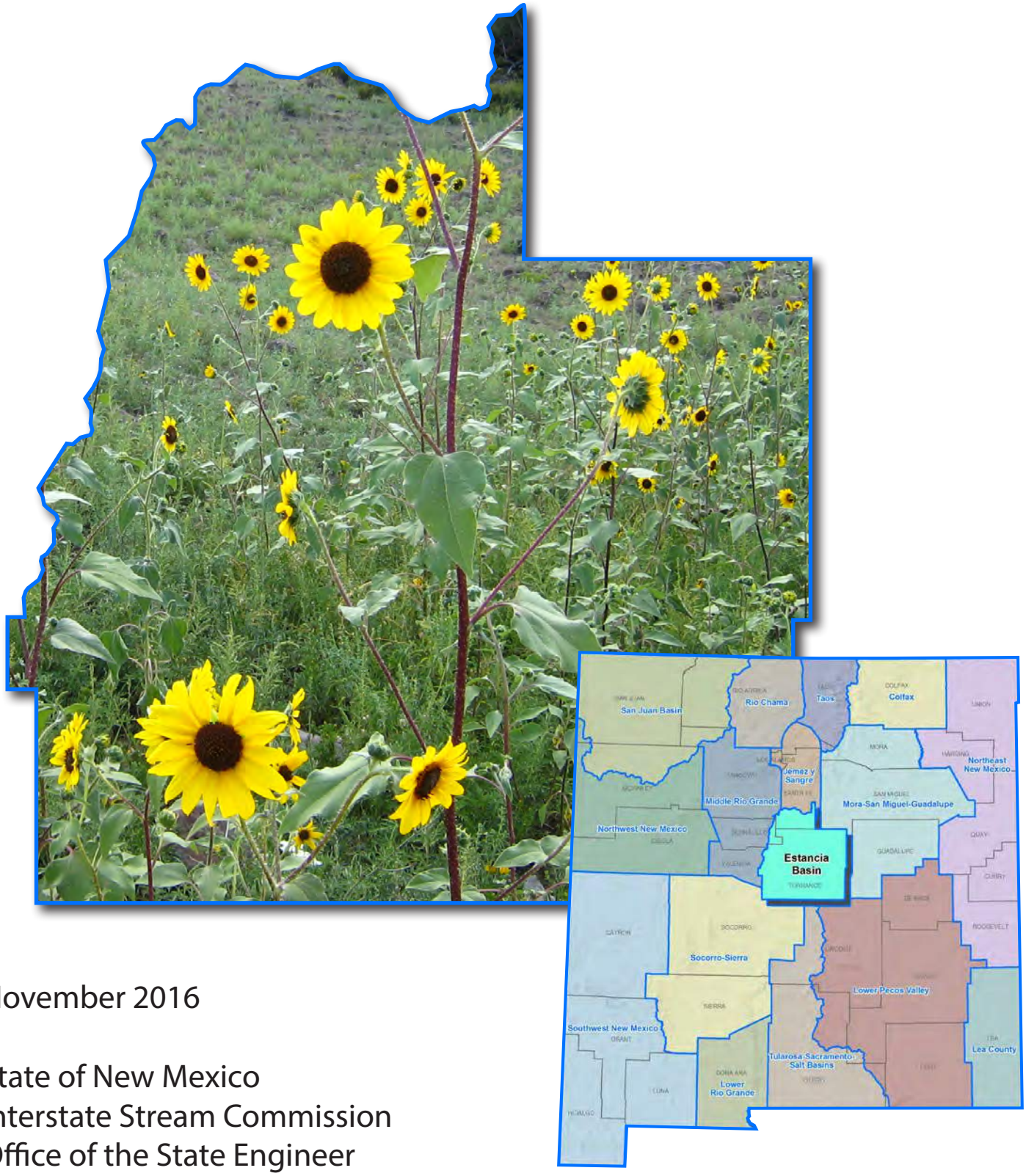
# Estancia Basin Regional Water Plan




November 2016

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

*Cover photograph:* Sunflowers near Torrance County, New Mexico

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*Note: Appendix designations indicate corresponding section in plan*

## List of Acronyms

| | |
|---|---|
| °F | degrees Fahrenheit |
| ac-ft/yr | acre-feet per year |
| AMO | Atlantic multidecadal oscillation |
| ATAA | Alamogordo-Tularosa Administrative Area |
| AWRM | Active Water Resource Management |
| BBER | Bureau of Business and Economic Research |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFRP | Collaborative Forest Restoration Program |
| CID | Carlsbad Irrigation District |
| CWA | Clean Water Act |
| DWS | Domestic Well Statute |
| EBWPC | Estancia Basin Water Planning Council |
| EMWT | Estancia, Moriarty, Willard and Torrance |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| FY | fiscal year |
| GIS | geographic information system |
| gpcd | gallons per capita per day |
| gpm | gallons per minute |
| GWQB | Ground Water Quality Bureau [New Mexico Environment Department] |
| ICIP | Infrastructure Capital Improvement Plan |
| IPCC | Intergovernmental Panel on Climate Change |
| JSAI | John Shomaker & Associates, Inc. |
| MCLGs | maximum contaminant level goals |
| MCLs | maximum contaminant levels |
| µS/cm | microSiemens per centimeter |
| MDWCA | mutual domestic water consumers association |
| MRCOG | Mid-Region Council of Governments |
| NASS | National Agricultural Statistics Service |
| NCDC | National Climatic Data Center |
| NMAC | New Mexico Administrative Code |

| | |
|---|---|
| NMBGMR | New Mexico Bureau of Geology & Mineral Resources |
| NMED | New Mexico Environment Department |
| NMISC | New Mexico Interstate Stream Commission |
| NMOSE | New Mexico Office of the State Engineer |
| NMSA | New Mexico Statutes Annotated |
| NMWQCC | New Mexico Water Quality Control Commission |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NWS | National Weather Service |
| PDO | Pacific decadal oscillation |
| PDSI | Palmer Drought Severity Index |
| PPP | project, program, and policy |
| PSTB | Petroleum Storage Tank Bureau (NMED) |
| PVACD | Pecos Valley Artesian Conservancy District |
| RWP | regional water plan |
| SDWA | Safe Drinking Water Act |
| SNOTEL | snowpack telemetry |
| TDS | total dissolved solids |
| TMDL | total maximum daily load |
| U.S. EPA | U.S. Environmental Protection Agency |
| UNM | University of New Mexico |
| USBR | U.S. Bureau of Reclamation |
| USDA | U.S. Department of Agriculture |
| USFS | U.S. Forest Service |
| 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 |
| WBP | watershed based plan |
| WQA | Water Quality Act |
| WRCC | Western Regional Climate Center |
| WUA | water users association |

## Executive Summary

The Estancia Basin Water Planning Region, which encompasses the majority of Torrance County and parts of Bernalillo and Santa Fe counties (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 Estancia Basin Regional Water Plan was completed and accepted by the NMISC in 1999 and updated in 2010.

The purpose of this document is to provide new and changed information related to water planning in the Estancia Basin 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 1999 and 2010 plans and provides updated information regarding changed conditions and additional data that have become available.

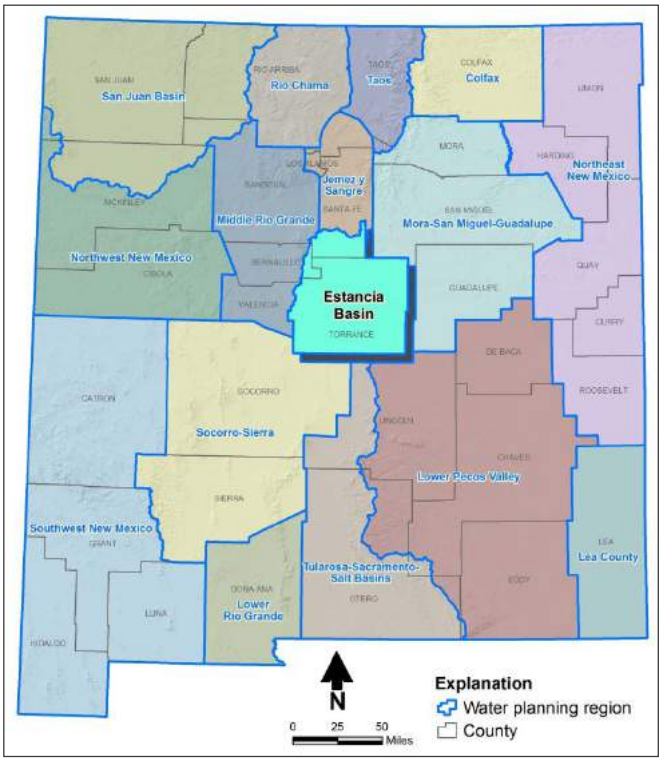



*Figure ES-1. Estancia Basin Water Planning Region*

Based on updated water demand (Figure ES-2) data, 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 and legal availability and compliance with water rights policies. In 2010 agriculture was the predominant use of water in the Estancia Basin at 94 percent, with public, self-supplied domestic, livestock, and commercial sectors using about 6 percent of the water in the basin. A small amount of water is also used for self-supplied industrial and mining uses. Actual water use from agriculture remains an area of uncertainty and controversy because most of the wells are not metered.

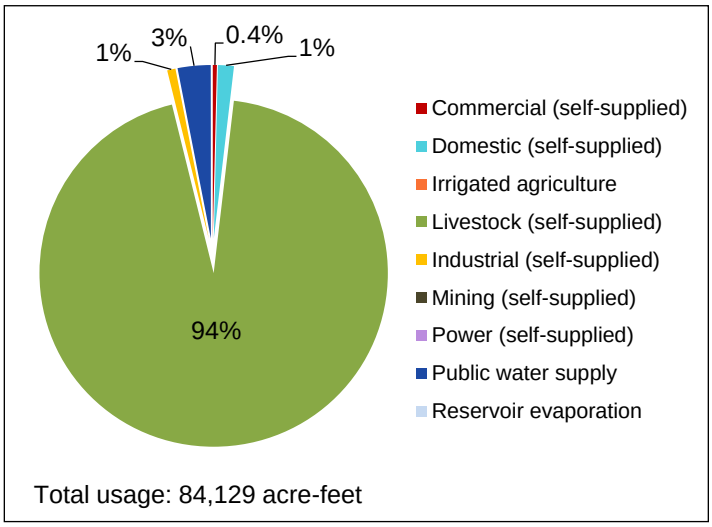



*Figure ES-2. Total Regional Water Demand, 2010*

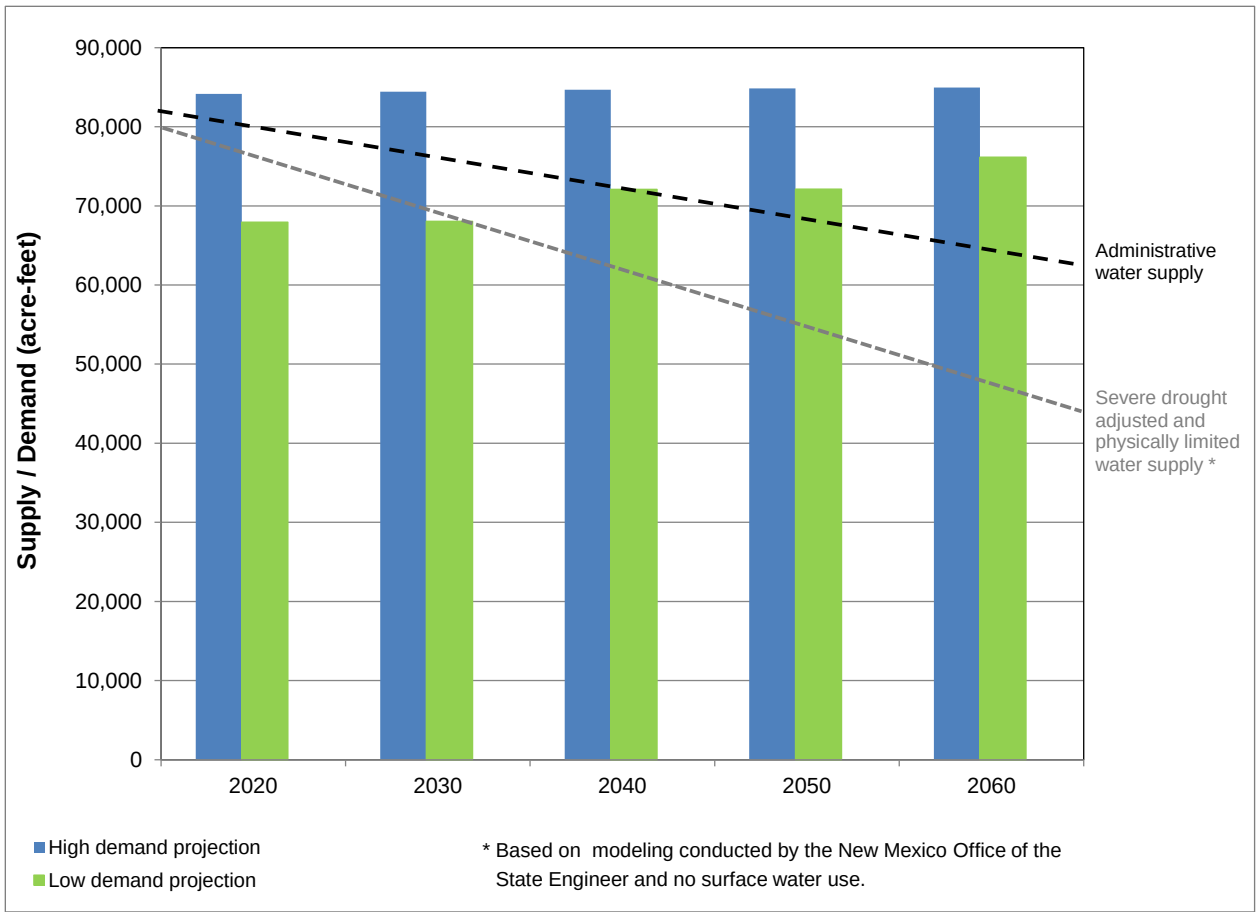



*Figure ES-3. Available Supply and Projected Demand*

Future water demand from agriculture is projected to remain unchanged from the 2010 estimated demand under the high projection, and almost 30 percent less under the low projection based on a declining trend reported by the USDA Agricultural Census. Demand in the public water supply, commercial, and domestic categories is projected to increase in all three counties under the high scenario, proportional to the initially increasing population projections. However, water use in these categories is not projected to decline proportionally to the projections indicating later declining population for Torrance and Santa Fe counties; it is assumed that use in these categories will remain at 2010 levels (in Torrance County) or 2030 levels (in Santa Fe County).

The Estancia Basin water supply, with the exception of a few small springs, consists entirely of groundwater. Most of the groundwater is derived from a closed basin with a diminishing supply; thus the region is focused on understanding the limits of this resource and planning for future reduction in annual pumping capacity. The supply is anticipated to be less than the projected demand by 2020. By 2060, the supply is projected be 77 percent of the volume pumped in 2010 and as low as 57 percent under a 20-year drought scenario. Consequently, the Estancia Basin Water Planning Council has worked diligently since 1997 to enhance the understanding of the water resources through development of a water monitoring network and has proposed plans to meter all wells and improve the groundwater model for the region. The region is also interested in exploring options for an intra-basin pipeline, in conjunction with a water bank, to allow for transfer of leased water from a less-stressed area of the valley fill to areas where irrigation infrastructure is in place. These actions require support from the NMOSE and flexibility in the current administrative procedures and may require changes in state water law. The region is also actively developing and implementing water conservation measures to reduce demand in the agricultural and public water supply categories. Watershed restoration is also a high priority to protect and enhance recharge to the aquifers.

## 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, seven meetings were held in the Estancia Basin 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 Estancia Basin region include the following:

- Large-scale agricultural pumping has been occurring in the region since about 1950. Groundwater mining (i.e., pumping more water from the aquifer than is replenished) has resulted in serious water level declines in the Valley Fill aquifer system, causing some wells to go dry, and computer modeling of the basin predicts that water levels will continue to decline in the coming decades.

- For many areas, the Valley Fill aquifer is underlain by other geologic formations that have been designated as critical management areas (CMAs). The Estancia Underground Water Basin (UWB) guidelines adopted by the NMOSE do not allow the deepening of wells producing from the Valley Fill aquifer into an underlying CMA.

- New appropriations of groundwater are not permitted within the Estancia UWB. Groundwater rights may be obtained by transferring a valid water right that has been put to beneficial use from an owner who is willing to transfer that right. Water right licenses, declarations, and permits in the Estancia UWB far exceed the amount of water that has been put to beneficial use. The NMOSE calculated that the total irrigated agricultural pumping for the basin in 2010 was much less than the permitted diversion.

- The Estancia UWB guidelines limit the number of years in which extensions of time may be filed to 10 years. Permits are typically conditioned to require that proof of beneficial use be submitted within 4 years following the permit approval date. If the application of water to beneficial use cannot be filed within the specified time, an extension of time may be filed. More than 35 permits have been canceled because proof of beneficial use was not filed within 10 years.

- Regional water planning efforts by the Estancia Basin Water Planning Committee (EBWPC) have focused on evaluating and limiting adverse impacts from transfers to other basins and achieving water self-sufficiency and sustainability. In 2008 the New Mexico Legislature adopted Senate Joint Memorial 17, which indicated the Legislature's desire for the State Engineer to consider the availability of water supplies within the basin to which water is being exported when evaluating applications to export groundwater out of the Estancia Basin.

- 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 individual farms.

- Most irrigation wells are not metered, which limits the ability of models to accurately characterize the stresses on the water resources.

- The increase in population since the release of the 1999 regional water plan has resulted in an increase in domestic use of water in the Estancia Basin. In addition, proposed alternative energy projects and other business ventures will increase demand. To meet these new demands, other water rights, such as irrigation rights, will have to be discontinued. The transfer of irrigation rights to other uses results in a decrease in pumping, because only the consumptive use amount, not the diversion amount, may be transferred.

- Interest in the development of brackish groundwater resources with associated development of two intra-basin pipelines could help meet the region's water demand, but there is concern that development of these resources could potentially impact water quality.

- The 2010 updated RWP expressed concern about NMOSE administrative policies that restrict transfers of water rights to alternate points of diversion within the basin and the impact of such restrictions on economic development along the I-40 corridor. To provide a water source alternative and allow farmers flexibility to lease their water over the short term, the EBWPC identified development and construction of an intra-basin pipeline(s) as one of its five-year regional water plan priorities to allow the physical transfer of water within the region.

- Notices of intent have been filed by three entities under New Mexico Statutes 72-12-25 through 72-12-28 to drill up to 32 wells, each over 2,500 feet in depth, and divert up to 50,500 acre-feet per year of non-potable groundwater. These notices have not yet been followed by any action by the applicants.

- Reducing depletions in the Valley Fill aquifer system and achieving self-sufficiency and sustainability with respect to water supply and demand are paramount to the economic and cultural viability of the Estancia Basin.

- Nitrate contamination of groundwater is a concern because of the high density of septic tanks in certain areas.

- Saline water may be migrating into areas with better water quality.

- Critical issues to better understand are the connection between the Madera and Valley Fill aquifers and the potential for subsidence in the Valley Fill and saline water intrusion.

- Forest restoration efforts have helped to reduce the risk of wildfire, but the reduction in evapotranspiration from reduced vegetation is not easy to measure, particularly during

dry periods when the remaining vegetation transpires the limited amount of precipitation. Continued monitoring will be crucial to understanding the role vegetation management plays on the region's water budgets.

## 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 1999 Estancia Basin RWP and the 2010 Estancia Basin updated RWP recommended the following strategies for meeting future water demand:

- Management programs, including an improved groundwater model, a water level monitoring program, and a water banking or leasing program
- Conservation programs, including water conservation programs without losing water rights, agricultural conservation programs, water use metering, residential and commercial water conservation programs, and watershed monitoring programs
- Water development programs, including drilling of exploratory deep wells, forest restoration, a collaborative program to facilitate recovery of lost well capacity, and watershed monitoring
- Infrastructure programs, including an intra-basin pipeline
- Water quality programs, including improved wastewater treatment systems, watershed management, and watershed monitoring

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 Estancia Basin Steering Committee and stakeholders identified projects, programs, and policies (PPPs) to address their water issues. Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan, Water Trust Board, Capital Outlay, and NMED funding processes; these projects are also included in a comprehensive table of PPP needs. The information was not ranked or prioritized; it is a table of the types of the PPPs that regional stakeholders are interested in pursuing. In the Estancia Basin region, projects identified on the PPP table are primarily water system infrastructure, water conservation, 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 Estancia Basin region stakeholders:

- Management programs
  - An improved groundwater model that is more reflective of actual pumping and hydrologic boundaries
  - A water level monitoring program to improve the understanding of the water resources and obtain data for improved model calibration
  - A water banking or leasing program to allow flexibility in managing the water resources
- Conservation programs
  - Water conservation programs without losing water rights
  - Agricultural conservation programs such as alternative crops and irrigation methods
  - Water use metering to better understand the stress on the resources and provide a sense of fairness
  - Residential and commercial water conservation programs such as rooftop harvesting
  - Watershed monitoring programs to assess the impacts of forest treatments on soil loss, vegetation, and water use
- Water development programs
  - Drilling of exploratory deep wells to provide a better understanding of the water resource
  - Forest restoration to reduce the risk of catastrophic fire, enhance recharge, and improve forest health
  - A collaborative program to facilitate recovery of lost well capacity to allow deepening of wells
  - Watershed monitoring to monitor effectiveness of standard forest thinning on recharge to the aquifer
- Infrastructure programs
  - Intra-basin pipeline such as the Estancia-Moriarty-Willard-Torrance Regional Water Association pipeline to reduce localized stress on the aquifer and allow for recovery

- Water quality programs
    - Improved wastewater treatment systems to address contamination from septic tanks
    - Watershed management to reduce the risk of high-intensity fires that can impact the health of the watersheds
    - Watershed monitoring to determine the effectiveness of the forest treatments on water quality

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

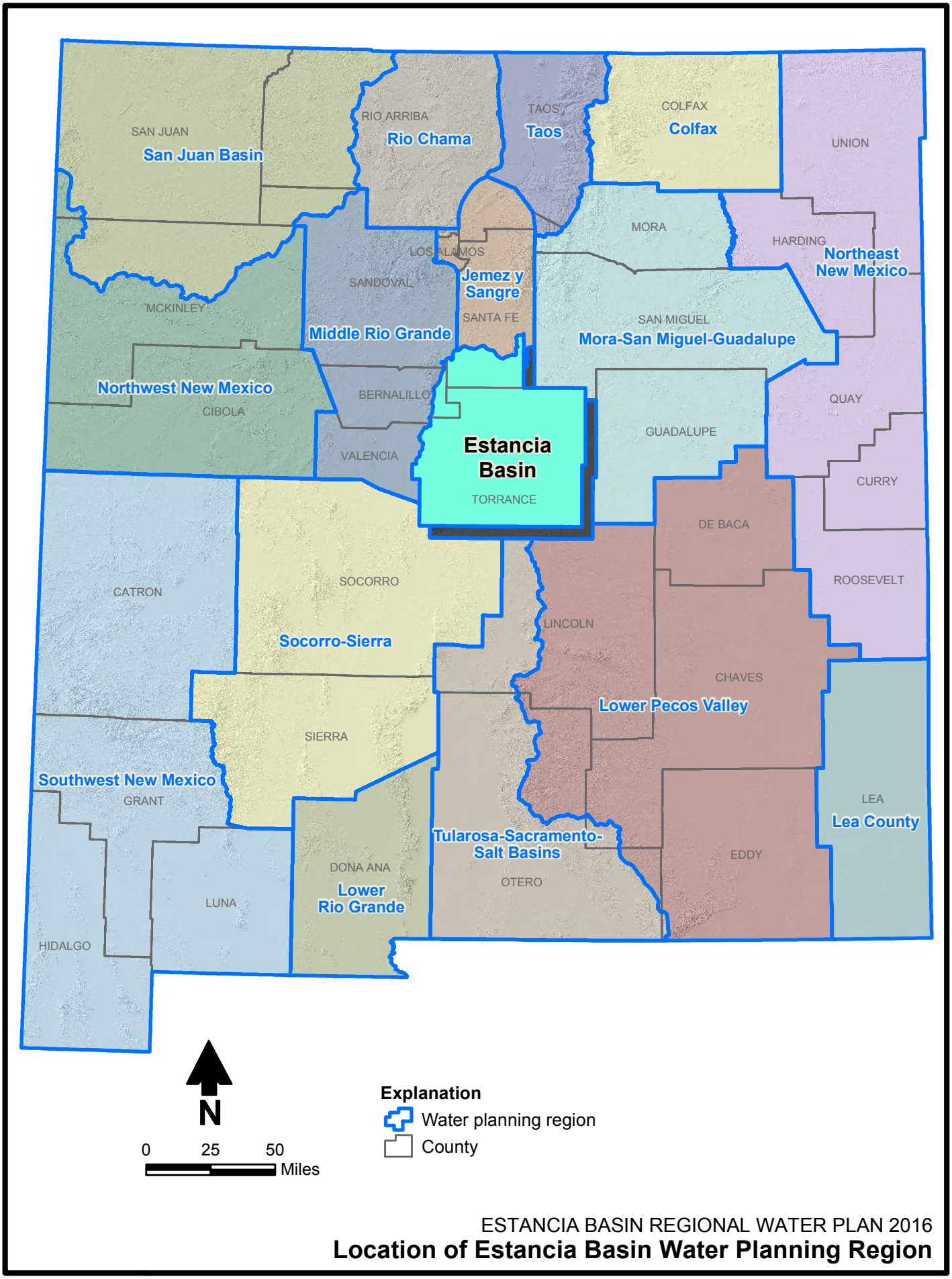
# 1. Introduction

The Estancia Basin Water Planning Region, which encompasses the majority of Torrance County and parts of Bernalillo and Santa Fe counties (Figure 1-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary purpose being to protect New Mexico water resources and to ensure that each region is prepared to meet future water demands. Between 1987 and 2008, each of the 16 planning regions, with funding and oversight from the New Mexico Interstate Stream Commission (NMISC), developed a plan to meet regional water needs over the ensuing 40 years.

The NMISC-accepted Estancia Basin Regional Water Plan was developed in two phases: a Phase I Report that addressed water supply and demand data, completed in January 1997 (JSAI et al., 1997), and an analysis of potential strategies for meeting the region's projected demands, completed in January 1999 (Corbin Consulting, Inc., 1999). The 1999 plan (and by reference the 1997 Phase I Report) was accepted by the NMISC in April 1999. This plan was updated in 2010, with the release of the *Estancia Basin Regional Water Plan: Year 2010 Update* in February 2010 (2010 RWP update [EBWPC and HR, 2010]), which includes a public welfare definition and criteria. These previous Estancia Basin regional water plans (RWPs) covered the area within the Estancia Underground Water Basin (UWB) only and did not include the areas within the planning region (in eastern and southern portions of Torrance County) that are outside of the Estancia UWB.

The purpose of this document is to provide new and changed information related to water planning in the Estancia Basin Water Planning 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. This information is provided for the entire planning area not just the Estancia UWB. Accordingly, the following sections summarize key information in the accepted and updated 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 Estancia Basin Water Planning 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 Estancia Basin region's future water management needs and goals.
- Discusses other goals or priorities as identified by stakeholders in the region.

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ESTANCIA BASIN REGIONAL WATER PLAN 2016

**Location of Estancia Basin Water Planning Region**

Figure 1-1

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

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

- Information regarding the public involvement process followed during development of this RWP update and entities involved in the planning process is provided in Section 2.
- Section 3 provides background information regarding the characteristics of the Estancia Basin planning region, including an overview of updated population and economic data.
- The legal framework and constraints that affect the availability of water are briefly summarized in Section 4, with recent developments and any new issues discussed in more detail.
- The physical availability of surface water and groundwater and water quality constraints was discussed in detail in the accepted and updated RWPs; key information from those plans is summarized in Section 5, with new information that has become available since 2010 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.

**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.

- The information regarding historical water demand in the planning region, projected population and economic growth, and projected future water demand was discussed in detail in the accepted and updated RWPs. Section 6 provides updated population and water use data, which are then used to develop updated projections of future water demand.

- Based on the current water supply and demand information discussed in Sections 5 and 6, Section 7 updates the projected gap between supply and demand of the planning region.

- Section 8 outlines new strategies (water programs, projects, or policies) identified by the region as part of this update, including additional water conservation measures.

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

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

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

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

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

- *Water demand* is the amount of water needed at a specified time.

## 2. Public Involvement in the Planning Process

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

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

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

- Setting up and facilitating meetings to carry out the regional water plan update process.
- Working with local representatives to encourage broad public involvement and participation in the planning process.
- Working to re-establish steering committees in regions that no longer had active steering committees.
- Supporting the steering committees once they were established.
- Facilitating input from the stakeholders and steering committees in the form of compiling comments to the technical sections drafted by the State and developing draft lists of projects, programs, and policies (PPPs) based on meeting input, with an emphasis on projects that could be implemented.
- Finalizing Section 8, Implementation of Strategies to Meet Future Water Demand, by writing a narrative that describes the key collaborative strategies based on steering committee direction.

This approach represents a change in the State's role from the initial round of regional water planning, beginning in the1990s through 2008, when the original regional water plans were developed. During that phase of planning, the NMISC granted regions funding to form their own regional steering committees and hire consultants to write the regional water plans, but NMISC staff were not directly involved in the process. Over time, many of the regional steering committees established for the purpose of developing a region's water plan disbanded. Funding for regional planning from the NMISC decreased significantly, and many regions were not meeting to keep their plans current. The Estancia Basin Water Planning Committee (EBWPC) has been an exception because they continued to meet regularly and conduct investigations through financial and in-kind support.

In accordance with the updated Handbook (NMISC, 2013), the NMISC re-established, where necessary, 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. In the case of the Estancia Basin, the NMISC and contractors participated in the existing process established by the

EBWPC. During these first months, through its team of consultants and working with contacts in the regions, the NMISC prepared "master stakeholder" lists, comprised of water providers and managers, local government representatives, and members of the public with a general interest in water, and assisted in developing updated steering committees based on criteria from the Handbook and recommendations from the stakeholders. (The steering committee and master stakeholder lists for the Estancia Basin 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 *Estancia Basin 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 on Sections 2 and 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 Estancia Basin 2016 regional water plan update.

## 2.2 Public Involvement in the Estancia Basin Region Planning Process

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

### 2.2.1 Identification of Regional Steering Committee Members

The Handbook (NMISC, 2013) specifies that the steering committee membership include representatives from multiple water user groups. Some of the categories may not be applicable to the 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

The EBWPC was formed in 1993 and formalized by a Memorandum of Understanding between three county governments in 1995: Bernalillo, Torrance, and Santa Fe. The EBWPC was given the responsibility of developing the region's original water plan in 1999 and updating it periodically. The group receives ongoing funding from Santa Fe County and Edgewood and in-kind support from East Torrance Soil and Water Conservation District (SWCD) and Bernalillo County. With this support and commitment, the EBWPC met monthly from 1995 through 2014, and began bimonthly meetings in 2015. Because of its effectiveness and formality, EBWPC chose to form an ad hoc steering committee composed of existing members and ad hoc members recruited to fill certain categories not already represented by the EBWPC membership. Through the addition of these ad hoc members, the EBWPC established a representative steering committee, the members of which are listed in Table 2-1.

## Table 2-1. Steering Committee Members, Estancia Basin Water Planning Region

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| Water User Group | Name | Organization / Representation |
|---|---|---|
| Agricultural – groundwater user | Gene Winn | Member Estancia Basin Water Planning Committee<br>Program Director, USDA Extension Service |
| | Ryan Schwebach | Schwebach Farms |
| | Rik Thompson | Estancia Basin Water Planning Committee |
| Agricultural – surface water user | Herman Salas | Torreon Acequia Association |
| | Orlando S. Lopez | Manzano Spring and Ditch Association |
| County government | Linda Jaramillo, County Clerk | Torrance County |
| | Steve Guestchow, Planning Director | Torrance County |
| | Dan McGregor, Secetary-Treasurer EBWPC | Bernalillo County Hydrologist<br>Member, Estancia Basin Water Planning Committee |
| | Jerry Schoeppner | Santa Fe County Hydrologist |
| Environmental interest | Ted Barela | Estancia Basin Resources Association |
| Extractive industry | NA | |
| Federal agency (technical support to the region) | John Perea | USDA, Farm Service Agency |
| | Alan Warren | Range Management Specialist, Cibola National Forest |
| State agency (technical support to the region) | Tom Perkins | State Land Office, Surface Resources Division<br>Member Estancia Basin Water Planning Committee |
| | Lawrence Crane | New Mexico State Forestry |
| Local (retail) business | David Tixier | Magnum Steel Building Co.<br>Member Estancia Basin Water Planning Committee |
| Municipal government | Ted Hart, Mayor | City of Moriarty |
| | John Bassett, Mayor | Town of Edgewood |
| | Rita Loy Simmons, Town Councilor | Town of Edgewood |
| | Cass Tyler, Sanitation Committee | Town of Willard |
| | George Immerwahr, City Councilor | City of Mountainair |
| Rural water provider | John Jones | Entranosa Water<br>Member Estancia Basin Water Planning Committee |
| | Orlando S. Lopez | Manzano Domestic Water Consumer Association |
| Tribal (as applicable) | NA | |

## Table 2-1. Steering Committee Members, Estancia Basin Water Planning Region

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| Water User Group | Name | Organization / Representation |
|---|---|---|
| Watershed interest | Arthur Swenka | Edgewood Soil and Water Conservation District<br>Member Estancia Basin Water Planning Committee |
| | J. Brian Greene | Member Estancia Basin Water Planning Committee |
| | Dierdra Tarr | Claunch-Pinto Soil and Water Conservation District (SWCD) |
| Other groups as identified by the steering committee | Rita Loy Simmons | Member Estancia Basin Water Planning Committee |
| | Debbie Ortiz | Partnership for Healthy Torrance County |
| | Rhonda King | Estancia Moriarty Willard Torrance County Water Association |
| | Josh Lewis, intern | Claunch-Pinto SWCD |
| New Mexico Legislature | Ted Barela | State Senator |
| Land grants [a] | John Perea | Torreon Land Grant |
| | Vanessa Chavez-Gutierrez or other* | President, Tajique Land Grant |

[a] Land Grants will select member for future water planning effort.

The steering committee includes state and federal agency representatives who participate as technical resources to the region. These individuals are generally knowledgeable about water issues in the region and are involved with many of the PPPs related to water management in the region. The list also includes non-profit groups who are involved in local water-related initiatives. The steering committee identified John Jones as the chair. Although the steering committee acknowledged that subcommittees could be a useful means of enhancing the planning effort and ensuring implementation of the RWP, they chose not to form any subcommittees at this time.

### 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, and 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 announcement 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:

- All steering committee meetings were held during the ad-hoc portion of the EBWPC bimonthly meetings, which were open to the public and interested stakeholders.
- Meetings were announced to the master stakeholder list by e-mail with the in-kind support of Cheri Lujan, East Torrance County SWCD.
- Steering committee members served as a conduit of information to others and through their own organizational communications with other agencies to encourage participation in the process.

Over the two-year update process, seven NMISC-supported steering committee meetings were held in the Estancia Basin region. A summary of each of those 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 public involvement process was centered on developing a representative steering committee, informing the regions about the process for updating the RWPs, and obtaining a list of PPPs that will address the needs of the region. The EBWPC identified the following items for additional public outreach:

## Table 2-2. Estancia Basin Region Public Meetings

Page 1 of 3

| Date | Location | Purpose | Meeting Summary |
|---|---|---|---|
| ***FY 2014*** | | | |
| 4/17/2014 | Moriarty | Kickoff meeting: Present the regional water planning update process to the region and review the Estancia Basin Water Planning Committee membership for consistency with the NMISC template. | 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. |
| ***FY 2015*** | | | |
| 2/19/2015 | Estancia | 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. |
| 4/16/2015 | Moriarty | Discuss the three responsibilities of the steering committee:<br>• 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.<br>• Provide direction on the public involvement process, including setting meeting times and locations and promoting outreach.<br>• Identify water-related projects and programs and policies needed to address water management challenges in the region and future water needs. | The group reviewed the update process, which was important for new people who had not attended meetings before, and the timeline for updating the regional water plan (RWP). Second, they continued to refine the ad hoc membership of the steering committee and identified additional representatives of environmental and other interests named in the template. Third, they began the task of identifying the projects, programs, and policies they wanted to include in the regional water plan update. They received forms for entering the projects, programs and policies – both completed and anticipated. Finally, they agreed to review their existing Public Involvement Plan and update it if necessary |

## Table 2-2. Estancia Basin Region Public Meetings

Page 2 of 3

| Date | Location | Purpose | Meeting Summary |
|---|---|---|---|
| 6/18/2015 | Estancia | Discuss projects, programs and policies (PPPs) and the public involvement chapter and ideas for FY 2015-2016 outreach. | In reviewing the membership of the steering committee, participants suggested additional names to fill unrepresented categories, including the State Legislature and land grants. The group reviewed the list of PPPs submitted by steering committee members and those consolidated from other sources by the consultant and discussed the advantages and disadvantages of including more specific projects to the list, for example items from the ICIP lists for each municipality. They also reviewed the Public Involvement Plan template supplied by the NMISC and modified it to fit their situation. The group further discussed potential collaborative projects such as agriculture/acequia projects, water system regionalization/cooperation, monitoring/data collection, watershed restoration, drought contingency planning, municipal conservation and reuse, local and state water policy recommendations, endangered species projects, and water quality protection. |
| ***FY 2016*** | | | |
| 2/11/2016 | Moriarty | Discuss process for reviewing draft plan, public involvement. Review steering committee membership and leadership. Focus on the PPPs to be included in the update. | Explained that NMISC needs comments on the draft technical sections of the plan and the importance of providing an opportunity for the public to comment on the plan before it is finalized was recognized. The steering committee decided to advertise to the public through newspaper and radio and hard copies in libraries to receive public input beyond the steering committee.<br>Section 8 of the plan, Implementation of Strategies to Meet Future Water Demand, was also discussed and a draft was promised by March 11, 2016. |

## Table 2-2. Estancia Basin Region Public Meetings

Page 3 of 3

| Date | Location | Purpose | Meeting Summary |
|---|---|---|---|
| 4/14/2016 | Estancia | Discuss process for reviewing draft plan, public involvement | The formal comments submitted to the NMISC were discussed and helpful to the NMISC. A member of the La Merced del Pueblo de Tajique Land Grant said he learned about the water planning process from an ad in the newspaper and would like more time to review the plan and provide comments on the draft plan. The four land grants in the Estancia Basin should be included in the stakeholder list. Preliminary feedback on the draft Section 8 included concern about the impact of the PPP list and future projects not included in this snapshot. Although the list can be updated, when and how that would occur just adds another layer of bureaucracy that is beyond the intent of the steering committee. Language to address this concern and other edits were noted and revised Sections 2 and 8 were sent to the steering committee for discussion at an interim meeting on May 12, 2016. |
| 6/9/2016 | Moriarty | Solicit final comments on draft sections of plan; select representatives to present plan to NMISC | Changes to Section 2 and 8 were discussed and accepted. Rik Thompson, Rhonda King, and Dan McGregor were selected to work on the presentation to NMISC on September 15. |

- The EBWPC advertised the comment period on the draft plan in the local newspaper and radio. Copies of the draft plan were placed in local libraries. Torrance County Clerk Linda Jaramillo emailed all of the municipalities copies of the draft plan for comment.

- The public outreach generated interest from the land grant communities in the region. Although one member of a land grant is on the steering committee, he was not specifically selected by the four land grants to represent their interests. The four land grants are Tajique Land Grant, Torreon Land Grant, Chilili Land Grant, and La Merced del Manzano Land Grant. They will select a representative to serve as an ad hoc member of the water planning steering committee in the future.

# 3. Description of the Planning Region

This section provides a general overview of the Estancia Basin Water Planning Region. Detailed information, including maps illustrating the land use and general features of the region, was provided in the accepted and updated RWPs; that information is briefly summarized and updated as appropriate here. Additional detail on the climate, water resources, and demographics of the region is provided in Sections 5 and 6.

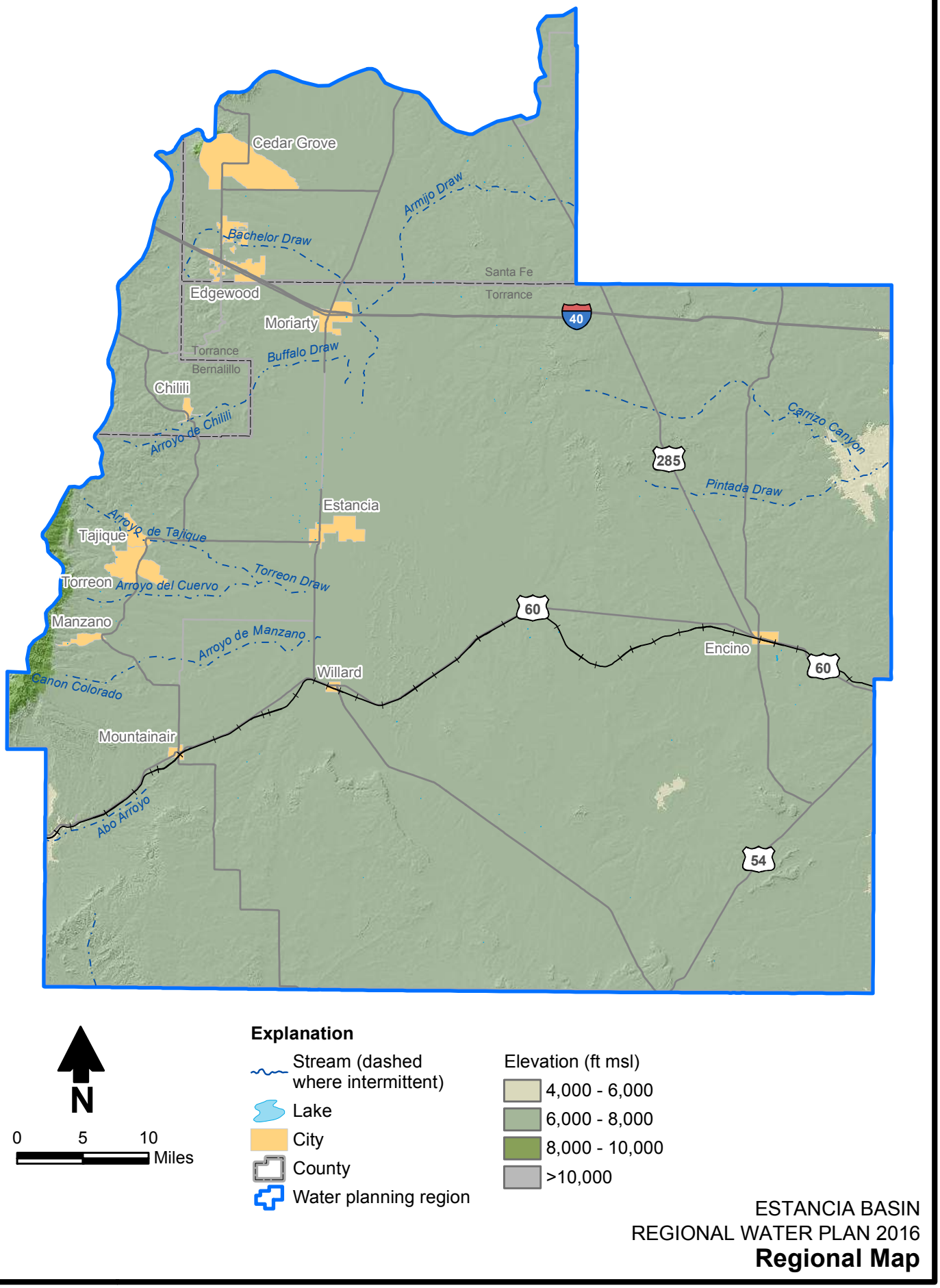
## 3.1 General Description of the Planning Region

The Estancia Basin Water Planning Region is located in central New Mexico, covering the majority of Torrance County and the portions of Santa Fe and Bernalillo counties that overly the Estancia UWB. Approximately 80 percent of the land area within the hydrographic boundaries of the Estancia UWB is in Torrance County. Santa Fe and Bernalillo counties also play significant roles in the Estancia Basin due to burgeoning residential housing that is expanding eastward into the planning region.

The region is bounded on the north by the crest of the San Pedro Mountains in Santa Fe County and by San Miguel County, on the west by the Estancia UWB boundary and by Valencia County, on the south by Lincoln and Socorro counties, and on the east by Guadalupe County (Figure 3-1). The total area of the planning region is approximately 3,800 square miles, but only about 2,200 square miles fall within the Estancia UWB. The total area of the planning region is distributed among the three counties as follows:

- Santa Fe County: 435 square miles
- Bernalillo County: 113 square miles
- Torrance County: 3,278 square miles

The planning region encompasses varied terrain, from mountainous areas in the north, west, and south, to plains and rangeland in the central and south-central portions of the region. Elevations range from 10,097 feet above mean sea level at Manzano Peak to 6,050 feet in the Laguna del Perro area.

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ESTANCIA BASIN
REGIONAL WATER PLAN 2016
**Regional Map**

Figure 3-1

Natural resources include sand and gravel, forest products, and minerals, including four precious metals mines or prospects and one uranium mining claim (Corbin Consulting, Inc., 1999). Exploration wells have found very deep oil and gas resources (Broadhead, 1997); to date, these have not been developed, but as oil and gas prices rise, increased oil and gas activities are likely (EBWPC and HR, 2010). The 2010 RWP update reiterated the assertion in the Phase I report that the region's groundwater, particularly the Valley Fill aquifer generally located in the central portion of the basin, is its most important natural resource.

## 3.2 Climate

The varied terrain of the planning region results in significant climate variations. Average annual precipitation, including both snowmelt and rainfall, ranges from about 12 inches in the lower elevations (Pedernal 4 E) to more than 20 inches along the eastern slopes of the Sandia and Manzano Mountains. Most of the region receives 14 to 18 inches of precipitation annually. Very little runoff occurs from rainfall or snowmelt due to the high permeability of the upland areas (fractured limestone); thus a reduction in precipitation would result in less recharge.

Further information regarding climate and its effect on the region's water supplies is provided in Section 5.1.

## 3.3 Major Surface Water and Groundwater Sources

No significant streams exist in the region and most surface water flow occurs as ephemeral flow in drainages and arroyos. Two small freshwater lakes and numerous playa lakes are present within the planning region (Figure 3-1). The region relies solely on groundwater and precipitation for water supply, and the vast majority of the current water supply is derived from the Valley Fill aquifer system generally located in the central portion of the Estancia Basin.

The primary NMOSE-declared UWB in the region is the Estancia UWB; small portions of the Upper Pecos, Fort Sumner, Roswell, Tularosa, Rio Grande (Middle), and Sandia UWBs are also present beneath the peripheries of the region. (A declared UWB is an area of the state proclaimed by the State Engineer to be underlain by a groundwater source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of groundwater from the source.) While the Estancia UWB supplies most of the region's population and economy, the eastern and southern parts of the region obtain water from adjacent UWBs that are shared with other regions:

- Upper Pecos UWB: Mora-San Miguel-Guadalupe region
- Fort Sumner UWB: Mora-San Miguel-Guadalupe and Lower Pecos Valley regions
- Roswell UWB: Mora-San Miguel-Guadalupe and Lower Pecos Valley regions

- Tularosa UWB: Tularosa-Sacramento-Salt, Lower Rio Grande, and Socorro-Sierra regions
- Rio Grande (Middle) UWB: Socorro-Sierra and Middle Rio Grande regions

The Sandia UWB, shared with the Middle Rio Grande region, is present in a small part of the northwest portion of the Estancia Basin and supplies water to domestic wells. 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 Estancia Basin Water Planning Region includes all of Torrance County and small portions of Santa Fe and Bernalillo counties that, because of their residential population, play significant roles in the region. The total 2013 population of Torrance County was 15,717 (U.S. Census Bureau, 2014a). No reliable figures for the portions of Santa Fe and Bernalillo counties that fall within the Estancia Basin region are available for 2013. As shown in Table 3-1a, between 2010 and 2013, the population of Torrance County declined from 16,383 to 15,717 (about 4.1 percent).

The portion of Santa Fe County within the Estancia Basin Water Planning Region had a population of 10,014 in 2010, as determined by DBS&A from U.S. Census data. This area has substantial land dedicated to irrigated agriculture.

The small portion of Bernalillo County within the Estancia Basin Water Planning Region had 6,297 residents in 2010, as determined by DBS&A from U.S. Census data. The area is mostly residential with no irrigated agriculture and minimal ranching activity.

The largest employment categories are education/healthcare, retail trade, professional, scientific and management, followed by arts, entertainment, recreation, and accommodation and food services (Table 3-1c). The greatest amount of water has been used for irrigated agriculture.

Land in the Estancia Basin water planning region is owned by various federal, state, and private entities, as illustrated on Figure 3-2 and outlined below:

- Federal agencies: 244 square miles
- State agencies: 657 square miles
- Private entities: 2,921 square miles
- Land grants: 502 square miles

## Table 3-1. Summary of Demographic and Economic Statistics for the Estancia Basin Water Planning Region



### a. Population

| County | 2000 | 2010 [a] | 2013 |
|---|---|---|---|
| Santa Fe | NA | 10,014 | NA |
| Bernalillo | NA | 6,297 | NA |
| Torrance | 16,911 | 16,383 | 15,717 |
| Total Region | NA | 32,694 | NA |

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 (%) |
| Santa Fe | NA | NA | NA | NA | NA |
| Bernalillo | NA | NA | NA | NA | NA |
| Torrance | 17,849 | 75 | 6,167 | 5,649 | 8.4 |

[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] |
| Santa Fe | NA | NA | NA |
| Bernalillo | NA | NA | NA |
| Torrance | Education/Healthcare | 1,045 | 233 |
| | Agriculture | 909 | |
| | Retail trade | 810 | |
| | Professional, scientific, management | 459 | |
| | Construction | 428 | |

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

**Table 3-1. Summary of Demographic and Economic Statistics for the Estancia Basin Water Planning Region**
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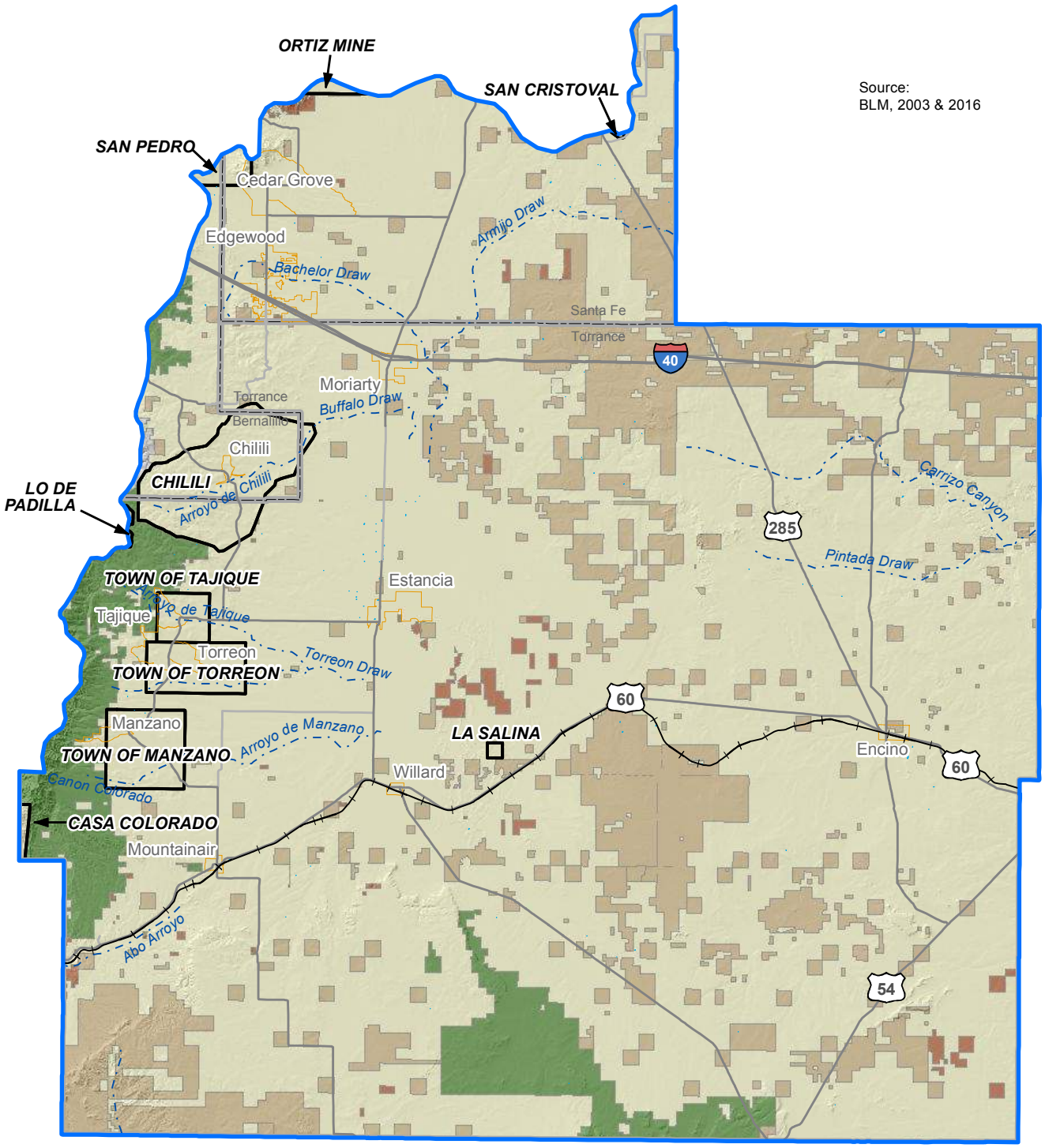
## d. Agriculture

| County | Farms / Ranches [a] | | | Most Valuable Agricultural Commodities [b] |
|---|---|---|---|---|
| | Number | Acreage | | |
| | | Total | Average | |
| Santa Fe | NA | NA | NA | NA |
| Bernalillo | NA | NA | NA | NA |
| Torrance | 589 | 1,864,589 | 3,166 | Cattle, calves<br>Corn for silage |

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




ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Land Ownership**

Figure 3-2

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

# 4. Legal Issues

The Estancia Basin Water Planning Region is the subject of two water plans. The *Regional Water Plan, Estancia Underground Water Basin, New Mexico* was prepared by Corbin Consulting, Inc. (1999) and included as Volume II a prior plan prepared by John Shomaker & Associates, Inc. (JSAI) in 1997. The plan was accepted by the New Mexico Interstate Stream Commission in April 1999. The *Estancia Basin Regional Water Plan: Year 2010 Update* was prepared by the Estancia Basin Water Planning Commission and Hydro Resolutions, LLC in 2010. This section updates the information in Section III of the JSAI (1997) plan and Section 5 (Legal Issues) of the 2010 plan update, the latter of which details many of the legal issues regarding water resource management that pose a challenge to the region.

## 4.1 Relevant Water Law

### 4.1.1 State of New Mexico Law

Since publication of the 2010 plan update 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 Estancia Basin region is discussed in Section 4.1.2.

#### *4.1.1.1 Regulatory Powers of the NMOSE*

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

Based on Section 72-2-9.1, the State Engineer promulgated the Active Water Resource Management (AWRM) regulations in December 2004. The regulation's stated purpose is to establish the framework for the State Engineer "to carry out his responsibility to supervise the physical distribution of water to protect senior water right owners, to assure compliance with interstate stream compacts and to prevent waste by administration of water rights." 19.25.13.6 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 Estancia Basin 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 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.

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, a case that originated in the planning region. In *Hanson*, a water rights permit holder who had not yet applied the water to beneficial use sought to transfer her unperfected water right from irrigation to subdivision use. The State Engineer denied the application because the water had not been put to beneficial use. The permit holder argued that pursuant to NMSA 1978, Section 72-12-7(A) (1985), which allows the owner of a "water right" to change the use of the water upon application to the State Engineer, the State Engineer had wrongly rejected her application. The Court upheld the denial of the application, finding that under western water law the term "water right" does not include a permit to appropriate water when no water has been put to beneficial use. Accordingly, as used in Section 72-12-7(A) the term "water right" requires the perfection of a water right through beneficial use before a transfer can be allowed.

#### *4.1.1.2 Legal Review of NMOSE Determinations*

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

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

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

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

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

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

#### *4.1.1.3 Beneficial Use of Water – Non-Consumptive Use*

*Carangelo v. Albuquerque-Bernalillo County Water Utility Authority*, 2014-NMCA-032, addressed whether a non-consumptive use of water qualifies as a beneficial use under New Mexico law and, accordingly, can be the basis for an appropriation of such water. In *Carangelo*, the NMOSE granted the Albuquerque-Bernalillo County Water Utility Authority's (Authority's) application to divert approximately 45,000 acre-feet per year of Rio Grande surface water, to which the Authority had no appropriative right. The Authority intended to use the water for the non-consumptive purpose of "carrying" the Authority's own San Juan-Chama Project water, Colorado River Basin water to which the Authority had contracted for use of, to a water treatment plant for drinking water purposes. The Court of Appeals found the NMOSE erred in granting the application because the application failed to seek a new appropriation. The

Authority's application sought to divert water, to which the Authority asserted no prior appropriative right, which required a new appropriation. Moreover, the Authority affirmatively asserted no beneficial use of the water. The Court remanded the matter to the NMOSE to issue a corrected permit.

The Court's decision included the following legal conclusions:

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

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

#### *4.1.1.4 Impairment*

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

#### *4.1.1.5 Rights Appurtenant to Water Rights*

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

Therefore, a lessee can acquire water rights on leased land by appropriating water and placing it to beneficial use. Those developed rights remain the property of the lessee, not the lessor, unless stipulated otherwise in an agreement.

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

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

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

#### *4.1.1.6 Deep, Non-Potable Aquifers*

In 2009 the New Mexico Legislature amended NMSA 1978, Section 72-12-25 (2009), to provide for administrative regulation of deep, non-potable aquifers. These groundwater basins are greater than 2,500 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). Note that the administrative guidelines for Estancia administrative basin, discussed in Section 4.1.2.2, limit domestic well permits to 0.5 ac-ft/yr in the basin.
    - 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.

#### *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 (1) present the county with NMOSE-issued water use permits for the subdivision or (2) prove 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.

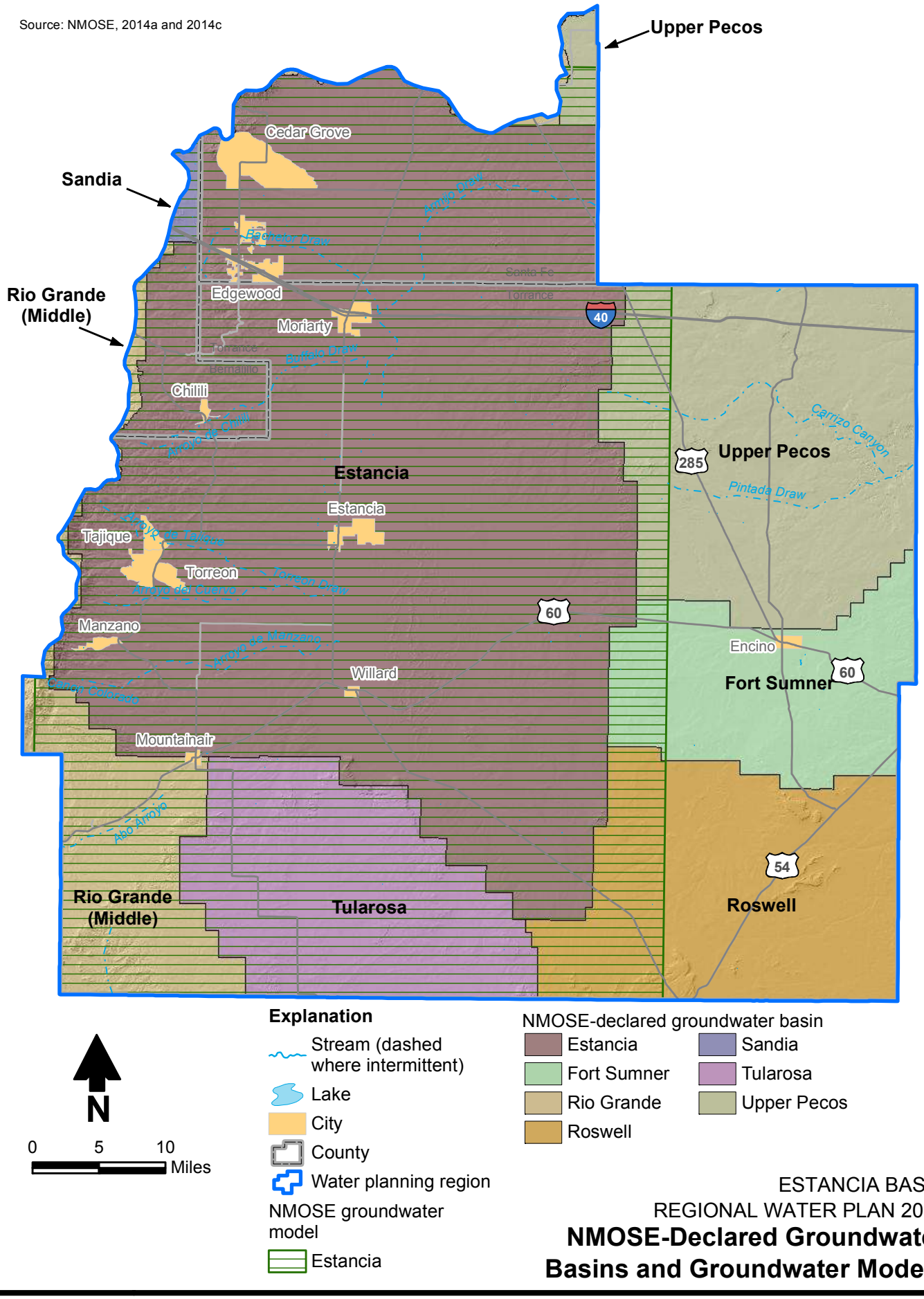
#### *4.1.2.1 Water Masters*

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). There are no water masters for the region.

#### *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 Estancia Basin region is comprised primarily of the Estancia UWB, surrounded by the Fort Sumner, Rio Grande, Roswell, Sandia, Tularosa, and Upper Pecos UWBs (Figure 4-1). Groundwater basin guidelines are in place for several basins within the region, as described below.

- *Estancia:* In 2002, guidelines were established for the Estancia UWB. The *Estancia Underground Water Basin Guidelines for Review of Water Right Applications* (NMOSE, 2002) specify the criteria for administering existing water rights throughout the UWB, including within designated critical management areas, through evaluating water levels and the rate of water level decline on both a regional and local basis. The guidelines use two approaches to administer water in the basin. In aquifers with a relatively thin saturated thickness, declines are limited to a prescribed level over a prescribed period. In aquifers with a relatively thick saturated thickness, the rate of groundwater decline is limited. Critical management areas have been designated in areas with water declines of 1.5 feet per year or greater, or where the saturated thickness of the aquifer is expected to be below 80 feet by 2040.




ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**NMOSE-Declared Groundwater Basins and Groundwater Models**

Figure 4-1

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- *Fort Sumner:* There are no specific guidelines governing appropriations in the Fort Sumner UWB. However, State Engineer Order No. 183 (05/23/2013) requires the metering of groundwater in the UWB.

- *Roswell UWB:* The *Roswell Basin Guidelines for Review of Water Right Applications* (NMOSE, 2005), which are applicable to the small portion of the Roswell UWB that falls within the region, are discussed in the Lower Pecos Valley Regional Water Plan.

- *Tularosa:* This basin was extended in 2005 (19.27.64.1 *et seq.* NMAC). In 2014, the NMOSE put forth an *Update to the Alamogordo-Tularosa Administrative Guidelines for Review of Water Right Applications* (NMOSE, 2014e) that provides guidelines on the procedures for processing pending and future water rights applications filed within the Alamogordo-Tularosa Administrative Area (ATAA). The updated guidelines replace the *Tularosa Basin Administrative Criteria* adopted by the NMOSE in 1997.

#### *4.1.2.3 AWRM Implementation in the Basin*

None of the basins in the region have been designated as a priority basin for implementation of AWRM regulations.

#### *4.1.2.4 Special Districts in the Basin*

Special districts are various districts within the region having legal control over the use of water in that district. All are subject to specific statutes or other laws concerning their organization and operation, found in Chapter 73 of the New Mexico Statutes. In the Estancia Basin region, special districts include a number of soil and water conservation districts, which are governed by NMSA 1978, §§73-20-25 through 48.

#### *4.1.2.5 State Court Adjudications in the Basin*

Adjudications in the region, or more precisely, the lack of adjudications in the region, are discussed in the 2010 RWP update to the 1999 RWP, Section 5.3. Adjudication of Estancia Basin water rights are not pending. Adjudication of the Upper Pecos Underground Water Basin is ongoing and discussed more extensively in the Mora-San Miguel-Guadalupe RWP.

### 4.1.3 Federal Water Laws

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

On federal lands (e.g., Forest Service, Park Service), water rights are reserved by the United States for use on those lands. The priority date of federally reserved water rights is the date the United States reserved the land for the particular use. In some cases, the United States may have state law rights under the prior appropriation system, for instance, if the United States acquires lands with existing water rights. The only federally reserved land within the Estancia Basin planning region is Cibola National Forest.

#### *4.1.3.2 Interstate Stream Compacts*

Not applicable.

#### *4.1.3.3 Treaties*

Not applicable.

#### *4.1.3.4 Federal Water Projects*

Not applicable.

#### *4.1.3.5 Federal Adjudications in the Basin*

Not applicable.

### 4.1.4 Tribal Law

Not applicable.

### 4.1.5 Local Law

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

#### *4.1.5.1 Torrance County*

Water use in Torrance County is guided by the *Comprehensive Land Use Plan for Torrance County, New Mexico* (MRCOG, 2003) and regulated by ordinance.

The Torrance County comprehensive plan recognizes that there is no regional authority to manage the consumptive use of water resources in the County, with many decisions affecting water resources in the County made by individual local governments and by private sector water providers. The plan recognizes that water is easily the most serious issue affecting the County. The plan sets forth a goal of balancing the needs of a growing population while retaining the rural residential character and culture of the County. The plan also sets as a goal ensuring an adequate and sustainable supply of good-quality water for current and future needs of the County. The plan outlines the following objectives to meet these goals:

- Administer water rights in the Estancia Basin as a Special Groundwater Management Area.
- Educate water users about the necessity of water conservation, while offering conservation techniques.
- Protect groundwater by preventing land uses that pollute the groundwater.
- Support a Basin-wide program of comprehensive monitoring, metering, and ongoing investigation of water resources in the Estancia Basin.
- Promote the efficient use of centralized water and wastewater systems in the urbanizing areas of the County.

Torrance County subdivision regulations Section 5.7 require that subdivisions containing 20 or more parcels with at least 1 parcel of 2 acres or less must have a State Engineer permit to appropriate water for or transfer water to the subdivision.

#### *4.1.5.2 City of Moriarty*

Water use in the City of Moriarty is guided by the *Moriarty Comprehensive Plan Update* (MRCOG, 2012b), the *Water Conservation Program for the City of Moriarty* (MRCOG, 2012a) (as adopted by Resolution 11-12-33), and by ordinance.

The comprehensive plan recognizes that water quality and the wise use of water are critical issues for Moriarty residents. One goal set forth in the plan is to provide drinking water and

wastewater disposal services to all City residents. The objectives to meet that goal include the following:

- Prepare and maintain a current 40-year water plan to ensure adequate water resources and sufficient water rights to meet projected future demands.
- Implement the recommendations identified in the Moriarty water conservation program.
- Educate water users about the costs and benefits of water conservation, and identify specific water conservation techniques, incentives, and practices.
- Protect groundwater by preventing specific land use activities that may contaminate groundwater.
- Regulate development in flood prone areas and wellhead protection zones through the zoning ordinance.
- Maintain the public drinking water system by improving the pumping and storage capabilities and minimizing leakage throughout the water.
- Provide adequate wastewater collection and treatment for all residences, businesses, and industries in the City.
- Improve the effluent reuse system to provide landscape water for City parks and recreation fields.

The Water Conservation Program has ten basic elements establishing a framework of conservation activities for implementation and promotion by the City: (1) recordkeeping and water system audits, (2) monitoring and measuring, (3) water pricing, (4) low-flow plumbing fixtures, (5) xeriscaping, (6) regulating outdoor watering, (7) water harvesting, (8) graywater use, (9) public education and outreach, and (10) development of an emergency water shortage plan.

The City of Moriarty Ordinance No. O-2012-01 establishes an emergency water shortage plan to manage water use in response to emergencies or unexpected events that may disrupt or endanger the municipal water supply. The ordinance outlines three water emergency stages, depending on the severity of the water emergency.

#### *4.1.5.3 Town of Estancia*

Estancia has no specific ordinances or comprehensive plan relating to water use.

#### *4.1.5.4 Town of Mountainair*

Mountainair has no specific ordinances or comprehensive plan relating to water use.

#### *4.1.5.5 Village of Willard*

Willard has no specific ordinances or comprehensive plan relating to water use.

#### *4.1.5.6 Santa Fe County*

Water use in Santa Fe County is guided by the *Santa Fe County Water Conservation Plan 2010* (Santa Fe County, 2010a), the *Santa Fe County Conjunctive Management Plan for the Santa Fe Basin* (Santa Fe County, 2009), the *Santa Fe County Sustainable Growth Management Plan* (Santa Fe County, 2010b), and by several County ordinances.

The Water Conservation Plan was compiled to (1) meet the requirements set out by the U.S. Bureau of Reclamation for water conservation planning and (2) fulfill the statutory requirement for water conservation planning for the State of New Mexico in response to a permit condition imposed by the New Mexico State Engineer. The plan is defined and organized by sub-basins within the Santa Fe County boundaries. The plan outlines the following goals for the County: conserve water through current ordinances and programs and through the development of future ordinances and regulations as needed, provide guidance on best water management practices, incorporate new water conservation technologies, integrate low water use practices, and protect water resources. The plan includes existing water conservation ordinances, ways to expand on the existing water conservation practices, future planned initiatives, an implementation schedule, and funding sources. Future implementation activities include (1) identifying water conservation audiences, (2) seeking technical assistance, (3) developing ordinances for rain, storm, gray and black water harvesting, and (4) conducting water conservation research programs.

Santa Fe County regulates water use by ordinance. Subchapter 51 of the Santa Fe County Code of Ordinances (Code) deals with water conservation, including prohibiting water wasting actions and listing fines for various types of water waste. Section 51.04 of the Code outlines outdoor conservation measures, including time of day watering restrictions from May through September. Section 51.05 of the Code outlines indoor conservation measures, including leak repair requirements, plumbing fixture requirements, and hotel and restaurant requirements. Section 51.07 of the Code outlines the County's domestic well use metering program. Section 51.08 of the Code specifically defines and prohibits water waste and "fugitive water."

The County's Sustainable Land Development Code (Section 7.13) outlines water supply requirements for all development within the County, including water supply and water conservation requirements for connection to water and wastewater systems.

#### *4.1.5.7 Town of Edgewood*

Water use in the Town of Edgewood is governed by ordinance and the *Town of Edgewood Comprehensive Land Use Plan* (MRCOG, 2008). Subdivision Ordinance No. 2014-03 sets forth water availability requirements for subdivisions.

The *Comprehensive Land Use Plan* sets as a goal the protection of the water resources of the Edgewood community through the following objectives:

- Establish a groundwater protection plan that regulates land use activities in order to prevent the contamination of water resources.
- Develop and implement a water conservation program and a drought contingency plan.
- In order to protect the community from property damage and contamination caused by stormwater runoff, regulate development in designated floodplains and protect the natural drainage features in the community.
- Encourage rainwater harvesting and use of graywater systems in the community.

Provide for the collection and treatment of wastewater in appropriate areas of the community to protect groundwater from contamination.

#### *4.1.5.8 Bernalillo County*

Water use in Bernalillo County is regulated by ordinances and guided by a water conservation plan and the *Albuquerque/Bernalillo County Comprehensive Plan* (COA, 2013).

The Bernalillo County Code of Ordinances has a number of provisions relating to water use.

- Section 30-153 of the Code establishes a combined city, water authority, and county board called the Water Protection Advisory Board, the purpose of which is to advise the three governmental entities on surface and groundwater protection concerns. These concerns include policies necessary to enhance protection of surface and groundwater quality, oversee implementation of the groundwater protection policy and action plan, promote consistency in city, authority, and county actions to protect surface and groundwater quality, and advocate effective protection of surface and groundwater quality.
- Section 30-241 of the Code sets forth water conservation requirements in order to reduce per capita water use, encourage responsible use of water, reduce water waste, require conservation measures for new developments, and preserve water supplies within the county.
- Section 30-247 outlines outdoor water restrictions.
- Section 30-248 prohibits water waste.
- Section 30-249 sets forth design and construction requirements for new developments.

The Bernalillo County Subdivision Code, Sections 74-96 and 97, outlines water availability assessments for subdivisions.

Bernalillo County's Water Conservation Plan (2006) outlines initial goals for the plan and its implementation:

- Evaluate current water usage.
- Evaluate mandatory, voluntary, and other conservation measures for the Water Conservation Plan.
- Determine resource levels for the water conservation program.
- Determine sources of funding for the water conservation program.
- Develop priorities.
- Set measurement goals and criteria.
- Improve baseline information on county water usage and update annually.
- Gather information on domestic well permits and domestic well usage on an ongoing basis.
- Gradually develop appropriate ordinance(s) from the Water Conservation Plan.

The *Albuquerque/Bernalillo County Comprehensive Plan* includes policy goals for both water quality and water management (Sections II(C)(2) and II(D)(2)). The water quality goal is to maintain a dependable, high-quality supply of water for the urbanized area's needs. The policies for meeting this goal are to minimize the potential for contaminants entering the community water supply, minimize water quality degradation resulting from on-site liquid waste disposal systems, and minimize water quality contamination from solid waste disposal. The water management goal is efficient water management and use. The polices for meeting this goal are to adopt measures to discourage wasteful water use, encourage maximum absorption of precipitation through retention of natural arroyos and other means of runoff conservation, and protect existing water rights and acquire new rights to meet increasing population needs.

## 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. 6 U.S.C. § 1536(a)(2). This requirement applies whenever a private or public entity undertakes an action that is "authorized, funded, or carried out," wholly or in part by a federal agency. *Id.* As part of the consultation process, federal agencies must usually prepare a biological assessment to identify endangered or threatened species and determine the likely effect of the federal action on those species and their critical habitat. 16 U.S.C. § 1536(c). At the end of the consultation process, the USFWS prepares a biological opinion stating whether the proposed action will jeopardize the species or destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(c)(4). USFWS may also recommend reasonable alternatives that do not jeopardize the species. *Id.*

The species in the planning region that are subject to protection under the ESA are as follows:

- Southwestern willow flycatcher (endangered, final recovery plan - Santa Fe County)
- Yellow-billed cuckoo (threatened – Santa Fe County)
- Mexican spotted owl (threatened, implementation of final recovery plan – Santa Fe and Torrance counties)
- Sprague's pipit (candidate – Bernalillo County)

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

#### *4.2.1.2 New Mexico Wildlife Conservation Act*

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

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

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

### 4.2.2 Water Quality Laws

#### *4.2.2.1 Federal Clean Water Act*

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

##### *4.2.2.1.1 NPDES Permit Program (Section 402)*

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

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

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

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

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

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

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

segments of the headwaters of the Pecos River are on the impaired list, but these are not the primary waters in the region.

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 ground water 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.

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

There is no ongoing or threatened litigation that may affect water management in the Estancia Basin region as of the time of writing. The 2010 plan update details many of the legal issues regarding water resource management that pose a challenge to the region.

# 5. Water Supply

This section provides an overview of the water supply in the Estancia Basin 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 prior Estancia Basin RWPs (JSAI et al., 1997; Corbin Consulting, Inc., 1999; EBWPC and HR, 2010) 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 Estancia Basin region are:

- Large-scale agricultural pumping has been occurring in the region since about 1950. Groundwater mining (i.e., pumping more water from the aquifer than is replenished) has resulted in serious water level declines in the Valley Fill aquifer system, causing some wells to go dry, and computer modeling of the basin predicts that water levels will continue to decline in the coming decades. Average water level declines are over 1 foot per year in the Valley Fill, which is on average only 131 feet thick (EBWPC and HR, 2010). However, declines up to 5 feet per year in the Valley Fill have been observed.

- For many areas, the Valley Fill aquifer is underlain by other geologic formations that have been designated as critical management areas (CMAs). The Estancia UWB guidelines adopted by the NMOSE do not allow the deepening of wells producing from the Valley Fill aquifer into an underlying CMA.

- New appropriations of groundwater are not permitted within the Estancia UWB. Groundwater rights may be obtained by transferring a valid water right that has been put to beneficial use from an owner who is willing to transfer that right. Water right licenses, declarations, and permits in the Estancia UWB far exceed the amount of water that has been put to beneficial use. The NMOSE calculated the total irrigated agricultural pumping for the basin in 2010 to be 79,298 acre-feet per year (ac-ft/yr) (Longworth et al., 2013), much less than the permitted diversion of 158,475 ac-ft/yr (HydroResolutions, LLC, 2013).

- The Estancia UWB guidelines limit the number of years in which extensions of time may be filed to 10 years. Permits are typically conditioned to require that proof of beneficial use be submitted within 4 years following the permit approval date. If the application of water to beneficial use cannot be filed within the specified time, an extension of time may be filed. More than 35 permits have been canceled because proof of beneficial use was not filed within 10 years.

- Regional water planning efforts by the Estancia Basin Water Planning Committee (EBWPC) have focused on evaluating and limiting adverse impacts from transfers to other basins and achieving water self-sufficiency and sustainability. In 2008 the New Mexico Legislature adopted Senate Joint Memorial 17, which indicated the Legislature's desire for the State Engineer to consider the availability of water supplies within the basin to which water is being exported when evaluating applications to export groundwater out of the Estancia Basin.

- 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 individual farms (Brinegar and Ward, 2009; Ward and Pulido-Velazquez, 2008).

- Most irrigation wells are not metered, which limits the ability of models to accurately characterize the stresses on the water resources.

- The increase in population since the release of the 1999 regional water plan (Corbin Consulting, 1999) has resulted in an increase in domestic use of water in the Estancia Basin. In addition, proposed alternative energy projects and other business ventures will increase demand. To meet these new demands, other water rights, such as irrigation rights, will have to be discontinued. The transfer of irrigation rights to other uses results in a decrease in pumping, because only the consumptive use amount, not the diversion amount, may be transferred.

- Interest in the development of brackish groundwater resources with associated development of two intra-basin pipelines could help meet the region's water demand, but there is concern that development of these resources could potentially impact water quality.

- The updated RWP (EBWPC and HR, 2010) expressed concern about NMOSE administrative policies that restrict transfers of water rights to alternate points of diversion within the basin and the impact of such restrictions on economic development along the I-40 corridor. To provide a water source alternative and allow farmers flexibility to lease their water over the short term, the EBWPC identified development and construction of an intra-basin pipeline(s) as one of its five-year regional water plan priorities to allow the physical transfer of water within the region.

- Notices of intent have been filed by three entities under New Mexico Statutes 72-12-25 through 72-12-28 to drill up to 32 wells, each over 2,500 feet in depth, and divert up to 50,500 acre-feet per year of non-potable groundwater. These notices have not yet been followed by any action by the applicants.
- Reducing depletions in the Valley Fill aquifer system and achieving self-sufficiency and sustainability with respect to water supply and demand are paramount to the economic and cultural viability of the Estancia Basin.
- Nitrate contamination of groundwater is a concern in certain areas because of the high density of septic tanks (EBWPC and HR, 2010).
- Saline water may be migrating into areas with better water quality.
- Critical issues to better understand are the connection between the Madera and Valley Fill aquifers and the potential for subsidence in the Valley Fill and saline water intrusion (EBWPC and HR, 2010).
- Forest restoration efforts have helped to reduce the risk of wildfire, but the reduction in evapotranspiration from reduced vegetation is not easy to measure, particularly during dry periods when the remaining vegetation transpires the limited amount of precipitation. Continued monitoring will be crucial to understanding the role vegetation management plays on the region's water budgets.

## 5.1 Summary of Climate Conditions

The accepted regional water plan (JSAI et al., 1997) included an analysis of historical precipitation in the Estancia UWB. This section provides an updated summary of temperature, precipitation, snowpack conditions, and drought indices pertinent to the entire planning region (Section 5.1.1). Studies relevant to climate change and its potential impacts to water resources in New Mexico and the Estancia Basin Water Planning Region are discussed in Section 5.1.2.

### 5.1.1 Temperature, Precipitation, and Drought Indices

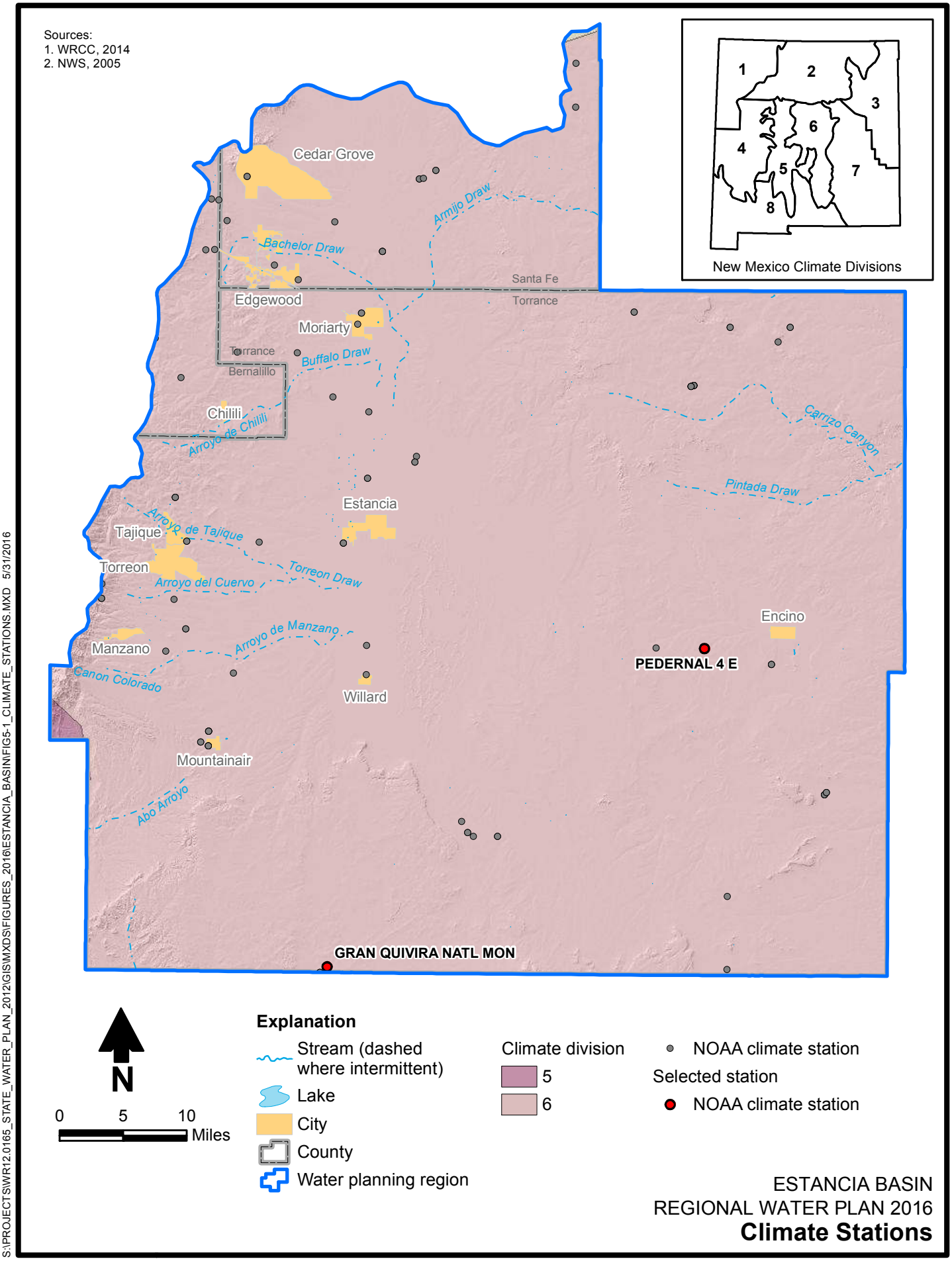
Table 5-1 lists the periods of record for weather stations in Santa Fe, Bernalillo, and Torrance counties (within the planning region) and identifies two stations that were used for analysis of weather trends. These stations were selected based on location, how well they represented conditions in their respective counties, and completeness of their historical records. The region contains no snow course or snowpack telemetry (SNOTEL) stations that can be used to document snowfall in the region. The locations of the climate stations for which additional data were analyzed are shown in Figure 5-1.

## Table 5-1. Estancia Basin Climate Stations

| Climate Stations [a] | Latitude | Longitude | Elevation | Precipitation | | Temperature | |
|---|---|---|---|---|---|---|---|
| | | | | Data Start | Data End | Data Start | Data End |
| ***Santa Fe County*** | | | | | | | |
| Clines Corners | 35.02 | –105.67 | 7,201 | 7/1/1959 | 11/30/1968 | 7/1/1959 | 11/30/1968 |
| Edgewood | 35.05 | –106.13 | 6,804 | 7/1/1944 | 8/31/1959 | — | — |
| Otto FAA Airport | 35.08 | –106.02 | 6,234 | 3/1/1909 | 10/31/1954 | 3/1/1909 | 10/31/1954 |
| Stanley 1 NNE | 35.17 | –105.96 | 6,380 | 3/1/1909 | Present | 3/1/1909 | Present |
| ***Bernalillo County*** | | | | | | | |
| Barton | 35.08 | –106.25 | 6,875 | 7/1/1914 | 1/31/1926 | 7/1/1914 | 12/31/1925 |
| ***Torrance County*** | | | | | | | |
| Clines Corners 7 SE | 34.93 | –105.59 | 6,924 | 12/1/1968 | 12/31/2013 | 12/1/1968 | 12/31/2013 |
| Duran | 34.47 | –105.40 | 6,285 | 7/1/1908 | 9/30/1951 | 8/1/1908 | 2/28/1933 |
| **Gran Quivira Natl Mon** | 34.27 | –106.08 | 6,600 | 5/1/1905 | Present | 1/1/1930 | Present |
| Mc Intosh 4 NW | 34.92 | –106.08 | 6,253 | 1/1/1928 | 8/31/1976 | 1/1/1928 | 8/31/1976 |
| Mountainair | 34.52 | –106.26 | 6,520 | 5/1/1902 | Present | 5/1/1902 | Present |
| Palma | 35.00 | –105.45 | 6,453 | 5/1/1905 | 7/31/1968 | — | — |
| **Pedernal 4 E** | 34.63 | –105.57 | 6,200 | 1/1/1929 | Present | 7/1/1956 | Present |
| Pfeister Ranch | 34.60 | –106.22 | 6,604 | 3/1/1942 | 3/31/1955 | — | — |
| Progresso | 34.42 | –105.89 | 6,297 | 7/1/1929 | 7/31/2012 | — | — |
| Tajique | 34.75 | –106.28 | 6,693 | 11/1/1970 | 4/30/1979 | 11/1/1970 | 4/30/1979 |
| Tajique 4 NW | 34.80 | –106.30 | 6,985 | 4/30/1910 | 10/31/1970 | 5/1/1920 | 10/31/1970 |
| Willard (Near) | 34.63 | –106.03 | 6,080 | 10/1/1912 | 7/31/1923 | 10/1/1912 | 3/31/1923 |

Source: WRCC, 2014

[a] Stations in **bold** type were selected for detailed analysis. — = Information not available

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ESTANCIA BASIN
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**Climate Stations**

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.

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 at the two representative stations in the planning region. Total annual precipitation for the selected climate stations is shown in Figure 5-4.

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.

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 Estancia Basin Water Planning Region falls primarily within New Mexico Climate Division 6 (the Central Highlands Climate Division) with a small portion of the southwestern corner of the region in Division 5 (the Central Valley Climate Division) (Figure 5-1). Figure 5-6 shows the long-term PDSI for these two climate divisions. Of interest are the large variations from year to year in both 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 1930s, the 1950s, the early 2000s, and in recent years (2011 to 2013) (Figure 5-6). The PDSI indicates that the region can expect protracted periods of drought (as occurred 1950-1958) and moderate-length wet periods similar to those in 1905-1909 and 1985-1989). However, given that the period of record is relatively short, one should not expect this century to necessarily be patterned after the last.

## Table 5-2. Temperature and Precipitation for Selected Climate Stations Estancia Basin 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] |
| Gran Quivira Natl Mo | 15.23 | 6.26 | 25.53 | 98.9 | 53.4 | 38.0 | 68.9 | 84.1 |
| Pedernal 4 E | 12.17 | 3.82 | 20.44 | 76.5 | 50.8 | 35.3 | 66.4 | 61 |

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.

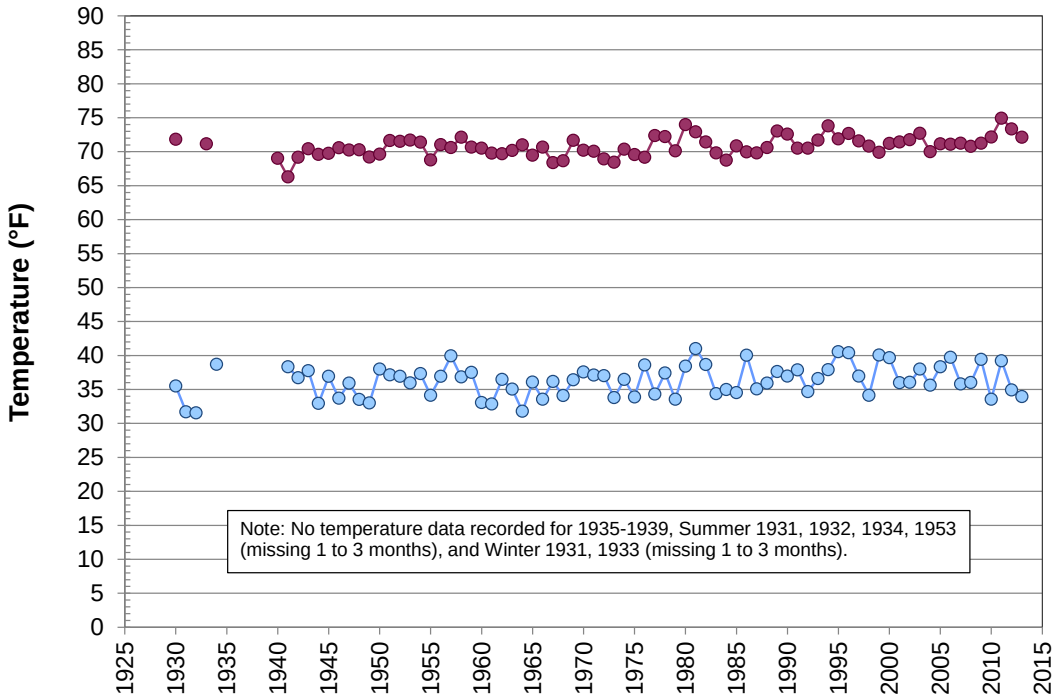
[b] Minimum and maximum recorded annual precipitation amounts for each station.

[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).

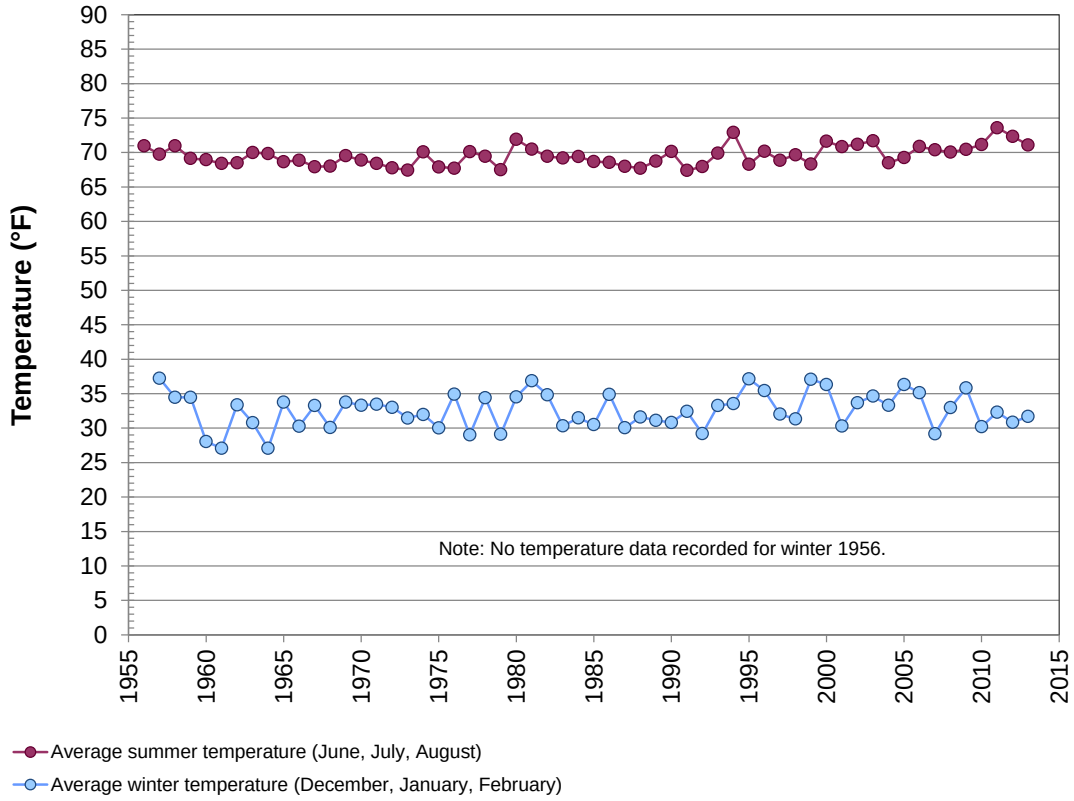
[d] Average of the daily average temperatures calculated for each station.

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

## Gran Quivira Natl Mon




## Pedernal 4 E

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**Average Temperature, Gran Quivira Natl Mon and Pedernal 4 E Climate Stations**

Figure 5-2

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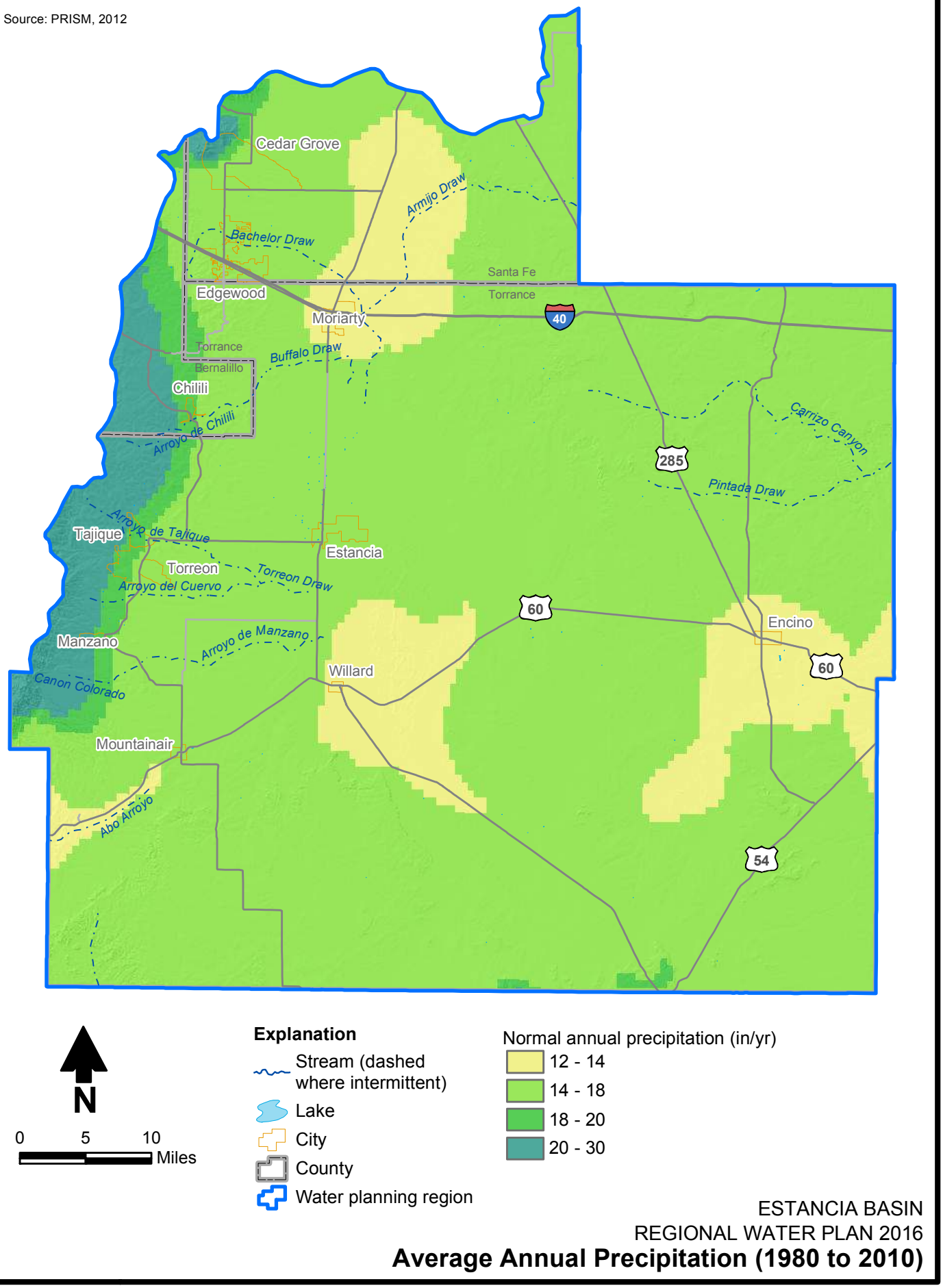


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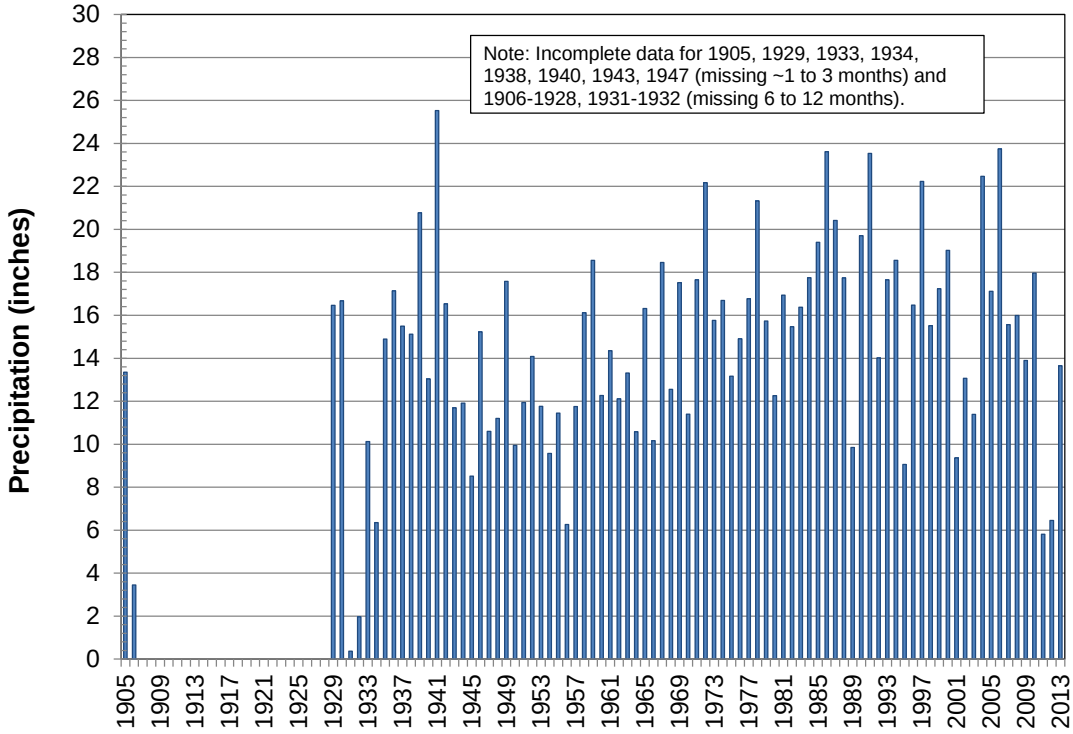
ESTANCIA BASIN
REGIONAL WATER PLAN 2016

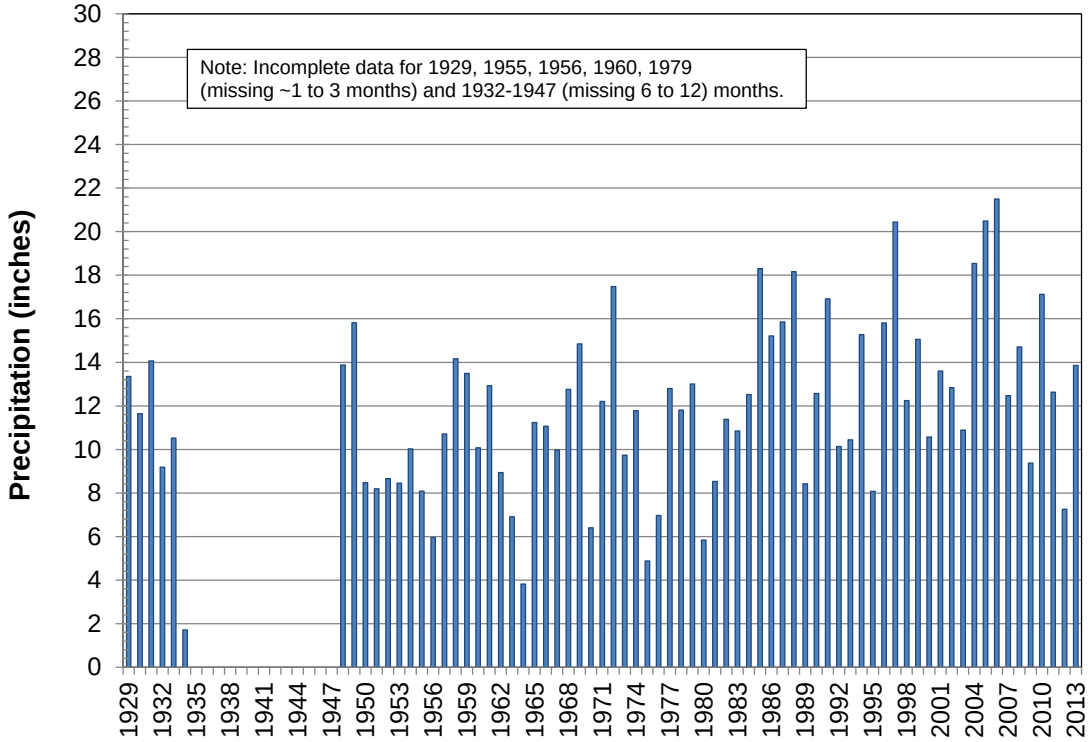
**Average Annual Precipitation (1980 to 2010)**

Figure 5-3

## Gran Quivira Natl Mon




## Pedernal 4 E




ESTANCIA BASIN
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**Annual Precipitation, Gran Quivira Natl Mon and Pedernal 4E Climate Stations**

Figure 5-4

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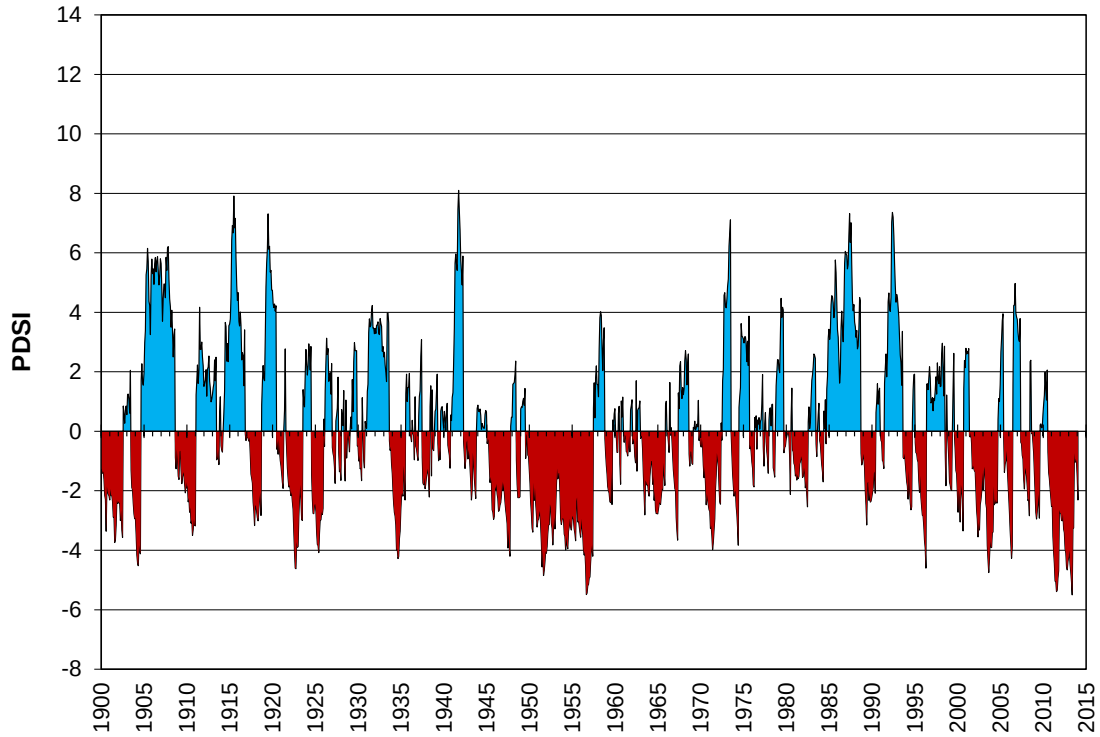
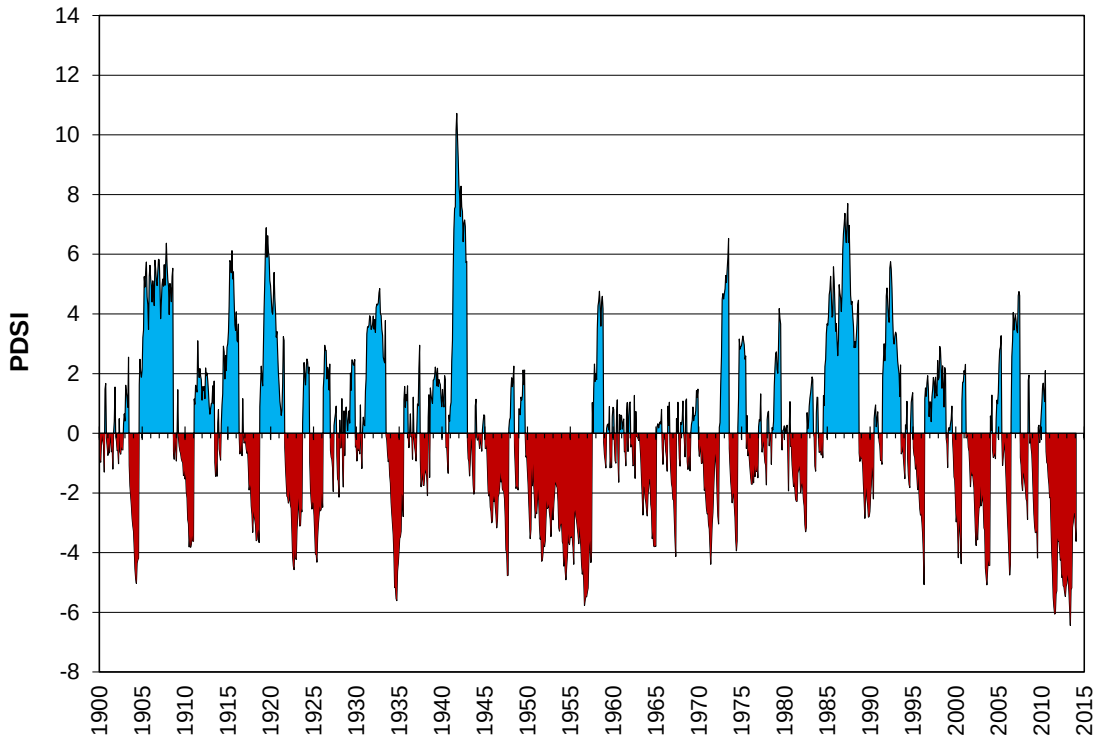
## Table 5-3. Palmer Drought Severity Index Classifications

| 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 |

**Climate Division 5**




**Climate Division 6**




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 5 and 6**

Figure 5-6

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

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

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

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

- *The North American Monsoon* is characterized by a shift in wind patterns in summer, which occurs as Mexico and the southwest U.S. warm under intense solar heating. As this happens, the flow reverses from 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 of 5° to 10°F by the end of the century (Hurd and Coonrod, 2008; USBR, 2011). Predictions of precipitation changes 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 frequency and severity of flooding.
- 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.

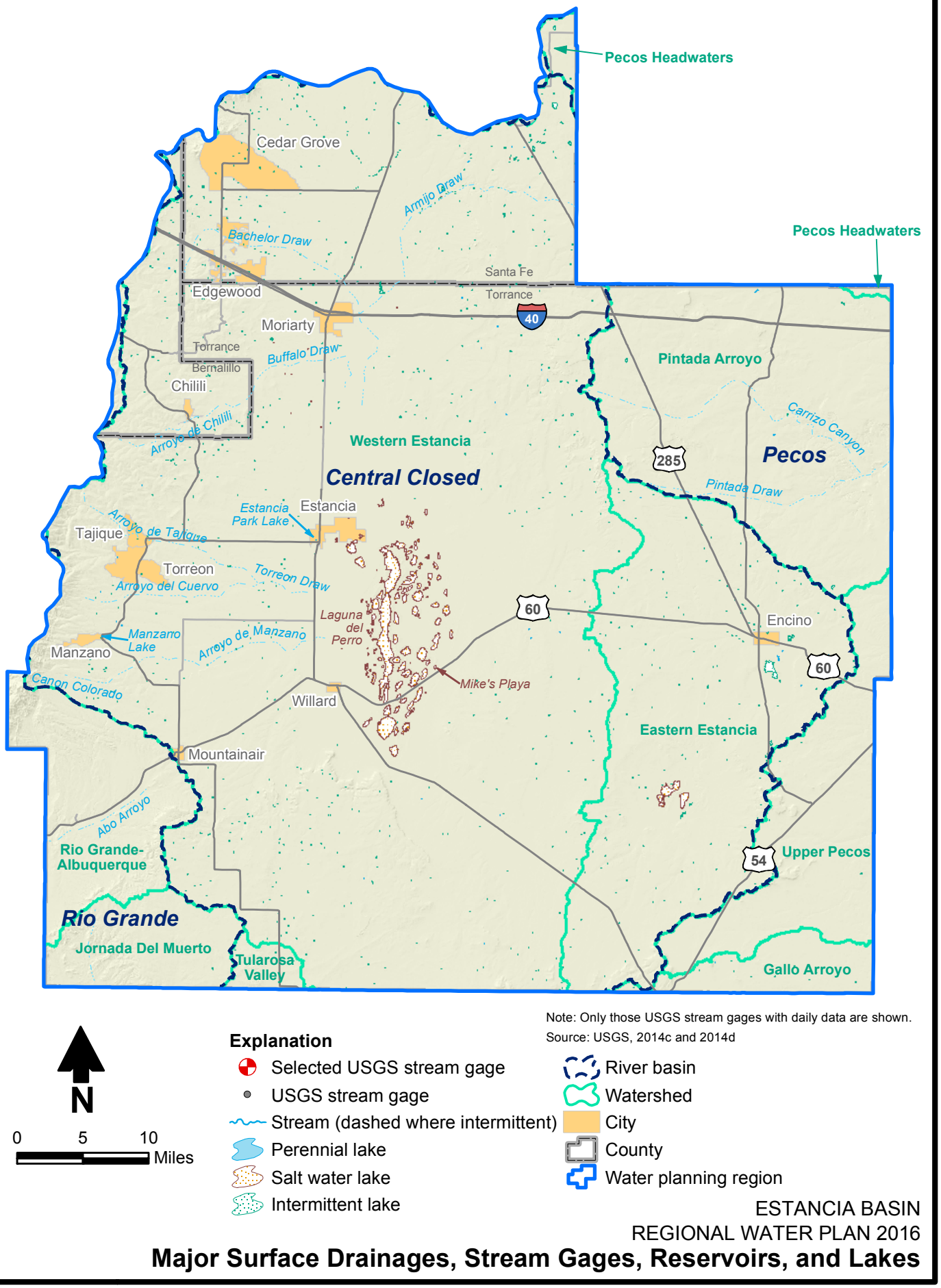
To minimize the impact of these changes, it is imperative that New Mexico plan for variable water supplies, including focusing on drought planning and being prepared to maximize storage from extreme precipitation events while minimizing their adverse impacts.

## 5.2 Surface Water Resources

Surface water supplies in the Estancia Basin are very minor and supply only approximately 0.1 percent of the water currently diverted in the Estancia Basin Water Planning Region, with its sole use for livestock. The major surface watershed boundaries in the planning region are shown on Figure 5-7.

There are no major or perennial streams, and streamflow is therefore not monitored in the planning region. The springs in the Manzano Mountains at the western edge of the planning region are the only freshwater riparian areas of note in the region. The Manzano Spring Community Ditch, the Tajique Irrigation System, and Torreon Community Ditch use surface water, but the amount is not known and is not included in the *New Mexico Water Use by Categories* report (Longworth et al., 2013). In ephemeral streams, flows vary from a typical condition of no flow to several thousand cubic feet per second. More than 30 springs are present in the basin and some sustain surface flows for short distances.

No fresh water lakes or reservoirs with greater than 5,000 acre-feet storage capacity are present in the planning region (Figure 5-7), but two small dams store ephemeral flows. Runoff is locally captured in stock tanks and in the two small freshwater lakes, Manzano and Sherwood Forest Lakes, created to capture ephemeral streamflows. The Estancia Basin once contained an ancient lake, the remnants of which have been studied by Keyes (1903) and Meinzer (1911). The lake existed during the Pleistocene Age, when precipitation was greater and temperatures were lower (Leopold, 1951). Because the Estancia Basin is a closed basin, the water in this lake (prior to pumping) discharged through evaporation, leaving behind numerous playa lakes where salt has been harvested for centuries (Titus, 1973). At least 85 saltwater lakes, such as Laguna del Perro, which has a surface area of more than 13,000 acres, are present in the central part of the basin.




ESTANCIA BASIN
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**Major Surface Drainages, Stream Gages, Reservoirs, and Lakes**

Figure 5-7

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The NMOSE conducts periodic inspections of non-federal dams in New Mexico to assess dam safety issues. Dams that equal or exceed 25 feet in height that impound 15 acre-feet of storage or dams that equal or exceed 6 feet in height and impound at least 50 acre-feet of storage are under the jurisdiction of the State Engineer. These non-federal dams are ranked as being in good, fair, poor, or unsatisfactory condition. Unsatisfactory conditions are defined as "dam safety deficiency . . . that requires immediate or emergency remedial action for problem resolution" (NMOSE, 2014b). Dams with unsatisfactory conditions are those that require immediate or remedial action. One of the two dams within the Estancia Basin region has been identified in recent inspections as being deficient, with a significant hazard potential (Table 5-7).

## 5.3 Groundwater Resources

Groundwater accounted for about 99.9 percent of all water depletions in the year 2010, with its primary use being for irrigated agriculture (Longworth et al., 2013). As described in Chapter 4, the Estancia Basin Water Planning Region contains seven declared groundwater basins (Figure 4-1). The Estancia Basin is contained wholly within the water planning region, and according to JSAI et al. (1997), 98 percent of the water pumped in the Estancia Basin is from the Valley Fill aquifer. Review of data compiled by Longworth et al. (2013) shows that the total from the Valley Fill in 2010 is 92 percent. Thus, the focus of the Estancia Basin Regional Water Plan is on the Valley Fill aquifer, but other geologic formations, described in Section 5.3.1, provide water to domestic and stock wells.

### 5.3.1 Regional Hydrogeology

The geology that controls groundwater occurrence and movement within the planning region was described in the accepted and updated RWPs (JSAI et al., 1997; Corbin Consulting Inc., 1999; EBWPC and HR, 2010), based on studies by Smith (1957), Titus (1969, 1980), and Hawley (2004, 2005). In addition to the Valley Fill aquifer, the Estancia Basin has multiple aquifer (water-bearing) units, including the Madera Limestone, the Abo-Yeso Formation, and the San Andres-Glorieta Formation, that provide water to numerous domestic wells, stock wells, water systems, and irrigation wells. 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.

Three physiographic regions exist within the planning region (ArcGIS USGS, 2015). From the west to the east, these are:

- Basin and Range (Mexican Highland Section)
- Basin and Range (Sacramento Section)
- Las Vegas Plateau

## Table 5-7. Dams with Dam Safety Deficiency Rankings

| Dam | Condition Assessment [a] | Deficiency | Hazard Potential [b] | Estimated Cost to Repair ($) |
|---|---|---|---|---|
| ***Santa Fe County*** | | | | |
| Kinsell Reservoir Dam | Poor | Spillway capacity unknown<br>Rodent infestation, severe erosion<br>Maintenance needed | Low | 2,500,000 |
| ***Torrance County*** | | | | |
| Mescalero Reservoir Dam | Poor | Lack of design information | Significant | 200,000 |

Source: NMOSE, 2014b PMP= Probable maximum precipitation

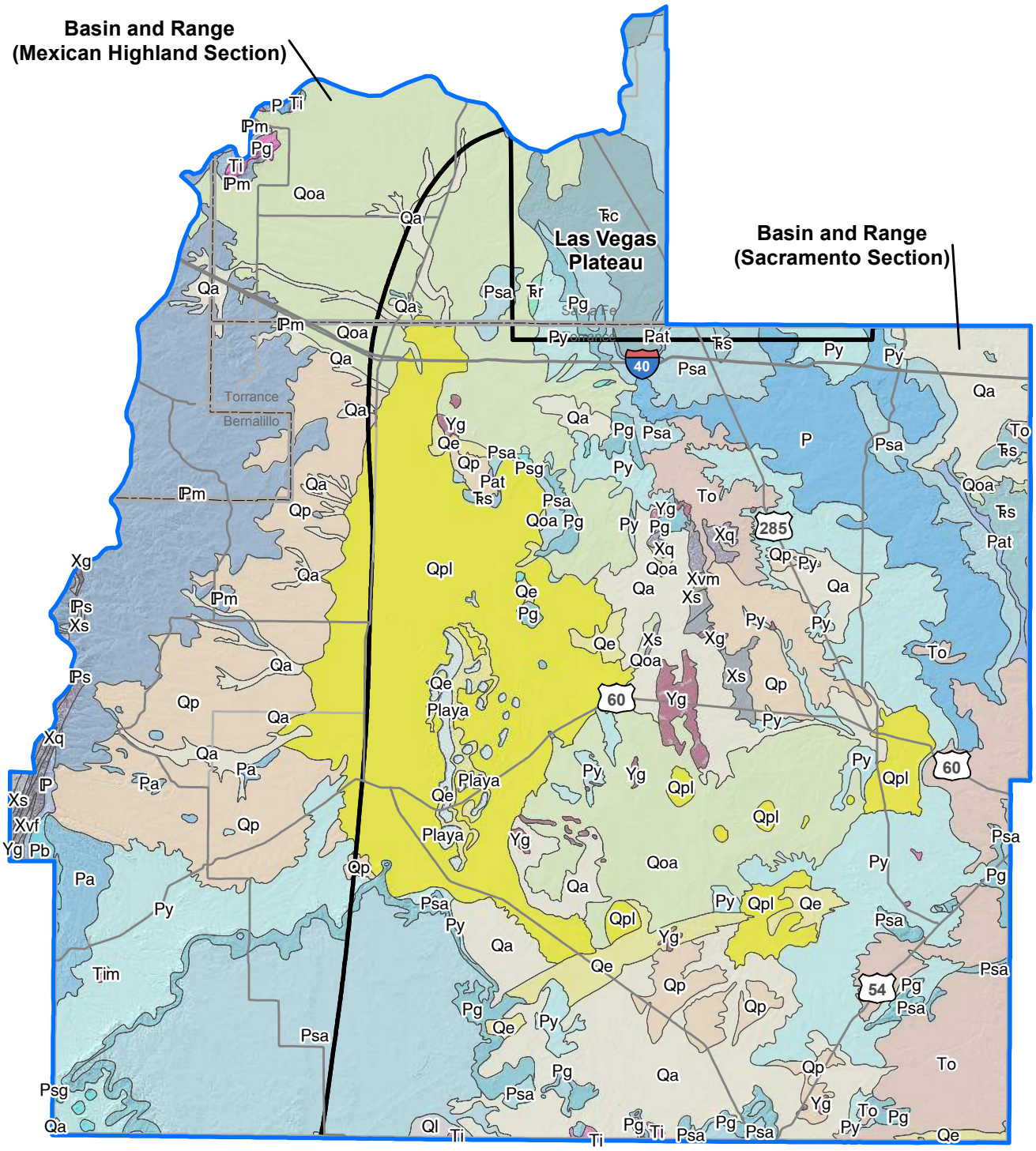
[a] Condition assessment:

| | *2008 US Army Corps of Engineers Criteria (adopted by NM OSE in FY09)* | *NMOSE Spillway Risk Guidelines* |
|---|---|---|
| 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. |

[b] Hazard Potential Classifications:

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

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.

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ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Geology and Physiographic Provinces**

Figure 5-10a


Source: NMBGMR, 2003

ESTANCIA BASIN
REGIONAL WATER PLAN 2016
**Geology Explanation**

Figure 5-10b

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

Geologic strata exposed in the planning region range from crystalline bedrock to sedimentary units such as shale, sandstone, and limestone, to unconsolidated valley fill deposits. The geologic formations present in planning region include (from oldest to youngest):

- Precambrian-age rock
- Pennsylvanian-age rock including the Sandia and Madera Formations
- Permian-age rock including the Abo, Yeso, Glorieta, and San Andres Formations
- Triassic-age rock including the Santa Rosa Formation and Quaternary-age sediments including valley fill

The major aquifers in the planning region consist of:

- The Madera Group in the west-central and northwestern portions of the basin consists of limestone, with sandstone and shale.
- The Yeso Formation, composed of sandstone, limestone, and gypsum, is present in the areas north and east of Chupadera Mesa; Mountainair has water supply wells in the Yeso.
- The Glorieta Sandstone is an important aquifer beneath valley fill near Lobo Hill.
- The Valley Fill aquifer system extends across about 625 square miles of the central portion of the basin. It is composed of up to 400 feet of sand, silt, and gravel, but the thickness decreases to a feather edge toward the margins of the basin floor. Most of the irrigation wells in the basin draw from this aquifer.

In bedrock aquifers, fracturing tends to enhance well yield. Other units provide minor water supplies for domestic and stock purposes, such as the Abo Formation, Triassic-age rocks, and thin deposits of alluvium in drainages. The Precambrian-age formations provide relatively limited quantities of water to wells. White (1994) provides an excellent overview of the water-bearing properties of the geologic formations in the Estancia Basin. The San Andres Limestone lies above the water table where present and is not considered to be an aquifer within the Estancia Basin (EBWPC and HR, 2010).

### 5.3.2 Aquifer Conditions

As reported in the accepted and updated RWPs (JSAI et al., 1997; Corbin Consulting Inc., 1999; EBWPC and HR, 2010), the primary aquifer in the planning region is the Valley Fill aquifer system. Wells completed in this aquifer are capable of producing hundreds of gallons per minute (gpm) (EBWPC and HR, 2010). Recent work by Hawley (2004, 2005) suggests that the effective saturated portion of the valley fill may be much more limited in the east-west direction than previously thought.

Other aquifers in the region are generally less productive. Wells completed in the Madera Group are capable of producing anywhere from 1 to 1,000 gpm, but the vast majority produce between 1 and 15 gpm (EBWPC and HR, 2010). Wells completed in the Yeso Formation are capable of producing as much as 3,000 gpm (JSAI et al., 1997), but most supply less than 15 gpm. Wells producing from the Glorieta Sandstone are capable of producing several to more than 1,000 gpm, but the productivity is a function of the amount of fracturing present in the area (Smith, 1957).

While the Madera can be very productive, many wells drilled into the formation are dry due to the fractured nature of the rock in the northeast side of the Estancia Basin Water Planning Region (Titus, 1980; White, 1994). Limestones typically have very low primary porosity and are productive only where fractured and (or) dissolved by solution. The sandstones in the lower member of the Madera do not appear to yield much water to wells or springs (Bartolino et al., 2011). The town of Encino, in the eastern part of the Estancia Basin Water Planning Region, receives its water from the town of Vaughn, outside of the region (Phillips, 2015). Groundwater quality and quantity in local aquifers were insufficient to meet Encino's water demands.

In order to evaluate changes in water levels over time, the U.S. Geological Survey (USGS) monitors groundwater wells throughout New Mexico (Figure 5-11). Hydrographs illustrating groundwater levels versus time, as compiled by the USGS (2014b), were selected for 5 monitor wells with longer periods of record and are shown on Figure 5-12a. Examination of hydrographs for wells completed in the Valley Fill aquifer system in the northern (350344106004601) and southern (343443106024401) portions of Estancia Basin show a long-term trend of decreasing water levels. The average rate of decline in those USGS wells with decreasing water levels is about 1.23 ft/yr (from 1985 to 2014).

HydroResolutions, LLC (2013; Roberts, 2014; Chace and Roberts, 2016) recently evaluated groundwater level data from wells within the Estancia Basin that are included in the Estancia Basin Water Planning Committee (EBWPC) hydrogeologic monitoring program and water level data from USGS monitor wells dating back to the 1950s (Figure 5-11). Water level monitoring in the alluvial aquifer in the northern, central, and southern parts of the basin show an overall decrease in water levels since about 1950, with a tapering off of the decline rate starting around 1985 in response to increased annual precipitation (with a lag time of five years). HydroResolutions (2013) showed that changes in water levels vary from a 5-foot decline per year to no change, with the greatest decline in the central part of the basin near high-capacity irrigation pumping wells. In some of the wells within the EBWPC network, water levels have risen since monitoring began in 2008. The 2016 groundwater monitoring report contains numerous hydrographs of these wells and confirms similar trends (Chace and Roberts, 2016) (Figure 5-12b). The different water level trends in these wells illustrate the complexity of the basin hydrology.

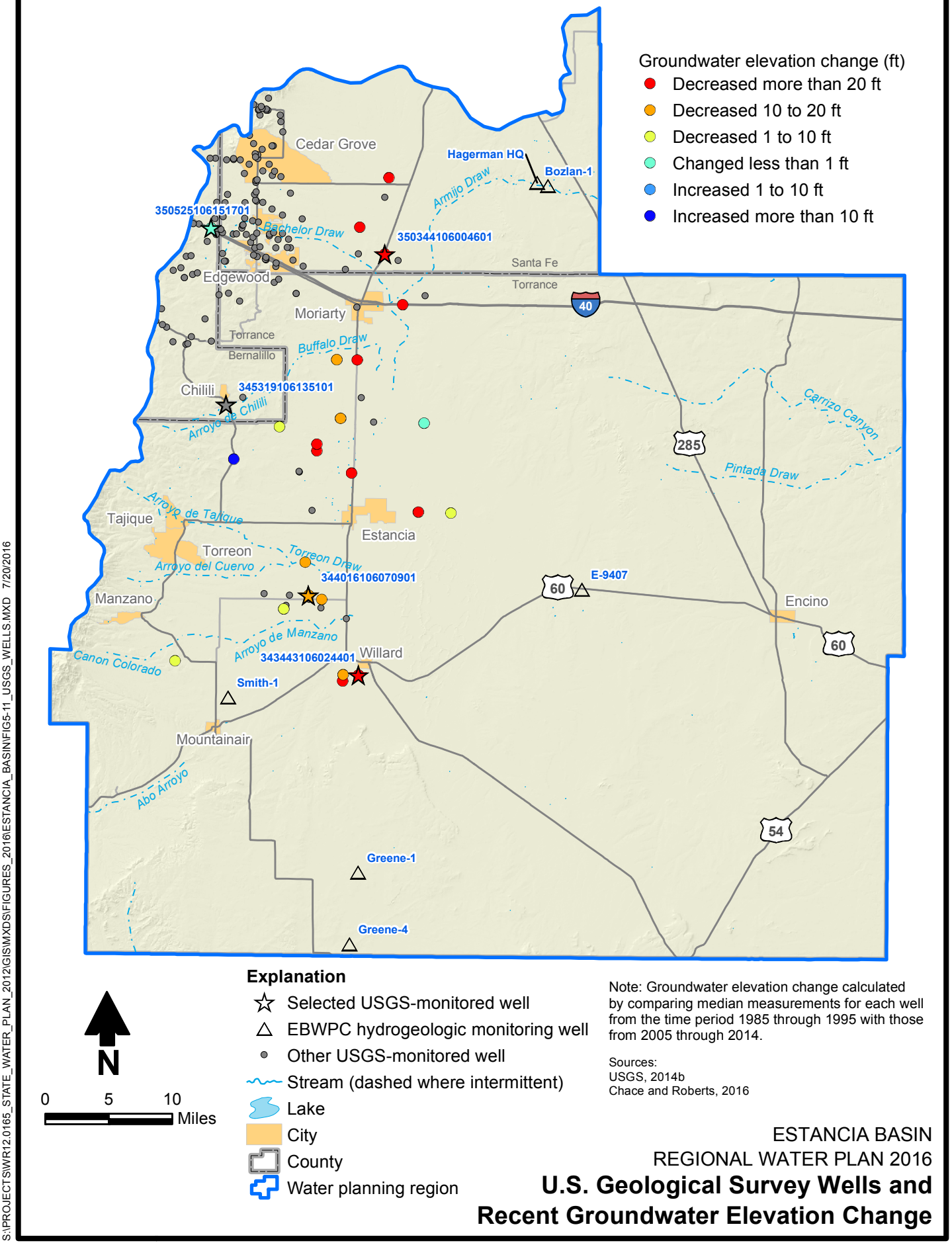
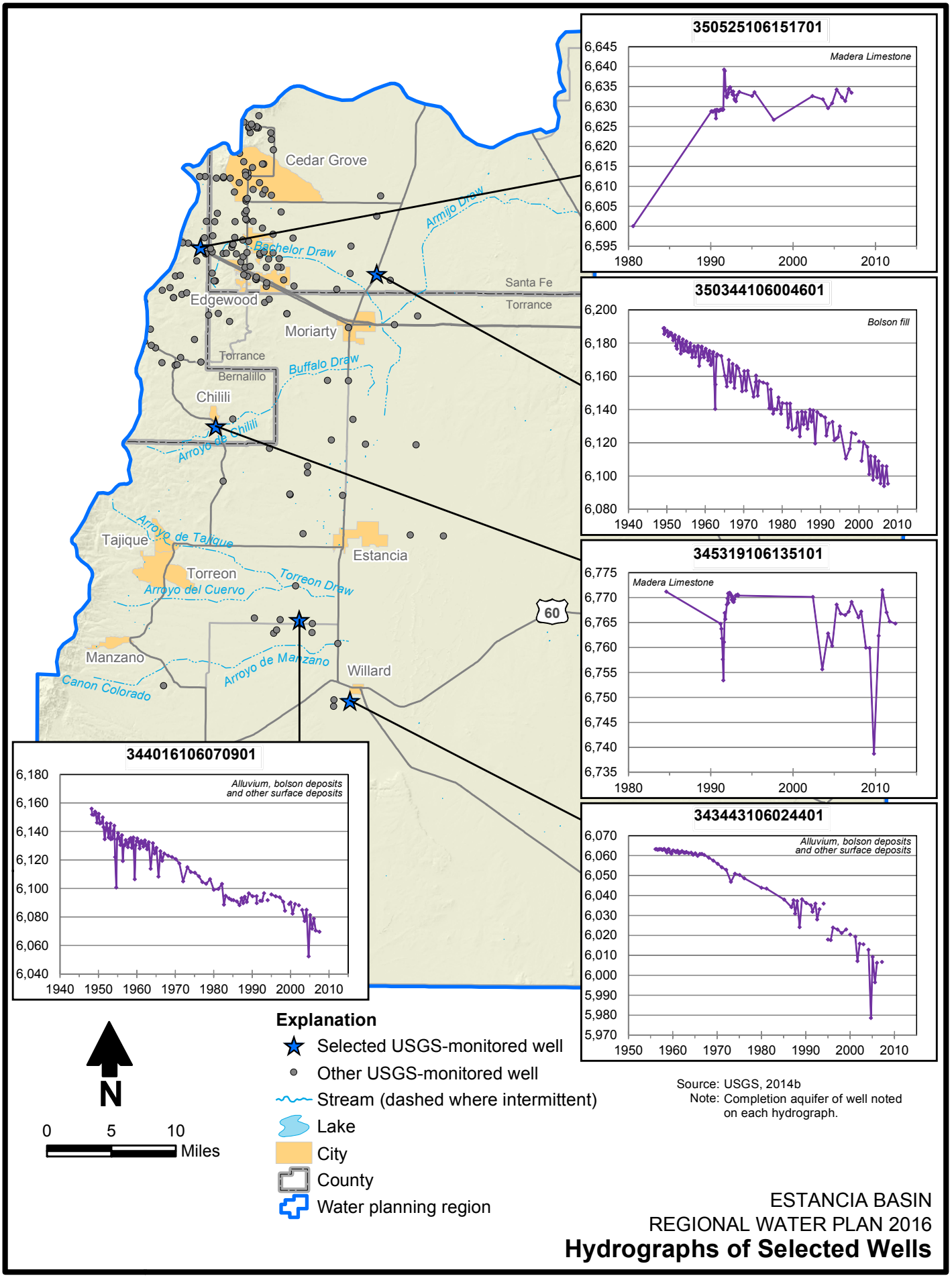

Groundwater elevation change (ft)
Decreased more than 20 ft
Decreased 10 to 20 ft
Decreased 1 to 10 ft
Changed less than 1 ft
Increased 1 to 10 ft
Increased more than 10 ft
Cedar Grove
Hagerman HQ
Bozlan-1
Armijo Draw
350525106151701
Bachelor Draw
350344106004601
Santa Fe
Torrance
Edgewood
Moriarty
40
Torrance
Bernalillo
Buffalo Draw
Chilili
345319106135101
Arroyo de Chilili
Carrizo Canyon
285
Pintada Draw
Arroyo de Tajique
Tajique
Estancia
Torreon
Torreon Draw
Arroyo del Cuervo
344016106070901
E-9407
60
Manzano
Encino
Arroyo de Manzano
Canon Colorado
343443106024401
Willard
60
Smith-1
Mountainair
Abo Arroyo
54
Greene-1
Greene-4
N
0
5
10
Miles
Explanation
Selected USGS-monitored well
EBWPC hydrogeologic monitoring 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.
Sources:
USGS, 2014b
Chace and Roberts, 2016
ESTANCIA BASIN
REGIONAL WATER PLAN 2016
U.S. Geological Survey Wells and Recent Groundwater Elevation Change
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2016\ESTANCIA_BASIN\FIG5-11_USGS_WELLS.MXD 7/20/2016

Figure 5-11




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

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Hydrographs of Selected Wells**

Figure 5-12a

S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2016\ESTANCIA_BASIN\FIG5-12A_USGS_WELLS_HYDROGRAPHS.MXD 7/22/2016

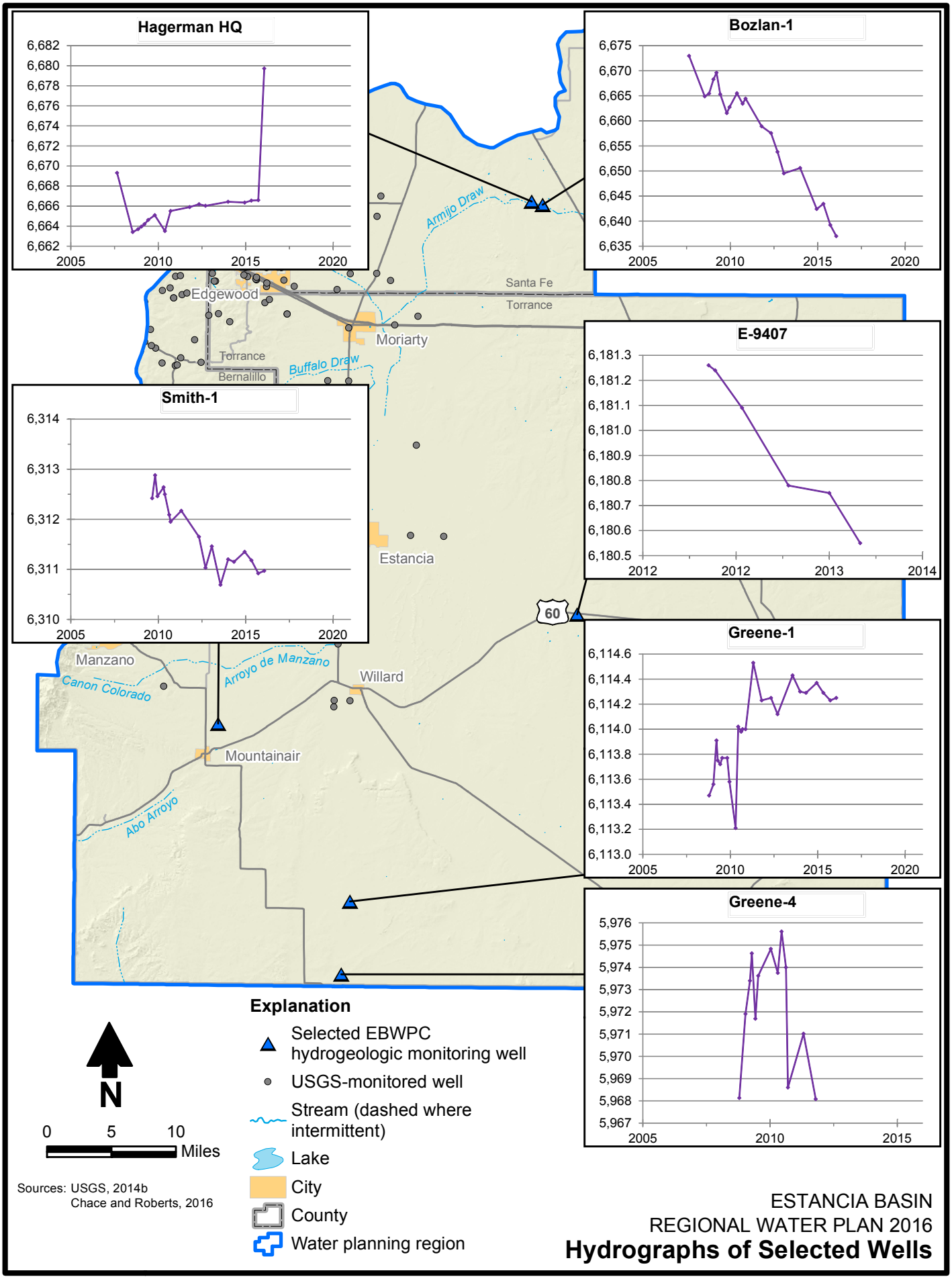

Hagerman HQ
6,682
6,680
6,678
6,676
6,674
6,672
6,670
6,668
6,666
6,664
6,662
2005
2010
2015
2020
Bozlan-1
6,675
6,670
6,665
6,660
6,655
6,650
6,645
6,640
6,635
2005
2010
2015
2020
Armijo Draw
Santa Fe
Torrance
Edgewood
Moriarty
Torrance
Bernalillo
Buffalo Draw
E-9407
6,181.3
6,181.2
6,181.1
6,181.0
6,180.9
6,180.8
6,180.7
6,180.6
6,180.5
2012
2012
2013
2014
Smith-1
6,314
6,313
6,312
6,311
6,310
2005
2010
2015
2020
Estancia
60
Greene-1
6,114.6
6,114.4
6,114.2
6,114.0
6,113.8
6,113.6
6,113.4
6,113.2
6,113.0
2005
2010
2015
2020
Manzano
Canon Colorado
Arroyo de Manzano
Willard
Mountainair
Abo Arroyo
Greene-4
5,976
5,975
5,974
5,973
5,972
5,971
5,970
5,969
5,968
5,967
2005
2010
2015
Explanation
Selected EBWPC hydrogeologic monitoring well
USGS-monitored well
Stream (dashed where intermittent)
Lake
City
County
Water planning region
N
0
5
10
Miles
Sources: USGS, 2014b
Chace and Roberts, 2016
ESTANCIA BASIN
REGIONAL WATER PLAN 2016
Hydrographs of Selected Wells
S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2016\ESTANCIA_BASIN\FIG5-12B_WELLS_HYDROGRAPHS.MXD 7/22/2016

Figure 5-12b

Bernalillo County has also initiated quarterly water level monitoring and conducts annual water quality sampling at five locations in the western Estancia Basin (eastern Bernalillo County) (EBWPC and HR, 2010). Water chemistry data were collected by Sandia National Laboratories in a variety of locations within the Estancia Basin as part of a region-wide study. This information provides a four-dimensional picture of water chemistry and water levels within the Estancia Basin (EBWPC and HR, 2010).

The aquifers in the planning region are generally recharged through direct infiltration of precipitation, infiltration of surface water runoff in stream channels, arroyos, or road ditches, and infiltration of wastewater discharged to septic systems (Bartolino et al., 2011). The RWPs and the 2013 HydroResolutions, LLC report provided the following published estimates of recharge in the region, both for the Valley Fill aquifer system:

- 22,000 acre-feet per year (Keyes and Frost, 2001)
- 37,800 acre-feet per year (Corbin Consulting Inc., 1999)
- 50,000 acre-feet per year (Smith, 1957)
- 38,000 acre-feet per year (JSAI et al., 1997)
- 30,100 acre-feet per year (Shafike and Flanigan, 1999)

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

- Edgewood (Estancia)
- Entranosa Water & Wastewater Association (Estancia)
- Estancia (Estancia)
- Moriarty (Estancia)
- Mountainair (Estancia)
- Tranquillo Pines (Middle Rio Grande)
- Willard (Estancia)

In addition to these well fields, numerous irrigation, domestic, and stock wells are located throughout the Estancia UWB.

## 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 accepted regional water plan and updates it to reflect new studies of surface and groundwater quality and current databases of contaminant

sources. The identified water quality concerns should be a consideration in the selection of potential projects, programs, and policies to address the region's water resource issues.

Surface water quality in the Estancia Basin Water Planning Region is evaluated through periodic monitoring and comparison of sample results to pertinent water quality standards. The limited data available indicate that the quality of the surface water is highly variable. Spring-flows in certain areas of the region are a result of groundwater discharge from the Madera-Sandia hydrostratigraphic unit (Jenkins, 1982), which has an electrical conductivity reported to range from 228 to 3,020 microSiemens per centimeter (μS/cm) (Bartolino et al., 2011). The water quality standard for electrical conductivity for the designated use of public water supply is less than 300 μS/cm (NMWQCC, 2002). No water quality analyses for Manzano Lake and Sherwood Forest Lake have been reported, but it is thought that the lakes probably have good water quality based on their location in the mountains. The salt lakes in the central basin receive groundwater discharge and have very high concentrations of total dissolved solids (TDS) and specific conductance ranging from 4,000 to 6,000 μS/cm to 187,000 μS/cm (White, 1994).

Two lakes and one playa within the Central Closed watershed 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 the lakes and playa included in the 303(d) list; these have not yet been fully assessed. Table 5-8 provides listing information for those reaches.

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

Generally the quality of groundwater in the planning region is highly variable, ranging from relatively fresh water in the Madera limestone and in parts of the alluvial aquifer to relatively salty, low-quality water around the playa lakes and in the deeper aquifers. In the Valley Fill aquifer system, the salinity of the groundwater is much higher in the east-central portion of the basin due to natural evapotranspiration of water in the closed basin.

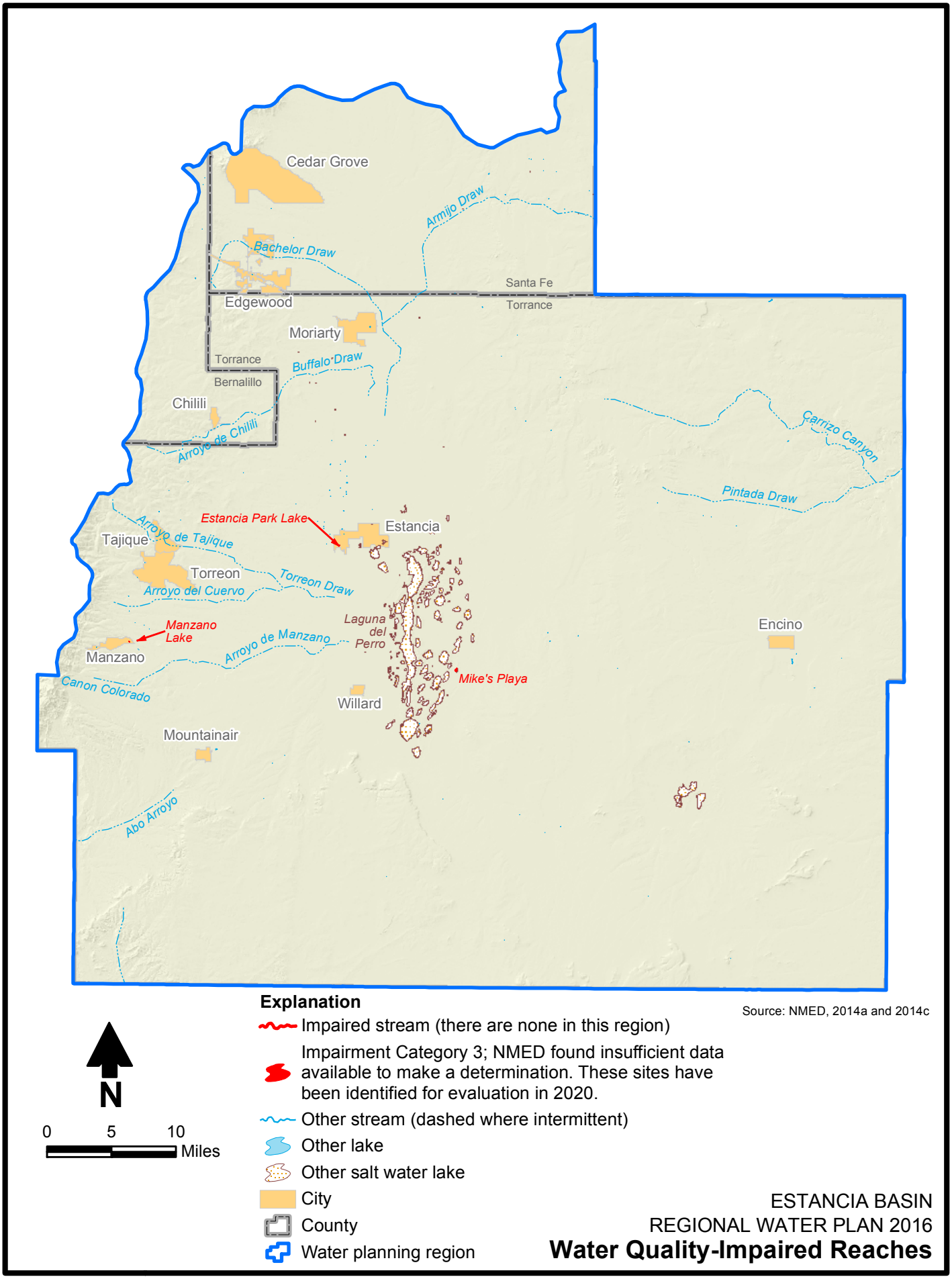



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Figure 5-13

## Table 5-8. Total Maximum Daily Load Status of Streams in the Estancia Basin Water Planning Region

| Waterbody Name (basin, segment) | Assessment Unit ID | Affected Reach (acres) | Probable Sources of Pollutant | Uses Not Fully Supported | Specific Pollutant | IR Category [b] |
|---|---|---|---|---|---|---|
| ***Torrance County*** | | | | | | |
| Estancia Park Lake | NM-9000.B_042 | 1 | Not assessed | — | — | 3/3A |
| Manzano Lake | NM-9000.B_114 | 3.2 | Not assessed | — | — | 3/3A |
| Mike's Playa | NM-9000.B_085 | 30 | Not assessed | — | — | 3/3A |

Source: NMED, 2014a

[a] Unless otherwise noted.

[b] 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).

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

The primary sources of man-made contamination in the planning region are leaking underground storage tanks and septic tanks.

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

### 5.4.1 Potential Sources of Contamination to Surface and Groundwater

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

#### *5.4.1.1 Municipal and Industrial Sources*

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

The NMED NPDES database shows no permitted discharge in the planning region (http://www.nmenv.state.nm.us/swqb/Permits/). Therefore, Table 5-9 (Municipal and Industrial NPDES Permittees in the Estancia Basin Water Planning Region), is not included in this Estancia Basin RWP.

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*

No sites in the planning region are listed by the U.S. EPA (2013, 2014, 2016a, 2016b) as Superfund sites. Therefore, this RWP does not include Table 5-11 (Superfund Sites in the Estancia Basin Water Planning Region).

## Table 5-10. Groundwater Discharge Permits in the Estancia Basin Water Planning Region



| County | Facility Name [a] | Permit No. | Status [b] | Permitted Discharge Amount (gpd [c]) |
|---|---|---|---|---|
| Santa Fe | East Mountain Wastewater Limited Partnership | DP-1591 | Pending | — |
| | Edgewood (Town of) - Wastewater Treatment Plant | DP-1654 | Active | 150,000 |
| | Edgewood Center North | DP-1173 | Active | 2,000 |
| | Edgewood Elementary School | DP-856 | Active | 9,500 |
| | Edgewood Middle School | DP-1269 | Active | 7,000 |
| | Prairie Hills Subdivision | DP-1094 | Active | 15,000 |
| | South Mountain Elementary | DP-1031 | Active | 5,000 |
| | Zorro Ranch | DP-1452 | Active | 10,080 |
| Bernalillo | Green Ridge MDWCA Water Treatment Facility | DP-1805 | Active | 2,054 |
| | Route 66 Elementary School | DP-1110 | Active | 3,300 |
| | Solana Wastewater Treatment Plant | DP-1256 | Active | 60,630 |
| | Woodlands Subdivision Sewer Cooperative Association | DP-1080 | Active | 31,800 |
| Torrance | Bowlin's Flying C Ranch | DP-399 | Active | 5,000 |
| | Clines Corners Snack Bar Phillips 66 | DP-444 | Active | 15,000 |
| | Estancia (Town of) - Wastewater Treatment Plant | DP-975 | Active | 115,000 |
| | Estancia Valley Solid Waste Authority | DP-1708 | Active | 10,000 [d] |
| | Keers Environmental Landfill | DP-1012 | Active | 48,600 |

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.

[c] Unless otherwise noted

[d] Gallons per week

gpd = Gallons per day

— = Not listed on GWQB web site

## Table 5-10. Groundwater Discharge Permits in the Estancia Basin Water Planning Region



| County | Facility Name [a] | Permit No. | Status [b] | Permitted Discharge Amount (gpd [c]) |
|---|---|---|---|---|
| Torrance (cont.) | Moriarty (City of) - Wastewater Treatment Plant | DP-910 | Active | 670,000 |
| | Mountainair (Town of) - Waste Water Treatment Plant | DP-1440 | Active | 50,000 |
| | Mountainair Heritage Meat Processing | DP-1551 | Active | 2,400 |
| | Mountainview Elementary School | DP-447 | Active | 7,500 |
| | Tagawa Southwest | DP-1144 | Active | 20,555 |
| | Torrance County Correctional Facility | DP-690 | Active | 122,500 |
| | Willard (Village of) - Wastewater Treatment Facility | DP-1353 | Active | 34,200 |
| | Willard Dairy | DP-1004 | Active | 80,000 |

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.

[c] Unless otherwise noted

gpd = Gallons per day

— = Not listed on GWQB web site

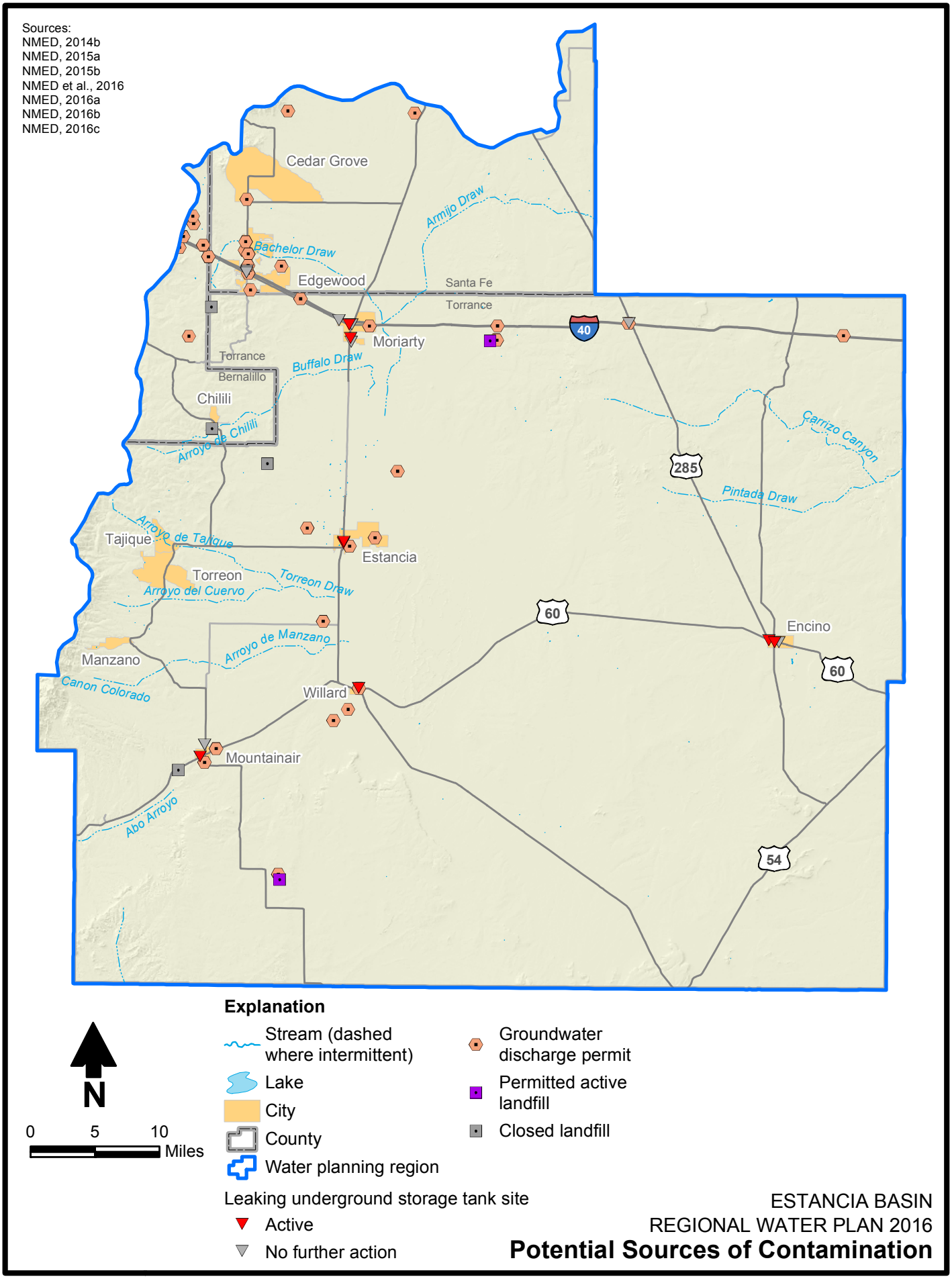
Sources:
NMED, 2014b
NMED, 2015a
NMED, 2015b
NMED et al., 2016
NMED, 2016a
NMED, 2016b
NMED, 2016c
Cedar Grove
Armijo Draw
Bachelor Draw
Edgewood
Santa Fe
Torrance
Moriarty
40
Torrance
Bernalillo
Buffalo Draw
Chilili
Arroyo de Chilili
Carrizo Canyon
285
Pintada Draw
Arroyo de Tajique
Tajique
Estancia
Torreon
Torreon Draw
Arroyo del Cuervo
60
Encino
Arroyo de Manzano
Manzano
Canon Colorado
Willard
60
Mountainair
Abo Arroyo
54
N
0
5
10
Miles
Explanation
Stream (dashed where intermittent)
Lake
City
County
Water planning region
Groundwater discharge permit
Permitted active landfill
Closed landfill
Leaking underground storage tank site
Active
No further action
ESTANCIA BASIN
REGIONAL WATER PLAN 2016
Potential Sources of Contamination
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Figure 5-14

#### *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 Estancia Basin 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).

#### *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 two operating landfills and four closed landfills (Table 5-13, Figure 5-14).

#### *5.4.1.5 Nonpoint Sources*

As noted above, a primary 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.

## Table 5-12. Leaking Underground Storage Tank Sites in the Estancia Basin Water Planning Region

| City [a] | Release/Facility Name [b,c] | Release ID | Facility ID | Physical Address c | Status [d] |
|---|---|---|---|---|---|
| ***Santa Fe County*** | | | | | |
| White Lakes | White Lakes Station | 427 | 8305 | NM 285 | Cleanup, Responsible Party |
| ***Torrance County*** | | | | | |
| Moriarty | JR Tire Service | 1409 | 28796 | 601 Hwy 66 | Cleanup, Responsible Party |
| | Old Shell Station | 3058 | 26216 | 121 Route Hwy 66 | Investigation, Responsible Party |
| | Sierra Cable Vision | 1193 | 30599 | 1001 Route 66 | Investigation, Responsible Party |
| | JR Tire Service | 1409 | 28796 | 601 Hwy 66 | Cleanup, Responsible Party |
| Estancia | Giant DBA, Thriftway 7278a | 3318 | 31840 | 5th and Joseph | Cleanup, Responsible Party |
| | H&M Service Station | 2042 | 28433 | 5th and Allen | Investigation, State Lead, CAF |
| Encino | NMDOT Encino Patrol Yard 45 43, NMSHTD Encino | 1985 | 26233 | US 60 MP 253 | Aggr Cleanup Completed, Resp Party |
| | Rio Pecos Truck Stop, Txco & Prp | 834 | 30253 | US 285 60 W End of Twon | Cleanup, Responsible Party |
| Willard | Deans Gas & Grocery | 1265 | 27649 | Dunlavy and Hwy 60 | Cleanup, Responsible Party |
| Mountainair | Toms Mini-Mart | 2438 | 31149 | US Hwy 60 & Roosevelt Ave | 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] Investigation: Ongoing assessment of environmental impact
Cleanup: Physical removal of contamination ongoing
State Lead: State has assumed responsibility for mitigation of release
CAF: Corrective action fund
Aggressive Cleanup Completed (Aggr Cleanup Completed): Effective removal of contamination complete
Responsible Party (Resp Party): Owner/Operator responsible for mitigation of release

**Table 5-13. Landfills in the Estancia Basin Water Planning Region**

| County | Landfill Name [a] | Landfill Operating Status | Landfill Closure Date |
|---|---|---|---|
| Bernalillo | Chilili Landfill | Closed | — |
| Torrance | Estancia Valley Regional Landfill (formerly Torrance County Landfill) | Open | NA |
| | Keers Asbestos Landfill | Open | NA |
| | Mountain Refuse Landfill | Closed | — |
| | Mountainair Landfill | Closed | — |
| | Willard Landfill | Closed | — |

Sources: EBWPC and HR, 2006; NMED, 2014b, 2015a, 2015b

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

NA = Not applicable

— = Information not available

Some communities in the west side of the basin (the East Mountain area) have reported septic tank contamination, although only one thus far (Chilili) has reported nitrate concentrations that exceed maximum contaminant levels. In the future, nitrate contamination associated with septic tanks will likely be more of a problem in areas of shallow groundwater or thinly covered fractured bedrock in the Estancia Basin, particularly if septic tank density in the basin increases.

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 Estancia Basin region, the Estancia Basin Water Planning Committee has identified the need for a water quality monitoring project within the planning region to protect the existing aquifer water supply from contamination and water quality deterioration. During the 2010 planning process, the Committee conceptualized development and implementation of such a program (EBWPC and HR, 2010) targeting areas of known or potential contamination.

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

### 5.5.1 2010 and 2060 Administrative Water Supply

The administrative water supply (i.e., total withdrawals) in 2010 for the Estancia Basin region, as reported in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013), was 84,129 acre-feet. Of this total, 60 acre-feet were surface water withdrawals (from stock ponds for livestock) and 84,069 acre-feet were groundwater. The amount of groundwater pumped from the Valley Fill in 2010 was estimated to be 77,531 ac-ft/yr, and the amount from other formations was 6,538. 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.

In mined basins such as the Estancia Basin, where the aquifer is depleted, the administrative water supply may not be sustainable in the future. The future available supply was estimated using two methods, as described in the following subsections.

#### *5.5.1.1 Model Predicted Decline*

Non-stream connected groundwater basins with available NMOSE administrative models were used to predict the water level declines in the year 2060 based on estimated groundwater diversions (Table 5-14a). For the Estancia declared NMOSE administrative groundwater basin, the Valley Fill, has been modeled by NMOSE for administration of the mined basin. The water level declines in the Valley Fill and the calculated available water column in wells were used to estimate the future administrative supply as outlined in Table 5-14a. The predicted drawdown in 2060 from a model cell in a heavily stressed area was selected and compared to the available water column in existing wells to calculate the percentage of wells impacted by the drawdown. This percentage of impacted wells was assumed to reflect a percentage reduction in available supply.

## Table 5-14a. Projected Groundwater Supply in 2060 in Estancia Basin Valley Fill Aquifer, Based on Modeled Drawdown

| Row | Calculation Step | Estancia Valley Fill | Explanation/Source |
|---|---|---|---|
| 1 | Estimated groundwater diversions in 2010 (ac-ft/yr) | 77,531 | Longworth, et al., 2013 |
| 2 | Modeled pumping (ac-ft/yr) | 42,000 | Tom Morrison, personal communication, 2015 |
| 3 | Ratio of administrative supply to modeled pumping | 1.85 | Row 1 divided by Row 2 |
| 4 | Median water column (feet) | 181 | Difference between the water level at the top of the well and total depth of the well, based on 61 wells from WATERS database with post-1997 water level data |
| 5 | Available water column (feet) | 127 | Applying the 70% guideline (feet) from the ISC Handbook |
| 6 | Predicted drawdown from model into 2060 (feet) | 34 | Greatest decline in the Edgewood area, Tom Morrison, personal communication, 2015 |
| 7 | Adjusted model-predicted drawdown in 2060 (feet) | 62.8 | Row 3 times Row 6 |
| 8 | Percentage of wells impacted (percentage reduction in supply) | 25% | Row 7 divided by Row 5 times 50% (to account for the median) |
| 9 | Groundwater supply by 2060 due to continued pumping (ac-ft/yr) | 58,328 | Row 1 reduced by Row 8 |

ac-ft/yr = Acre-feet per year

Using this method, the administrative supply in the Estancia Basin in 2060 was calculated to be 58,328 ac-ft/yr from the valley fill, plus 6,538 ac-ft/yr from other aquifers and 60 ac-ft/yr from surface water for a total of 64,926 in a normal (i.e., no drought) year.

#### *5.5.1.2 Observed Rate of Decline*

Another method to predict the future decline of the saturated thickness and thus available supply is to use existing wells with water level hydrographs and compare the predicted decline with the available water column in existing wells. Using the average rate of water level decline calculated from USGS monitor wells within the non-stream connected groundwater and assuming this rate would continue until 2060, the water level decline was predicted as shown in Table 5-14b. The percentage of impacted wells was estimated by comparing the predicted drawdown to the available water column in existing wells, and the percentage of impacted wells was assumed to represent the reduction in supply by 2060.

The predicted water level decline in the Estancia Basin Valley Fill is 61.5 feet in 2060, assuming the average water level decline rate of 1.23 ft/yr (Table 5-14b). A decline of 61.5 feet would impact about 24 percent of the wells. Assuming that the 24 percent of impacted wells results in a proportional impact on water supply, then the estimated supply in 2060 from the Valley Fill is 58,714 acre-feet per year, which is within 1 percent of the model-estimated method.

#### *5.5.1.3 Other Considerations*

Both of these approaches represent an approximation of the reduction in administrative supply by 2060. Factors that may affect the accuracy of these predictions include:

- The water columns may not represent the available supply because existing wells could possibly be drilled deeper.
- The shallowest wells that are most impacted may not proportionally represent the distribution of pumping (the deeper wells most likely pump more than the shallow wells).
- New wells could be drilled in other parts of the aquifer.

Ideally, the aquifer should be modeled to determine a sustainable rate or lifetime that is desired by the regions and to estimate the best distribution of pumping.

### 5.5.2 Drought Supply

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 of a 20-year drought by 2060. In a non-stream connected basin such as Estancia Basin, the change in recharge during a drought may be significant.

## Table 5-14b. Projected Groundwater Supply in 2060 in Estancia Basin Valley Fill Aquifer, Based on Observed Rate of Decline

| Row | Calculation Step | Estancia Valley Fill | Explanation/Source |
|---|---|---|---|
| 1 | Estimated groundwater diversions in 2010 (ac-ft/yr) | 77,531 | Longworth et al., 2013. |
| 2 | Median water column (feet) | 181 | Difference between the water level at the top of the well and total depth of the well, based on 61 wells from WATERS database with post-1997 water level. |
| 3 | Available water column (feet) | 127 | Applying the 70% guideline (feet) from the ISC Handbook. |
| 4 | Rate of water level decline (ft/yr) | 1.23 | Using the water level data for USGS monitor wells within the non-stream-connected groundwater basin (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. An average rate of water level decline was estimated for those wells with decreasing water levels. |
| 5 | Estimated decline in 50 years (feet) | 61.5 | The average rate of water level decline was multiplied by 50 years to predict the average drawdown by 2060. |
| 6 | Percentage of wells impacted | 24% | Row 5 divided by Row 3 and multiplied by 50%. |
| 7 | Groundwater supply by 2060 due to continued pumping (ac-ft/yr) | 58,714 | Row 1 reduced by Row 6. |

ac-ft/yr = Acre-feet per year

As discussed in Section 5.1.1, the PDSI is an indicator of whether drought conditions exist and if so, what the relative severity of those conditions is. For the two main climate divisions present in the Estancia Basin region, the PDSI classifications for 2010 were near normal (Climate Divisions 5 and 6) (Figure 5-6).

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 non-stream connected aquifers is described below:

- The drought adjustment is applied only to the portion of the administrative water supply that derives water from the mined aquifer and to the minor amount of surface water use.
- 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.
- This adjusted predicted drawdown is then compared to the median available water column in 2010 (as described in Sections 5.5.1.1) to determine the percentage of wells that are impacted by the 20-year drought and continued pumping.
- This percentage represents the reduction in supply due to drought. The drought supply will be estimated by multiplying the percentage by the 2060 administrative supply.

The estimated reduction in administrative supply due to continued pumping and one 20-year drought with no recharge over the 50-year planning period is 47 percent, resulting in an available water supply for the Valley Fill of about 41,400 ac-ft/yr. In the Valley Fill, the adjusted predicted drawdown without the drought is 63 feet, and the additional drawdown due to drought is 55 feet, for a total decline of 118 feet. Comparing the predicted drawdown during a drought to the available water column of 127 feet shows that 47 percent of wells would be impacted. Thus the water supply in 2060 is estimated to be 47 percent less than the 2010 water use or about 41,400 ac-ft/yr in the Valley Fill aquifer. This estimate includes only the Valley Fill aquifer; the other aquifers were not analyzed. The total supply for the Estancia Basin in 2060 after enduring

## Table 5-15. Projected Drought Water Supply in Estancia Basin Water Planning Region in 2060

| Row | Calculation Step | Estancia Valley Fill | Explanation/Source |
|---|---|---|---|
| 1 | Estimated groundwater diversions in 2010 (ac-ft/yr) | 77,531 | Longworth, et al., 2013 |
| 2 | Modeled pumping (ac-ft/yr) | 42,000 | Tom Morrison, personal communication, 2015 |
| 3 | Ratio of administrative supply to modeled pumping | 1.85 | Row 1 divided by Row 2 |
| 4 | Available water column (feet) | 127 | Applying the 70% guideline (feet) from the ISC Handbook |
| 5 | Predicted additional drawdown from 20-year drought (feet) | 30 | Tom Morrison, personal communication, 2015 |
| 6 | Adjusted predicted drawdown in 2060 due to drought (feet) | 55.4 | Row 5 times Row 3 |
| 7 | Total drawdown due to pumping and drought | 118 | Row 6 plus Row 7 from Table 5-14a |
| 8 | Percentage reduction in supply due to drought and pumping | 47% | Row 7 divided by Row 4 times 50% |
| 9 | Groundwater supply by 2060 with 20-year drought (ac-ft/yr) | 41,384 | Row 1 reduced by Row 8 |

ac-ft/yr = Acre-feet per year

a 20-year drought is about 47,900 ac-ft/yr, or about 57 percent of the existing administrative water supply. The 60 acre-feet of surface water diversions throughout the planning region are assumed to be zero for the drought scenario.

# 6. Water Demand

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

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

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

## 6.1 Present Uses

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

- Public water supply
- Domestic (self-supplied)
- Irrigated agriculture
- Livestock (self-supplied)
- Commercial (self-supplied)
- Industrial (self-supplied)

- Mining (self-supplied)
- Power (self-supplied)
- Reservoir evaporation

The total surface water and groundwater withdrawals for each category of use, for each county, and for the entire region, are shown on Table 6-1 and Figure 6-1. The predominant water use in 2010 in the Estancia Basin region was for irrigated agriculture.

Groundwater accounts for more than 99 percent of the total withdrawals in the region, most of which are for irrigated agriculture. Groundwater also supplies nearly all public water supply, domestic, livestock, and commercial uses. 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. The NMOSE report does not quantify additional categories of water demand, including riparian evapotranspiration and instream flow; with the exception of evaporation of groundwater from playa lakes, these categories do not represent a significant consumption of water in the Estancia Basin planning region.

Evaporation from playa lakes is a significant component of the water budget of the Estancia Valley; estimates include 50,000 ac-ft/yr (Smith, 1957), 27,000 to 36,000 ac-ft/yr (DeBrine, 1971), and 12,700 acre-feet per year in 1975 (Sorensen, 1977). As groundwater levels decline, discharge to the playa lakes decline as well, resulting in a decrease in evaporation.

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 2013 total population of Torrance County was 15,717 (U.S. Census Bureau, 2014a). No reliable figures for the portions of Torrance County, Santa Fe County, and Bernalillo County in Estancia Basin are available for 2013. The Torrance County population declined slightly over the previous 13 years (Table 3-1a).

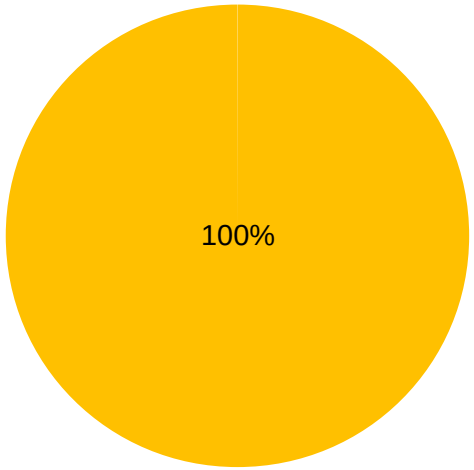
## Table 6-1. Total Withdrawals in the Estancia Basin Water Planning Region in 2010

| Water Use Category | Withdrawals (acre-feet) [a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Santa Fe County | | | Bernalillo County | | | Torrance County | | | Planning Region | | |
| | Surface Water | Ground-water | Total | Surface Water | Ground-water | Total | Surface Water | Ground-water | Total | Surface Water | Ground-water | Total |
| Commercial (self-supplied) | 0 | 3 | 3 | 0 | 40 | 40 | 0 | 276 | 276 | 0 | 319 | 319 |
| Domestic (self-supplied) | 0 | 132 | 132 | 0 | 627 | 627 | 0 | 487 | 487 | 0 | 1,246 | 1,246 |
| Industrial (self-supplied) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| Irrigated agriculture | 0 | 19,693 | 19,693 | 0 | 0 | 0 | 0 | 59,605 | 59,605 | 0 | 79,298 | 79,298 |
| Livestock (self-supplied) | 11 | 15 | 26 | 0.4 | 24 | 25 | 48 | 550 | 598 | 60 | 589 | 649 |
| Mining (self-supplied) | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 30 | 30 | 0 | 31 | 31 |
| Power (self-supplied) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Public water supply | 0 | 911 | 911 | 0 | 40 | 40 | 0 | 1,634 | 1,634 | 0 | 2,584 | 2,584 |
| Reservoir evaporation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 11 | 20,754 | 20,766 | 0.4 | 732 | 732 | 48 | 62,583 | 62,631 | 60 | 84,069 | 84,129 |

Source: Longworth et al., 2013

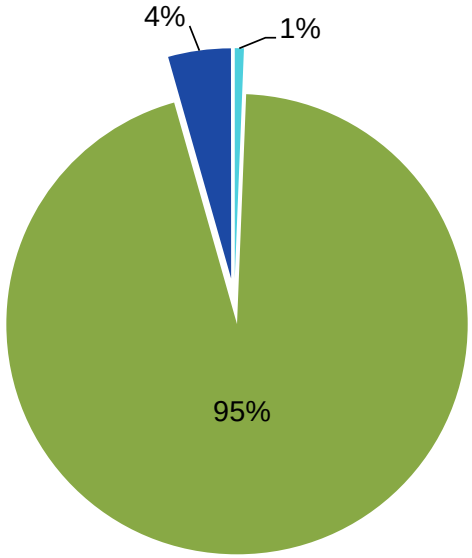
[a] Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this table.

## Surface Water



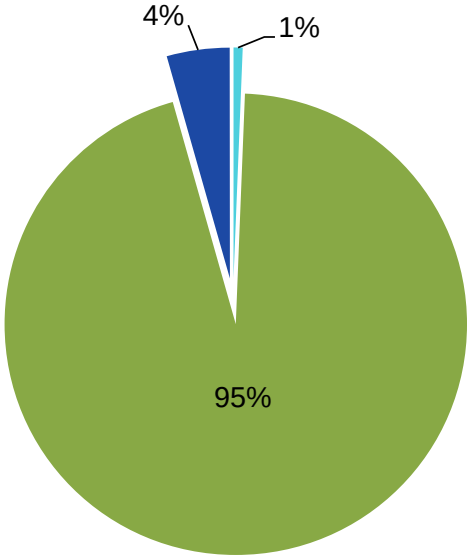

Total usage: 11 acre-feet

## Groundwater




Total usage: 20,754 acre-feet

## Total




Total usage: 20,766 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

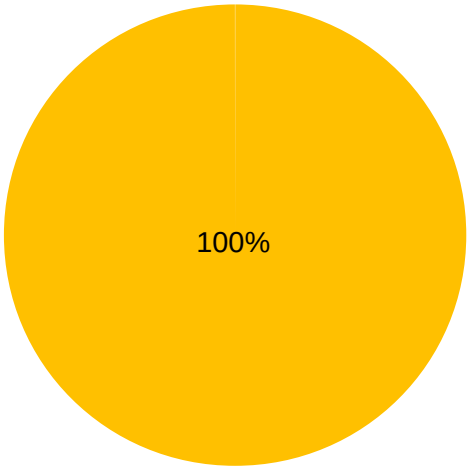
**Notes:**
1. Only categories with usage above 0.1% are shown.
2. Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Santa Fe County Water Demand, 2010**

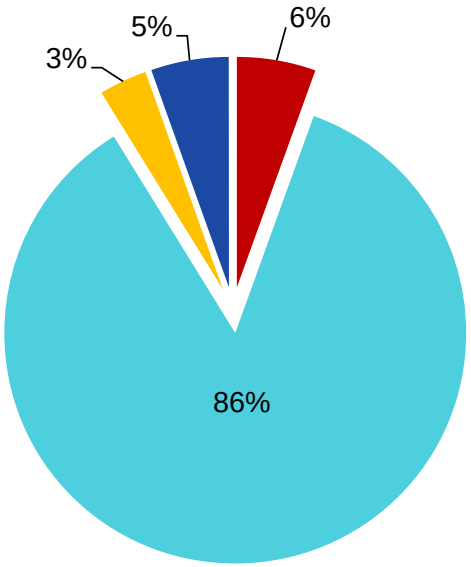
Figure 6-1a

## Surface Water



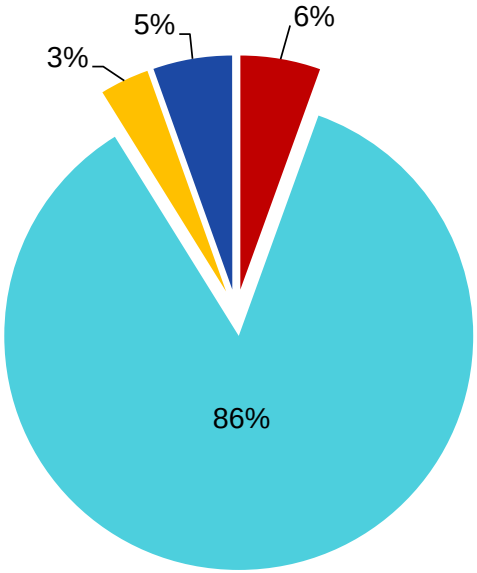

Total usage: 0.4 acre-feet

## Groundwater




Total usage: 732 acre-feet

## Total




Total usage: 732 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

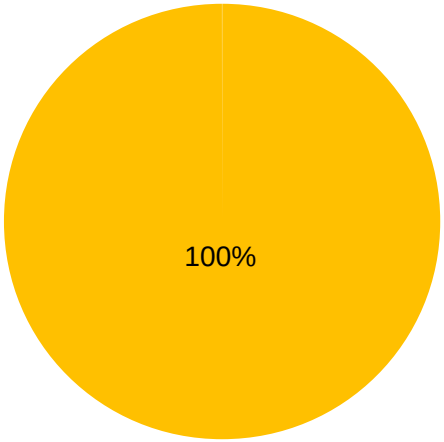
**Notes:**
1. Only categories with usage above 0.1% are shown.
2. Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Bernalillo County Water Demand, 2010**

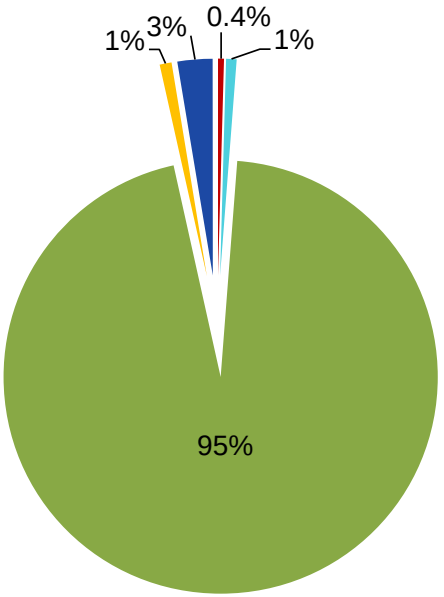
Figure 6-1b

## Surface Water



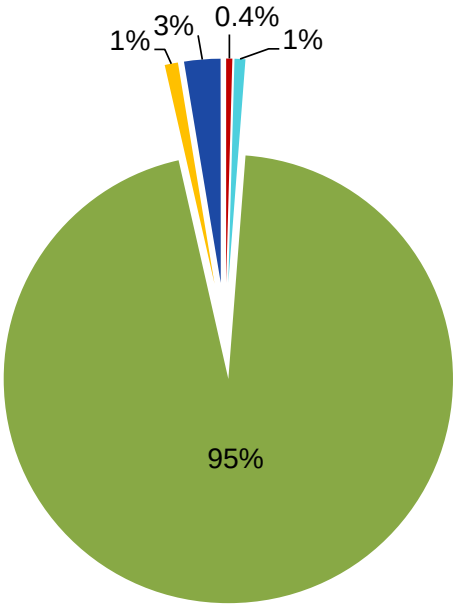

Total usage: 48 acre-feet

## Groundwater




Total usage: 62,583 acre-feet

## Total




Total usage: 62,631 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

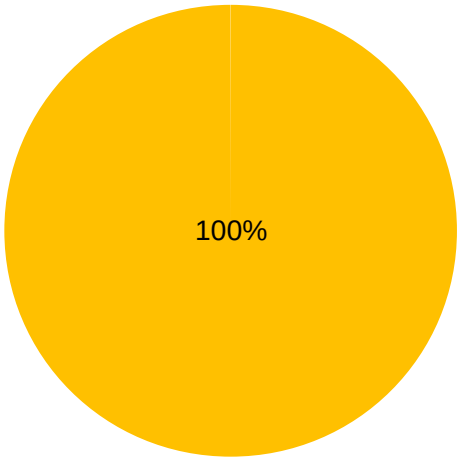
**Notes:**
1. Only categories with usage above 0.1% are shown.
2. Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Torrance County Water Demand, 2010**

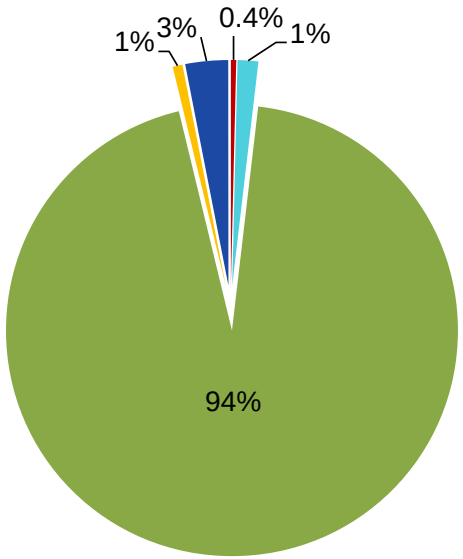
Figure 6-1c

## Surface Water



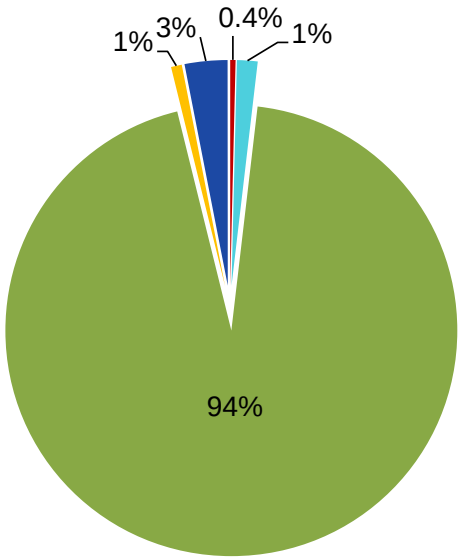

Total usage: 60 acre-feet

## Groundwater




Total usage: 84,069 acre-feet

## Total




Total usage: 84,129 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

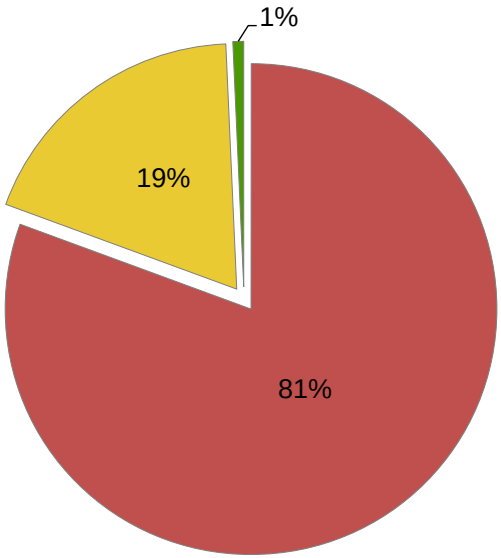
**Notes:**
1. Only categories with usage above 0.1% are shown.
2. Tribes and pueblos in New Mexico are not required to provide water use data to the State. Therefore, tribal water use data are not necessarily reflected in this figure.

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Total Regional Water Demand by Sector, 2010**

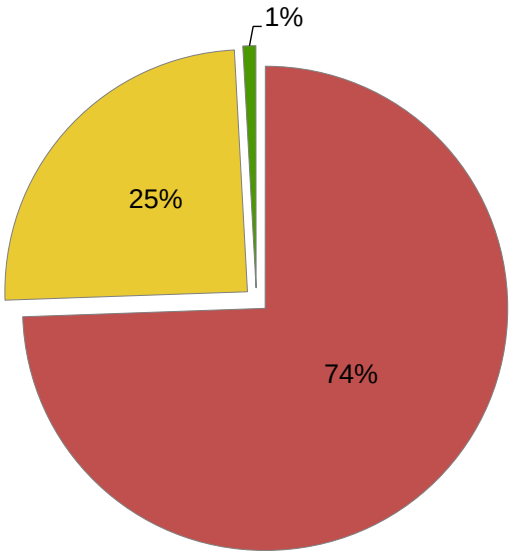
Figure 6-1d

## Surface Water



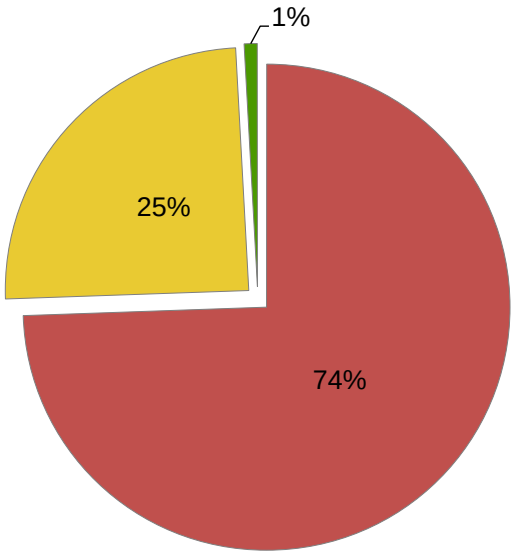

Total usage: 60 acre-feet

## Groundwater




Total usage: 84,069 acre-feet

## Total




Total usage: 84,129 acre-feet

**Explanation**

- Torrance
- Santa Fe
- Bernalillo

**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 6-1e

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Total Regional Water Demand by County, 2010**

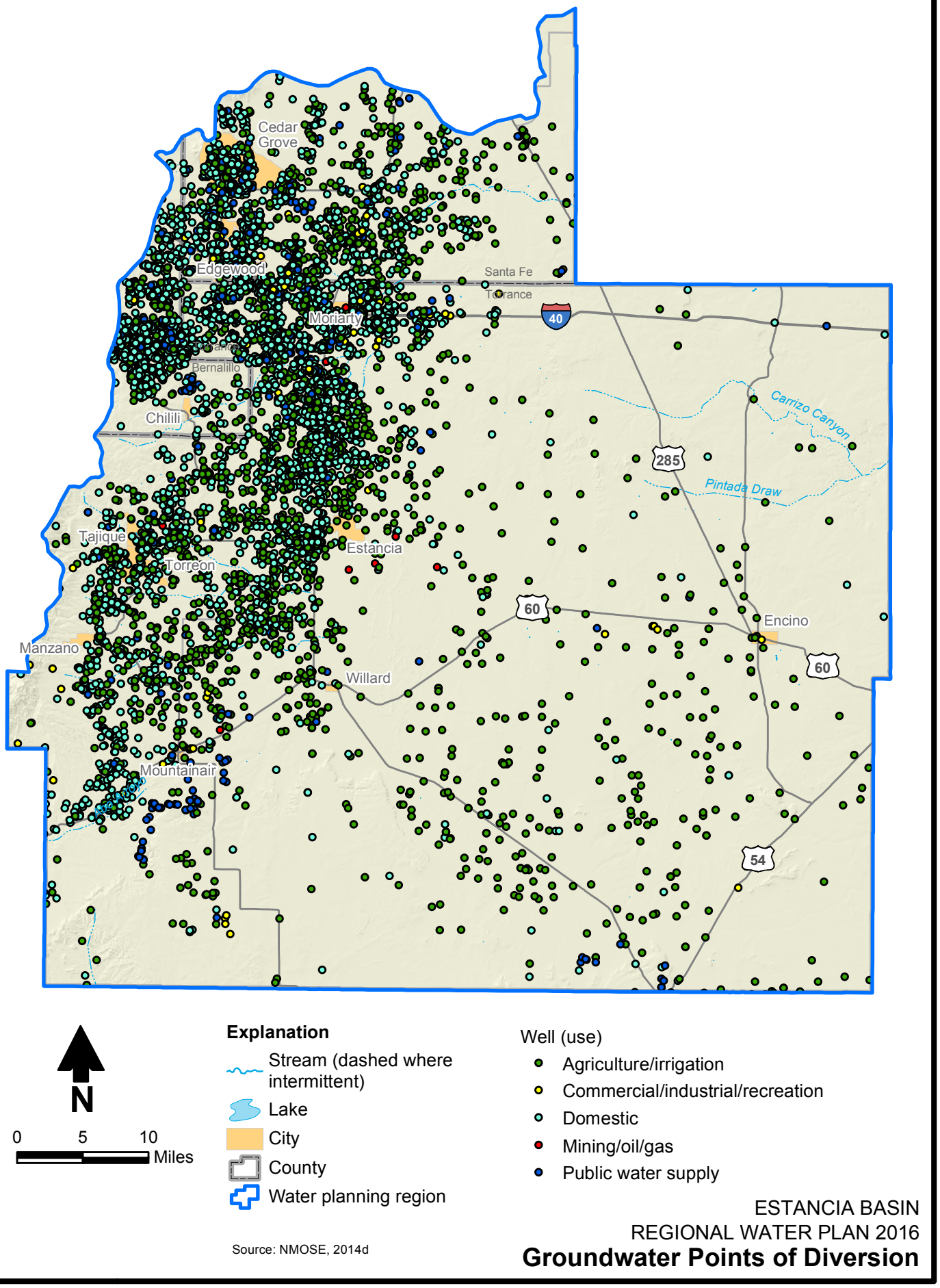



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Figure 6-2

As noted in Table 3-1d, cattle, calves, and corn for silage are the most valuable agricultural commodities in Torrance County. A land use map was included in the 1999 accepted water plan and there have not been substantial changes.

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 Santa Fe County

The southwestern area of Santa Fe County that is within the Estancia Basin Water Planning Region had a population of 10,014 in 2010 (UNM, 2014). The area has approximately 20,000 acres of irrigated agriculture.

The town of Edgewood is the main population center of this area. It is 20 miles east of Albuquerque and has become a popular bedroom community for commuters. The town's population grew 97 percent between 2000 and 2010, from 1,893 to 3,735 (U.S. Census Bureau, 2014c). The population grew to 3,779 in 2012 (City-data.com, 2014). Most of the new growth is a result of annexation, which now extends into Bernalillo County.

The town's close proximity to I-40 makes it attractive to developers and retailers. New retail stores have recently opened in the community, including the new Walmart SuperCenter, which has drawn shoppers from Moriarty. The population of the town could increase another 3,500 by the end of 2015 because of additional annexation, but the population of the Estancia Basin Water Planning Region will not increase as a result of the annexations because this population already resides within the region.

### 6.2.2 Bernalillo County

The small part of Bernalillo County in the Estancia Basin Water Planning Region, less than 10 percent of the county, is predominantly rural residential, served by domestic wells. Three community water systems in the region serve a significant portion of eastern Bernalillo County outside the planning region.

### 6.2.3 Torrance County

The total population of Torrance County (in both the Estancia Basin and Middle Rio Grande Water Planning Regions) declined from 16,911 in 2000 to 16,383 in 2010, and to 15,717 in 2013. The decline can be attributed to the lack of a diversified economy, which resulted in out-

migration. After 2010, the drought also contributed. No new subdivisions have been built in many years, and new building permits average less than ten a year.

In 2012 there were 589 farms and ranches in Torrance County, a slight increase over 2007, and the number of acres increased as well, by 4 percent. Of the 589 farms, 379 reported a net loss in 2012, and 307 had sales of less than $2,500 (USDA NASS, 2014). The number of farms participating in agricultural support programs increased from 72 in 2007 to 163 in 2012 and the amount paid per farm increased from $8,353 to $19,991. According to the agriculture census (USDA NASS, 2014), irrigated acreage decreased by 16.5 percent, from 29,942 acres in 2007 to 25,015 acres in 2012. The average age of a producer in the county increased from 61 years in 2007 to 63.5 years in 2012, and there were only 42 producers under 45 years of age (USDA NASS, 2014).

A contributing factor to the downturn in farming is increasing energy costs, as farmers have to run their well pumps for longer periods of time because of the declining water table. Increased water demand during drought in the County exacerbates the lowering of the water table and thus the potential for some private wells to go dry. Corn silage and alfalfa are the main crops. Ranchers have already sold off much of their herds and are not likely to replenish them until the cost of feed decreases and the price for breeding heifers decreases.

The school-age population has been declining for the past few years as persons of childbearing age leave the county. Two elementary schools in the Moriarty-Edgewood School District closed in 2014.

Education and healthcare provide the largest number of non-farm jobs, with retail trade ranking second.

Commercial activity in Moriarty is found along Historic Route 66. Traffic comes from I-40, which runs parallel to Route 66. Businesses are mostly travel-related—gas stations, restaurants, motels, and truck stop/travel centers. The town's retail variety store closed recently because many people go to Edgewood to shop.

## 6.3 Projected Population Growth

The Bureau of Business and Economic Research (BBER) at the University of New Mexico (UNM) prepared county-level population forecasts through 2040 using data and historical trends from 1960 through to the 2000 Census. The Estancia Basin Water Planning Committee (EBWPC) and HydroResolutions, LLC (HR) prepared the *Estancia Basin Regional Water Plan Year 2010 Update,* relying on population data prepared by the BBER in 2008. The EBWPC and HR projection for 2010 of a population of 37,709 residents exceeded the actual population of 32,694 (Table 6-2). Since 2010, the drought, the national recession that started in 2007, and an inability to attract jobs to the area have resulted in population losses in Torrance County.

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

| County | 2010 Regional Water Plan Projected Population [a] | Actual Population 2010 U.S. Census [b] |
|---|---|---|
| Santa Fe | 14,531 | 10,014 |
| Bernalillo | 3,339 | 6,297 |
| Torrance | 19,839 | 16,383 |
| Total Region | 37,709 | 32,694 |

[a] EBWPC and HR, 2010

[b] U.S. Census Bureau, 2010 (numbers represent portion of population in the water planning region, not total county population)

For the population projections through 2060 (Table 6-3), two population forecasts were developed: one based on a slightly optimistic view of the economy for this region over the long-term and one that portrays a more pessimistic picture. The BBER population projections through 2040 (Appendix 6-B) were used as a starting point for the high population projections in Torrance County. For the portion of Santa Fe County in the Estancia Basin, a more recent report regarding population estimates and forecasts for Santa Fe County (UNM, 2014) was relied upon. The low population projections for the region incorporate factors that have been affecting New Mexico since 2000, including drought, continuing recession, job losses, and most recently, out-migration, especially of younger residents.

The population projections are detailed in Table 6-3 and summarized by county below:

- *Torrance County:* The population of Torrance County is projected to decline in the low growth scenario but to grow in the high growth scenario. The low growth scenario anticipates that the highly skilled employees required to fill the new jobs anticipated will commute from elsewhere. The high scenario is based on the 2012 BBER forecast and reflects an improvement in both the residential and employment situation. Even in the high scenario, it is not expected that the most highly skilled workers will live in the Moriarty area, but there will be an opportunity for more retail businesses to serve the new workforce. Under the high scenario, the northern part of Torrance County may become more of a bedroom community as a less expensive residential alternative to surrounding counties.

- *Santa Fe County:* Population growth is projected in the high scenario through 2050 and in the low scenario through 2030; from that time forward it will start to decline in the low scenario as population becomes more centralized in the Santa Fe urban area. The southern portion of Santa Fe County, mainly Edgewood, is a bedroom community for both Albuquerque and Santa Fe.

## Table 6-3. Estancia Basin 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 |
| Santa Fe | High | 1.73 | 0.80 | 0.73 | 0.18 | 0.00 |
| | Low | 0.18 | 0.24 | –0.34 | –0.15 | –0.28 |
| Bernalillo | High | 0.30 | 0.31 | 0.10 | 0.22 | 0.15 |
| | Low | 0.20 | 0.18 | 0.04 | 0.05 | 0.05 |
| Torrance | High | 0.39 | 0.35 | 0.28 | 0.28 | 0.28 |
| | Low | –0.35 | –0.11 | –0.11 | –0.10 | –0.06 |

### b. Projected Population

| County | Projection | Population | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Santa Fe | High | 10,014 | 11,890 | 12,880 | 13,850 | 14,100 | 14,100 |
| | Low | 10,014 | 10,200 | 10,450 | 10,100 | 9,950 | 9,675 |
| Bernalillo | High | 6,297 | 6,486 | 6,687 | 6,753 | 6,902 | 7,005 |
| | Low | 6,297 | 6,423 | 6,539 | 6,564 | 6,597 | 6,630 |
| Torrance | High | 16,383 | 17,038 | 17,652 | 18,146 | 18,663 | 19,195 |
| | Low | 16,383 | 15,826 | 15,652 | 15,480 | 15,325 | 15,235 |

Source: Poster Enterprises, 2014

- *Bernalillo County:* The population of Bernalillo County within the Estancia Basin Water Planning Region is projected to increase modestly in both the high and low scenarios. This is primarily a residential area with little economic activity. It may serve as a bedroom community for skilled jobs in Moriarty.

## 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 Estancia Basin 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 (such as Clines Corners, which supplies a truck stop). 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:

## 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 |
| ***Santa Fe County*** | | | | | |
| Estancia | Entranosa Water and Wastewater Coop [c] - part | 4,224 | 76 | 0 | 359 |
| | EPCOR/New Mexico American Water Co. - part | 4,320 | 114 | 0 | 551 |
| | *Santa Fe County public water supply totals* | 8,544 | | 0 | 911 |
| | *County-wide public water supply per capita use [d]* | | 95 | | |
| Estancia<br>Upper Pecos | Rural self-supplied homes<br>(Rio Grande and Pecos) | 1,470 | 80 | 0 | 132 |
| | *Santa Fe County domestic self-supplied totals* | 1,470 | | 0 | 132 |
| | *County-wide domestic self-supplied per capita use [d]* | | 80 | | |
| ***Bernalillo County*** | | | | | |
| Estancia | Bearcat Homeowners Assn | 100 | 59 | 0 | 7 |
| | Chilili WUA | 90 | 70 | 0 | 7 |
| | Green Ridge MDWCA | 130 | 32 | 0 | 5 |
| Rio Grande (Middle) | Tranquillo Pines Water System [e] | 375 | 52 | 0 | 22 |
| | *Bernalillo County public water supply totals* | 695 | | 0 | 40 |
| | *County-wide public water supply per capita use [d]* | | 51 | | |
| Estancia<br>Rio Grande (Middle)<br>Sandia | Rural Self-Supplied Homes<br>(Rio Grande) | 5,602 | 100 | 0 | 627 |
| | *Bernalillo County domestic self-supplied totals* | 5,602 | | 0 | 627 |
| | *County-wide domestic self-supplied per capita use [d]* | | 100 | | |

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

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

[b] Rural self-supplied homes are shown for specified surface water basin in parenthesis.

[c] The Thunder Mountain Water System, located in Santa Fe County, imports water from the town of Estancia in Torrance County; this withdrawal and population is reported under the Estancia water system (Longworth et al., 2013).

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

[e] Portion that is in Estancia Basin planning region

gpcd = Gallons per capita per day

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



| OSE Declared Groundwater Basin(s) [a] | Water Supplier [b] | Population | Per Capita Use (gpcd) | Withdrawals (acre-feet) | |
|---|---|---|---|---|---|
| | | | | Surface Water | Groundwater |
| ***Torrance County*** | | | | | |
| Estancia | Carlos Lucero Subdivision - Gilbert Lucero | 75 | 50 | 0 | 4 |
| | Cassandra Water System | 54 | 80 | 0 | 5 |
| | Clines Corners Water System | 40 | 368 | 0 | 16 |
| | Echo Valley Water Co. | 408 | 79 | 0 | 36 |
| | Edgewood Meadows Water Co-Op | 100 | 62 | 0 | 7 |
| | EPCOR/New Mexico American Water Co Edgewood District [c] - part | 1,081 | 114 | 0 | 138 |
| | Estancia, Town of | 2,200 | 138 | 0 | 341 |
| | Indian Hills Water Company | 460 | 80 | 0 | 41 |
| | Manzano MDWCA | 95 | 43 | 0 | 5 |
| | Melody Ranch Water Co | 193 | 81 | 0 | 18 |
| | Moriarty Water System | 1,763 | 266 | 0 | 525 |
| | Mountainair | 1,600 | 125 | 0 | 224 |
| | Punta De Agua MDWCA | 50 | 80 | 0 | 4 |
| | Squaw Valley Water Supply System | 216 | 80 | 0 | 19 |
| | Sunset Acres Subdivision | 300 | 63 | 0 | 21 |
| | Tajique MDWCA | 181 | 102 | 0 | 21 |
| | Torreon MDWCA | 150 | 23 | 0 | 4 |
| | Willard Water Supply System (Rio Grande) | 210 | 91 | 21 | 0 |

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 shown for specified surface water basin in parenthesis.

[c] The Thunder Mountain Water System, located in Santa Fe County, imports water from the town of Estancia in Torrance County; this withdrawal and population is reported under the Estancia water system (Longworth et al., 2013).

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

gpcd = Gallons per capita per day

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



| OSE Declared Groundwater Basin(s) [a] | Water Supplier [b] | Population | Per Capita Use (gpcd) | Withdrawals (acre-feet) | |
|---|---|---|---|---|---|
| | | | | Surface Water | Groundwater |
| ***Torrance County (cont.)*** | | | | | |
| Fort Sumner | Encino Water System | 100 | 126 | 0 | 14 |
| NA | Duran Water System | 70 | 76 | 0 | 6 |
| | Homestead Estates | 230 | 156 | 0 | 40 |
| | Pine Canyon Ranch | 1,366 | 80 | 0 | 122 |
| | *Torrance County public water supply totals* | 10,942 | | 21 | 1,612 |
| | *County-wide public water supply per capita use* [d] | | 133 | | |
| Fort Sumner<br>Roswell<br>Upper Pecos | Rural self-supplied homes (Pecos) | 109 | 80 | 0 | 10 |
| Estancia<br>Fort Sumner<br>Rio Grande (Middle)<br>Roswell<br>Tularosa<br>Upper Pecos | Rural self-supplied homes (Rio Grande) | 5,329 | 80 | 0 | 477 |
| | *Torrance County domestic self-supplied totals* | 5,438 | | 0 | 487 |
| | *County-wide domestic self-supplied per capita use* [d] | | 80 | | |

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 shown for specified surface water basin in parenthesis.

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

For the Estancia Basin region, current per capita use in Santa Fe and Bernalillo counties is under 130 gpcd (Table 6-4), so no additional conservation is assumed. Torrance County currently has an average per capita use between 130 and 200 gpcd (Table 6-4), so their future per capita use for new population is assumed to be reduced to 130 gpcd. In the projections, these reductions are phased in over time.

*Self-supplied domestic.* Homeowners with private wells can achieve water savings through household conservation measures. Most pre-2002 wells are not metered, unless they serve multiple homes, and current water use estimates were developed based on a relatively low per capita use assumption (Table 6-4; Longworth et al., 2013). Therefore, no additional conservation savings were assumed in developing the water demand projections. For purposes of developing projections, a county-wide per capita rate was calculated as the total self-supplied domestic use in the county divided by the total county population (or portion of the county within the region), excluding those served by a public water system.

*Irrigated agriculture.* As the largest water use in the region, conservation in this sector 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. For example, drip irrigation and center pivots may reduce the amount of water diverted, but due to the increased efficiency of application, it actually increases consumptive use.

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 Estancia Basin Steering Committee to achieve savings in agricultural water use within the region.

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

*Reservoir evaporation*. In many parts of New Mexico, reservoir evaporation is one of the highest consumptive water uses, but in the Estancia Basin region it is zero due to the absence of reservoirs in the region. However, there is evaporation from the playas and areas where the groundwater levels are shallow.

## 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

Estancia Basin region. The projections of future water demand determined using this consistent method, as applicable, for the Estancia Basin 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 Estancia Basin region are discussed in Section 6.5.2.

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

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

and low projections incorporated conservation for counties with per capita use above 130 gpcd, as discussed in Section 6.4, based on the assumption that some of the new demand would be met through reduction of per capita use.

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

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

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

In much of the state, recent drought and recession are thought to be driving a decline in agricultural production. However, that does not necessarily indicate that there is less demand for water. In parts of the state where irrigation is supplied by surface water, there are frequent supply limitations, with many ditches having no or limited supply later in the season.

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 administrative water supply is equal to the 2010 demand for both the high and low scenarios.

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. No reservoirs of this size exist in the planning region. 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.

### 6.5.2 Estancia Basin Projected Water Demand

Table 6-5 summarizes the projected water demands for each water use category for each of the three 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 under the high projections in all three counties, except for a decline in Santa Fe County after 2050 only. For the low growth scenario, population is projected to decline slightly in Torrance County, increase slightly in Santa Fe County through 2030 and then decline, and increase slightly in Bernalillo County.

## Table 6-5. Projected Water Demand, 2020 through 2060
## Estancia Basin Water Planning Region


| Use Sector | Projection | Water Demand (acre-feet) [a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 [b] | 2020 | 2030 | 2040 | 2050 | 2060 |
| ***Santa Fe County*** [c] | | | | | | | |
| Public water supply | High | 911 | 1,081 | 1,171 | 1,259 | 1,282 | 1,282 |
| | Low | 911 | 928 | 950 | 950 [d] | 950 [d] | 950 [d] |
| Domestic (self-supplied) | High | 132 | 157 | 170 | 183 | 186 | 186 |
| | Low | 132 | 134 | 138 | 138 [d] | 138 [d] | 138 [d] |
| Irrigated agriculture | High | 19,693 | 19,693 | 19,693 | 19,693 | 19,693 | 19,693 |
| | Low | 19,693 | 15,754 | 15,754 | 16,739 | 16,739 | 17,724 |
| Livestock (self-supplied) | High | 26 | 14 | 16 | 18 | 21 | 22 |
| | Low | 26 | 12 | 13 | 16 | 17 | 20 |
| Commercial (self-supplied) | High | 3 | 3 | 4 | 4 | 4 | 4 |
| | Low | 3 | 3 | 3 | 3 | 3 | 3 |
| Industrial (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Mining (self-supplied) | Low/High | 1 | 1 | 1 | 1 | 1 | 1 |
| Power (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Reservoir evaporation | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| ***Bernalillo County*** [c] | | | | | | | |
| Public water supply | High | 40 | 41 | 42 | 43 | 44 | 44 |
| | Low | 40 | 41 | 41 | 42 | 42 | 42 |
| Domestic (self-supplied) | High | 627 | 646 | 666 | 672 | 687 | 698 |
| | Low | 627 | 640 | 651 | 654 | 657 | 660 |
| Irrigated agriculture | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Livestock (self-supplied) | High | 25 | 13 | 14 | 15 | 16 | 18 |
| | Low | 25 | 10 | 11 | 13 | 14 | 14 |
| Commercial (self-supplied) | High | 40 | 42 | 43 | 43 | 44 | 45 |
| | Low | 40 | 41 | 42 | 42 | 42 | 42 |
| Industrial (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Mining (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Power (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Reservoir evaporation | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |

[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] Portion of the county within the planning region

[d] Projections set equal to 2030 decade high

## Table 6-5. Projected Water Demand, 2020 through 2060
## Estancia Basin Water Planning Region


| Use Sector | Projection | Water Demand (acre-feet) [a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 [b] | 2020 | 2030 | 2040 | 2050 | 2060 |
| ***Torrance County*** | | | | | | | |
| Public water supply | High | 1,634 | 1,698 | 1,757 | 1,804 | 1,853 | 1,904 |
| | Low | 1,634 | 1,634 | 1,634 | 1,634 | 1,634 | 1,634 |
| Domestic (self-supplied) | High | 487 | 506 | 524 | 539 | 555 | 570 |
| | Low | 487 | 487 | 487 | 487 | 487 | 487 |
| Irrigated agriculture | High | 59,605 | 59,605 | 59,605 | 59,605 | 59,605 | 59,605 |
| | Low | 59,605 | 47,684 | 47,684 | 50,664 | 50,664 | 53,645 |
| Livestock (self-supplied) | High | 598 | 329 | 389 | 449 | 508 | 538 |
| | Low | 598 | 269 | 329 | 389 | 419 | 478 |
| Commercial (self-supplied) | High | 276 | 287 | 297 | 306 | 314 | 323 |
| | Low | 276 | 276 | 276 | 276 | 276 | 276 |
| Industrial (self-supplied) | Low/High | 1 | 3 | 5 | 5 | 6 | 6 |
| Mining (self-supplied) | Low/High | 30 | 30 | 30 | 30 | 30 | 30 |
| Power (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Reservoir evaporation | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| ***Total region*** | | | | | | | |
| Public water supply | High | 2,584 | 2,820 | 2,971 | 3,106 | 3,178 | 3,230 |
| | Low | 2,584 | 2,602 | 2,625 | 2,626 | 2,626 | 2,626 |
| Domestic (self-supplied) | High | 1,246 | 1,309 | 1,360 | 1,394 | 1,428 | 1,454 |
| | Low | 1,246 | 1,261 | 1,276 | 1,278 | 1,281 | 1,285 |
| Irrigated agriculture | High | 79,298 | 79,298 | 79,298 | 79,298 | 79,298 | 79,298 |
| | Low | 79,298 | 63,438 | 63,438 | 67,403 | 67,403 | 71,369 |
| Livestock (self-supplied) | High | 649 | 356 | 419 | 482 | 545 | 578 |
| | Low | 649 | 291 | 353 | 418 | 450 | 512 |
| Commercial (self-supplied) | High | 319 | 332 | 344 | 353 | 363 | 372 |
| | Low | 319 | 320 | 321 | 321 | 321 | 321 |
| Industrial (self-supplied) | Low/High | 1 | 3 | 5 | 5 | 6 | 6 |
| Mining (self-supplied) | Low/High | 31 | 31 | 31 | 31 | 31 | 31 |
| Power (self-supplied) | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| Reservoir evaporation | Low/High | 0 | 0 | 0 | 0 | 0 | 0 |
| ***Total regional demand*** | High | 84,129 | 84,149 | 84,428 | 84,670 | 84,849 | 84,969 |
| | Low | 84,129 | 67,946 | 68,049 | 72,082 | 72,119 | 76,150 |

[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)

Demand in the *public water supply* category is projected to increase in all three counties under the high scenario, proportional to the increasing population projections. However, use in this category is not projected to decline proportionally to the low projections for Torrance and Santa Fe counties indicating declining population, because as discussed in Section 6.5.1, the water suppliers retain their water rights via NMSA 1978, Section 72-1-9, and, for planning purposes, it is assumed that use in the public water supply category will remain at 2010 levels (in Torrance County) or 2030 levels (in Santa Fe County).

Projected water demand in the *commercial* and *domestic* categories is assumed to be proportional to the population growth rates, which are anticipated to increase except in Santa Fe and Torrance counties, where a slight decrease is projected under the low scenario for all or some of the future decades. The low projections for Torrance County assume current levels of use for the domestic and commercial categories, and for Santa Fe County, a higher value is projected in 2030 and is assumed to be maintained for decades 2040 through 2060.

The current observed declining trend in *agricultural* water use is expected to continue for the short-term; for the low projection purposes this is assumed to be through 2020 with agriculture beginning to recover by 2030. However, a reduction in demand does not mean additional water would available for appropriation, as the agricultural center of the water planning region has been closed to new appropriations since 2001. Additionally, though water rights transfers in the Estancia UWB are constrained by NMOSE guidelines (NMOSE, 2002), as demand shifts over time, transfers from agriculture to other water use sectors may occur through sales and leases. Even in areas where the data indicate a decline in the agricultural economy, the high projection assumes that overall water uses will remain at 2010 levels since water rights have economic value and will continue to be used.

For the high scenario, the demand for water devoted to irrigated agriculture in Torrance County is projected to remain at the 2010 level throughout the projection period (regardless of the actual availability of water) to illustrate the potential gap between supply and demand. For the low scenario, an initial steep decline is projected with a gradual rebound to 80 percent of the 2010 level by 2050, remaining steady at that level through 2060.

In Santa Fe and Torrance counties the amount of water devoted to irrigated agriculture is projected to remain stable at the 2010 level through 2060 in the high scenario, but to reach only 90 percent of that level by 2060 in the low scenario.

No irrigated agriculture exists in the Bernalillo County portion of Estancia Basin.

The *livestock* category in Torrance County is expected to recover to 90 percent of 2010 levels by 2060 in the high projection, but to only 80 percent in the low projection. In this scenario, some ranches will go out of business because younger people, who do not view ranching as a desirable or economically viable career choice, will not replace the older generation of ranchers. Similar trends are expected for livestock water use in the portions of Santa Fe and Bernalillo counties within the planning region.

None of the counties within the region have any significant *industrial*, *mining*, or *power generation* activity, and based on the interviews conducted, no growth is expected in the mining and power sectors. A slight increase in the industrial category for Torrance County is anticipated.

The *reservoir evaporation* category is included for statewide accounting, but has little bearing on the supply available to the Estancia Basin region. The Estancia Basin region projections include no water demand in the reservoir evaporation category due to lack of any reservoir greater than 5,000 acre-feet within the planning area. However, various researchers estimated evaporation of groundwater from playa lakes within the planning region to be approximately 50,000 ac-ft/yr (Smith, 1957), 27,000 to 36,000 (DeBrine, 1971), and 12,700 in 1975 (Sorensen, 1977).

## 7. Identified Gaps between Supply and Demand

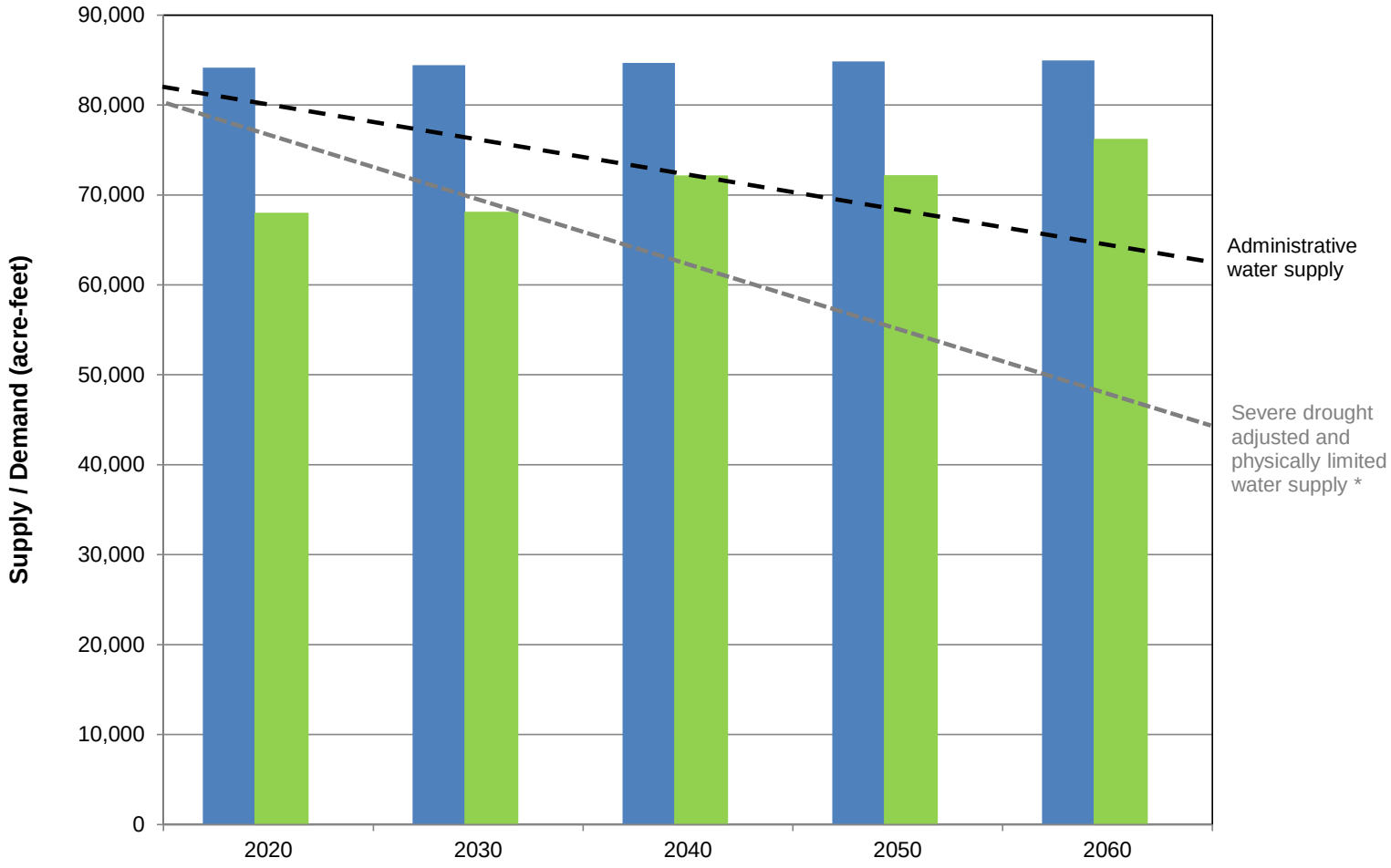
Estimating the balance between supply and demand requires consideration of several complex issues, including:

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

- As discussed in Section 4, there are considerable legal limitations on the development of water supplies in the Estancia Basin. The basin is closed to new water rights appropriations, other than domestic and livestock wells, which affects the ability of the region to prepare for shortages by developing new supplies within the region and no other source of supply are available.

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

Despite these limitations, it is useful to have a general understanding of the overall balance of the supply and demand. Figure 7-1 illustrates the total projected regional water demand under the high and low demand scenarios, and also shows the administrative water supply and the drought-adjusted water supply. As presented in Section 5.5, the region's administrative water supply is 84,129 acre-feet based on 2010 withdrawals but is expected to decline to about 65,000 acre-feet by 2060. The drought supply is estimated to be about 47,900 acre-feet in 2060, or 57 percent the 2010 administrative water supply. Future water demand projections do not reflect substantial growth in water use (Figure 7-1), due to the declining economy discussed in Sections 3 and 6.




* Based on modeling conducted by the New Mexico Office of the State Engineer and no surface water use.

Figure 7-1

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Available Supply and Projected Demand**

The future water supply is represented as declining based on the predicted impact to the Estancia Basin Valley Fill if the aquifer continues to decline at current rates (Figure 7-1, Table 7-1). Comparing the projected demands to the future supply following a prolonged drought shows a range of water shortages between 22,000 and 37,000 acre-feet in 2060. However, water management strategies to mitigate the impacts of diminishing groundwater supplies are high priorities for the region (EBWPC and HR, 2010); thus the rate of decline may change to enhance the life of the aquifer.

**Table 7-1. Water Use and Estimated Availability in the Estancia Basin Water Planning Region**

| Source | Basin | 2010 Estimated Water Use (ac-ft/yr) | 2060 Estimated Water Availability (ac-ft/yr) | |
|---|---|---|---|---|
| | | | No Drought | One 20-Year Drought |
| Valley fill aquifer | Estancia Valley UWB | 77,531 | 58,328 | 41,384 |
| All other aquifers | Six other UWBs | 6,538 | 6,538 | 6,538 |
| Surface water | All areas | 60 | 60 | 0 |
| | Total | 84,129 | 64,926 | 47,922 |
| | Future water use as a percentage of 2010 use | | 77% | 57% |

ac-ft/yr = Acre-feet per year
UWB = Underground water basin

## 8. Implementation of Strategies to Meet Future Water Demand

To address the balance and gap between supply and demand and to ensure that the region is prepared to address future water needs, the Estancia Basin considered a variety of strategies for meeting demand. As discussed in Sections 5 and 7, the water supply in the closed basin is declining in the most heavily pumped areas and improved management will require both a better understanding of the resources and flexibility not currently allowed by state water law. Thus, the Estancia Basin strategies are focused on acquiring information about the hydrogeology and stresses (pumping) on the aquifers for improved modeling and a pipeline to allow transfers of water as needed.

This RWP builds on the water plan prepared by the EBWPC and accepted by the NMISC in 1999 (1999 RWP) and the subsequent 2010 RWP update, and is considering strategies that will enhance and update, rather than replace, the strategies identified in the 1999 RWP and the 2010 RWP update. An assessment of the status of strategies from the 1999 RWP is included 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 included in Section 8.3. This list is dynamic and serves as examples of the types of projects to be evaluated for the basin.

## 8.1 Implementation of Strategies Identified in Previous Plans

Due to concerns about the declining water levels in the Estancia Basin, the EBWPC was initiated by Torrance County in 1993 and was formalized, in its current form, in 1995 through a tri-county Memorandum of Understanding. The EBWPC, composed of citizens representing major stakeholders, has met regularly and worked diligently to address the water supply issues in the region. The 1999 RWP included four major categories of programs:

- Management Programs
- Conservation Programs
- Water Development Programs
- Water Quality Programs

Since the release of the 1999 RWP, the elements of each of the programs listed above have been implemented with varying degrees of success, as shown in Table 8-1. This summary is compiled from the detail provided in the 2010 RWP update prepared by the EBWPC through its ongoing efforts and updated by EBWPC as part of this planning effort. The three SWCDs in the region (Edgewood, East Torrance, and Claunch-Pinto) have been actively involved in numerous watershed restoration projects (described in Section 8.3.1).

The 2010 RWP update (EBWPC and HR, 2010) concluded that the primary concerns mentioned in the 1999 report remain unchanged and noted an increased interest in the development of brackish groundwater resources and preliminary studies and inquiries for development of two intra-basin pipelines. The 2010 RWP update utilized the current understanding of the water resources of the Estancia Basin along with the political, cultural, social, and economic dynamics of the Estancia Basin to set its five-year priorities as follows:

> *1.) In order to promote the agricultural heritage of the basin, and because approximately 95% of the groundwater use in the basin is agricultural, it is imperative that the EBWPC investigate, promote, and encourage changes in farming techniques and facilitate the conversion from spray irrigation based practices to lower water use systems such as no-till, drip irrigation, and/or greenhouse based agriculture.*
>
> *2.) In order to protect and fully utilize existing proven water rights, EBWPC will promote and encourage public and/or private efforts for development of an intra-basin water pipeline to allow physical transfer of water within the basin.*
>
> *3.) In order to understand the uncertainties associated with the planning process, EBWPC will investigate the magnitude and uncertainty of declared and appropriated "paper water" rights and determine the impact on the plan and water resources of the basin if such rights were converted to "wet water" pumping.*
>
> *4.) In order to be prudent with a limited resource and to fulfill its designated responsibilities, EBWPC will review and propose ordinances and policies for local governmental entities with respect to water conservation and increased efficiency of use.*

## Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Estancia Basin Water Planning Region



| Strategy | Status / Action Taken |
|---|---|
| ***Category I: Management Programs*** | |
| Special Groundwater Management Area | • In 2002 the NMOSE designated portion of the Estancia Basin as a Critical Management Area.<br>• In 2002 the NMOSE adopted new guidelines for the administration of the Estancia Underground Water Basin which closed the Estancia Basin to new Section 72-12-3 applications to appropriate water or the transfer of water rights into severely stressed areas; Limits Section 72-12-1 permits for household use to 0.5 acre-feet per year or less; Adopts detailed enforcement provisions to cancel water rights which have not been developed; Institutes water conservation provisions requiring water well metering and use of best technology practically available; and Coordination of water quality assessments with other state and federal agencies. |
| Coordinate, Planning and Oversight | • The Tri-County Memorandum of Understanding continues to be the basis for the EBWPC as a basin-wide coordinating and oversight entity with funding of $20,000 from Santa Fe County.<br>• East Torrance Soil and Water Conservation District (SWCD) provides administrative support and Torrance County is the financial agent.<br>• NMISC provided funding in 2006 and 2007 to support the 2016 regional water plan and New Mexico State Representative provided $30,000.<br>• The EBWPC met monthly from 1999 through 2014, then every other month. |
| Comprehensive Monitoring | • Sandia National Labs (SNL) developed a comprehensive monitoring and hydrogeological characterization program that includes (1) defining the fresh/brackish water interface within the valley fill, (2) better understanding the underlying aquifers beneath the valley fill and (3) identifying recharge areas and finding ways to enhance recharge.<br>• Water quality and water level information in a variety of locations within the Estancia Basin are collected to expand on the information collected by the United States Geologic Survey (USGS). NMOSE has funded the USGS to measure water levels in approximately 57 wells within the Estancia Basin since the1950s. EBWPC has retained HydroResolutions to monitor and evaluate groundwater level data from wells within the Estancia Basin. The most recent report (HydroResolutions, 2016) documents the data from continuous transducer-recorded data from ten wells and manual water-level measurements from 13 wells. To date, 14 wells have been subject to continuous monitoring for some period of time.<br>• An investigation to measure and record precipitation and soil moisture at a location in the Cedar Crest area was designed to quantify the amount of water that makes it below the root zone of the native vegetation in both an open meadow-type area and in a pinon/juniper forested area (EnviroLogic, Inc. 2007). |

**Table 8-1. Implementation Status of Strategies Identified in Accepted Plan**
**Estancia Basin Water Planning Region**


| Strategy | Status / Action Taken |
|---|---|
| Information and Education | • The East Torrance, Edgewood, and Claunch/Pinto SWCDs as well as the National Resource Conservation Service hold many different types of informational and educational programs. Some of these programs include water fairs, rolling river presentations, and the testing of well water for water quality parameters.<br>• The EBWPC maintains a website (http://www.ebwpc.org/) with information on upcoming meetings, reports and draft documents for review.<br>• The EBWPC members supported the New Mexico Forest & Watershed Health website (http://allaboutwatersheds.org/) that is a clearinghouse for watershed projects. |
| Local Codes and Ordinances | • Bernalillo and Santa Fe Counties have initiated water conservation ordinances requiring the use of high efficient plumbing, water savings devices, xeriscaping, precipitation harvesting, and consideration of such elements during the design and permitting stages of development projects. Rebate programs are offered by Santa Fe and Bernalillo Counties. Some Santa Fe County ordinances address rebuild/retrofit issues<br>• The EBWPC works with Torrance County in reviewing subdivision applications at the preliminary plat stage to evaluate these applications with respect to the goals and programs of the EBWPC. |
| ***Category 2: Conservation Programs*** | |
| Audit and Budget | • Audit and retrofit programs have been established and are active in both Santa Fe and Bernalillo Counties for residences. |
| Plumbing and Retrofit | • Bernalillo and Santa Fe Counties and Edgewood and East Torrance SWCDs have retrofit programs for residential customers. |
| Agricultural Efficiency | • The Low Energy Precision Application (LEPA) program was established by the Estancia Field Office of the Natural Resource Conservation Service. Spray irrigation systems were converted to LEPA systems, reducing evaporative losses which resulted in an estimated 11,000 acre-feet per year water savings with approximately 7,600 acre-feet in increased irrigation efficiency efforts. |
| Metering | • A metering program was developed and implemented on a voluntary basis but there has been no systematic reporting or use of the data. NMOSE now requires that new wells, wells undergoing repair or deepening, and domestic wells be metered. However, there is no systematic NMOSE program for ensuring reporting of metering data after the initial installation and reporting. |

**Table 8-1. Implementation Status of Strategies Identified in Accepted Plan**
**Estancia Basin Water Planning Region**
Page 3 of 4

| Strategy | Status / Action Taken |
|---|---|
| Watering Practices | • Both Bernalillo and Santa Fe Counties have implemented water programs for businesses and residential use that restrict watering during mid-day when evaporation is highest. |
| Water Rights | • EBWPC has conceptualized the components of a multifaceted program involving legislation, incentives, buyouts, leasing, and banking programs which are all critical to the success of any conservation effort in a largely rural area and to the success of the Plan. Until the basin is adjudicated, no progress can be made on managing water rights and the water resource. |
| Water Catchment Programs | • Edgewood and East Torrance SWCDs have water harvesting cost-share programs. The water harvesting programs are available residential, agriculture and commercial buildings; harvested water can be used as potable, non-potable, agricultural and for fire protection. |
| ***Category III: Water Development Programs*** | |
| Cloud Seeding | • Determined to be unfeasible. |
| Terrain and Vegetation Modification | • Terrain and vegetative modification programs, primarily of forest thinning projects along the eastern slope of the Manzano Mountains are ongoing (see Watershed Management Alternative below) resulted in 5,164 acres of treated forest.<br>• Estimated increase in water supply of 3,400 acre-feet through forest thinning projects. |
| Undeclared Area Annex | • Previous undeclared areas were annexed by NMOSE in 2006. |
| Underground Investigation | • The comprehensive monitoring program described above will help understand and manage the resource. |
| Desalination/Brackish Water Development | • In 2006, Great Basin Water proposed to develop a portion of the brackish water resources of the Estancia Basin in order to reduce the demand on the Valley Fill aquifer. EBWPC has several concerns with the development of this resource including (1) potential for encroachment of brackish water on fresh water resources, (2) potential for cross-aquifer contamination, (3) the relative percentage utilization of fresh and brackish water resources, (4) the long-term sustainability of such supplies, (5) nature and disposal of the generated waste. |
| ***Category IV: Water Quality Programs*** | |
| Monitoring | • See discussion above on implementation of Comprehensive Monitoring Program. |
| Aquifer Protection | • Bernalillo County filmed a public service announcement regarding the need to properly plug and abandon wells which aired on Govt TV-16. In Year 2005, Bernalillo County also adopted a new individual well ordinance that included new permitting and construction requirements.<br>• SNL developed an inventory of active and abandoned wells for monitoring purposes. |

**Table 8-1. Implementation Status of Strategies Identified in Accepted Plan**
**Estancia Basin Water Planning Region**


| Strategy | Status / Action Taken |
|---|---|
| Aquifer Protection (cont.) | • The East Torrance, Edgewood, and Claunch/Pinto SWCDs established a well plugging program funded through a grant received from the Soil & Water Conservation Commission. This program is inactive due to a lack of funding. Some well plugging and abandonment efforts are ongoing as part of the Estancia Watershed Health Monitoring Project being conducted by SWCA. |
| Septic Tank Remedial Program | • The Bernalillo County Wastewater Ordinance was updated in 2007, 2012, and in 2015. The Ordinance now requires that all wastewater systems be permitted, that systems older than 30 years be evaluated on a five year basis, and that advanced systems are required on lots less than ¾ acre. The County has also instituted a campaign to address all unpermitted systems in the unincorporated areas of the County. |
| Sewer Systems | • Edgewood wastewater treatment system improvements funded by the legislature (SB159). |
| Septic Tank Effluent | • EBWPC educated County government on nitrate problem and need to address septic tank effluent. |
| Watershed Management | • Eight USFS CFRP funded projects resulting in 2,350 acres treated (see Appendix 8-B for details).<br>• 10 Water Trust Board funded projects resulting in 4,063 acres treated.<br>• 5 State Forestry funded projects resulting in 3,153 acres treated.<br>• USFS treated 10,035 acres.<br>• Pueblo of Isleta treated 1,661 acres.<br>• Other USFS partners treated 2,649 acres. |

The steering committee reviewed each of the strategies and indicated that they are all still relevant, though some refocusing of efforts is recommended as discussed in Section 8.2. Actions that have been completed in order to implement the strategies identified in the 2010 RWP update are summarized on Table 8-1. To fully understand the water resource issues facing the region, the 2010 Update is available at http://www.ebwpc.org/PDFS/water_plan2010/Plan_Update_Final.pdf.

## 8.2 Water Conservation

Water conservation is one of the many actions taken and proposed by the EBWPC to address the projected gap between supply and demand. Both Bernalillo and Santa Fe counties have implemented water conservation actions, including programs for business and residential use that restrict watering during mid-day when evaporation is highest and audit and retrofit programs. Edgewood and East Torrance SWCDs have water harvesting cost-share programs. The water harvesting programs are available for residences, agriculture, and commercial buildings; harvested water can be used as potable, non-potable, and agricultural supply and for fire protection. Water use in the City of Moriarty is guided by the *Moriarty Comprehensive Plan Update* (MRCOG, 2012b) and the *Water Conservation Program for the City of Moriarty* (MRCOG, 2012a).

The largest water use in the region is by far the agricultural sector, and thus the region is focused on agricultural water efficiency efforts, such as those listed in Table 8-1, including the low energy precision application program to convert spray irrigation systems and reduce evaporative losses by an estimated 11,000 acre-feet per year. A metering program was developed and implemented on a voluntary basis, but could be expanded. Water conservation will continue to be included in all future water planning efforts in the region, and water providers will continue to implement their existing water conservation programs and drought contingency ordinances. As shown in Table 8-1, several water conservation projects have been completed since the original plan was accepted in 1999.

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

In addition to continuing with strategies from the previous plan, the EBWPC 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 EBWPC and other stakeholders and reflect their interest and intent. The recommendations made by the EBWPC 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 List of Projects, Programs and Policies

Over the two-year update process, seven meetings were held with stakeholders in the Estancia Basin 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 provided in Appendix 8-A. Information was requested during several open meetings. Requests for input were also e-mailed to all stakeholders who had expressed interest in the regional water planning process.

Most of the projects were already identified in the Estancia Basin's previous water planning efforts, particularly the 2010 RWP update. Some water projects were identified through the State of New Mexico Infrastructure Capital Improvement Plan (ICIP) and Capital Outlay funding processes; these projects are also included in the Estancia PPP table. 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 watershed management and restoration, water conservation, water, wastewater and other water-related infrastructure projects, and monitoring programs that help improve the understanding of the water resources.

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 region will build on the ongoing extensive water restoration projects spearheaded by the three SWCD in the region, each of which is detailed in Appendix 8-B.

The information in Appendix 8-A has not been ranked or prioritized; it is an illustrative list of the types of PPPs that regional stakeholders are interested in pursuing as of 2016. The list will need to be updated as needed to reflect the needs of the region. It includes both projects that are 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 improving system efficiency, reducing demand, protecting existing supplies, and increasing water supplies. In the Estancia Basin Region, projects identified in the PPP table are primarily water system infrastructure (such as a central pipeline), agricultural conservation, exploratory wells to improve the knowledge of the Estancia Basin, monitoring and updated groundwater modeling, and stormwater protection projects.

The steering committee is concerned about the PPP list, that defining specific projects will result in confining the region to receiving funding only for the specified projects. Historically, over the last two decades, the EBWPC has collaborated on assessing big-picture water planning problems and possible strategies to address the problems, such as the declining water table in the closed

groundwater basin. Projects from an ICIP list or other specific water system needs (like drilling an emergency well for a community), while important, do not need to obtain approval from a regional water planning entity such as the EBWPC.

Given the above-mentioned concerns, the Estancia Basin Regional Water Planning Steering Committee is interested in describing the projects currently identified for meeting future water needs.

### 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 EBWPC meetings held in 2015 and 2016, and in numerous meeting held to develop and implement their 2010 RWP update, 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.

Key collaborative projects identified by the EBWPC and stakeholders are shown on Table 8-2 and listed below under the categories developed in the original water plan in 1999. Watershed restoration and monitoring programs appear under multiple categories because these programs are important to many aspects of water resource management.

- Management programs
    - An improved groundwater model is needed to reflect new information about the aquifer, including the most recent understanding of geology and structure. The existing model severely underestimates drawdown southwest of Estancia, poorly represents the underlying formations, and includes estimates of pumping that are speculative; thus, it should be updated to improve predicted water level response for water resource management.
    - Water level monitoring program of water levels in 8 wells (with transducers) and in 13 wells (with quarterly manual measurements) should be continued in order to gather important information on aquifer response. Water level data are vital to maintaining a calibrated numerical model of the groundwater resources.
    - Water banking or leasing programs could be coupled with water conservation programs to extend the life of the basin. This could include options to lease water rights as well as a tool to allow for water conservation without loss or forfeiture of water rights.

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
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| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| ***CATEGORY 1:MANAGEMENT PROGRAMS*** | | | | | |
| ***Improved Groundwater Model*** | | | | | |
| Revise existing administrative model to improve understanding of resource through Basin Computer Model and GIS | NMOSE | EBWPC, Estancia, Torrance, Southern Santa Fe County | | > 50,000 | Requires NMOSE to implement, uncertain of their priorities. Also requires metering of wells. |
| ***Water Level Monitoring Program*** | | | | | |
| Support water level monitoring programs like the current project for monitoring water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | | $35,000 – 60,000/year | Highly feasible, ongoing investigation to improve understanding of water resources |
| ***Water Banking*** | | | | | |
| This could include options to lease water rights as well as a tool to allow for water conservation without loss of water rights. | Estancia, Moriarty, Willard and Torrance (EMWT) Regional Water Association or other pipeline system | Estancia, Willard, Moriarty and Torrance & Farmers, Southern Santa Fe County or other basin partners | | $ 700,000 | Feasible if water rights are metered and the central pipeline is developed. |

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
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| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| ***CATEGORY 2:CONSERVATION PROGRAMS*** | | | | | |
| ***Develop Water Conservation Program*** | | | | | |
| Develop a water conservation program to implement the water conservation program statute with the purpose of enabling water right owners to conserve the resource without losing their water right. | | | | | Water rights must be put to beneficial use or they can be reduced. Without a change in the current NMOSE "use it or lose it" policy, farmers will continue to pump the maximum amount allowable under their rights to ensure that there is no way that they can lose their water rights. |
| ***Agricultural Conservation*** | | | | | |
| Reduce water use through alternative crops/irrigation methods | USDA | East Torrance SWCD & local farmers | | $ 200,000 | Impacts farmers' techniques: more uncertainty with different crops, operations are different, more unknowns. Lessen impact of decline in agricultural production. |
| ***Water Rights Metering*** | | | | | |
| Install meters on all wells to quantify actual diversions and improve management of resources | NMOSE | EBWPC, SWCD, & Water Right holders | | $ 500,000 | Low feasibility because it needs to be part of NMOSE administrative guidelines. Would provide a sense of fairness, clarity with water rights for transfers or leases. |

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
**Page 3 of 6**

| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| ***Residential and Commercial Water Conservation*** | | | | | |
| Develop water conservation programs to encourage water conservation, like roof-top harvesting | Edgewood and East Torrance Soil & Water Conservation Districts | Claunch-Pinto SWCD | District Cost-Share Funding, WTB | $5,000 to $10,000 per project | Funding |
| ***Watershed Monitoring*** | | | | | |
| Estancia Basin Watershed Monitoring | Claunch-Pinto SWCD | East Torrance and Edgewood SWCDs; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | WTB, Private Foundations | $175,000/year | Funding |
| **CATEGORY 3: WATER DEVELOPMENT PROGRAMS** | | | | | |
| ***Drill Exploratory Deep Wells*** | | | | | |
| Hydrologic Investigations into other aquifers - deep wells with piezometers will provide better understanding of deeper resources and aquifer interaction | EBWPC | East Torrance SWCD & Edgewood SWCD & NMOSE | | $ 260,000 | Very feasible. Could use deep wells for agriculture and save valley fill for domestic wells |

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
**Page 4 of 6**

| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| ***Forest Restoration*** | | | | | |
| Reduce risk of high-intensity fire, improve health and enhance recharge, and minimize risk of destruction of homes and associated social disruption following catastrophic fires | Claunch-Pinto and East Torrance Soil & Water Conservation Districts | SWCDs, Land Grants, Tribal Entities, State Forestry, Private Land Owners, USFS, NMED, NMFWRI, Highlands University | $80,000/year cost share from East Torrance SWCD in 2016 | $600,000-900,000/year | Public support for thinning, but concern about USFS designating watershed areas as Wilderness that may hamper efforts to restore forests. |
| ***Develop Program for Deepening Wells*** | | | | | |
| Develop a collaborative program to facilitate water right holders deepening or replacing wells to prior capacity | EBWPC | NMOSE | | | Need criteria to allow for deepening or replacing wells in lower aquifers |
| ***Watershed Monitoring*** | | | | | |
| The principal goals of the monitoring are to determine the effectiveness of standard forest thinning on soils, hydrology, water yield and quality, vegetation, and wildlife | Claunch-Pinto SWCD | State Forestry, USFS, NMED, NMFWRI, Highlands University, NM Game and Fish, Pueblo of Isleta, SWCDs, Private Land Owners | WTB | $159,000/year | |

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
**Page 5 of 6**

| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| **CATEGORY 4: INFRASTRUCTURE PROGRAMS** | | | | | |
| ***EMWT Pipeline*** | | | | | |
| Pipeline(s) transecting the Estancia Basin to allow transfer of water leased through water bank to areas that need the water | EMWT Regional Water Association or other pipeline system | Estancia, Willard, Moriarty and Torrance or other basin partners | | $60-135M | Very feasible, dependent on water leases and acquisition of right or way. Help farmers manage their resources and provide options, foster business investment, promotes lower/middle income housing stability (Domestic wells going dry, folks can't afford to drill). Spread the decline in water table, reduce localized stresses, allow water level recovery, and reduce potential for subsidence. |
| **CATEGORY 5: WATER QUALITY PROGRAMS** | | | | | |
| ***Improve Wastewater Systems*** | | | | | |
| Programs the address contamination of groundwater from septic tanks or other water quality concerns | | | | | |

**Table 8-2. Key Collaborative Programs, Projects, and Policies, 2016 Estancia Basin Regional Water Plan**
**Page 6 of 6**

| Project Description | Project Lead | Project Partners | Probable Funding Source(s) | Cost Range | Major Implementation Issues |
|---|---|---|---|---|---|
| ***Watershed Management*** | | | | | |
| Reduce risk of high-intensity fire, improve health and enhance recharge, and minimize risk of destruction of homes and associated social disruption following catastrophic fires | Claunch-Pinto SWCD | State Forestry, USFS, NMED, NMFWRI, Highlands University, SWCDs, Private Land Owners | | $600,000-900,000/year | Public support for thinning, but concern about USFS designating watershed areas as Wilderness that may hamper efforts to restore forests. |
| ***Watershed Monitoring*** | | | | | |
| The principal goals of the monitoring are to determine the effectiveness of standard forest thinning on soils, hydrology, water yield and quality, vegetation, and wildlife | Claunch-Pinto SWCD | State Forestry, USFS, NMED, NMFWRI, Highlands University, NM Game and Fish, Pueblo of Isleta, SWCDs, Private Land Owners | WTB | $159,000/year | |

- Conservation programs
    - Development of a water conservation program to implement the water conservation program statute amended in 1991 (NMSA 72-5-28 and 72-12-8). Develop criteria to enable water rights owners to execute a water conservation program to allow for long-term management and protection of water rights without forfeiture of the water rights.
    - Agricultural conservation program to reduce water use through alternative crops and/or irrigation methods.
    - Water rights metering program to install meters on all wells to quantify actual diversions and improve management of resources.
    - Residential and commercial water conservation programs that encourage water conservation like rooftop harvesting are important.
    - Watershed monitoring programs to assess the impacts of watershed treatments on soil, hydrology, water yield, vegetation, and wildlife are important to implement best management practices.
- Water development programs
    - Drill exploratory deep wells to investigate the hydrologic properties of other aquifers. Deep wells with piezometers will provide a better understanding of deeper resources and aquifer interaction and address ongoing concerns to recover capacity of senior water right holders (see Section 8.2.3). The deep wells will also help in understanding the brine resources below 2,500 feet and evaluate potential impact on overlying fresh aquifer resources.
    - Forest restoration and terrain and vegetative modification programs are important to reduce the risk of catastrophic wildfire and maintain healthy conditions in the recharge areas of the basin. The EBWPC is concerned with the Cibola National Forest's possible recommendation to designate portions of the Cibola National Forest within the Manzano Mountains as wilderness areas. This recommendation comes out of the ongoing review and revision of the 1985 Land and Resource Management Plan (U.S. Forest Service, July 1985). Federally designated wilderness areas are subject to restrictions on mechanized treatments, which would limit the abilities of local entities to manage watersheds (U.S. Forest Service, 2006).
    - Develop a collaborative program to facilitate water right holders deepening or replacing existing wells to recapture capacity. Develop criteria to allow for deepening or replacing wells in lower aquifers to recapture capacity of water right holders.

    - Watershed monitoring programs to determine the effectiveness of forest thinning on soils, hydrology, water yield, vegetation, and wildlife are important to maintain best management practices in forest treatments.

- Infrastructure programs
    - The Estancia, Moriarty, Willard and Torrance (EMWT) Pipeline or other pipeline system program that transfers water leased through a water bank, or other permitted mechanism, to areas that need the water is a key component to managing the water resources and meeting future demands. This project can only be successful if water right sheltering (without risk of forfeiture) can be done under an approved water conservation plan.
- Water quality programs
    - Improved wastewater treatment systems are essential to addressing contamination from septic tanks or other water quality concerns.
    - Watershed management to reduce the risk of high-intensity wildfires, improve forest health, and minimize risk of destruction of homes associated with catastrophic fires is important for protecting water quality.
    - Watershed monitoring to determine the effectiveness of forest thinning on soils, hydrology, water yield, vegetation, and wildlife are important for maintaining best management practices.

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.

The EBWPC identified the following recommendation for PPPs to be considered in the state water plan and other State action:

- Allow flexibility for water banking, leasing, and temporary transfers of water.
- Require metering and reporting on all wells to improve estimates of actual water use.
- Improve groundwater modeling to reflect improved understanding or hydrologic boundaries and actual pumping. Until the actual water use in the basin is better estimated, management of the resource is very difficult.
- The projected demand and depletion numbers are based on a limited number of metered wells, a limited number of measurement points, and "best available" data. Consequently, the projections are essentially a "best guess" with associated large uncertainties. This can only be corrected with additional funding and staffing for basic data collection programs at the local, state, and/or federal level. Without such funding, little if anything can be done to advance the state of knowledge of the basin's groundwater resources.
- Additionally, the NMOSE database indicates that there remains over 159,000 acre-feet per year of "permitted" water rights, although only a portion of those rights, approximately 61,000 acre-feet per year, are being or have been put to use since 2005. Implementation or use of those unused permits, in part or in total, would put the Estancia Basin in a grave and potentially disastrous situation. Accordingly, NMOSE action to at least clarify the status of these unused permits is of critical importance. Such action is beyond the purview or regulatory authority of the EBWPC or county governments. NMOSE should continue ongoing efforts to cancel permits in which little or no beneficial use has been exercised.
- Work with the EBWPC on the criteria for deepening wells in the Estancia Basin.
- When considering interbasin transfer applications, the NMOSE should be mindful of Senate Joint JM 17 (2008) considerations as well as local public welfare statements, criteria, and priorities.
- Educate title companies statewide on the need to file a change-of-ownership for real estate that includes a well.

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.

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# Appendix 2-A

# Master Stakeholder List

# Estancia Region 13 RWP Master Stakeholder List

June 2016

| Last | First | Affiliation / Category |
|---|---|---|
| Barela | Ted | Estancia Basin Resources Association |
| Bassett | John | Mayor, Town of Edgewood |
| Chace | David | HydroResources, Inc |
| Chavez-Gutierrez | Vanessa | President La Merced Del Pueblo De Tajique Land Grant |
| Crane | Lawrence | NM State Forestry |
| Greene | J. Brian | Member Estancia Basin Water Planning Committee |
| Guetschow | Steve | Torrance County Planning and Zoning |
| Hart | Ted | Mayor, City of Edgewood |
| Immerwahr | George | Mountainair City Councilor |
| Jaramillo | Linda | Torrance County Clerk, Member Estancia Basin Water Planning Committee |
| Jones | John L. | Chairman Estancia Basin Water Planning Committee<br>Bernalillo County<br>Municipal/Developer/Utility |
| King | Rhonda | Estancia Moriarty Willard Torrance County Water Association |
| Lewis | Joshua | Claunch-Pinto Soil and Water Conservation District Intern |
| Lopez | Orlando | Manzano Spring and Ditch Association<br>Manzano Domestic Water Consumer Association<br>La Merced Del Pueblo De Manzano Land Grant |
| Lujan | Cheri | East Torrance Soil and Water Conservation District<br>NRCS<br>Member Estancia Basin Water Planning Committee, |
| McGregor | Daniel | Bernalillo County Hydrologist<br>Member, Secretary/Treasurer, Estancia Basin Water Planning Committee |
| Ortiz | Debbie | Town of Encino and Public Health |
| Perea | John | U.S. Department of Agriculture, Farm Service Agency<br>Torreon Land Grant |
| Perea | Jose Maria | President Torreon Land Grant |
| Perkins | Tom | State Land Office, Surface Resources Division<br>Member Estancia Basin Water Planning Committee |
| Romero | Johnny | La Merced del Pueblo de Tajique Land Grant |
| Salas | Herman | Torreon Acequia |
| Schoeppner | Jerry | Santa Fe County Hydrologist |
| Schwebach | Ryan | East Torrance Soil and Water Conservation District<br>Member Estancia Basin Water Planning Committee |
| Shepherd | Steve | Town of Edgewood |
| Simmons | Rita-Loy | Member Estancia Basin Water Planning Committee |

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.

# Estancia Region 13 RWP Master Stakeholder List

June 2016

| Last | First | Affiliation / Category |
|---|---|---|
| Swenka | Art | Edgewood Soil and Water Conservation District<br>Member Estancia Basin Water Planning Committee<br>Estancia Basin Resources Association |
| Tarr | Dierdra | Claunch-Pinto Soil Water Conservation District<br>Member Estancia Basin Water Planning Committee |
| Thompson | Rick | Vice-Chair Estancia Basin Water Planning Committee<br>Santa Fe County farmer |
| Tixier | Dave | Estancia Basin Water Planning Committee<br>Torrance County |
| Tyler | Cass | Town of Willard Sanitation Committee |
| Warren | Alan | U.S. Forest Service |
| Winn | Gene | Torrance County<br>USDA Extension Service, Program Director<br>Member Estancia Basin Water Planning Committee, |
| Zamora | Gloria | La Merced del Pueblo de Manzano Land Grant |

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

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| General | | | No public welfare section or discussion is included. Please list the public welfare criteria previously provided in the 2010 update section 5.6, in the legal section of this update, or if that is not acceptable, then as a new subsection in Section 2.0 - probably as 2.4, or as a minimum as a sep |
| | | | No mention of acequias by name or recognition of area land grants. Probably need to address this in intro section 3.1 (land grants) and 3.3 (acequias). Wherever tribal entities and land areas are discussed in other regions, would probably be appropriate section for land grant discussion. They are legal entities, and need to be recognized (as are acequias). |
| | | | Difficulty in monitoring capability for wilderness designated areas. This couples with concerns of markedly increased canopy interception in wilderness areas due to lack of management and its potential for effects on recharge to the Madera. This discussion is probably warranted for Section 3. or wherever recharge areas are discussed. but that raises another question, Where are the recharge areas for the underlying formations discussed or even mentioned? |
| | | | Protect well and land grand rights of older communities , particularly along the Monzano foothills - Perhaps discuss in Section 4 (impairment and recourse) |
| | | | Phase I OSE termination of unused permits for Estancia Basin completed - how many paper water rights have been cancelled? (Perhaps discuss in section where amount of total permits is mentioned, believe that is Page 7 second bullet, or might mention in Section 4.0) and then address continuation of Phase II as a Section 8.2.3 bullet item? |
| | | | Need to incorporate explanation with mention in section 4 or 8 (referencing to page 7, 5th bullet.). Without understanding how the diversion vs depletion, vs consumptive use are calculated its not clear to the lay reader what is intended. How can you reduce the diversion amount, but not reduce depletion, in layman's terms. Think a similar statement appears in Section 8 |
| | | | Water right sheltering can be done under an approved water conservation plan, and is part and parcel with water banking concept . Accordingly need reference in legal section for the existing conservation plan provisions, need additional explanation in section 8. Need to tie together leasing, banking, water conservation |
| | | | Need specific reference to acequias and land grants in background section. Both entity types have request more time for review and for discussion of the water plans impact to mountain communities |
| Table of Contents | | | Several appendices will be requested in comments below. TOC will need to be corrected accordingly. |
| 1 | 2 | | Please insert statement following HR 2010 reference. "The 2010 Update was approved by local entities, forwarded to the ISC for acceptance, but no further approval action was taken by the ISC." |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 1 | 3 | | Include statement "and to incorporate data/information provided in the 2010 Update.". *Note to Amy and Emily- since the 2010 Update was never officially accepted by ISC, it would seem prejudicial/disingenuous, and is definitely inconsistent for ISC to then take a position that any thing we suggest be included from the 2010 Update be excluded based on a position of "that data was already reported". There really should be a strong technical basis for its exclusion.* |
| 2 | last bullet | | Not all applicable data was utilized - no updated figures from Hydroreolutions or OSE monitored wells were included or discussed, so the blanket statement is incorrect - need Appendices or comment that such key update data is provided in Appendices (Hydroresolutions, etc.) |
| 3 | 1/Section 3.1 | | Need a general comment about the administrative/planning boundary differing from the hydrologic boundaries. |
| 4 | 1st | | Expand summary table to include percentages, and also add values and percentages for population (2010) and water demand by County and percentage |
| 4 | 2nd | | Move discussion of physiographic provinces to end of second paragraph - it doesn't flow or fit within context of section 5 where it currently resides. |
| 4 | 3.2 | | Mention watershed management concerns for wilderness (reference to 5.1). "underscore the importance of increased ability to properly management the watershed uplands, which supplies the basin recharge, and the need to properly manage watershed to ensure that overgrowth canopy in wilderness areas does not interfere with precipitation leading to recharge. *Seems like it best fits here, climate change could also affect the vegetative patterns resulting is similar affects?)* |
| 4 | 3.3 | | Salt basin lakes not shown of corresponding figure, nor are acequia locations or land grant locations identified nor are the other lakes later mentioned. Figure says intermittent streams vs ephemeral mentioned here. Need better clarification which are intermittent and which are ephemeral . This is important due to the inclusion of the 303 discussion in later sections, as the requirements differ based on those classifications, also need specific mention of acequias here with surface water. |
| Legal Section 4.0 | | | This section is disproportionately long compared to the purpose being a water plan update - suggest retaining the listing, but two sentence summary and an |
| | | | Please include reference Joint Memorial 17 (Bedford - 2008) regarding interbasin water transfers, in legal section of this update as well as discussion of the existing water sheltering provisions in an approved water conservation plan |
| | | | also, the length of this section is disproportionate to other sections and to the primary purpose of this report, which is not legal issues. Suggest doing three sentence summary and a sentence or to on impact on OSE Administration, then move this as is into a separate appendices. |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| Legal Section 4.0 (cont.) | | | If concerns from 2010 update not mentioned here and discussed, need to add reference to Section 8 where they need to be referenced as on-going. |
| Legal 1 | | | 1st paragraph - paragraph break should be the sentence before. |
| Legal 3 | last | | Reference needed here to existing OSE efforts on cancellations in basin here under Hanson, or under whatever authority is being utilized. And/or discuss use of this authority in Section 8 discussion. Also need reference within these section of forfiture or abandonment provisions from NMAC Chapter 72 (not new, and thinking that he enforcement may be occurring under those provisions). |
| Legal 11 | | | Section 4.1.2.6 Need reference here to the water conservation program for potential sheltering of rights. Also need reference to forfeiture statutes. |
| Legal 14 | | | Domestic double dipping (sell of water right, develop under domestic well statute) Might could be addressed earlier as it was Peter Wirth's bill that got passed a few years back because local efforts resulted subsequently in the state law (so move up under 4.1.2.7) - that is a significant oversight - why wasn't it included? Similar why has Senate JM 17 (2008) not been discussed within the legal context - it deals with interbasin transfers and that the move to must show it is the only option. Again - one wonders if that is just oversight or inconvenience for the OSE/ISC who wrote this section? |
| Legal 17 | | | Bernalillo County and Torrance have water rights / proof of availability requirements / longevity of supply in subdivision ordinances, also there is similar reference in state the subdivision act. |
| | | | Recent update to Santa Fe Sustainable Land Development Code - should also be referenced. |
| Legal 19 | | | Goshawk habitat probably should also be mentioned for Monzano - Torrance |
| Legal 21 | | | Remove discussion of CWA - not relevant to the Basin as there are no surface waters? |
| Main body of text | | | |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 6 | | | Can recent decline report from NMBGR be incorporated in mention. Also need to discuss declines in underlying aquifers as deepening is one of the management options to develop new supplies and/or retain existing capacities, and/or develop bring resources. Four appendices (or combination as appropriate) are specifically requested and should be included in the discussion and reference here or perhaps in 5.3.2 (This gets back to the fact that this is new data not previously accepted by the ISC in the 2010 update, nor has it previously been provided as it post dates the 2010 Update, and again its a question of whose plan is it and how will ISC address /accept/ incorporate data not its own? The four appendices should be the latest NMBG decline report that Amy sent out last week, the latest version of Hydroresolutions monitoring report, a copy of the earlier Hydroresolution evaluation of the basin status and water level status, and any similar reports of OSE data not included. This is needed as this report woefully depends/represent only the USGs measured wells, where as the referenced appendices are much more extensive and a truer/larger representation of the areal extend and also lower aquifer status. |
| 7 | 5th bullet | | Need to clarify - efficiency does equal decreased use. How is consumptive use increased? Doesn't make sense with decreased diversion? This needs a bit of background discussion about how agricultural water is administratively accounted -- given that most of the water demand is agricultural, its probably a more important use of space, then 21 pages of legal explanation, most of which, by the way, are NOT new regulations so technically "have already been reported" |
| 7 | 4th bullet | | Change "prevent" - to "evaluating and limiting adverse impacts from transfers". Also please include herein and emphasis of Senate JM 17 (2008 - Bedford) which originated out of this region - hence its still a issue and appropriately mentioned in legal section, and here as well. Also, its not our only focus as implied here - we've done a lot of watershed management vis the SWCDs, there is the monitoring program which addressed differing aquifers, and there is the promotion of the agricultural efficiency, and the transfer/develop domestic well permit that resulted in Peter Wirth's bill (which should be listed in Section 4). |
| 7 | last bullet | | Concern is not with stress on the aquifer, it is with the potential impacts on the overlying aquifers with fresh water including but not limited to the valley fill (i.e. brine intrusion), and also that it's a no or minimally renewable resource, and that deep aquifer interaction data is very limited (i.e. the unknowns). |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 8 | last bullet | | We disagree - we are showing some evidence of increased soil moisture and potentially recharge from southern Monzano studies.- need to incorporate SWCA study - call Dr. Cody Stopke - reports on "allaboutwatersheds. Org". Ox Canyon riparian restoration project is a project in point, as are the water level monitoring results for foothills wells as noted by Hydroresolution and even now the NMBG report - which is why they need to be included at least as appendices. also need to expand here that there is growing concern with potential designation of increased wilderness areas in the basin due to fire management and overgrowth limiting recharge potential. |
| 12 | 5.2 | | Introduction said all water supply is groundwater. Need specific mention of here of acequias, springs that feed upland lakes. Delete last sentence. Show lakes on corresponding figure. Again is this ephemeral or intermittent - they are not interchangeable terms in a regulatory context. |
| 13 | 5.3 | | Need to have appendices with cross-sections from 2010 Update. Again - they were not previously accepted, hence not previously reported, and need to be included as a result and also because the basin is not two dimensional and involves more that just the Valley Fill. With out depth perspective, the role of the evaporative lakes is not understood. Why mention physiographic basins here - not hydrogeology - should be background/regional information. |
| 15 | General | | Why is only valley fill discussed, need to discuss trends and wells from other formation. Need appendices with Hydroreolutions evaluation report and most recent HR WL monitoring report to show other wells, and possibly OSE data as well. |
| 16-17 | 5.4 | | What is the source for the cited water quality information. Subdivide the section to discuss surface water and groundwater separately (303D not applicable to GW, which is the major source of supply |
| 17 | | 2nd P | Correct the statement about 5-13. Those water bodies have not been impaired and are not shown on the figure 5-13, Table 5-8 indicates not assessed, so not impaired. Given that, why are the two middle paragraphs even included given lack of impairment - this is irrelevant boiler plate and should be removed. |
| 18 | 5.4.1 | | Generic text, no surface water to basin, so no point discharges - please mention. Remove reference to Table 5.11 which doesn't exist - renumber tables accordingly |
| 19 | 1st P. | | Clarify whether there are known releases based on active and/or historic monitoring of these landfill sites. Similar to what was just done with USTs, you need to put the risk into perspective - know, suspected, or unknown? |
| 19 | Last P | | Reference to Sandia studies is out of place, doesn't deal with contamination and never intended to - its about regional groundwater study for hydrogeology - move it forward to 5.3, well prior to point sources. |
| 20 | 5.5.1 | | If not irrigation wells metered, then how did OSE get to the estimated diversion - need clarification - photo analysis? |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 20 | 5.5 | | Need specific reference to not using unused paper water rights given the abundance in the basin - could also again reference ongoing OSE to terminate permits that have not been shown to be put to beneficial use. |
| 21 | 5.5.1 | | Question that deeper well use remains same. As valley fill depletes, likely that senior rights would be allowed to go deeper. Also need the basin criteria in Section 4 to specifically call it out. Need to include this as concern in section 8. Also clarification on how wells screening multiple wells and pre-basin wells - again in Section 8. also, as will be mentioned for bullets - there is a HUGE assumption that the well records are correct with regard to depth, screen interval, and initial reported water levels as opposed ot currently measured. |
| 22 | bullets | | 2nd bullet doesn't make sense, both in Valley Fill aquifer unless the model assumes a consistent production and doesn't differ between shallow and deep portions (i.e. all cells assigned same aquifer properties. |
| | bullets | | Add bullet - Any errors in well records or reported water levels could result in significant misestmation of the percentage of the wells affected. |
| 22 | 1st | | After or lifetime - "that is desired" - need to specifically mention the model timeframe that was modeled. Also need to relate this statement to the various lifetime requirements used the state, county, in basin to determine long-term water availability (which could be 40, 70, or 100 for subdivision purposes), and also distinguish that from economically useable lifetime or perhaps longevity which we think is what is intended here. The length of this discussion in committee strongly indicates that discussion is needed here, and the provisions from the various County Ordinances is needing to be included in Section 4 as well (many of those updates occurred after the 1997 report, and they were not mentioned in the 2010 Update - so again they have NOT been previously reported). Delete as technical platform predetermined at 50 years and/or model not run out to economic end life (i.e. with projected high/low demand as determine at 2060, how much longer could the Valley Fill be extended? i.e. .invert the statement here to ask the question and extend the model runs to answer it? |
| 22 | 5.5.2 | | Reference to surface water fluctuation irrelevant for Estancia Basin as no surface water exists - hence have to go to groundwater monitoring. |
| 23 | 1st P. | | Please reference to 47,900 as being within 20% of existing administrative supply. This sets the results in context of the difference of the 1% difference in modeling techniques discussed in 5.5.5.1.1 - i.e. well outside the plus/minus error. |
| 24 | 1st P. | | Rather than predominate use - please quantify as a percentage in 2010 and also its percentage at 2060 under high/low scenarios |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 25 | 6.2.1 | | What are the agricultural acreage trend for Santa Fe? Was that also factored into the model or is just based on Torrance County agricultural decline - important given that 20% of land in basin is in Santa Fe County. Because roughly 25% or irrigated acreage is in Santa Fe County, its decline or rise needs to treated with same diligence as with Santa Fe - or if decline data not available, then specify whether you just used the Torrance County decline percent as a surrogate? |
| 25 | 6.2.2 | | Three significant water supply corporations supply water to Bernalillo County exterior to the basin boundaries, but resource is from the basin - add "and three community water systems which supply a significant portion of eastern portion of Bernalillo County" |
| 26 | | | Delete reference to water availability may become a problem non-sequitur and irrelevant when discussing demographic and economic trends - should already be addressed by basing declines on percentage of wells affected as previously discussed. |
| 26-27 | | | Delete all references to Google - how does the affect projections? Probably not a great deal given the agricultural percentage (which is why ag percent needs to be specified earlier). |
| 27 | 1st P. | | Show comparison of past BBER and HR projections for 2060, compared to the current used for the report - significant difference. Suggest you insert after 32694 " and populations were projected to reach in excess of 50,000 by 20140 and in excess of 60,000 by 2060. and in third paragraph specify for the current population projections through 2060, two forecasts...../ then give the total populations for 2040 and 2060 - don't just defer to the table. Its important to know how significant the change in population was between the update and this plan. |
| 27 | | | How was Entranosa portion of supply to Bernalillo County incorporated. As population growth for the service area outside of basin grows or declines, the demand will also change accordingly. If you are only using the population from the small percentage in the basin in Bernalillo County, then this may be a significant model error. 75% of Entranosa usage is in Bernalillo County |
| 28 / 29 | | | Problem with conservation application approach as Clines Corner (Torrance County) travel center skews the GPCD number and conservation there is unlikely? |
| 29 | | | Conveyance losses - not applicable to pivot irrigation - clarify for Basin or remove reference. |

# Estancia Basin Regional Water Plan Compilation of Comments on Draft Plan

| Page | Paragraph/ Section | Line | Comment |
|---|---|---|---|
| 29 | 4 under irrigated agriculture | | See previous comment, need explanation. Need to explain return number, less recharge due to increased efficiency for more crops. Please use " Important to consider impact to basin" rather than "water balance". Use of water balance is confusing, misleading here as its a different accounting method than the conveniently developed "administrative supply" concept used throughout - the term water balance" should be struck anywhere it occurs in this or other regional water plans. |
| 35 | last | | Need to have parallel language for ag declines in Torrance and Santa Fe - i.e. how much does the Torrance County decline before rebounding? Also, why would there be any difference in Santa Fe and Torrance percentages - given its common basin, water supply, and economy? Questioning the difference in assumptions. |
| 36 | 2nd bullet | | Insert and reference in Section 8.2.3 Policies and Recommendations as well as its an ongoing concern and issue that needs to be addressed by the state to allow deepening to recover capacity of senior water rights holders |

# Estancia Basin Water Planning Committee

## Draft AGENDA

**Thursday** March 10, 2016
9:30 A.M

**Regular Meeting to be Held at:**
*Magnum Steel Office Building*
*Conference Room*
*2515 HWY 333*
*Old Route 66*
*Moriarty, NM 87035*

**Call To Order:**

**Approval of Ad Hoc Agenda:**

**Welcome**

**Discussion and consolidation of ISC Water Plan Draft comments.**

**Adjourn Ad Hoc Meeting**

March 3, 2016

Estancia Basin Water Planning Committee
P.O. Box 58
Estancia, NM 87016

Dear Committee Members,

Thank you for seeking input on the regional water plan proposed update. As the President of the Tajique Land Grant and member of the Tajique Mutual Domestic Water Consumers Association, I would like to be directed to the specific pages of the report that pertain to water plans affecting the four land grants within Torrance County and Bernalillo County. These land grants are La Merced Del Pueblo De Tajique, La Merced Del Pueblo De Chililli, the Torreon Land Grant, and the Manzano Land Grant.

The entire report is very extensive and we would like more time to comment on the proposed update after we review plans specific to the mountain communities. Water conservation is critical for the Estancia Valley and the entire state and we appreciate all the years of monitoring and reporting this organization has done over the years.

Thank you for your time and response to this request. Should you have any questions my contact information is listed below.

Venessa Chavez Gutierrez
P.O. Box 251
Torreon NM 87061
505-400-0940
Venessachavez3@gmail.com

Respectfully,

Venessa Chavez Gutierrez

Venessa Chavez Gutierrez

March 3, 2016

Attention EBWPC;

I am responding to your very small and uninformative article in the Mountain View Telegraph about the Estancia Basin Water Planning Committee. I like some of what the five year priorities are, however you need to include how you plan to protect the rights of the communities and ranches along the mountain chain. There are wells and land grant rights over one hundred years old.

One of your goals should be to protect peoples' rights, if their water is pumped to areas other than where the wells are located and affects the wells of the neighboring areas which could cause the wells to stop or slow down and make them unable to replenish.

Anyone who has had wells before these water associations and committees were formed, have in my opinion, the highest right to keep the water quantities that the states' law permitted at the time they were drilled.

In closing please consider protecting the immediate rights of the communities where the water is being pumped. It is not our responsibility to furnish water to over-developed areas, especially for things like golf courses and plush parks. Developers should be responsible for the water problems within their area of development and not the surrounding communities. Remember the rights that should be protected the most are of those who have lived here all their lives and for the future generations.

Thank you for giving me the chance to comment and voice my opinion.

Johnny Romero

March 9/2016

To the Estancia Basin Water planning comm.

The Manzano Land Grant would like to help in whatever capacity we can be useful. We have in our possesion years of data on the watershed above the Manzano Land Grant in the Manzano Mountains.

Our Greatest concern today is the Forest Service wilderness review. We must unite and stop anymore lands in our National Forest from becoming Wilderness Disignated. Torrance County and State engineer needs time to do water studies on the recharge zones and if these lands are turned into wilderness they will be lost for restoration and thinning as well as monitoring sites for recharge and prevention of catastrophe fires, which would sterolize and destroy recharge openings. The eastern slopes of the Manzanos are primarly of the Madera limestone formations. The limestone extends almost to the town of Estancia.

Do to over growth and thick canopy cover at the higher elevation where we get deeper snow and more rain the canopy from pine forest prevent a large precentage of moisture reaching the ground.

Thank you

President Manzano Land Grant

(505)
phone 221 3427

# Appendix 6-A

# List of Individuals Interviewed

## Appendix 6-A. List of Individuals Interviewed
## Estancia Basin Water Planning Region

| Name | Title | Organization | City |
|---|---|---|---|
| Gene Winn | Program Director | USDA Extension Service | Estancia |
| D'Layne Bruce | District Conservationist | USDA - NRCS | Estancia |
| Steve Guetschow | Planning Coordinator | Torrance County | Estancia |
| Debbie Ortiz | Director | Moriarty Chamber of Commerce | Moriarty |
| Saul Araque | Director | Workforce Solutions | Moriarty |
| Cheri Lujan | Secretary | Estancia Basin Water Planning Assn. | Estancia |
| Ted Hart | Mayor | City of Moriarty | Moriarty |
| Kevin Urquardt | Vice President | US Bank | Moriarty |
| Kay Davis McGill | Administrator | Town of Edgewood | Edgewood |
| Linda Warren | Town Administrator | Town of Estancia | Estancia |
| Joy Ansley | County Manager | Torrance County | Estancia |

# Appendix 6-B

# Projected Population Growth Rates, 2010 to 2040

## Appendix 6-B. BBER Projected Five-Year Population Growth Rates, 2010 to 2040 Estancia Basin Water Planning Region

| County | Five-Year Growth Rate (%) | | | | | |
|---|---|---|---|---|---|---|
| | 2010-2015 | 2015-2020 | 2020-2025 | 2025-2030 | 2030-2035 | 2035-2040 |
| Torrance [a] | 3.32 | 3.91 | 3.85 | 3.28 | 2.54 | 2.36 |
| Santa Fe [b] | 10.43 | 7.53 | 4.29 | 3.86 | NA | NA |
| Bernalillo | NA | NA | NA | NA | NA | NA |

Source: [a] 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.

[b] Population Estimates and Forecasts for Santa Fe County, 1990 to 2030 Geospatial and Population Studies Group, Bureau of Business & Economic Research, University of New Mexico. Released September 2014.

NA = Population growth estimated for entire counties only.

# Appendix 8-A

# Recommended Projects, Programs, and Policies

# Regional Water Planning Update

*Projects, Programs, and Policies*

Water Planning Region 13: Estancia Basin

| Planning Region | County | Regional or System Specific | Strategy Type | Strategy Approach | Subcategory | Project Name | Source of Project Information | Description | Project lead | Partners | Fiscal Year | Planning Phase | Cost | Need or reason for the project, program, or policy | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Torrance/ Santa Fe | R | PJ | Improve System Efficiency | Changes to Infrasturcture | EMWT Pipeline | McGregor, 2015 | Central pipeline to transfer water throughout the basin | EMWT Regional Water Association | Estancia, Willard, Moriarty and Torrance | FY16-21 | conceptual design to constructio n | 60-135M | Transfer water leased through water bank to areas that need the water | Very feasible, dependent on water leases and acquisition of right or way |
| 13 | Torrance/ Santa Fe | R | PJ | Reduce Demand | Changes in Crops and Irrigation Methods | Agricultural Conservation | McGregor, 2015 | Conservation focused on Agriculture | USDA | East Torrance SWCD & local farmers | FY16-18 | Pilot project/ implementa tion | $ 200,000 | Reduce water use through alternative crops/irrigation methods | Feasible |
| 13 | Torrance/ Santa Fe | R | PM | Improve System Efficiency | Groundwater Modeling Studeis | Improved Groundwater Model | McGregor, 2015 | Basin Computer Model and GIS | OSE | EBWPC, Estancia, Torrance, Southern Santa Fe County | | Discussion | $ 50,000 | Improve understanding of resource | Very feasible |
| 13 | Torrance/ Santa Fe | R | PM | Increase Water Supply | Groundwater Investigation | Drill Deep Wells | McGregor, 2015 | Hydrologic Investigations into other aquifers | EBWPC | East Torrance SWCD & Edgewood SWCD & OSE | FY16-18 | Discussion | $ 260,000 | Drill deep wells with piezometers, better understanding of deeper resources and aquifer interaction | Very feasible |
| 13 | Torrance/ Santa Fe | R | PJ | Protect Existing Supplies | Well field management: Install Meters | Water Rights Metering | McGregor, 2015 | Install meters on all wells | OSE | EBWPC, SWCD, & Water Right holders | FY16-18 | Discussion | $ 500,000 | Manage resource wisely | Very feasible |
| 13 | Torrance/ Santa Fe | R | PJ | Improve System Efficiency | Water Banking | Water Banking | McGregor, 2015 | Allow Farmers to lease rights when desirable | EMWT Regional Water Association | Estancia, Willard, Moriarty and Torrance & Farmers, Southern Santa Fe County | 5-10 years (after pipeline in place) | Discussion | $ 700,000 | Allows farmers flexibility to lease | |
| 13 | Torrance/ Santa Fe/ Bernalillo | R | PJ | Protect Existing Supplies | Watershed Restoration | Forest Restoration | McGregor, 2015, ICIP Project Summary | Terrain and Vegetative Modification Program | Claunch-Pinto SWCD | State Forestry, Private Land Owners | FY16-2021 | Annual recurrence (ongoing) | $600,000-900,000/ year | Reduce risk of high-intensity fire, improve health and enhance recharge | 6,128,568 funded to date |
| 13 | Santa Fe | SS | PJ | Improve System Efficiency | Wastewater Reuse | Edgewood Wastewater Reuse | WTB 2015 | Wastewater Re-Use System | Edgewood, Town of | | FY16 | | $1,089,570 | | |

# Regional Water Planning Update

*Projects, Programs, and Policies*

Water Planning Region 13: Estancia Basin

| Planning Region | County | Regional or System Specific | Strategy Type | Strategy Approach | Subcategory | Project Name | Source of Project Information | Description | Project lead | Partners | Fiscal Year | Planning Phase | Cost | Need or reason for the project, program, or policy | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Santa Fe | SS | PJ | Protect Existing Supplies | Infrastructure Improvements to Wastewater | Edgewood Wastewater System Improvements | SB159 | Edgewood Wastewater System Improvements | Edgewood, Town of | | FY16 | | $620,000 | | |
| 13 | Torrance | SS | PJ | Increase Water Supply | Drill new well | Estancia Supply Well | WTB 2015 | drill new drinking well | Estancia, Town of | | FY16 | | $500,000 | | |
| 13 | Torrance-Bernalillo and SF | R | PM | Improve System Efficiency | Monitoring | Water level Monitoring Program | McGregor, 2015, ICIP Project Summary | Monitors water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | FY16 | | $ 95,000.00 | Improve understanding of resource | |
| 13 | Torrance-Bernalillo and SF | R | PM | Improve System Efficiency | Monitoring | Water level Monitoring Program | McGregor, 2015, ICIP Project Summary | Monitors water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | FY17 | | $ 35,000.00 | Improve understanding of resource | |
| 13 | Torrance-Bernalillo and SF | R | PM | Improve System Efficiency | Monitoring | Water level Monitoring Program | McGregor, 2015, ICIP Project Summary | Monitors water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | FY18 | | $ 35,000.00 | Improve understanding of resource | |
| 13 | Torrance-Bernalillo and SF | R | PM | Improve System Efficiency | Monitoring | Water level Monitoring Program | McGregor, 2015, ICIP Project Summary | Monitors water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | FY19 | | $ 35,000.00 | Improve understanding of resource | |
| 13 | Torrance-Bernalillo and SF | R | PM | Improve System Efficiency | Monitoring | Water level Monitoring Program | McGregor, 2015, ICIP Project Summary | Monitors water levels with transducers in 8 wells and quarterly manual measurements in 13 wells | East Torrance Soil and Water Conservation District | EBWPC, Estancia, Torrance, Southern Santa Fe County | FY20 | | $ 60,000.00 | Improve understanding of resource | |
| 13 | Guadalupe | SS | PJ | Protect Existing Supplies | Changes to Infrasturcture | New Transmission Line to Encino | WTB 2015 | Transmission line replacement to Encino | Vaughn, Town of | Encino | FY16 | | $1,255,000 | Pipeline is too small | |
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Floodwater Detention Structure | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY16 | | $ 3,110,000 | | |

# Regional Water Planning Update

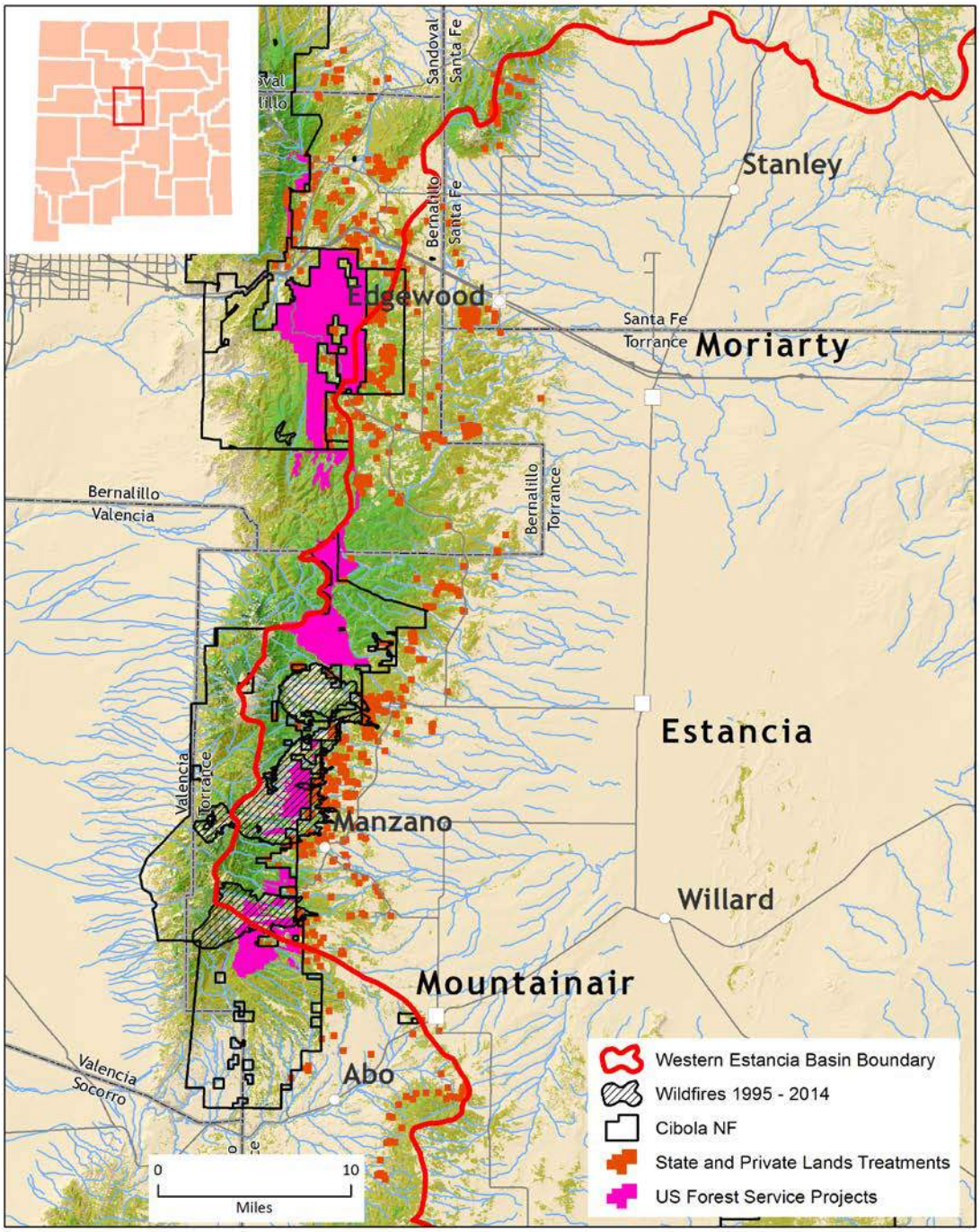
*Projects, Programs, and Policies*

Water Planning Region 13: Estancia Basin

| Planning Region | County | Regional or System Specific | Strategy Type | Strategy Approach | Subcategory | Project Name | Source of Project Information | Description | Project lead | Partners | Fiscal Year | Planning Phase | Cost | Need or reason for the project, program, or policy | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Water Harvesting System | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY16 | | $ 40,400.00 | | |
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Water Harvesting System | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY17 | | $ 30,400.00 | | |
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Water Harvesting System | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY18 | | $ 30,400.00 | | |
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Water Harvesting System | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY19 | | $ 30,400.00 | | |
| 13 | Torrance | R | PJ | Protect Existing Supplies | Storm water protection | Water Harvesting System | ICIP, 2014 | Storm water control | East Torrance Soil and Water Conservation District | | FY20 | | $ 120,400 | | |
| 13 | Torrance | SS | PJ | Protect Existing Supplies | Infrastructure Improvements | Encino Water System Improvement | SB159 | | Encino, Town of | | FY16 | | $10,000 | | |
| 13 | Torrance | SS | PJ | Reduce Demand | Metering | Estancia Water Meters | SB159 | Meter residential customers for the town of Estancia | Estancia, Town of | | FY16 | | $30,000 | Residential Customers are not metered for water use | |
| 13 | Torrance | SS | PJ | Protect Existing Supplies | Infrastructure Improvements | Moriarity Water System Improvements | SB159 | Water Line Extension | Moriarty, Town of | | FY16 | | $330,000 | Reach out to new customers | |
| 13 | Torrance | SS | PJ | Reduce Demand | Metering | Bulk Water Kiosk Station | SB159 | Construct new metered station for selling treated effluent to road construction, oil & gas contractors | Moriarty, Town of | | FY 17 | | $35,000 | No meter at station for contractors to purchase water | |
| 13 | Torrance | SS | PJ | Increase Water Supply | Drill new well | Willard Well and Water System | SB159 | Drill new drinking well | Willard, Town of | | FY16 | | $65,000 | Village has only one well, need to have a back up well. | |

# Appendix 8-B

# Forest Restoration Projects in the Estancia Basin Water Planning Region




*Estancia Basin Watershed Health, Restoration, and Monitoring Project Area, May 2016.*

**Source:** Zebrowski, J.P. 2016. E-mail from Joseph P. Zebrowski, Director of Geospatial Technology, Natural Resource Management Department, New Mexico Highlands University, to Amy Lewis and Dierdra Tarr regarding a map of the Western EBWHRM Projects. May 17, 2016.

ESTANCIA BASIN
REGIONAL WATER PLAN 2016

**Forest Restoration Projects in the Estancia Basin Water Planning Region**

Figure 8-B-1

P:_WR12-165\RWPs_2014\13_Estancia\Appendices\8-B\Watershed project map.docx 10/31/16

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Las Humanas | CFRP 43-01: Las Humanas Forest and Watershed Rehabilitation Fire Reduction. | USFS CFRP, Communities of Mountainair, Abo, Acholle, Punto de Agua, and the Torreon, Manzano, Torreon, and Tajique Land Grants in the Manzano Mountains. | $356,400 | 2001 | Project expanded existing thinning crews to handle large volume forest restoration projects on the Cibola National Forest and develop economic opportunities for rural communities by expanding an existing value added post and viga peeling facility. |
| P&M Plastics | CFRP 21-02 Mountainair. Watershed Improvement, Job Creation, and the Utilization of Wildfire Thinning from Government Forest Land in New Mexico as a Raw Material for Value | USFS CFRP, Cibola National Forest | $360,000 | 2002 | Upgrade a composites production facility to produce signs and other products made from wood chips and recycled plastic. The design, purchase and installation of a large extruder, die, calendar roll/press system, and downstream processing equipment capable of producing a melt blended mixture of wood and plastic that can produce a 4 x 4 foot product will dramatically increase P&M Plastics's ability to use small diameter and invasive species. |
| P&M Plastics. Mountain Air | CFRP 02-05 Innovative Use of Small Diameter Material from the Thunderbird Forest Restoration Project Area of the Cibola National Forest. | USFS CFRP, Cibola National Forest Service Mountain Air Ranger District, Forest Guild, USDA Forest Service Forest Products Laboratory, The Nature Conservancy, the Pueblo of Isleta, Claunch Pinto Soil and Water Conservation District, and the Youth Conservation Corps. USDA | $450,000 | 2005 | Project treated 1,500-3,000 acres of Ponderosa Pine forest over three years on the Thunderbird project area of the Mountainair Ranger District on the Cibola National Forest to reduce the risk of catastrophic fire, and improve forest and watershed health and wildlife habitat. Funding used to purchase low impact logging and material handling equipment and to transport chipped ponderosa pine to a processing facility in Mountain Air, New Mexico. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Four Corners Institute | CFRP 22-08 Mountainair. Ojo Peak Crown Fire Restoration Planning Project: Developing a Plan for Restoring Post-Crown Fire Watershed Integrity | USFS CFRP, Mountainair Ranger District, Cibola National Forest, Zeedyk Ecological Consulting LLC, Claunch-Pinto Soil and Water Conservation District, Mountainair School System, Estrada Collaborative Resource Management, Crane Collaborations, Mexicano Land, Education and Conservation Trust, The Nature Conservancy, and the Town of Mountainair. | $109,026.73 | 2008 | To obtain National Environmental Policy Act (NEPA) clearance, develop a restoration plan to protect hydrologic features, revegetate stream banks, and replant trees on hillslopes for a 387 acre proposed site in the Cibola National Forest northeast of Mountainair, along a section of Ox Creek and its tributaries. |
| Chilili Land Grant | CFRP 23-08 Rev 1 – New Mexico Community Land Grant Planning & Preparation for Community Forest Restoration Pilot Project | Mexicano Land Education & Conservation Trust (MLECT); the Merced de Pueblo de Chilili, the Canon de Carnue Land Grant; the New Mexico Land Grant Council; the Latino Sustainability Institute; the Four Corners Institute; the Forest Guild; Crane Collaborations; the Ciudad Soil & Water Conservation District; the Edgewood Soil and Water Conservation District; Santa Clara Pueblo; and the North Central New Mexico Economic Development District (NCNMEDD). | $120,000 | 2008 | The project will plan and prepare restoration projects on common lands of the community land grants of Carnue and Chilili. This will include conducting NEPA and National Historic Preservation Act (NHPA) clearances, development of restoration designs and prescriptions, and the development of ecological and socio-economic monitoring and evaluation plans. The project will also produce a strategic economic development plan for the utilization of small diameter products removed from the restoration sites. The planning effort will focus on restoring forest structure and composition to approximately 269 acres of piñon-juniper and ponderosa pine in Chilili and 90 acres of mixed riparian forest along Carnue Creek that is composed of native riparian cottonwood, coyote willow, non-native elms, Russian olive, and salt cedar. The project will also provide training and outreach sessions to other community land grants to demonstrate the value of developing forest restoration programs within their forested lands and to identify potential future CFRP projects. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Pueblo of Isleta | CFRP 09-09 Isleta Multi-jurisdictional Collaborative Landscape Analysis CFRP Proposal | U.S. Forest Service Sandia and Mountainair Ranger Districts, Kirtland Air Force Base, Chilili Land Grant; Bureau of Indian Affairs; SWCA Environmental Consultants; and the National Wild Turkey Federation. | $360,000 | 2009 | The Pueblo of Isleta will complete NEPA analysis for 8,530 acres of Ponderosa pine forest restoration treatments across Pueblo, Kirkland Air Force Base, Chilili Land Grant, and U.S. Forest Service Cibola National Forest land. The Pueblo and the Bureau of Indian Affairs will host a youth practicum designed to introduce 10-15 middle and high school students to careers in natural resources, and SWCA Environmental Consultants will train youth crews from the Pueblo to conduct forest monitoring activities. |
| Edgewood Soil & Water Conservation District | CFRP 26-14 Restoring Forest and Watershed Health and Functioning within a Multijurisdictional Ponderosa Pine/Pinon Juniper Landscape in the Manzano Mountains of New Mexico. | Pueblo of Isleta, US Forest Service Mountainair Ranger District, Forest Fitness, LLC SWCA Environmental Consultants: Estrada Consulting: Claunch-Pinto Soil and Water Conservation District: New Mexico Forest Industries Association: and The Nature Conservancy. | $360,000 | 2014 | Treat and restore 855 acres of pinion-juniper and ponderosa pine woodlands on a multijurisdictional landscape through mechanical and hand thinning in an area designated as a high to extreme fire risk in the East Mountain and Torrance County Community Wildfire Protection Plans. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| La Merced del Manzano: Mountainair, Manzano Land Grant | CFRP 07-09:: Red Canyon Forest Restoration Project | Claunch-Pinto Soil and Water Conservation District, SWCA Environmental Consultants, U.S. Forest Service Mountainair Ranger District, Restoration Solutions, Crane Collaboration, The Nature Conservancy, New Mexico Forest Industry Association, Chilili Land Grant, La Merced del Manzano Youth Corp, New Mexico Land Grant Council, Estancia Basin Watershed Health, Restoration and Monitoring Steering Committee, Estrada Collaborative Resource Management, New Mexico Forest and Watershed Restoration Institute, New Mexico State University Mora Extension Agency, and Mount Taylor Millworks. | $354,918 | 2009 | Thin approximately 300 acres of NEPA cleared Ponderosa pine and mixed conifer stands in Red Canyon to reduce hazardous fuels and improve forest health. |
| Merced del Pueblo de Chilili | CFRP 08-09: Merced del Pueblo de Chilili Wildfire Fuels Reduction Collaborative Forest Restoration Project. | USFS CFRP, Cañon de Carnue Land Grant, Mexicano Land Education & Conservation Trust, Santa Clara Pueblo, and the Edgewood & Claunch-Pinto Soil and Water Conservation Districts, New Mexico Land Grant Council, New Mexico Wilderness Alliance, La Merced del Manzano Youth Conservation Corps | $360,000 | 2009 | Implement a 290-acre forest restoration project to reduce fuel loads from 196 basal feet per acre to approximately 60 basil feet per acre. Develop treatment and multiparty monitoring plans. Approximately 1,800 cords of fuel wood will result from the treatment which will be sold or donated to the community. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Claunch Pinto Soil and Water Conservation District | CFRP 06-09 Ojo Peak Post-Wildfire Remediation and Monitoring Project | Zeedyk Ecological Consulting, Mexicano Lands Education and Conservation Trust, U.S. Forest Service Mountainair Ranger District, La Merced de Manzano, SWCA Environmental Consultants, Crane Collaborations, Estrada Collaborative Resource, New Mexico Forest Industry Association, La Merced del Manzano Youth Corps, Mountainair School District, The Nature Conservancy, New Mexico State University Mora Extension Agency, Natural Resources Conservation Service Plant Materials Center, New Mexico Forest & Watershed Institute, and Barksdale, Inc. | $213,268 | 2009 | Restore and monitor the efficacy of restoration efforts on 387 acres of Ponderosa pine and mixed conifer forest in the: Ox Canyon drainage, Mountainair Ranger District, Manzano Mountain Division, Cibola National Forest within the Ojo Peak fire perimeter of the Cibola National forest, which burned severely in the fall of 2007. The project used existing materials from the area to create erosion control structures and restore native vegetation. |
| Romero Wood, LLC | Building Local Forest Industry Capacity in Central New Mexico through Restoration and Education in the Manzano Mountains | Claunch-Pinto SWCD, SWCA Environmental Consultants, NM Forest Industry Association, Estrada Collaborative Resource Management, LLC, The Nature Conservancy, | $360,000 | 2014 | Improve ecosystem and watershed functioning by reducing the extreme risk of wildfire within a ponderosa pine forest in the Manzano Mountains in central New Mexico. Build capacity for the forest industry in a region of New Mexico where the industry is currently lacking.<br>750 Acres |
| Edgewood SWCD | Edgewood SWCD WUI | | $60,000 | 2008 | The project emphasized the development of defensible space for individual homeowners, the development of fuel breaks along common boundaries between private and public land, improving watershed areas on public and private land and assistance with thinning of individual lots and subdivisions. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Claunch-Pinto SWCD | Estancia Basin Watershed Health – NFL Projects | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $300,000 | 2009 | The project emphasized the development of defensible space for individual homeowners, the development of fuel breaks along common boundaries between private and public land, improving watershed areas on public and private land and assistance with thinning of individual lots and subdivisions. |
| Claunch-Pinto SWCD | Manzano Mountain Unified Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD | $114,807 | 2009 | Conduct Hazardous fuel reduction projects in the northern and southern east side of the Manzano Mountains. Have an extensive educational outreach program; create defensible space and planned fuel breaks around homes and communities. |
| Claunch-Pinto SWCD | Claunch-Pinto SWCD Southern WUI | | $261,000 | 2010 | Conduct Hazardous Fuel Reduction Projects in the Southern portion of the Manzano and Gallinas Mountains to protect against future catastrophic wildfires. |
| Claunch-Pinto SWCD | Claunch-Pinto SWCD Estancia Basin Restoration Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $255,000 | 2011 | Conduct landscape hazardous fuel project in the Northern to Southern portion of the Manzano Mountains to protect against future fires in this area and mitigate some threat to the southern portion of the East Mountains. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $292,600 | 2003 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Edgewood SWCD | Development of a Regional Water Data Base. | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD | $160,000 | 2003 | Evaluate the monitoring that has been completed within the Basin to date with respect to water levels, water quality and stream flow to develop monitoring criteria and develop a regional water database. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $556, 200 | 2004 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $450,000 | 2005 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2006 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2007 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2008 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2009 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $540,000 | 2010 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2011 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2012 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)

## Appendix 8-B. Forest Restoration Projects in the Estancia Basin Water Planning Region



| Lead Organization | Project Title | Partners | Total | Year | Purpose |
|---|---|---|---|---|---|
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2013 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |
| Claunch-Pinto SWCD | Estancia Basin Watershed Health, Restoration and Monitoring Project | Claunch-Pinto SWCD; East Torrance SWCD; Edgewood SWCD; Estancia Basin Watershed "CORE" Steering Committee (includes Federal, State, Land Grant and Tribal partners) | $600,000 | 2014 | A landscape scale watershed restoration project aimed to improve watershed health and conservation, increase water recharge, and reduce property and natural resource loss from wildfire in the Estancia Basin of central NM and the associated effectiveness monitoring. |

Source: Collaborative Forest Restoration Program (CFRP ) (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3829559.pdf)