



3. Background

This section provides a general overview of the characteristics of the Socorro-Sierra planning region. Additional detail on the climate, water resources, and demographics of the region is provided in Sections 5 and 6. Maps illustrating the land use and general features of the region were prepared by the New Mexico Water Resources Research Institute and are provided in Appendix B.

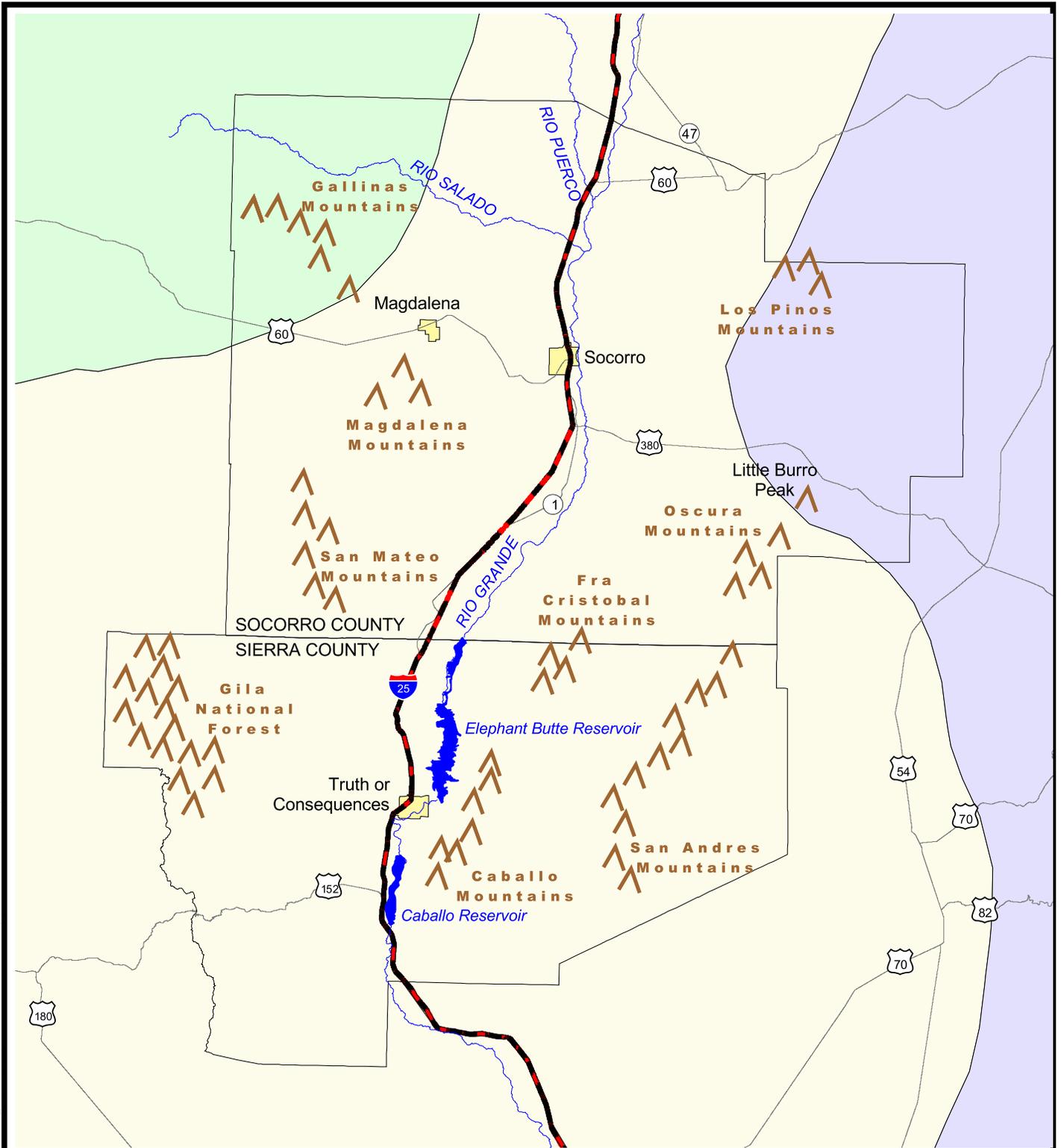
3.1 General Description of the Planning Region

Socorro and Sierra Counties are located in central New Mexico (Figure 1-1). The area of Socorro County is approximately 6,624 square miles, and the area of Sierra County is approximately 4,180 square miles, for a total of 10,804 square miles of land within the planning region. Elevations range from over 10,000 feet above mean sea level (ft msl) in the mountainous areas of the region to about 4,100 ft msl in the southern portion (Figure 3-1).

The region includes parts of two major physiographic provinces, the Colorado Plateau and the Basin and Range, as follows:

- The northwest portion of Socorro County encompasses part of the Datil Section of the Colorado Plateau and includes the Bear and Gallinas Mountains.
- The central portion of Socorro County and all of Sierra County fall within the Mexican Highland Section of the Basin and Range Province and are characterized by dissected block mountains and aggraded desert plains. This area includes the Ladron, Lemitar, Los Pinos, Socorro, Magdalena, and San Mateo Mountains in Socorro County, and the Fra Cristobal, Mud Springs, and San Andres Mountains and the eastern slope of the Black Hills in Sierra County.
- The eastern portion of Socorro County falls within the Sacramento Section of the Basin and Range Province. This area is characterized by mature block mountains and includes the Chupadera Mesa and Tularosa Basin.

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Explanation

- River
- Reservoir
- Highway
- Town
- Physiographic province
 - Colorado Plateau - Datil section
 - Basin and Range - Mexican Highland section
 - Basin and Range - Sacramento section



Base Map Source: ESRI Data & Maps, 1999
(modified by DBS&A) and New Mexico RGIS program, 1998



**SOCORRO-SIERRA REGIONAL WATER PLAN
Area Map**



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Figure 3-1



Vegetation in the planning region is greatly influenced by elevation differences and ranges from the yellow pine, cedar, and juniper forests of the mountains through a transition of scrub oak, cedar, and range grasses in the foothills and plains, to the greasewood, mesquite, and cactus in the valley bottoms. In the Bosque of the Rio Grande, native cottonwood and willow and non native Russian olive and salt cedar species are prevalent.

3.1.1 Climate

The varied terrain of Socorro and Sierra Counties, which ranges from mountains to foothills to plains and valleys, results in significant climate variations. For example, temperatures range from lows that are well below 0 degrees Fahrenheit (°F) in the mountains to highs in excess of 100°F in the valley. The average temperature in the planning region ranges between 50 and 60°F.

Precipitation also varies across the planning region, influenced by location and somewhat by elevation. Weather systems may enter the planning region from the west (Pacific), northeast (Arctic air masses from the plains), and southwest (Gulf of Mexico), and systems from each point of origin bring unique sets of temperatures and moisture to the planning region. Average precipitation, including both snowmelt and rainfall, ranges from about 8 to 18 inches. The majority of the precipitation occurs as monsoons during the months of July through September.

3.1.2 Major Surface and Groundwater Sources

Socorro and Sierra Counties lie almost entirely within the Rio Grande Basin. A small area in northwest Sierra County lies within the Gila River Basin. The main tributaries to the Rio Grande within the planning region are the Rio Salado and the Rio Puerco, both of which enter the Rio Grande from the northwest. Section 5.1 further describes surface water sources in the planning region.

The occurrence of groundwater in the planning region is controlled by the varying hydrogeologic conditions of the two physiographic provinces: Datil Section of the Colorado Plateau and the Mexican Highland and Sacramento Sections of the Basin and Range Province. Hydrogeologic



conditions are also dependent upon localized geologic structures, stratigraphy, and geologic formation lithologies, which are described more fully in Sections 5.2 through 5.10. Groundwater basins that are present in the region include portions of eight basins that have been declared by the Office of the State Engineer (OSE) for the purpose of active management and part of an undeclared groundwater basin in the very northeast corner of the region.

3.1.3 Demographics, Economic Situation and Land Use

Socorro County includes two incorporated areas, Magdalena and Socorro, while Sierra County includes four incorporated areas: Elephant Butte, Truth or Consequences, Williamsburg, and Hillsboro. Socorro, in Socorro County, is the largest municipality in the planning region, with a population of approximately 8,900 in 2000, and Truth or Consequences, in Sierra County, is the second largest town, with a population of approximately 7,300 (BBER, 2001; NMEDD, 2003). The total populations of Socorro and Sierra Counties have doubled over the last 30 years and are currently about 18,100 for Socorro County and 13,300 for Sierra County (BBER, 2001; NMEDD, 2003).

The Socorro-Sierra Region includes the Alamo Navajo Reservation, which is located 57 miles northeast of Socorro, New Mexico. It has a population of approximately 3,000 individuals with one school serving more than 400 elementary, middle, and high school students. The 63,000-acre reservation is semiarid with rolling hills, badlands, volcanic rock formations and mountains.

Groundwater is the only source of water to communities and is provided from wells located on the reservation. Two sacred springs are also present on the reservation. Although the Rio Salado flows through the reservation, no irrigation diversions take place. Some dry land farming using ancient farming techniques is practiced on the south side of the reservation.

Land ownership within the planning region is primarily a mixture of private, forest service, state, and Bureau of Land Management (BLM) land with a large portion of Department of Defense land in the southeast area (Appendix B, Figure B-2). Most of the land in the region, approximately 77 percent, is used as rangeland, with agriculture taking place near the Rio Grande (Appendix B, Figure B-3). Almost 3 million acres of land are held by 403 farms and



ranches, with cattle, alfalfa, and chile being the major agricultural commodities in the region (NMEDD, 2003).

In addition to agriculture, recreation is a key component of the local economy in Sierra County. Elephant Butte is the largest reservoir and the largest State Park in New Mexico, and the mild climate of the area makes this park a popular year-round destination. Elephant Butte Reservoir draws recreational users from New Mexico and from throughout the southwest for a variety of water sports, including sailing, water skiing and fishing, with fishing being one of the most popular. Fishing guide services and more than 200 camping and picnicking sites, as well as concession operated-marinas and stores are present at the reservoir. In addition to the direct economic benefit of these services, Elephant Butte recreational users also support motels, restaurants, gas stations, grocery stores, and other shops in the communities of Elephant Butte and Truth or Consequences. Preservation of adequate water to support the recreational industry at Elephant Butte is therefore a key water planning concern for the Socorro-Sierra region.

More than 2,700 residents in the planning region are employed by state, local, or federal government. New Mexico Institute of Mining and Technology (New Mexico Tech) employs faculty and support staff, and the student population contributes to the local economy, as well. The hotel and food service industry employs the second largest group of workers, followed by health care and social services, and professional and technical services (NMEDD, 2003).

The administrative and waste services industry has the highest average weekly wage while hotel and food service employees are among the lowest paid. In 2000, the average per capita income was \$15,352 in Socorro County and \$16,770 in Sierra County, and within the planning region there were 549 established businesses with more than \$125,400,000 in gross receipts from retail trade (NMEDD, 2003).



3.2 Overview of Historical Water Use in the Region

Based on OSE water use categories, irrigated agriculture and reservoir evaporation have historically been and continue to be by far the largest water use in Socorro and Sierra Counties, respectively:

- In 2000, irrigated agriculture accounted for approximately 93 percent of total withdrawals in Socorro County, while reservoir evaporation accounted for approximately 4 percent of total withdrawals.
- In 2000, reservoir evaporation in Sierra County accounted for around 85 percent of total withdrawals, while irrigated agriculture accounted for around 14 percent of total withdrawals.

The large amount of reservoir evaporation in Sierra County is due to the presence of Elephant Butte and Caballo Reservoirs. Elephant Butte serves as the Rio Grande Compact delivery point, and both reservoirs supply downstream users outside the Socorro-Sierra Region, so the purpose of these reservoirs is much broader than serving the needs of Sierra County. However, OSE water use records (Wilson, 1986, 1992; Wilson and Lucero, 1997; Wilson et al., 2003) report the evaporation according to the County where the reservoir is located. Section 6 provides additional detail regarding demand both with and without reservoir evaporation.

The majority of irrigation in the region takes place through the Middle Rio Grande Conservancy District (MRGCD) and the Elephant Butte Irrigation District (EBID):

- The MRGCD supplies surface water to more than 60,000 acres of farmland along the Rio Grande, from Cochiti Reservoir on the north to Bosque del Apache Refuge on the south. Approximately one-third of the MRGCD acreage lies in Socorro County.
- The EBID is the largest supplier of surface water in New Mexico. The district serves more than 8,000 constituents in southern New Mexico and irrigates more than 90,000 acres with prime water rights through a network of diversion dams, canals, laterals, and



drains. Most of the district is located south of the Sierra County line in Dona Ana County, but EBID supplies irrigation water to farms along the Rio Grande south of Elephant Butte Reservoir. Of the total irrigated acreage served by EBID, approximately 3,000 acres are in Sierra County.

Each of the remaining uses of water in the two counties, including public and domestic water supply, livestock, mining, industrial, and commercial applications, accounts for no more than 1.5 percent of total withdrawals in each county.

A comparison of water use records for 1975 and 2000 shows little overall change in the proportionate uses of water in the Socorro-Sierra area (Sorensen, 1977; Wilson et. al., 2003); however, the overall amount of water withdrawn in the counties increased by approximately 52,000 acre-feet in Socorro County (from around 138,000 acre-feet in 1975 to approximately 190,000 acre-feet in 2000) and by approximately 169,000 acre-feet in Sierra County (from around 115,000 acre-feet in 1975 to approximately 284,000 acre-feet in 2000). Section 6 provides a more in-depth discussion of historical and current water use and demand.