for all of these alternatives.
Lower Rio Grande	Doña Ana	SS	Project	Reduce and Manage Demand	Municipal Conservation	Iron and Manganese Removal	2017-2021 ICIP	To design, construct, purchase and equip additional treatment for iron and manganese removal at existing wells located in Brazito and Mesquite. Project ID 30449	Lower Rio Grande Public Water Works Authority		2017		$ 1,200,000		
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Irrigation Audits	Community Engagement Workgroup (2015-2016 Update)	Optimize irrigation systems and landscapes throughout Las Cruces by subsidizing irrigation audits, irrigation system adjustments and educating the public about the need for optimization. Outdoor irrigation accounts for about 1/3 (33%) of total water use in Las Cruces. With a growing population, Las Cruces' water needs are expected to increase; this program can help keep the total water use down. Older irrigation systems are often inefficient and require application of excess water in order to supply sufficient water to all areas of the landscape. Poorly maintained systems with broken sprinkler heads or with leaks will waste water. Irrigation schedules are often set too long.						Reduce outdoor water use	
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Landscaping meters	Community Engagement Workgroup (2015-2016 Update)	Require separate landscape meters on all new development in Las Cruces. Separate landscape meters make it possible to determine how much water is being used on landscape. This provides the opportunity to more easily detect leaks and other irrigation inefficiencies. As a side benefit, in Las Cruces customers are not charged for sewer services on landscape water where there is a separate meter						More accurate tracking of water use	EBID is a strong believer that effective water management requires detailed metering.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Limit water use throughout the Mesilla Basin at the renewable supply limit	Community Engagement Workgroup (2015-2016 Update)	Work with the regional stakeholders to cap water use at the calculated renewable supply (calculated over a annual or other appropriate timeframe). If the current trend of mining aquifers continues, the reliable supply of water will diminish with many associated problems, not least of which is to make the area more susceptible to drought, reduce the capacity of the area to sustain people and agriculture, and degrade natural environment						Develop a more sustainable water use program	
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Promote LID (Low Impact Design) for the homeowner and commercial developer	Chris Canavan - NMED (2015-2016 Update)	Encompass techniques such as rain gardens/bioswales, permeable pavement, cisterns, curb cuts in medians, parking lots, etc., small detention basin-parks						These techniques are currently exist and proven to work	
Lower Rio Grande	Doña Ana	SS	Project	Reduce and Manage Demand	Planning	Asset Management	2016-2020 ICIP	Project ID 28063	Chamberino MDWCA				$ 30,000		
Lower Rio Grande	Doña Ana	SS	Project	Reduce and Manage Demand	Planning	Conservation Plan	2016-2020 ICIP	Project ID 28064	Chamberino MDWCA				$ 25,000		

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Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Storm/Surface Water Control	Aquifer Storage and Recovery	2003 Regional Water Plan Section 8.2.4	The alternative in the 2003 plan envisioned taking surface water during times of excess and injecting it into groundwater reservoirs for future use. The steering committee would like to see this alternative updated to include the use of reclaimed water, treated storm water runoff, treated wastewater, and purchased surface water right for injection. Reclaimed water must currently be treated to drinking water standards, and this regulation severely limits its use options (and increases costs). The committee would encourage a change in NMED regulations on reclaimed water. The benefits of ASR include storing water without evaporation losses or constructing storage tanks.					no costs discussed		EBID recommends additional research, including geophysical and geochemical studies with exploratory well drilling to identify potential injection sites and depths within the regional aquifers that storage may be feasible. EBID also notes that surface water within the Rio Grande Project cannot be used for ASR without a conversion contract with the Bureau of Reclamation and EBID. EBID believes that stormwater capture or concentrated impoundment of treated wastewater provide opportunities for shallow aquifer recharge without the expense of forced injection.
Lower Rio Grande	Doña Ana	SS	Project	Reduce and Manage Demand	Storm/Surface Water Control	Determine need and cost of dam rehabilitation	EBID	Preliminary Engineer Reports including cost estimates are needed for all jurisdictional flood control dams in Dona Ana County to determine cost and necessity of rehabilitation to meet new OSE Dam Safety Bureau requirements	Dam sponsors/SCNM Stormwater Coalition	NM Watershed and Dam Owners Coalition			TBD	It is likely that every flood control dam in Dona Ana County lack the spillway capacity of current requirements due to the fact that they were designed to a different standard than the current Dam Safety Bureau requirements. Most were designed to protect farm land and now provide important flood control to downstream development. Cost and benefit implications of each rehabilitation needs to be determined.	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Data Collection	Automated Weather Observation System (AWOS)	2016-2020 ICIP				2016		$ 180,000		18523
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Data Collection	Environmental Water Needs Assessment	Kevin Bixby - Environment Work Group (2015-2016 Update)	Develop an Environmental Water Needs Assessment for the lower Rio Grande that will: 1) determine the amount of water needed to restore and maintain a healthy river/floodplain ecosystem, including water needed for year-round base flows to sustain native fish, peak flows, floodplain vegetation and open water features, river-associated wildlife, and recreational boating; 2) include a 3-year flow study to document the relationship between water deliveries and river conditions; 3) include scenario planning to support environmental water allocation decisions with varying water supplies.						Currently there is no allocated water supply for the environment. The river floodplain ecosystem has been severely degraded due to more than a century of dam building, channelization and dewatering. Two thirds of native fish species have disappeared from this reach. The proposed assessment is needed to determine how much water would be needed to restore and sustain a healthy river floodplain ecosystem.	
Lower Rio Grande	Doña Ana	R	Policy	Promote Regional Values	Data Collection	Fund climate research	Chris Canavan - NMED (2015-2016 Update)	The research on our climate (such as WRRI or USGS gage data) should be supported (financially), complied, and disseminated.						There is a growing need for good hydrologic data. Increased data facilitates regional water planning.	

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Data Collection	Telemetry Metering for Irrigation Wells	EBID	Funding to purchase irrigation well telemetry meters (approx. $3000/well) that are compatible with EBID's RTU system.	EBID		2017-		TBD	Micrometers used by many farmers to meter their wells are not accurate, so much of the well data the OSE receives is unreliable or has gaps. EBID owns and operates a state-of-the-art RTU system, but funding is needed to purchase meters for irrigation wells. EBID would maintain the meters thereafter. Using EBID's RTU system to monitor groundwater use in the LRG would be a more cost-effective and accurate method than the current method of using inaccurate micrometers that must be manually checked.	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Data Collection	Weather Station	2015 Capital Outlay Bill SB159	Dona Ana County Santa Teresa Auto Water Observation System					$ 262,000		1289
Lower Rio Grande	Doña Ana	SS	Program	Promote Regional Values	Environmental Protection	Environmental Water Transaction Program (ETWP)	EBID	The EWTP policy, developed in partnership with USIBWC and Audubon New Mexico, provides a market-based mechanism for EBID water to be used for creation and maintenance of riparian habitat.	EBID	USIBWC, Audubon NM	2014-		TBD	Provide water for restoration projects in a fully appropriated basin.	
Lower Rio Grande	Doña Ana	R	Project	Promote Regional Values	Habitat Restoration	Floodplain Management	Chris Canavan - NMED (2015-2016 Update)	Shave the floodplain to capture stormflows. Use gage data to determine flood frequency and flow volume. Overbank should occur as close to just above irrigation delivery as possible/practicable..		BLM, SWCDs, dam sponsors, SCNM Stormwater Coalition				This would reduce flood severity, increase flood capacity, infiltrate water, mitigate pollution, and create floodplain habitat	Countless opportunities for multi-objective floodplain management, modification, rehabilitation, and restoration projects exist. The benefits of soil and water conservation by reducing storm runoff flows, increasing infiltration, and reducing sediment transport can have benefits for the public and downstream development by reducing flooding. A lack of existing vegetation and unpredictable precipitation makes revegetation and floodplain improvements challenging but experimentation and development of techniques will be important to determining the best future implementation. Climate data, and local precipitation and flow data is needed to quantify necessity and measure project benefits.
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Habitat Restoration	Living River Program	Kevin Bixby - Environment Work Group (2015-2016 Update)	Establish a Living River Program to encourage water conservation among urban water users and raise money to acquire water rights for river restoration. 1) Some urban water users do not like to reduce water usage because they are concerned the saved water will go towards more urban growth. This program would give them an incentive to conserve. 2) Money is needed to purchase or lease water for restoring the river. This program would generate funds for this purpose						Incentive to conserve water and generate funds	Similar programs have been implemented in Arizona and Santa Fe. See http://conserve2enhance.org/ for more information about the Arizona programs. Also see EBID's Environmental Water Policy for a market-based mechanism for EBID water to be used for creation and maintenance of riparian habitat.
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Habitat Restoration	Passive Use of Water for Restoration	2003 Regional Water Plan Section 8.2.2.6.1	Not all restoration needs will have water allocated to them							There are current EIS studies to re-establish stable channels and flood plains of the river with passive restoration (i.e. simply reducing or eliminating the sources of degradation and allowing recovery time).

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Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Habitat Restoration	Remove Invasive Plants	2003 Regional Water Plan Section 8.2.2.1	Remove invasive or non-native plants from the river.							One current example f this is the USIBWC Conceptual Restoration project. Replacing invasive species with native plants doesn't increase water savings, but it does have other beneficial environmental impacts. The habitat areas would have to be carefully replanted with care and detail to endangered species needs.
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Habitat Restoration	Restore Fish Habitat	Kevin Bixby - Environment Work Group (2015-2016 Update)	Develop a plan to reestablish self-sustaining populations of native fish in the Rio Grande below Caballo. Restoring all or a significant number of extirpated native fish species would represent major progress towards restoring the Rio Grande to ecological health since it would require a comprehensive approach by necessity, addressing a host of factors that have caused native fish to disappear. Most of these species are not currently listed as threatened or endangered under the U.S. Endangered Species Act, but their current depleted status suggests that listing could become warranted at some point in the future. Their listing could result in serious constraints on existing Rio Grande management, as it has for the middle Rio Grande of New Mexico with the Rio Grande silvery minnow. Taking a proactive approach to conserving native fish by developing a plan for their recovery before they are listed will minimize disruptions to water users while providing greater flexibility in the choice of conservation measures	Plan could be done by scientists at NMSU or UNM, in partnership with others	NMSU, UNM, UTEP, U.S. Fish and Wildlife Service, NM Dept. of Game and Fish, BoR, International Boundary and Water Commission—U.S. Section				The Rio Grande has lost two thirds of its native fish species due to a century of dam building, channelization and dewatering. The disappearance of these species is an indication that the river ecosystem has been severely degraded	EBID is concerned that this program would be in conflict with the Regional Value of preserving agriculture.
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Habitat Restoration	Watershed Restoration & Management	2003 Regional Water Plan, Section 8.2.2.1 and Chris Canavan - NMED (2015-2016 Update)	Watershed management considers methods to improve the quantity and/or quality of water within the Basin. In the LRG basin this often means replacement of invasive species with native plant and animal communities. Recent studies have shown that water saving from plant replacement is not as dramatic as initially hoped for, but it does have other beneficial environmental impacts. The update recommendation looks for projects that promote watershed restoration that reduces runoff while increasing infiltration.							Countless opportunities for multi-objective floodplain management, modification, rehabilitation, and restoration projects exist. The benefits of soil and water conservation by reducing storm runoff flows, increasing infiltration, and reducing sediment transport can have benefits for the public and downstream development by reducing flooding. A lack of existing vegetation and unpredictable precipitation makes revegetation and floodplain improvements challenging but experimentation and development of techniques will be important to determining the best future implementation. Climate data and local precipitation and flow data are needed to quantify necessity and measure project benefits.
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Municipal Conservation	1 MG Elevated Storage Tank	2017-2021 ICIP	Camino Real Regional Utility Authority		2018		$ 3,000,000		Project ID 30454	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Municipal Conservation	Lift Stations Improvements and Replacements	2017-2021 ICIP	Camino Real Regional Utility Authority		2017		$ 2,100,000		Project ID 30529	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	40 Year Water Plan	2017-2021 ICIP		La Union MDS&WA				$ 30,000		Project ID 29115
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	40 year Water Plan Update	2017-2021 ICIP	This project will update the 40 Year Water Plan in light of the new merger with the Organ Water & Sewer Association, the Butterfield Park MDWCA, and the Brazito MDWCA. This is a planning project. Project ID 25937	Lower Rio Grande Public Water Works Authority		2018		$ 75,000		
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Planning	40 year Water Plan Update	2017-2021 ICIP		Hatch, Village of		2017		$ 100,000		Project ID 27636

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	Green Projects	2017-2021 ICIP	To conduct planning/feasibility studies for green projects including solar installations, wind power, and water reclamation for the Lower Rio Grande Public Water Works Authority in Dona Ana County. Project ID 27612	Lower Rio Grande Public Water Works Authority		2021		$ 100,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	Hill Area Drainage Plan	2016-2020 ICIP				2016-2017		$ 275,000		30136
Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Planning	Increased Funding for Planning	Domestic & Civic Users Group (2015-2016 Update)	Provide funding for domestic and civic users past, current and future master plans, preliminary engineering reports, feasibility studies, infrastructure capital improvement projects, asset management plans, and 40-year water development plans, rate studies, etc.						To improve each specific water provider to meet any of the strategic objectives, new development, manage growth, address aging infrastructure, utilize updated and new technologies to become more efficient and water conscience.	Each water system is responsible for their own system with specific needs. The plans, reports, studies and projects can be found at each of the water system main offices, as requested or provided.
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	PER and Environmental Documents for East Mesa	2017-2021 ICIP	This project consists of a PER and environmental documents for water system improvements on the East Mesa. The PER will identify easements and rights of way that must be acquired for projects to be constructed in the future. Project ID 29104	Lower Rio Grande Public Water Works Authority		2017		$ 150,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	PER Update	2018-2022 ICIP		Picacho MDWCA				$ 30,000		Project ID 31946
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	Radium Springs Drainage Master Plan	2016-2020 ICIP				2016		$ 100,000		30045
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	South Central Asset Management Plan	2016-2020 ICIP				2016		$ 250,000		30039
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	System-Wide Information Technology Standardization	2017-2021 ICIP	This project will plan, design, purchase, construct/install system-wide standardized information technology to include computer hardware and software, GPS tracking for vehicles, SCADA system (for well/pump/tank control/lift stations), security fences and cameras, radio-read water meters, and associated technology, equipment, licenses, GIS, GPS, computers, printers, office equipment, and fixtures. This project will install SCADA in Butterfield Park to integrate with the Organ SCADA system. Project ID 24026	Lower Rio Grande Public Water Works Authority		2017		$ 2,080,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Planning	Water Master Plan	2017-2021 ICIP	To create a Water Master Plan for the south valley and east mesa zones to include water modeling. Project ID 30447	Lower Rio Grande Public Water Works Authority		2017		$ 200,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Recreation	Riverwalk	2017-2021 ICIP	Project ID 26132	Dona Ana MDWCA				$ 516,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Airport Drainage Improvements	2017-2021 ICIP		Hatch, Village of				$ 1,000,000		Project ID 27807
Lower Rio Grande	Doña Ana		Project	Promote Regional Values	Storm/Surface Water Control	Anthony 4th Street Drainage Pond	2017-2021 ICIP	Anthony 4th Street Drainage Pond Improvements	Anthony				$ 3,770,000		Project ID 26912
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Berino Drainage Improvements	2015 Capital Outlay Bill SB159	Berino Drainage Improvements Dona Ana County	Berino				$ 50,000		1286
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Brahman Dam	2016-2020 ICIP				2016-2019		$ 3,625,000		26079
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Brown Farm Flood Control	2016-2020 ICIP				2016-2020		$ 5,100,000		19953
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Dragonfly Channel	2016-2020 ICIP				2016-2020		$ 8,404,000		26085
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	East Mesa Flood Control Structure	2015 Capital Outlay Bill SB159	Dona Ana County East Mesa Flood Control Structure					$ 400,000		1470
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Hatch Flood Control Project	2016-2020 ICIP				2016-2020		$ 6,191,420		26131
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Longhorn Drive Area Drainage Improvements	2016-2020 ICIP				2016-2017		$ 300,000		30043
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Placitas Arroyo Improvements	2017-2021 ICIP	This project ID is 27996 on the 2017-2021 ICIP list, a similar project was on the 2016-2020 ICIP list with a project ID 21129	Hatch, Village of		2017-2019		$ 3,500,000		Project ID 27996

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Lower Rio Grande	Doña Ana	R	Program	Promote Regional Values	Storm/Surface Water Control	Spring Canyon Dam Project	2017-2021 ICIP	Project ID 27663	Hatch, Village of		2017		$ 250,000		Project ID 27663. Does the Steering Committee want more information about this project?
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Storm drain multi-purpose recreational flood control facility	2015 Water Trust Board Application		Anthony, City of				$ 190,000		760
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Storm/Surface Water Control	Installation of Pedestrian Storm Drain Grates	2017-2021 ICIP		Mesilla		2020		$ 50,000		20494
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Chaparral WW Project Phase 1C	2016-2020 ICIP				2016		$ 3,450,000		28684
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Chaparral WW Project Phase IC	2017-2021 ICIP		Chaparral		2021		$ 4,114,000		28684
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	De Lara Estates Extended Sanitary Collection System	2016-2020 ICIP		Desert Aire MDW&SWA				$ 2,240,000		Project ID 25321
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Del Rey Area Collection System	2017-2021 ICIP	Project ID 17070	Dona Ana MDWCA				$ 9,914,100		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Desert Aire Extended Sanitary Collection System	2016-2020 ICIP		Desert Aire MDW&SWA				$ 2,240,000		Project ID 25322
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	District 5 Wastewater Treatment Plant Improvements	2017-2021 ICIP	Project ID 30462	Dona Ana MDWCA				$ 3,082,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	East Central Area Collection System	2017-2021 ICIP	Project ID 17053	Dona Ana MDWCA				$ 19,441,500		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	East Mesa Water Reclamation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 1,350,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	EMWR Solar Photovoltaic	Las Cruces Utilities		Las Cruces Utilities		2017		$ 1,964,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Forcemain and Sanitary Collection Project	2016-2020 ICIP	This project will acquire easements, rights of way, and land, and plan, design and construct the extension of sewer lines from Desert Aire Subdivision to the Dona Ana County Wastewater Treatment Facility including the collection of additional customers along the way. A preliminary Engineering Report and Environmental Documents are completed.	Desert Aire MDW&SWA				$ 6,293,146		Project ID 24230
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Forcemain Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 736,197		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Ft. Selden Area Collection System	2017-2021 ICIP	Project ID 15740	Dona Ana MDWCA				$ 9,191,200		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Generator for Lift Station	2017-2021 ICIP		Mesilla		2018		$ 90,926		22390
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Jornada Area Collection System	2017-2021 ICIP	Project ID 17046	Dona Ana MDWCA				$ 14,937,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Lift Station and Forcemain Line Improvements	2017-2021 ICIP	Project ID 30520	Dona Ana MDWCA				$ 921,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Lift Station Improvements & Replacements	2017-2021 ICIP		CRRUA				$ 2,100,000		Project ID 30529
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Lift Station Renovations	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 1,019,997		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Lift Station Upgrade	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 3,169,520		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Line and Manhole Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 646,841		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Line Rehabilitation Extension	Las Cruces Utilities		Las Cruces Utilities	Bonds	2017-2021		$ 1,098,093		

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Mesilla Wastewater Collection System	2015 Capital Outlay Bill SB159	McDowell Road Wastewater Collection System Mesilla	Mesilla				$ 250,000		1990
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Mesquite-Brazito Sewer Project	2017-2021 ICIP	Extend wastewater collection system from existing Mesquite system discharging to DAC SC Treatment Plant to unserved areas of Mesquite & Brazito	Lower Rio Grande Public Water Works Authority	Lower Rio Grande PWWA and Dona Ana County Utilities	FY2017 & beyond funding priority	Currently in design	Budget is being updated, exceeds the $9 million currently funded.	Protection of groundwater from contamination by septic systems.	Project will also provide some economies of scale to the recently completed Mesquite system.
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	New Interceptors	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 8,874,658		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Picacho Area Collection System	2017-2021 ICIP	Project ID 15739	Dona Ana MDWCA				$ 6,820,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Rocca Secca Collection System	2017-2021 ICIP	Project ID 17132	Dona Ana MDWCA				$ 10,445,400		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	SCADA Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017		$ 100,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Septic Replacement Projects	2017-2021 ICIP		Las Cruces		2017-2019		$ 5,725,226		31416
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Septic Systems	Las Cruces Utilities		Las Cruces Utilities	NMED	2017-2021		$ 19,755,038		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Sewer Line Extensions Phase I,II, III	2017-2021 ICIP		Mesilla		2018-2019		$ 1,000,000		20488
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Sewer Line Improvements in Picacho Hills Arroyo	2017-2021 ICIP	Project ID 30476	Dona Ana MDWCA				$ 339,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Sewer Service Extension to Unserved Areas	2017-2021 ICIP	To conduct archaeological and environmental studies, acquire easements and rights of way, plan, design, construct, purchase, and install sewer line extensions to currently unserved areas for the Lower Rio Grande Public Water Works Authority in Dona Ana County. Project ID 25097	Lower Rio Grande Public Water Works Authority		2019		$ 2,200,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	South Central Wastewater Treatment Plant Improvements.	2016-2020 ICIP				2016-2018		$ 3,500,000		26263
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	South Central WW Collection Improvements	2016-2020 ICIP				2016-2018		$ 1,500,000		26235
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	South Dona Ana Rd. FM	2017-2021 ICIP	Project ID 25470	Dona Ana MDWCA				$ 1,928,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Storm Drain Repair, Video Inspection of Storm Drain	2017-2021 ICIP		Mesilla		2019		$ 150,000		20491
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Street Improvement Projects	Las Cruces Utilities		Las Cruces Utilities	Bonds	2017		$ 1,170,548		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Street Utility Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 10,293,504		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Sunland Park WWTP Improvements	2017-2021 ICIP	Camino Real Regional Utility Authority		2017		$ 1,000,000		Project ID 28330	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Sunland Park WWTP Improvements	2017-2021 ICIP		CRRUA				$ 1,000,000		Project ID 28330
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Trails End Collection System	2017-2021 ICIP	Project ID 16981	Dona Ana MDWCA				$ 13,590,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Bond Projects 2015	Las Cruces Utilities		Las Cruces Utilities	Bonds	2017		$ 5,011,438		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Collection Line Extension Unserved Areas	2016-2020 ICIP		Anthony WSD				$ 1,000,000		Project ID 16453

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Collection Lines	2017-2021 ICIP	Camino Real Regional Utility Authority		2018		$ 1,000,000		Project ID 28328	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Collection McDowell Rd Phase II	2017-2021 ICIP		Mesilla		2017		$ 150,000		30309
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Interceptor Line Extensions	2016-2020 ICIP		Anthony WSD				$ 1,075,000		Project ID 28502
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Lift Station Elimination	2016-2020 ICIP		Anthony WSD				$ 1,075,000		Project ID 28505
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Treatment Plant Solar Energy	2016-2020 ICIP		Anthony WSD				$ 2,250,000		Project ID 28545
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Wastewater Treatment Plant Upgrades/Improvements	2016-2020 ICIP	To plan, design, construct, and conduct archaeological and environmental studies for upgrades to the Anthony Water and Sanitation District activated sludge Wastewater Treatment Plant that was built in 1995 and is need of upgrades. As the community of Anthony grows, it is critical that reliable infrastructure is available to meet demand and meet all governmental regulatory standards	Anthony WSD				$ 17,000,000		Project ID 23833
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Water Reclamation Lift Station	Las Cruces Utilities		Las Cruces Utilities		2017		$ 20,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Westmoreland Area Collections System	2017-2021 ICIP	Project ID 17051	Dona Ana MDWCA				$ 10,687,300		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	Westwind Collection System	2017-2021 ICIP	Project ID 15738	Dona Ana MDWCA				$ 11,915,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WW Jake Hands Treat Plant Operations	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 600,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WW SE Area Collection System	2017-2021 ICIP	Project ID 17073	Dona Ana MDWCA				$ 14,506,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WWTP Laboratory	Las Cruces Utilities		Las Cruces Utilities		2017		$ 2,199,050		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WWTP Odor Control	Las Cruces Utilities		Las Cruces Utilities						
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WWTP Primary Clarifier	Las Cruces Utilities		Las Cruces Utilities		2017		$ 1,200,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Wastewater	WWTP Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 20,870,745		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	1 MG Elevated Water Storage Tank	2017-2021 ICIP		CRRUA				$ 3,000,000		Project ID 30454
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	2M Gallon Water Storage Tank on W. Side of System	2017-2021 ICIP	Project ID 16877	Dona Ana MDWCA				$ 43,700		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Administration Building	2018-2022 ICIP		San Pablo MDWCA				$ 566,000		Project ID 21339
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Airport Road Interconnect Design & Construct	2017-2021 ICIP		CRRUA				$ 740,000		Project ID 28321
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Anthony Water System Improvements	2015 Capital Outlay Bill SB159	Anthony WSD Water Line Improvement Gadsden High School	Anthony				$ 250,000		1358
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Backup Generator	2017-2021 ICIP		La Union MDS&WA				$ 238,000		Project ID 27955
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Barela Loop Water System Improvements	2017-2021 ICIP	Project ID 15197	Dona Ana MDWCA				$ 829,000		

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Booster Pump Station	Las Cruces Utilities		Las Cruces Utilities		2018-2021		$ 17,343,050		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Carver Road Waterline Looping	2018-2022 ICIP		San Pablo MDWCA				$ 387,000		Project ID 30509
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Central Office & Warehouse Facility	2017-2021 ICIP	To conduct environmental and archaeological studies, plan, design, construct, furnish, and equip a central office and warehouse facility for the Lower Rio Grande Public Water Works Authority in Dona Ana County. Project ID 30435	Lower Rio Grande Public Water Works Authority		2020		$ 2,000,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Drill Replacement Wells	Las Cruces Utilities	Water rehabilitation projects for three different wells	Las Cruces Utilities	NMFA, NMED	2017		$ 1,846,079		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	East Mesa Water System	Las Cruces Utilities		Las Cruces Utilities	Bonds, NMFA 2007	2017		$ 1,583,692		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	El Faro Street Waterline Looping	2018-2022 ICIP		San Pablo MDWCA				$ 188,000		Project ID 30508
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Elephant Butte Discharge Pipeline	2015 Capital Outlay Bill SB159	Elephant Butte ID Discharge Pipeline Dona Ana County					$ 300,000		1685
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Equipment Purchase	2017-2021 ICIP		La Union MDS&WA				$ 170,000		Project ID 27956
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Equipment Purchase - Hoist	2018-2022 ICIP		San Pablo MDWCA				$ 8,000		Project ID 21664
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Equipment Purchase - Portable Vacuum Pump	2018-2022 ICIP		San Pablo MDWCA				$ 20,000		Project ID 21348
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Extend Water Lines to Unserved Areas	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 300,000		Project ID 29114
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Fairview/Fairacres Water Distribution System, Phase II	2017-2021 ICIP	Project ID 25521	Dona Ana MDWCA				$ 1,393,310		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Farmers Market New Well	2016-2020 ICIP		Anthony WSD				$ 50,000		Project ID 28511
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Fire Flow Protection	2017-2021 ICIP		La Union MDS&WA				$ 190,000		Project ID 30430
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Fire Hydrants	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 70,000		Project ID 29113
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Generators A	2017-2021 ICIP		CRRUA				$ 100,000		Project ID 28324
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	GPS Equipment	2018-2022 ICIP		Picacho MDWCA				$ 25,000		Project ID 31949
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Hadley Complex UST Replacement	2017-2021 ICIP	Project ID 31448. Underground Storage Tank (UST) replacement. Design and construct	Las Cruces		2020-2021		$ 1,200,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Industrial Park Utility Improvements	2017-2021 ICIP	Project ID 27674	Hatch, Village of		2018		$ 1,000,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Install/Replace Fire Hydrants	2017-2021 ICIP		Mesilla		2018		$ 250,000		20499
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Installation of Transmission Main-Phase I and II	2017-2021 ICIP		Mesilla		2021		$ 600,000		20589
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Interconnect & Looping Project	2017-2021 ICIP	Looped large diameter interconnections between community water systems	Lower Rio Grande Public Water Works Authority	LRGPWWA serves multiple community water systems	FY2017 funding priority	Some interconnects are complete, others need plan & design	$5 million	Improve system efficiency & resilience	Interconnecting allows community wells to provide backup water supplies in other communities. Looped lg. diam. Interconnects will allow for planning future well fields to minimize impacts to ag. and move public water supply wells away from areas of known contamination (arsenic).
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Koogle Future Water Infrastructure Development	2017-2021 ICIP		La Union MDS&WA				$ 2,225,213		Project ID 30432

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	La Union Community Fire Hydrant Improvements	2017-2021 ICIP		La Union MDS&WA				$ 599,808		Project ID 27201
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Leak Detection Equipment	2018-2022 ICIP		Picacho MDWCA				$ 25,000		Project ID 31950
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Lift Station Improvements	2016-2020 ICIP	This is Anthony WSD largest and most critical lift station. This lift station handles forty percent of the community wastewater flow and is located in a low lying flood prone community location. Some of the components of the lift station have failed and cause sewer spills in the area. The lift station needs to be relocated to make much needed upgrades to ensure protection of property along the flood prone area. Phase one has been completed and it consisted of a PER and study of different alternatives. Phase Two consists of design of the new lift station. Phase three will be to bid the project and construction.	Anthony WSD				$ 3,610,000		Project ID 20311
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Line Extension	Las Cruces Utilities		Las Cruces Utilities						
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New 2 Million Gallon Tank South End	2017-2021 ICIP	Project ID 17118	Dona Ana MDWCA				$ 2,007,320		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New 2 Million Gallon Water Storage Tank	2016-2020 ICIP		Anthony WSD				$ 1,355,000		Project ID 28488
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New Water Well	2017-2021 ICIP	Project ID 15212	Hatch, Village of				$ 466,000		Cost reflects amount not yet funded. Project ID 15212
Lower Rio Grande	Doña Ana		Project	Promote Regional Values	Water Infrastructure	New Water Well	2017-2021 ICIP	Project ID 16126	Mesilla		2021		$ 1,000,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New Water Well	2018-2022 ICIP		Picacho MDWCA				$ 400,000		Project ID 30429
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New Well 14	2017-2021 ICIP	Camino Real Regional Utility Authority		2017		$ 1,500,000		Project ID 26971	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	New Well 14	2017-2021 ICIP		CRRUA				$ 1,500,000		Project ID 28240
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	North Tank Water System Improvements	2017-2021 ICIP	Project ID 17152	Dona Ana MDWCA				$ 1,885,500		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Northeast Quad and Upsizing Waterline Improvements	2016-2020 ICIP		Desert Aire MDW&SWA				$ 3,042,721		Project ID 27911
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Pump Station for New Well and Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 1,608,069		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Purchase Generators B	2017-2021 ICIP		CRRUA				$ 100,000		Project ID 28335
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Purchase Generators C	2017-2021 ICIP		CRRUA				$ 100,000		Project ID 28336
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Radio Read Meters	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 85,000		Project ID 29112
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Radium Springs Water System Improvements	2017-2021 ICIP	Project ID 28290	Dona Ana MDWCA				$ 3,468,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Re-coating Existing Storage Tanks	2016-2020 ICIP		Anthony WSD				$ 240,000		Project ID 28496
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Rehab. Existing Water Supply Well	2017-2021 ICIP		Mesilla		2020		$ 200,000		20490
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Relocate Water Services	2018-2022 ICIP		Picacho MDWCA				$ 21,250		Project ID 31948
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Replace Outdated Water Lines	2017-2021 ICIP		La Union MDS&WA				$ 946,094		Project ID 30433

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Replace Water Lines Phase I, II, III	2017-2021 ICIP		Mesilla		2018-2021		$ 2,090,000		20588
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Replacement Well	2017-2021 ICIP	Project ID 17158	Dona Ana MDWCA				$ 427,750		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Replacement Well No. 10	2017-2021 ICIP	Project ID 17159	Dona Ana MDWCA				$ 409,750		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Reservoir Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017		$ 410,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Santa Cruz Road Waterline Looping	2018-2022 ICIP		San Pablo MDWCA				$ 124,000		Project ID 30507
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	SCADA Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017		$ 15,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	SCADA System	2017-2021 ICIP		Mesilla		2021		$ 400,000		20587
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	SCADA Systems	2017-2021 ICIP		CRRUA				$ 300,000		Project ID 26971
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	SCADA Systems	2017-2021 ICIP	Camino Real Regional Utility Authority		2017		$ 300,000		Project ID 26971	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Secondary Storage Tank	2017-2021 ICIP		La Union MDS&WA				$ 425,200		Project ID 22892
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Shalem Colony Water Improvements Project	2017-2021 ICIP	Project ID 17153	Dona Ana MDWCA				$ 384,275		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	South Dona Ana Rd. Water System Improvements	2017-2021 ICIP	Project ID 17150	Dona Ana MDWCA				$ 932,500		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	South Tank Rehab	2017-2021 ICIP	Project ID 28257	Dona Ana MDWCA				$ 360,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Southeast and Southwest Quadrant Waterlines	2016-2020 ICIP	This project will acquire easements, rights of way, and land, and plan, design and construct water system improvements consisting of new pipelines for new customers. Approx. 18,000 linear feet of 6 inch PVC waterlines will be constructed.	Desert Aire MDW&SWA				$ 1,758,026		Project ID 26137
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Street Improvement Projects	Las Cruces Utilities		Las Cruces Utilities	NMFA, NMED	2017		$ 1,193,750		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Street Utility Rehabilitation	Las Cruces Utilities		Las Cruces Utilities		2017-2021		$ 5,191,135		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Supplemental Well No. 2	2015 Water Trust Board Application	Also included on the Chamberino ICIP lists. The work will consist of planning, designing, and construction of a new supplemental well. Chamberino MDWCA currently only has one well as their sole water supply. With the drought that the state is experiencing and the static water level dropping by 30-ft and farmers drilling more water wells in the area, Chamberino needs a supplemental well to avoid running out of water. The planning will consist of acquiring the land to drill the well and easements to run main transmission line to tie to existing system, environmental clearance of the new well and main transmission line alignment, design and construction. Anthony Water and Sanitation District will perform the operation and maintenance of the new facility per NMED and EPA standards.	Chamberino MDWC&SA				$ 125,000		841
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Tank Demolition	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 11,000		Project ID 30419
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Tank Repair	2017-2021 ICIP	Project ID 30425	Hatch, Village of		2018		$ 75,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Taylor Rd. Water System Improvements Project	2017-2021 ICIP	Project ID 17148	Dona Ana MDWCA				$ 624,902		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Transmission Lines	Las Cruces Utilities		Las Cruces Utilities		2018-2021		$ 22,531,342		

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Transmission Lines West Mesa	Las Cruces Utilities		Las Cruces Utilities	Bonds	2017		$ 202,500		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Upgrading waterlines	2015 Water Trust Board Application		Garfield MDWC&MSWA				$ 2,416,308		743
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Utility Lines Extension	2017-2021 ICIP	Project ID 22378	Hatch, Village of		2017-2018		$ 2,000,000		Project ID 22378
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Vactor Trucks	2017-2021 ICIP		CRRUA				$ 250,000		Project ID 28326
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Vado Area Water System Improvements	2017-2021 ICIP	To conduct archaeological and environmental studies, plan, design, construct, purchase and install water system improvements in the community of Vado for the Lower Rio Grande Public Water Works Authority in Dona Ana County. Project ID 22911	Lower Rio Grande Public Water Works Authority		2018		$ 1,580,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Valley Water Distribution	2017-2021 ICIP	Project ID 28287	Dona Ana MDWCA				$ 2,185,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Valve Replacement	2018-2022 ICIP		Picacho MDWCA				$ 50,000		Project ID 31947
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Via Norte Waterline Improvements	2017-2021 ICIP	Project ID 30473	Dona Ana MDWCA				$ 1,025,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Wastewater Collection Lines	2017-2021 ICIP		CRRUA				$ 1,000,000		Project ID 28328
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Bond Projects	Las Cruces Utilities		Las Cruces Utilities		2017		$ 8,763,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Conveyance Lines	2017-2021 ICIP		CRRUA				$ 1,000,000		Project ID 28329
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Conveyance Lines	2017-2021 ICIP	Camino Real Regional Utility Authority		2018		$ 1,000,000		Project ID 28329	
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Distribution Extension	2016-2020 ICIP	Phase one of the project will consist of planning, design, environmental/archaeological studies and construction of the Medina Well, O'Hara Road, Webb Road, NM 28, placing 20,000 feet of 12-inch-diameter distribution water lines and water services.	Anthony WSD				$ 3,806,000		Project ID 25297
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Line Extensions	2017-2021 ICIP		La Union MDS&WA				$ 550,000		Project ID 30431
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Line Relocation	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 65,000		Project ID 30420
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Line Replacement Timber Addition	2016-2020 ICIP	Phase one of the project will consist of evaluating the waterlines as part of the planning process, including archaeological/environmental study. Phase two will consist of the design and complete construction documents to bid for construction. Phase three will be the construction of approximately 10,000 linear feet of 6" diameter water lines, replace 20 fire hydrants, and redo approximately 400 water services.	Anthony WSD				$ 1,135,000		Project ID 21613
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Meter Replacement	2018-2022 ICIP		San Pablo MDWCA				$ 200,000		Project ID 30506
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Storage Tanks	2016-2020 ICIP	Plan, design, permit, acquire ROQ and construct new storage tanks including valves, transducers, and SCADA to provide efficiency, storage capacity, and safety to the existing water system.	Garfield MDWC&MSWA				$ 1,465,000		Project ID 16428
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Equipment	2017-2021 ICIP		La Union MDS&WA				$ 241,560		Project ID 27202
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Improvements	2016-2020 ICIP	Project ID 16274	Chamberino MDWCA				$ 1,690,500		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Improvements	2017-2021 ICIP		Mesilla		2017		$ 267,000		30307
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water system improvements	2015 Water Trust Board Application		Desert Aire MDW&SWA				$ 1,477,563		799
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Improvements	2015 Water Trust Board Application	Mesilla has Water System Improvement projects on the 2016-2020 ICIP, the 2017-2021 ICIP, and the 2015 Water Trust Board Application.	Mesilla, Town of		2017		$ 267,000		Prices for completion vary on different applications. 2017-2020 ICIP project ID 30307
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Improvements	2017-2021 ICIP		La Union MDS&WA				$ 615,486		Project ID 27200

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Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water System Rehabilitation & Improvements	2017-2021 ICIP	Continue with rehabilitation & upgrade of all water system components for the 9 water systems served by the LRGPWWA.	Lower Rio Grande Public Water Works Authority	LRGPWWA serves multiple community water systems	FY2017 & beyond funding priority	Existing PER can be updated & expanded, new PER needed for E. Mesa systems	$7.5 mil.	Improve system efficiency & resilience	The 8 former mutual domestic systems were initially built in the 1960s & 1970, and the Valle Del Rio (formerly private) system in the 1980s. Replacement of aging infrastructure and upgrades to accommodate growth by in-fill are ongoing.
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water transmission pipeline	2015 Water Trust Board Application		Hatch, Village of				$ 458,654		798
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Treatment & System Upgrades	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 555,000		Project ID 29138
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Water Well Rehabilitation	2017-2021 ICIP		Las Cruces		2017-2019		$ 1,248,000		30231
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Waterline Improvements	2016-2020 ICIP	Plan, design, permit, acquire ROQ and construct waterline improvements including valves, fire hydrants and fitting to replace the old existing waterlines	Garfield MDWC&MSWA				$ 2,772,700		Project ID 16424
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Well No. 2 Redevelopment	2016-2020 ICIP		Anthony WSD				$ 755,000		Project ID 28514
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Well No. 5 Redevelopment	2016-2020 ICIP		Anthony WSD				$ 755,000		Project ID 29318
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Well, Tank, and Line Improvements	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 2,394,744		Project ID 29111
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	West mesa Water Service Project	2017-2021 ICIP	Project ID 25468	Dona Ana MDWCA				$ 8,056,000		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	West Side Water Service	2016-2020 ICIP		Anthony WSD				$ 2,500,000		Project ID 28490
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	West Trails End Water Improvements Project	2017-2021 ICIP	Project ID 17156	Dona Ana MDWCA				$ 166,808		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Westwind Water Distribution System	2017-2021 ICIP	Project ID 16986	Dona Ana MDWCA				$ 847,032		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	WWTP Laboratory	Las Cruces Utilities		Las Cruces Utilities	Bonds	2017		$ 999,833		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Infrastructure	Zone 1 Interconnect Phase B	Las Cruces Utilities		Las Cruces Utilities	NMFA	2017		$ 1,560,914		
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Supply	Water Rights	2018-2022 ICIP		Alto de Las Flores MDWCA				$ 260,000		Project ID 29110
Lower Rio Grande	Doña Ana	SS	Project	Promote Regional Values	Water Supply	Water Rights Purchase	2017-2021 ICIP		La Union MDS&WA				$ 200,000		Project ID 29116
Lower Rio Grande	Doña Ana	SS	Program	Reduce and Manage Demand	Build system resilience, reduce use	Depletion Reduction Offset Program (DROP)	EBID	The DROP policy provides a mechanism for M&I users to enter into contracts with farmers to fallow land, thus reducing the agricultural depletion to offset the effects of M&I pumping on local hydrology and the surface water supply of the Rio Grande Project.	EBID	EBID	2016-		TBD	Ongoing and increasing depletions of Rio Grande Project surface water supply by non-Project entities.	
Lower Rio Grande	Doña Ana	SS	Program	Reduce and Manage Demand	Municipal Conservation	Expansion of water reclamation system in Las Cruces	Community Engagement Workgroup (2015-2016 Update)	Fund the expansion of the water reclamation and delivery system in Las Cruces. The existing system has a maximum capacity of 1M gallons per day. More of the City's wastewater could be treated and reused on landscapes. In addition to more treatment capacity at the reclamation plant, more purple pipe distribution system needs to be installed to deliver the treated water where it is needed. Require purple pipe on all new development in the City Utility's service area.						Water that can be reused effectively reduces overall demand.	

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Lower Rio Grande	Doña Ana	R	Program	Reduce and Manage Demand	Municipal Conservation	Low-flow conversion incentive	Community Engagement Workgroup (2015-2016 Update)	Replace indoor residential and commercial water infrastructure such as toilets and showerheads with low-water used models in the region. Make the program accessible especially to low and moderate income households.						Older infrastructure uses significantly more water than newer, water-efficient models. Research has shown that toilets and showers are the two highest indoor water uses. Replacement of older infrastructure will reduce water consumption, improving overall system efficiency. This program needs to reach the low-income communities, which typically have the oldest infrastructure and lack the income to replace old and leaking equipment.	Both the Cities of Santa Fe and Albuquerque have had similar programs, which led to reduction in indoor water use in these areas.
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Residential Rainwater Harvesting	Domestic & Civic Users Group (2015-2016 Update)	Residential Rainwater Harvesting using residential rooftops as collecting area and on site storage. Surface storage would be utilized for lawns and gardens or for other domestic uses. Sub-surface storage (e.g., using French drains or cisterns) would serve to recharge the shallow aquifer. A modest rooftop of 1,500 sq-ft area would collect roughly 300 gallons during a single modest 0.3 inch rainfall and nearly 8,000 gallons (about 0.02 Af) in the course of a typical year. This is roughly 10 percent of typical annual household use – about half of which is normally consumed for lawns and gardens.	Principal beneficiaries would be residential homeowners and utilities confronting reduced water supplies. Installation of residential collection systems could be encouraged through a system of tax credits or rebates.					Provide additional residential water supply using water which (given local conditions) would otherwise run off or evaporate on site.	
Lower Rio Grande	Doña Ana	S	Program	Reduce and Mange Demand	Municipal Conservation	Water leak detection program	Community Engagement Workgroup (2015-2016 Update)	Fund the purchase or rental of leak detection equipment and personnel to inspect the City of Las Cruces water distribution system. As water distribution infrastructure ages, real losses rise. The loss represents a waste of both water and energy used to treat and deliver water.						Like many water systems, real losses in the City of Las Cruces distribution system account for some unknown portion of the total unaccounted for water loss in the system. In 2014, total unaccounted for water loss was 16.8% of the total water provided. Reduction in real losses will help to keep the City of Las Cruces' total water need down as the population grows.	
Lower Rio Grande	Doña Ana	R	Policy	Reduce and Manage Demand	Municipal Conservation	Water-wise designs for indoor and outdoor infrastructure	Community Engagement Workgroup (2015-2016 Update)	Require water conserving designs and infrastructure (both indoor and outdoor) in all new development or create a point system for assessing the water-efficiency of the proposed new development						Developers have a tendency to continue to use technology that they are familiar with and require little change in design. However, there are ways to design buildings to take advantage of rainwater, stormwater, and low-water infrastructure (both indoor and outdoor). Policies requiring specific designs, infrastructure, or levels of efficiency can level the playing field for all developers while promoting water efficiency.	Municipalities in other parts of the country use a point system to assess building designs for a variety of conservation and efficiency measures and award permits to those designs that meet a certain score.