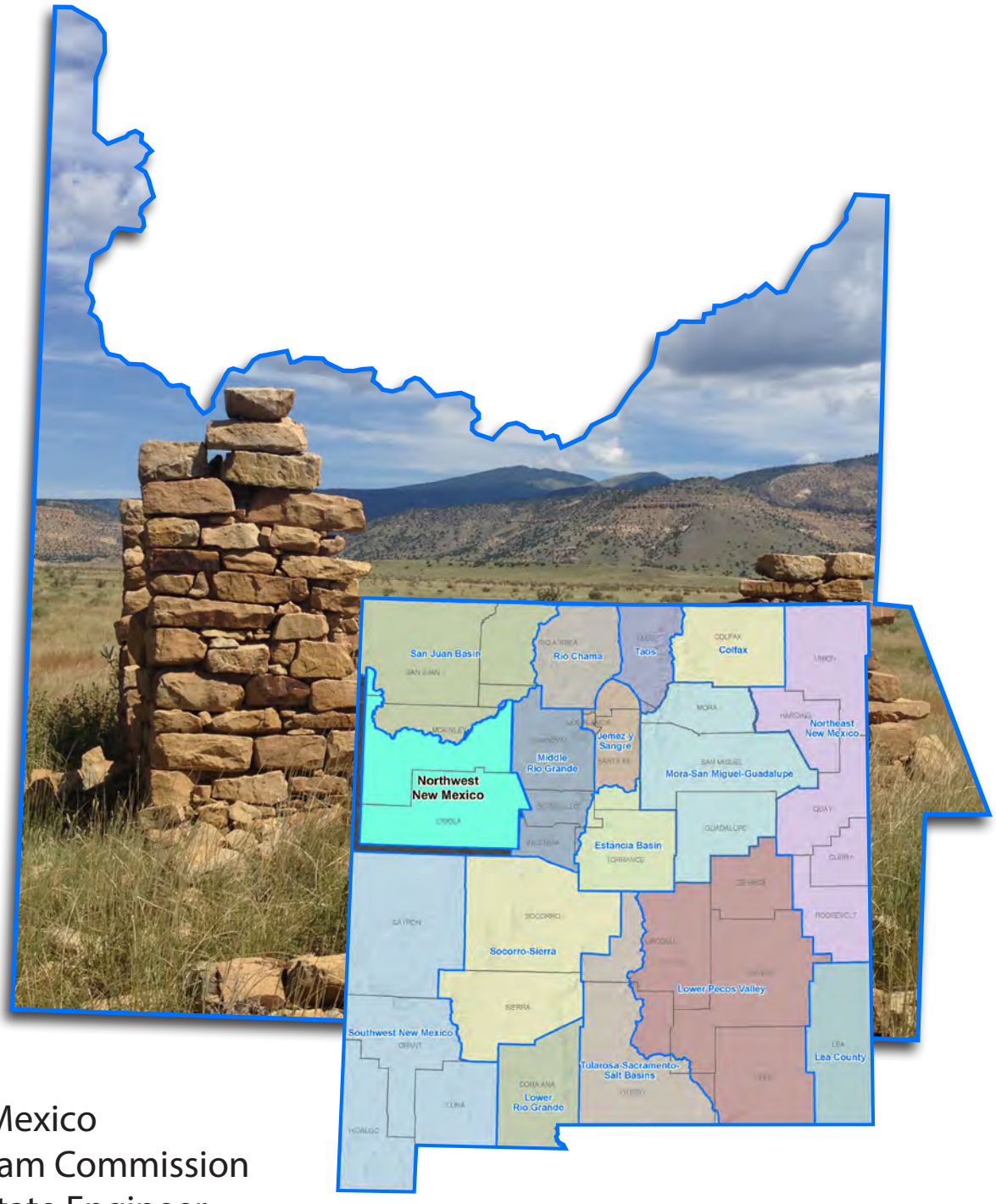
Northwest New Mexico Regional Water Plan



January 2017

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

Cover photograph: Acoma Pueblo ruins

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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
CID	Carlsbad Irrigation District
CWA	Clean Water Act
DBS&A	Daniel B. Stephens & Associates, Inc.
DOI	Department of the Interior (U.S.)
DWS	Domestic Well Statute
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
ft amsl	feet above mean sea level
FY	fiscal year
GGEDC	Greater Gallup Economic Development Corporation
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
LQ	location quotient
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDWCA	mutual domestic water consumers association
MDWUA	mutual domestic water users association
MSGP	Multi-Sector General Permit
NASS	National Agricultural Statistics Service
NCDC	National Climatic Data Center
NGWSP	Navajo-Gallup Water Supply Project

NMAC	New Mexico Administrative Code
NMBGMR	New Mexico Bureau of Geology & Mineral Resources
NMDOT	New Mexico Department of Transportation
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
NWNMCOG	Northwest New Mexico Council of Governments
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
RTI	Resource Technology, Inc.
RWP	regional water plan
SDWA	Safe Drinking Water Act
SNOTEL	snowpack telemetry
TDS	total dissolved solids
TMDL	total maximum daily load
µmhos	micromhos
UNM	University of New Mexico
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
U.S. EPA	U.S. Environmental Protection Agency
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

Executive Summary

The Northwest New Mexico Water Planning Region, which encompasses primarily Cibola County and the part of McKinley County that is not in the San Juan Basin (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 Northwest New Mexico regional water plan was completed and accepted by the NMISC in 2004.

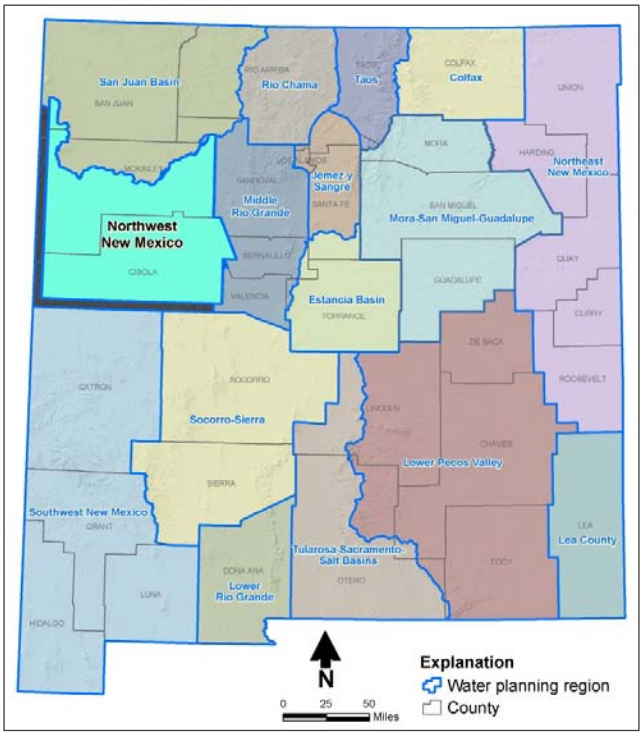


Figure ES-1. Northwest New Mexico Water Planning Region

The purpose of this document is to provide new and changed information related to water planning in the Northwest New Mexico 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 2004 plan and provides updated information regarding changed conditions and additional data that have become available.

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 increase in administrative and drought-adjusted water supplies in year 2024 is due to the Navajo-Gallup Water Supply Project (NGWSP) coming online. The estimated shortages with drought and declining groundwater in the year 2060 range from 5,259 to 14,400 acre-feet. Strategies that the region identified to address water management challenges and future shortages include watershed and stream restoration, increased groundwater monitoring and updating groundwater models, increased local water planning, small water system capacity development and regionalization, and water system upgrades and improvements.

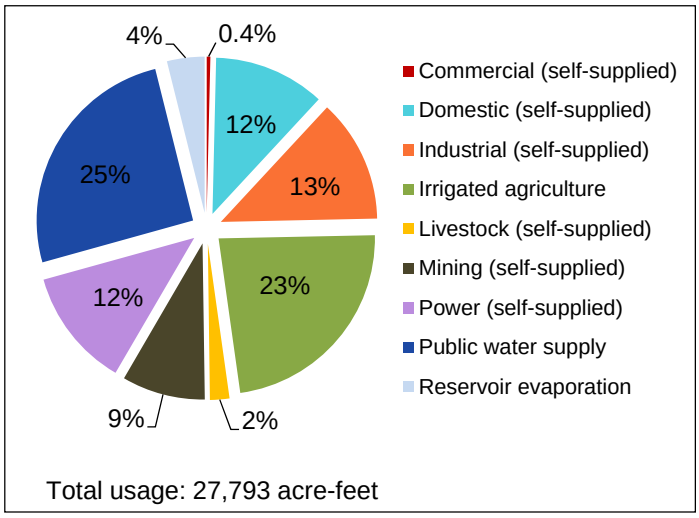


Figure ES-2. Total Regional Water Use, 2010

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.

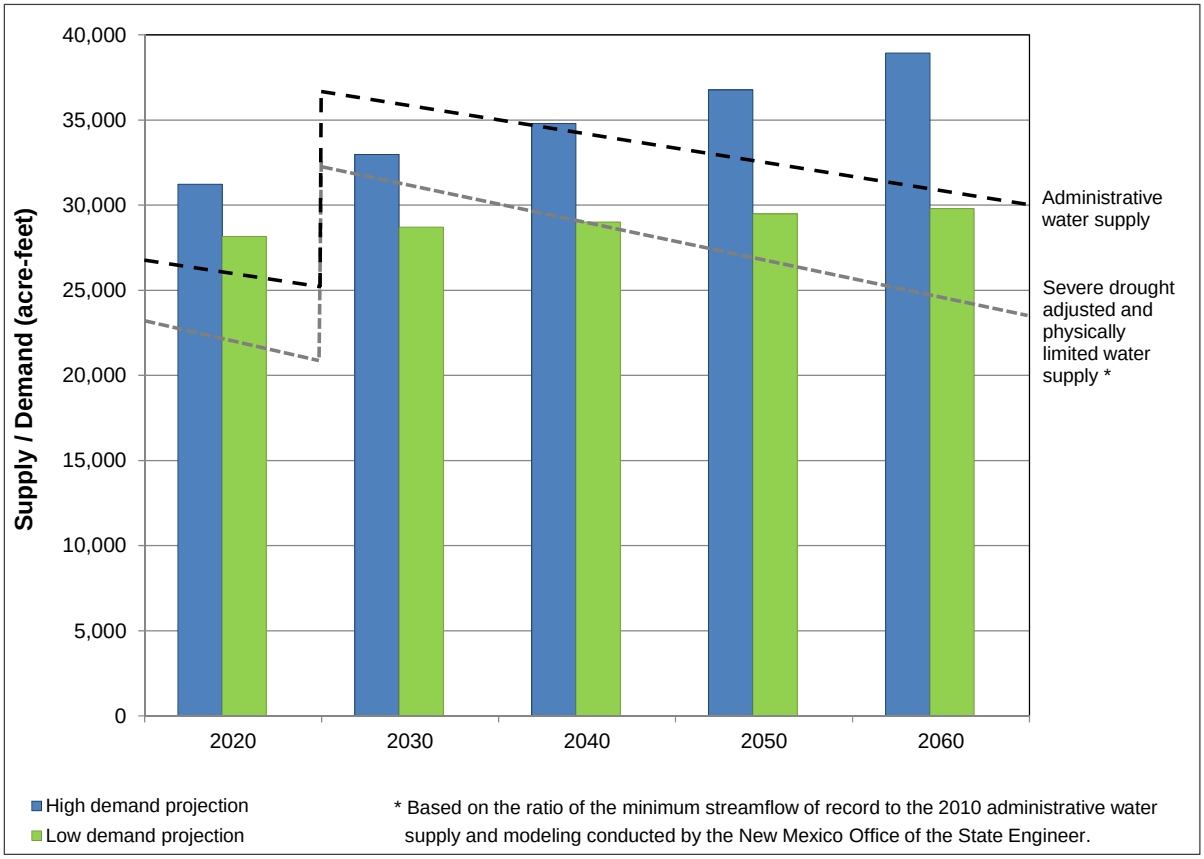


Figure ES-3. Available Supply and Projected Demand

Note: 1. 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.

2. The increase in administrative and drought-adjusted water supplies in year 2024 is due to the Navajo-Gallup Water Supply Project coming online.

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.
- 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.

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.

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 Northwest New Mexico 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 Northwest New Mexico region include the following:

- Current municipal and domestic uses are causing substantial groundwater level declines, most notably near the City of Gallup, where water levels have declined over 800 feet since the 1970s.

- Most of the water used in the City of Gallup and nearby communities is pumped from the Gallup Sandstone and Dakota-Westwater aquifers. These aquifers are deep, and static water levels in the aquifers have declined up to several hundred feet during the past 30 years. The current groundwater use by the City of Gallup is not sustainable. Groundwater in the basin is used for municipal (City of Gallup) supply, small rural community water supply, individual household use, and livestock, minerals processing, and road construction purposes.

- The surface water supplies in the region are very limited, and seasonal shortages to surface water uses in the basin occur frequently.

- The San Juan River Basin in New Mexico, Navajo Nation Water Rights Settlement Agreement (San Juan Navajo Water Rights Settlement) was approved by Congress in March 2009 and signed into law by the President of the United States as part of the Northwestern New Mexico Rural Water Projects Act. The Act authorized construction of the NGWSP to (1) service municipal and domestic water demands of Navajo Nation communities in the San Juan and Little Colorado river basins in New Mexico using diversions from the San Juan River and (2) provide a renewable surface water supply from the San Juan River to the City of Gallup. Development of the NGWSP is needed for the City of Gallup, 43 chapters of the neighboring Navajo Nation, and the Teepee Junction area of the Jicarilla Apache Nation to replace currently used but diminishing groundwater supplies with renewable surface water supplies to meet projected municipal

and domestic water demands in the Little Colorado River Basin in New Mexico. The project is required to be completed by December 31, 2024 and will provide up to 37,760 acre-feet per year.

- For the climate divisions within the planning region, 2011, 2012, and 2013 were all moderate to extreme drought years (NCDC, 2014), and the winter snowpack for 2014 was also very low.

- Ongoing water supply shortages for the City of Grants and the Village of Milan are ongoing concerns for the region. Water quality issues in the aquifers that these communities rely on limit the use of the water resources.

- There are many small rural drinking water systems within the region. 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 can be a financial and logistical challenge for these small systems. However, because groundwater supplies are diminishing, interconnection of these systems to a sustainable supply such as the NGWSP is necessary for a long-term water supply to these communities.

- Many communities also need to improve community wastewater systems and conduct watershed restoration in order to protect water quality.

- Some communities such as Laguna Pueblo have public water supply wells in the alluvium, which may be more susceptible to contamination than deeper aquifers.

- The potential development of the Roca Honda uranium mine northwest of Grants is a concern in the region due to potential impacts to water supply and water quality.

- Portions of the region are vulnerable to flooding. The Federal Emergency Management Administration (FEMA) provides floodplain maps for New Mexico that define hazard areas and indicate flood insurance rate boundaries. These maps can help to define areas and infrastructure that are vulnerable to flooding during extreme climate events, helping the region prepare for extreme precipitation. These maps do not consider the impact of climate change, which is predicted to cause more extreme precipitation events and even greater flooding impacts than presented on the FEMA maps. Communities can work to make their watersheds more resilient by assessing the adequacy of bridges and culverts to sustain peak flow events.

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 support their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2004 Northwest New Mexico RWP recommended the following strategies for meeting future water demand:

- Develop new water supplies
  - Navajo-Gallup Water Supply Project implementation
  - Gallup regional water distribution system
  - Drill new wells in Gallup sandstone
- Water conservation and reuse
  - Conservation initiatives to reduce municipal water use (per capita use)
  - Develop a reuse plan
- River and watershed restoration
  - Rio Puerco restoration
  - Zuni River restoration
- Public outreach
  - Technical advisory boards and citizen panels
  - Regional planning committee
  - Hire a regional water planning coordinator
- Funding source for enhancing local water supplies
- Regionalization: Small water system collaboration and interconnection
- Drought contingency plan

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

During the two-year update process the Northwest New Mexico 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 New Mexico Environment Department 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 Northwest New Mexico region, projects identified on the PPP table are primarily water system infrastructure, irrigation system upgrades, and watershed restoration projects.

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 Northwest New Mexico region stakeholders:

- *Watershed, Forest and Stream Restoration.* Implement thinning, restoration, and treatment in the watershed and streams in the San Jose/Bluewater Creek area and in the Mt. Taylor and Zuni Mountains areas. Rio San Jose and Puerco River restoration efforts should include salt cedar and sediment removal. A hydrologic model is needed to guide watershed restoration projects to ensure increased recharge and streamflow.

- *Water Planning, Data Sharing, and Communication.* Implement a Rio San Jose East and West Side Water Forum. Organize two separate meetings to discuss shared values related to water and risks to the resources including water quality concerns, further data needs, and implementation at the local level.

- *Groundwater Monitoring and Modeling.* Develop a groundwater monitoring program. Ensure that data collected are incorporated into regional models.

- *Small Water System Regionalization and Capacity Development.* Create a county-wide water and sanitation district to include service areas of small water systems. Technical assistance is needed for small water system capacity development and operations. Provide funding to Aqua Mesa Domestic Water Alliance to hire a Level 4 operator that will provide assistance to small water systems in the region. Record-keeping assistance and county-wide engineering technical assistance are needed.

- *Water System Upgrades, Improvements, and Well Development.* Many water suppliers in the region require funding for water system improvements, upgrades, and well drilling. As water levels decline, suppliers will need additional wells to meet future demand.

The 2016 Regional Water Plan 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

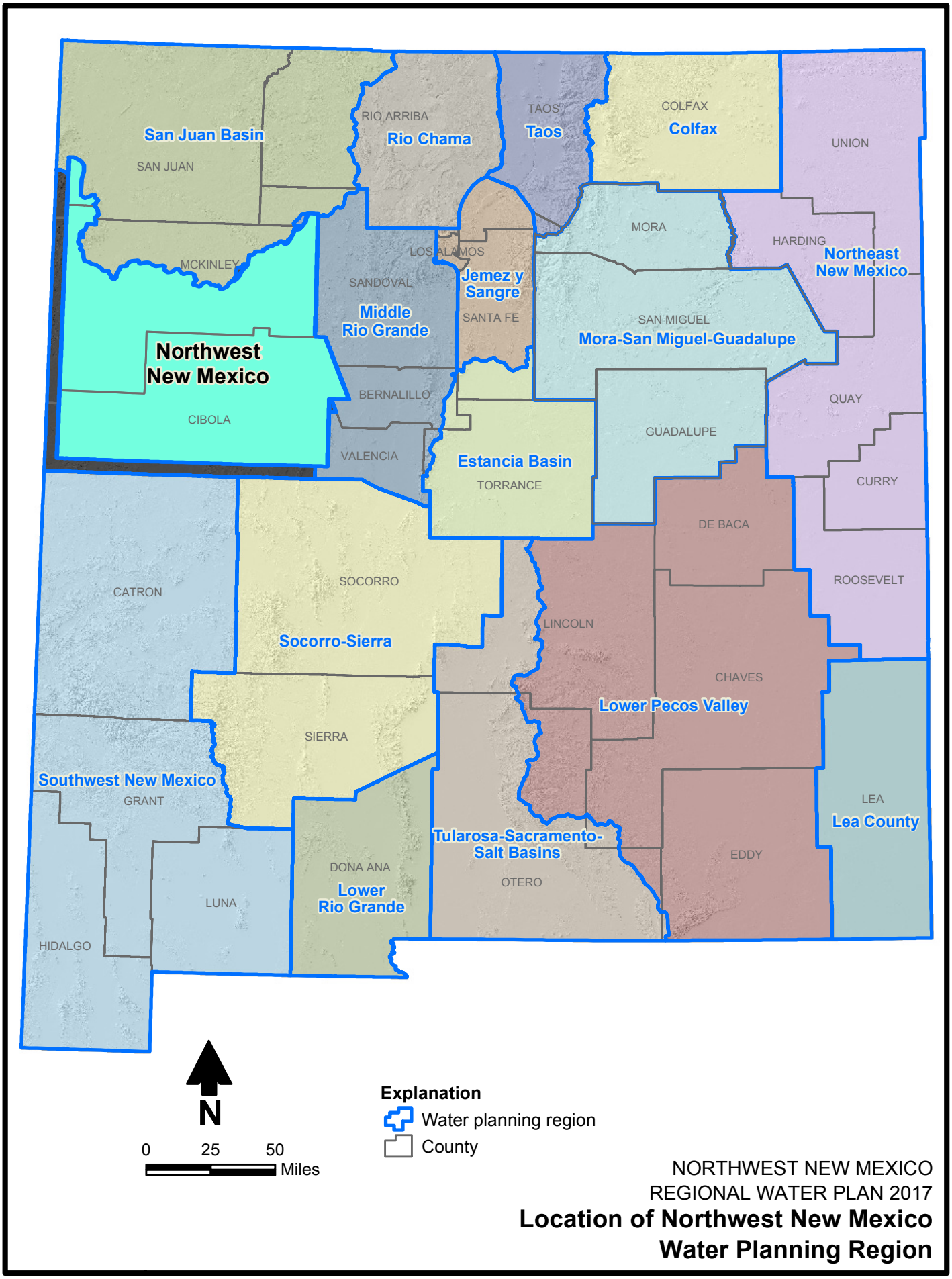
The Northwest New Mexico Water Planning Region, which encompasses primarily Cibola County and the part of McKinley County that is not in the San Juan Basin (Figure 1-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary 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. An initial Northwest New Mexico water plan was completed in 1998 (Northwest New Mexico Council of Governments [NWNMCOG], 1998), and the *Cibola/McKinley Regional Water Plan*, was completed January of 2004 and accepted by the NMISC that same year (NWNMCOG] 2004).

The purpose of this document is to provide new and changed information related to water planning in the Northwest New Mexico 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 1998 and 2004 plans 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 Northwest New Mexico 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 types of strategies that will help to balance supplies and projected demands and address the Northwest New Mexico 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. Tribes and pueblos in New Mexico are not required to provide water use data to the State, and so tribal water use data are not necessarily reflected in this RWP update.

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):



NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Location of Northwest New Mexico Water Planning Region

Figure 1-1

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- 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.
- Section 3 provides background information regarding the characteristics of the Northwest New Mexico 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 the 1998 and 2004 RWPs; key information from that plan is summarized in Section 5, with additional information, including from studies that have become available since 2004, 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 the 2004 RWP. Section 6 provides updated population and water use data, which are then used to develop updated projections of future water demand.

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.

* *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 plan.*

- 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.

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 (PPP) 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, 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, tribal and 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 Northwest New Mexico planning region 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 *Northwest New Mexico Regional 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] and comments received from the public on Section 8.)

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 representative to participate in the regional water planning process

Section 2.2 provides additional detail regarding the public involvement process for the Northwest New Mexico 2016 regional water plan.

2.2 Public Involvement in the Northwest New Mexico 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 Northwest New Mexico Water Planning Region established a representative steering committee, the members of which are listed in Table 2-1.

The steering committee includes several state and federal agency and tribal 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 and were identified as technical resources to the region. These individuals received meeting invitations and water planning materials, but may not have been able to participate in the meetings. The list also includes non-profit groups who are involved in local water-related initiatives and/or have expertise such as watershed restoration or small water systems concerns and issues. The key contacts for this regional water plan are Jeff Kiely and Brandon Howe of the Northwest New Mexico Council of Governments.

The steering committee discussed the value of developing subcommittees and determined that while subcommittees may be a useful means of enhancing the planning effort and ensuring implementation of the RWP, it was not feasible to hold separate meetings in addition to the meetings organized and facilitated by the NMISC.

Table 2-1. Steering Committee Members, Northwest New Mexico Water Planning Region

Water User Group	Name	Organization / Representation
Agricultural – groundwater user	Kathy Landers, County Extension Agent	McKinley County Extension Office New Mexico State University
Agricultural – groundwater user (identified as a technical resource for the region)	Dudley Byerley, Board President	McKinley Soil and Water Conservation District (SWCD)
Agricultural – surface water user Acequias		Bluewater Toltec Irrigation District
Rural water provider	Sherry Botkin	Thoreau Water & Sanitation District
	Mike Daly	White Cliffs MDWCA
County government	Douglas W. Decker, County Attorney	McKinley County
	Carol Bowman-Muskett, Commissioner	McKinley County
	Tony Boyd	Cibola County Manager
	Judy Horacek	Cibola County Special Programs Officer
County government (identified as a technical resource for the region)	Pat Simpson, Commissioner	Cibola County Commission
	Lloyd Felipe, Commissioner	Cibola County Commission
Municipal government	Paul Peña, Public Works Director	City of Grants
	Marcella Sandoval, Village Manager	Village of Milan
	Vincent Tovar, Executive Director	Gallup Joint Utilities, City of Gallup
Tribal government	Steve Juanico	Acoma Pueblo
	Jason John, Director	Department of Water Resources, Water Management Branch, Navajo Nation
	Ben Cowboy	Navajo Nation Water Rights Commission
	Teresa Showa	Navajo Nation Department of Water Resources, Water Management Branch
	Donald Benn	Navajo Nation EPA
Tribal participants/observers (not steering committee members)	Dr. Sharon Hausam, Planning Program Manager	Pueblo of Laguna Planning Program
	Kirk Bemis	Zuni Pueblo Conservation Program
	Andres Cheama	Zuni Pueblo Water Rights
Environmental interest	Matt Piccarello	Community Forestry Coordinator, Forest Guild

Table 2-1. Steering Committee Members, Northwest New Mexico Water Planning Region

Water User Group	Name	Organization / Representation
Extractive industry	Joe Lister, Mine Manager	Mt. Taylor Mine, Rio Grande Resources
Federal agency (identified as technical support to the region)	Pat Page, Project Leader	Navajo-Gallup Water Supply Project Western Colorado Area Office, U.S. Bureau of Reclamation
	Bernadette Tsosie, Hydrologist	Bureau of Indian Affairs
	Rudy Keedah	Bureau of Indian Affairs
	Roger Slape	Navajo Area Indian Health Service
	Jeanne Dawson, District Ranger	U.S. Forest Service/Cibola National Forest
	Steve Etsitty, Executive Director	Navajo EPA
	Herilene Yazzie	Bureau of Indian Affairs
	Evert Oldham, Rural Development Area Director	USDA
State agency (identified as technical support to the region)	Attila Bality	National Park Service/El Morro
	Steven Ikeda	New Mexico State Land Office
	David Bishop	New Mexico Environment Department
State agency	Jeff Kiely, Executive Director	Northwest New Mexico Council of Governments
Local (retail) business (identified as technical support to the region)	Bill Lee, President & CEO	Gallup/McKinley County Chamber of Commerce
	Dominic Orozco, President Tessa Jimenez	Grants Cibola Chamber of Commerce
	Eileen Yarbrough, Executive Director	Cibola Communities Economic Development Foundation
	Patty Lundstrom, Executive Director	Greater Gallup Economic Development Corporation
	Michael Sage, Deputy Director	Greater Gallup Economic Development Corporation
	Miles Morgan, Water Resources Engineer	Tri-State Generation & Transmission
	Mack Juarez, Member Services Manager	Continental Divide Coop
Other groups identified by the steering committee as technical support to the region	Lee Maestas, Board President	Cebolleta Land Grant

Table 2-1. Steering Committee Members, Northwest New Mexico Water Planning Region

Page 3 of 3

Water User Group	Name	Organization / Representation
Other groups identified by the steering committee as technical support to the region	Johnty Cresto	Gallup McKinley County Schools – Director of Construction
Other groups as identified by the steering committee	Marc DePauli	Engineer working with various municipalities
Watershed interest	Larry Winn	McKinley & Lava SWCD

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, 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:

- Gallup and Grants, New Mexico are the preferred meeting locations.
- The meeting room at the New Mexico Council of Governments in Gallup and the Cibola County Building in Grants were suggested as meeting spaces.
- Afternoons would be the best time for meetings.
- Steering committee members will continue to assist with outreach.

Over the two-year update process, seven meetings were held in the Northwest New Mexico region. A summary of each of the meetings is provided in Table 2-2.

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 regional steering committee should continue to meet quarterly.
- Meetings should be held at different locations throughout the region.

3. Description of the Planning Region

This section provides a general overview of the Northwest New Mexico Water Planning Region. General information, including maps illustrating the land use and general features of the region, was provided in the 1998 and 2004 RWPs and is updated as appropriate here. Additional detail on the climate, water resources, and demographics of the region is provided in Sections 5 and 6.

Table 2-2. Northwest New Mexico Region Public Meetings

Date	Location	Purpose	Meeting Summary
FY 2014			
3/19/2014	Grants, New Mexico	Kickoff meeting: Present the regional water planning update process to the region and continue to conduct outreach to begin building the steering committee.	The initial meeting took place in conjunction with the Northwest New Mexico Council of Governments meeting. 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			
12/5/2014	Gallup, New Mexico	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.
5/7/2015	UNM Gallup, Student Services Building, Gallup, New Mexico	Review the update process and the timeline for completing the regional water plan (RWP) update.	The meeting began with an overview of the RWP update process and timeline. The group discussed the region's role in public involvement and developing future projects, policies, programs (PPPs) as well as new information from the region and/or the PPPs that had been implemented since the 2004 plan. The group further discussed where future meetings would be held and the time that worked the best for getting the most attendance. A date was set for the next meeting.

Table 2-2. Northwest New Mexico Region Public Meetings
Page 2 of 3

Date	Location	Purpose	Meeting Summary
6/4/2015	Northwest New Mexico Council of Governments Building, Gallup, New Mexico	Review projects completed since submission of the accepted plan and provide additional input. Discuss potential collaborative projects.	The group discussed alternatives and projects completed since submission of the accepted plan. The group further discussed issues of greatest concern and identified potential collaborative projects such as watershed restoration needs, water system regionalization/cooperation, watershed restoration, drought contingency planning, municipal conservation and reuse, local and state water policy recommendations, and water quality protection. The future project checklist was reviewed and discussed, and a deadline for sending information to the consultants was confirmed. The group discussed elements that would be included in the public involvement chapter and ideas for FY 2015-2016 outreach. Jeff Kiely was identified as a key contact person for the region. The consultants affirmed the next steps for the RWP update effort and a general idea for how and when meetings would begin again in FY 2015-2016.
FY 2016			
2/11/2016	Northwest New Mexico Council of Governments Building, Gallup, New Mexico	Review steering committee membership and leadership. Focus on the PPPs to be included in the update and the process for submitting comments to the draft RWP.	The group reviewed the steering committee membership and added individuals to fill vacancies. The steering committee and interested stakeholders present participated in a brainstorming activity that helped to identify regional projects with potential for the greatest collaboration and effort. The next steps for the RWP update effort and a general idea for meeting again in FY 2016 were affirmed.

Table 2-2. Northwest New Mexico Region Public Meetings
Page 3 of 3

Date	Location	Purpose	Meeting Summary
3/23/2016	Cibola County Building, Grants, New Mexico	Refine the key collaborative PPP recommendations specific to Section 8.	The group identified a number of projects that would potentially have greater interest and benefit multiple stakeholders, and in a small group format using worksheets, added additional information. The final meeting was scheduled for June 14, 2016.
6/14/2016	El Morro Event Center, Gallup, New Mexico	Review the Public Involvement section (2) and the Section 8 key strategies and PPP list.	The steering committee reviewed the updated drafts of Sections 2 and 8 as well as the single comment document. Additional comments were submitted by Zuni Pueblo to be added to the single comment document. The group discussed the comments. Final edits to all documents were noted and will be incorporated prior to submission of these sections to the NMISC on June 30.

3.1 General Description of the Planning Region

The Northwest New Mexico Water Planning Region is located in northwestern New Mexico and encompasses Cibola County, roughly two-thirds of McKinley County, and a small area of San Juan County. The region is bounded on the northeast by the continental divide, the northwest by the divide between the Little Colorado River basin and the San Juan River basin boundary, and the far northwest by the Chuska Mountains in McKinley and San Juan counties (San Juan Basin planning region). On the east it is bounded by Valencia, Bernalillo, and Sandoval counties (Middle Rio Grande planning region), on the south by Catron and Socorro counties (Southwest and Socorro-Sierra planning regions), and on the west by Arizona (Figure 1-1).

The total area of the planning region is approximately 8,314 square miles, distributed among the three counties as follows:

- San Juan: 118 square miles
- McKinley: 3,650 square miles
- Cibola: 4,547 square miles

The Zuni, Acoma and Laguna Pueblos and part of the Navajo Nation are located within the Northwest New Mexico Water Planning Region.

Non-renewable resources in the region include natural gas, oil, coal, uranium, cinder, crushed stone, perlite, and vanadium. Renewable resources in the region include lumber and wood products, rangeland, solar power, and wind power. The Cibola National Forest covers parts of the Northwest New Mexico region and provides commercial and recreational opportunities in the region.

Resource extraction has traditionally been a major industry in this region. In the 1970s and 1980s, uranium mining was extensive, and there has recently been renewed interest in uranium mining in the region. Coal, oil, and natural gas production have been consistent industries in the region, although the level of production has fluctuated considerably at times. Tourism is also important in the region, largely a result of the long history of Native American traditions and culture in the region, coupled with the spectacular natural beauty of the area (NWNMCOG, 1998).

3.2 Climate

Climatic conditions vary widely in the region, based on elevation and topography. Given this variation, along with the limited number of weather stations, region-wide generalizations regarding the region's climate are problematic. Based on the available data, temperatures vary from mean annual highs of 68 degrees Fahrenheit (°F) in the lower elevations to mean annual lows of about 30°F in the higher elevations, and average annual precipitation varies from less

than 10 to more than 30 inches per year. Snowfall varies from a low average annual amount of 1 inch in Rice Park to a high of 47 inches at Bowl Canyon.

3.3 Major Surface Water and Groundwater Sources

Surface water is extremely limited. Most streams within the region are ephemeral, although some include man-made impoundments that may contain water year-round. The principal surface water drainages are the Rio San Jose, which ultimately discharges to the Rio Grande in Cibola County, and the Zuni River, which drains into the Little Colorado River in Arizona (Figure 3-1). Surface waters are typically used for agriculture and stock watering. The principal aquifers are the San Andres and Glorieta within the Bluewater Basin and the Gallup Sandstone and Dakota-Westwater within the Gallup Basin.

OSE-declared underground water basins (UWBs) in the region include the Bluewater, Gallup, and Rio Grande (Middle) UWBs and a small portion of the San Juan UWB. (A declared UWB is an area of the state proclaimed by the State Engineer to be underlain by a ground water source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of ground water from the source.) The Bluewater UWB falls entirely within the Northwest New Mexico region, but the other three UWBs are shared with other water planning regions, as follows:

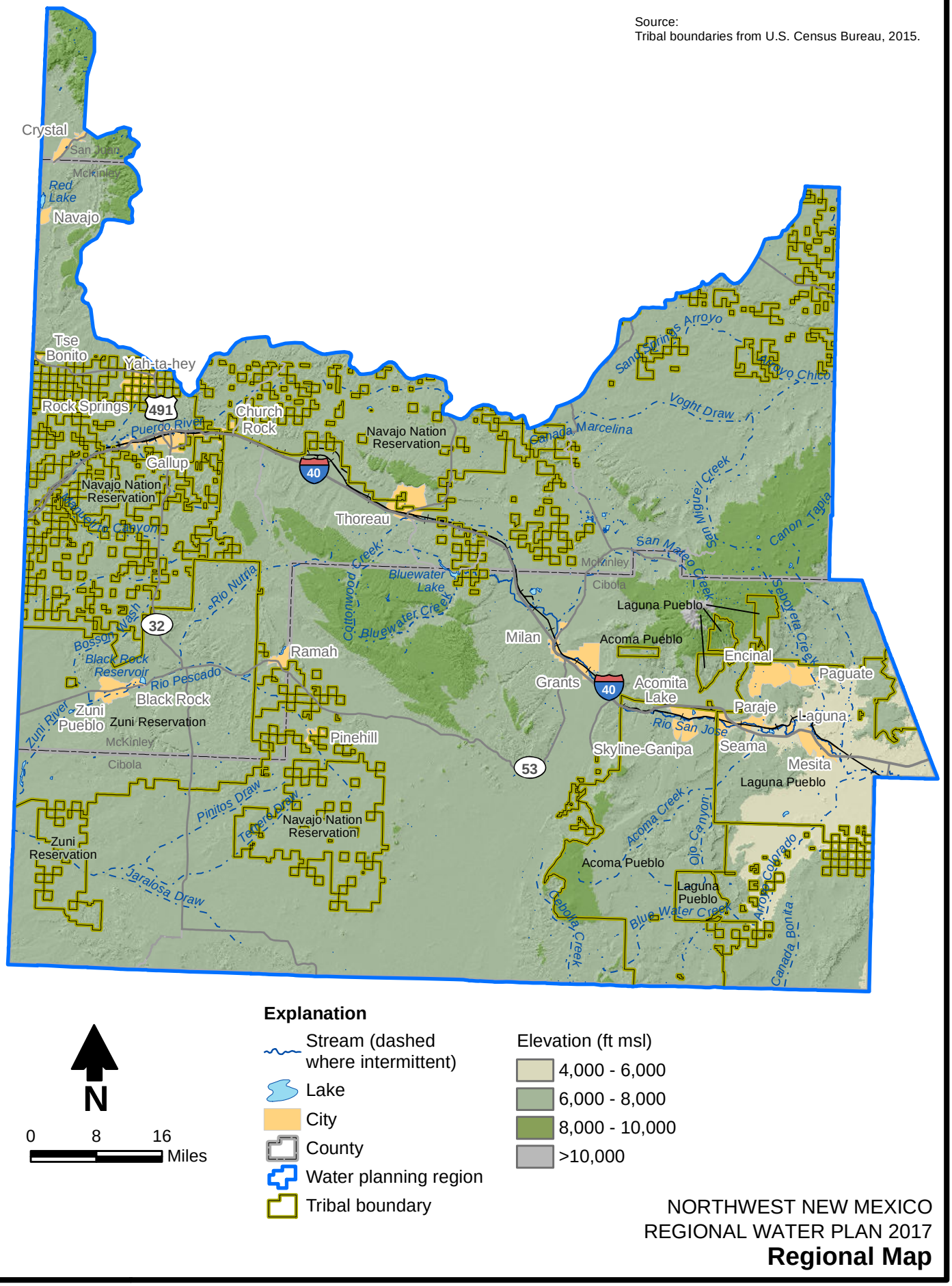
- Gallup: Southwest New Mexico
- Rio Grande UWB (Middle): Middle Rio Grande and Socorro-Sierra
- San Juan: San Juan Basin

Several other, more distant water planning regions extend slightly into the Rio Grande UWB (Middle), but their use of the UWB does not significantly impact the Northwest New Mexico 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.

3.4 Demographics, Economic Overview, and Land Use

The 2013 population of Cibola County was 27,235, while the population of all of McKinley County was 73,308 (U.S. Census Bureau, 2014a). Gallup is McKinley County's largest municipality. As shown in Table 3-1, from 2000 to 2010, Cibola County experienced moderate growth, McKinley County lost population, and San Juan County experienced a high rate of population growth. Since 2010, there has been a decline in San Juan County, growth in McKinley, and little change in Cibola.



NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Regional Map

Figure 3-1

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Table 3-1. Summary of Demographic and Economic Statistics for the Northwest New Mexico Water Planning Region

a. Population

County	2000 Total	2010		2013
		Total	Within Region [a]	
San Juan	113,801	130,044	410	126,503
McKinley	74,798	71,492	60,096	73,308
Cibola	25,595	27,213	27,213	27,335
Total Region	214,194	228,749	87,719	227,146

Source: U.S. Census Bureau, 2014a, unless otherwise noted.
[a] U.S. Census Bureau, 2010

b. Income and Employment

County	2008-2012 Income [a]		Labor Force Annual Average 2013 [b]		
	Per Capita ($)	Percentage of State Average	Number of Workers	Number Employed	Unemployment Rate (%)
San Juan	NA	NA	NA	NA	NA
McKinley	13,445	57	25,812	23,417	9.3
Cibola	15,508	65	12,027	11,261	6.4

[a] U.S. Census Bureau, 2014c, American Community Survey 5-Year Estimate
[b] NM Department of Workforce Solutions, 2014

c. Business Environment

County	Industry	Number Employed	Number of Businesses
	2008-2012 [a]		*2012* [b]
San Juan	NA	NA	NA
McKinley	Education/Healthcare	7,819	992
	Retail trade	3,470	
	Entertainment, recreation, arts, hospitality, restaurant	2,364	
	Public administration	2,034	
	Manufacturing	1,990	
	Construction	1,585	

Table 3-1. Summary of Demographic and Economic Statistics for the Northwest New Mexico Water Planning Region

c. Business Environment (continued)

County	Industry	Number Employed	Number of Businesses
	2008-2012 [a]		*2012* [b]
Cibola	Education/Healthcare	2,328	333
	Entertainment, recreation, arts, hospitality, restaurant	1,458	
	Retail trade	1,210	
	Public administration	1,015	

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

d. Agriculture

County	Farms / Ranches [a]			Most Valuable Agricultural Commodities [b]
	Number	Acreage		
		Total	Average	
San Juan	NA	NA	NA	NA
McKinley	2,297	3,022,704	1,316	Cattle, calves
Cibola	522	1,559,974	522	Cattle, calves

[a] USDA NASS, 2014, Table 1
[b] USDA NASS, 2014, Table 2

McKinley County is about 60 percent Native American reservation and the only county in New Mexico with a larger Native American population (77.5 percent [U.S. Census Bureau, 2016b]) than of other descent (NWNMCOG, 1998). Although Cibola County does not have as high a percentage of American Indians and Alaska Natives as McKinley County, that population is still significant at 42.1 percent (U.S. Census Bureau, 2016a) with nearly 24 percent of the county's total area consisting of Native American lands (Western Rural Development Center, 2010). Land ownership in the region as a whole also includes federal, state, and private lands, as illustrated on Figure 3-2 and outlined below:

- Federal agencies: 1,957.4 square miles
- Tribes: 3,394.5 square miles
- State agencies: 495.8 square miles
- Private entities: 2,465.8 square miles

The largest employment categories in the region are education/healthcare, tourism-related services (arts, entertainment, recreation, hospitality, and food services), retail trade, public administration, manufacturing, and construction. Agriculture is the largest water user in Cibola County, followed by public water supply and industrial. The largest water use categories in McKinley are (in order) public water supply, power generation, mining, and domestic.

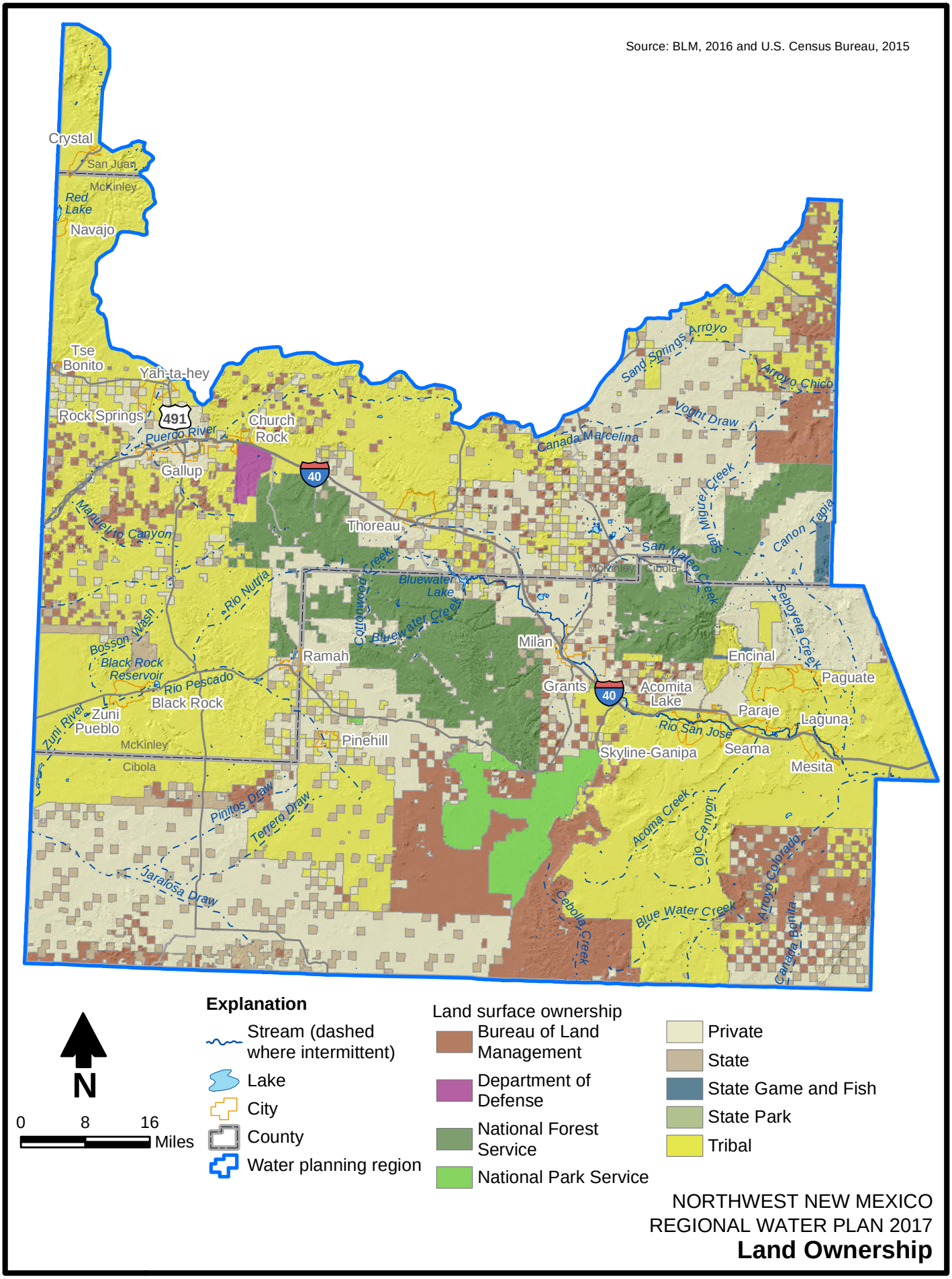
Current statistics on the economy and land use in each county, compiled from the U.S. Census Bureau and the New Mexico Department of Workforce Solutions, are summarized in Table 3-1. Additional detail on demographics and economics within the region is provided in Section 6.

4. Legal Issues

4.1 Relevant Water Law

4.1.1 State of New Mexico Law

The Region 6 *Cibola/McKinley Regional Water Plan* was accepted by the New Mexico Interstate Stream Commission in 2004. Prior to the 2004 plan, the 1998 draft water plan for the region contained a detailed discussion of legal issues (NWNMCOG, 1998, Section III). However, since 1998 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 Northwest New Mexico region is discussed in Section 4.1.2.



NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Land Ownership

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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) (2003). 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. 13.6 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 Northwest New Mexico 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 United States 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. In *Turner* 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, Section 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. No basins in the region have been named as priorities for the NMISC.

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

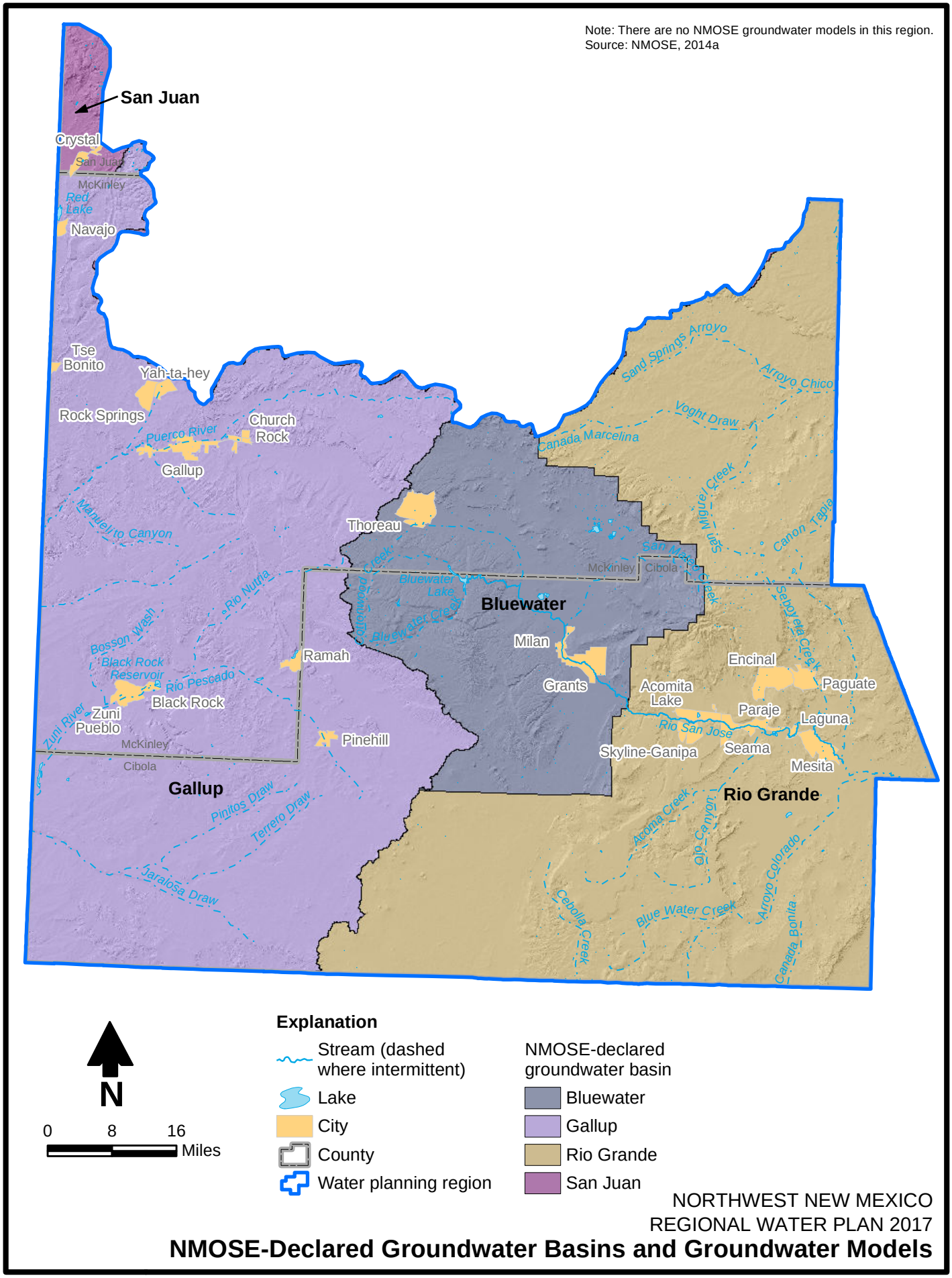
In New Mexico, water is administered generally by the State Engineer, who has the "general supervision of waters of the state and of the measurement, appropriation, distribution thereof and such other duties as required." NMSA 1978, § 72-2-1 (1982). To administer water throughout the state the State 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, within the Northwest New Mexico region there are two water masters assigned to the San Juan Basin.

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. The Northwest New Mexico region includes four UWBs: the Rio Grande, Bluewater, Gallup, and San Juan (Figure 4-1). No specific guidelines governing appropriations in any of the four UWBs have been set.



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NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

NMOSE-Declared Groundwater Basins and Groundwater Models

Figure 4-1

4.1.2.3 AWRM Implementation in the Basin

The San Juan basin has been designated as a priority basin for implementation of AWRM regulations, but AWRM regulations have not yet been implemented.

4.1.2.4 Special Districts in the Basin

Special districts are discussed in the 1998 plan, Section III. 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. In the Northwest New Mexico region, special districts include soil and conservation districts, which are governed by NMSA 1978, §§ 73-20-25 through 48. Another special district in the region is the Bluewater-Toltec Irrigation District.

4.1.2.5 State Court Adjudications in the Basin

In the Northwest New Mexico region one adjudication is currently ongoing: the Rio San Jose adjudication, *State of New Mexico ex rel. State Engineer v. Kerr-McGee Corporation, et al.*, Case No, CG-83-190-CV and CB-83-220-CV(Consolidated). The current proceeding is Subproceeding 1, the adjudication of the Acoma and Laguna pueblos' past and present water uses. In September 2002, the Court granted the joint motion of the State and the United States to establish an expedited *inter se* subproceeding ("Subproceeding 1") to adjudicate the water rights of Acoma Pueblo and Laguna Pueblo based on past and present uses of water. Discovery began in Subproceeding 1 in 2007 and concluded in November 2013. After the conclusion of discovery, and before the filing of dispositive motions on significant legal issues, settlement discussions began in March 2014 involving New Mexico, the United States, Acoma and Laguna pueblos, and other significant water users in the Rio San Jose stream system. Trial was scheduled to begin in July 2014, but the Special Master ordered a stay in the litigation schedule through calendar year 2014 to allow settlement discussions to continue. Due to the parties failing to reach a settlement, the Special Master in December 2014 denied a further stay of the Subproceeding 1 litigation schedule. New Mexico, the United States, Acoma Pueblo, and several other parties filed dispositive motions in May 2015 that were argued to the Special Master in October 2015. Subsequently, the Special Master has granted multiple stays in the litigation to allow for continued settlement discussions. Concurrently from late 2016 through early 2017 the Special Master will be hearing the trial testimony of four expert witnesses for Tri-State Generation and Transmission Association, Inc. New Mexico, the United States, Acoma and Laguna pueblos, and several other significant water users continue to participate in regular mediation sessions in the hope of reaching settlement on the matter.

4.1.2.6 Court Decrees

Two decrees in the San Juan adjudication may impact the Navajo Nation Water Rights Settlement, thereby impacting the Navajo-Gallup Water Supply Project, which will affect water planning in the region.

- Partial Final Judgment and Decree of the Water Rights of the Navajo Nation, CV-75-184 (11th Judicial District Court, San Juan County, NM) (11/1/2013). On appeal to the New Mexico Court of Appeals.

- Supplemental Partial Final Judgment and Decree of the Water Rights of the Navajo Nation, CV-75-184 (11th Judicial District Court, San Juan County, NM) (11/1/2013). On appeal to the New Mexico Court of Appeals.

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 2004 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. Because of its importance to the entire state, a description of the case is included here.

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 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. Elephant Butte Irrigation District and El Paso County Water Improvement District Number One have both sought to intervene in the case as well, claiming that their interests are not fully represented by the named parties. The motions to intervene along with a motion to dismiss filed by New Mexico are currently pending.

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 water rights on Indian lands are known as "*Winters* reserved rights." The *Winters* Doctrine provides that at the time the United States established an Indian reservation, it also reserved sufficient water to provide for the reservation as a permanent homeland. *Winters v. United States*, 207 U.S. 564 (1908). Neither the priority date nor the amount of *Winters* reserved rights is based on the historical actual beneficial use of water. Under the *Winters* Doctrine, the priority date is based on the date the federal government established the Indian reservation. A

Winters reserved right is quantified based on the amount of water needed to make the reservation a permanent homeland and to fulfill the purposes of the reservation.

Several courts have held that *Winters* rights are unique federally reserved rights because of the many purposes served by federally created Indian reservations. In 1963, the U.S. Supreme Court adopted the "practically irrigable acreage" standard for quantifying federal Indian reserved water rights through a determination of the number of acres that can be practically or feasibly irrigated on the reservation. *Arizona v. California*, 376 U.S. 546 (1963). In New Mexico, courts have faced a different question in the determination of Pueblo Indian water rights. Although one federal district court recognized historically irrigated acreage as the basis for determining the quantity of a pueblo's water right, there is no established law for determining Pueblo Indian water rights. *See New Mexico ex rel. State Engineer v. Aamodt, et al.*, 6:6-CV-6639 (D.N.M.).

Federally reserved lands within the Northwest New Mexico planning region include the following:

- Navajo Nation
- Ramah Navajo Nation
- Acoma Pueblo
- Laguna Pueblo
- Zuni Pueblo
- Cibola National Forest
- El Malpais National Monument
- El Malpais National Conservation Area
- El Morro National Monument
- Ft. Wingate (closed, but environmental cleanup continues)
- Bureau of Land Management lands
- Bureau of Land Management wilderness lands

4.1.3.2 Interstate Stream Compacts

Interstate compacts become federal law once ratified by Congress. The interstate stream compacts governing water use in the Northwest New Mexico region are discussed in the 1998 plan, Section III. The compacts in the planning region are:

- Rio Grande Compact
- Upper Colorado River Basin Compact
- Colorado River Compact

4.1.3.3 Treaties

The Colorado River, of which the Zuni River is a tributary, is subject to a 1944 international treaty between the United States and Mexico. *Treaty of the United States and Mexico on the Utilization of the Waters of Colorado and Tijuana Rivers and of the Rio Grande*, Feb. 3, 1944, U.S.-Mexico, T.S. No. 994.

The Rio Grande, of which the Rio San Jose is a tributary, is subject to a 1906 international treaty between the United States and Mexico for use of water of the Rio Grande. *Convention for the Equitable Distribution of the Waters of the Rio Grande of May 21, 1906 Between the United States and Mexico*, 34 Stat. 2953. This Treaty provides for the distribution between the United States and Mexico of the waters of the Rio Grande in the international reach of the river between the El Paso-Juárez Valley and Fort Quitman, Texas. Although this reach is below the region, any use of water upstream of this reach may impact the downstream distribution of water.

4.1.3.4 Federal Water Projects

The Navajo-Gallup Water Supply Project is important to the region. The project currently is under construction and will supply water from the Navajo Reservoir to 43 Navajo chapters, the Jicarilla Apache Nation, and the Gallup area. Funding for the project is authorized through the federally authorized Navajo Indian Water Rights Settlement, *Northwestern New Mexico Rural Water Projects Act*, Public Law 111-11, Title X, Subtitle B, which also limits the diversion and depletion amounts for the Project; specifically, the Project will result in a diversion of 22,650 acre-feet and a depletion of 20,780 acre-feet from the San Juan River.

4.1.3.5 Federal Adjudications in the Basin

One federal adjudication is ongoing in the Northwest New Mexico region: the Zuni adjudication, *In Re: United States of America & State of NM v. A & R Productions, et al*, Case No. 6:01-cv-00072-MV-WPL. The primary subfile work is occurring with the non-Indian claims; the Zuni Indian claims are currently in settlement discussions. Both the Zuni and Navajo tribes are actively involved in technical work related to settlement, and it is expected that the Navajo Nation claims will be addressed later in formal settlement discussions. Information regarding the Zuni adjudication can be found at http://www.zunibasin.com/.

4.1.4 Tribal Law

Within the Northwest New Mexico region, the Navajo Nation and the Pueblo of Laguna have water codes, while the pueblos of Acoma and Zuni do not. The Pueblo of Zuni does not have a water code, but does have a drought contingency plan. The stated purpose of the plan is to provide the Zuni Tribe with a policy and system for monitoring, assessing, and mitigating Zuni drought conditions, while supporting the sovereignty of the Zuni tribal government with respect to other governmental agencies when addressing drought situations on Zuni lands (Zuni Tribe and NRCE, 2001).

The Navajo Nation Water Code (1984) (22 N.N.C. §§ 1101 et seq.) applies to water use on the Navajo Indian Reservation and the Ramah Navajo Nation. The Code is applicable to "all the waters of the Navajo Nation," which include all surface and groundwater. The Code further declares that ". . . [I]t shall be unlawful for any person . . . to . . . make any use of . . . water within the territorial jurisdiction of the Navajo Nation unless . . . this Code [has] been complied with. No right to use water, from whatever sources, shall be recognized, except use rights obtained under and subject to this Code."

The Pueblo of Laguna water code restricts the drilling of domestic wells in the areas of Encinal Canyon and the sub-village of Philadelphia. These areas are considered "water control and pollution control areas," and domestic wells can only be drilled with the permission of the Tribal Council (Pueblo of Laguna, New Mexico Tribal Code: Title IX, Chap. 2 [Domestic Water Control]).

4.1.5 Local Law

Local laws addressing water use have been implemented by both municipalities and counties within the planning region. Because only a small portion of San Juan County lies within the planning region, the San Juan local laws are not addressed here; see the *San Juan Basin Regional Water Plan 2016* for a discussion of local laws in San Juan County.

4.1.5.1 Cibola County

Water use in Cibola County is guided by the *Final Comprehensive Plan for Cibola County, New Mexico* (R.M. Draker and Associates, 2015). The plan addresses water conservation and protection of the County's water resources to provide an assured water supply for the community. The plan suggests the following to meet these goals: site development standards to conserve water and minimize water loss; water harvesting and storage; low water use landscaping and plant materials; agricultural, residential, and commercial water use limitations; and recycling and reuse of water.

4.1.5.2 City of Grants

Water use in the City of Grants is guided by its municipal code.

4.1.5.3 Village of Milan

The Village of Milan regulates water use through a conservation plan.

4.1.5.4 McKinley County

Water use in McKinley County is governed by subdivision regulations and the *McKinley County Comprehensive Plan Update* (McKinley County, 2012).

Section 5.6 of the County's subdivision regulations require that subdivisions containing 20 or more parcels with at least 1 parcel of 2 acres or less have a State Engineer permit to appropriate or transfer water. Appendix B of the regulations outlines water availability requirements, and Appendix C outlines water quality requirements.

The comprehensive plan update sets the goal of ensuring a long-term, sustainable, and good-quality water supply for County residents and to increase access by County households to a public water supply. One strategy to meet this goal is encouraging water conservation measures.

4.1.5.5 City of Gallup

Water use in the City of Gallup is regulated through its City Code and is guided by a planning document, *Assuring Gallup's Water Future* (Gallup Water Board, 2012), which outlines recommendations to protect Gallup's water supply. The planning document addresses conservation, water infrastructure repair/upgrade/replacement, water source protection, watershed restoration, storm and gray water harvesting, and reuse.

The City Code prohibits water waste, Section 8.2.1, restricts irrigation, Section 8.2.5, and implements emergency water use restrictions, Section 8.2.6.

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.*

Below are some of the animal species in the planning region that are subject to protection under the ESA:

- Yellow-billed cuckoo (threatened): McKinley, San Juan, and Cibola counties
- Mexican spotted owl (threatened; implementation of final recovery plan): McKinley, San Juan, and Cibola counties
- Southwestern willow flycatcher (endangered; implementation of final recovery plan): McKinley, San Juan, and Cibola counties
- Zuni bluehead sucker (endangered): McKinley, San Juan, and Cibola counties

Of the threatened and endangered species found in the Northwest New Mexico region, the protection and recovery of the yellow-billed cuckoo, southwestern willow flycatcher, and Zuni bluehead sucker are most likely to affect water planning within the region because all rely on riparian habitat. Any actions that are likely to harm the habitat used by these species will be subject to strict review and possible limitation.

There is also a threatened riparian plant species with critical habitat in the planning region, the Pecos sunflower (*Helianthus paradoxus*). Management of the critical habitat area for the sunflower may also impact water use in the planning region.

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 Northwest New Mexico planning region, all of the federally listed species discussed above are protected also under the New Mexico Act.

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). Numerous river segments in the planning region 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.

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.

4.2.2.1 Tribal Law

Tribal water quality standards are discussed in the 2004 plan, pp. 19-20. The CWA, discussed in Section 4.2.2.1, affords Native American tribes the same status as states for purposes of implementing the Act's regulatory and permitting programs. Thus, a tribe can receive from EPA delegated authority to implement the Section 402 NPDES permit program and the Section 404 dredge and fill permit program. 33 U.S.C. § 1377(e). A tribe can also adopt water quality standards for EPA approval. 33 U.S.C. § 1377(e).

Several of the tribal nations within the Northwest New Mexico region have adopted water quality standards under the federal CWA and they monitor water quality on a regular basis.

- The Navajo Nation initially adopted surface water quality standards in 2006 and revised them on May 13, 2008. See *Navajo Nation Surface Water Quality Standards 2007* (adopted 2008). The EPA approved the standards in 2006.

- Acoma Pueblo adopted water quality standards in 1998 that were subsequently revised in 2005. See *Pueblo of Acoma Water Quality Standards* (2005). The EPA approved the standards in 2001.

- Laguna Pueblo has adopted surface water quality standards, which are set forth in the Pueblo of Laguna Code, Title XI, Chapter 2 (Water Quality Standards) (May 21, 2013). EPA approval of the standards is currently pending.

The Zuni Pueblo has no water quality standards.

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

There are ongoing legal challenges to the Navajo Nation Water Rights Settlement, the outcome of which will impact water planning in the region. The San Jose Adjudication continues to progress, which again is extremely important to water allocation in the region.

Other key issues including conflicts in the region identified by the region are summarized in Section 5.

5. Water Supply

This section provides an overview of the water supply in the Northwest New Mexico 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 and original regional water plans (NWNMCOG, 2004, 1998) and, where appropriate, updated with more recent information and data from a number of sources, as referenced throughout this section.

Currently some of the key water supply updates and issues impacting the Northwest New Mexico region are:

- Current municipal and domestic uses are causing substantial groundwater level declines, most notably near the City of Gallup, where water levels have declined over 800 feet since the 1970s (USBR, 2009).

- Most of the water used in the City of Gallup and nearby communities is pumped from the Gallup Sandstone and Dakota-Westwater aquifers. These aquifers are deep, and static water levels in the aquifers have declined up to several hundred feet during the past 30 years. The current groundwater use by the City of Gallup is not sustainable (Sterling

& Mataya, 1998). Groundwater in the basin is used for municipal (City of Gallup) supply, small rural community water supply, individual household use, and livestock, minerals processing, and road construction purposes.

- The surface water supplies in the region are very limited, and seasonal shortages to surface water uses in the basin occur frequently.

- On April 19, 2005, the State of New Mexico and the Navajo Nation signed the San Juan River Basin in New Mexico, Navajo Nation Water Rights Settlement Agreement (San Juan Navajo Water Rights Settlement), which was approved by Congress in March 2009 and signed into law by the President of the United States as part of the Northwestern New Mexico Rural Water Projects Act (Public Law 111-11, Title X, Subtitle B). As part of the San Juan Navajo Water Rights Settlement, the Act authorized construction of the Navajo-Gallup Water Supply Project (NGWSP) to (1) service municipal and domestic water demands of Navajo Nation communities in the San Juan and Little Colorado river basins in New Mexico using diversions from the San Juan River and (2) provide a renewable surface water supply from the San Juan River to the City of Gallup. Development of the NGWSP is needed for the City of Gallup, 43 chapters of the neighboring Navajo Nation, and the Teepee Junction area of the Jicarilla Apache Nation to replace currently used but diminishing groundwater supplies with renewable surface water supplies to meet projected municipal and domestic water demands in the Little Colorado River Basin in New Mexico. The project is required to be completed by December 31, 2024 and will provide up to 37,760 ac-ft/yr (USBR, 2015).

- For the climate divisions within the planning region, 2011, 2012, and 2013 were all moderate to extreme drought years (NCDC, 2014), and the winter snowpack for 2014 was also very low.

- Ongoing water supply shortages for the City of Grants and the Village of Milan were predicted in the accepted regional water plan (NWNMCOG, 2004) and this is an ongoing concern for the region. Water quality issues in the aquifers that these communities rely on limit the use of the water resources.

- There are many small rural drinking water systems within the region. 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 can be a financial and logistical challenge for these small systems. However, because groundwater supplies are diminishing, interconnection of these systems to a sustainable supply such as the NGWSP is necessary for a long-term water supply to these communities.

- Many communities also need to improve community wastewater systems and conduct watershed restoration in order to protect water quality.
- Some communities such as Laguna Pueblo have public water supply wells in the alluvium, which may be more susceptible to contamination than deeper aquifers.
- The potential development of the Roca Honda uranium mine northwest of Grants is a concern in the region for potential impacts to water supply and water quality.
- Portions of the region are vulnerable to flooding. The Federal Emergency Management Administration (FEMA) provides floodplain maps for New Mexico (https://www.fema.gov/states/new-mexico) that define hazard areas and indicate flood insurance rate boundaries. These maps can help to define areas and infrastructure that are vulnerable to flooding during extreme climate events, helping the region prepare for extreme precipitation. These maps do not consider the impact of climate change, which is predicted to cause more extreme precipitation events and even greater flooding impacts than presented on the FEMA maps. Communities can work to make their watersheds more resilient by assessing the adequacy of bridges and culverts to sustain peak flow events.

5.1 Summary of Climate Conditions

The accepted regional water plan (NWNMCOG, 2004) 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 Northwest New Mexico 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 the planning region and identifies two stations that were used for analysis of weather trends. These two stations were selected based on location, how well they represented conditions in their respective counties, and completeness of their historical records. In addition to the climate stations, data were available from ten snow course or snowpack telemetry (SNOTEL) stations and data from four of the stations were used to document snowfall in the region (Table 5-1). 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 representative 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.

Table 5-1. Northwest New Mexico Climate Stations

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Climate Stations [a]	Latitude	Longitude	Elevation	Precipitation		Temperature	
				Data Start	Data End	Data Start	Data End
McKinley County							
Black Rock	35.10	–108.78	6,453	6/1/1908	6/30/1949	6/1/1908	6/30/1949
Fort Wingate	35.47	–108.53	7,005	1/1/1897	7/31/1966	1/1/1897	7/31/1966
Gallup 5 E	35.53	–108.65	6,604	8/1/1918	12/31/1979	8/1/1918	12/31/1979
Gallup FAA Ap	35.51	–108.79	6,466	1/1/1973	Present	1/1/1973	Present
Gallup Ranger Stn	35.45	–108.57	7,106	8/1/1943	1/31/1975	8/1/1966	1/31/1975
Gamerco	35.60	–108.77	6,745	7/1/1922	5/31/1951	7/1/1922	5/31/1951
Gower	35.33	–108.75	7,306	5/1/1922	12/31/1948	6/1/1922	12/31/1948
Mc Gaffey 5 SE	35.34	–108.44	8,000	2/1/1949	1/31/2014	2/1/1949	1/31/2014
Mc Gaffey Ranger Stn	35.37	–108.52	8,005	10/1/1911	9/25/1948	11/1/1911	10/31/1947
Sheep Laboratory	35.45	–108.57	7,106	8/1/1943	1/31/1975	8/1/1966	1/31/1975
Thoreau 5 ENE	35.43	–108.15	7,100	10/1/1929	11/30/1992	9/1/1963	11/30/1992
Zuni	35.07	–108.84	6,311	3/1/1949	Present	3/1/1949	Present
Cibola County							
Acomita CAA Ap	35.05	–107.72	6,585	1/1/1941	4/30/1953	6/1/1946	4/30/1953
Bluewater 3 WSW	35.25	–108.03	6,804	7/1/1896	11/30/1959	5/1/1896	11/30/1959
Cubero	35.09	–107.52	6,195	1/1/1977	Present	1/1/1977	Present
El Morro CAA Airport	35.02	–108.40	7,123	3/1/1940	1/31/1949	3/1/1940	1/31/1949
El Morro Natl Monument	35.04	–108.35	7,223	3/1/1938	Present	3/1/1938	Present
Fence Lake 1 N	34.65	–108.68	7,083	8/23/1972	12/20/1972	11/1/1933	8/31/2008
Grants	35.17	–107.87	6,506	6/1/1945	10/31/1956	6/1/1945	10/31/1956
Grants Airport	35.17	–107.90	6,526	5/1/1953	Present	5/1/1953	Present
Laguna	35.05	–107.37	5,830	4/1/1905	3/31/2006	4/1/1905	3/31/2006

Source: WRCC, 2014

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

— = Information not available

NR = Temperature is not recorded at SNOTEL stations.

Table 5-1. Northwest New Mexico Climate Stations

Page 2 of 2

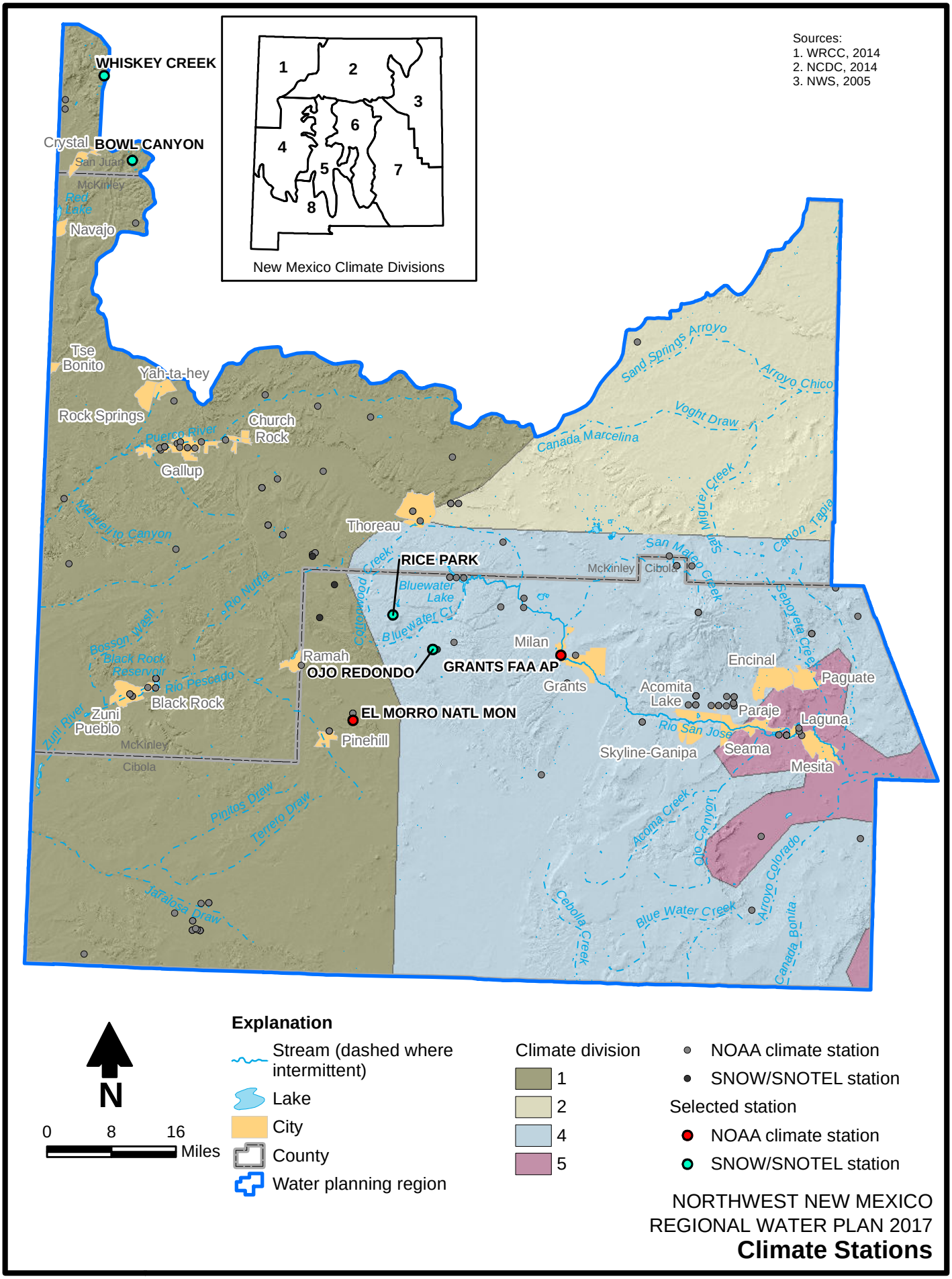
Climate Stations [a]	Latitude	Longitude	Elevation	Precipitation		Temperature	
				Data Start	Data End	Data Start	Data End
Cibola County (cont.)							
Marquez	35.30	–107.30	7,625	1/1/1942	10/31/1975	—	—
Ramah	35.13	–108.47	7,205	7/1/1922	5/31/1947	12/31/1940	5/31/1947
San Fidel 1 N	35.10	–107.60	6,165	5/1/1920	9/30/1976	6/1/1920	9/30/1976
San Mateo	35.33	–107.65	7,242	4/1/1918	2/28/1988	4/1/1918	2/28/1988
Thoreau 12 SE	35.30	–108.15	7,425	7/1/1994	Present	7/1/1994	Present
SNOTEL Stations							
Boon – Snow	35.28	–108.40	8,140	1994	Present	NR	NR
Dan Valley – Snow	35.22	–108.43	7,640	1994	Present	NR	NR
Ojo Redondo – Snow	35.17	–108.18	8,200	1982	Present	NR	NR
Post Office Flats – Snow	35.17	–108.17	8,400	1982	Present	NR	NR
Rice Park – Snow	35.23	–108.27	8,460	1982	Present	NR	NR
Rice Park – SNTL	35.23	–108.27	8,460	9/25/1998	Present	NR	NR
Mcgaffey – Snow	35.33	–108.45	8,120	1999	Present	NR	NR
Bowl Canyon – Snow	36.03	–108.88	8,980	1986	Present	NR	NR
Navajo Whiskey Ck – SNTL	36.18	–108.95	9,050	5/12/2009	Present	NR	NR
Whiskey Creek – Snow	36.18	–108.95	9,050	1986	Present	NR	NR

Source: WRCC, 2014

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

— = Information not available

NR = Temperature is not recorded at SNOTEL stations.



NORTHWEST NEW MEXICO
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Climate Stations

Figure 5-1

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Table 5-2. Temperature and Precipitation for Selected Climate Stations Northwest New Mexico Water Planning Region

Station Name	Precipitation (inches)				Temperature			
					Average (°F)			
	Average Annual [a]	Minimum [b]	Maximum [b]	% of Possible Observations [c]	Annual [d]	Minimum [e]	Maximum [e]	% of Possible Observations [c]
El Morro Natl Mon	13.81	7.78	19.62	98.7	47.5	30.9	64.1	83.5
Grants Airport	10.29	4.41	17.11	96.1	50.5	33.0	68.1	96.2

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.

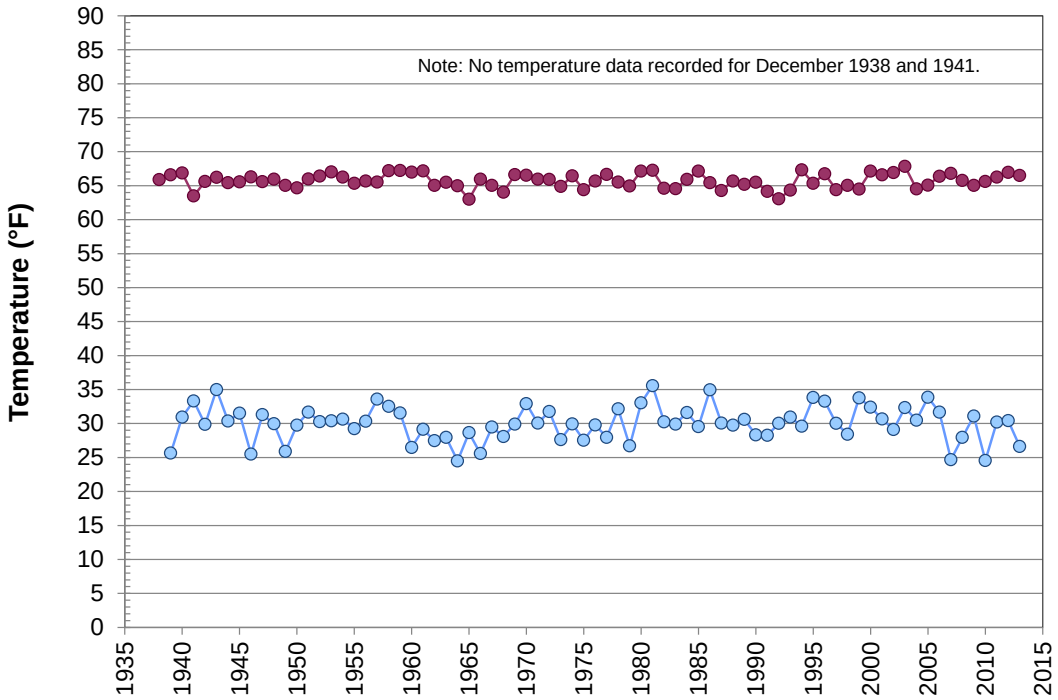
[b] Minimum and maximum recorded annual precipitation amounts for each station.

[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).

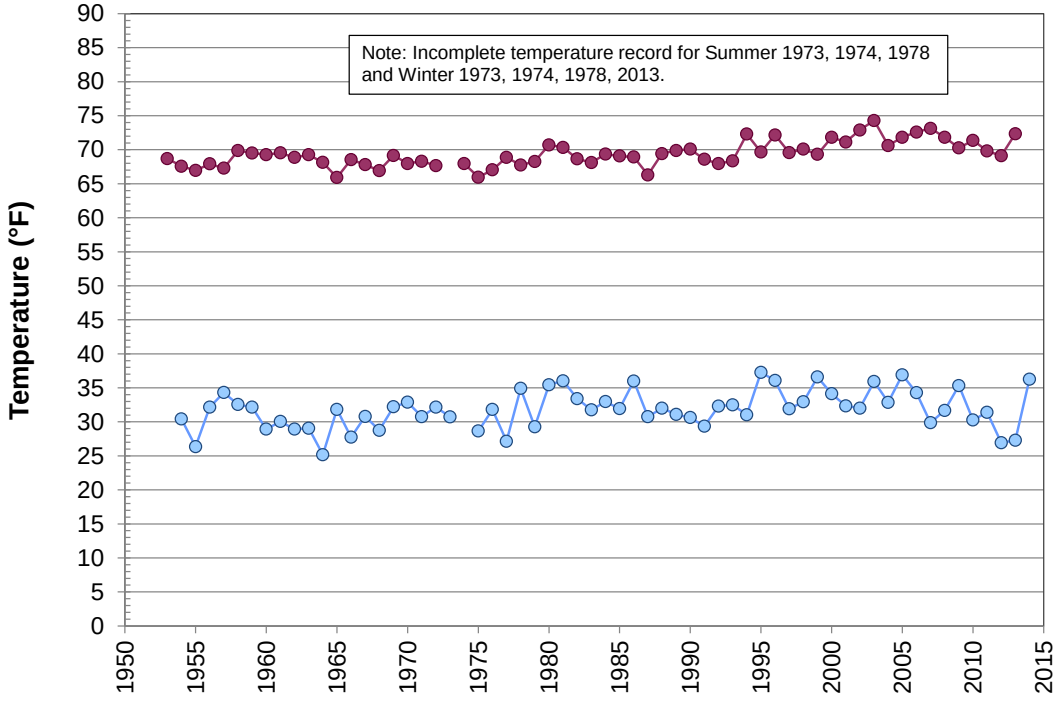
[d] Average of the daily average temperatures calculated for each station.

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

El Morro National Monument



Grants Airport



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Average Temperature, El Morro National Monument and Grants Airport Climate Stations

Figure 5-2

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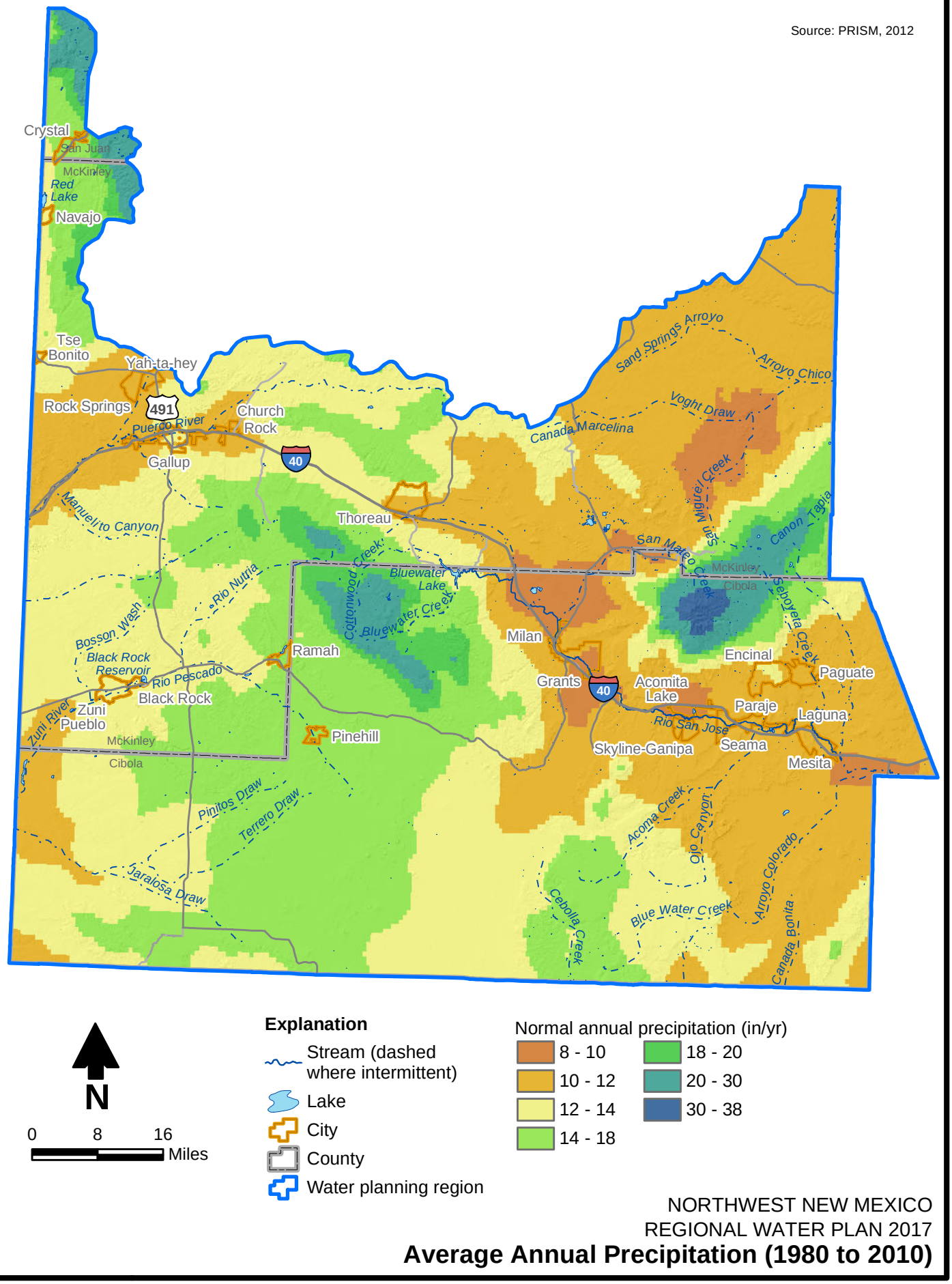
The average precipitation distribution across the entire region is shown on Figure 5-3, and Table 5-2 lists the minimum, maximum, and long-term average annual precipitation (rainfall and snowmelt) at the representative stations in the planning region. The long-term averages do not reflect the considerable variability of precipitation, which creates a direct challenge for water supply planning. The variability in total annual precipitation for the two selected climate stations is shown in Figure 5-4 and is also reflected in the snow data and drought indices discussed below. In addition to annual variability, monthly variability in precipitation and resulting streamflow also presents a challenge: snowmelt and/or monsoon flows may not occur at times when water is most needed for agriculture or other uses.

The Natural Resources Conservation Service (NRCS) operates two SNOTEL stations and eight snow course stations in the planning region; all ten stations provide snow depth and snow water equivalent data (Figure 5-5) (NRCS, 2014a). The following four stations were used to document snowfall in the region:

- The Ojo Redondo Snow Course site is located at an elevation of 8,200 feet above mean sea level (ft amsl) and has been operational since February 1982.
- The Rice Park SNOTEL site is located at an elevation of 8,460 ft amsl and has been operational since September 1998. The Rice Park Snow Course site has been operational since 1982.
- The Bowl Canyon Snow Course site is located at an elevation of 8,980 ft amsl and has been operational since January 1986.
- The Whiskey Creek Snow Course site is located at an elevation of 9,050 ft amsl and has been operational since January 1986.

The snow water equivalent is the amount of water, reported in inches, within the snowpack, or the amount of water that would result if the snowpack were instantly melted (NRCS, 2014b). The end of season snowpack is a good indicator of the runoff that will be available to meet water supply needs. A summary of the early April (generally measured within a week of April 1) snow depth and snow water equivalent information at the four selected stations is provided on Figure 5-5, which illustrates the zero to very low snowpack for 2011-2014.

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.



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NORTHWEST NEW MEXICO
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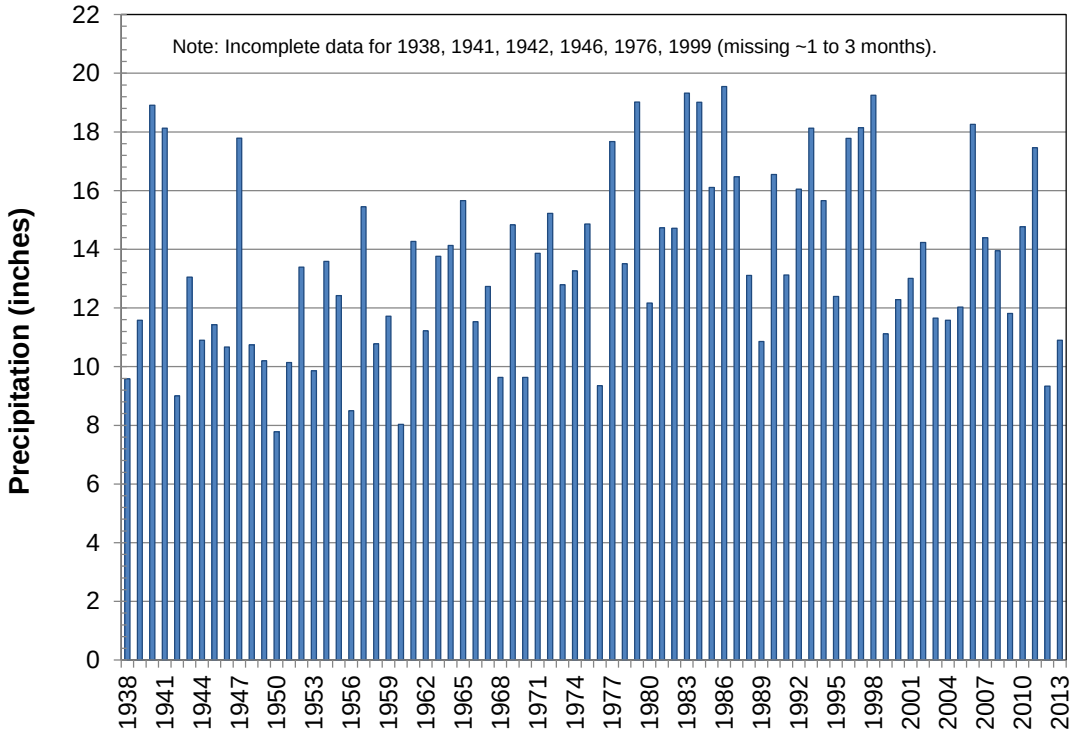
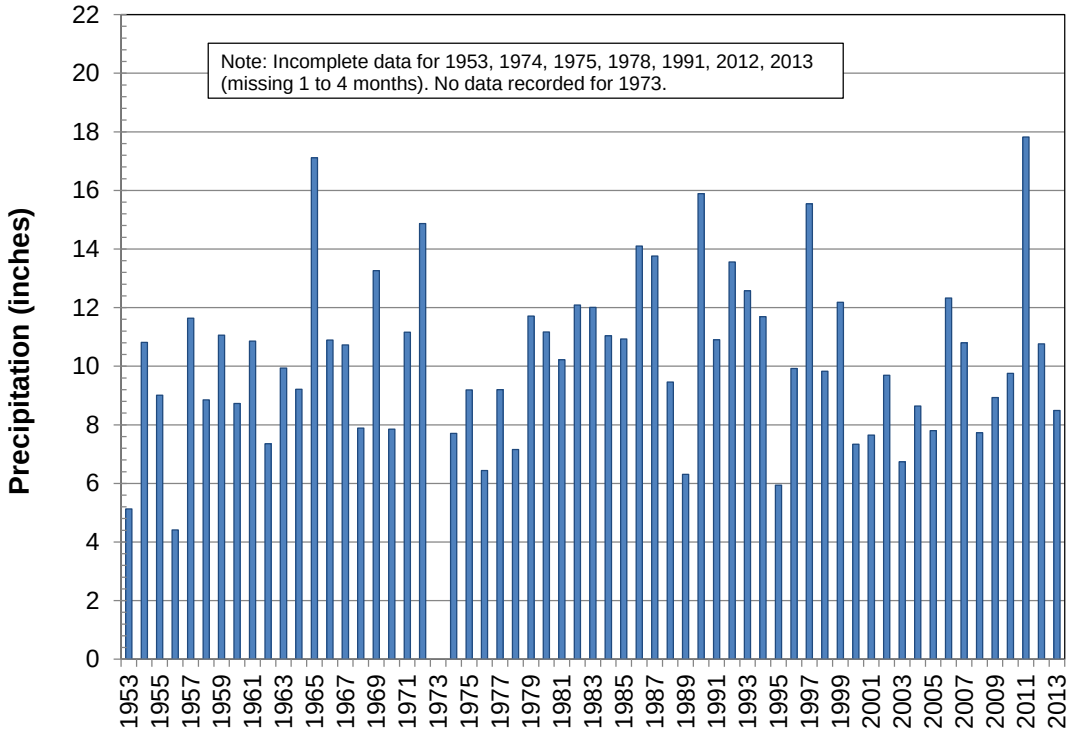
Average Annual Precipitation (1980 to 2010)

Figure 5-3

El Morro National Monument



Grants Airport



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Annual Precipitation, El Morro National Monument and Grants Airport Climate Stations

Figure 5-4

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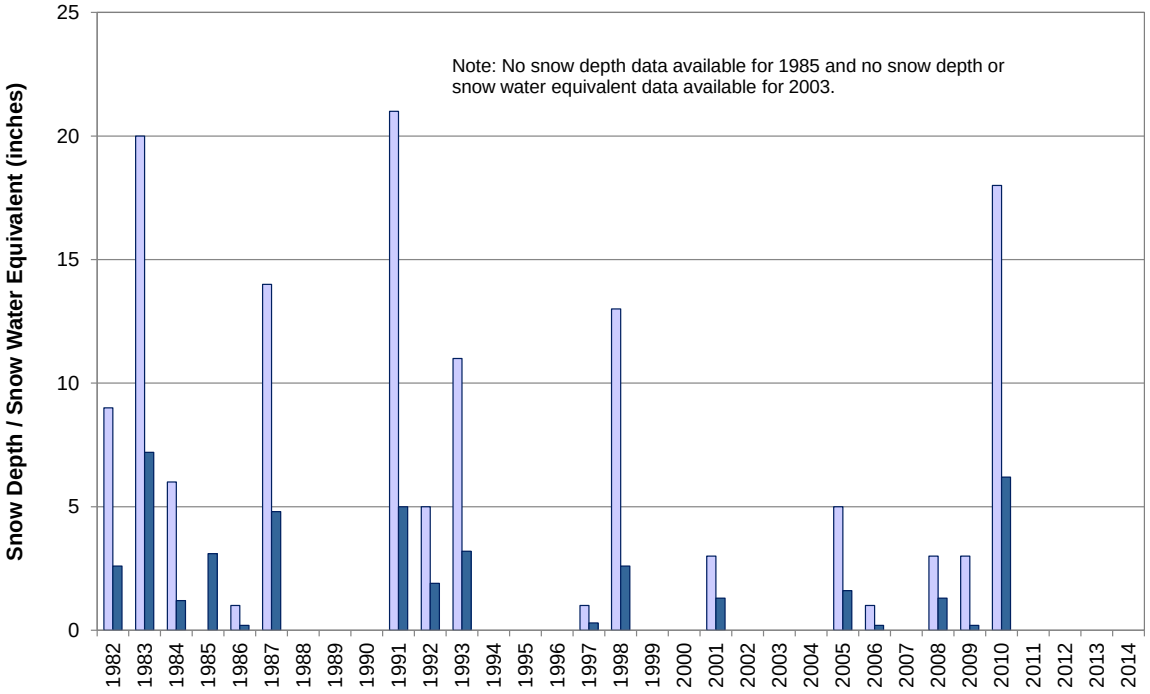
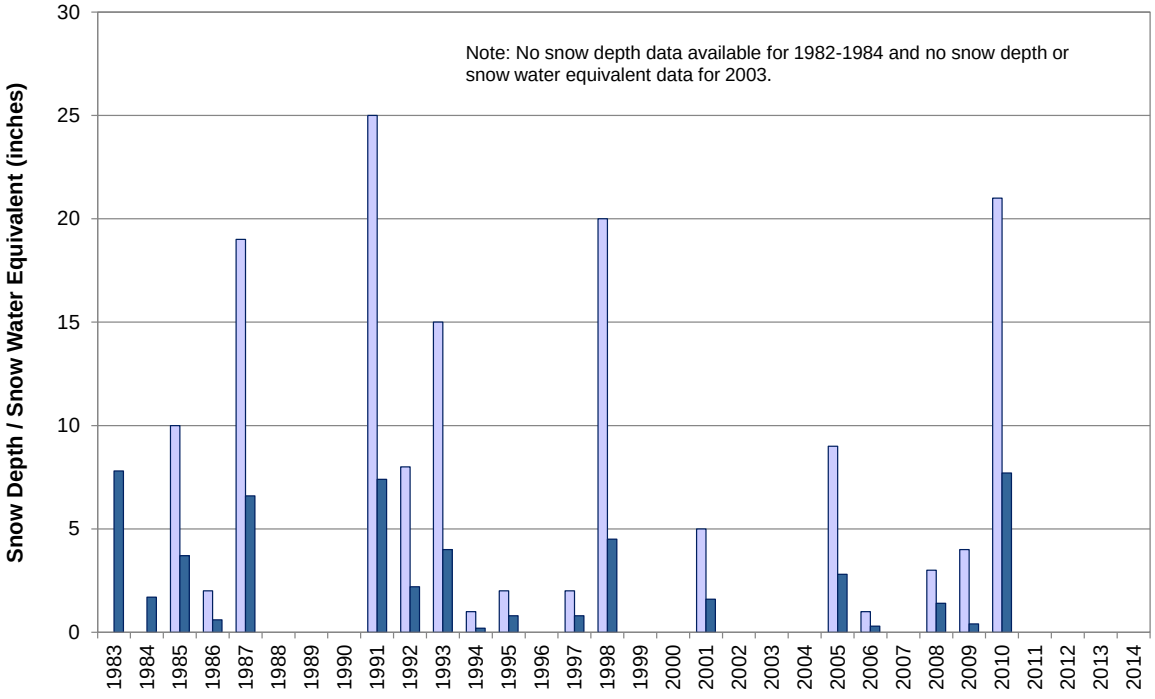
Ojo Redondo Snow Course with Aerial Marker



Rice Park Snow Course with Aerial Marker



Snow depth

Snow water equivalent (the amount of water that would result if the snowpack were instantly melted)

Notes: 1. Measurements made in the last few days of March or first few days of April.
2. Years with no bars visible are years with zero snow depth (unless otherwise noted).

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Snow Depth and Snow Water Equivalent for April

Figure 5-5a

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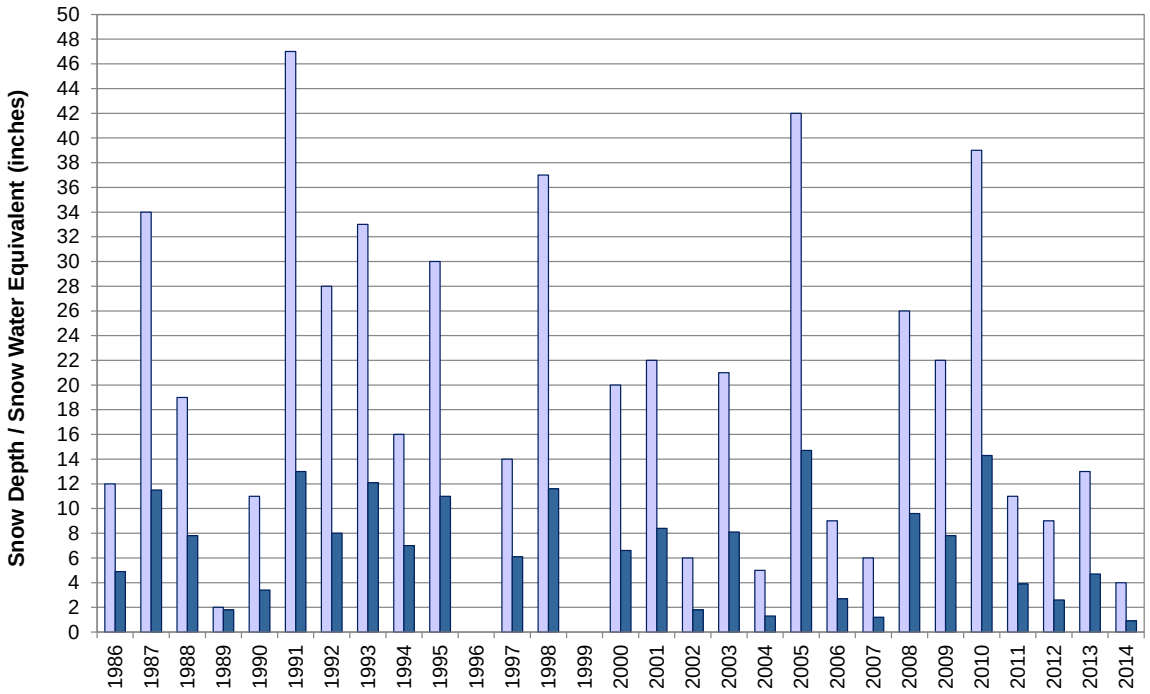
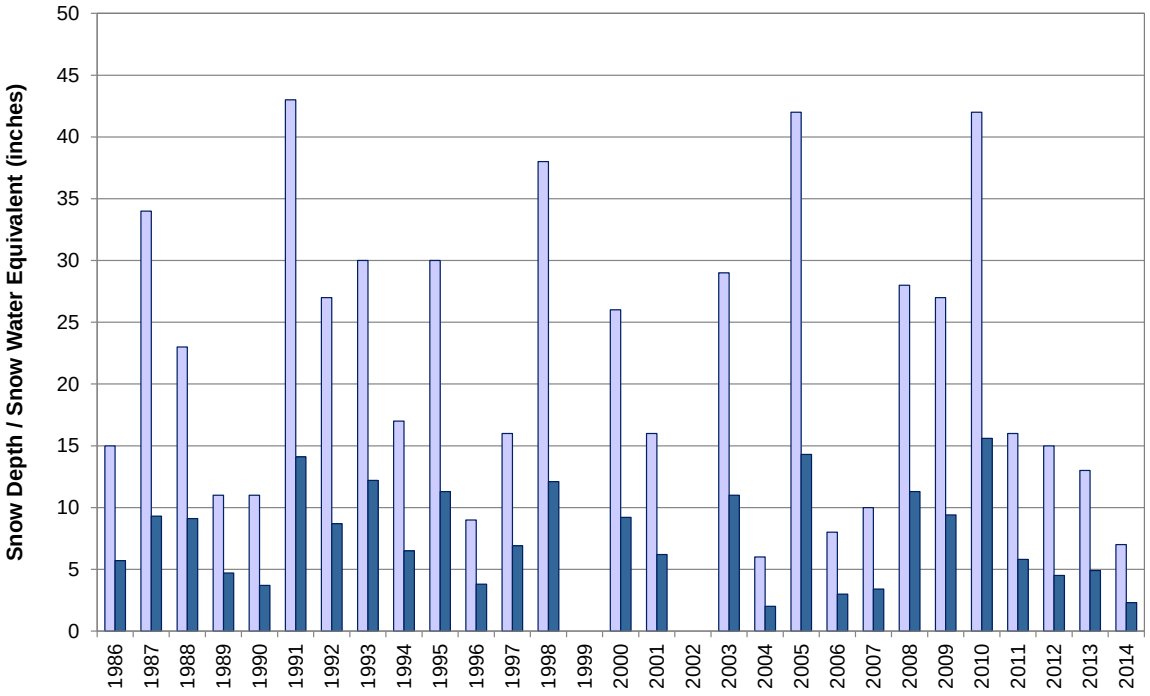
Bowl Canyon Snow Course with Aerial Marker



Whiskey Creek Snow Course with Aerial Marker



Snow depth

Snow water equivalent (the amount of water that would result if the snowpack were instantly melted)

Notes: 1. Measurements made in the last few days of March or first few days of April.
2. Years with no bars visible are years with zero snow depth (unless otherwise noted).

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Snow Depth and Snow Water Equivalent for April

Figure 5-5b

P:_NM15-203\RWPs_2016\6_Northwest NM\Fig5-05b_SNOTEL_Bowl Canyon-Whiskey Creek_.docx 12/27/16

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

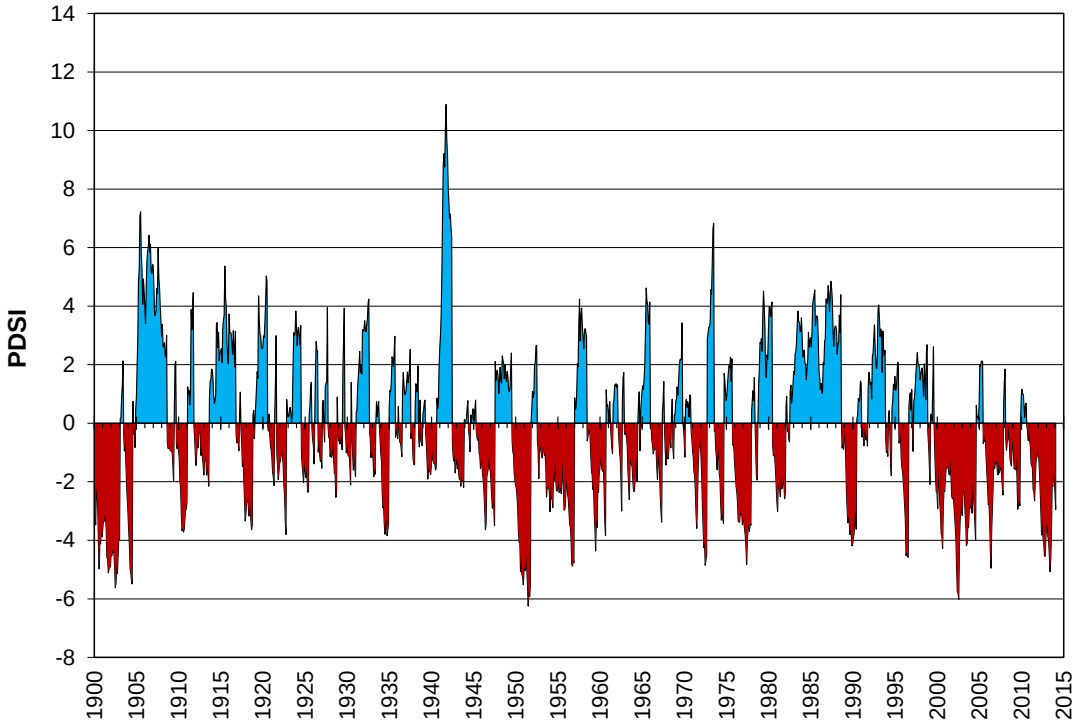
There are considerable limitations when using the PDSI, as it may not describe rainfall and runoff that varies from location to location within a climate division and may also lag in indicating emerging droughts by several months. Also, the PDSI does not consider groundwater or reservoir storage, which 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. The portion of McKinley County in the planning region falls within New Mexico Climate Division 1 (the Northwestern Plateau Climate Division) and Division 2 (the Northern Mountains Climate Division) (Figure 5-1). Cibola County falls within New Mexico Climate Divisions 1 and 4 (the Southwestern Mountains Climate Division), with small extensions of Division 5 (the Central Valley Climate Division) on the eastern side of the county (Figure 5-1). Figure 5-6 and 5-6b show the long-term PDSI for these four regions. Of interest are the large variations from year to year in these divisions, which are similar in pattern though not necessarily in magnitude.

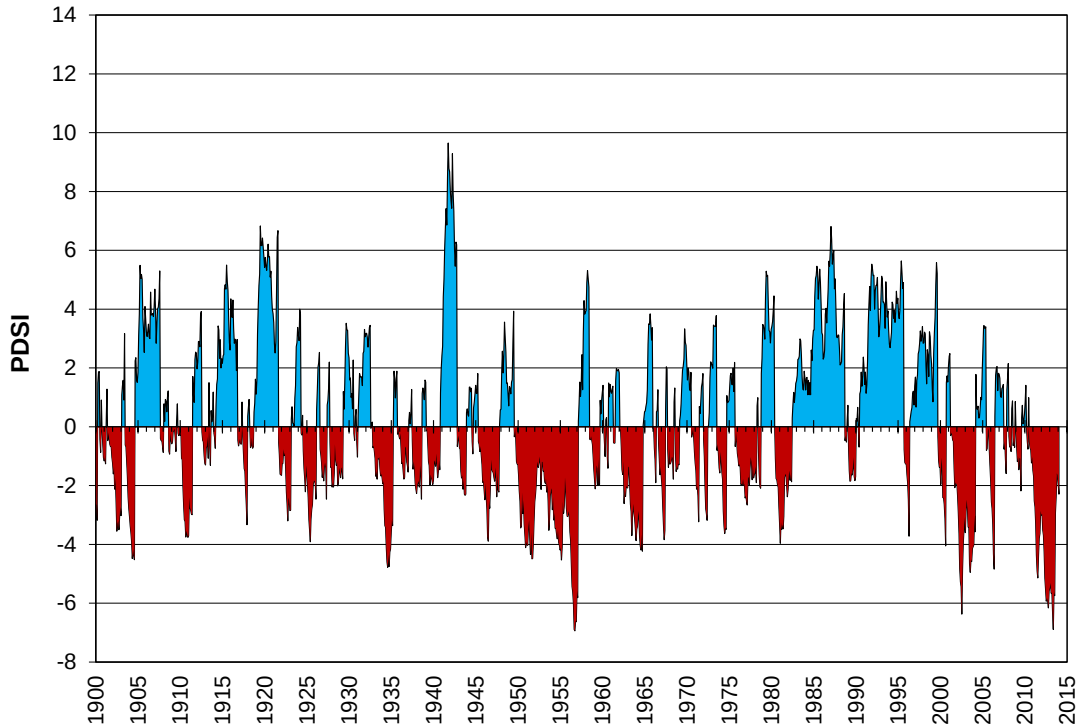
The chronological history of drought, as illustrated by the PDSI, indicates that the most severe droughts in the last century occurred in the early 1900s, the 1950s, the early 2000s, and in recent years (2011 to 2013) (Figures 5-6a and 5-6b).

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

Climate Division 1



Climate Division 2



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

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Palmer Drought Severity Index
New Mexico Climate Divisions 1 and 2

Figure 5-6a

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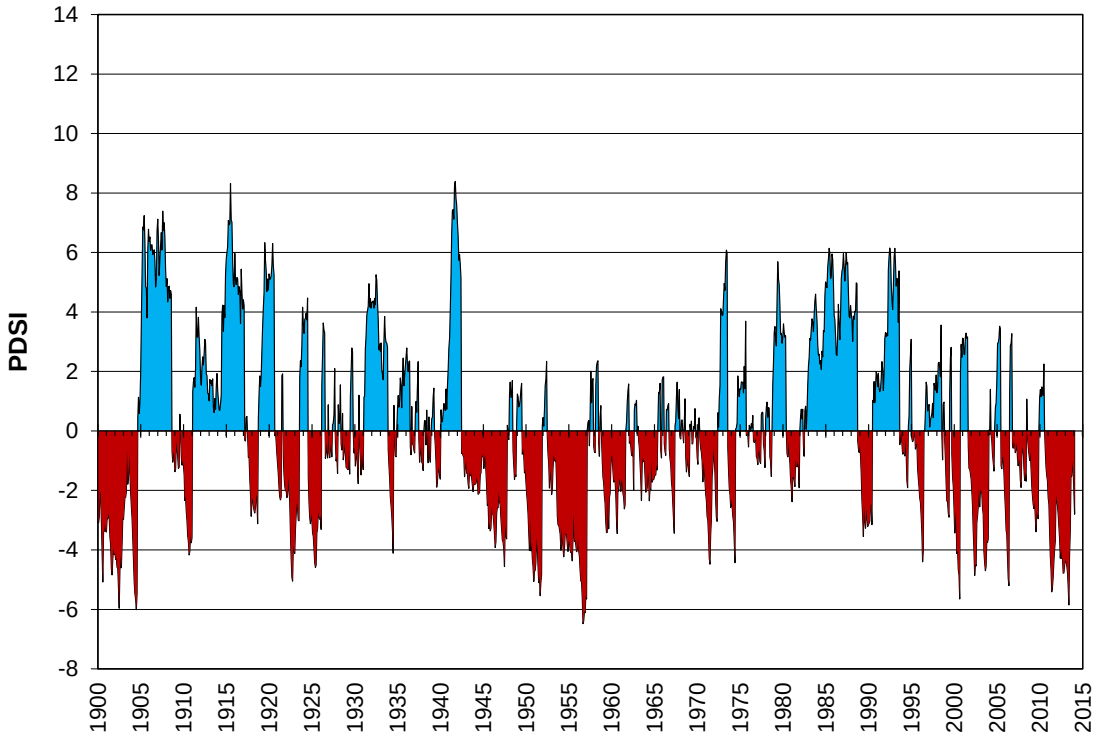
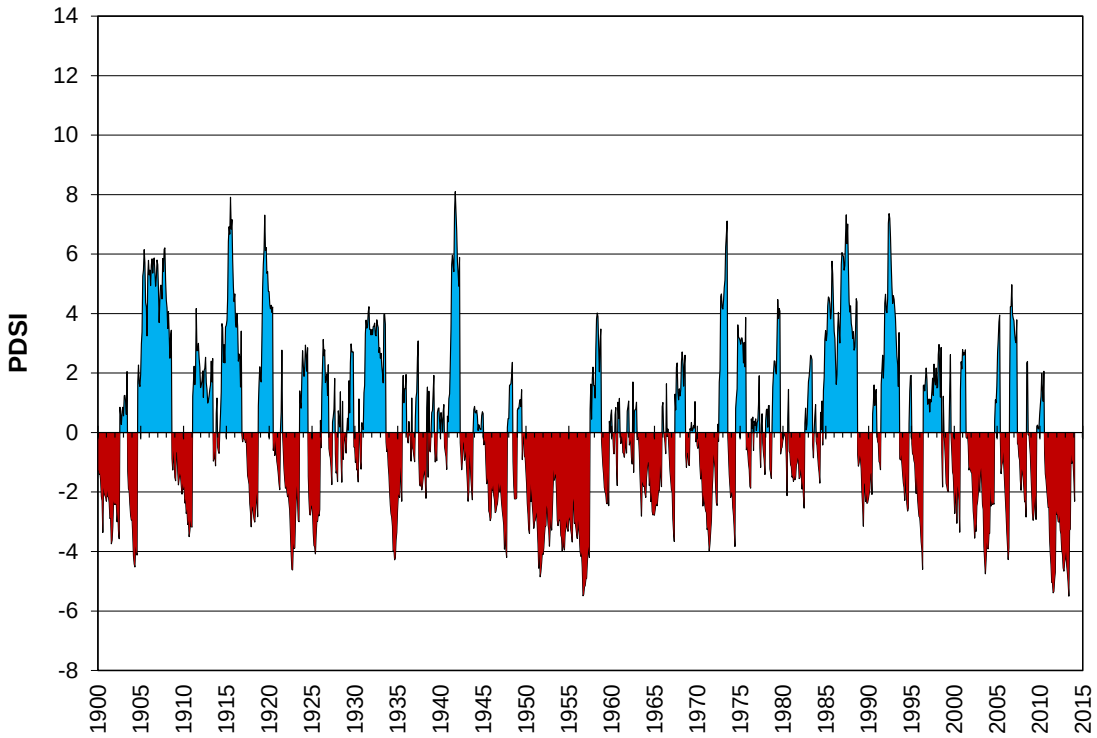
Climate Division 4



Climate Division 5



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

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Palmer Drought Severity Index
New Mexico Climate Divisions 4 and 5

Figure 5-6b

P:_NM15-203\RWPs_2016\6_Northwest NM\Fig5-06b_Reg 6_PDSI Div 4&5.docx 12/27/16

- *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 dryland 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.

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 13.5 percent of the water currently diverted in the Northwest New Mexico Water Planning Region, with its primary uses being for irrigated agriculture and livestock. The dominant waterways flowing in the region are the Rio San Jose and the Zuni River.

- The Rio San Jose basin includes most of the eastern portion of Cibola County and a portion of south central McKinley County. The watershed begins with Bluewater Creek, which becomes the Rio San Jose prior to its confluence with San Mateo Creek. It then flows through Grants to Horace Springs and eventually connects to the Rio Puerco outside the Northwest New Mexico region, near the Bernalillo/Valencia County line. Above Horace Springs, the Rio San Jose is often dry, except after immediate rain events. Regional groundwater withdrawals have diminished inputs to the Rio San Jose, decreasing flow in the river (Risser, 1982).

- The Zuni River and tributary the Rio Nutria converge in McKinley County and flow southwest to converge with the Little Colorado River in Arizona.

- San Juan River water will be delivered to the region via pipeline when the Navajo Gallup Water Supply Project is completed in 2024.

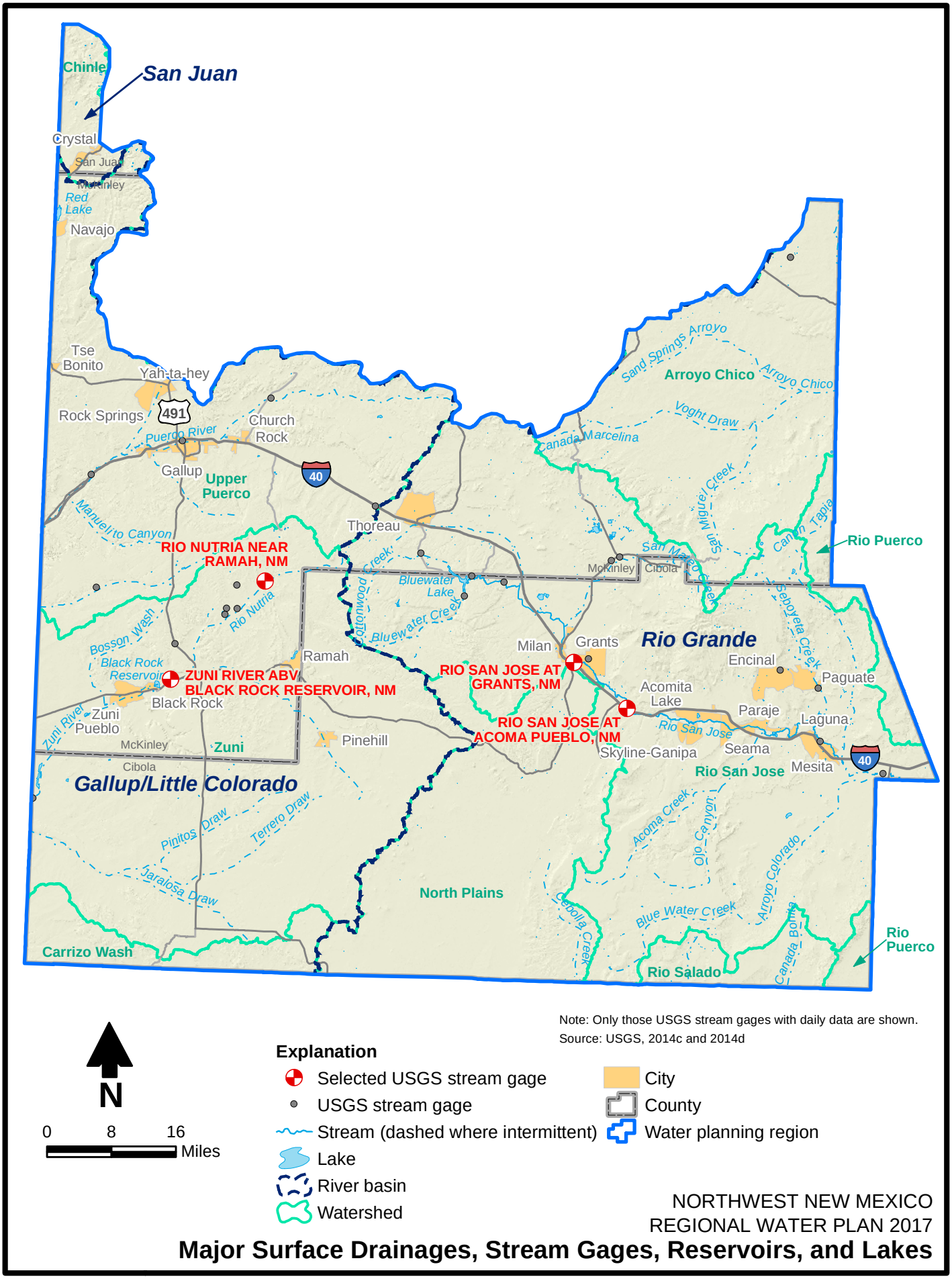
Major surface drainages (including both perennial and intermittent streams) and watersheds in the planning region are shown on Figure 5-7. When evaluating surface water information, it is important to note that streamflow does not represent available supply, as there are also water rights and interstate 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 and indicates that most of the streamflow occurs in the March to June snowmelt runoff period, with some additional larger flows at some gages occurring during the July to September monsoon season. Relatively low flows are observed in October through February.

For this water planning update, four stream gages, 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 four gages. As shown in these figures, streamflow varies greatly from year to year, with the highest-flow years supplying many times more water than the drier years. The exceptionally low flows in 2011, 2012, and generally between 1999 and 2009 can be observed on Figure 5-9a.

Several lakes and reservoirs are present in the planning region (Figure 5-7). Table 5-6 summarizes the characteristics of the one larger lake (i.e., storage capacity greater than 5,000 acre-feet, as reported in the *New Mexico Water Use by Categories 2010* report [Longworth et al., 2013]) in the region. As indicated on Table 5-6, Bluewater Lake, a reservoir constructed in 1927 in the upper basin, is the main storage facility for surface water in the area, with a storage capacity of 45,500 acre-feet. However, the surface water flows are very limited and unreliable, and this lake is not seen as a viable source for municipal supplies in the area.



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NORTHWEST NEW MEXICO
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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
McKinley County								
Papers Wash Nr Starlake Trading Post, NM	08334300	35.8933527	–107.416714	—	20	—	9/30/1977	9/30/1982
Cottonwood Creek Near Thoreau, NM	08341365	35.3422512	–108.21229	7,415	73	—	7/20/1989	2/21/2001
San Mateo Cr Nr San Mateo, NM	08342600	35.3461437	–107.775891	6,800	76	—	5/23/1977	10/7/1982
Arroyo Del Puerto Nr San Mateo, NM	08342700	35.3391994	–107.794225	6,765	—	—	9/11/1979	10/7/1982
Rio Nutria Near Ramah, NM	09386900	35.2825528	–108.552975	6,860	71	NA	10/1/1969	Present
Conservation Draw at Nutria Village, NM	09386910	35.2730844	–108.61369	—	—	—	5/14/1992	9/30/1994
Rio Nutria Abv Res No. 3 Nr Lower Nurtia, NM	09386915	35.231141	–108.611468	—	—	—	3/1/1994	9/30/1995
Garcia Draw Abv Res No 3 Nr Lower Nutria, NM	09386917	35.2311409	–108.634802	—	24	—	3/29/1994	9/30/1995
Spillway Channel Blw Res No 3 Nr Lower Nutria, NM	09386919	35.2200301	–108.637302	—	152	—	12/16/1993	9/30/1995
Y-Unit Draw at State Hwy 602 Nr Zuni, NM	09386925	35.1636421	–108.744249	—	—	—	7/1/1992	9/30/1994
Zuni River Abv Black Rock Reservoir, NM	09386950	35.1002778	–108.751667	6,480	848	NA	10/1/1969	Present
Puerco River Nr Church Rock, NM	09395350	35.61141	–108.553691	6,730	220	—	10/1/1977	10/28/1992
Foster Canyon Nr Continental Divide, NM	09395381	35.4239149	–108.315905	—	—	—	10/1/1987	10/27/1990
Sixmile Canyon Nr Fort Wingate, NM	09395390	35.483357	–108.457299	—	—	—	10/1/1987	10/30/1990
Puerco River at Gallup, NM	09395500	35.5291893	–108.745362	6,480	558	—	10/1/1940	9/30/1982
Puerco River Nr Manuelito, NM	09395630	35.4619674	–108.942867	—	—	—	5/2/1989	9/30/1993
Whitewater Arr Nr Cheechilgeetho, NM	09395700	35.2597485	–108.921475	6,670	79	—	7/1/1964	9/30/1967

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: NNMCOG, 2004; USGS, 2014a

USGS = U.S. Geological Survey

ft amsl = Feet above mean sea level

sq mi = Square miles

NA = Not available

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

Table 5-4a. USGS Stream Gage Stations

Page 2 of 2

USGS Station [a]						Irrigated Upstream Land [c] (acres)	Period of Record	
Name [b]	Number	Latitude	Longitude	Elevation (ft amsl)	Drainage Area (sq mi)		Start Date	End Date
Cibola County								
Bluewater Cr Ab Bluewater Dam Bluewtr, NM	08341300	35.2675323	–108.114509	7,410	75	—	7/21/1989	2/23/2001
Bluewater C B Bluewater Dam, NM	08341500	35.3036425	–108.099509	7,290	201	—	3/17/1951	2/22/2001
Bluewater C Nr Bluewater, NM	08342000	35.2944769	–108.028396	6,720	209	—	10/1/1960	1/4/1973
Rio San Jose at Grants, NM	08343000	35.154482	–107.870336	6,468	1,020	—	10/1/1912	10/3/2011
Grants Canyon at Grants, NM	08343100	35.1608709	–107.838113	6,450	13	—	1/1/1962	9/30/1995
Rio San Jose at Acoma Pueblo, NM	08343500	35.0744111	–107.751114	6,273	2,300	NA	10/1/1936	Present
Paguate C Nr Laguna, NM	08349500	35.1500403	–107.41727	6,350	—	—	3/1/1937	9/30/1941
Rio Paguate Below Jackpile Mine Near Laguna, NM	08349800	35.1192083	–107.333101	5,820	107	—	3/26/1976	9/30/1993
Rio San Jose Near Laguna, NM	08350500	35.0236556	–107.326155	5,640	3,040	—	8/13/1973	3/22/1976
Rio San Jose at Correo, NM	08351500	34.9681024	–107.186984	5,475	3,660	—	4/1/1943	9/30/1994
Zuni River Nr NM-AZ State Line, NM	09387300	34.8764244	–109.042032	—	1,314	—	10/1/1987	9/30/1994

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: NNMCOG, 2004; USGS, 2014a

USGS = U.S. Geological Survey

ft amsl = Feet above mean sea level

sq mi = Square miles

NA = Not available

— = 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	
McKinley County				
Cottonwood Creek Near Thoreau, NM	4	1,549	15,638	11
Rio Nutria Near Ramah, NM	90	1,296	16,217	43
Zuni River Abv Black Rock Reservoir, NM	59	1,151	33,520	43
Cibola County				
Bluewater Cr Ab Bluewater Dam Bluewtr, NM	121	2,700	32,651	11
Bluewater C B Bluewater Dam, NM	244	9,339	15,927	11
Bluewater C Nr Bluewater, NM	633	3,468	7,746	12
Rio San Jose at Grants, NM	0	41	5,857	38
Grants Canyon at Grants, NM	1	39	403	31
Rio San Jose at Acoma Pueblo, NM	2,447	4,011	14,117	67
Rio Paguate Below Jackpile Mine Near Laguna, NM	572	1,339	11,511	16
Rio San Jose at Correo, NM	883	6,957	34,823	50

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

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
McKinley County													
Cottonwood Creek Near Thoreau, NM	11	177	329	2,249	1,152	134	14	7	28	56	5	36	10
Rio Nutria Near Ramah, NM	43	54	280	1,677	1,421	144	14	36	90	35	23	35	37
Zuni River Abv Black Rock Reservoir, NM	43	131	417	1,792	2,059	221	7	129	293	115	66	60	59
Cibola County													
Bluewater Cr Ab Bluewater Dam Bluewtr, NM	11	129	446	3,498	2,174	248	51	31	96	62	23	60	51
Bluewater C B Bluewater Dam, NM	11	70	72	135	330	1,995	1,644	1,685	1,016	589	180	78	72
Bluewater C Nr Bluewater, NM	12	87	71	83	124	603	779	698	606	268	116	90	85
Rio San Jose at Grants, NM	38	0	0	11	251	83	2	10	39	15	11	1	0
Grants Canyon at Grants, NM	31	0	0	0	0	2	2	13	35	17	9	0	0
Rio San Jose at Acoma Pueblo, NM	67	325	301	329	452	457	313	399	525	380	332	306	307
Rio Paguate Below Jackpile Mine Near Laguna, NM	16	133	114	162	135	88	73	290	725	167	61	65	117
Rio San Jose at Correo, NM	50	273	326	342	362	245	159	1,018	2,986	1,288	786	214	177

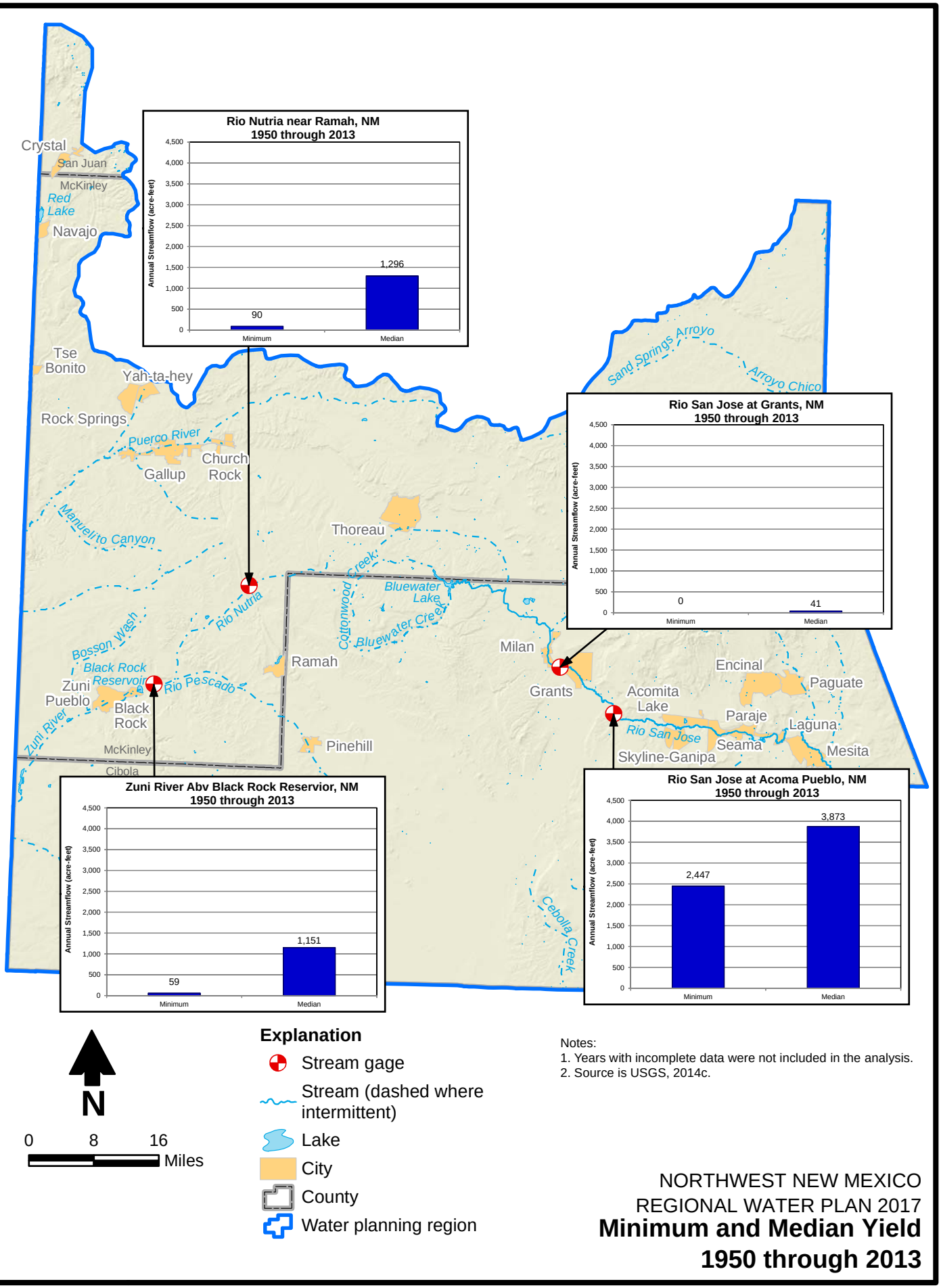
Source: USGS, 2014c

[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.

USGS = U.S. Geological Survey



Notes:
1. Years with incomplete data were not included in the analysis.
2. Source is USGS, 2014c.

NORTHWEST NEW MEXICO
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Minimum and Median Yield
1950 through 2013

Figure 5-8

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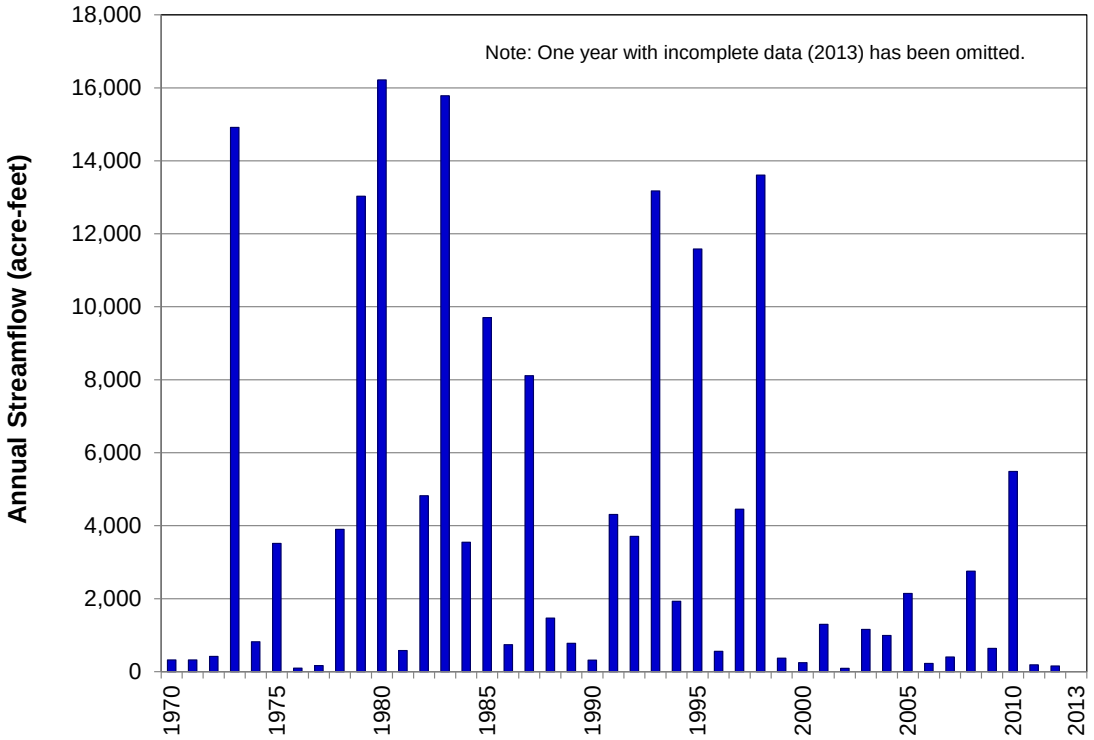
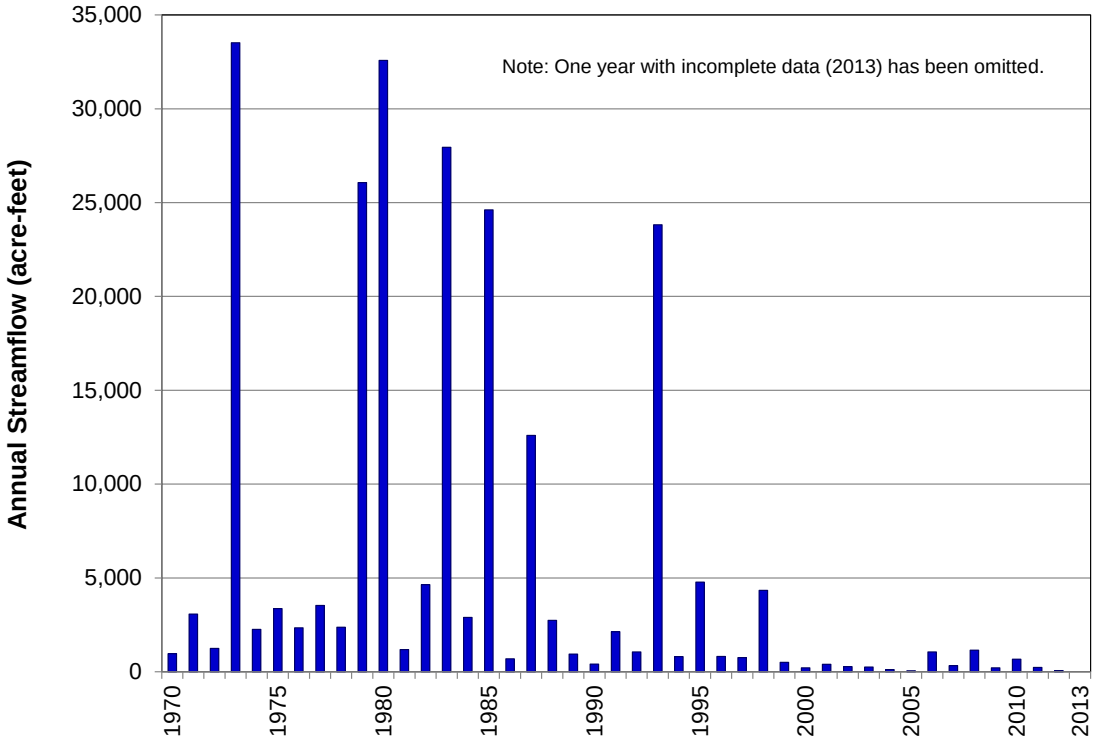
Rio Nutria near Ramah, NM



Zuni River above Black Rock Reservior, NM



NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Annual Streamflow for Selected Gaging Stations on the Rio Nutria and Zuni River

Figure 5-9a

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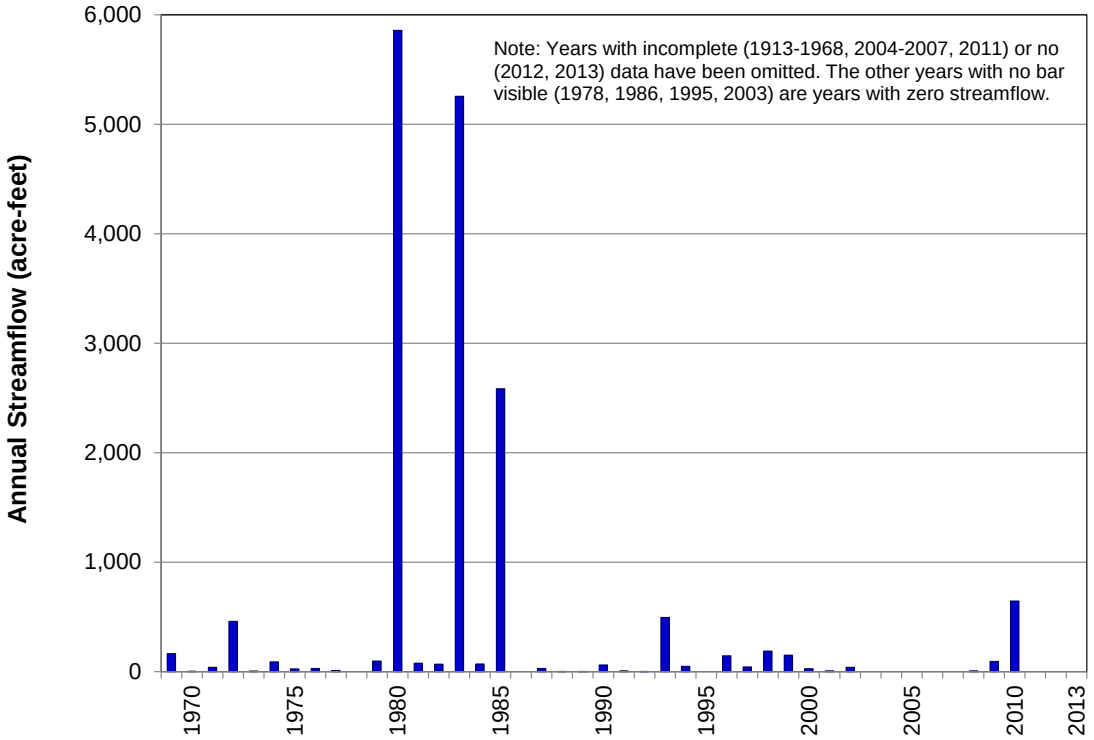
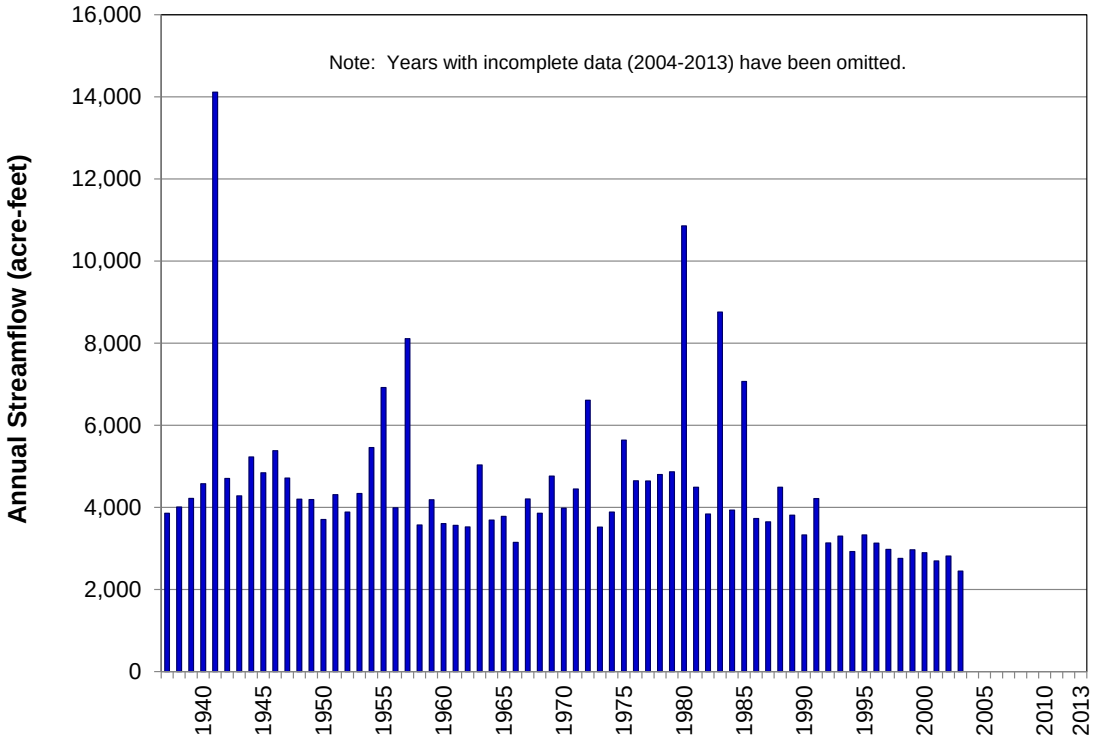
Rio San Jose at Grants, NM



Rio San Jose at Acoma Pueblo, NM



NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Annual Streamflow for Selected Gaging Stations on the Rio San Jose

Figure 5-9b

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Table 5-6. Reservoirs and Lakes (greater than 5,000 acre-feet) in the Northwest New Mexico Water Planning Region

River	Reservoir	Primary Purpose	Operator	Date Completed	Total Storage Capacity (acre-feet)	Surface Area (acres)	Dam Height (feet)	Dam Length (feet)
Cibola County								
Bluewater Creek	Bluewater Lake	Irrigation	Bluewater Toltec Irrigation District	1927	44,150	1,730	92	655

Source: USACE, 1999

In addition to the reservoir shown in Table 5-6, several smaller lakes and reservoirs are present in the region; information on these smaller reservoirs was included in the original water plan (NWNMCOG, 1998).

The NMOSE conducts periodic inspections of non-federal dams in New Mexico to assess dam safety issues. Dams on tribal lands may not be included in the NMOSE report. 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.

There are two dams in McKinley County with high hazard potential (McGaffey Lake Dam and Ramah Dam) and one with a significant hazard ranking (San Lucas Dam). Both of the high hazard dams have a spillway capacity that is less than required for flood. In Cibola County, there are five dams with a ranking of high hazard. These dams also have a deficiency in flood capacity.

5.3 Groundwater Resources

Groundwater accounted for about 86 percent of all water diversions in the year 2010 (Longworth et al., 2013). Groundwater supplies all of the public drinking water systems in the region, including the numerous small drinking water systems, and also supplies irrigated agriculture, industrial, power, domestic, mining, and a small amount of livestock and commercial use.

5.3.1 Regional Hydrogeology

The geology that controls groundwater occurrence and movement within the planning region was described in the original regional water plan (NWNMCOG, 1998). According to the plan, comprehensive hydrogeologic studies in the area began with those of Gregory (1916) and Waring and Andrews (1935). The areas of the Gallup Basin and the Bluewater Basin have been treated in detail in U.S. Geological Survey and New Mexico State Engineer Office reports by West (1957), Mercer and Cooper (1970), Shomaker (1971), Gordon (1961), and Cooper and John (1968) (a reference list from the 1998 plan was not available, so most of these references are not provided in this updated RWP). Most of the planning region is covered in a New Mexico Bureau of Mines and Mineral Resources summary by Stone et al. (1983). A short summary by Shomaker and Newcomer (1987, as cited in NWNMCOG, 1998) covers McKinley and northern Cibola counties.

Table 5-7. Dams with Dam Safety Deficiency Rankings

Dam	Condition Assessment [a]	Deficiency	Hazard Potential [b]	Estimated Cost to Repair ($)
McKinley County				
Escalante Generating Station Bottom Ash Pond Dam	Poor	Lack of design information	Low	100,000
Escalante Generating Station Coal Yard Runoff Rete	Poor	Lack of design information	Low	100,000
Escalante Generating Station Raw Water Storage Dam	Poor	Lack of design information	Low	100,000
Kerr-McGee Storage Dam	Poor	Removal planned. Reservoir evacuated & contaminated material removed from us slope & reservoir.	Significant	2,000,000
McGaffey Lake Dam	Poor	Spillway capacity 8% of required flood Spillway deteriorated Woody vegetation Rodents	High	4,000,000
Ramah Dam	Poor	Spillway capacity 70% of required flood Maintenance needed Unauthorized modification No design information	High	2,000,000
San Lucas Dam	Poor	Lack of design information	Low	100,000
Cibola County				
Bluewater Dam	Fair	Saddle dam overtopping at 30% of required flood Scour of downstream toe	High	3,000,000
Lower Nielson Retarding Dam	Poor	Spillway capacity 40% of required flood Lack of design information	High	200,000
Prop Canyon Site 1 Dam	Poor	Spillway 10% of required flood	High	2,500,000
Prop Canyon Site 2A Dam	Poor	Spillway capacity 14% of required flood	High	2,500,000
San Mateo Lake Dam	Unsatisfactory	Spillway capacity 27% of required flood Seepage on downstream slope Maintenance needed OSE order	High	5,500,000
Seboyeta Irrigation Dam	Fair		Low	

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 2 of 2

[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

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.

Groundwater in the region has high naturally occurring levels of radium, fluoride, arsenic, and selenium. High levels of nitrate, sulfate, and chloride may also be present (NWNMCOG, 1998).

The primary physiographic region within the planning region is the Colorado Plateau (Navajo and Acoma-Zuni Sections), with a small corner of the Mexican Highland (Rio Grande Subsection) physiographic region present in the southeast corner of the region. Figure 5-10 shows the approximate extents of these areas within the planning region.

The Colorado Plateau topography is characterized by large flat plateaus and buttes separated by wide valleys and locally incised canyons (RTI, 1991). The Colorado Plateau Province is comprised mainly of numerous sedimentary rock formations that were deposited in shallow marine and fluvial environments between 65 and 250 million years ago (Cretaceous-Permian) (Basabilvazo, 1997). Sedimentary formations of the Colorado Plateau are locally overlain by Quaternary alluvium and basalt. The primary water bearing units in the region are:

- Quaternary alluvium, found in arroyos, washes, and stream channel, supplies limited water for stock wells, but does not form important regional aquifers. However, many of the Pueblo of Laguna's public water supply wells are completed in the alluvium.

- The Cretaceous Mesaverde Group formations may provide water for domestic or stock uses (U.S. BLM, 1990). Yields from the Crevasse Canyon Formation of the Mesaverde Group range from 0.5 to 1.5 gallons per minute (gpm) (Basabilvazo, 1997).

- The Mancos Shale consists of three members separated by thin sandstone layers containing limited water that may provide water for stock wells in the area.

- The Dakota Sandstone is approximately 50 feet thick and consists of cross-bedded sandstone, carbonaceous siltstones, shales, and coal. The Dakota Sandstone produces generally fair-water quality in Cibola and McKinley counties with well yields of approximately 50 gpm (Dam, 1995).

- The Westwater Canyon Member of the Jurassic Morrison Formation consists of fluvial sandstones and has the potential to be a good water resource in the Northwest New Mexico region (Gordon, 1961). Well yields can be on the order of 50 gpm (Dam, 1995). Water quality may be variable due to uranium mineralization in some areas of the Grants Uranium District.

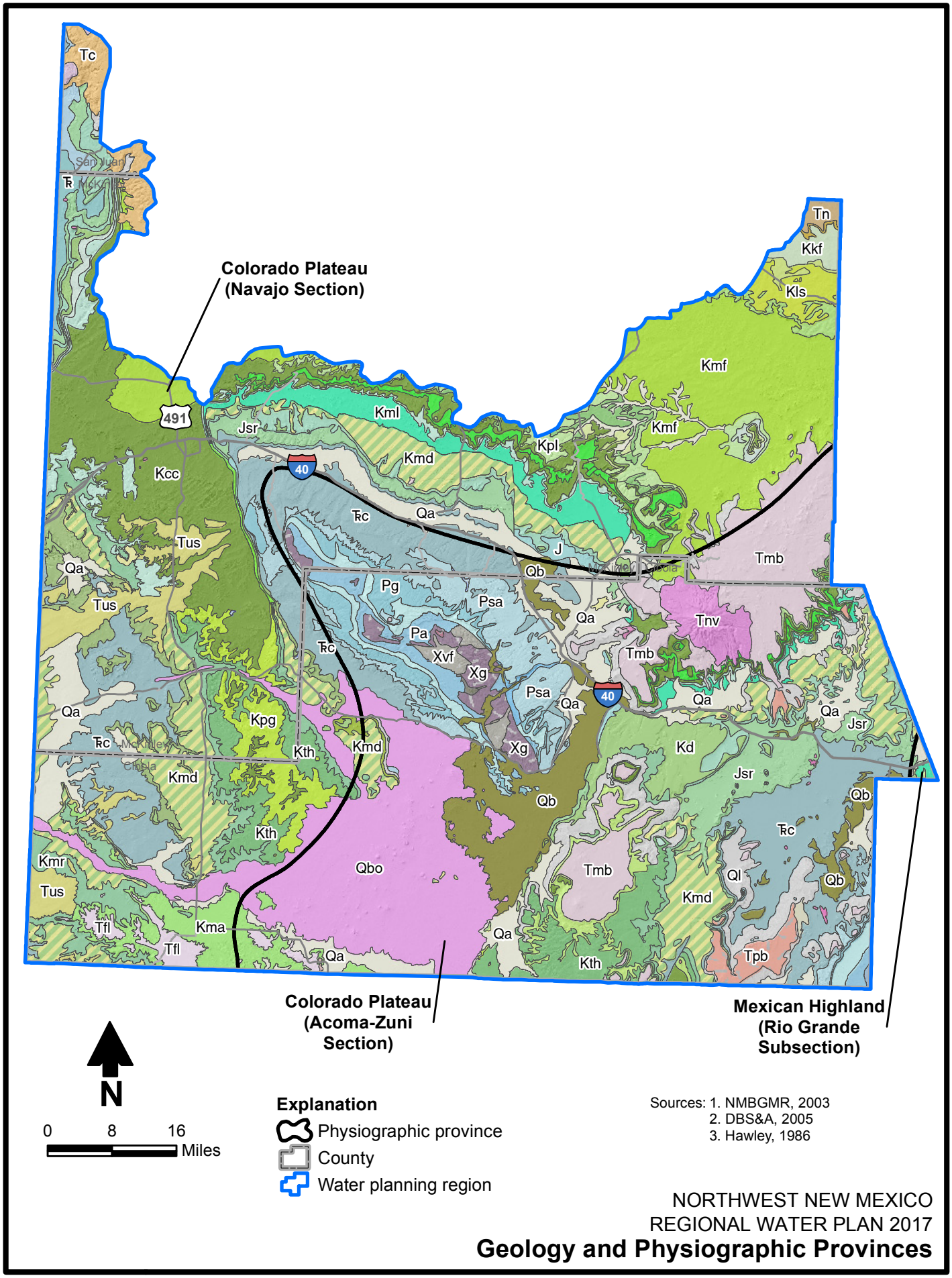

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Figure 5-10a

Geology Explanation

- IPm - Madera Group
- J - Upper and Middle Jurassic rocks, undivided
- Je - Entrada Sandstone
- Jm - Morrison Formation
- Jsr - San Rafael Group
- Jz - Zuni Sandstone
- Jze - Zuni and Entrada Sandstones, undivided
- Kcc - Crevasse Canyon Formation
- Kch - Cliff House Sandstone
- Kd - Dakota Sandstone
- Kdr - Dakota Sandstone and Rio Salado Tongue of the Mancos Shale
- Kg - Gallup Sandstone
- Kgm - Gallup Sandstone and underlying D-Cross Tongue of the Mancos Shale
- Kkf - Kirtland and Fruitland Formations
- Kls - Lewis Shale
- Km - Mancos Shale
- Kma - Moreno Hill Formation and Atarque Sandstone
- Kmd - Intertongued Mancos Shale and Dakota Sandstone of west-central New Mexico
- Kmf - Menefee Formation
- Kml - Mancos Shale, lower part
- Kmm - Mulatto Tongue of Mancos Shale
- Kmr - Rio Salado Tongue of the Mancos Shale
- Kms - Satan Tongue of Mancos Shale
- Kmu - Mancos Shale, upper part
- Kmv - Mesaverde Group
- Kpc - Pictured Cliffs Sandstone
- Kpg - Pescado Tongue of the Mancos Shale and Gallup Sandstone
- Kph - Hosta Tongue of Point Lookout Sandstone
- Kpl - Point Lookout Sandstone
- Kth - Tres Hermanos Formation
- Ku - Upper Cretaceous Rocks of southwestern New Mexico, undivided
- P - Permian rocks, undivided
- Pa - Abo Formation
- Pg - Glorieta Sandstone
- Psa - San Andres Formation
- Py - Yeso Formation
- QTt - Travertine
- Qa - Alluvium
- Qb - Basaltic to andesitic lava flows
- Qbo - Basaltic to andesitic lava flows
- Qe - Eolian deposits
- Ql - Landslide deposits and colluvium
- Tc - Chuska Sandstone
- Tfl - Fence Lake Formation
- Ti - Tertiary intrusive rocks of intermediate to silicic composition
- Tim - Tertiary mafic intrusive rocks
- Tmb - Basaltic to andesitic lava flows
- Tn - Nacimiento Formation
- Tnr - Silicic to intermediate volcanic rocks
- Tnv - Intermediate to silicic volcanic rocks
- Toa - Ojo Alamo Formation
- Tpb - Basaltic to andesitic lava flows
- Tps - Paleogene sedimentary units
- Tuau - Upper middle Tertiary basaltic andesites and andesites of the Mogollon Group
- Tus - Upper Tertiary sedimentary units
- Water - Water
- Xg - Paleoproterozoic granitic plutonic rocks
- Xpc - Paleoproterozoic calc-alkaline plutonic rocks
- Xvf - Paleoproterozoic rhyolite and felsic volcanic schist
- Xvm - Paleoproterozoic mafic metavolcanic rocks with subordinate felsic metavolcanic rocks
- Yg - Mesoproterozoic granitic plutonic rocks
- TR - Triassic rocks, undivided
- TRc - Chinle Group
- TRrp - Rock Point Formation of Chinle Group

Source: NMBGMR, 2003

NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Geology Explanation

Figure 5-10b

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- The Zuni Sandstone is an aeolian sandstone up to 500 feet thick that underlies the Dakota Sandstone in parts of the region. The hydrologic properties of the Zuni Sandstone are not well known, but at least five stock wells in the region produce water from it (Orr, 1987).

- The Chinle Formation underlies the Zuni Sandstone in Cibola and McKinley counties, where it is approximately 1,500 feet thick. In this area it consists of claystones, shales, siltstones, and mudstones interbedded with thin lenses of sandstone and conglomerates (Willard and Weber, 1958; Foster, 1964; McClellan et al., 1984, as cited in Basabilvazo, 1997). A few wells completed in the sandstone lenses supply small amounts of water with generally high total dissolved solids (TDS) contents. Some well yields have been reported as great as 40 gpm.

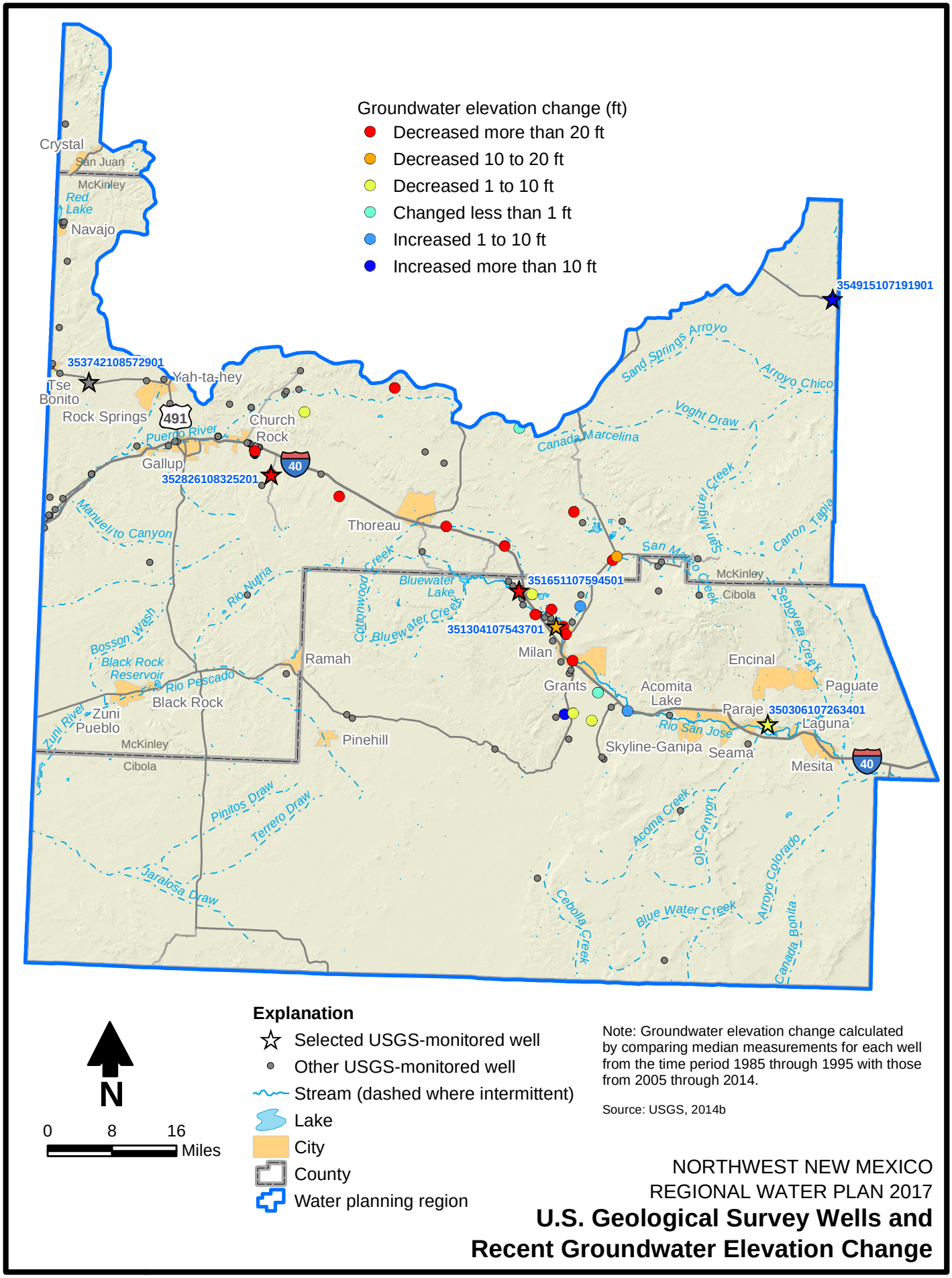
- Beneath the Chinle Formation lie several Triassic and Permian units, including the Moenkopi Formation, San Andres Formation, and Glorieta Sandstone. The combined San Andres and Glorieta aquifer system produces good amounts of water in this region. Wells have variable yields, potentially producing 100 to 200 gpm, and water quality is good (Baldwin and Anderholm, 1992). East of Grants, the San Andres and Glorieta aquifer system is encountered at great depth (>2,000 feet) due to faulting, and water quality is poor.

In summary, groundwater within the Northwest Region exists primarily in sedimentary formations, most predominantly the Dakota Sandstone, Morrison Formation, and San Andres-Glorieta aquifers system (Basabilvazo, 1997). Tertiary volcanics and Quaternary alluvium also contain localized groundwater, which is used for some public water supply systems. However, they are not extensive enough to be considered a regionally important groundwater source.

5.3.2 Aquifer Conditions

Most groundwater in the Gallup Basin is stored in deep, confined bedrock aquifers. Except for the relatively small outcrop areas, these aquifers generally have low storage coefficients, and this leads to large and extensive drawdown effects when wells are pumped. The aquifers in the northern part of the Gallup Basin are in the San Juan geologic basin. The sequence of aquifers in the southern portion of the basin is somewhat different, where river-deposited alluvium found along the main drainage channels above the bedrock can, when saturated, provide local supplies of groundwater. Because much of the groundwater is confined, any precipitation must fall on the outcrop of the geologic unit and then travel downgradient to the saturated aquifer level (NWNMCOG, 1998) for recharge to occur; therefore, groundwater recharge from precipitation is minimal near well fields.

In order to evaluate changes in water levels over time, the USGS monitors groundwater wells throughout New Mexico (Figure 5-11). The periods of record for many of the wells are short (less than 10 years), and the hydrographs often exhibit periodic fluctuations or inconsistent


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
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353742108572901
352826108325201
351651107594501
351304107543701
350306107263401
Crystal
San Juan
McKinley
Red Lake
Navajo
Tse Bonito
Yah-ta-hey
Rock Springs
491
Church Rock
Gallup
40
Thoreau
Manuelito Canyon
Puerco River
Sand Springs Arroyo
Arroyo Chico
Voght Draw
Canada Marcelina
Miguel Creek
San Mateo Creek
Canon Tapia
Cottonwood Creek
Bluewater Lake
Bluewater Creek
Rio Nutria
Bosson Wash
Black Rock Reservoir
Rio Pescado
Black Rock
Zuni Pueblo
Zuni River
Ramah
Pinehill
Milan
Grants
Acomita Lake
Encinal
Paguate
Paraje
Laguna
Rio San Jose
Skyline-Ganipa
Seama
Mesita
Sabinoso Creek
Pintos Draw
Terrero Draw
Jaralosa Draw
Acoma Creek
Ojo Canyon
Arroyo Colorado
Cebolla Creek
Blue Water Creek
Canada Bonita
N
0
8
16
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
NORTHWEST NEW MEXICO
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\NORTHWEST_NEW_MEXICO\FIG5-11_USGS_WELLS.MXD 2/22/2017

Figure 5-11

patterns that do not indicate clear trends. Hydrographs illustrating groundwater levels versus time, as compiled by the USGS (2014b), were selected for six monitor wells with longer periods of record and are shown on Figure 5-12. The three wells in Cibola County illustrate a decline in the groundwater table over time. The selected wells in McKinley County show a variable trend, with one well showing a decline and two wells depicting a slight increase in water level. It is not known if the measured water levels are in some cases affected by local sporadic pumping (Figure 5-12).

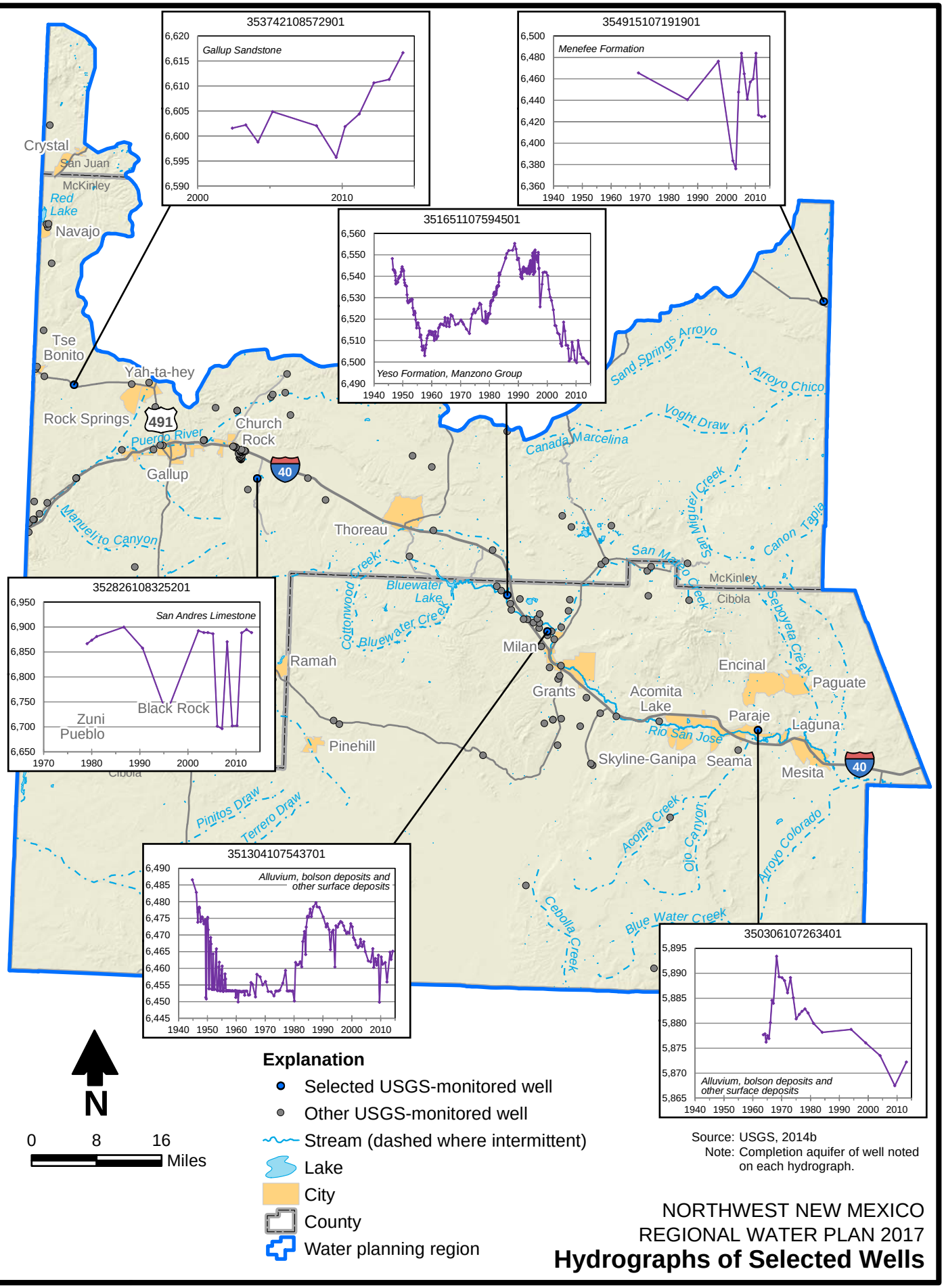
The City of Gallup and surrounding communities have relied on groundwater to meet their water supply needs for over 100 years. As pumping has continued from the confined aquifers, the regional water level drawdown has become extensive. This drawdown and continued pumping has lowered water levels in supply wells, often leading to lowering of pumps to follow the resource deeper into the aquifer and diminishing pumping rates. Depletion of the aquifers and lowered pumping levels has caused a drop in the effective transmissivity of the aquifers or ability of the aquifer to transmit water to the wells, which means less water at higher costs. Gallup has two well fields, the Santa Fe and Yah-Ta-Hey, and water levels have been declining and are predicted to continue declining at rates of 20 feet per year or greater under historical pumping scenarios (Sterling & Mataya, 1998). The Navajo Gallup Water Supply Project is intended to supplement their water supply.

Near the communities of Grants and Milan, New Mexico, water quality contamination is impacting aquifers that host the local water supplies. The aquifers near Grants—the alluvium, volcanics, and San Andres-Glorieta—have been potentially impacted by organic chemicals derived from solvents and gasoline (USGS, 2015).

Near Milan, the Homestake Uranium Mill Superfund site has documented water quality impacts and is on the National Priorities List (NPL), indicating that the U.S. EPA has designated it as a Superfund site (U.S. EPA, 2015). Water quality in the alluvial and Chinle aquifers has been documented and includes uranium, selenium radium isotopes, and other metals associated with uranium milling. Domestic wells near the site are being shut down, and water from the Milan community system is being provided to residents (U.S. EPA, 2015).

The Jackpile-Paguate Uranium Mine site is located within the boundaries of Laguna Pueblo, about 40 miles west of Albuquerque in Paguate, Cibola County, New Mexico. The mine, which consisted of three tribal leases, was operated from 1953 through March 1982. Mining operations detrimentally affected surface water with hazardous chemicals in quantities sufficient to support listing onto the EPA National Priorities List (NPL) for CERCLA cleanup (U.S. EPA, 2016).

Some of the current uses of water in specific aquifers in each of the administrative groundwater basins (Figure 4-1), as discussed in the original regional plan, are summarized below (Leedshill-Herkenhoff, 1994, as cited in NWNMCOG, 1998). The uses of each aquifer are indicative of the water quality and quantity available in each administrative basin.



Source: USGS, 2014b
Note: Completion aquifer of well noted on each hydrograph.

NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Hydrographs of Selected Wells

S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\NORTHWEST_NEW_MEXICO\FIG5-12_USGS_WELLS_HYDROGRAPHS.MXD 2/22/2017

Figure 5-12

- Bluewater Basin:
  - Wells in the alluvium provide supplies for domestic, livestock, and irrigation use. Specific conductance (an indirect indicator of water quality) ranges from 600 to 2,500 micromhos (µmhos), and well yields are several hundred gallons per minute (gpm).
  - Wells and springs from the Gallup Sandstone provide water for domestic use, livestock, and coal operations. Specific conductance in the Gallup Sandstone ranges from 260 to 6,000 µmhos, and well yields range from a few to several hundred gpm.
  - Where the water quality is suitable and drilling and pumping are economically feasible, water from the Morrison Formation is used for domestic, industrial, and livestock supplies (Dam et al., 1990, as cited in NWNMCOG, 1998). Specific conductance ranges from 380 to 2,900 µmhos, and well yields range from several to 500 gpm.
  - Wells from the Cow Springs-Bluff Sandstone provide water for domestic and livestock uses and are generally completed in either the overlying Morrison or underlying Entrada (Stone et al., 1983). Specific conductance in this aquifer in the Bluewater Basin is generally less than 2,000 µmhos, but well yields are small, ranging from one to less than 50 gpm.
  - Stone et al. (1983) note that water from the Entrada Sandstone is generally not suitable for drinking. No specific conductance figure was provided for the Bluewater Basin; however, an unspecified administrative basin in San Juan, Cibola, or McKinley County had a range for specific conductance of less than 1,500 to 10,000 µmhos, the same as the range provided for the Gallup Basin. Well yields in the Entrada in the Bluewater Basin are just a few gpm.
  - The Sonsela Sandstone bed and the Shinarump Conglomerate of the Chinle Formation provide small amounts of water for domestic and livestock uses. No data for specific conductance of the Sonsela Sandstone in the basin were provided, but well yields range from 20 to 30 gpm.
  - The San Andres-Glorieta Aquifer is the principal source of water along I-40 between Grants and Gallup for municipal, industrial and irrigation supplies and an important aquifer in the Grants-Bluewater area (Hiss, 1975, as cited in NWNMCOG, 1998). Large water users in the Bluewater Basin also withdraw from this aquifer. The specific conductance of this aquifer in the basin ranges from 700 to 5,000 µmhos, and well yields range from 10 gpm to several thousand gpm.
- Rio Grande Basin
  - Wells in the alluvium provide supplies for domestic, livestock, and irrigation use. No figures were indicated for specific conductance in the basin, but well yields are from 10 to several hundred gpm.

- Wells and springs in the Gallup Sandstone produce water for domestic and livestock uses on the southern and western portions of the basin. The range of specific conductance in this aquifer is 410 to 3,130 µmhos, and the median well yield of 32 wells tested in the basin is 30 gpm.
- Wells in the Morrison Formation in the Rio Grande Basin provide water for domestic and livestock use. Specific conductance is from 300 to 6,000 µmhos, and well yields vary from 6 to 85 gpm.

- Gallup Basin
  - The alluvium in the Gallup Basin is a minor aquifer in parts of the basin (Shomaker, 1991, as cited in NWNMCOG, 1998), but specific uses were not noted. The range of well yields indicated is 10 to 100 gpm. No data for specific conductance were provided.
  - The Menefee Formation is widely distributed at the surface and is a common source of water for domestic and livestock use on or near outcrops (Stone et al., 1983). With reported well yields of 12 gpm, the aquifer does not have sufficient capacity for municipal supply (John W. Shomaker, Inc., 1991, as cited in NWNMCOG, 1998). Specific conductance is from 800 to 3,100 µmhos.
  - The Point Lookout Sandstone is not a widely used water source. Few domestic and livestock wells are completed in this unit (Stone et al., 1983). The range for specific conductance is 690 to 1369 µmhos, while well yields are few gpm to several hundred gpm.
  - Water from wells completed in the Crevasse Canyon Formation and from springs supplies water for domestic and livestock purposes. The aquifer does not have sufficient capacity for municipal supply (John W. Shomaker, Inc., 1991, as cited in NWNMCOG, 1998), as well yields are less than 10 gpm. Specific conductance is generally less than 2,000 µmhos.
  - Wells and springs from the Gallup Sandstone provide water for public water supply, domestic use, livestock, and coal operations. The City of Gallup is the primary user of water from the Gallup Sandstone. Water from the Gallup Sandstone also provides supplies for coal operations near the City of Gallup. The range of specific conductance is 457 to 3,100 µmhos, and well yields vary from a few to several hundred gpm.
  - Water wells completed in the Dakota Sandstone provide water for domestic and livestock purposes. Early water supply wells for the City of Gallup and the AT&SF Railroad were completed in the combined Dakota Westwater (Westwater Canyon Member of the Morrison Formation) aquifer (John W. Shomaker, Inc., 1991, as cited in NWNMCOG, 1998). Many wells completed in the Dakota are also completed in

underlying and/or overlying units (Stone et al., 1983). Well yields are only 10 gpm in this basin, and specific conductance is from 2,000 to 10,000 µmhos.

- The Morrison Formation is the public water source for the village of Crownpoint, in McKinley County but outside the planning region. The City of Gallup also has wells completed in the Morrison Formation. Numerous flowing wells along the western edge of the basin, between Crownpoint and Shiprock, produce water for livestock and domestic purposes (Stone et al., 1983). The range of specific conductance in the Morrison in this basin is 400 to 2,200 µmhos, and well yields are from several gpm to 500 gpm.
- Wells from the Cow Springs-Bluff Sandstone provide water for domestic and livestock uses and are generally completed in either the overlying Morrison or underlying Entrada (Stone et al., 1983). Near outcrops, specific conductance is about 2,000 µmhos. Well yields are under 50 gpm.
- Stone et al. (1983) note that water from the Entrada Sandstone is generally not suitable for drinking. However, between Smith Lake and Mariano Lake, much of the water for stock and domestic uses is produced from the Entrada (Stone et al., 1983). The range of specific conductance is large, from 1,500 to 10,000 µmhos, and wells yield only a few gpm.
- The San Andres-Glorieta Aquifer is present within the Gallup Basin, but lies at too great a depth to be feasibly tapped as a water supply (John W. Shomaker, Inc., 1991, as cited in NWNMCOG, 1998). Specific conductance ranges from 800 to 3,500 µmhos.

- Gallup Extension
  - Wells in the alluvium provide water for stock and domestic uses. The range of specific conductance is 300 to 4,500 µmhos, with wells yielding up to 10 gpm.
  - Wells in the Chinle Formation provide water for domestic uses in Zuni village and the Black Rock area, and for stock uses. Well yields are from 5 to 125 gpm, and specific conductance is from 300 to 3,000 µmhos.
  - Wells in the San Andres-Glorieta Aquifer provide water for municipal, domestic, and livestock use in the Gallup Extension area. Specific conductance is fairly low, ranging from 500 to 1,600 µmhos, and well yields are from 25 to 150 gpm.

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 original and accepted regional water plans

(NWNMCOG, 1998, 2004) 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 Northwest New Mexico Water Planning Region is evaluated through periodic monitoring and comparison of sample results to pertinent water quality standards. In general, surface water quality is good throughout the region, except for notable concerns regarding heavy metals such as barium, selenium, lead, and chromium. Mining and refineries create potential hazards through surface runoff. Sedimentation also creates issues for the regions streams and reservoirs. Several reaches of rivers within the region 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).

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. Causes of impairment in the Northwest New Mexico region include ammonia, arsenic, biological indicators, nutrient/eutrophication, sediment/siltation, and temperature.

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.

Groundwater in the region contains notably high concentrations of naturally occurring radium, fluoride, arsenic, and selenium. The federal water quality standard for radium is exceeded in some public and private supply wells (NWNMCOG, 1998).

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.

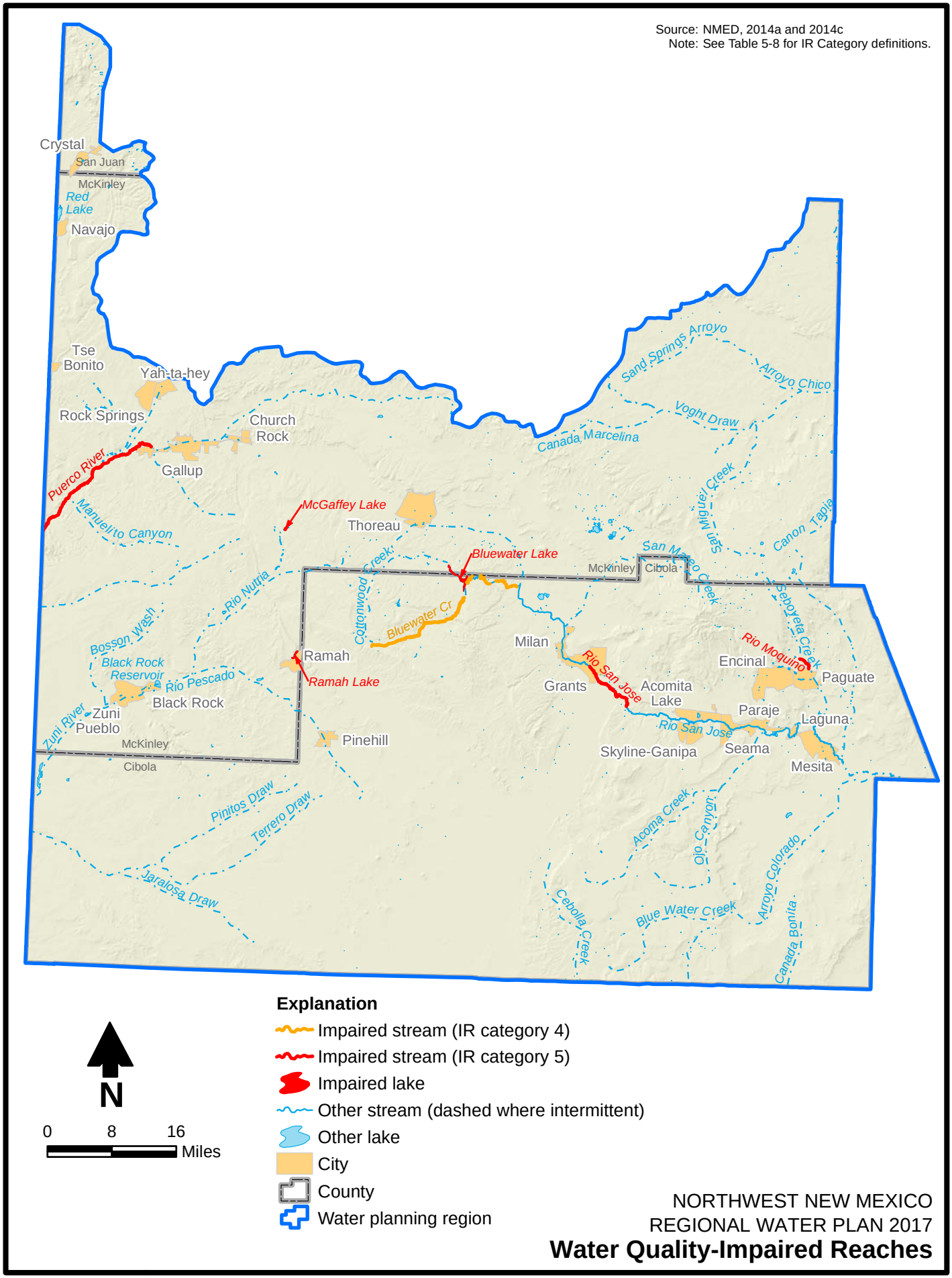

Source: NMED, 2014a and 2014c
Note: See Table 5-8 for IR Category definitions.
Crystal
San Juan
McKinley
Red Lake
Navajo
Tse Bonito
Yah-ta-hey
Rock Springs
Church Rock
Gallup
Puerco River
Manuelito Canyon
McGaffey Lake
Thoreau
Bluewater Lake
Cottonwood Creek
Bluewater Cr
Rio Nutria
Bosson Wash
Black Rock Reservoir
Rio Pescado
Black Rock
Zuni Pueblo
Zuni River
McKinley
Cibola
Ramah
Ramah Lake
Pinehill
Pintos Draw
Terrero Draw
Jaralosa Draw
Sand Springs Arroyo
Arroyo Chico
Voght Draw
Canada Marcelina
Miguel Creek
San Mateo Creek
Canon Tapia
Milan
Grants
Rio San Jose
Acomita Lake
Rio Moquino
Encinal
Paguate
Paraje
Laguna
Seama
Skyline-Ganipa
Mesita
Acoma Creek
Ojo Canyon
Arroyo Colorado
Cebolla Creek
Blue Water Creek
Canada Bonita
Explanation
Impaired stream (IR category 4)
Impaired stream (IR category 5)
Impaired lake
Other stream (dashed where intermittent)
Other lake
City
County
Water planning region
N
0
8
16
Miles
NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017
Water Quality-Impaired Reaches
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2017\NORTHWEST_NEW_MEXICO\FIG5-13_WQ_IMPAIRED_REACHES.MXD 2/22/2017

Figure 5-13

Table 5-8. Total Maximum Daily Load Status of Streams in the Northwest New Mexico Water Planning Region

Waterbody Name [a] (basin, segment)	Assessment Unit ID	Affected Reach (miles [b])	Probable Sources of Pollutant	Uses Not Fully Supported [c]	Specific Pollutant	IR Category [d]
McKinley County						
Arroyo Chico (Rio Puerco to San Isidro Arroyo)	NM-98.A_016	32.46	Not assessed	—	—	3/3A
Arroyo del Puerto (San Mateo Cr to mine entrance rd)	NM-97.A_018	6.8	Not assessed	—	—	3/3A
Bluewater Ck (Perennial prt R San Jose to Bluewater Rsvr)	NM-2107.A_00	7.06	Loss of riparian habitat Rangeland grazing Streambank modifications/destabilization	ColdWAL	Nutrient/eutrophication Biological indicators Temperature, water	4A
Bluewater Lake	NM-2107.B_00	608.6 [e]	Source unknown	ColdWAL	Nutrient/eutrophication Biological indicators	5/5A
Cebolla Creek (Ramah Rsv to headwaters)	NM-9000.A_032	11.54	Not assessed	—	—	3/3A
Cebolla Creek (Zuni Pueblo bdy to Ramah Rsv)	NM-9000.A_031	4.08	Not assessed	—	—	3/3A
Defiance Draw (CR 1 to W Defiance Rd)	NM-97.A_026	2.7	Not assessed	—	—	3/3A
Inditos Draw (breached road berm to hdwtrs)	NM-97.A_021	3.1	Not assessed	—	—	3/3A
McGaffey Lake	NM-9000.B_083	10.94 [e]	Source unknown	MWWAL	Nutrient/eutrophication Biological indicators	5/5C
Mulatto Canyon (Arroyo Tinaja to one mi blw USFS bnd)	NM-97.A_024	7	Not assessed	—	—	3/3A
Puerco River (non-tribal AZ border to Gallup WWTP)	NM-9000.A_200	22.21	Source unknown	WWAL	Ammonia (total)	5/5A

Source: NMED, 2014a

[a] Only waterbodies assigned to IR categories 3 and above are included.

[b] Unless otherwise noted.

[c] ColdWAL = Coldwater aquatic life
MWWAL = Marginal warmwater aquatic life
WWAL = Warm water aquatic life

[d] Impairment (IR) category definitions are attached as the last page of this table.

[e] Acres

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

Table 5-8. Total Maximum Daily Load Status of Streams in the Northwest New Mexico Water Planning Region

Waterbody Name [a] (basin, segment)	Assessment Unit ID	Affected Reach (miles [b])	Probable Sources of Pollutant	Uses Not Fully Supported [c]	Specific Pollutant	IR Category [d]
McKinley County (cont.)						
Ramah Reservoir	NM-9000.B_110	250 [e]	Source unknown	ColdWAL	Nutrient/eutrophication Biological indicators	5/5A
Rio Nutria (Tampico Draw to headwaters)	NM-9000.A_033	5.45	Not assessed	—	—	3/3A
San Isidro Arroyo (mine outfall to Tinaja Arroyo)	NM-97.A_022	0.5	Not assessed	—	—	3/3A
San Lucas Canyon (San Miguel Creek to headwaters)	NM-98.A_014	13.87	Not assessed	—	—	3/3A
San Miguel Creek (Arroyo Chico to headwaters)	NM-98.A_015	28.43	Not assessed	—	—	3/3A
Tampico Draw (Rio Nutria to headwaters)	NM-9000.A_080	4.8	Not assessed	—	—	3/3A
Tinaja Arroyo (San Isidro Arroyo to Mulatto Cny)	NM-97.A_023	1	Not assessed	—	—	3/3A
Unnamed trib to Defiance Draw (CR 1 to NM 264)	NM-97.A_027	3.1	Not assessed	—	—	3/3A
Unnamed tributary (San Mateo Cr to mine outfall)	NM-97.A_019	1.5	Not assessed	—	—	3/3A
Cibola County						
Bluewater Ck (Perennial prt R San Jose to Bluewater Rsvr)	NM-2107.A_00	7.06	Loss of riparian habitat Rangeland grazing Streambank modifications/destabilization	ColdWAL	Nutrient/eutrophication Biological indicators Temperature, water	4A

Source: NMED, 2014a

[a] Only waterbodies assigned to IR categories 3 and above are included.

[b] Unless otherwise noted.

[c] ColdWAL = Coldwater aquatic life
MWWAL = Marginal warmwater aquatic life
WWAL = Warm water aquatic life

[d] Impairment (IR) category definitions are attached as the last page of this table.

[e] Acres

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

Table 5-8. Total Maximum Daily Load Status of Streams in the Northwest New Mexico Water Planning Region

Waterbody Name [a] (basin, segment)	Assessment Unit ID	Affected Reach (miles [b])	Probable Sources of Pollutant	Uses Not Fully Supported [c]	Specific Pollutant	IR Category [d]
Cibola County (cont.)						
Bluewater Creek (Perennial prt Bluewater Rsvr to headwaters)	NM-2107.A_01	20.23	Forest roads (road construction and use) Silviculture harvesting Loss of riparian habitat Streambank modifications/destabilization	ColdWAL	Temperature, water	4A
Bluewater Lake	NM-2107.B_00	608.6 [e]	Source unknown	ColdWAL	Nutrient/eutrophication Biological indicators	5/5A
Canon del Piojo S Fk (main cny to ranch pond)	NM-97.A_016	1.2	Not assessed	—	—	3/3A
Cebolla Creek (Ramah Rsv to headwaters)	NM-9000.A_032	11.54	Not assessed	—	—	3/3A
Cebolla Creek (Zuni Pueblo bdy to Ramah Rsv)	NM-9000.A_031	4.08	Not assessed	—	—	3/3A
Laguna Seco	NM-9000.B_060	20 [e]	Not assessed	—	—	3/3A
Rio Moquino (Laguna Pueblo to Seboyettia Creek)	NM-2107.A_10	2	Source unknown Loss of riparian habitat Surface mining	ColdWAL	Nutrient/eutrophication Biological indicators Sedimentation/siltation Temperature, water	5/5C
Rio Nutria (Tampico Draw to headwaters)	NM-9000.A_033	5.45	Not assessed	—	—	3/3A
Rio Paguate (Laguna Pueblo bnd to headwaters)	NM-2107.A_30	10.59	Not assessed	—	—	3/3A
Rio San Jose (Grants BNSF RR crossing to headwaters)	NM-97.A_028	12.87	Not assessed	—	—	3/3A

Source: NMED, 2014a

[a] Only waterbodies assigned to IR categories 3 and above are included.

[b] Unless otherwise noted.

[c] ColdWAL = Coldwater aquatic life
MWWAL = Marginal warmwater aquatic life
WWAL = Warm water aquatic life

[d] Impairment (IR) category definitions are attached as the last page of this table.

[e] Acres

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

Table 5-8. Total Maximum Daily Load Status of Streams in the Northwest New Mexico Water Planning Region

Waterbody Name [a] (basin, segment)	Assessment Unit ID	Affected Reach (miles [b])	Probable Sources of Pollutant	Uses Not Fully Supported [c]	Specific Pollutant	IR Category [d]
Cibola County (cont.)						
Rio San Jose (Horace Springs to Grants BNSF RR crossing)	NM-9000.A_003	10	Source unknown	WWAL	Arsenic	5/5C
Seboyeta Creek (Rio Moquino to headwaters)	NM-2107.A_20	17.08	Not assessed	—	—	3/3A
Unnamed tributary (San Mateo Cr to mine outfall)	NM-97.A_019	1.5	Not assessed	—	—	3/3A

Source: NMED, 2014a

[a] Only waterbodies assigned to IR categories 3 and above are included.

[b] Unless otherwise noted.

[c] ColdWAL = Coldwater aquatic life
MWWAL = Marginal warmwater aquatic life
WWAL = Warm water aquatic life

[d] Impairment (IR) category definitions are attached as the last page of this table.

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

Table 5-8. Total Maximum Daily Load Status of Streams in the Northwest New Mexico Water Planning Region

[d] 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, 2013) 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: Limited data (n = 0 to 1) available, no exceedences. AUs are listed in this subcategory when there are no exceedences in the limited data set. These are considered low priority for follow up monitoring (NMED, 2013).

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.

Category 5/5C: Impaired for one or more designated or existing uses and Additional data will be collected before a TMDL is scheduled. AUs are listed in this category if there is not enough data to determine the pollutant of concern or there is not adequate data to develop a TMDL. For example, AUs with biological impairment will be listed in this category until further research can determine the particular pollutant(s) of concern. When the pollutant(s) are determined, the AU will be moved to IR Category 5A and a TMDL will be scheduled. If it is determined that the current designated uses are inappropriate, it will be moved to IR Category 5B and a UAA will be developed. If it is determined that “pollution” is causing the impairment (vs. a “pollutant”), the AU will be moved to IR Category 4C.

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/). The permitted discharges are primarily municipal wastewater treatment plants and mining operations.

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

Five sites in the planning region were listed by the U.S. EPA (2014) as Superfund sites. Information regarding these sites is provided in Table 5-11. Mining, specifically uranium and refinery activities, makes up the bulk of the EPA sites.

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).

Table 5-9. Municipal and Industrial NPDES Permittees in the Northwest New Mexico Water Planning Region

Permit No	Municipality/Industry [a]	Permit Type [b]
McKinley County		
NN0029386	Chevron Mining Inc./McKinley Mine	Coal mine
NM0020672	Gallup, City of/WWTP [c]	Municipal (POTW)
NM0030996	Lee Ranch Coal Company/El Segundo Mine	Coal mine
NM0029581	Lee Ranch Coal Company/Lee Ranch Mine	Coal mine
NM0023396	Ramah Water and Sanitation District/DWC & MSWA	Municipal (POTW)
NM0020532	Rio Algom Mining LLC/Ambrosia Lake Mine [c]	Mine (non-coal)
NM0028100	Rio Grande Resources Corporation/Mt .Taylor [c]	Mine (non-coal)
NM0031119	Roca Honda Resources, LLC/Roca Honda Mine [c]	Mine (non-coal)
NM0031071	Western Refining Gallup Refinery	
Cibola County		
NM0030678	Casa Blanca WWTP	Municipal (POTW)

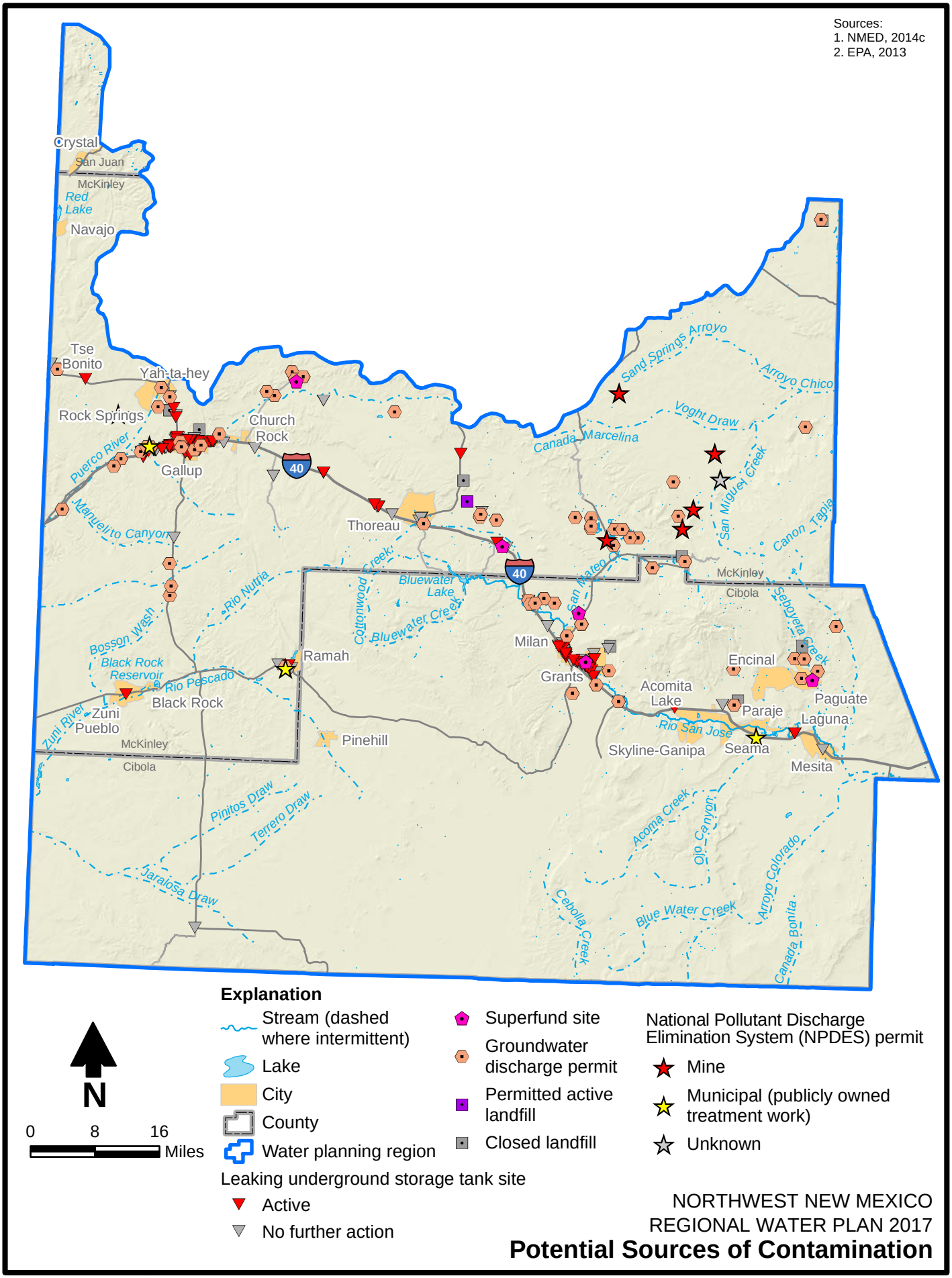
Source: NMED, 2016c

[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.

NPDES = National Pollutant Discharge and Elimination System
WWTP = Wastewater treatment plant
POTW = Publicly owned treatment works
U.S. EPA = U.S. Environmental Protection Agency



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NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Potential Sources of Contamination

Figure 5-14

Table 5-10. Groundwater Discharge Permits in the Northwest New Mexico Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
McKinley	Broken Arrow Bible Ranch	DP-1693	Active	7,000
	Burlington Northern Santa Fe - Gallup Fueling Facility	DP-193	Active	325
	Chee Dodge Elementary School	DP-540	Active	4,275
	Church Rock Mine	DP-558	Active	—
	City of Gallup Wastewater Treatment Facility	DP-1342	Active	3,500,000
	David Skeet Elementary School	DP-672	Active	9,900
	El Segundo Mine	DP-777	Active	4,000
	Gallup (City of) - Golf Course	DP-95	Active	1
	Gallup (City of) Sludge Disposal	DP-418	Active	35,000
	Kamp Kiwanis	DP-1501	Active	4,000
	Navajo Division of Transportation	DP-1752	Active	2,400
	NMDOT Manuelito Rest Area	DP-1658	Active	12,000
	Nutt Dairy	DP-1391	Active	40,000
	Prewitt Escalante Generating Station	DP-206	Active	1,457,550
	Questa (Village of) - Wastewater Treatment Plant	DP-191	Active	175,000
	Quivira Mining Company	DP-71	Active	2,390,000
	Quivira Mining Company	DP-169	Active	2,400,000
	Quivira Mining Company	DP-362	Active	7,200,000
	Quivira Mining Company	DP-67	Active	—

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

gpd = Gallons per day

— = Not listed on GWQB web site

[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 Northwest New Mexico Water Planning Region

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
McKinley (cont.)	Ramah Water and Sanitation District	DP-1235	Active	69,000
	T and R Market	DP-1007	Active	15,000
	Texaco Mini Mart Two	DP-1836	Active	750
	Thoreau Water and Sanitation District	DP-603	Active	140,000
	Truckstops of America-Gallup	DP-270	Active	400
	White Cliffs Domestic Water Users Association Treatment and Disposal System	DP-977	Active	25,000
	Yah-tah-hey WWTF	DP-792	Active	37,130
Cibola	Bibo-Seboyeta Sewage Lagoons	DP-138	Active	24,000
	Bluewater Water and Sanitation District	DP-109	Active	48,800
	Bowlin Bluewater Outpost	DP-1441	Active	3,500
	Grants (City of) - Wastewater Treatment Plant	DP-695	Active	1,800,000
	Grants Cibola County Schools - Cubero Elementary School	DP-1417	Active	6,000
	Homestake Mining Company	DP-200	Active	—
	Homestake Mining Company	DP-725	Active	1,008,000
	Homestake Mining Company	DP-1751	Pending	—
	Moquino Sewage Lagoon	DP-841	Active	2,500
	Roca Honda Uranium Mine	DP-1717	Active	11,520,000
	San Rafael Water and San. Dist	DP-58	Active	40,425

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

[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.

gpd = Gallons per day

— = Not listed on GWQB web site

Table 5-11. Superfund Sites in the Northwest New Mexico Water Planning Region

Site Location	Site Name [a]	Site ID	EPA ID	Status [b]
McKinley County				
Prewitt, NM	Prewitt Abandoned Refinery	NMD980622773	600877	NPL
17 miles northeast of Gallup, NM	United Nuclear Corp	NMD030443303	600819	NPL
Cibola County				
Grants, NM	Grants Chlorinated Solvents Plume	NM0007271768	605144	NPL
Paguate, NM	Jack Pile-Paguate Uranium Mine	NMN000607033	—	NPL
5.5 miles north of Milan, NM (southern margin of the San Juan Basin in Cibola, McKinley, Sandoval, and Bernalillo Counties as well as on Tribal lands)	Home Stake Mining (Grants Mining District)	NMD007860935	—	NPL

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

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

[b] NPL = National Priorities List

— = Information not available

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 Northwest New Mexico 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 5-12. Leaking Underground Storage Tank Sites in the Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County					
Continental Divide	Indian Village Gift	2309	28657	Exit 47 I 40 W Hwy	Cleanup, Responsible Party
	Souvenirs Indian Village	3165	30711	Exit 47 I 40 W	Investigation, Responsible Party
	Whiting Brothers 46	4428	31624	Hwy I-40 W	Investigation, Responsible Party
Gallup	A1 Tire Company	2137	820	300 W Maloney	Investigation, State Lead, CAF
	Afmy At Gamarco (Area Facilities Management Yard Gamerco)	3509	26639	US Hwy 666	Pre-Investigation, Confirmed Release
	Alpine Lumber Co.	4576	53755	Unknown	Pre-Investigation, Confirmed Release
	Allsups 234	3238	26508	Aztec and Patton	Cleanup, Responsible Party
	Allsups 250	2941	26510	1801 S 2nd	Cleanup, Responsible Party
	Allsups 303a	2930	26521	820 W Maloney	Cleanup, Responsible Party
	American Heritage Plaza	4368	26569	950 N Hwy 491	Cleanup, Responsible Party
	Bill'S Radiator Shop	2334	26945	3020 E Hwy 66	Cleanup, Responsible Party
	Downtown Conoco	80	27783	400 W Aztec	Aggr Cleanup Completed, Resp Party
	Eagle Exxon & L	1314	27816	1715 W 66 Ave	Investigation, Responsible Party
	Ed & Son's Service	2034	27849	2100 W 66 Avenue	Cleanup, State Lead with CAF
	El Camino Shell	3037	27867	US Hwy 66 and IH 20	Cleanup, Responsible Party
	El Rancho Shell	1262	27873	1000 E 66	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

[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
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
CAF: Corrective action fund

Table 5-12. Leaking Underground Storage Tank Sites in the Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County (cont.)					
Gallup (cont.)	Felixs Jewlery/Jobbers Indian Jewelry	376	28007	515 W Hwy 66	Investigation, Responsible Party
	Freeway Service Center 2	4399	28174	3308 W Hwy 66	Investigation, Responsible Party
	Gallup Motor Pool	3402	28235	700 S Boardman	Aggr Cleanup Completed, Resp Party
	Gallup School Bus Terminal	3406	28241	501 S Boardman	Cleanup, Responsible Party
	Gallup Shell	1586	28242	1898 E 66	Investigation, Responsible Party
	Gallup Whse 1	335	28226	1910 W Warehouse Ln	Cleanup, Responsible Party
	Gallup Whse 2	1152	28225	1900 W Warehouse Ln	Cleanup, Responsible Party
	Gas A Mat 558	2637	28280	2908 E Hwy 66	Investigation, Responsible Party
	Gas and Save 2	3768	28269	200 Marguerite St	Cleanup, Responsible Party
	Gas Up	4072	28238	920 E 66 Ave	Investigation, Responsible Party
	GasMax Gallup	4610	28689	Hwy 491 5 Miles N of	Investigation, Responsible Party
	Gasoline Vapor Investigation Gallup	4636	53755	Unknown	Pre-Investigation, Confirmed Release
	Georges 66	987	28311	1305 E 66 Ave	Investigation, Responsible Party
	High Country Tire	3622	53755	Unknown	Pre-Investigation, Confirmed Release
	Ideal Gulf	239	28644	706 W 66	Cleanup, Responsible Party
	Indian Hills Shell 2	2411	30295	3400 E 66	Investigation, 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 Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County (cont.)					
Gallup (cont.)	Indian Hills Shell	2691	30295	3400 E 66	Investigation, Responsible Party
	Indian Hills Shell 3	4377	30295	3400 E 66	Investigation, Responsible Party
	La Linda Texaco Svc	2799	29587	1100 East Hwy 66	Cleanup, Responsible Party
	Leyba'S Auto Clinic	2324	29091	1220 E Hwy 66	Investigation, Responsible Party
	Liberty Oil Co	1912	29096	1931 Barbara	Investigation, Responsible Party
	Loves 215	1744	29172	3380 W Hwy 66	Aggr Cleanup Completed, Resp Party
	Loves Country Store 215	3556	29172	3380 W Hwy 66	Cleanup, Responsible Party
	M&M Texaco Service	1908	29209	1301 E 66 Avenue	Investigation, Responsible Party
	Malco #181	3030	1671	2500 E 66th	Cleanup, Responsible Party
	Malco	4641	1671	2500 E 66th	Pre-Investigation, Confirmed Release
	Marshalls Texaco Service	3504	29271	2100 E 66 Ave	Cleanup, Responsible Party
	Mataya Chevron	3390	29295	3307 W Hwy 66	Cleanup, Responsible Party
	Mataya'S	2508	7076	431 W Hwy 66 Ave	Cleanup, Responsible Party
	Mckinley Mine	173	29825	27 Miles Northwest of Gallup	Referred to US EPA
	Nicolae's Malco Station	1358	1671	2500 E 66th	Investigation, Responsible Party
	Nmshtd Project East	973	29655	1015 E 66 Ave	Aggr Cleanup Completed, Resp Party
	Northside Chevr	2506	29701	1118 W Wilson	Investigation, 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

[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 Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County (cont.)					
Gallup (cont.)	Old Jewelry Store Demolition	4644	54728	907 W 66	Pre-Investigation, Confirmed Release
	Old Shamrock Station	1325	29767	3100 E Hwy 66	Cleanup, Responsible Party
	Pit Stop Texaco	308	31061	1615 W Hwy 66 Ave	Cleanup, State Lead with CAF
	Plateau Malco 181	1683	1671	2500 E 66th	Cleanup, Responsible Party
	Rehoboth Hospit	223	30189	1901 Redrock Dr	Cleanup, Responsible Party
	Rental Service Corp 397	4369	51673	2323 W Hwy 66	Investigation, Responsible Party
	Rogers Oil Company	4047	52269	500 E Hwy 66	Investigation, Responsible Party
	Rt 66 Conoco/Thriftway 290	1724	29534	800 W Hwy 66	Cleanup, Responsible Party
	Smith'S Mobile Svc	2510	30648	1001 E Hwy 66	Investigation, Responsible Party
	Speedway Muffler	2507	27772	601 W Hwy 66	Cleanup, Responsible Party
	Texaco Bulk Plant	4590	31043	2900 W 66 Ave	Pre-Investigation, Confirmed Release
	Thriftway #408	2056	31827	3430 E Hwy 66	Aggr Cleanup Completed, Resp Party
	Thriftway 182	3178	30559	3120 W Hwy 66	Cleanup, Responsible Party
	Thriftway 264	3317	30722	Hcr 5	Investigation, Responsible Party
	Tipton Electronics	2511	31132	300 East 66 Hwy	Investigation, Responsible Party
	Traders Shell 113	1483	31171	550 N Hwy 491	Investigation, 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

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

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Table 5-12. Leaking Underground Storage Tank Sites in the Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County (cont.)					
Gallup (cont.)	Truck Stops of America Gallup 2	4467	31212	I 40 Hwy 66	Investigation, Responsible Party
	Truckstops of Amer	2136	31212	I 40 Hwy 66	Cleanup, Responsible Party
	Truckstops of America	3567	31212	I 40 Hwy 66	Investigation, Responsible Party
	Twin Butte Hot Plant	2494	1968	66 Twin Buttes	Investigation, State Lead, CAF
	Unocal Trk Stp	303	28246	I 40 Hwy 66	Aggr Cleanup Completed, Resp Party
	West Conoco	867	31574	1921 W 66 Ave	Investigation, Responsible Party
Jamestown	7209 Pilot Travel Center 305	4501	1358	1 Giant Crossing I 40 Exit 39	Investigation, Responsible Party
	Giant Travel Center	3184	1358	1 Giant Crossing I 40 Exit 39	Investigation, Responsible Party
	Pilot Travel Center 305	4704	1358	1 Giant Crossing I 40 Exit 39	Pre-Investigation, Confirmed Release
	Pilot Travel Center - No305	4378	1358	1 Giant Crossing I 40 Exit 39	Cleanup, Responsible Party
	Pilot Travel Ceter #305	4617	1358	1 Giant Crossing I 40 Exit 39	Investigation, Responsible Party
Prewitt	Grants West Campground	3627	28382	PO Box 10	Cleanup, Responsible Party
Ramah	Ramah Chevron Srvce	1860	30134	3369 Highway 53	Cleanup, Responsible Party
Smith Lake	Smith Lake Chevron	4516	53349	Hwy 371	Pre-Investigation, Confirmed Release
Thoreau	Johnnies Lumber Co	2957	28776	1 Mile W of Thoreau	Pre-Investigation, Confirmed Release
Tse Bonito	Thriftway #602	2422	1920	NM Hwy 264	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 Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
McKinley County (cont.)					
Vanderwagen	El Sabino Fina	977	27877	SR 32	Referred to Surface Water Quality Bureau
Yah-Ta-Hay	Perry's Shell	2672	29935	N Hwy 666 State Rd 264 Int	Cleanup, Responsible Party
Zuni	Thriftway 256 R	4049	31102	1189 State Rd 53	Cleanup, Responsible Party
Cibola County					
Grants	11565 Conoco Bulk Plant	4497	52389	San Jose Dr	Pre-Investigation, Confirmed Release
	5688 Auto Clinic, Grants	4432	27086	511 E Santa Fe	Investigation, Responsible Party
	Allsups #200	1637	26504	616 N 1st St	Cleanup, Responsible Party
	Allsups 90	518	26528	1012 Roosevelt St	Cleanup, Responsible Party
	Atex 162	2503	28086	1231 E Santa Fe Rd	Aggr Cleanup Completed, Resp Party
	Auto Clinic	826	27086	511 E Santa Fe	Cleanup, Responsible Party
	Bar F 5	337	30721	720 E Santa Fe	Aggr Cleanup Completed, Resp Party
	Cibola Chevron	341	27360	1201 W Santa Fe Ave	Cleanup, State Lead with CAF
	Cibola Chevron 2	4533	27360	1201 W Santa Fe Ave	Cleanup, Responsible Party
	Cibola Cty Road	1756	27361	320 E High St	Cleanup, Responsible Party
	Delta Tire Corral	2502	27652	833 E Santa Fe Ave	Cleanup, Responsible Party
	El Malpais East Santa Fe	2501	53740	Unknown	Pre-Investigation, Suspected 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.

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Table 5-12. Leaking Underground Storage Tank Sites in the Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Cibola County (cont.)					
Grants (cont.)	Gils Shell	380	28379	1300 W Santa Fe	Cleanup, State Lead with CAF
	Grants Maverik 139	907	29299	1204 W Santa Fe Ave	Cleanup, State Lead with CAF
	Grants-Redi-Mart	4683	27494	800 E Santa Fe Ave	Pre-Investigation, Confirmed Release
	Grants-Redi-Mart	2896	27494	800 E Santa Fe Ave	Pre-Investigation, Confirmed Release
	Holiday Shell	4070	28575	1512 East Santa Fe Ave	Aggr Cleanup Completed, Resp Party
	Holiday Shell	980	28575	1512 East Santa Fe Ave	Aggr Cleanup Completed, Resp Party
	Milan	3282	53740	Unknown	Cleanup, State Lead with CAF
	Romero's Classic	88	30302	600 E Santa Fe Ave	Cleanup, Responsible Party
	School Maint Yd	24	29008	Reservaton	Referred to US EPA
	Sf Ave/Nimitz	428	30444	Santa Fe Ave and Nimitz	Cleanup, Responsible Party
	Speedys 426	4488	30721	720 E Santa Fe	Pre-Investigation, Confirmed Release
	Texaco Travel Center	1907	31071	1628 W Santa Fe	Investigation, Responsible Party
	Tommy's 66 Station	2317	1925	526 N First St	Cleanup, Responsible Party
	U-Haul	2504	30497	1100 E Santa Fe	Cleanup, Responsible Party
	Vacant Lot/City Park Copper & W Santa Fe	3572	53740	Unknown	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 Northwest New Mexico Water Planning Region

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Cibola County (cont.)					
Laguna	Laguna Mart	3613	29009	Exit 114 off I 40 W	Cleanup, Responsible Party
	Transouthwestestern PIPELINE NO6	2069	31180	PO Box 61	Referred to US EPA
Milan	Allsups #161	2041	26499	507 W Hwy 66	Cleanup, Responsible Party
	Carver Oil Co	2646	1026	304 Uranium Ave	Cleanup, Responsible Party
	Former Patterson Oil Bulk Plant	4090	51760	712 W Hwy 66	Investigation, Responsible Party
	Giant 295/Old Atex 53	117	31825	610 W Hwy 66	Cleanup, Responsible Party
	Giant 52	3503	1319	632 W Hwy 66	Investigation, Responsible Party
	Loves Country Stor #257	3029	29168	I 40 and Horizon Blvd	Cleanup, Responsible Party
	Loves Country Store 257	4648	29168	I 40 and Horizon Blvd	Investigation, Responsible Party
	Love's Country Store 257	4591	29168	I 40 and Horizon Blvd	Cleanup, Responsible Party
	Marvin Burrows	3412	27171	1430 Febco	Cleanup, State Lead with CAF
	Petro Psc Lp	4453	29941	I 40 and Horizon Blvd	Cleanup, Responsible Party
	Petro Psc Lp	4465	29941	I 40 and Horizon Blvd	Cleanup, Responsible Party
	Petro Psc Lp-Milan Truck Stop	4494	29941	I 40 and Horizon Blvd	Cleanup, Responsible Party
New Laguna	AT&SF Railroad	805	26781	Unknown	Referred to Ground Water Quality Bureau
San Fidel	Whiting Bros 79	629	31626	Hwy I 40 Exist 96	Aggr Cleanup Completed, Resp Party
San Mateo	Mt Taylor Mine	989	29482	1 Mile N of San Mateo	Investigation, 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

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

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
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Investigation: Ongoing assessment of environmental impact
Cleanup: Physical removal of contamination ongoing
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
CAF: Corrective action fund

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 one operating and nine closed landfills (Table 5-13, Figure 5-14).

Table 5-13. Landfills in the Northwest New Mexico Water Planning Region

County	Landfill Name [a]	Landfill Operating Status	Landfill Closure Date
McKinley	Gallup Landfill	Closed	—
	Gamerco Landfill	Closed	—
	Ojo Encino Landfill	Closed	—
	Red Rocks Regional Landfill	Open	NA
	Smith Lake Landfill	Closed	—
	Thoreau Landfill	Closed	—
Cibola	Cubero Landfill	Closed	—
	Lobo Canyon Landfill	Closed	—
	San Mateo Landfill	Closed	—
	Seboyeta Landfill	Closed	—

Sources: NMED, 2014b, 2015a, 2015b; NWNMCOG, 2004.

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

NA = Not applicable

— = Information not available

5.4.1.5 Nonpoint Sources

A water quality concern in the planning region is groundwater contamination 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.

Other nonpoint sources of pollutants that are concerns for surface water quality in the planning region include forest roads, rangeland grazing, loss of riparian habitat, road and highway maintenance, silvicultural harvesting, streambank modifications/ destabilization, surface mining, and unknown sources.

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 Northwest New Mexico region, the Rio Puerco Management Committee has identified needed restoration projects in the Rio Puerco Watershed (RPMC, 2001). The Rio Puerco Management Committee has also been actively working to reduce erosion and sediment and to improve vegetative communities along the Rio Puerco drainage.

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 Administrative Water Supply

The administrative water supply (i.e., total withdrawals) in 2010 for the Northwest New Mexico region, as reported in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013), was 27,793 acre-feet. Of this total, 3,757 acre-feet were surface water withdrawals and 24,037 acre-feet were groundwater. The breakdown of these withdrawals among the various categories of use detailed in the *New Mexico Water Use by Categories 2010 report* is discussed in Section 6.1.

However, for regions such as the Northwest New Mexico planning region, where the aquifers are being depleted, the administrative water supply may not be sustainable in the future. In these cases, the future available supply was estimated as described below.

The future available water supply in non-stream-connected groundwater basins (without available administrative models) was estimated by predicting the future decline of the saturated thickness using existing wells with water level hydrographs. By comparing the predicted decline with the available water column in existing wells, the impact on the water supply can be predicted. Using the average rate of water level decline calculated from USGS monitor wells within the non-stream-connected groundwater 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 declines in the Gallup and Bluewater UWBs are about 87 and 64 feet by 2060, assuming an average water level decline of 1.7 and 1.3 feet per year. A predicted decline of 87 feet in the Gallup UWB would impact about 31 percent of the wells. For the Bluewater UWB, the predicted decline is 64 feet, which would impact 38 percent of the wells. Assuming that the percentage of impacted wells results in an equal impact on water supply, then the estimated supply in 2060 is reduced proportionally in each of the UWBs shown in Table 5-14.

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

- Pumping by the City of Gallup will be reduced once the Navajo-Gallup Water Supply Project comes online.
- The water columns may not represent the available supply because some 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).

Table 5-14. Projected Groundwater Supply in Gallup and Bluewater Groundwater Basins of the Northwest New Mexico Water Planning Region in 2060 Based on Observed Rate of Decline

Row	Calculation Step	Underground Water Basin		Explanation/Source
		Gallup	Bluewater	
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	6,864	15,975	Longworth et al., 2013
2	Median water column (feet)	201	120	Difference between water level at the top of the well and total depth of the well, based on 578 wells in the Gallup UWB and 332 wells in the Bluewater UWB from WATERS database with post-1997 water level
3	Available water column	141	84.0	NMISC Handbook (2013) guideline (70% of median water column)
4	Rate of water level decline (ft/yr)	1.74	1.29	Using the water level data for USGS monitor wells in 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.
5	Estimated decline in 50 years (feet)	87.0	64.5	The average rate of water level decline was multiplied by 50 years to predict the average drawdown by 2060.
6	Percentage of wells impacted	31%	38%	Row 5 divided by Row 3 and multiplied by 50%
7	Groundwater supply from mined sub-basins in 2060 (ac-ft/yr)	4,742	9,842	Row 1 reduced by Row 6

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

- New wells could be drilled in other parts of the aquifer, although doing so would require a water right permit.

- Water level declines experienced by the City of Gallup are significantly greater than the water level declines used in this analysis.

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 Northwest New Mexico region, 2010 was a year with above average snowpack at some stations (Figure 5-5) and, according to the PDSI (Figures 5-6a and 5-6b), a normal water year overall. 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. For the four climate divisions present in the Northwest New Mexico region, the PDSI classifications for 2010 were all near normal (Climate Division 1, 2, 4 and 5). Given that the water use data for 2010 represent a near normal year, 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.

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 Northwest New Mexico region, the gage with the minimum ratio of annual yield to 2010 yield is the Rio San Jose at Grants, with a ratio of 0.0 for minimum annual yield (0 acre-feet in 2003) to 2010 yield (645 acre-feet) (USGS, 2014c); the Zuni River above Black Rock Reservoir had the next lowest ratio, 0.09, of minimum annual yield to 2010 yield. Based on the region's total administrative surface water supply of 3,757 acre-feet (Section 5.5.1), the drought-adjusted surface water supply is 0 to 338 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, while longer-term droughts can potentially have greater consequences. This approach does not evaluate mitigating influences of reservoir storage in early phases of a drought when storage is available or potential development of new groundwater supplies. 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, groundwater models are used, where available, 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 Water Supply in Gallup and Bluewater Groundwater Basins of the Northwest New Mexico Water Planning Region in 2060

Row	Calculation Step	Underground Water Basin		Explanation/Source
		Gallup	Bluewater	
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	6,864	15,975	Longworth et al., 2013
2	Reduction in supply due to 50 years of pumping and 20-year drought	31 + 12 = 43%	38 + 12 = 50%	Values from Row 6 of Table 5-14 added to the average impact estimated from all NMOSE models (12%)
3	Revised supply by 2060 with 20-year drought (ac-ft/yr)	3,918	7,925	Row 1 reduced by the total of Row 2

ac-ft/yr = Acre-feet per year
NA = Information not available

- 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.

For the Northwest New Mexico Region, no regional-scale groundwater models were available to use. Therefore, the statewide drought adjustment average of 12 percent discussed above was added to the predicted decline. Thus, the impact to the Gallup UWB is 43 percent (31+12) or a reduction from about 6,900 acre-feet to 3,900 acre-feet in 2060. Likewise, the Bluewater UWB can expect to see a decline of 50 percent under this drought scenario, a reduction from about 16,000 acre-feet in 2010 to 7,900 acre-feet in 2060. The estimate of water diversions in the Bluewater UWB is very approximate, based on assumptions about the amount of water use in the Rio Grande surface water basin in Longworth, et al (2010), which does not specify groundwater basins for some of the water use categories such as irrigation.

Outside of the closed basins, but within the Northwest New Mexico planning region, an estimated 1,197 acre-feet are pumped and assumed to be unaffected by drought. Combined with the impacts of drought on surface water supplies, which are projected to be about 0 ac-ft/yr during a drought, the water supply in 2060 is estimated to be 53 percent less than the 2010 water use, or 13,040 acre-feet.

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 Figures 6-1a through 6-1d. The predominant water use in 2010 in the Northwest New Mexico region was for public supply and irrigated agriculture.

The largest use of groundwater in the Northwest New Mexico region is for public water supply. Groundwater also supplies mining, power, industrial, and domestic wells. Groundwater supplied 86 percent of the total withdrawals in the region in 2010. 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. 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 plan. There are also some unquantified additional categories of water use, including riparian evapotranspiration and instream flow.

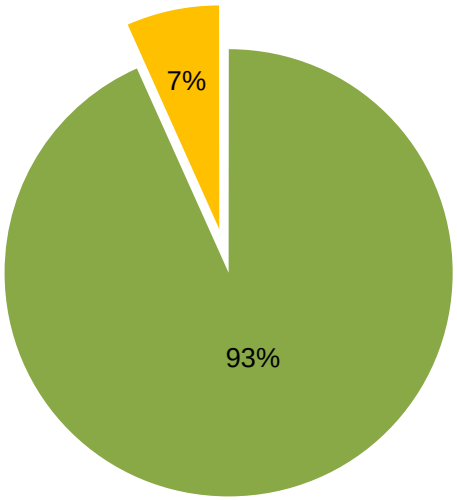
Table 6-1. Total Withdrawals in the Northwest New Mexico Water Planning Region in 2010

Water Use Category	Withdrawals (acre-feet) [a]								
	McKinley County			Cibola County			Planning Region		
	Surface Water	Ground-water	Total	Surface Water	Ground-water	Total	Surface Water	Ground-water	Total
Commercial (self-supplied)	0	60	60	0	45	45	0	105	105
Domestic (self-supplied)	0	2,137	2,137	0	1,063	1,063	0	3,201	3,201
Industrial (self-supplied)	0	800	800	0	2,749	2,749	0	3,550	3,550
Irrigated agriculture	975	0	975	1,591	3,855	5,446	2,566	3,855	6,421
Livestock (self-supplied)	70	283	353	40	166	206	110	449	560
Mining (self-supplied)	0	2,372	2,372	0	21	21	0	2,393	2,393
Power (self-supplied)	0	3,415	3,415	0	0	0	0	3,415	3,415
Public water supply	0	4,123	4,123	0	2,947	2,947	0	7,070	7,070
Reservoir evaporation	0	0	0	1,080	0	1,080	1,080	0	1,080
Total	1,045	13,190	14,235	2,711	10,847	13,558	3,757	24,037	27,793

Source: Longworth et al., 2013

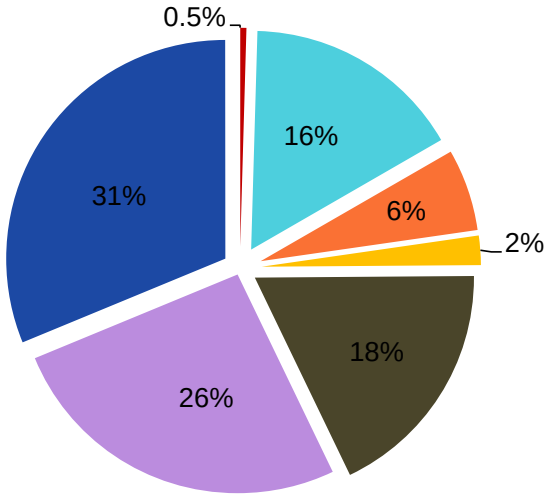
[a] Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this table.

Surface Water



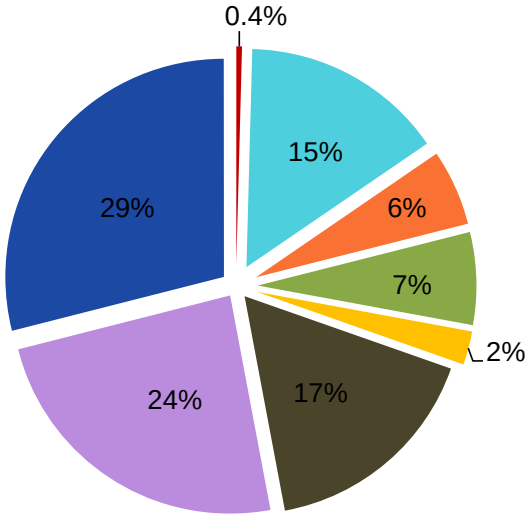
Total usage: 1,045 acre-feet

Groundwater



Total usage: 13,190 acre-feet

Total



Total usage: 14,235 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.

NORTHWEST NEW MEXICO
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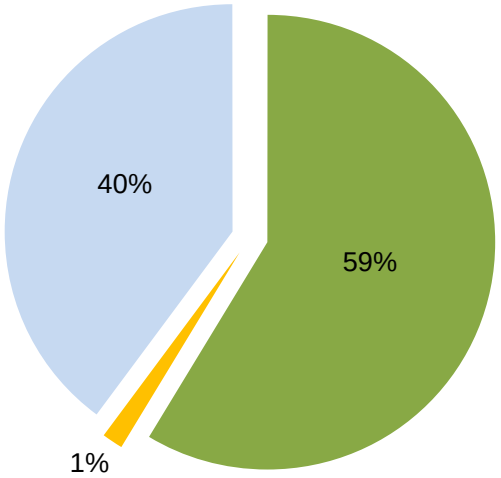
McKinley County Water Demand, 2010

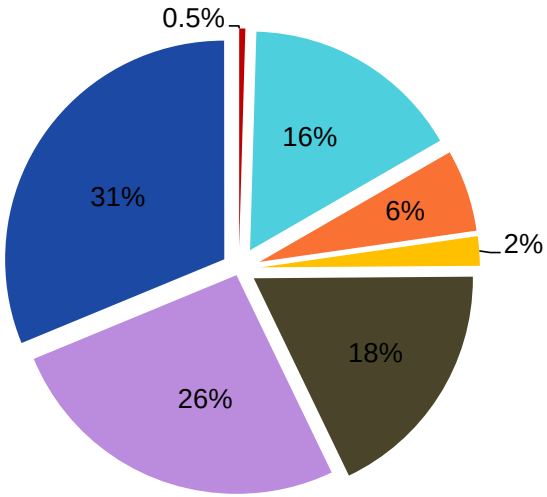
Figure 6-1a

Surface Water



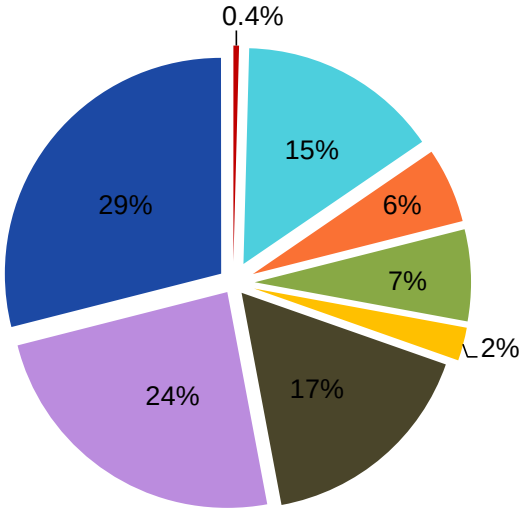
Total usage: 2,711 acre-feet

Groundwater



Total usage: 10,847 acre-feet

Total



Total usage: 13,558 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 6-1b

NORTHWEST NEW MEXICO
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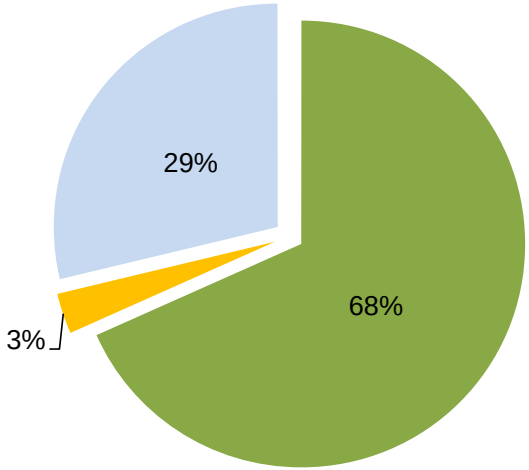
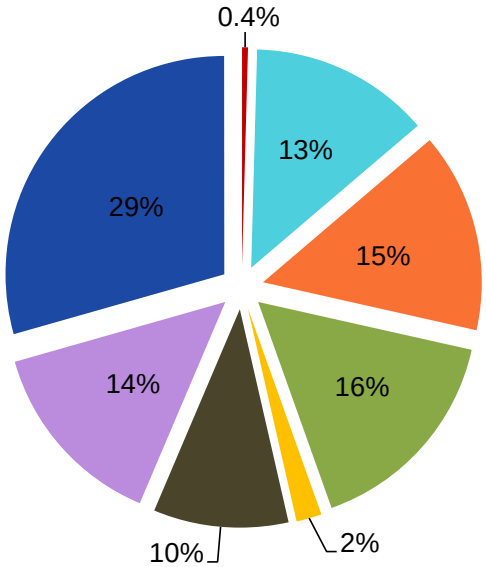
Cibola County Water Demand, 2010

Surface Water



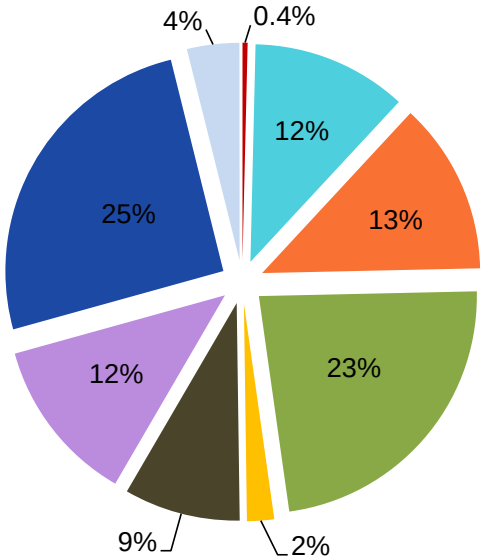
Total usage: 3,757 acre-feet

Groundwater



Total usage: 24,037 acre-feet

Total



Total usage: 27,793 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.

NORTHWEST NEW MEXICO
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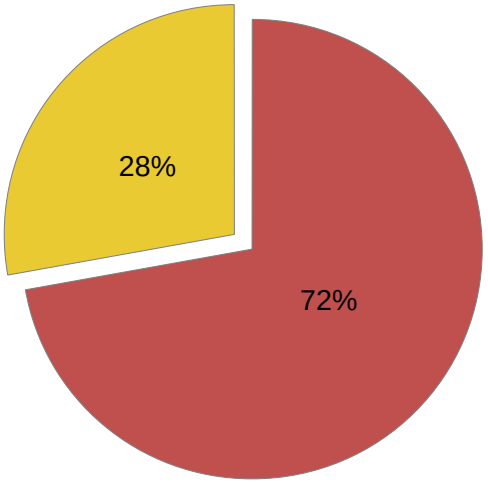
Total Regional Water Demand by Sector, 2010

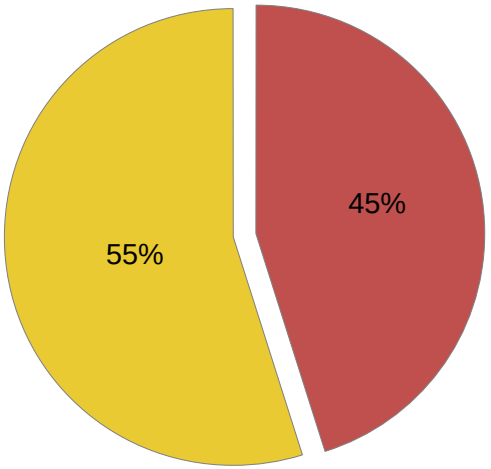
Figure 6-1c

Surface Water



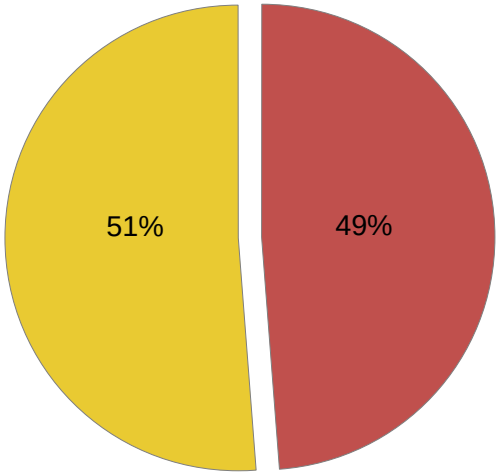
Total usage: 3,757 acre-feet

Groundwater



Total usage: 24,037 acre-feet

Total



Total usage: 27,793 acre-feet

Explanation

- Cibola
- McKinley

Source: Longworth et al., 2013

Notes:
1. Due to rounding, the percentages may not add to 100%.
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 6-1d

NORTHWEST NEW MEXICO
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Total Regional Water Demand by County, 2010

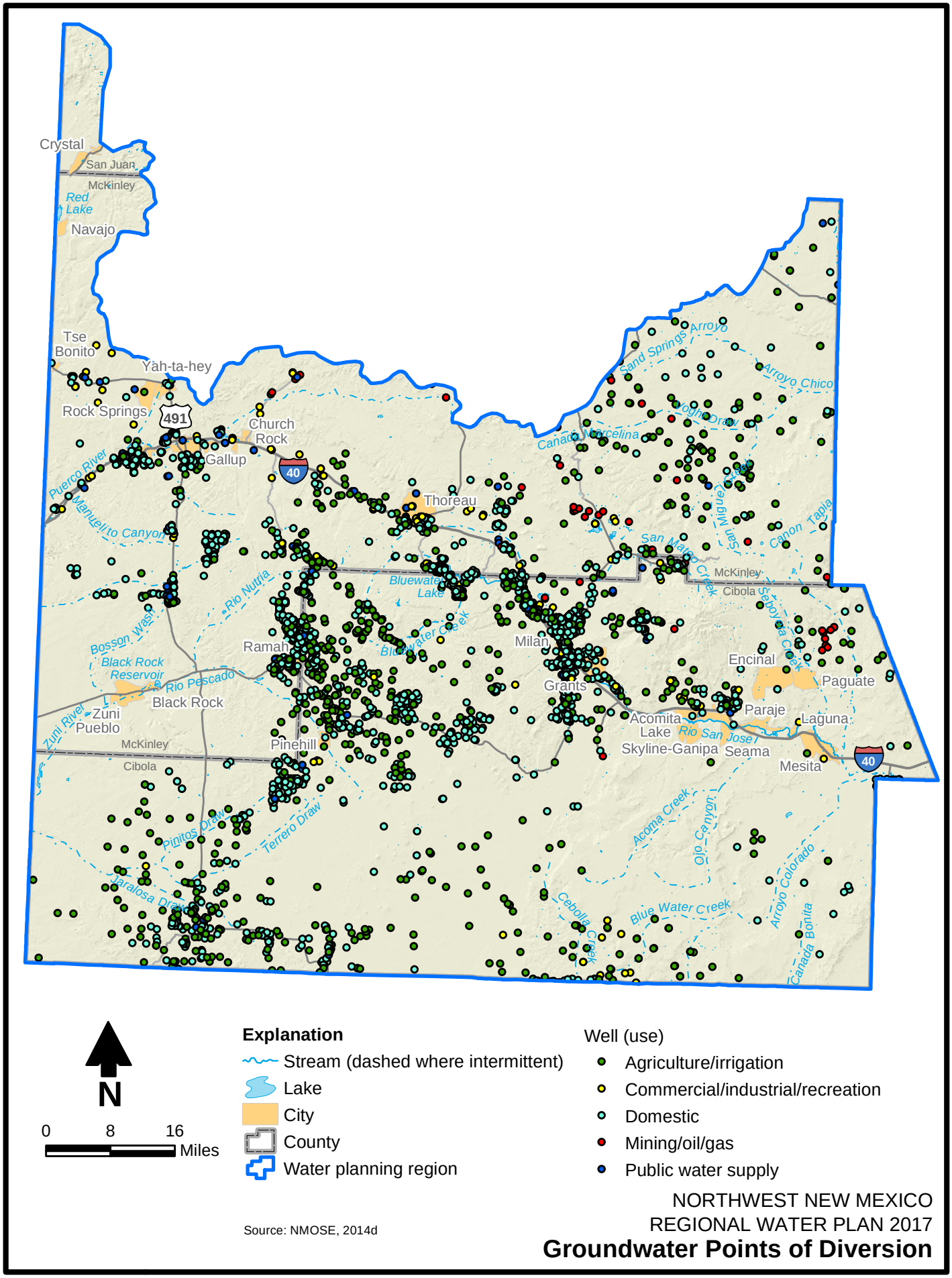

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Figure 6-2

- *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 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.

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. The Northwest New Mexico region includes all of Cibola County, as well as most of McKinley County, and a small part of southern San Juan County.

As noted in Table 3-1d, cattle and calves are the most valuable agricultural commodity in Cibola and McKinley counties.

Specific information regarding the population and economic trends in each county is provided in Sections 6.2.1 through 6.2.3. The information provided in these sections was obtained primarily from telephone interviews with government officials and other parties with knowledge of demographic and economic trends in the three counties; the list of interviewees is provided in Appendix 6-A. The information in these following subsections was used to project population, economic growth, and future water demand, as presented in Sections 6.3 and 6.5.

6.2.1 San Juan County

In 2010, there were 410 residents within the San Juan County portion of the region and little economic activity. Much of the small portion of San Juan County that is located within the Northwest New Mexico region lies within the Navajo Reservation. The majority of farms in the county are on the Navajo Reservation and are family-owned, with less than 15 acres. Sheep and beef cattle comprise the largest livestock categories. In recent years, there have been few sales of agricultural land.

6.2.2 McKinley County

Most of McKinley County is included within the Northwest region. It is primarily a rural area that is again located largely on the Navajo Reservation with a smaller area on Zuni Pueblo. In 2010 its population within the region was 60,096. The largest city is Gallup, with a population of 21,678 in 2010, equivalent to just over one-third of the portion of the county's population within the region. Gallup is a tourist destination located on the original Route 66 (now I-40), with many stores selling Native American arts and crafts. It is also a service center to the Navajo Nation. The population of McKinley County grew steadily from 1920 to 2000, increasing from 13,731 in 1920 to 37,209 in 1960, 56,449 in 1980, and 74,798 in 2000. The County then lost population from 2000 to 2010, before experiencing an increase from 2010 to 2013.

The Arrowhead Center at NMSU analyzed the economy of McKinley County and identified the basic industries that support the economy (Arrowhead Center, 2013). Basic industries bring outside dollars into the economy. A basic industry frequently has a location quotient (LQ) greater than 1.0, which means that its relative share of the local economy is greater than that industry's relative share of the state economy. In McKinley County the basic industries were agriculture (LQ of 3.67), wholesale trade (LQ of 3.10), accommodations and food services (LQ of 1.22), health care (LQ of 1.19), retail trade (LQ of 1.09), and federal civilian employment (LQ of 2.82). The largest employment categories are education/healthcare, retail trade, tourism, and public administration.

It is expected that the Gallup area will slowly recover from the recession. It is estimated that 650 construction jobs will be created as part of the Navajo-Gallup Water Supply Project and that the project will enable further job creation due to the greater availability of water for economic development (U.S. DOI, 2014). The completion date for all project features is December 31, 2024. Construction of the associated Tohlakai Pumping Plant, 8 miles north of Gallup, is underway and will create about 140 direct and indirect jobs during the anticipated 26-month construction period.

A feasibility study has been funded to explore building a rail line from Farmington to Thoreau or Gallup. Such a line would allow for the export of coal, crude oil, fly ash, agricultural products, and manufactured goods, as well as the import of fertilizer, oil field supplies, and other products. The rail line is also being addressed in the 2040 Statewide Long-Range Multimodal Transportation Plan (NMDOT, 2014). In another transportation development, U.S. Highway 491, which connects Gallup to Shiprock and Farmington, is becoming four lanes for its entire length.

The former Gamerco property northwest of Gallup is being developed as an industrial park under a master plan created by the Greater Gallup Economic Development Corporation in partnership with the BNSF Railway (GGEDC, 2013). The 1200-acre site is expected to be used as a transportation hub and distribution center and to include manufacturing and value-added agriculture. The Boardman Industrial Park is also being developed on the east side of Gallup.

According to the Census of Agriculture, the most valuable agricultural commodities in McKinley County are cattle and calves. Next in importance are vegetables, melons, and potatoes (USDA NASS, 2014). From 2007 to 2012 the number of farms and ranches decreased by 12 percent, from 2,624 to 2,297, and the amount of land in farms and ranches declined by 5 percent, from 3,172,899 acres to 3,022,704 acres. This led to a small increase in average farm size, from 1,209 acres in 2007 to 1,316 acres in 2012. Between 2007 and 2012 irrigated acreage declined from 4,524 acres to 1,901 acres, a decrease of 58 percent.

In 2012, the average payment to a farmer in McKinley County participating in agricultural support programs was $1,237, up 139 percent over the $518 received in 2007. Total government payments going to farmers in McKinley County was $845,000 in 2012 versus $71,000 in 2007. The average farm had a net cash operating loss of $4,269. The average age of a farmer in 2012 was 63.1.

Approximately 30 percent of the farms in the county are less than 10 acres in size. The main crop is alfalfa. Livestock primarily includes beef cattle and sheep. Ranchers have been substantially reducing their herds due to the drought, and many ranchers are keeping their land idle. The average ranch is large, at about 12,000 acres but the median farm size is 160 acres.

6.2.3 Cibola County

The entirety of Cibola County is included within the Northwest Region. It is a largely rural area that includes the Pueblos of Laguna and Acoma, the Zuni Reservation and Zuni Trust lands, and the Ramah Navajo Reservation. The largest cities are Grants and Milan, with populations in 2010 of 9,182 and 3,245, respectively. These two communities, which are located along I-40, comprise nearly half of the population of the county. Cibola County was formed out of a portion of Valencia County in 1981. Its population has gone through several boom and bust cycles related to the uranium and, to a lesser extent, coal industries. From 1990 to 2010 its population grew from 23,794 to 27,213. Since 2010, there has been only a slight increase in population.

The Arrowhead Center at NMSU analyzed the economy of Cibola County and identified the basic industries that support the economy (Arrowhead Center, 2013). In Cibola County, the primary basic industries in 2011 were farm employment (LQ of 1.43), federal civilian employment (LQ of 1.10), and state and local government (LQ of 1.84). Utilities had an LQ of 4.58 in 2010, but these data, and data for mining, were suppressed in 2011. The largest employment categories are education/healthcare, tourism, retail trade, and public administration.

The New Mexico Legislative Job Council (2013) has targeted "integrated IT and cyber," as well as manufacturing and extractives, in the Northwest District of New Mexico (which includes Cibola and McKinley counties). It is possible that 16,500 jobs could be created in these three sectors during the next ten years if limitations in broadband, transportation, workforce quality, leadership, and tax and regulatory areas could be overcome.

The New Mexico Department of Workforce Solutions (2013) has projected future job growth in the Northern Region, which includes Cibola and McKinley counties (as well as San Juan and several counties in north-central New Mexico). It is projected that 32,000 jobs will be created between 2010 and 2020, with the largest number of jobs in educational services, food and drinking establishments, ambulatory health care, and professional and technical services.

The economy of Cibola County has been relatively stagnant. Some potential for economic development lies in the development of several uranium mines that are seeking permits. In addition, a truck-to-rail facility to move oil from the Four Corners area is going to be built in Milan at a cost of $52 million. Delaware-based NGL Energy Partners expects the project to generate 62 jobs by the third quarter of 2015 and another 50 within five years.

According to the Census of Agriculture, the most valuable agricultural commodities in Cibola County are cattle and calves. There were 522 farms and ranches in Cibola County in 2012, a 65 percent increase from the 317 farms in 2007. During that time, the amount of land in farms and ranches increased by 5 percent, from 1,478,697 acres in 2007 to 1,558,974 in 2012. This resulted in a 36 percent decrease in the average farm size, from 4,665 acres to 2,987 acres. The

irrigated acreage in 2007 was 2,319 acres; no irrigated acreage data for 2012 were provided in the Census of Agriculture.

In 2012, the average payment to a farmer in Cibola County participating in agricultural support programs was $3,673, down 60 percent from the average of $9,293 in 2007. Total government payments going to farmers in Cibola County was $500,000 in 2012, an increase of 116 percent over the total amount of $232,000 paid in 2007. The average farm had a net cash operating loss of $2,675. The average age of a farmer in 2012 was 56.5, somewhat below the state average.

Approximately 40 percent of the farms in the county are less than 10 acres and the median farm size is 22 acres. Livestock primarily includes beef cattle and sheep. In recent years ranchers have cut back on livestock by about half due to drought. Some are trying to lease land from other ranchers to have access to their grass. The average ranch is large, about 15,000 acres. Some ranchers have been selling out, and younger people are leaving the ranches for other work.

6.3 Projected Population Growth

As shown in Table 6-2, the 2004 RWP included a high and low population projection for 2010 for McKinley County, but only one forecast for Cibola County. The Cibola projection and the low for McKinley were based on Bureau of Business & Economic Research (BBER) projections (1996, as cited in NWNMCOG, 1998), while the high for McKinley was based on input from communities within the region. The actual 2010 population was close to the Cibola projection, while the actual McKinley population (for the portion of the county within the region) was less than even the low forecast. While the low projection was for a 2010 population of 90,356 for the region, the actual population was only 87,692.

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

County	2004 Regional Water Plan Projected Population [a]		Actual Population 2010 U.S. Census [b]	
	High	Low	Entire County	County Portion Within Planning Region
San Juan	NA	NA	130,044	410
McKinley	79,740	63,847	71,492	60,096
Cibola	26,509 [c]	26,509 [c]	27,213	27,213
Total Region	106,249	90,356	228,749	87,692

[a] NWNMCOG, 2004
[b] U.S. Census Bureau, 2014a
[c] The high and low projections were the same

The slower than anticipated population growth in this region since 2008 was due to drought and the national recession that started in 2007. The BBER has continued to revise population projections downward to reflect slower growth than originally anticipated (BBER, 2012; 2008).

In developing population projections for this RWP update, several forecasts made by others were considered:

- Trib Choudhary, formerly the demographer for the Navajo Nation developed population projections through 2020. Mr. Choudhary projected that the annual growth will average approximately 2 percent throughout the Reservation.
- The 2012 McKinley County Comprehensive Plan Update (McKinley County, 2012) forecast that growth for the county would occur at the following annual percentages:
    - 2010-15 0.86
    - 2015-20 0.89
    - 2020-25 0.68
    - 2025-30 0.45
    - 2030-35 0.33

    These growth rates were derived from BBER (2008). For the comprehensive plan update, the 2030-2035 growth rate was extrapolated beyond 2035 to an annual growth rate of between 0.33 percent in the initial years and 0.31 percent by 2060.

For the population projections through 2060 (Table 6-3), two population forecasts were developed: one based on a moderately optimistic view of the economy for this region over the long-term and one that portrays a more pessimistic picture. The population projections for each county in the region are detailed in Table 6-3 and summarized below:

- For Cibola County, the high forecast uses the 2012 BBER projections through 2040 (Appendix 6-B), which are then extrapolated through 2060. The low is based on an annual growth rate that is half of the high growth rate. By 2060, population is projected to reach 34,838 under the high scenario and 30,844 under the low.
- For McKinley County, the 2012 BBER projections through 2040 (Appendix 6-B), extrapolated through 2060, are used for the low forecast. The high forecast is based on a projected 1.0 percent annual growth rate through 2060. By 2060, population is projected to reach 98,781 under the high and 55,265 under the low.
- For the portion of San Juan County within the region, the high forecast assumes that there is no growth or decline, while the low assumes a decline of 3 percent per decade. By 2060, population would remain at 410 under the high and drop to 352 under the low.

Table 6–3. Northwest New Mexico 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
San Juan	High	0.00	0.00	0.00	0.00	0.00
	Low	–0.30	–0.31	–0.32	–0.30	–0.31
McKinley	High	1.00	1.00	1.00	1.00	1.00
	Low	0.35	0.04	–0.31	–0.41	–0.51
Cibola	High	0.68	0.50	0.47	0.43	0.39
	Low	0.35	0.25	0.24	0.22	0.20

b. Projected Population

County	Projection	Population					
		2010	2020	2030	2040	2050	2060
San Juan	High	410	410	410	410	410	410
	Low	410	398	386	374	363	352
McKinley	High	60,096	66,376	73,312	80,973	89,435	98,781
	Low	60,096	62,211	62,485	60,598	58,174	55,265
Cibola	High	27,213	29,134	30,629	32,090	33,499	34,839
	Low	27,213	28,174	28,898	29,588	30,239	30,844

Source: Poster Enterprises, 2014

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 Northwest New Mexico 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.

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.

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

OSE Declared Groundwater Basin(s) [a]	Water Supplier [b]	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
McKinley County					
Bluewater	Bluewater Lake MDWCA	400	25	0	11
	Greers Subdivision	115	70	0	9
	Thoreau Water & Sanitation District	1,200	97	0	130
Gallup	Block a Well CO-OP/ William Acres	96	102	0	11
	Cedar Ridge Trailer Park	76	89	0	8
	Coal Basin Water Assn.	57	153	0	10
	D & S Trailer Ranch	100	70	0	8
	Ft Wingate Army Depot [c]	69	70	0	5
	Gamerco Water & Sanitation	1,610	63	0	114
	Manuelito Navajo Childrens Home	70	70	0	5
	Ramah Water & Sanitation Dist.	450	66	0	33
	Sagebrush Water Co-Op	56	70	0	4
	St Williams Mobile Home Park	84	70	0	7
	Whispering Cedars Water Assoc.	350	70	0	27
	White Cliffs MDWUA	260	70	0	20
	Zuni Pueblo Water Works [c]	6,302	70	0	494
Gallup San Juan	Gallup Water System	20,209	142	0	3,211
NA	Rob Roy Trailer Park	95	137	0	15
	McKinley County public water supply totals	31,599		0	4,123
	County-wide public water supply per capita use [d]		117		

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

[c] Assumed based on geographic location of water supplier.

[d] County-wide per capita use, calculated as the total population divided by total withdrawals

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 [b]	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
McKinley County (cont.)					
Gallup San Juan	Rural self-supplied homes (Lower Colorado)	23,704	70	0	1,859
Bluewater Rio Grande (Middle)	Rural self-supplied homes (Rio Grande)	3,554	70	0	279
	McKinley County domestic self-supplied totals	27,259		0	2,137
	County-wide domestic self-supplied per capita use [d]		70		
Cibola County					
Bluewater	Bluewater Acres Water Association	371	41	0	17
	Bluewater Water & Sanitation District	560	203	0	128
	Grants Domestic Water System	9,043	197	0	1,991
	Milan Community Water System	1,911	292	0	625
	San Mateo MDWCA	192	64	0	14
	San Rafael Water & Sanitation Dist.	886	108	0	107
NA	Candy Kitchen Water Coop	45	83	0	4
	Plano Colorado Estates	43	70	0	3
Rio Grande (Middle)	Bibo Mutual Domestic Water Association	263	70	0	21
	Moquino Water Users Association II	50	54	0	3
	Seboyeta Water System	290	103	0	33
	Cibola County public water supply totals	13,654		0	2,947
	County-wide public water supply per capita use [d]		193		

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

[d] County-wide per capita use, calculated as the total population divided by total withdrawals

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 [b]	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Cibola County (cont.)					
Bluewater Gallup Rio Grande (Middle)	Rural self-supplied homes (Rio Grande)	13,559	70	0	1,063
	Cibola County domestic self-supplied totals	13,559		0	1,063
	County-wide domestic self-supplied per capita use [d]		70		

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

[d] County-wide per capita use, calculated as the total population divided by total withdrawals

gpcd = Gallons per capita per day

- 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.

For the Northwest New Mexico region, current per capita use in McKinley County is under 130 gpcd (Table 6-4), so no additional conservation is assumed. Cibola County currently has per capita use between 130 and 200 gpcd (Table 6-4), so their future per capita use is assumed to be reduced to 130 gpcd. In the projections, this reduction is 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 second largest water use in the region, conservation in this sector may be beneficial. However, when considering the potential for improved efficiency in agricultural irrigation systems, it is important 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 Northwest New Mexico 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 information was not available to quantify potential conservation savings, 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 in the Northwest New Mexico region it is one of the lowest categories of water use. However, reservoir evaporation accounts for the largest use of surface water. 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 Northwest New Mexico region. The projections of future water demand determined using this consistent method, as applicable, for the Northwest New Mexico 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 *New Mexico 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.

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 Northwest New Mexico 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. 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 as aquifers go dry.

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.

In regions that use surface water for agriculture withdrawals, the 2010 administrative water supply used as the starting point for the projections reflects a near normal water year for the region. For the 2020 through 2060 projections, therefore, it was generally 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).

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 the 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. The amount of reservoir evaporation is dependent on the surface area of the reservoir as well as the rate of evaporation.

Evaporation rates are partially dependent on temperature and humidity; that is, when it is hotter and drier, evaporation rates increase. Surface areas of reservoirs are variable, and during extreme drought years, the low surface areas contribute to lower total evaporation, even though the rate of evaporation may be high.

The projections of reservoir evaporation for each region were based on evaporation rates reported in the *Upper Rio Grande Impact Assessment* (USBR, 2013), which evaluated potential climate change impacts in New Mexico. This report predicted considerable uncertainty, but some increase in evaporation rates and lower evaporation totals overall due to predicted greater drought frequency and resultant lower reservoir surface areas. Although it is possible that total evaporation will be lower in drought years, since the projections are to be compared to 2010 use, assuming lower reservoir evaporation would give a false impression of excess water. Thus, the low projection assumes 2010 evaporation amounts. For the high projection, the same surface areas as 2010 were assumed, but higher evaporation rates, derived from the *Upper Rio Grande Impact Assessment* (USBR, 2013), were used to reflect potentially warmer temperatures. The high scenario projected using this approach represents a year in which there is a normal amount of water in storage but the evaporation rates have increased due to increasing temperatures.

In reality the fluctuations in reservoir evaporation are expected to be much greater than the high/low range projected using this method. To evaluate the balance between supply and demand, the projections are being compared to the administrative water supply, including reservoir evaporation. It is important to not show an unrealistic scenario of excess available water. Therefore the full range starting with potentially very low reservoir surface areas was not included in the projections.

6.5.2 Northwest New Mexico Projected Water Demand

Table 6-5 summarizes the projected water demands for each water use category for each of the two counties, which were developed by applying the methods discussed in Section 6.5.1. As discussed in Section 6.3, population is projected to increase slightly under the low scenario and more significantly under the high scenario in Cibola County. In McKinley County population is projected to decline under the low scenario. The total projected water demand in the region in 2060 ranges from approximately 30,000 to 39,000 acre-feet per year. 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.

Demand in the *public water supply* category is projected to increase in McKinley County and slightly increase in Cibola County under the high scenario, proportional to the increasing population projections. However, use in this category is not projected to decline proportionally to the projections indicating declining population, because it is anticipated that existing water rights and domestic wells will continue to be used at the 2010 administrative supply level.

Table 6-5. Projected Water Demand, 2020 through 2060
Northwest New Mexico Water Planning Region
Page 1 of 2

Use Sector	Projection	Water Demand (acre-feet) [a]					
		2010 [b]	2020	2030	2040	2050	2060
McKinley County							
Public water supply	High	4,123	4,563	5,049	5,585	6,178	6,833
	Low	4,123	4,271	4,290	4,290 [c]	4,290 [c]	4,290 [c]
Domestic (self-supplied)	High	2,137	2,365	2,617	2,895	3,203	3,542
	Low	2,137	2,214	2,224	2,224 [c]	2,224 [c]	2,224 [c]
Irrigated agriculture	Low/High	975	975	975	975	975	975
Livestock (self-supplied)	High	353	300	318	335	353	353
	Low	353	265	300	318	335	353
Commercial (self-supplied)	High	60	66	73	80	89	98
	Low	60	62	62	62 [c]	62 [c]	62 [c]
Industrial (self-supplied)	High	800	880	968	1,065	1,171	1,288
	Low	800	840	882	926	972	1,021
Mining (self-supplied)	High	2,372	2,609	2,870	3,157	3,473	3,820
	Low	2,372	2,372	2,372	2,372	2,372	2,372
Power (self-supplied)	High	3,415	4,396	4,396	4,396	4,396	4,396
	Low	3,415	3,966	3,966	3,966	3,966	3,966
Reservoir evaporation	Low/High	0	0	0	0	0	0
Cibola County							
Public water supply	High	2,947	3,138	3,257	3,346	3,406	3,504
	Low	2,947	3,042	3,100	3,141	3,168	3,212
Domestic (self-supplied)	High	1,063	1,138	1,197	1,254	1,309	1,361
	Low	1,063	1,101	1,129	1,156	1,181	1,205
Irrigated agriculture	High	5,446	5,446	5,446	5,446	5,446	5,446
	Low	5,446	4,868	5,060	5,060	5,253	5,253
Livestock (self-supplied)	High	206	175	185	196	206	206
	Low	206	155	175	185	196	206
Commercial (self-supplied)	High	45	48	51	53	55	58
	Low	45	47	48	49	50	51
Industrial (self-supplied)	High	2,749	3,023	3,362	3,659	4,025	4,427
	Low	2,749	2,886	3,031	3,182	3,341	3,508

[a] 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 table.

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

[c] Projections set equal to 2030 decade high

Table 6-5. Projected Water Demand, 2020 through 2060
Northwest New Mexico Water Planning Region
Page 2 of 2

Use Sector	Projection	Water Demand (acre-feet) [a]					
		2010 [b]	2020	2030	2040	2050	2060
Cibola County (cont.)							
Mining (self-supplied)	High	21	1,021	1,123	1,235	1,359	1,495
	Low	21	21	21	21	21	21
Power (self-supplied)	Low/High	0	0	0	0	0	0
Reservoir evaporation	High	1,080	1,090	1,101	1,114	1,130	1,139
	Low	1,080	1,080	1,080	1,080	1,080	1,080
Total region							
Public water supply	High	7,070	7,701	8,305	8,931	9,584	10,336
	Low	7,070	7,313	7,390	7,431	7,458	7,502
Domestic (self-supplied)	High	3,201	3,504	3,814	4,149	4,512	4,903
	Low	3,201	3,315	3,353	3,380	3,405	3,429
Irrigated agriculture	High	6,421	6,421	6,421	6,421	6,421	6,421
	Low	6,421	5,843	6,035	6,035	6,228	6,228
Livestock (self-supplied)	High	560	475	503	531	559	559
	Low	560	420	475	503	531	559
Commercial (self-supplied)	High	105	114	123	133	144	156
	Low	105	108	110	111	112	113
Industrial (self-supplied)	High	3,550	3,903	4,330	4,724	5,196	5,715
	Low	3,550	3,726	3,913	4,108	4,313	4,529
Mining (self-supplied)	High	2,393	3,630	3,993	4,392	4,832	5,315
	Low	2,393	2,393	2,393	2,393	2,393	2,393
Power (self-supplied)	High	3,415	4,396	4,396	4,396	4,396	4,396
	Low	3,415	3,966	3,966	3,966	3,966	3,966
Reservoir evaporation	High	1,080	1,090	1,101	1,114	1,130	1,139
	Low	1,080	1,080	1,080	1,080	1,080	1,080
Total regional demand	High	27,793	31,234	32,986	34,791	36,774	38,940
	Low	27,793	28,165	28,715	29,007	29,486	29,799

[a] 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 table.

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

[c] Projections set equal to 2030 decade high

Projected water demand in the *commercial* and *domestic* categories is assumed to be proportional to the population growth rates, resulting in increases under both the high and low scenario in Cibola County and under the high scenario in McKinley County. Under the low scenario in McKinley County, use is projected to remain at 2010 rates.

The *agricultural* projections are based on the assumption that the current observed declining trend for agriculture will continue for the short trend, through 2020. However, irrigated agriculture is entirely dependent on surface water in McKinley County, and partially dependent on surface water in Cibola County. Because surface water is highly susceptible to drought, the recent drought, along with the recession, is thought to be driving the decline 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 the many adjudicated water rights in the region (Section 4), there is clearly a demand for agricultural water if it is available. Hence, it is assumed that agriculture will begin to recover after 2020:

- In McKinley County, under both scenarios the amount of water devoted to current acreage is expected to remain at 2010 levels throughout the planning horizon, because the surface water used in agriculture will be put to beneficial use.
- Similarly, in Cibola County under the high scenario, the amount of water devoted to current acreage is expected to remain at 2010 levels throughout the planning horizon. Under the low scenario, it is expected that agriculture usage of groundwater (which accounts for 71 percent of water used by irrigated agriculture in Cibola) will decline initially, before nearly recovering to 2010 levels by 2060.

The *livestock* segment in Cibola and McKinley counties is expected to see a small decline by 2020, but to recover to 100 percent of 2010 use by 2060.

For the *mining* sector, the lower scenario projects no change in future usage in either county. The high scenario for mining is based on the potential for additional coal and uranium mining in the region, as well as for some hydraulic fracturing activity in McKinley County, and for this scenario, an increase of 10 percent per decade is projected in McKinley County, which would result in an increase of more than 60 percent in water usage by 2060. Peabody Coal is developing a new mine adjacent to the El Segundo Mine, 35 miles north of Grants in McKinley County. Several uranium mines in Cibola County are in the application process, including the San Mateo Mine; thus, under the high scenario for Cibola County, growth is also projected in this sector.

Industrial use includes usage by a refinery and several mines. Usage is expected to grow at 10 percent per decade in the high scenario and at 5 percent per decade in the low.

The projections for the *power* sector are based on input received from Tri-State Generation and Transmission, Inc., the cooperative that operates the Escalante Power Plant in McKinley County. Tri-State projects that future usage for the plant will range between a low of 3,966 acre-feet and a high of 4,396 acre-feet. Excess steam and water from the plant is used by the McKinley Paper Company, which produces containerboard.

The Northwest New Mexico region projections include some water use in the *reservoir evaporation* category due to the presence of Bluewater Lake. As discussed in Section 6.5.1, the projected demand is based on 2010 reservoir surface areas so that it can accurately be compared to the 2010 administrative water supply.

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 6.5.1, the fluctuations in reservoir evaporation are expected to be much greater than the high/low projected range developed for this balance. When comparing the projected demands to the administrative water supply, which is based on 2010 water withdrawals, 2010 surface areas of reservoirs were used to avoid an unrealistic scenario of excess available water. The actual amount of water that will be used for reservoir evaporation is dependent on the surface area of the reservoir and temperatures. During the first year of a drought when there is surface water in storage,

the reservoir evaporation could be similar to 2010 use, but after subsequent years of drought, when storage and surface areas are lower, reservoir evaporation would be lower.

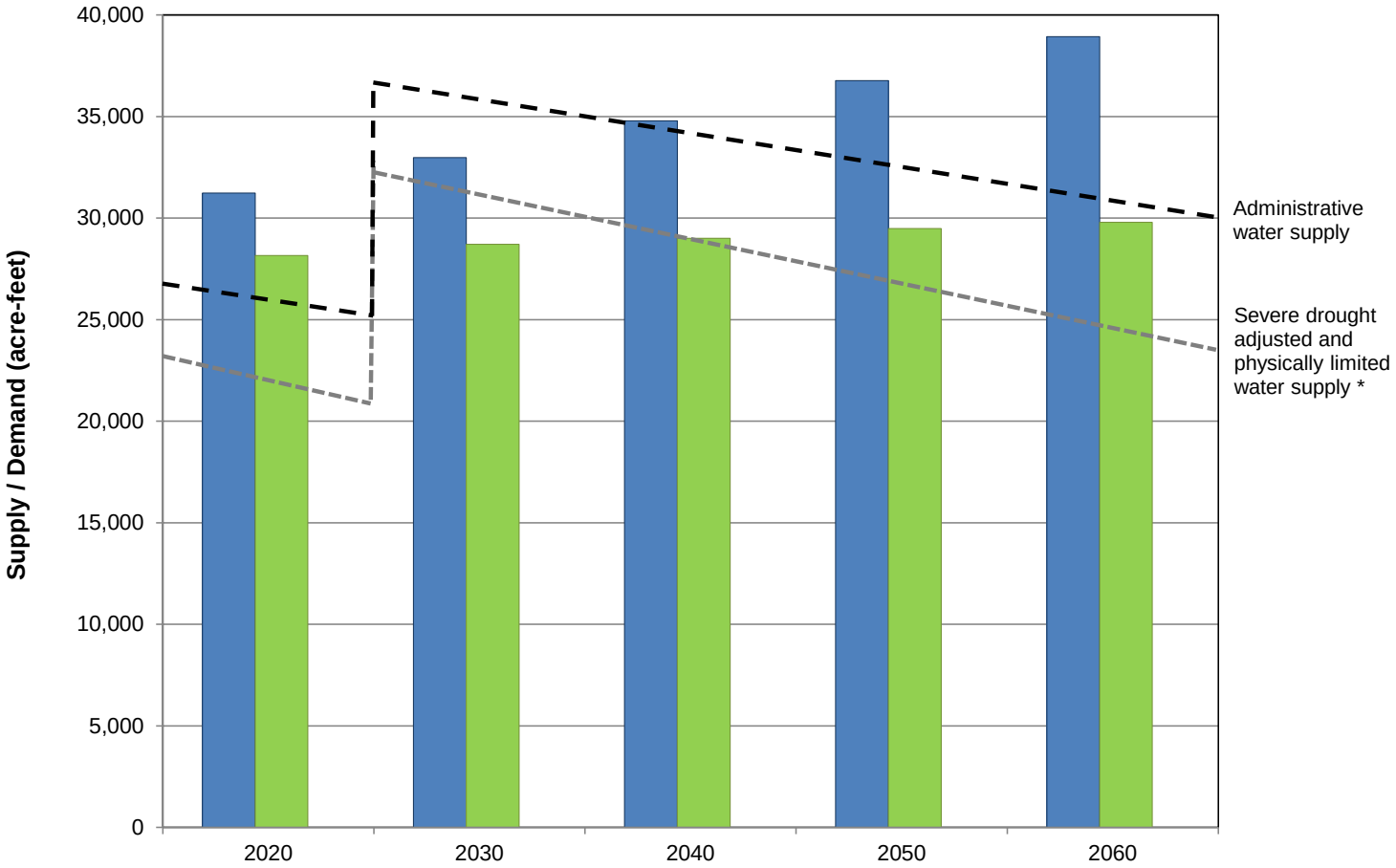
- As discussed in Section 4, there are considerable legal limitations on the development of new surface and groundwater resources, given that surface and surface-connected groundwater supplies are fully appropriated, which affects the ability of the region to prepare for shortages by developing new supplies.

- 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.

- Planning for long-term water supply in the region has been underway for many years, and with the NGWSP in place by 2024, the project beneficiaries will have access to renewable source of supply. The City of Gallup, whose wells have experienced significant declines, will have the right to use up to 7,500 acre-feet of water leased from the Jicarilla Apache Nation and conveyed through the project. An estimated 4,000 acre-feet of water will be supplied to the Navajo Nation for domestic uses in the region. Planning is underway to develop access to project water for the small water systems near Gallup who currently rely on diminishing groundwater supplies (DBS&A, 2015).

Despite these limitations, it is useful to have a general understanding of the overall balance of the supply and demand. Figure 7-1 and Table 7-1 illustrate the total projected regional water demand under the high and low demand scenarios, and also show the declining trend of administrative water supply and the drought-adjusted water supply. The increase in administrative and drought-adjusted water supplies in year 2024 is due to the Navajo-Gallup Water Supply Project (NGWSP) coming online. The values presented in Figure 7-1 and Table 7-1 should be considered a schematic of the general trends and not a precise analysis of the aquifer behavior. Ideally, the numerical models could be used to simulate the decline in supply.

As presented in Section 5.5, the region's current administrative water supply is 27,793 acre-feet and the drought supply is 13,040 acre-feet, or about 47 percent of a normal year administrative water supply. Future water demand projections reflect substantial growth in water use (Figure 7-1), due to the economic trends discussed in Sections 3 and 6. Comparing estimated future high and low water demands after inclusion of the additional supply provided by the NGWSP, the estimated shortage with drought and declining groundwater in the year 2060 ranges from 5,259 to 14,400 acre-feet.



* 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:
1. 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.
2. The increase in administrative and drought-adjusted water supplies in year 2024 is due to the Navajo-Gallup Water Supply Project coming online.

NORTHWEST NEW MEXICO
REGIONAL WATER PLAN 2017

Available Supply and Projected Demand

Figure 7-1

Table 7-1. Water Use and Estimated Availability in the Northwest New Mexico 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	Gallup	6,864	4,742	3,918
	Bluewater	15,975	9,842	7,925
Stream-connected	Surface water	3,757	3,757	0
	Groundwater connected to surface water	1,197	1,197	1,197
Total		27,793	19,538	13,040
Water use as a percentage of 2010 use			70%	47%

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 Northwest New Mexico region considered a variety of strategies for addressing these water management challenges. As discussed in Sections 5 and 7, the Northwest New Mexico region is very vulnerable to drought, and there is a large gap between projected demands and drought supplies. Consequently, the Northwest New Mexico effort focused on drought planning in addition to overall water resource planning.

This RWP is building on the 2004 water plan and is considering strategies that will enhance and update, rather than replace, the strategies identified in the accepted water plan. The status of strategies from the 2004 RWP 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 both identify strategies and facilitate their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2004 Northwest New Mexico Regional Water Plan recommended the following strategies for meeting future water demand:

- Develop new water supplies
  - Navajo-Gallup Water Supply Project implementation
  - Gallup regional water distribution system
  - Drill new wells in Gallup sandstone
- Water conservation and reuse
  - Conservation initiatives to reduce municipal water use (gpcd)
  - Develop a reuse plan
- River and watershed restoration
  - Rio Puerco restoration
  - Zuni River restoration
- Public outreach
  - Technical advisory boards and citizen panels
  - Regional planning committee
  - Hire a regional water planning coordinator
- Funding source for enhancing local water supplies
- Regionalization: Small water system collaboration and interconnection
- Drought contingency plan

The steering committee reviewed each of the strategies and indicated that they are all still relevant and are actively being implemented or being refocused as new recommended strategies (Appendix 8-A). Actions that have been completed in order to implement the strategies identified in the 2004 plan are summarized on Table 8-1.

8.2 Water Conservation

Municipal water use is generally low in the Northwest New Mexico Water Planning Region, and water conservation programs are already in place, many having been implemented as recommended in the 2004 accepted plan (Section 8.1); therefore, 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.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Northwest New Mexico Water Planning Region

Strategy	Status
Develop new water supplies	
Navajo-Gallup Water Supply Project implementation	The Omnibus Public Lands Management Act was passed in 2009 and included approval of funds for the construction of the Navajo-Gallup Water Supply Project.
Gallup regional water distribution system	The Omnibus Public Lands Management Act passed in 2009 included approval of funds for the construction of the Gallup regional water distribution system.
Drill new wells in Gallup sandstone	As part of the Navajo-Gallup Water Supply Project implementation, several deep water supply wells have been drilled into the Gallup Sandstone.
Water conservation and reuse	
Conservation initiatives to reduce municipal water use (gpcd)	The City of Gallup has developed a conservation program and has a water conservation coordinator on staff to implement program objectives.
Develop a reuse plan	Preliminary feasibility studies have been completed by the City of Gallup.
River and watershed restoration	
Puerco River restoration	Restoration is ongoing.
Zuni River restoration	Restoration is ongoing.
Public outreach	
Technical advisory boards and citizen panels	McKinley County created a water board in 2004 with broad representation from the regional water planning participants. The water board met regularly between 2004 and 2006.
Regional planning committee	The McKinley County Water Board provided regional water planning support between 2004 and 2006.
	The Aqua Mesa Domestic Water Alliance was formed in 2007. This alliance of several water systems continues to work together to identify opportunities for sharing resources and functions such as hiring an operator.
Hire a regional water planning coordinator	No coordinator has been hired.
Funding source for enhancing local water supplies	McKinley County has developed a local environmental fund that provides funds for water supply projects and project match in the region.
	In 2012 the New Mexico legislature passed House Bill 277, which provided for the imposition of a "federal water project gross receipts tax" as approved by referendum for the repayment of loans for construction of the Navajo-Gallup Water Supply Project.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Northwest New Mexico Water Planning Region

Strategy	Status
Regionalization: Small water system collaboration and interconnection	McKinley County implemented several regionalization projects. The first project was a regionalization plan issued in 2007. Implementation of the plan was partially successful when McKinley County and the Northwest New Mexico Council of Governments (NWNMCOG) obtained a Water Trust Board grant to construct emergency connections between some of the small water systems around Gallup.
	The County and NWNMCOG also successfully developed an appraisal level investigation funded by the Bureau of Reclamation that evaluated options for future water supply for 8 systems and prepared conceptual engineering designs for interconnection to the Navajo-Gallup Water Supply Project.
	Several small water systems have developed operations and maintenance as well as asset management plans as part of the regionalization project.
Drought contingency plan	McKinley County has developed a drought contingency plan.
	The Navajo Nation has developed a drought contingency plan.
	The Zuni Pueblo has developed a drought contingency plan.

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

In addition to continuing with strategies from the previous plan, the Northwest New Mexico 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 Northwest New Mexico Regional Water Planning Steering Committee and other stakeholders and reflect their interest and intent. The recommendations made by the steering committee and other stakeholders have not been evaluated or approved by NMISC. Regardless of the NMISC's 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.

8.3.1 Comprehensive Table of Projects, Programs and Policies

Over the two-year update process, seven meetings were held with stakeholders in the Northwest New Mexico 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). A summary of the PPP information, obtained primarily from input supplied directly by stakeholders, is included in Appendix 8-A. 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.

Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan (ICIP), Water Trust Board, and Capital Outlay funding processes, and those projects are also included in the Northwest New Mexico PPP table. The projects included are from the 2017-2021 ICIP list (http://nmdfa.state.nm.us/ICIP.aspx, accessed March 2016), which is updated on an annual basis. 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 expanded watershed restoration, ongoing implementation of the Navajo-Gallup Water Supply Project and the small water system regionalization initiative, 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 Appendix 8-A has not been ranked or prioritized; it is an inclusive table of all of the PPPs 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). The table identifies each PPP by category, including water and wastewater system infrastructure, water conservation, watershed restoration, flood prevention, water reuse, water rights, water quality, and data collection.

In the Northwest New Mexico region, projects identified on the PPP table are primarily water system infrastructure and watershed restoration projects. Because municipal water use is generally low and water conservation programs are already in place, few water conservation projects are included. However, water providers in the region will continue to implement their water conservation programs and drought contingency ordinances.

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. However, identifying larger regional collaborative projects is helpful to successful implementation of the regional plan. 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 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 Northwest New Mexico region stakeholders are shown on Table 8-2.

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 8-2 and the PPPs listed in Appendix 8-A in that they would be implemented on a state rather than 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.

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed, Forest and Stream Restoration					
• Rio San Jose upstream conservation and water quality improvements.	Different reaches of the river will have different project leads.	• City of Grants • Village of Milan • Bluewater Village • Small water systems • Acoma Pueblo • Laguna Pueblo • Lava Soil and Water Conservation District • Rio San Jose Flood Control District • Bureau of Indian Affairs (BIA)	• U.S. Department of Agriculture (USDA), Rural Development and Rural Utilities	$150,000 – $200,000	
• Restore Rio San Jose through salt cedar and sediment removal.			• Water Trust Board • Collaborative Forest Restoration Program • New Mexico State Forestry • New Mexico Environment Department (NMED) 319 Program	Project-specific. Costs can be as high as $1,000 to $4,000 per acre.	
• Promote Puerco River restoration through salt cedar removal (both initial treatment and retreatment).	McKinley Soil and Water Conservation District	• City of Gallup • McKinley County • U.S. Forest Service (USFS) • Fort Wingate • Conservation nonprofits			

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed, Forest and Stream Restoration (cont.)					
• Conduct a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the San Jose/Bluewater Creek and in the Mt. Taylor and Zuni Mountains areas. This tool will assist in evaluating outcomes from restoration projects and in prioritizing key areas for future projects.	New Mexico Tech	• Northwest New Mexico Council of Governments (NWNMCOG) • U.S. Geological Survey (USGS) • U.S. Forest Service (USFS) • Bluewater State Park • Nature Conservancy	• State appropriation • New Mexico Finance Authority (NMFA) • Water Trust Board	$30,000 – $120,000	
Water Planning, Data Sharing and Communication					
• Rio San Jose East and West Side Water Forum. Organize two separate meetings to discuss shared values related to water, risks to the resources including water quality concerns, further data needs, and implementation at the local level.	NWNMCOG	• McKinley and Cibola counties • Acoma Pueblo • Laguna Pueblo • Navajo Nation • Zuni Pueblo • Small water systems • USFS • City of Grants • City of Gallup • Village of Milan • Soil and water conservation districts (SWCDs)	• Local government contribution • BIA	$5,000 for initial meeting	Ongoing support for the initiative

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Water Planning, Data Sharing and Communication (cont.)					
• Hire a water coordinator to work at the NWNMCOG	NWNMCOG			$75,000	
Groundwater Monitoring and Modeling					
• Develop groundwater monitoring program. • Ensure that data collected are incorporated into regional models.	New Mexico Tech	• USGS • New Mexico Office of the State Engineer (NMOSE) • City of Gallup	• State • County budgets	$100,000	
Small Water System Regionalization and Capacity Development					
• Create County-wide water and sanitation district to include service areas of small water systems.	• State and local representatives • McKinley County	• City of Gallup • Ya Ta Hey • White Cliffs • Gamerco • Domestic well owners • Other water systems as listed in the appraisal level investigation	• Bureau of Reclamation • Capital Outlay • Water Trust Board • McKinley County	$400,000	• Small systems are reluctant to relinquish ownership and control of their water to a larger regional organization • Significant capital investments would be required to interconnect the more rural systems. • Potential for conflicts over service area boundaries • Governance of the organization and structure of assistance
• Small water system capacity development and operations. Provide funding to Aqua Mesa to hire a Level 4 operator to provide assistance to small water systems in the region. Need record keeping assistance and county-wide engineering technical assistance.	Aqua Mesa Domestic Water Alliance	• McKinley County • Ya Ta Hey Water and Sanitation District • Gamerco Water and Sanitation District • White Cliffs Mutual Domestic Water Association	• Water Trust Board • NMED • USDA • State appropriation	$300,000	

Table 8-2. Key Collaborative Programs, Projects, and Policies 2016 Northwest New Mexico Regional Water Plan

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Water System Upgrades, Improvements, and Well Development					
Many water suppliers in the region require funding for water system improvements, upgrades, and well drilling. As water levels decline, suppliers will need additional wells to meet future demand. Specific projects are identified in Appendix 8-A.	Water suppliers throughout the region	• Rural Community Assistance Corporation (RCAC) • U.S. Environmental Protection Agency (EPA) • NMFA • NMED • New Mexico Rural Water Association • USDA • NWNMCOG • City of Gallup	• New Mexico Capital Outlay Request • Water Trust Board • Drinking Water Revolving Loan Fund • USDA	Overall cost for the region is millions of dollars. Planning and engineering documents for some improvements range in cost from $50,000 to $100,000.	Funding limitations are the main obstacle to implementation.

After group discussion, Northwest New Mexico region identified the following recommendations to be considered in the state water plan:

- Provide for ongoing regional water planning support for implementation.
- Ensure appropriate regional boundaries and focus planning locally with the stakeholders who are best suited to collaborate in certain areas. For example, the Northwest New Mexico Water Planning region has east-side and west-side issues. Future planning efforts should recognize those differences and allow for more localized planning.
- Consider renaming Region 6 since Northwest New Mexico Water Planning Region does not accurately reflect the geographical boundaries of the region. This region does not include San Juan County, which covers the northwestern corner of the state.
- Promote interregional communication on shared issues.
- Recognize that tribal water use is not accounted for in regional water planning.

The 2016 Northwest New Mexico Regional Water Plan 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.

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Appendix 2-A

Master Stakeholder List

Northwest New Mexico Region 6 RWP Master Stakeholder List

Updated June 14, 2016

Last	First	Affiliation / Category
Arviso	Gil	Ft. Defiance Agency (works for Navajo Nation Design & Engineering)
Bality	Attila	Park Service/El Morro
Begay	Michelle	Indian Health Services
Bemis	Kirk	Hydrologist, Zuni Tribe Conservation Program
Benn	Donald	Navajo Nation EPA
Bishop	David	New Mexico Environment Department
Botkin	Sherry	Thoreau Water & Sanitation
Bowman-Muskett	Carol	Chair, McKinley County Commission
Boyd	Tony	Cibola County Manager
Bright	Bill	Sustainable Gallup, Chair
Brown	Jim	Coal Basin Water Association
Busemeyer	John	Park Planner, State Parks and Recreation
Byerley	Dudley	McKinley SWCD
Cain	Robert	Ramah Water and Sanitation District
Campbell	Robert	Assistant City Manager, City of Farmington
Chavez	Aaron	San Juan Water Commission
Cheama	Andres	Zuni Pueblo Water Rights
Chiasson	Jim	New Mexico Environment Department
Choudhary	Trib	Former Demographer, Navajo Nation
Cothran	Chris	Bluewater Village Water and Sanitation District
Cowboy	Ben	Navajo Nation Water Rights Commission
Cresto	John	Gallup McKinley County Schools – Director of Construction
Daly	Mike	President, Mariposa Domestic Water Alliance White Cliffs MDWUA
Dawson	Jeanne	Cibola National Forest
Decker	Doug	McKinley County Attorney
DePauli	Marc	DePauli Engineering
Devlin	Tom	Gamerco Water & Sanitation District
Dunlap	Jim	Chair, NM ISC
Dyer	Chris	Executive Director, UNM-Gallup Campus
Edaakie	Strallie	Zuni Tribe
Edmonson	Andy	NMED Drinking Water Bureau
Espinoza	Jason A.	Vice President, Government Affairs, Association of Commerce and Industry
Etsitty	Steve	Navajo EPA
Felipe	Lloyd	Commissioner, Cibola County Commission

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.

Northwest New Mexico Region 6 RWP Master Stakeholder List

Updated June 14, 2016

Last	First	Affiliation / Category
Fox	Ian	Ian Fox, Forestry Program Manager, Forest Service Cibola National Forest and National Grasslands
Frank	Mitzi	Superintendent, National Park Service, El Malpais
Garcia	Theresa	Village Clerk
Garden	Lynette	Bluewater Village Water and Sanitation District
Gomez	Jesse	Bluewater Acres Domestic Water Users Association
Greene	Mike	Project Manager, Generation Asset Management, PNM
Griego	Alex	San Mateo MDWCA
Haskie	Lionel	O & M Manager, Navajo Agricultural Products Industry
Hathaway	Loline	Ya-ta-hey W&SD
Hausam	Sharon	Director, Tribal Planning & Development, Laguna Pueblo
Henke	Steve	Executive Director, NM Oil & Gas Association
Hicks	Martin	Mayor of Grants
Lee	Bill	President & CEO, Gallup/McKinley County Chamber of Commerce
Horacek	Judy	Cibola County Special Programs Officer
Howe	Brandon	NWNMCOG
Ikeda	Steven	New Mexico State Land Office
Ishmael	Donna	Williams Acres Water and Sanitation District
Jaramillo	Laura	City Manager, Grants
Jeff	Sheryl	Navajo Nation Dept. of Natural Resources
Jim	Clinton	Standing Rock Chapter
John	Jason	Director, Navajo Nation Department of Water Resources, Water Management Branch
Juanico	Steve	Acoma Pueblo
Juarez	Mack	Continental Divide Coop
Keedah	Rudy	Bureau of Indian Affairs
Kiely	Jeff	Northwestern New Mexico Council of Governments
Kohrmann	Elaine	S.O., Cibola NF
Krasilovsky	Eytan	Forest Guild
Landers	Kathy	County Extension Agent, McKinley County, NMSU
Larsen	Tim	GISC McKinley County
Leeper	John	AMEC
Levine	Lacy	NM Department of Agriculture
Lister	Joe	Mine Manager, Rio Grande Resources/Mt. Taylor Mine
Lundstrom	Patty	Greater Gallup Economic Development
Lyons	Dale	Director of Freshwater Programs, Nature Conservancy
Maestas	Lee	Cebolleta Land Grant / Water System

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.

Northwest New Mexico Region 6 RWP Master Stakeholder List

Updated June 14, 2016

Last	First	Affiliation / Category
McKinney	Jackie	Mayor, City of Gallup
Montoya	Richard	Lava Soil and Water Conservation District
Morgan	Miles	Tri-State
Munn	Gary	City of Gallup Water and Sanitation Dept
Norrell	Joe	Acting Supervisor, Cibola National Forest
Oldham	Evert	USDA-Rural Development Area Director
Orozco	Dominic	Grants Cibola Chamber of Commerce, President Tessa Jimenez
Page	Pat	Navajo-Gallup Water Supply Project, Western Colorado Area Office, U.S. Bureau of Reclamation
Pat	Althea	Ramah WSD
Pena	Paul	Public Works Director, Grants (former City manager)
Piccarello	Matt	Community Forestry Coordinator, Forest Guild
Quintana	Andy	Village of Milan Public Works
Rasor	Julie	Administrative Director, Four Corners Economic Development
Riley	Pat	Ramah Water and Sanitation District
Ringia	Adam	Environmental and Natural Resources Director, Laguna Pueblo
Rogers	Steve	Yah-Ta-Hey Water & Sanitation District, New Mexico
Romero	Dennis	Executive Director, Gallup Joint Utilities, City of Gallup
Sage	Michael	Executive Director, Greater Gallup Economic Development
Sandoval	Marcella	Village Manager, Village of Milan
Shoultz	David	Navajo Area Indian Health Service (IHS officer, assigned to NTUA)
Showa	Theresa	Navajo Nation Department of Water Resources, Water Management Branch
Simpson	Pat	Commissioner, Cibola County Commission
Slape	Roger	Navajo Tribal Utility Authority
Spencer	Kay	Bluewater Village Water and Sanitation District
Spidle	Cynthia	Lava SWCD
Thomas	Jason	Natural Resources Manager, Pueblo of Laguna
Tovar	Vincent	Executive Director, Gallup Joint Utilities
Tsosie	Bernadette	Bureau of Indian Affairs
Ulmer-Scholle	Dana	Associate Research Professor of Geology, Dept. of Earth & Environmental Science, New Mexico Tech
Ustick	MaryAnn	Gallup City Manager
Wakan	Duane	Associate Planner, Farmington MPO
White	Frederick	Navajo Nation Division of Natural Resources
Williams	Evan	Deputy Director, Northwest New Mexico Council of Governments

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.

Northwest New Mexico Region 6 RWP Master Stakeholder List

Updated June 14, 2016

Last	First	Affiliation / Category
Winn	Larry	McKinley & Lava SWCD
Yarbrough	Eileen	Executive Director, Cibola Communities Economic Development Foundation
Yazzie	Harrilene	Bureau of Indian Affairs
		Bluewater Coalition
		McKinley County Extension Office

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

Summary of Comments on Technical and Legal Sections (Single Comment Document) and Other Public Comments

Northwest New Mexico Regional Water Plan Compilation of Comments on Draft Plan

NO.	Comment Source	Location (Section/ Page/ Paragraph)	COMMENTS
1	Pueblo of Laguna	Page 2	"Common Technical Approach," paragraph on estimates of supply: Please include text stating that because data on tribal diversions is not available, the estimation of supply may not be accurate.
2	Pueblo of Laguna	Page 4	"Major Surface and Groundwater Sources," continued: Please include text stating that agricultural economies are also important in the region, particularly among the Pueblos.
3	Pueblo of Laguna	Page 5	"Demographics": Although Cibola County does not have as a high percentage of American Indians and Alaska Natives as McKinley County, this population is still significant. Please include some text referring to the AIAN population in Cibola County. At a minimum, please research and refer to the percentage of the population that is AIAN. In addition the NW region has a fairly high percentage of Native American lands (percentage should be included in each of the water plans), this will skew the results of any supply and demand analysis due to the lack of data from those lands.
4	Pueblo of Laguna	Page 6	"Water Supply": Many communities also need to improve community wastewater systems and do watershed restoration in order to protect water quality. Please state this in the text.
5	Pueblo of Laguna	Page 6	"Water Supply": Some communities have public water supply wells in the alluvium, which may be more subject to contamination than deeper aquifers. Please state this in the text.
6	Pueblo of Laguna	Page 14	"Surface Water Resources," continued: In addition to non-federal dams, the plan should include information on tribal and federal dams, such as the dam creating Paguate Lake, on the Pueblo of Laguna's lands. If it is not possible to conduct further research for this plan, please state that there are other dams in the region.
7	Pueblo of Laguna	Page 14	"Groundwater Resources": Citations are included in section VII of the 1998 plan. Please include them in this plan as well.
8	Pueblo of Laguna	Page 15	"Groundwater Resources," continued: Please state that some public water supply wells, including most of the Pueblo of Laguna's, are in the alluvium.
9	Pueblo of Laguna	Page 16	"Groundwater Resources," continued, last paragraph: As noted above, many of the Pueblo of Laguna's public water supply wells are in the alluvium. Please reword the final sentence of this paragraph as follows: "Tertiary volcanics and Quartenary alluvium also contain localized groundwater, which is used for some public water supply systems, but they are not .... "
10	Pueblo of Laguna	Page 17	"Aquifer Conditions," continued: Please include text referring to the Jackpile Mine Superfund site, and associated water quality concerns. Basic information is available from an Environmental Protection Agency web site, https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0607033
11	Pueblo of Laguna	Page 24	"2010 Administrative Water Supply": Please include text explaining that because data on tribal diversions is not available, the estimation of the administrative water supply may not be accurate.
12	Pueblo of Laguna	Page 28	"Present Uses": Please include text explaining that because data on tribal withdrawals is not available, amounts are likely to be underestimated.
13	Pueblo of Laguna	Page 31	"Cibola County": Although the Village of Milan may be the second-largest city, the Pueblo of Laguna has a larger population (4,043, based on the 2010 U.S. Census). It may be more appropriate to note, for example, that Grants and Milan are the only incorporated municipalities in Cibola County (if this is true).
14	Pueblo of Laguna	Page 37	"Water Demand Projection Methods": Tribal public water supply systems are not included in the data. Public water supply systems also serve commercial, industrial, and institutional users. Estimates of demand based on domestic well rates, at 70 gpcd in Cibola County (as stated in the report by Longworth), are likely to be major underestimates. Please include text explaining that because data on diversions from tribal public water supply systems is not available, amounts were based on domestic wells, which are likely to be underestimated.
15	Pueblo of Laguna	Page 38	"Water Demand Projection Methods," paragraph on public water supply: Please include text stating that data on tribal public water supply systems was not available.

Northwest New Mexico Regional Water Plan Compilation of Comments on Draft Plan

NO.	Comment Source	Location (Section/ Page/ Paragraph)	COMMENTS
16	Pueblo of Laguna	Page 39	"Water Demand Projection Methods," paragraph on irrigated agriculture: Please include text stating that complete data on tribal agriculture may not have been available.
17	Pueblo of Laguna	Page 40	"Water Demand Projection Methods," paragraph on commercial self-supplied: Please include text stating that data on tribal commercial self-supplied wells was not available.
18	Pueblo of Laguna	Page 40	"Water Demand Projection Methods," paragraph on livestock: Please include text stating that complete data on tribal livestock water use may not have been available.
19	Pueblo of Laguna	Page 41	"Water Demand Projection Methods," paragraph on reservoir evaporation: Please include text stating that complete data on reservoirs on tribal lands may not have been available.
20	Pueblo of Laguna	Public Involvement	The chapter should only list the meetings for the region discussed in each plan, not the meetings in all of the regions, which are not relevant to this specific plan.
21	Pueblo of Laguna	Public Involvement	Please remove Sharon Hausam's name from the list of steering committee members. Dr. Hausam, Mr. Adam Ringia, and other Pueblo of Laguna staff have attended regional water planning meetings and provided comments on the planning process, and wish to continue to receive ali information that is provided to the steering committee. However, the Pueblo of Laguna has not committed to formal representation on the steering committee, which could be misconstrued as approval of the plan. We suggest that the plan include a list of participants in the planning process in lieu of or in addition to the list of steering committee members.
22	Pueblo of Laguna	Legal Issues	The legal section provides only two sentences about the Rio San Jose adjudication. Please provide an adequate treatment of this extremely important issue, including a description of the ways it affects water allocation in the region. Additional information could be taken from the previous version of the regional water plan, which many readers of the update will not have, supplemented with materials from the Utton Center's updates to the state legislature about water issues.
23	Pueblo of Laguna	Page 16	"Tribal Law": The Pueblo of Laguna's water code refers to the "sub-village," not the Village, of Philadelphia. Please correct this.
24	Pueblo of Laguna	Page 19	"Federal Endangered Species Act": If it is not possible to include a list of all endangered, threatened, and sensitive species in the region (perhaps as an appendix), it may be preferable to not mention any in this section. A short list risks leaving out species that could have significant impacts on water-related actions.
25	Pueblo of Laguna	Page 20	"Water Quality Laws": Please provide a description of tribal Treatment as a State under federal law, and its relevance to the region, including a discussion of tribal water quality standards. Additional information could be taken from the previous version of the regional water plan, which many readers of the update will not have.
26	Pueblo of Laguna	PPP	In addition to the projects currently listed in the draft materials, which were adapted from the Pueblo of Laguna's submittal to the New Mexico Infrastructure Capital Improvement Plan, please also include the Pueblo of Laguna projects listed in the spreadsheet attached to this letter.
27	Pueblo of Laguna	Figures	All maps of the region should show the boundaries of tribal lands.
28	Pueblo of Laguna	Figures	In all maps, the heading "explanation" should be changed to "legend."
29	Pueblo of Laguna	Figures	In all maps, the label "city," which is inaccurate for most of the jurisdictions in the region, should be changed. A more appropriate label might be "city/place," reflecting U.S. Census terminology.
30	Pueblo of Laguna	Figures	All figures depicting water demand and water supply (6-la, 6-lb, 6-lc, 6-ld, 7-1) should include a note that estimates of water demand and water supply may not accurately reflect tribal water usage and systems.

Northwest New Mexico Regional Water Plan Compilation of Comments on Draft Plan

NO.	Comment Source	Location (Section/ Page/ Paragraph)	COMMENTS
31	Pueblo of Laguna	Tables	Tables displaying diversions (6-1), withdrawals (6-4), and demand (6-5) should include a note that estimates of diversions may not accurately reflect tribal water usage and systems.
32	Laura Watchempino, Pueblo of Acoma	General	I would like to propose some additional strategies for meeting projected future demand in the Rio San Jose basin located in Cibola County. This area covers 4,557 square miles and represents the largest area within the Northwest Region of New Mexico.
33	Laura Watchempino, Pueblo of Acoma	General	Overview The Northwest Planning Region contains a variety of renewable and non-renewable natural resources, not the least of which is our precious surface water and ground water resources. The draft plan notes that surface water within the region is extremely limited and ground water supplies are declining. Adding to the scarcity issue, the region's 2010 administrative water supply baseline indicates that we are headed for a shortfall if demand and population continue to grow. Water supply shortages could be anywhere from 5,100 to 11,300 acre feet per year in an unchanged growth scenario, according to the draft plan. Factor in the enormous water consumption of extractive industries like coal, uranium, oil and gas, along with current drought conditions (climate change), and we have a recipe that calls for urgent measures. Invasive species like salt cedar along the Rio San Jose also consume vast quantities of water, resulting in reduced surface water flows and adverse water quality impacts. Water quality impacts from leaking wastewater infrastructure and legacy contamination within the Grants Mining District affect our ability to use existing water supplies. A source water protection plan is needed to identify and monitor water levels, production rates, and the water quality of our existing water supplies and identify conservation measures to reduce consumptive uses. The current outlook calls for drastic measures to deal with expected shortfalls in our water supplies. As discussed in the 2015 Fall issue of the DIALOGUE, we need to focus on how to deal with declining water supplies in changing conditions. Sustaining our water resources into the future must become our guiding principle.
34	Laura Watchempino, Pueblo of Acoma		Recommendations • Phase out water-intensive industry when market conditions are unfavorable and phase in the development of renewable resources that use less water or return flows to the hydrologic system. • Adopt an ecosystem approach to protect surface flows and replenish hydrologically-related ground water. • Administer and manage surface and ground water supplies to: o Measure return flows o Retire and/or transfer water rights to preferred economic activities that are less water-intensive and that return water to the hydrologic system. o Identify conservation measures which encourage re-use of treated wastewater, graywater, and harvested rainwater. • Develop a source water protection plan for the Bluewater Basin to identify and monitor potential sources of contamination, including o An emergency response plan in the event of an accidental release, and o A water conservation plan that prioritizes the development of renewable resources like rangeland and irrigated crops. o Impose measurable targets for reducing and extending future DCMI uses, such as the installation of water meters at the source and low-flow fixtures after consumer connections to decrease domestic use, especially as old infrastructure is replaced. • Finally, we need to expand public education and outreach efforts to inform our youth and community members about our regional hydrogeology, historical changes in water quantity and quality, and the conservation measures that are needed to protect our water supplies into the future.

Northwest New Mexico Regional Water Plan Compilation of Comments on Draft Plan

NO.	Comment Source	Location (Section/ Page/ Paragraph)	COMMENTS
35	Laura Watchempino, Pueblo of Acoma		None of the regional water planning meetings were held in Cibola County, although it comprises the largest area within the Northwest Region. The time and expense of travelling to Gallup during the evening hours prevented me from providing my comments at an earlier date.
36	Zuni Tribe	Section 4.1.3.5	Reference should be made to the Zuni River Basin water rights adjudication website, http://www.zunibasin.com/, for hydrographic survey reports and claim documents that include water information that has become available since the 2004 Regional Water Plan. For example, Zuni's past, present, and future water demands for its uses, such as public water supply and irrigated agriculture, are available for consideration in more accurate water planning that must reconcile supplies and all potential future demands. Failure to include those documented uses is unwise planning and presents a skewed description of water use in the Northwest Region.
37	Zuni Tribe	Section 4.1.3.5	Also, only the Zuni Indian claims, not the Navajo Nation claims, are in active settlement discussions, although both Tribes are involved in settlement technical work underway. It is expected the Navajo Nation's claims will also be addressed through the settlement process.
38	Zuni Tribe	Section 4.1.4	The Zuni Drought Contingency Plan, not Drought Management Plan, is listed as (Zuni Tribe and NRCE, 2001) in the References. The citation should be corrected.
39	Zuni Tribe	Section 4.1.4	Zuni also has a Flood Damage Prevention Ordinance pursuant to the Tribe's participation in the National Flood Insurance Program, as it pertains to the FEMA floodplain maps and flooding vulnerability mentioned in Section 5, Water Supply.
40	Zuni Tribe	Section 4.2.1.1	Critical habitat was recently designated for the Zuni bluehead sucker, to be effective July 7, 2016. "In total, approximately 55.7 kilometers (km) (34.6 miles (mi)) in McKinley and Cibola Counties, New Mexico, fall within the boundaries of the critical habitat designation." (Federal Register, Vol. 81, No. 109, June 7, 2016)
41	Zuni Tribe	Section 4.3	More recent information should be checked for the Navajo Nation Water Rights Settlement, which may have already been decreed, and for the San Jose Adjudication, which may currently be in settlement discussions.
42	Zuni Tribe	Section 4.3	Other regional legal issues and conflicts needing resolution include the federally endangered status and critical habitat designation of the Zuni bluehead sucker, which may impact water planning and uses, the Zuni River Basin water rights adjudication, and the G-22 groundwater application by the City of Gallup.
43	Zuni Tribe	Section 5.3.1	A reference (U.S. BLM, 1990) for a proposed project located outside of the Northwest Region is used to state that the Zuni Sandstone has unclear hydrologic properties and is likely not a significant source of water. However, aquifer properties and wells of the Zuni Sandstone on Zuni Reservation and Trust lands in McKinley and Cibola Counties are described in USGS Water-Supply Paper 2227 (Orr, 1987) and in USGS Water-Resources Investigations Report 94-4178 (Baldwin and Rankin, 1995).
44	Zuni Tribe	Section 6.1	Table 6-4 shows 494 acre-feet as the 2010 public water supply withdrawal for the Zuni Pueblo Water Works. The cited report (Longworth et al., 2013) calculated this amount using a rate of 70 GPCD taken from the 2005 water use report (NMOSE Technical Report 52), which does not clearly explain how this rate was determined for Zuni. That figure certainly does not account for all water withdrawals on the Zuni Reservation to meet existing domestic and municipal water needs.
45	Zuni Tribe	Figure 6-2	Figure 6-2, Groundwater Points of Diversion, shows wells from the "New Mexico water rights reporting system" (NMOSE, 2014d). But few, if any, wells are shown on Zuni Reservation and Trust lands despite such information for Zuni wells being available to the State and public in the hydrographic survey and claim documents of the Zuni River Basin water rights adjudication at http://www.zunibasin.com/.
46	Zuni Tribe	Section 6.2.3	Cibola County also includes Zuni Reservation and Trust lands, which is not stated.

From: James C. Brockmann [jcbrockmann@newmexicowaterlaw.com]
Sent: Tuesday, November 08, 2016 2:52 PM
To: Cartron, Dominique
Cc: Marc DePauli; 'George Kozeliski'; Dennis Romero; Lee Wilson and Associates; Jay F. Stein
Subject: Northwest New Mexico Regional Water Plan Update

Dominique,

You and I discussed comments that the City of Gallup wanted to make to the Northwest New Mexico Regional Water Plan. The City's representative, Vince Tovar, resigned around the time the draft plan was being circulated and the City did not get its comments to you at that time. Attached are hand-written revisions the City requests be made to the draft Regional Water Plan. The City made minimal comments that should be straightforward and aid the plan in explaining important developments and plans going forward, both in terms of regional planning and planning for the City of Gallup.

You might also want to consider one other point that is not specifically addressed in the attached comments, but is very relevant for those doing water planning in this region. Section 8 begins by indicating a regional problem is drought vulnerability. While drought obviously does have an impact, it is most typically associated with water uses that depend on variable surface water, such as irrigation, or on municipal supplies derived from reservoirs that depend on runoff. The most important uses in this region depend on groundwater and are largely unaffected by drought. In the Gallup area, the primary regional problem is mining and drawdown of the supply aquifers. Droughts have little effect on this problem, other than recharge. In the Grants area, the primary problem is the impact of existing well diversions on the depletion of spring flows. Droughts have little effect on this problem. For the City of Gallup and other water users in the region, the issue that has been faced for decades is the over-used, declining, and unsustainable use of the Gallup Sandstone. This is the driver for NGWSP, regionalization of infrastructure for water service, and using groundwater only as needed, and primarily as a drought reserve. I hope these concepts are expressly strongly enough in the plan.

We appreciate the opportunity to have these comments in the final document that goes before ISC for approval. Call me or Marc DePauli if you have any questions. Thanks. Jim

James C. Brockmann
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P.O. Box 2067
Santa Fe, NM 87504-2067
(505) 983-3880
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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 Northwest New Mexico region considered a variety of strategies for addressing these water management challenges. As discussed in Sections 5 and 7, the Northwest New Mexico region is very vulnerable to drought, and there is a large gap between projected demands and drought supplies. Consequently, the Northwest New Mexico effort focused on drought planning in addition to overall water resource planning. This RWP is building on the 2004 water plan and is considering strategies that will enhance and update, rather than replace, the strategies identified in the accepted water plan. The status of strategies from the previous regional 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

("NGWSP")

Key components include importing surface water through the Navajo-Gallup Water Supply Project and regionalization of existing potable water supply systems to conjunctively manage surface water and limited ground water supplies.

8.1 Implementation of Strategies Identified in Previously Accepted Regional Water Plan

An important focus of the RWP update process is to both identify strategies and processes and consider their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2004 Northwest New Mexico Regional Water Plan recommended the following strategies for meeting future water demand:

- Develop new water supplies
  - Navajo-Gallup Water Supply Project implementation
  - Gallup regional water distribution system
  - Drill new wells in ~~Gallup sandstone~~ the Plains State well Field (San Andres/Glorieta formation)
- Water conservation and reuse
  - Conservation initiatives to reduce municipal water use (gpcd)
  - Develop a reuse plan

- River and watershed restoration
  - Rio Puerco restoration
  - Zuni River restoration
- Public outreach
  - Technical advisory boards and citizen panels
  - Regional planning committee
  - Hire a regional water planning coordinator
- Funding source for enhancing local water supplies
- Regionalization: Small water system collaboration and interconnection
- Drought contingency plan

The steering committee reviewed each of the strategies and indicated that they are all still relevant and are actively being implemented or being refocused as new recommended strategies (Appendix 8-A). Actions that have been completed to in order to implement the strategies identified in the 2004 plan are summarized on Table 8-1.

8.2 Water Conservation

Municipal water use is generally low in the Northwest New Mexico Water Planning Region, and water conservation programs are already in place, many having been implemented as recommended in the 2004 accepted plan (Section 8.1); therefore, 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 Northwest New Mexico 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 Northwest New Mexico Regional Water Planning Steering Committee and other stakeholders and reflect their interest and intent. The recommendations made by the steering committee and other stakeholders have not been evaluated or approved by NMISC. Regardless of the NMISC's 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—Northwest New Mexico Water Planning Region

Strategy	Status
Develop new water supplies	
Navajo-Gallup Water Supply Project implementation	The Omnibus Public Lands Management Act was passed in 2009 and included approval of funds for the construction of the Navajo-Gallup Water Supply Project.
Gallup regional water distribution system	The Omnibus Public Lands Management Act passed in 2009 included approval of funds for the construction Gallup regional water distribution system.
Drill new wells in ~~Gallup sandstone~~ the San Andres/ Glorieta formation	As part of the Navajo-Gallup Water Supply Project implementation, several deep water supply wells ~~have been~~ drilled into the ~~Gallup Sandstone~~. San Andres/Glorieta formation must be
Water conservation and reuse	
Conservation initiatives to reduce municipal water use (gpcd)	The City of Gallup has developed a conservation program and has a water conservation coordinator on staff to implement program objectives. Water Conservation plan complete and accepted by the State Engineer.
Develop a reuse plan	Preliminary feasibility studies have been completed by the City of Gallup.
River and watershed restoration	
Puerco River restoration	Restoration is ongoing.
Zuni River restoration	Restoration is ongoing.
Public outreach	
Technical advisory boards and citizen panels	McKinley County created a water board in 2004 with broad representation from the regional water planning participants. The water board met regularly between 2004 and 2006.
Regional planning committee	The McKinley County Water Board provided regional water planning support between 2004 and 2006.
	The Aqua Mesa Domestic Water Alliance was formed in 2007. This alliance of several water systems continues to work together to identify opportunities for sharing resources and functions such as hiring an operator.
Public outreach (cont.)	
Hire a regional water planning coordinator	No coordinator has been hired.
Funding source for enhancing local water supplies	McKinley County has developed a local environmental fund that provides funds for water supply projects and project match in the region.
	In 2012 the New Mexico legislature passed House Bill 277, which provided for the imposition of a "federal water project gross receipts tax" as approved by referendum for the repayment of loans for construction of the Navajo-Gallup Water Supply Project.

Investigate possible additional use of the Dakota Westwater Formation.

Continued use of effluent reuse for irrigation and construction water.

DRAFT

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Northwest New Mexico Water Planning Region
Page 2 of 2

Strategy	Status
Regionalization: Small water system collaboration and interconnection	McKinley County implemented several regionalization projects. The first project was a regionalization plan issued in 2007. Implementation of the plan was partially successful when McKinley County and the Northwest New Mexico Council of Governments (NWNMCOG) obtained a Water Trust Board grant to construct emergency connections between some of the small water systems around Gallup.
	The County and NWNMCOG also successfully developed an appraisal level investigation funded by the Bureau of Reclamation that evaluated options for future water supply for 8 systems and prepared conceptual engineering designs for interconnection to the Navajo-Gallup Water Supply Project.
	Several small water systems have developed operations and maintenance as well as asset management plans as part of the regionalization project.
Drought contingency plan	McKinley County has developed a drought contingency plan.
	The Navajo Nation has developed a drought contingency plan.

Add a 4th box –

In accordance with the NGWSP, the City of Gallup will construct and operate the regional water system which will supply and distribute potable water to the city of Gallup, surrounding communities, and areas of the Navajo Nation. Many components of the Gallup regional system have already been built and interconnections are being planned and developed. Once the NGWSP is operational, surface water will be the primary water supply, supplemented by groundwater. ~~Because~~ because the Gallup Sandstone has been depleted for decades, San Andres/Glorieta wells will be drilled as an additional groundwater supply.

8.3.1 Comprehensive Table of Projects, Programs and Policies

Over the two-year update process, seven meetings were held with stakeholders in the Northwest New Mexico 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). A summary of the PPP information, obtained primarily from input supplied directly by stakeholders, is included in Appendix 8-A. 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.

Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan (ICIP), Water Trust Board, and Capital Outlay funding processes, and those projects are also included in the Northwest New Mexico PPP table. The projects included are from the 2017-2021 ICIP list (http://nmdfa.state.nm.us/ICIP.aspx, accessed March 2016), which is updated on an annual basis. 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 expanded watershed restoration, ongoing implementation of the Navajo-Gallup Water Supply Project and the small water system regionalization initiative, 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 Appendix 8-A has not been ranked or prioritized; it is an inclusive table of all of the PPPs 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). The table identifies each PPP by category, including water and wastewater system infrastructure, water conservation, watershed restoration, flood prevention, water reuse, water rights, water quality, and data collection.

In the Northwest New Mexico region, projects identified on the PPP table are primarily water system infrastructure and watershed restoration projects. Because municipal water use is generally low and water conservation programs are already in place, few water conservation projects are included. However, water providers in the region will continue to implement their water conservation programs and drought contingency ordinances.

8.3.2 Key Projects 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. However, identifying larger regional collaborative projects is helpful to successful implementation of the regional plan. 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 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 Northwest New Mexico region stakeholders are shown on Table 8-2.

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 8-2 and the PPPs listed in Appendix 8-A in that they would be implemented on a state rather than 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, Northwest New Mexico region identified the following recommendations to be considered in the state water plan:

- Provide for ongoing regional water planning support for implementation.
- Ensure appropriate regional boundaries and focus planning locally with the stakeholders who are best suited to collaborate in certain areas. For example, the Northwest New Mexico Water Planning region has east-side and west-side issues. Future planning efforts should recognize those differences and allow for more localized planning.

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
Page 1 of 5

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed, Forest and Stream Restoration					
• Rio San Jose upstream conservation and water quality improvements.	Different reaches of the river will have different project leads.	• City of Grants • Village of Milan • Bluewater Village • Small water systems • Acoma Pueblo • Laguna Pueblo • Lava Soil and Water Conservation District • Rio San Jose Flood Control District • Bureau of Indian Affairs (BIA)	• U.S. Department of Agriculture (USDA), Rural Development and Rural Utilities	$150,000 – $200,000	
• Restore Rio San Jose through salt cedar and sediment removal.			• Water Trust Board • Collaborative Forest Restoration Program • New Mexico State Forestry • New Mexico Environment Department (NMED) 319 Program	Project-specific. Costs can be as high as $1,000 to $4,000 per acre.	
• Promote Puerco River restoration through salt cedar removal (both initial treatment and retreatment).	McKinley Soil and Water Conservation District	• City of Gallup • McKinley County • U.S. Forest Service (USFS) • Fort Wingate • Conservation nonprofits			

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
Page 2 of 5

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Watershed, Forest and Stream Restoration (cont.)					
• Conduct a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the San Jose/Bluewater Creek and in the Mt. Taylor and Zuni Mountains areas. This tool will assist in evaluating outcomes from restoration projects and in prioritizing key areas for future projects.	New Mexico Tech	• Northwest New Mexico Council of Governments (NWNMCOG) • U.S. Geological Survey (USGS) • U.S. Forest Service (USFS) • Bluewater State Park • Nature Conservancy	• State appropriation • New Mexico Finance Authority (NMFA) • Water Trust Board	$30,000 – $120,000	

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
Page 3 of 5

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Water Planning, Data Sharing and Communication					
• Rio San Jose East and West Side Water Forum. Organize two separate meetings to discuss shared values related to water, risks to the resources including water quality concerns, further data needs, and implementation at the local level.	NWNMCOG	• McKinley and Cibola counties • Acoma Pueblo • Laguna Pueblo • Navajo Nation • Zuni Pueblo • Small water systems • USFS • City of Grants • City of Gallup • Village of Milan • Soil and water conservation districts (SWCDs)	• Local government contribution • BIA	$5,000 for initial meeting	Ongoing support for the initiative
• Hire a water coordinator to work at the NWNMCOG	NWNMCOG			$75,000	
Groundwater Monitoring and Modeling					
• Develop groundwater monitoring program. • Ensure that data collected are incorporated into regional models.	New Mexico Tech	• USGS • New Mexico Office of the State Engineer (NMOSE) • City of Gallup	• State • County budgets	$100,000	

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
Page 4 of 5

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Small Water System Regionalization and Capacity Development					
• Create County-wide water and sanitation district to include service areas of small water systems.	• State and local representatives • McKinley County	• City of Gallup • Ya Ta Hey • White Cliffs • Gamerco • Domestic well owners • Other water systems as listed in the appraisal level investigation	• Bureau of Reclamation • Capital Outlay • Water Trust Board • McKinley County	$400,000	• Small systems are reluctant to relinquish ownership and control of their water to a larger regional organization • Significant capital investments would be required to interconnect the more rural systems. • Potential for conflicts over service area boundaries • Governance of the organization and structure of assistance
• Small water system capacity development and operations. Provide funding to Aqua Mesa to hire a Level 4 operator to provide assistance to small water systems in the region. Need record keeping assistance and county-wide engineering technical assistance.	Aqua Mesa Domestic Water Alliance	• McKinley County • Ya Ta Hey Water and Sanitation District • Gamerco Water and Sanitation District • White Cliffs Mutual Domestic Water Association	• Water Trust Board • NMED • USDA • State appropriation	$300,000	

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Northwest New Mexico Regional Water Plan
Page 5 of 5

Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Water System Upgrades, Improvements, and Well Development					
Many water suppliers in the region require funding for water system improvements, upgrades, and well drilling. As water levels decline, suppliers will need additional wells to meet future demand. Specific projects are identified in Appendix 8-A.	Water suppliers throughout the region	• Rural Community Assistance Corporation (RCAC) • U.S. Environmental Protection Agency (EPA) • NMFA • NMED • New Mexico Rural Water Association • USDA • NWNMCOG	• New Mexico Capital Outlay Request • Water Trust Board • Drinking Water Revolving Loan Fund • USDA	Overall cost for the region is millions of dollars. Planning and engineering documents for some improvements range in cost from $50,000 to $100,000.	Funding limitations are the main obstacle to implementation.

City of Gallup

- Consider renaming Region 6 since Northwest New Mexico Water Planning Region does not accurately reflect the geographical boundaries of the region. This region does not include San Juan County, which covers the northwestern corner of the state.
- Promote interregional communication on shared issues.
- Recognize that tribal water use is not accounted for in regional water planning.

The 2016 Northwest New Mexico Regional Water Plan 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.

DRAFT
Regional Water Planning Update
Projects, Programs, and Policies
Water Planning Region 6: Northwest

County	Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
Cibola	SS	Project	Water System Infrastructure (SI)	Cubero Waste Water System	Northwest New Mexico Council of Governments	To construct a new wastewater system in Cubero, NM. Construction includes piping for a collection system, no part to a pumping station and lagoons. Phase 1 Installation of piping for collection, Phase 2 Construction of pump stations, Phase 3 construction of lagoons, Phase 4. Installation of service lines for residents. Planning and design participatory have been completed	Cubero LG				$2,440,000		
Cibola	SS	Project	Water System Infrastructure (SI)	Cubero Water System	Northwest New Mexico Council of Governments	To plan, design, and construct including standard archaeological and environmental assessments on the Cubero drinking water system in the Cubero Land Grant, Cibola County, NM. Phase 1: Planning and PER with recommendations for water system improvement of installation of new distribution/service lines, gate valves, fire hydrants, and possibility the location, drilling, and construction of a new water well(s) for the community. Phase 2: Design and Specifications of water system improvements including design for distribution and services lines and a new well. Phase 3 Construction based on planning, design, and spec documents NOTE: the PER will help determine the necessary exact feet, dept of well and other information not yet known	Cubero LG				$2,000,000		
McKinley	SS	Project	Planning	Crownpoint Community Sewerline Feasibility Study	Northwest New Mexico Council of Governments		Fort Defiance Chapter				$100,000		
McKinley	SS	Project	Water System Infrastructure (SI)	New Crownpoint Wastewater Treatment Agency	Northwest New Mexico Council of Governments		Fort Defiance Chapter				$475,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Mid Baahaali Waterline - New	2017-2021 ICIP new projects		Fort Defiance Chapter				$400,000		
McKinley	SS	Project	Wastewater System Infrastructure (SI)	GALLUP WWATER TREATMENT PLANT IMPROVE	Capital Outlay	Wastewater treatment plant improvements	Gallup	Capital Outlay	2018		$150,000		State funded
McKinley	SS	Project	Water System Infrastructure (SI)	Gulf Combo Effluent Pump Station	Northwest New Mexico Council of Governments		Gallup				$7,500,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Proj 040-New Hospital Pump & Haddock PRV Project	Northwest New Mexico Council of Governments		Gallup				$8,400,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Proj 010-New Red Rock 3 MG Storage Tank	Northwest New Mexico Council of Governments		Gallup				$8,700,000		
McKinley	SS	Project	Water System Infrastructure (SI)	New Chapter, pin 30	Northwest New Mexico Council of Governments		Gallup				$7,800,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Proj013-New Booster Head 1.5MG Storage Tank	Northwest New Mexico Council of Governments		Gallup				$3,775,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Proj 020-New Water Main (To Downtown Storage)	Northwest New Mexico Council of Governments		Gallup				$8,150,000		
McKinley	SS	Project	Water System Infrastructure (SI)	Proj 007 New Water Main (to Churchrock & Pipe Yard)	Northwest New Mexico Council of Governments		Gallup				$8,725,000		
McKinley	SS	Project	Water System Infrastructure (SI)	PS-Indian Hills Lift Station Rehabilitation	Northwest New Mexico Council of Governments		Gallup				$387,500		
McKinley	SS	Project	Water System Infrastructure (SI)	PS-Red Rock Lift Station Rehabilitation	Northwest New Mexico Council of Governments		Gallup				$287,500		
McKinley	SS	Project	Water System Infrastructure (SI)	Wastewater Manhole Rehabilitation	Northwest New Mexico Council of Governments		Gallup				$775,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC- Rio Puerco Crossing Replacement	Northwest New Mexico Council of Governments		Gallup				$1,500,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC - Rio Puerco Sewer Main Extension	Northwest New Mexico Council of Governments		Gallup				$2,300,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC-Coiledmen System Odor Control	Northwest New Mexico Council of Governments		Gallup				$1,300,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC-Hwy-66 Sewer Main Reconstruction	Northwest New Mexico Council of Governments		Gallup				$2,400,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC-Hwy-66 Sewer Line Reconstruction Ph 2	Northwest New Mexico Council of Governments		Gallup				$2,300,000		
McKinley	SS	Project	Water System Infrastructure (SI)	NC-South 2nd Street Sewer Main Reconstruction	Northwest New Mexico Council of Governments		Gallup				$4,725,000		

ADD:

Proj. #12 - New South Fork Reservoir 2.0 MG and 12" transmission line

$7,023,607

The Zuni Tribe has reviewed the City of Gallup's proposed edits to the draft 2016 Region 6 plan. We note that Gallup is offering its proposed edits and comments more than four months past the June 2016 deadline for participants to offer comments. Moreover, Zuni has serious concerns with some of the proposed edits.

Through a number of its proposed edits, Gallup proposes to incorporate into the draft Regional Plan an endorsement of Gallup's interest in drilling wells into the San Andres/Glorieta (Psg) aquifer. Zuni strongly opposes any language in the regional plan that takes a favorable position on this matter. Zuni is among a number of parties who have protested Gallup's pending groundwater permit application ("G-22") to drill from the Psg. Zuni is concerned, and all expert reports in the litigation so indicate, that Zuni's time-immemorial water rights in the Rio Nutria will be impaired by Gallup's proposed drilling. In addition to adversely affecting Zuni's senior rights, Gallup's proposed G-22 pumping will affect water supplies needed for the Zuni bluehead sucker, a federally recognized endangered species. In fact, the last remaining population of the Zuni bluehead sucker is in the very area that will be impacted by Gallup's proposed pumping. Thus, we oppose any language in the draft Regional Plan that appears to endorse production wells in the San Andres/Glorieta from the Plains State Well Field.

Notably, Zuni raised a similar objection in its December 19, 2003 comment letter submitted during the 2004 regional planning process. For reasons unknown, Zuni's comment letter was never included in the documentation for the 2004 Regional Plan. The 2004 Regional Plan instead suggests Gallup may pursue "additional short-term supplies from the Plains State Well Field". Whatever may be the meaning of "short-term supplies" from that well field, we objected then and we still object.

Specifically, Zuni objects to inclusion in the new Regional Plan the following proposed edits from the City of Gallup:

1. At page 1, Section 8.1, third bullet, Gallup is proposing to change the language of the 2004 Regional Plan. The 2004 Plan called for new wells to be drilled into the Gallup Sandstone formation, not the San Andres/Glorieta. Zuni requests this change not be made.

2. Likewise, at page 3, the third row of Table 8-1, intended to capture updates from the 2004 Plan, Gallup's proposed changes from "[d]rill new wells into the Gallup Sandstone" to "[d]rill new wells into the San Andres/Glorieta formation" should be rejected because this is not accurate.

3. At page 4, Gallup proposes to add a fourth box to Table 8-1 indicating construction of a Gallup regional water system as part of the NGWSP which will conjunctively deliver surface water and ground water. Zuni has no objection to addition of a fourth box covering this concept but strongly objects to inclusion of any language that suggests new wells in the San Andres/Glorieta are any part of the NGWSP, such as Gallup's last sentence of the proposed new box. The Planning Report and Final Environmental Impact Statement for the NGWSP does not anticipate new wells from the Psg as any part of the project and, in fact, there is language suggesting that the new surface water supplies may obviate the need for any new wells.

We ask that you attach this email response as well as the attached letter to the comment appendix in the same manner as you have attached Gallup's proposed edits. Thank you.

KB copy

ARLEN P. QUETAWKI, SR.
Governor

CARMELITA SANCHEZ
Lt. Governor

CARLETON P. ALBERT, SR.
Head Councilman

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Councilman

ZUNI TRIBE

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CHARLOTTE T. BRADLEY
Councilwoman

EDWARD W. WEMYTEWA
Councilman

DAN SIMPLICIO
Councilman

WILLIAM TSIKEWA, SR.
Councilman

December 19, 2003

Mr. Jeffrey Kiely, Deputy Director
Northwest New Mexico Council of Governments
224 West Coal Avenue
Gallup, New Mexico 87301

Re: **Zuni Indian Tribe's Comments Concerning Region 6 Water Plan Executive Summary–November 18, 2003 Draft**

Dear Mr. Kiely:

The Zuni Indian Tribe has reviewed the November 18, 2003 draft of the New Mexico Water Planning Region 6 Executive Summary, "Meeting Future Water Resource Needs," and appreciates being asked to offer comments on the draft document. Zuni remains very interested in working with state and local government on water resource issues. As we know, water does not respect geographic or jurisdictional boundaries. Thus, although as a sovereign, Zuni is not bound by any statements or policies contained in the Region 6 Water Plan or the draft Executive Summary, the Tribe is committed to working with our neighbors to see that a water plan is drafted which offers the best opportunity to meet present and future water needs while respecting Zuni's sovereign and proprietary interests and best protects the quality and quantity of our limited water resources.

The Zuni Tribe has also been involved in the State of New Mexico's water planning efforts, through participation in a tribal/state working group created in conjunction with development of the state's water plan and by offering comments of a general nature on the draft plan. We are attaching the comments we submitted to the State of New Mexico for your review and information. In addition, we expect to consult formally with the State of New Mexico on a government-to-government basis on water issues of more direct concern to the Tribe; we will keep Region 6 water planning participants informed.

The draft Executive Summary of the Region 6 Water Plan provides a thoughtful overview of the water resource issues facing our region. We offer a few pertinent comments.

Zuni very much agrees with the thoughtful discussion of current per capita use and future demand found in Part II at pages 3-4 and 16-17. Because of cultural and water scarcity reasons, the per capita use by our tribal membership is also far lower than regional averages, and any future demand projections must assume an increasing, not decreasing, per capita use for this population. We offered comments to this effect in our letter concerning the State's draft Water Plan, and appreciate the care given to this issue in the Region 6 draft Executive Summary.

The discussion of Sub-Region 6(B), the Zuni River and Largo Creek Basins, in Part II, Section C.2., at page 13, indicates that little is known about the area, and what is known cannot be shared because of the pending federal court general adjudication of water rights of the Zuni River basin. We agree, and suggest that resolution of water rights in the Zuni River basin through settlement or, failing settlement, by timely completion of the adjudication, should be given the greatest priority. This requires that the State of New Mexico and the United States devote sufficient resources, including funding and staff, to develop the data necessary to engage in settlement negotiations or litigation of the claims. We have been vocal about this issue in general and in our comments on the draft State Water Plan, and encourage interested parties in Region 6 to do the same. We all need the certainty associated with final quantification of water rights to plan effectively for meeting future water demand.

We also note with respect to the brief description of sub-region 6(B) that the Zuni Tribe has been devoting time and funding to development of information about its water resources and needs, including, for example, completion of a drought plan, watershed restoration activities, work on analyzing the Tribe's present and future water demand, and a ground water use well inventory. While some of this information is already available, other matters are not yet completed or not appropriate for release at this time. We look forward to sharing this information at a suitable time.

Part II, Section C.3., relating to the Puerco River drainage, raises a matter of great concern to the Zuni Tribe. The Tribe supports the efforts of the Navajo Nation to settle a portion of its water rights claims and, in particular, wholeheartedly endorses the region's efforts to obtain funding for construction of the proposed Navajo/Gallup pipeline. Zuni is well aware of the dire need of many Navajo communities to acquire water for basic domestic uses and has previously stated its support for the pipeline supply project.

Zuni is very concerned, however, with the hint in Part II, Section C.3., made manifest in the proposed action list at Part III, page 22, that suggests support for the City of Gallup's efforts to obtain approval of its ground water permit application to withdraw ground water from what is identified in the action list as "the Plains State Well Field." Zuni vehemently opposes this particular application to withdraw ground water from the Glorieta-San Andres aquifer at this well field now pending before the Office of the State Engineer. All available information and models show that the City of Gallup's proposed ground water withdrawals will have a significant detrimental effect on the surface flows of the Rio Nutria and its tributaries within the Zuni Reservation. The Rio Nutria flows directly on Glorieta-San Andres outcrop and is in direct hydrologic communication with the aquifer. For many generations, the Zuni Tribe and its members have used the waters of the Rio Nutria for agricultural, municipal, domestic, cultural,

and commercial purposes. At present, particularly with existing drought conditions, the available flow is insufficient to meet tribal consumptive and instream flow needs in the watershed area; withdrawal of hydrologically connected ground water will only exacerbate this water shortage problem. Zuni must zealously protect its senior water rights from further impairment, and, while we support many efforts by the City and the region to secure water necessary to meet future demand, we oppose the City of Gallup's "Plains State Well Field" ground water rights application. We noted the importance of respecting and protecting senior water rights in our comments concerning the State of New Mexico's draft Water Plan, and we reiterate this position now.

For these reasons, we object to the portion of the regional water plan Executive Summary draft that appears to support a project that will impair our senior rights, and ask that this item be removed from the action list endorsed by the region in the Executive Summary. In the alternative, we strongly request that the Executive Summary note Zuni's objection to this action item because of its likely impairment of our senior water rights. We also recommend that the mention of continued ground water development in Part I.B. of the draft Executive Summary, at page 2 relating to sources of water for future needs, be revised to recommend that the region's communities secure their water resource future through (2) continued groundwater development "in a manner that does not impair senior rights." Addition of this phrase will set the appropriate context for ground water development.

Zuni also notes that stream flow reduction that will result from the proposed ground water withdrawal will aggravate the serious threat to the continued existence of the Zuni bluehead sucker fish, a state endangered species and candidate for federal listing. Loss of stream flow may further reduce the only remaining habitat of this rare fish, which is already limited to approximately ten percent of its historic range. The Zuni Tribe is deeply committed to preservation of the plant and animal species that inhabit the areas in and surrounding its Reservation, and therefore objects to activities that will threaten rather than protect the precious watershed environment. This is an added basis for our objection to the City of Gallup's Plains Well Field water rights application. We strongly supported language in the State of New Mexico's draft water plan in favor of protecting endangered species, and suggest that Region 6 also take care to support efforts and activities that protect, rather than threaten, our watersheds and species residing within those watersheds.

Zuni notes that it raised similar objections earlier this summer to a water rights application filed in support of a subdivision development proposed by Southern Cross Ranch. That proposal, on a much smaller water use scale, posed the very same problems because of its proximity to the Rio Nutria. In our view, the proposed development was likely to impair the Tribe's senior rights and detrimentally affect the Zuni River basin watershed and its resident species. The developers of the proposed Southern Cross Ranch subdivision eventually withdrew, at least for the present, their water rights application filed with the Office of the State Engineer and their subdivision proposal submitted for approval to McKinley County.

In that regard, the action list in Part III for McKinley County, at page23, identifies a

number of items in which the Zuni Tribe is interested in continuing coordination and communication with McKinley County and other entities within Region 6. These include, for example, efforts by McKinley County to define "public welfare," review county subdivision regulations and other land use controls as related to water use, continued efforts to address erosion and sedimentation problems, solid waste pollution issues, and others. We share the County's interest in a number of these issues and look forward to an opportunity to continue to discuss some of these matters. We note, for example, that the County has applied to the United States Forest Service for a special use permit seeking a right-of-way for Forest Road 191D. This application was originally filed in conjunction with the proposed Southern Cross Ranch subdivision development mentioned above, and although the development proposal has been at least temporarily withdrawn, improvements to Forest Road 191D are likely linked to future efforts to develop a subdivision at Southern Cross Ranch and, in any event, pose threats to the watershed restoration efforts undertaken over the past decade by the Zuni Tribe. Continued dialogue on these issues of mutual concern will benefit all of us.

We also note with support the McKinley Soil and Water Conservation District's proposed action item, at Part III, page 24, to continue work associated with implementation of the Zuni River Watershed Plan. The importance of these efforts to restore our precious watershed cannot be overstated, and the Tribe looks forward to continued coordination of these efforts.

Finally, Part III, Section D proposes a number of future actions intended to support water management and planning efforts. While the Tribe is generally supportive of all of the proposed future actions listed in Section D, two matters are worthy of note. First, Paragraph 1 at page 25 suggests that technical advisory boards and citizen panels be established. Zuni has no objection to the specific recommendation. The Tribe notes, however, that because tribes are sovereign governments, this paragraph should clarify that creation of any tribal advisory boards, as well as coordinated activities between the tribe and state and local governments and participation of tribal representatives on state or local boards, would be wholly voluntary and not a consequence of any exercise of state administrative authority. We assume that this is the drafter's intent, but the paragraph would benefit from further clarification of this point.

Similarly, Paragraph 5, page 26 contains the statement that, "[g]iven the relatively limited groundwater development in the *Zuni River Basin*, a similar potential may exist for proactive and cooperative action by the communities in that basin." The meaning of this sentence is not entirely clear. To the extent it suggests that future water supply solutions should be the result of cooperative efforts, Zuni agrees. However, any such cooperative approaches can be pursued only after additional information is gathered about present and future water needs and supply in the Zuni River basin and only with the Tribe's participation in such efforts. These efforts, of course, would likely be linked to possible settlement of claims in the pending adjudication of water rights in the Basin and only with adequate protection for the Tribe's senior reserved rights. The Tribe recognizes, however, that cooperative agreements may offer the best opportunity for addressing water needs in the basin.

As a final technical matter, we note that the Zuni Indian Reservation is not identified on

the map of Water Planning Region 6 attached to the draft executive summary.

We look forward to continuing to work with our neighbors in Region 6 as the water planning efforts move forward. We would like the opportunity to review and discuss with the other planning participants the Region 6 Water Plan when it is presented. If you have any questions or wish to discuss this comment letter or related matters, please do not hesitate to contact our water rights attorney, Jane Marx, at (505) 344-1176, or me.

Sincerely,

Arlen P. Quetawki, Sr., Governor
Pueblo of Zuni

Enclosure (1)

cc: Mr. Roman Pawluk
Mr. Kirk Bemis
Zuni Department of Natural Resources

Ms. Jane Marx, Esq.

Appendix 6-A

List of Individuals Interviewed

Appendix 6-A. List of Individuals Interviewed Northwest New Mexico Water Planning Region

Name	Title	Organization	City
Richard Montoya	District Conservationist	USDA NRCS	Grants
Jeff Kiely	Executive Director	NW NM COG	Gallup
Prestene Garnenez	Regional Planner	NW NM COG	Gallup
Trib Choudhary	Former Demographer	Navajo Nation	Gallup
Michael Sage	Deputy Director	Greater Gallup Economic Development Corp.	Gallup
Bill Lee	County Manager	McKinley County	Gallup
Eileen Yarbrough	Executive Director	Cibola Communities Economic Development Foundation	Grants
Miles Morgan	Water Resource Engineer	Tri-State Generation & Transmission Association	Denver
Evan Williams	Deputy Director	NW NM COG	Gallup
Kim Carpenter	CEO	San Juan County	Aztec

Appendix 6-B

Projected Population Growth Rates, 2010 to 2040

Appendix 6-B. BBER Projected Five-Year Population Growth Rates, 2010 to 2040 Northwest New Mexico Water Planning Region

County	Five-Year Growth Rate (%)					
	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Cibola	3.76	3.18	2.66	2.41	2.39	2.32
McKinley	1.24	1.09	0.63	-0.19	-1.11	-1.93

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 6: Northwest

County	Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost ($)	Need or Reason for the Project, Program, or Policy	Comments
Cibola	R	Policy	Planning	Future Water Supply Evaluation	Key Collaborative Stategies	In the event that uranium mining commences around Mt. Taylor, water from such process should be treated to drinking water standard and made available to the Pueblos of Acoma and Laguna.	Acoma Pueblo						Partner: Laguna Pueblo
Cibola	R	Program	Watershed	Rio San Jose study	Key Collaborative Stategies developed during water planning meeting	Procure a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the Rio San Jose	Acoma Pueblo						Project partners: Pueblo of Laguna, Lava SWCD. Probable source of funding: BIA and other.
Cibola	R	Project	Watershed	Restore Rio San Jose	Water Planning Meeting	Restore Rio San Jose through salt cedar and sediment removal	Acoma Pueblo						Project partners: Pueblo of Laguna, Lava SWCD. Probable source of funding: BIA and other.
Cibola	R	Program	Planning	Flood Control Plan	Northwest NM Council of Governments	To conduct environmental studies, plan, design, construct, flood control prone areas in Bluewater Village, Bluewater Acres, Mt. Taylor Addition, San Rafael areas of Cibola County.	Cibola County				2,000,000	Per NFIP requirements all future road construction should be meet the std. A zone requirement, which is 18-24 inches above the flood plain. To ensure that all roads mentioned meet this standard. First phase will be conducting environmental studies, planning and design for all roads mentioned. Second Phase will be construction on Bluewater Village and Mt. Taylor Addition. Final Phase will be San Rafael and Bluewater Acres.	
Cibola	R	Program	Watershed	Rio San Jose study	Water Planning Meeting	Procure a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the Rio San Jose	Laguna Pueblo	Pueblo of Acoma, Lava SWCD. Probable source of funding: BIA, other					Probable source of funding: BIA, other
Cibola	R	Project	Watershed	Restore Rio San Jose	Water Planning Meeting and 2017-2021 ICIP new projects	Restore Rio San Jose through salt cedar and sediment removal	Laguna Pueblo	Pueblo of Acoma, Lava SWCD.			662,141		Probable funding source: BIA, Other. Project cost comes from ICIP 2017-2021 for a Rio San Jose Watershed Restoration Project.
Cibola	R	Program	Watershed	Rio San Jose study	Key Collaborative Stategies developed during water planning meeting	Procure a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the Rio San Jose/Bluewatert Creek and in the Mt. Taylor and Zuni Mountains areas generally.	Lava SWCD	Pueblo of Acoma, Pueblo of Laguna, McKinley SWCD.					Probable source of funding: BIA, other
Cibola	R	Project	Watershed	Restore Rio San Jose	Key Collaborative Stategies developed during water planning meeting	Restore Rio San Jose through salt cedar removal	Lava SWCD	Project Partners: Pueblo of Acoma, Pueblo of Laguna, McKinley SWCD.					Probable source of funding: BIA, other
McKinley	R	Program	Planning	McKinley County Small System Water Regionalization	Northwest New Mexico Council of Governments	To plan water system improvements throughout McKinley County	McKinley County				8,200,000		
McKinley	R	Program	Planning	McKinley County Small System Water Regionalization	2017-2021 ICIP new projects	Finalize planning for the McKinley County Small Systems Regionalization Project.	McKinley County				8,200,000	The County and its water associations and unincorporated communities is concluding an Appraisal Level Study. A sustainable solution for these systems is to connect to the Gallup Regional System (Navajo-Gallup Water Supply Project). The County would like to finalize planning and outreach not covered under USBR grant, including developing PERs for systems under this preferred alternative.	
McKinley	R	Project	Water System Infrastructure (M)	Ramah WSD system improvements	WTB		McKinley County		2015		250,000		
McKinley	R	Policy	Watershed	Positive Effects of Salt Cedar Removal	Key Collaborative Stategies	Science-based salt cedar removal, including both initial treatment and retreatment, can benefit river restoration and watershed health, and can increase water yield, and should be funded to accomplish such ends	McKinley SWCD						Project Partners: Navajo Nation, Pueblo of Zuni, Pueblo of Acoma, Pueblo of Laguna, Lava SWCD. Probable funding source: BIA, Other
McKinley	R	Policy	Watershed	Positive Effects of Forest Thinning	Key Collaborative Stategies	Science-based forest thinning can benefit watershed health and increase water yield, and should be funded to accomplish such ends.	McKinley SWCD						Project Partners: Navajo Nation, Pueblo of Zuni, Pueblo of Acoma, Pueblo of Laguna, Lava SWCD. Probable funding source: BIA, Other
McKinley	R	Program	Watershed	Area Hydrologic Study	Key Collaborative Stategies	Procure a hydrologic study of best approaches to thinning and other best practices for increasing both recharge and flow in the Rio San Jose/Bluewater Creek, Puerco River, and Zuni River and in the Mt. Taylor and Zuni Mountains areas generally.	McKinley SWCD						Project Partners: Pueblo of Acoma, Pueblo of Laguna, Pueblo of Zuni ,Lava SWCD. Probably funding source: BIA, other
McKinley	R	Project	Watershed	Puerco River Restoration	Key Collaborative Stategies	Promote Puerco River restoration through salt cedar removal (both initial treatment and retreatment).	McKinley SWCD						Project Partners: Navajo Nation. Probable funding source: BIA, other
McKinley	R	Project	Watershed	Forest Thinning	Key Collaborative Stategies	Conduct forest thinning operation in the Zuni Mountains area for the purpose of improving watershed health	McKinley SWCD						
McKinley	R	Project	Watershed	Weather Station Establishment	Key Collaborative Stategies	Establish a proper permanent weather data collection station in the Zuni Mountains in the McGaffey area.	McKinley SWCD						Project Partners: Pueblo of Zuni
McKinley	R	Project	Watershed	Salt Cedar Removal	Key Collaborative Stategies	Promote both flow and recharge in the Puerco River and other Navajo area streams by removing salt cedar through both initial treatment and retreatment from area washes, streams, and the river itself.	Navajo Nation						Project Partners: McKinley SWCD. Probable source of funding: BIA, other
Cibola	R	Program	Data Collection	Develop GIS Layout for Water Systems - all units	2017-2021 ICIP new projects		Ramah Chapter				175,000		

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McKinley/Cibola	R	Project	Watershed Restoration (thinning)	Zuni Mountains Landscape Strategy	Forest Guild	The project will address forest and riparian restoration efforts in the Bluewater watershed, with landscape scale multijurisdictional restoration across watersheds paired with sustainable restoration treatment and will aid in boosting the local forest-restoration based economy. Treatment includes 56,000 acres of ponderosa pine and pinon-juniper ecosystems from 2011-2020. Treatments include mechanical thinning and prescribed fire and will increase ecosystem resilience to disturbances such as pest outbreaks and wildfire. The Zuni Mountain Landscape encompasses two areas: (1) the fifth code Bluewater watershed in its entirety in the eastern half and (2) the Rio Puerco project area in the western half which spans across forested areas of the South Fork Rio Puerco and Rio Nutria watersheds and to a lesser extent other fifth code Defiance Draw-Upper Puerco River and Whitewater Arroyo watersheds.	US Forest Service Cibola National Forest and Grasslands	Mount Taylor District Forest Guild The Nature Conservancy Natural Resources Conservation Services Bureau of Land Management Sierra Club, Rio Grande Chapter Forest Guardians NM State Forestry Office Bureau of Indian Affairs NM State Land Office Center for Biological Diversity Restoration Solutions Public Service of New Mexico	2011 - 2020	Yearly project reports document phases*	7,600,000	Forest restoration will aid in addressing catastrophic fire risk and boost the local economy. Implementation (mechanical thinning and prescribed fire) has been ongoing and will continue throughout the life of the project.	Web link: http://www.forestguild.org/CFLRP/Documents/ZuniMountainLandscapeStrategy.pdf
McKinley	R	Project	Water system infrastructure	Water Meter Installation	Yah-ta-hey Water & Sanitation District	Meter all community water systems, both at the source and distribution.	Yah-ta-hey Water & Sanitation District					Aim for water losses of less than 10% and public recognition for communities achieving less than or equal 5% on annual basis.	Survey the need for increased metering and cost of installation maintenance and reading.
McKinley	R	Program	Watershed	Groundwater recharge modeling study	Key Collaborative Stategies identified during planning meeting	Procure a professional hydrologic study, and groundwater recharge model, for the Zuni River and Basin.	Zuni Pueblo						Project Partners: McKinley SWCD
McKinley	R	Project	Watershed	Weather Station Establishment	Key Collaborative Stategies	Establish a proper permanent weather data collection station in the Zuni Mountains in the McGaffey area.	Zuni Pueblo					The NOAA McGaffey weather station was discontinued in 2014.	Project Partners: McKinley SWCD
Cibola	SS	Project	Water System Infrastructure (M)	Improve Wastewater System	Northwest New Mexico Council of Governments		Acoma Pueblo				1,255,000		
Cibola	SS	Project	Water System Infrastructure (M)	Water & Wastewater Septic Truck	Northwest New Mexico Council of Governments		Acoma Pueblo				150,000		
Cibola	SS	Project	Water System Infrastructure (M)	Windmill Repairs	Northwest New Mexico Council of Governments		Acoma Pueblo				132,309		
Cibola	SS	Project	Water System Infrastructure (M)	North Acomita Wastewater Facility Expansion Project	WTB		Acoma Pueblo	WTB	2015		2,368,350		
Cibola	SS	Project	Water System Infrastructure (M)	Acoma Water Line Improvements	2017-2021 ICIP new projects		Acoma Pueblo				1,702,070		
Cibola	SS	Project	Water System Infrastructure (M)	Acoma-Anzac Water System Improvements	2017-2021 ICIP new projects		Acoma Pueblo				3,474,140		
Cibola	SS	Project	Water System Infrastructure (M)	Acoma Water Production/Treatment Facility Repairs	2017-2021 ICIP new projects		Acoma Pueblo				261,000		
Cibola	SS	Project	Water System Infrastructure (M)	Acomita Water Looping Project	2017-2021 ICIP new projects		Acoma Pueblo				493,000		
McKinley	SS	Program	Watershed	Develop Watershed Project	2017-2021 ICIP new projects		Baahaali Chapter				100,000		
McKinley	SS	Project	Water System Infrastructure (M)	Water Well Improvement	Northwest New Mexico Council of Governments		Baahaali Chapter				106,000		
McKinley	SS	Project	Water System Infrastructure (M)	Baca Chapter Water System Improvement	2017-2021 ICIP new projects		Baca Chapter				1,060,000		
Cibola	SS	Program	Watershed	Salt Cedar Removal	Pueblo of Laguna	Remove, reduce Salt Cedar populations	BIA	Laguna Pueblo					
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater Improvement	Northwest New Mexico Council of Governments		Bluewater Acres Domestic Water				80,000		
Cibola	SS	Project	Water System Infrastructure (M)	Waterline Extension	Northwest New Mexico Council of Governments		Bluewater Acres Domestic Water				1,130,000		
Cibola	SS	Project	Water System Infrastructure (M)	Construct new well	WTB		Bluewater WSD	WTB	2015		801,051		
Cibola	SS	Project	Water System Infrastructure (M)	Arsenic Treatment	Northwest New Mexico Council of Governments		Bluewater WSD				281,000		
Cibola	SS	Project	Water System Infrastructure (M)	New Water Meters	Northwest New Mexico Council of Governments		Bluewater WSD				107,100		
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater System Improvements	Northwest New Mexico Council of Governments		Bluewater WSD				2,010,000		
Cibola	SS	Project	Water System Infrastructure (M)	Water System Improvements	Northwest New Mexico Council of Governments		Bluewater WSD				1,765,587		
McKinley	SS	Project	Water System Infrastructure (M)	New Bathroom Additions	Northwest New Mexico Council of Governments		Casamero Lake Chapter				300,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Casamero Lake Waterline and B/A	2017-2021 ICIP new projects		Casamero Lake Chapter				290,000		
Cibola	SS	Project	Watershed	Erosion Control Improvements	Northwest New Mexico Council of Governments	Phase I will preparing a design document analyzing the watershed and drainage influences to accurately size the proposed drainage structures. Phase II will design and build erosion controls and drainage improvements with the Seboyeta creek to protect roadways for the Cebolleta Land Grant. Phase III and Phase IV will design and build erosion control structures within several arroyos and creeks within the Cebolleta Land Grant limits to protect public utilities and residential property.	Cebolleta LG				1,900,000		
Cibola	SS	Project	Water System Infrastructure (M)	Irrigation System Improvements	Northwest New Mexico Council of Governments	Design and build three water reservoir for irrigation for the Cebolleta Land Grant. Several water storage facilities are in needs of repair, rehabilitation, and expansion in order to continue to protect the Land Grant ability to farm and promote its agriculture. The reconstruction will improve water storage for agricultural use and protect the land grant's water rights and supply. The land grant is working in conjunction with the Acequia Association.	Cebolleta LG				1,090,000		
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater System Improvements	Northwest New Mexico Council of Governments	Phase I wastewater improvements will include designing and constructing a 25,000 gallon per days treatment system expansion to the existing wastewater system. Phase II improvements consist of designing and construction replacement sewer lines within the community of Seboyeta. Phase III is comprise of designing and building replacement sewer lines within the community of Seboyeta. Phase IV designing and building a new wastewater treatment system for the community of Moquino.	Cebolleta LG				2,405,000		

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McKinley	SS	Project	Water System Infrastructure (M)	Updgrade Sewer Lagoon Site	2017-2021 ICIP new projects		ChiChiltah Chapter				1,515,000		
McKinley	SS	Project	Water System Infrastructure (M)	Drll Wtr Well, Chichiltah-Vanderwagon W/L	2017-2021 ICIP new projects		ChiChiltah Chapter				2,900,000		
Cibola	SS	Project	Water System Infrastructure (M)	Various Community Water & Wastewater System Improv	2017-2021 ICIP new projects	For feasibility studies, planning, design, development, renovation and system improvements to Blue Water Village and San Rafael, water and waste water facilities.	Cibola County				1,500,000	Blue Water Village water district PER completed in July 2014 to construct a new supply well, reserve existing well as back up, blended existing well to new well to decrease arsenic levels, replace gate valves, improve fire protection capacity, build new meter house for both wells. San Rafael-Initial Engineering drawings have been completed, rebuild berms, new lift station, liner for existing pond and create one new pond, monitoring well.	Bluewater Village needs to replace a well that drilled in 1946 that longer meets the needs of this community. San Rafael has only one pond and the liner has been damaged and needs to be replaced and the lift station needs to be rebuilt in order to meet the needs of the community.
Cibola	SS	Project	Water System Infrastructure (M)	Waste Water Treatment Plant - City of Grants	Northwest New Mexico Council of Governments	The county is requesting funding to Plan, Develop, Renovate and make System improvements to the current 20 year old Wastewater Treatment Plant that is an a state of disrepair. Preliminary study has been completed to determine seepage issues from the wastewater treatment plant. This preliminary study was funded by NMFA in the amount of $50,000.	Cibola County				1,550,000	Area residents complain to the county regarding odor omissions and flooding issues caused by the treatment plant. New technology is available now to eliminate seepage issues and decrease odor emissions .	
Cibola	SS	Project	Watershed	Marquez Road Improvement	Key Collaborative Stategies	Mitigate drainage encroachment	Cibola County						Probable source of funding: state, local
McKinley	SS	Project	Water System Infrastructure (M)	Rehab/Expand-Sewer System Lagoon	Northwest New Mexico Council of Governments		Coyote Canyon Chapter				240,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Scattered Waterline Phs II East/Phs III West	2017-2021 ICIP new projects		Coyote Canyon Chapter				1,800,000		
McKinley	SS	Project	Water System Infrastructure (M)	Regional Beacon-Bisti Lateral Water Project	2017-2021 ICIP new projects		Coyote Canyon Chapter				65,750,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Eastside/Hardground Flats Wtrln	2017-2021 ICIP new projects		Coyote Canyon Chapter				7,392,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Beacon-Bisti Lateral Water Project	2017-2021 ICIP new projects		Crownpoint Chapter				65,750,000		
Cibola	SS	Project	Water System Infrastructure (M)	Cubero Waste Water System	Northwest New Mexico Council of Governments	To construct a new wastewater system in Cubero, NM. Construction includes piping for a collection system, as well as a pumping station and lagoons. Phase 1: Installation of piping for collection, Phase 2: Construction of pump stations, Phase 3: construction of lagoon/s, Phase 4: installation of service lines for residents. Planning and design specifications have been completed.	Cubero LG				2,410,000		
Cibola	SS	Project	Water System Infrastructure (M)	Cubero Water System	Northwest New Mexico Council of Governments	To plan, design, and construct including conduct archaeological and environmental assessments on the Cubero drinking water system in the Cubero Land Grant, Cibola County, NM. Phase 1: Planning and PER with recommendations for water system improvement of installation of new distribution/service lines, gate valves, fire hydrants, and potentially the location, drilling, and construction of a new water well(s) for the community, Phase 2: Design and Specifications of water system improvements including design for distribution and services lines and a new well, Phase 3: Construction based on planning, design, and spec documents. NOTE: the PER will help determine the necessary linear feet, dept of well and other information not yet known.	Cubero LG				2,165,000		
McKinley	SS	Project	Planning	Coalmine Community Sewerline Feasibility Study	Northwest New Mexico Council of Governments		Fort Defiance Chapter				100,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Coalmine Scattered Bathroom Additions	Northwest New Mexico Council of Governments		Fort Defiance Chapter				470,000		
McKinley	SS	Project	Water System Infrastructure (M)	NM-Scattered Waterline - New	2017-2021 ICIP new projects		Fort Defiance Chapter				500,000		
McKinley	SS	Project	Wastewater System Infrastructure (M)	GALLUP WWATER TRTMNT PLANT IMPROVE	Capital Outlay	Wastewater treatment plant improvements	Gallup	Capital Outlay	2016		150,000		State funded
McKinley	SS	Project	Water System Infrastructure (M)	Golf Course Effluent Pump Station	Northwest New Mexico Council of Governments		Gallup				2,300,000		
McKinley	SS	Project	Water System Infrastructure (M)	Prj #06-New Heaton Pump & Hogback PRV Station	Northwest New Mexico Council of Governments		Gallup				9,400,000		
McKinley	SS	Project	Water System Infrastructure (M)	Prj #10-New Red Rock 3 MG Storage Tank	Northwest New Mexico Council of Governments		Gallup				8,700,000		
McKinley	SS	Project	Water System Infrastructure (M)	Prj #11-New Water Main (To Red Rock Chapter, pts S)	Northwest New Mexico Council of Governments		Gallup				2,600,000		
McKinley	SS	Project	Water System Infrastructure	Prj #12 New South Fort Reservoir 2.0 MG and 12" transmission line	City of Gallup		Gallup				7,023,607		
McKinley	SS	Project	Water System Infrastructure (M)	Prj#13-New Sacred Heart 1.5MG Storage Tank	Northwest New Mexico Council of Governments		Gallup				3,775,000		
McKinley	SS	Project	Water System Infrastructure (M)	Prj #09-New Water Main (To Gamerco Storage)	Northwest New Mexico Council of Governments		Gallup				8,150,000		
McKinley	SS	Project	Water System Infrastructure (M)	Proj #07-New Water Main (to Churchrock & Point East)	Northwest New Mexico Council of Governments		Gallup				8,725,000		
McKinley	SS	Project	Water System Infrastructure (M)	PS-Indian Hills Lift Station Rehabilitation	Northwest New Mexico Council of Governments		Gallup				287,500		
McKinley	SS	Project	Water System Infrastructure (M)	PS-Red Rock Lift Station Rehabilitation	Northwest New Mexico Council of Governments		Gallup				287,500		
McKinley	SS	Project	Water System Infrastructure (M)	Wastewater Manhole Rehabilitation	Northwest New Mexico Council of Governments		Gallup				900,000		
McKinley	SS	Project	Water System Infrastructure (M)	WC- Rio Puerco Crossing Realignment	Northwest New Mexico Council of Governments		Gallup				1,500,000		
McKinley	SS	Project	Water System Infrastructure (M)	WC- Rio Puerco Sewer Main Relocation	Northwest New Mexico Council of Governments		Gallup				2,300,000		

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McKinley	SS	Project	Water System Infrastructure (M)	WC-Collections System Odor Control	Northwest New Mexico Council of Governments		Gallup				1,700,000		
McKinley	SS	Project	Water System Infrastructure (M)	WC-Hwy-66 Sewer Main Reconstruction	Northwest New Mexico Council of Governments		Gallup				6,900,000		
McKinley	SS	Project	Water System Infrastructure (M)	WC-Hwy-66 Sewer Main Reconstruction Ph 2	Northwest New Mexico Council of Governments		Gallup				2,300,000		
McKinley	SS	Project	Water System Infrastructure (M)	WC-South 2nd Street Sewer Main Reconstruction	Northwest New Mexico Council of Governments		Gallup				1,725,000		
McKinley	SS	Project	Water System Infrastructure (M)	WD-Neighborhood Water Line Replace (Alley IVO W 200)	Northwest New Mexico Council of Governments		Gallup				115,000		
McKinley	SS	Project	Water System Infrastructure (M)	WD-Neighborhood Water Line Replacement (Ridgecrest)	Northwest New Mexico Council of Governments		Gallup				115,000		
McKinley	SS	Project	Water System Infrastructure (M)	WD-Neighborhood Water Line Replacement Phase 3 Mal	Northwest New Mexico Council of Governments		Gallup				230,000		
McKinley	SS	Project	Water System Infrastructure (M)	WD-NH Waterline Replace (Alley IVO E 200 Blk Coal)	Northwest New Mexico Council of Governments		Gallup				86,250		
McKinley	SS	Project	Water System Infrastructure (M)	WP-Building Rehabilitation for Wells & Pump Station	Northwest New Mexico Council of Governments		Gallup				100,000		
McKinley	SS	Project	Water System Infrastructure (M)	WS-Collector Waterline Replacement (US 491 N 1300)	Northwest New Mexico Council of Governments		Gallup				86,250		
McKinley	SS	Project	Water System Infrastructure (M)	WWTP Nitrification/Denitrification Improvements	Northwest New Mexico Council of Governments		Gallup				6,900,000		
McKinley	SS	Project	Water System Infrastructure (M)	Well Field Feeder (#75) Line Reconstruction	2017-2021 ICIP new projects		Gallup				250,000		
McKinley	SS	Project	Water System Infrastructure (M)	WS-Water Tank Rehabilitation (Southwest)	2017-2021 ICIP new projects		Gallup				287,500		
McKinley	SS	Project	Water System Infrastructure (M)	WP-Well #12 Building Rehabilitation	2017-2021 ICIP new projects		Gallup				230,000		
McKinley	SS	Project	Water System Infrastructure (M)	WS-Water Tank Rehabilitation (Twin Buttes)	2017-2021 ICIP new projects		Gallup				862,500		
McKinley	SS	Project	Water System Infrastructure (M)	New Allision II Substation	2017-2021 ICIP new projects		Gallup				1,350,000		
McKinley	SS	Project	Water System Infrastructure (M)	WD-NH Water Line Replacement (W 300 Blk Princetion	2017-2021 ICIP new projects		Gallup				86,250		
McKinley	SS	Project	Water System Infrastructure (M)	WD-Green Ave Water Line Replcmnt (Grandview/2nd)	2017-2021 ICIP new projects		Gallup				1,083,466		
McKinley	SS	Project	Water System Infrastructure (M)	WS-Water Tank Rehabilitation (Rehoboth)	2017-2021 ICIP new projects		Gallup				1,300,000		
Cibola	SS	Project	Water System Infrastructure (M)	Gamerco New Well	Northwest New Mexico Council of Governments, Water Trust Board	This phase will design and construct a new well for the community including updating readiness documents specific to the new well, inspection, and engineering services. Gamerco WSD has the water rights for this project (289.93 acres feet) and has filed for a new well permit (G-9) with the Office of the State Engineer (OSE).	Gamerco WSD	McKinley County, DePauli Engineering, NMCOG	7/1/2015	This project will result in the completion of the fourth phase of a project that began nearly 10 years ago.	1,567,000	This phase will improve the water system's reliability, flexibility, and efforts for regionalization with other small water systems in McKinley County.	Listed as a McKinley project with a cost of $2,100,000 in the 2017-2021 ICIP projects
McKinley	SS	Project	Water System Infrastructure (M)	Gamerco New Well	Northwest New Mexico Council of Governments	To plan, design, and construct a new well to provide water to the citizens of Gamerco. Gamerco already has water rights. Gamerco wishes to partner with McKinley County and to be eligible to do so, has made arrangements with McKinley County to be the fiscal agent. Project Scope: Phase I: Plan and design of new well (2014) Phase II: Construction of new well (2015)	Gamerco WSD	McKinley County, DePauli Engineering			2,100,000	The current well has collapsed and needs to be replaced. Also, the citizens of Gamerco are dependent on the City of Gallup for all water services, which are considerably more expensive to the residents.	
Cibola	SS	Project	Water System Infrastructure (M)	Camera System for Sewer Department - 14	Northwest New Mexico Council of Governments		Grants				125,000		
Cibola	SS	Project	Water System Infrastructure (M)	Effluent Reuse Storage Ponds	Northwest New Mexico Council of Governments		Grants				4,500,000		
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater Treatment Plan Replacement	Northwest New Mexico Council of Governments		Grants				12,075,000		
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater treatment, DP695	Northwest New Mexico Council of Governments	This project would include improvements through: planning, design, and construction for a new or improved wastewater treatment facility. This includes, but is not limited to: new plant facilities, a lift station, headworks, new treatment process, sludge handling, aeration, and disinfection equipment. This project will also include the effluent disposal through a reuse system that includes conveyance storage and distribution.	Grants				10,230,000	he City of Grants is seeking funding assistance to implement system improvements in order to allow more sustainable and less costly operations for the treatment plant.	
Cibola	SS	Project	Water System Infrastructure (M)	WWTP - Pumps & Grinders	Northwest New Mexico Council of Governments		Grants				400,000		
Cibola	SS	Project	Water System Infrastructure (M)	Booster Tank & Water Tanks	2017-2021 ICIP new projects		Grants				725,000		
Cibola	SS	Project	Water System Infrastructure (M)	Equipping Water Well	2017-2021 ICIP new projects		Grants				850,000		
McKinley	SS	Project	Water System Infrastructure (M)	Evaluate Water and Drainage System	2017-2021 ICIP new projects		Iyanbito Chapter				1,000,000		
Cibola	SS	Policy	Watershed	Reuse	Water Planning Meeting	In the event that uranium mining commences around Mt. Taylor, water from such process should be treated to drinking water standard and made available to the Pueblos of Laguna and Acoma	Laguna Pueblo	Pueblo of Acoma					
Cibola	SS	Policy	Legal, water rights	Laguna Water Code	Pueblo of Laguna	Develop Policy governing the drilling of wells and water use on the Pueblo of Laguna	Laguna Pueblo	Pueblo of Laguna					
Cibola	SS	Policy	Legal, water quality	Laguna Water Quality Standards	Pueblo of Laguna	Establish Tribal Water Quality Standards	Laguna Pueblo	Pueblo of Laguna, EPA					
Cibola	SS	Program	Monitoring	Water Quality Monitoring	Pueblo of Laguna	Conduct routine sampling and measurements in order to remain aware of the state of our water systems	Laguna Pueblo	EPA	Ongoing				
Cibola	SS	Project	Water System Infrastructure (M)	Laguna Community Wastewater	Northwest New Mexico Council of Governments		Laguna Pueblo				39,687,015		

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Cibola	SS	Project	Water System Infrastructure (M)	Laguna Community Water	Northwest New Mexico Council of Governments		Laguna Pueblo				646,500		Cost is now $29,841,000 according to 2017-2021 ICIP projects. More likely this project is lumped together with the Laguna Community Wastewater project
Cibola	SS	Project	Water System Infrastructure (M)	Seama Reservoir Rehabilitation project-phase II	WTB		Laguna Pueblo	WTB	2015		3,543,600		
Cibola	SS	Project	Water System Infrastructure (M)	Laguna Community Water	2017-2021 ICIP new projects		Laguna Pueblo				29,841,000		
Cibola	SS	Project	Water system infrastructure (A), repair ditches	Irrigation Ditch repair/upgrade	Pueblo of Laguna	Repair damaged ditches, install pipeline where appropriate, ensure appropriate alignments	Laguna Pueblo	Pueblo of Laguna	Ongoing				
Cibola	SS	Project	Dam repair	Repair/Build Reservoirs	Pueblo of Laguna	Line Seama Reservoir; repair other damaged reservoirs	Laguna Pueblo	NM WTB	Pending Funding	Complete	$5M		
Cibola	SS	Project	Watershed	Mainstem Storage	Pueblo of Laguna	Develop new reservoirs for water storage adjacent to but not on the Rio San Jose Mainstem	Laguna Pueblo						
Cibola	SS	Project	Water system infrastructure (A), conservation, efficiency	Drip irrigation	Pueblo of Laguna	Install drip irrigation systems where feasible to maximize crops per available water	Laguna Pueblo						
Cibola	SS	Project	Data collection	Irrigation and Irrigable Lands Survey	Pueblo of Laguna	Survey existing irrigation infrastructure and lands irrigable with that infrastructure	Laguna Pueblo	Pueblo of Laguna; BOR					
Cibola	SS	Project	Water system Infrastructure	Paguate Mesita Pipeline	Pueblo of Laguna	Design and build pipeline to bring clean water from Paguate to Mesita, avoiding mine contamination	Laguna Pueblo	Pueblo of Laguna; BOR					
Cibola	SS	Project	Data collection	Stream Gages	Pueblo of Laguna	Install a variety of Stream Gages on Laguna's major water systems	Laguna Pueblo	Pueblo of Laguna; USGS; BOR					
Cibola	SS	Project	Water system infrastructure (A), efficiency	Field Leveling	Pueblo of Laguna	Level fields to improve water delivery efficiency	Laguna Pueblo	Pueblo of Laguna; BOR					
Cibola	SS	Project	Watershed	Rio San Jose repair	Pueblo of Laguna	Recontour deeply incised banks of the Rio San Jose to mitigate flood risk	Laguna Pueblo	Pueblo of Laguna; FEMA					
Cibola	SS	Project	Wastewater System Infrastructure (M)	Wastewater System Improvements	Pueblo of Laguna	Upgrade or replace sanitary sewer system infrastructure (sewer lines, lagoons, lift stations, etc.) in the Pueblo of Laguna's six villages.	Laguna Pueblo	USDA RUS, Indian Health Service, EPA					
Cibola	SS	Project	Water system Infrastructure (M)	Water System Improvements	Pueblo of Laguna	Upgrade or replace water lines in the Pueblo of Laguna's six villages.	Laguna Pueblo	USDA RUS, Indian Health Service, EPA					
Cibola	SS	Program	Conservation	Leaky Faucets	Laguna Pueblo, Utility Authority	Repair leaky faucets, pipes, install low flow appliances, encourage conservation through education, meter domestic use.	Laguna Pueblo, Utility Authority	Pueblo of Laguna; IHS	Ongoing				
Cibola	SS	Project	Water Treatment	Sewage Treatment Plants	Laguna Pueblo, Utility Authority	Replace sewage lagoons with treatment facilities	Laguna Pueblo, Utility Authority	Pueblo of Laguna; IHS	2030				
Cibola	SS	Project	Water System Infrastructure (M)	Paguate Alternate Supply	Laguna Pueblo, Utility Authority	Identify and Drill Altenate Domestic Supply Wells	Laguna Pueblo, Utility Authority	Pueblo of Laguna; IHS	2020				
Cibola	SS	Project	Water System Infrastructure (M)	Encinal Alternate Supply	Laguna Pueblo, Utility Authority	Identify and Drill Altenate Domestic Supply Wells	Laguna Pueblo, Utility Authority	Pueblo of Laguna; IHS	2020				
McKinley	SS	Project	Water System Infrastructure (M)	Regional Beacon-Bisti Lateral Water Project	2017-2021 ICIP new projects		Littlewater Chapter				65,900,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Waterline Extension Top Mesa (Phase III)	2017-2021 ICIP new projects		Mariano Lake Chapter				2,329,551		
McKinley	SS	Project	Water System Infrastructure (M)	Gamerco water system improvements/new well	WTB		McKinley County	WTB	2015		1,567,000		
McKinley	SS	Project	Water System Infrastructure (M)	Gamerco New Well	2017-2021 ICIP new projects		McKinley County				2,100,000		
McKinley	SS	Project	Water System Infrastructure (M)	Thoreau WSD Well Replacement	2017-2021 ICIP new projects		McKinley County				900,000		
Cibola	SS	Project	Water System Infrastructure (M)	Construction of Wastewater Treatment Plant Phase I and II	Northwest New Mexico Council of Governments	To plan, design and construct a wastewater treatment plant as the Village of Milan expands. At the current time we hold a JPA with the neighboring city. As we grow, we will need to look at having our own Treatment Plant, in the Village of Milan, County of Cibola.	Milan				3,000,000		
Cibola	SS	Project	Water System Infrastructure (M)	Flood Plain Mitigation Construction	Northwest New Mexico Council of Governments	To construct flood plain mitigation to include easements and ROW, archeological and environmental studies. Construction on this project will include diverting the Rio San Jose to mitigate any potential flooding within the Village of Milan, County of Cibola.	Milan				1,265,000		
Cibola	SS	Project	Water System Infrastructure (M)	Motel Dr. Drainage/Infrastructure Ph V and Ph VI	Northwest New Mexico Council of Governments	Replace sewer/drainage/water lines(divert to retention pond), add sidewalks/curb and gutter, as needed on Motel Drive in industrial park in Village of Milan, Cibola County. Project will include acquiring 2 acres of property, and construct 8" SDR 35 Sanitary Sewer and 24" to 48" diameter RCP storm drain on Motel Drive. The phase will be based on the actual funding secured, and will construct roadway, drainage, and sanitary sewer reconstruction.	Milan				3,875,022		
Cibola	SS	Project	Water System Infrastructure (M)	Sand Street-Maribal Park	Northwest New Mexico Council of Governments	Design, construct and replace one mile of 16" concrete drainage pipe into drainage pond at Mirabal Park drainage and water lines as needed from Uranium Avenue to the river.	Milan				1,428,000		
Cibola	SS	Project	Water System Infrastructure (M)	New Farm Water Well	2017-2021 ICIP new projects	To replace damaged water well on Village Farm. This will be the water used to irrigate approximately one half of the property on the farm. The current wall has caved in and is unrepairable. This will allow the Village of Milan to utilize water rights as per state requirements. Repairs to the well have been more costly than anticipated and will require additional funding to get the well in satisfactory working condition, in the Village of Milan, County of Cibola.	Milan				500,000		
McKinley	SS	Program	Watershed	Watershed Condition Analysis Program	Key Collaborative Stategies identified during planning meeting	Create a watershed condition analysis program for the Navajo Nation.	Navajo Nation						Probable funding source: BIA, Other
McKinley	SS	Program	Watershed	Watershed Education	Key Collaborative Stategies	Create and provide cultural-specific watershed education programs for both students and adults on the Navajo Nation.	Navajo Nation						Probable funding source: BIA, Other
McKinley	SS	Program	Watershed	Watershed Condition Analysis Program	Key Collaborative Stategies	Create a watershed condition analysis program for the Navajo Nation	Navajo Nation						Probable funding source: BIA, Other
McKinley	SS	Project	Watershed	Weather Station Establishment	Key Collaborative Stategies	Establish proper permanent weather data collection stations, in the Zuni Mountains in the McGaffey area, and in other upland areas of the Navajo Nation's choosing	Navajo Nation						Pueblo of Zuni, Pueblo of Acoma, Pueblo of Laguna Lava SWCD, McKinley SWCD

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McKinley	SS	Project	Water System Infrastructure (M)	Upgrade Sewer Lagoon	Northwest New Mexico Council of Governments		Ojo Encino Chapter				600,000		
Cibola	SS	Project	Water System Infrastructure (M)	Repair Windmills	Northwest New Mexico Council of Governments		Ramah Chapter				350,000		
Cibola	SS	Project	Water System Infrastructure (M)	Upgrade Mountain View Water/Wastewater Development	Northwest New Mexico Council of Governments		Ramah Chapter				1,500,000		
Cibola	SS	Project	Water System Infrastructure (M). Wells	New Ramah Detention Center and Section 27 Wells	2017-2021 ICIP new projects	plan, design, and construct Ramah Detention Center Well and Section 27 Well in Ramah Community, Cibola County. Phase I consisted of securing the easements/ROW, archaeological and environmental studies, the plan and design and drilling the first well for the Detention Center. Upon drilling this well the chapter encountered the lack of water and requires the re-drilling of the Detention Center well to a deeper depth. Phase II will include the drilling of the Detention Center Well deeper and the drilling Section 27 well and will be complete within a one-year time frame. Ramah Navajo Utility Authority will manage project and own and opertate the wells once they are completed and Navajo Nation is the Fiscal Agent for the project	Ramah Chapter				3,070,000		new, unless related to $3,478,180 project, Ramah Water System & Treatment Improvements
Cibola	SS	Project	Water System Infrastructure (M)	New Mountain View WL expansion	2017-2021 ICIP new projects		Ramah Chapter				1,800,000		
Cibola	SS	Project	Water System Infrastructure (M)	Plan and Design Water Well for Unit 5	2017-2021 ICIP new projects		Ramah Chapter				300,000		
Cibola	SS	Project	Water System Infrastructure (M)	Construct New Water Well for Unit 5	2017-2021 ICIP new projects		Ramah Chapter				3,000,000		
McKinley	SS	Project	Water System Infrastructure (M)	Lab Building for the WWTP	Northwest New Mexico Council of Governments		Ramah WSD				90,000		
McKinley	SS	Project	Water System Infrastructure (M)	WWTP Improvements	Northwest New Mexico Council of Governments	To complete design and construction (Phase II) for the Wastewater Treatment Plant, including excavation; installation of additional sludge drying beds; installation of sand filters, a UV disinfection unit, and a 60 KW generator; and additional piping and electric as necessary to run new equipment at the facility.	Ramah WSD				370,000		
McKinley	SS	Project	Water System Infrastructure (M)	Ramah WSD Water System Improvement Project, Phase I	Water Trust Board	The Ramah Water and Sanitation Department (WSD) has recently completed a Preliminary Engineering Report (PER), which provided a preferred alternative to improve the Ramah Water System and to secure water supply. The preferred alternative is complete replacement of the water system. The first phase of this project would be to design and construct the initial improvements to the water system.	Ramah WSD	McKinley County, NWCOG, AMEC		Phase 1	250,000	Ramah WSD needs to complete an Environmental Assessment and design water system and supply improvements.	Some pipes within the current water system are up to 50 years old, and piping at certain hydrants are 2" in diameter. Ramah WSD has been issued several violations for water quality over the past 5 years. All of their wells are in low-lying areas that are susceptible to flood damage.
McKinley	SS	Project	Water System Infrastructure (M)	NM-Upgrade Water Tank	2017-2021 ICIP new projects		Red Lake Chapter				150,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Sewer Lagoon	Northwest New Mexico Council of Governments		Rock Springs Chapter				748,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Scattered Wtrln-Ph II	2017-2021 ICIP new projects		Rock Springs Chapter				1,100,000		
Cibola	SS	Project	Water System Infrastructure (M)	Wastewater issues, preliminary engineering report to plan and design system improvements.	Northwest New Mexico Council of Governments	This rural community has serious wastewater issues and is in need of a preliminary engineering report to plan and design system improvements.	San Rafael WSD				50,000	This rural community has serious wastewater issues and is in need of a preliminary engineering report to plan and design system improvements.	
McKinley	SS	Project	Water System Infrastructure (M)	New Smith Lake Water System	2017-2021 ICIP new projects		Smith Lake Chapter				2,830,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Community Watering Project	Northwest New Mexico Council of Governments		Standing Rock Chapter				145,000		
McKinley	SS	Project	Water System Infrastructure (M)	Tse'ii'ahi Waterline Extensions	2017-2021 ICIP new projects	plan (including land acquisition, easement/ROW, archeological and environmental studies and clearances), design, construct, for the Tse'ii'ahi waterline extensions, to include land acquisition, archaeological and environment studies in Standing Rock Chapter, McKinley County.The project will utilize 6-inch PVC pipeline for 33 miles of waterline. Phase I Planning will include: land acquisition, easement/ROW, archeological and environmental studies and clearances. Phase I Planning will take no longer than 24 months to complete. Phase II and III will include design and construction of the Tse'ii'ahi Waterline Extensions. Phase II will take no longer than 24 months to complete. Phase III will take no longer than 30 months to complete. The Navajo Tribal Utility Authority will own and operate the system. The Navajo Nation be the fiscal agent.	Standing Rock Chapter				5,500,000		
McKinley	SS	Project	Water System Infrastructure (M)	Regional Beacon-Bisti Lateral Water Project	2017-2021 ICIP new projects		Standing Rock Chapter				65,900,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Construction Scattered Wtrln Ext	2017-2021 ICIP new projects		Thoreau Chapter				800,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Water Well	Northwest New Mexico Council of Governments	This project will involve planning, design, drilling/construction of a new well to a depth of 1,120 feet below ground level with 8-5/8 inch casing and installing piping that will connect the well with the existing distribution system. It will also involve the construction of a 8' x 12' cement block pump house with appropriate controls. This project is necessary to increase the supply of water to meet current and future needs and to improve the quality of water with a stable, clean and reliable water supply for the community. Scope of Work: 1. Plan and design a new water well 2. Drill and construct a new water well, including construction of a well house with pump 3. Connect/construct new water service lines to existing distribution system.	Thoreau WSD				900,000		
McKinley	SS	Project	Water System Infrastructure (M)	Thoreau Well Replacement	Northwest New Mexico Council of Governments	To plan, design, and construct a back up drinking water well in the Thoreau water systems	Thoreau WSD				1,450,000		A Thoreau WSD well replacement project is listed in the 2017-2021 ICIP projects, with an associated cost of $900,000
McKinley	SS	Project	Water System Infrastructure (M)	Wastewater Lagoon Improvements	Northwest New Mexico Council of Governments	To conduct environmental studies, plan, design, and construct improvements at the wastewater lagoon. The District would like to plan (including environmental studies), design, and construct the lining and piping of the pond and overall lagoon system including lining and piping pond #2 to make a part of lagoon system. This project will increase the wastewater lagoons' capacity (additional volume) required to meet the present and future needs of the Thoreau community.	Thoreau WSD				114,480		

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Cibola	SS	Project	Water System Infrastructure (M)	New Community Septic/Drain Fields	Northwest New Mexico Council of Governments		Tohajiilee Chapter				250,000		
Cibola	SS	Project	Water System Infrastructure (M)	New Sewer Lagoon	Northwest New Mexico Council of Governments		Tohajiilee Chapter				2,495,000		
Cibola	SS	Project	Water System Infrastructure (M)	New To'Hajiilee-Albq Waterline	2017-2021 ICIP new projects	To plan, design and construct a 12 miles 10" PVC waterline from Albuquerque to To'Hajiilee. The waterline is needed to improve the quality of water to the community members that will serve over 350 household units and a need for expansion for additional houses. The project has divided into five phases. Phase I consisted of the completion of the easements/rows, land withdrawal, archaeological and environmental studies and with completed with local and federal funds. Phase II consisted of the planning and design of the waterline and will take 12 months. Phase III consists of the construction and will take 24 months. The To'Hajiilee Chapter will own the waterline, Navajo Water Resource Department will operate the system and the Navajo Nation will be fiscal agent	Tohajiilee Chapter				3,275,000		
McKinley	SS	Project	Water System Infrastructure (M)	Upgrade Septic Tanks Installation	Northwest New Mexico Council of Governments		Tohatchi Chapter				155,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Scattered Waterline Extn	2017-2021 ICIP new projects	To secure easements/ROW, archaeological and environmental studies, to plan, design, construct water line extensions (4" PVC pipe, approximately 5 miles) and in the Tohatchi community, McKinley County. Phase 1-is planning/design includes archaeological and environmental studies, ROW and easement. Phase 2-construction will take about 1 year. The water line project will be managed by Tohatchi Chapter and Navajo Tribal Utility Authority (NTUA). NTUA will own and operate the line after construction through a MOU. The Fiscal Agent is the Navajo Nation	Tohatchi Chapter				1,075,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Cayaditto Camp/Torreon Sth Wtr Ln	2017-2021 ICIP new projects		Torreon/Star Lake Chapter				3,092,000		
Cibola	SS	Project	Data collection	San Jose Basin Study	Pueblo of Laguna	Develop modern model of surface and groundwater interaction for the entire San Jose Basin	USGS	Pueblo of Laguna, BOR, Pueblo of Acoma, others.					
McKinley	SS	Project	Water System Infrastructure (M)	Automatic Water Meter Readers	Northwest New Mexico Council of Governments		White Cliffs MDWUA				35,000		
McKinley	SS	Project	Water System Infrastructure (M)	Concentrate Pond Construction	Northwest New Mexico Council of Governments		White Cliffs MDWUA				175,000		
McKinley	SS	Project	Water System Infrastructure (M)	Construct a Sewerline to White Cliffs Road	Northwest New Mexico Council of Governments	To obtain ROW, plan, design and construct a sewerline to and along White Cliffs Road to serve customers out on White Cliffs Road. Phase 1: Complete ROW and other easements, plan and design of a new sewerline along White Cliffs Road. Phase 2: Begin and complete construction of new sewerline.	White Cliffs MDWUA				50,000		
McKinley	SS	Project	Water System Infrastructure (M)	New 3-phase Powerline White cliffs	Northwest New Mexico Council of Governments		White Cliffs MDWUA				20,000		
McKinley	SS	Project	Water System Infrastructure (M)	Water Connections for New Customers	Northwest New Mexico Council of Governments	To conduct a Preliminary Engineering Report (PER). We have had several small water systems adjacent to White Cliffs water systems. Tey suffer from poor water quality, high operational overhead and minimal ability for oversight. We can connect these customers to the NTUA water system and pay wholesale for the NTUA water thus eliminating a great deal of overhead and operational costs. This will eliminate four wells for about customers.	White Cliffs MDWUA				40,000		
McKinley	SS	Project	Water System Infrastructure (M)	Water Supply Improvements-White Cliffs	Northwest New Mexico Council of Governments	To acquire land, design and construct water supply improvements, including installation of domestic storage. The MDWUA currently does not have the capacity to store more than 400 gallons at a time, and to conduct continuous and daily maintenance. MDWUA desires to upgrade the SCADA system and install radio-read automatic water metering system. Frequent outages occur to the customers, on average 8 days a year.	White Cliffs MDWUA				615,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Northeast Bathroom Additions and Waterline	2017-2021 ICIP new projects		White Horse Lake Chapter				570,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Sandsprings/Ricon Marquis Bathroom Additions	2017-2021 ICIP new projects		White Horse Lake Chapter				640,000		
McKinley	SS	Project	Water System Infrastructure (M)	Rincon Marquez Waterline	2017-2021 ICIP new projects		White Horse Lake Chapter				200,000		
McKinley	SS	Project	Water System Infrastructure (M)	New Scattered Waterline	2017-2021 ICIP new projects		White Horse Lake Chapter				505,000		
McKinley	SS	Project	Water System Infrastructure (M)	Cnstr Wtrln Rincn Marquis, Sand Sprngs, Whthrs	2017-2021 ICIP new projects		White Horse Lake Chapter				315,000		
McKinley	SS	Project	Water System Infrastructure (M)	Williams Acres Water Regionalization-Connections	Northwest New Mexico Council of Governments	To plan, design, and construct water system inter-ties of the Williams Acres Subdivision water systems. The project includes Block A Well Coop, Cavigga's Trailer Park, Cedar Ridge Trailer Park, Manuelito Navajo Childrens Home, Rob Roy Trailer Park, Sage Brush Coop, and St. Williams Mobile Home Park. The Proposed system improvements include 7,050 linear feet of 10" waterline and 16,050 linear feet of 8" waterline, fire hydrants, water valves, residential and commercial water meters and associated water taps. this system will tie into a meter station for Reach 27.1 of the Navajo-Gallup WSP. This portion of the NGWSP comprises a 10,14, and 24 inch waterline. The proposed Williams Acres water supply connection will connect to the 10" western portion of this line.	Williams Acres				3,127,187		
McKinley	SS	Project	Water System Infrastructure (M)	Williams Acres Water System & Upgrade	Northwest New Mexico Council of Governments	Conduct a feasibility study first to determine best options for Williams Acres Subdivision to connect to either the City of Gallup or NTUA water systems. Upon recommendations conducted in the (PER) and design to upgrade small water systems into one larger water system. Construct upgrades and/or replacement of waterlines, valves, storage tanks, etc.	Williams Acres				1,887,000		
McKinley	SS	Program	Planning	40 Year Water Plan	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District	Development of water plan	Yah-ta-hey Water & Sanitation District	DePauli Engineering and Survey				Existing well and emergency tie-in to City of Gallup - future linked to Gallup's water supply.	Except for work needed at well head, distribution and storage in good shape with emergency supply line in place.

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McKinley	SS	Program	Planning	Sewer Master Plan Update	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District	Update master plan	Yah-ta-hey Water & Sanitation District	Dr. Pauli Engineering and Survey				Sewer system needs re-engineering because of terrain changes.	
McKinley	SS	Project	Data collection	Monitor Static Water Levels	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District	Monitor static levels in all community wells on annual or biannual basis and report to central organization.	Yah-ta-hey Water & Sanitation District					They do not currently have enough information to do this in Yah-ta-hey	
McKinley	SS	Project	Data collection	Monitoring	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District	Required monitoring	Yah-ta-hey Water & Sanitation District					NMED complaint	
McKinley	SS	Project	Water system infrastructure	Wastewater Infrastructure Feasibility Study	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District	Wastewater Infrastructure Feasibility Study	Yah-ta-hey Water & Sanitation District	Dr. Pauli Engineering and Survey					Funding will be a problem
McKinley	SS	Project	Water system infrastructure	Well testing	Loline Hathaway, Secty-Treasurer, Operator, Yah-ta-hey Water & Sanitation District		Yah-ta-hey Water & Sanitation District					Inadequate reference points. With pump replacement in next year or so, we hope to get specifics.	
McKinley	SS	Program	Water System Infrastructure (M)	Yahtahey Water System Improvement/Prevention Plans	Northwest New Mexico Council of Governments	To plan and implement a Water System Valve Exercise Plan and purchase/replace and construct a new well pump for the water well on the Yah-ta-hey Water System. The replacement of the pump is a preventative measure, as the existing pump has lasted beyond the expected useful life of a water pump. The major water improvements on the Yah-ta-hey Water System will add a number of new valves and gates. The Yah-ta-hey WSD Board would like assistance to develop and implement a Valve Exercise Plan that will ensure proper operation, routine maintenance, and preventative measures on the upgraded water system.	Yah-Ta-Hey WSD				95,000		
McKinley	SS	Program	Water System Infrastructure (M)	Yah-tah-hey Water Plans	Northwest New Mexico Council of Governments	To plan and develop a 40-year Water Plan, conduct Water Audits, and develop a Water Conservation Plan for Yah-tah-Hey Water & Sanitation District. 40-year water planning will identify the current and future water needs of the community including any water rights, conservation efforts, and water development for a period of no less than 40 years.	Yah-Ta-Hey WSD				30,000		
McKinley	SS	Project	Water System Infrastructure (M)	Yahtahey Wastewater System Improvements	Northwest New Mexico Council of Governments	The Yah-tah-hey Wastewater system is in serious need of improvement and currently does not meet the requirement of the wastewater discharge permit. This will require planning efforts including addressing geotechnical studies, drainage & erosion studies. Design and construction is needed to replace the existing clay liner that is cracking, repair breaches in the lagoon ponds, replacement of berms to the lagoon ponds, and the third lift station. A six pond lagoon (the old lagoon) system needs to be properly closed. Lastly, the entire wastewater plant (40 acres) needs to be enclosed (fenced-6000 linear feet, 8-ft high).	Yah-ta-hey WSD				1,000,000		
McKinley and Cibola	SS	Program	Data Collection	Springs Monitoring	Zuni Pueblo	Contract USGS to install, operate, and maintain continuous automated discharge gaging stations at major springs.	Zuni Pueblo						
McKinley and Cibola	SS	Program	Conservation	Zuni bluehead sucker management plan	Zuni Pueblo	Implement management plan for Zuni bluehead sucker and critical habitiat.	Zuni Pueblo	USFWS, NMGFD, The Nature Conservancy				ESA	In conjuction with recovery plan implementation.
McKinley	SS	Project	Water System Infrastructure (M)	Constructed Wetlands-Cell Development (wastewater disposal)	Northwest New Mexico Council of Governments		Zuni Pueblo				300,000		
McKinley	SS	Project	Water System Infrastructure (M)	Zuni Community Development Area W/W	Northwest New Mexico Council of Governments		Zuni Pueblo				1,713,500		
McKinley	SS	Project	Water System Infrastructure (M)	Bluebird Housing Development Water Infrastructure	2017-2021 ICIP new projects		Zuni Pueblo				973,572		
McKinley and Cibola	SS	Project	Water System Infrastructure (M)	Municipal Water System Sources Study and Implementation	Zuni Pueblo	Study sources and locations of potential new wells and feasibility for rehabilitation and treatment of existing wells and sources to integrate operations of all wells for enhanced management of system and sources. Implement results	Zuni Pueblo						
McKinley and Cibola	SS	Project	Water Rights (Protection and Acquisition)	Land acquisitions	Zuni Pueblo	Purchase lands with critical water and resources in upstream watersheds.	Zuni Pueblo						
McKinley and Cibola	SS	Project	Water System Infrastructure (I)	Irrigation System Improvements	Zuni Pueblo	Design and construct improvements for irrigation systems.	Zuni Pueblo						
McKinley and Cibola	SS	Project	Water System Infrastructure (I)	Reservoir Rehabilitation	Zuni Pueblo	Rehabilitate reservoirs and restore capacity lost due to sedimentation.	Zuni Pueblo						
McKinley and Cibola	SS	Project	Data Collection	Geologic mapping	Zuni Pueblo	Conduct geologic mapping of major spring areas.	Zuni Pueblo						
McKinley and Cibola	SS	Project	Water System Infrastructure (L)	Livestock Watering Facility Development and Improvements	Zuni Pueblo	Design and construct new wells and improvements for livestock watering facilities.	Zuni Pueblo						
McKinley	SS	Project	Water System Infrastructure (S)	Stormwater Infrastructure Improvements	Zuni Pueblo	Design and construct improvements for stormwater infrastructure.	Zuni Pueblo						

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McKinley	SS	Project	Water System Infrastructure (S)	Flood Mitigation	Zuni Pueblo	Design and construct flood mitigation measures.	Zuni Pueblo						
McKinley, Cibola	SS	Project	Watershed Restoration (thinning)	Zuni Mountains Landscape Strategy	Water Planning Meeting	Develop a landscape strategy working with partners in the area							