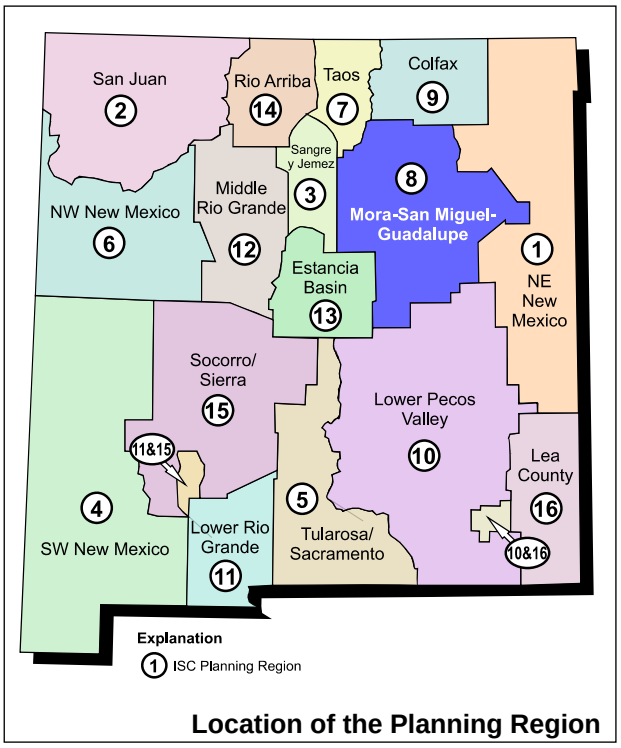
Executive Summary

The Mora-San Miguel-Guadalupe Water Planning Region, which includes all of Mora, San Miguel, and Guadalupe Counties (Figure ES-1), is one of 16 water planning regions in the State of New Mexico that are in the process of developing a regional water plan. 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. Regional water planning activities have been funded through and overseen by the New Mexico Interstate Stream Commission (ISC).



Location of the Planning Region

Figure ES-1

All of the regional water planning activities have been overseen by a steering committee consisting of representatives of the counties, municipalities, acéquias, other agricultural water users, state and federal agencies, and others with water interests in the region. The designated fiscal agent for the Mora-San Miguel-Guadalupe Region is the Tierra y Montes Soil and Water Conservation District (SWCD). The Tierra y Montes SWCD retained the team of Daniel B. Stephens & Associates, Inc. (DBS&A), Rosemary Romero Facilitation Services, Southwest Planning and Marketing, Amy C. Lewis, and Sheehan, Sheehan and Stelzner to develop the regional water plan.

Key water issues facing the Mora-San Miguel-Guadalupe Water Planning Region are:

- *Acéquias.* About 150 acéquias are located in the region and use 89 percent of the region's water depletions (excluding reservoir evaporation). The acéquias play an important role in

the area from a cultural and economic perspective, and protection of acéquia water rights is a key planning issue.

- *Drought vulnerability.* More than 95 percent of the water supply in the region is supplied by surface water, and storage of surface water for use within the region is fairly limited.

- *Watershed management*. Because a significant portion of the surface water supply originates in upland watersheds within the planning region, watershed management to protect water quality and potentially to enhance yield is an important component of the planning effort.

- *Pecos River Compact.* Much of the region is located within the Pecos River Basin. The State of New Mexico is required to make deliveries in accordance with the Pecos River Compact as directed by the Supreme Court; consequently, water resources management options within the basins are limited by Compact obligations.

- *Water rights litigation and protection of water rights.* Uncertainties regarding water rights ownership resulting from incomplete adjudication and ongoing litigation create complexities in the planning process. Efforts to protect water rights and ensure that water resources remain within the region were identified as priorities in the planning process.

- *Water quality.* There is considerable interest within the region in protecting and/or enhancing water quality, particularly issues related to septic systems.

- *Data gaps.* Lack of information about water use, water depletions, and extent of water resources causes uncertainty in water planning efforts, especially regarding the potential to develop groundwater.

Regional water planning in New Mexico is guided by the template outlined in the ISC *Regional Water Planning Handbook*, which defines the scope and content of regional water plans. According to the template, a regional water plan must address key questions:

1. What is the water supply available to the region?

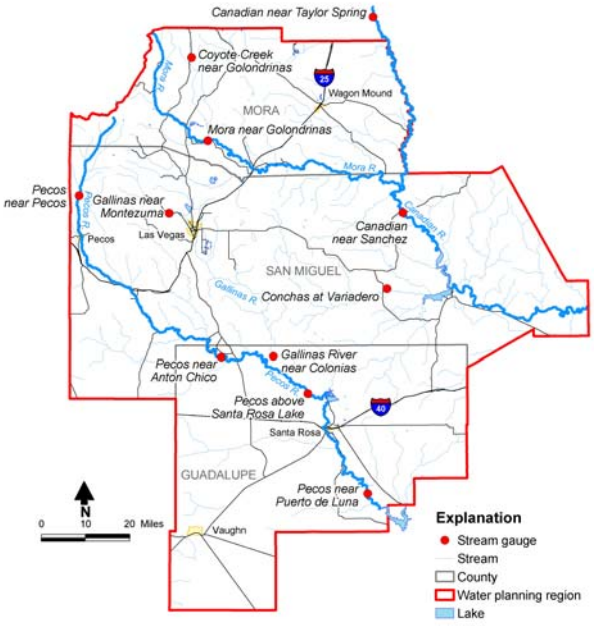
2. What is the region's current and projected future demand for water?

3. What are the region's alternatives for using available supplies to meet projected future water demands and how will they be implemented?

To address these questions, this plan discusses both the physical availability of water and the water rights and legal constraints that affect the availability of water, projects future demands for water, and identifies and evaluates alternatives for meeting future demands.

Water Supply

Identifying and understanding the available water supply is essential to water planning. The ISC regional water planning program requires that existing sources of information be used to characterize the regional water supply. The sources used in preparing this plan included documents by federal, state, and local agencies, academic research, and privately funded studies.



Surface Water Bodies in the Planning Region

Figure ES-2

Surface Water

Surface water supplies more than 95 percent of the water demand within the planning region and is used mostly for reservoir evaporation and irrigation. The majority of surface water is found within the Upper Canadian River and its tributary the Mora River, and the Upper Pecos River and its tributary the Gallinas River (Figure ES-2). These rivers and their larger tributaries are the main perennial (year-round) streams in the planning region.

Surface water flows originate primarily in the higher elevations, as snowmelt during the spring and as monsoonal rainfall during the late summer. Flows are highly varied from year to year, and the streams are typically characterized by prolonged durations of low flows punctuated by short-duration, high-volume flows. Figure ES-3 shows annual flows observed at the U.S. Geological Survey gaging stations in the planning region (the locations of these gages are shown on Figure ES-2).

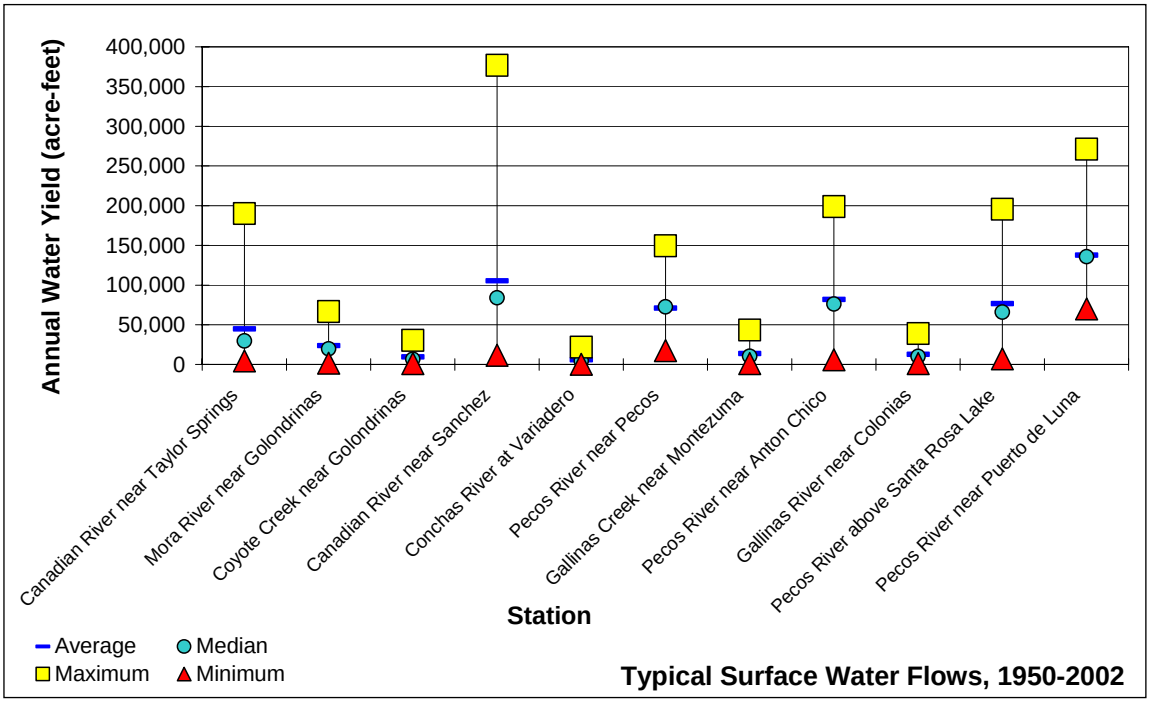


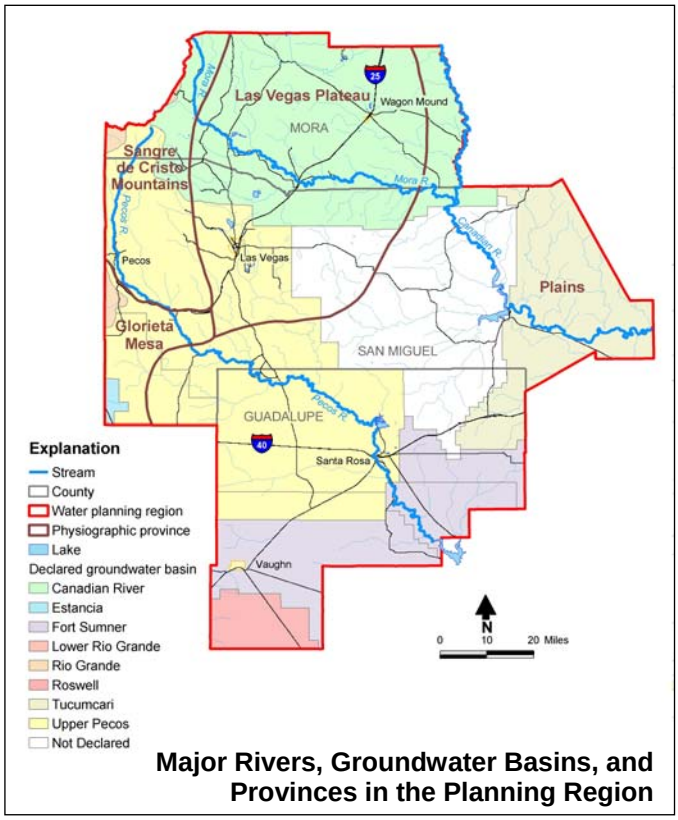
Figure ES-3

Surface water in the planning region is used primarily for irrigation. The City of Las Vegas relies primarily on the Gallinas River for domestic supply purposes, while most other communities rely on groundwater for their public water systems.

Groundwater

Though groundwater use represents only a small portion of the total supply in the region, it provides the sole source for drinking water supplies for most of the communities and rural residences in the planning region. The region contains all or part of seven separate groundwater basins declared by the New Mexico Office of the State Engineer (OSE), as well as

a few other areas that have not been declared (Figure ES-4). Groundwater availability is controlled to a large extent by the nature of the geology present, which in the planning region falls into four distinct geologic regions or "provinces" (Figure ES-4):



Major Rivers, Groundwater Basins, and Provinces in the Planning Region

Figure ES-4

- Western Mora County and the northwest corner of San Miguel County fall within the Sangre de Cristo Mountains province, where the predominant aquifers are comprised of fractured sedimentary rocks. Shallow alluvial deposits also provide limited amounts of water in local areas, primarily in valleys near the perennial stream channels.

- The southwestern corner of San Miguel County lies within the Glorieta Mesa province, characterized by Paleozoic sedimentary beds warped into a nearly flat-topped arch. Groundwater occurs primarily within these Paleozoic sedimentary formations, including the Yeso Formation, the Glorieta Sandstone, and the Santa Rosa Sandstone. Well depths in this province range from 200 to 1,100 feet.

- Much of Mora County and north-central San Miguel County fall within the Las Vegas Plateau. This area is made up of nearly flat-lying Mesozoic sediments. The major aquifer in the region is the Dakota Group, which supplies some wells but has limited potential as a significant supply due to variable production and/or water quality.

- The remaining area in the planning region, including south and southeastern San Miguel and Guadalupe Counties, fall within the Plains province. Over most of the Plains area,

water sufficient for domestic wells and livestock can be obtained from the Triassic-age Chinle Group or other sedimentary rocks. The depths of wells in this area are usually between 100 and 300 feet. Groundwater in the Santa Rosa area is derived from the San Andres Limestone and Glorieta Sandstone.

Water Quality

The quality of both surface water and groundwater is generally very good throughout the planning region. It is well suited for agriculture use and for private domestic wells and is easily treated for public water supply systems. There are, however, a number of existing water quality concerns.

Surface water resources near Pecos have been identified by the New Mexico Environment Department as being impacted by mining activities. Additionally, a number of stream reaches spread throughout the region have been impacted by grazing, silviculture, streambank destabilization, recreational pollution, construction, septic systems, and/or other sources. The water quality in most lakes and reservoirs in the planning region is good, although Upper Charette Lake, Conchas Lake, Morphy Lake, Santa Rosa Reservoir, and Sumner Reservoir have been impacted by excessive nutrients derived from agricultural lands, mercury accumulation in fish tissue, or other sources.

Groundwater quality in the planning region is impacted in localized areas by leaking gasoline storage tanks, elevated sulfates from former mining operations, and nitrates and bacteria from septic tanks. Additionally, in some areas of the region, groundwater is naturally high in fluoride, sulfates, or elevated dissolved solids due to natural geologic formations.

Legal Issues

Regional water planning is subject to “laws relating to impact on existing rights” (NMSA 72 14-44C(7)), and regional planners have no authority over allocation or ownership of water rights. Other legal issues can also place limits on the water supply in certain circumstances and must

therefore be fully understood and incorporated into actions or recommendations included in the Mora-San Miguel-Guadalupe Regional Water Plan.

Water Rights in New Mexico

The OSE manages water rights in New Mexico. To withdraw groundwater or divert surface water, a user must have a water right or obtain a water permit or license from the OSE. Although the Mora-San Miguel-Guadalupe region has seven OSE-declared groundwater basins, the two major basins are the Upper Pecos and Canadian Underground Water Basins (Figure ES-4). Once an underground basin is declared, the OSE requires a permit for new groundwater withdrawals and may also impose additional administrative criteria that further limit usage, especially in declining or mined aquifers.

Water rights may be transferred, sold, or leased, but such transactions are subject to protest, cannot impair existing water rights, and must not be contrary to public welfare or conservation. If water rights are not used during four consecutive years, they may be lost (after notice from the OSE).

A number of unique legal issues facing the region are described below.

Acéquias

Acéquias are governed both by New Mexico water law and a separate statute that covers organizational and functional aspects of these entities. Recently, the New Mexico legislature conferred a unique power to acéquias to enable them to better manage water transfers that impact the community. In particular, the acéquias may now pass bylaws that limit transfers of water out of the acéquia system, and the OSE will not approve transfers if the applicant has not complied with acéquia requirements (NMSA 72-5-24.1).

Endangered Species Act

The Endangered Species Act (ESA), 16 U.S.C. §§ 1531-1544 (2000 and 2002 Cum. Supp.), can play a prominent role in river management, including the timing and releases of flows. Two

species that are present in the Mora-San Miguel-Guadalupe region have been listed as threatened under the ESA: the Pecos bluntnose shiner and the Arkansas River Basin population of the Arkansas River shiner. Impacts to river flows, even upstream of designated habitats, may have ESA implications and be subject to strict review and possible limitation.

Status of Adjudication

A water rights adjudication is a lawsuit that determines the extent and ownership of each water right in a specific geographical area. An adjudication begins with a hydrographic survey of a stream system, where the elements and ownership of each water right in the survey area are determined (NMSA 1978, § 72-4-13 (1907)). The final court decree removes controversies concerning title to water rights and the validity of water rights.

The mainstem of the Canadian River and associated groundwater in Mora and San Miguel Counties have not been adjudicated. The State of New Mexico is currently adjudicating other basins and is unlikely to initiate an adjudication of the Canadian River for many years. Nevertheless, surface water in the Canadian River is considered to be fully appropriated.

Two comprehensive adjudications govern the upper Pecos stream system, as described below.

- In 1933, the federal court handed down a decree, commonly known as the Hope Decree (*United States of America v. Hope Community Ditch et al., No. 712 Equity*). This decree, which was based on a 1923 hydrographic survey conducted by the federal government, defined the rights of many parties to the use of surface water along the Pecos River and some of its tributaries, including the Gallinas River. The State of New Mexico was not a party to the Hope Decree, and the Hope Decree is therefore not binding on the State Engineer (*State of New Mexico v. City of Las Vegas, 2004-NMSC-009)*. Thus, as described below, water rights adjudicated under the Hope Decree are currently being adjudicated by the State.

- The state adjudication of the Pecos River stream system began in 1956. It was originally initiated to adjudicate groundwater rights in the Roswell Basin, but has since been expanded to include the entire Pecos River stream system. In the Upper Pecos, the water rights of

major groundwater users have been adjudicated, while domestic groundwater use has not been adjudicated.

The current major adjudication activity in the region is the adjudication of Gallinas River surface water rights, some of which were originally adjudicated in the Hope Decree. Although the State Engineer is not bound by the Decree and is readjudicating these rights, the OSE is using the Hope Decree as evidence in determining the elements of certain Gallinas River water rights. The Gallinas River adjudication is based on a five-volume hydrographic survey completed in 1991. Approximately one-fifth of the rights in Volume 1 have been adjudicated, and the adjudication of the Storrie Project rights (Volume 2) has been completed. Once the Gallinas River adjudication is complete, other surface uses on the Pecos River will most likely be adjudicated.

Administrative Policies for the Upper Pecos and Canadian Basins

Canadian River Compact: The Canadian River Compact, ratified in 1951, allows New Mexico the "free and unrestricted use of all waters originating in the drainage basin of the Canadian River above Conchas Dam (Article IV (a)). Below Conchas Dam, New Mexico has the "free and unrestricted use of water originating below the dam." However, the amount of water that may be stored or impounded is limited to 200,000 acre-feet of conservation storage (Article IV(b)). New Mexico stores water under the terms of the Compact in Ute Reservoir. The Compact limits storage of water below Conchas Dam, but does not require New Mexico to deliver specific amounts of water to the State of Texas.

The groundwater in the Canadian Basin is stream-connected, which means that any new groundwater development that may affect the Canadian River must be offset; that is, surface water rights must be purchased and retired in order to offset the effects of the proposed groundwater pumping. If an applicant could show that the new groundwater diversion would have no impact to the river at any time, then the OSE could approve the application.

Pecos River Compact: The Pecos River Compact is an agreement between New Mexico and Texas, ratified by Congress, primarily for the equitable apportionment between Texas and New Mexico of Pecos River waters (Articles I, III (a)). The Compact requires that New Mexico not

deplete by man's activities the flow of the Pecos River at the New Mexico-Texas state line to a quantity less than that which was available in 1947 (Article III(a)).

The State Engineer has not issued administrative criteria for the Upper Pecos Underground Water Basin. Water right applications in the basin are analyzed on a case-by-case basis. Because the Pecos stream system is fully appropriated and groundwater in the basin is stream-connected, new appropriations of groundwater from the Basin are not permitted without the retirement of surface water rights to offset the effects of new groundwater pumping. In reviewing applications to transfer surface water rights to groundwater rights, the State Engineer will generally limit the amount transferred to the amount of surface water historically used.

Population Projections

In order to plan for future water needs, regional water planners must estimate future population growth. Accordingly, population projections for the three counties in the planning region were developed. The population projections were based on information from interviews with selected community representatives, from historical population trends, and from Bureau of Business & Economic Research population projections. Based on this information, both high growth rate and low growth rate scenarios for future population development were determined.

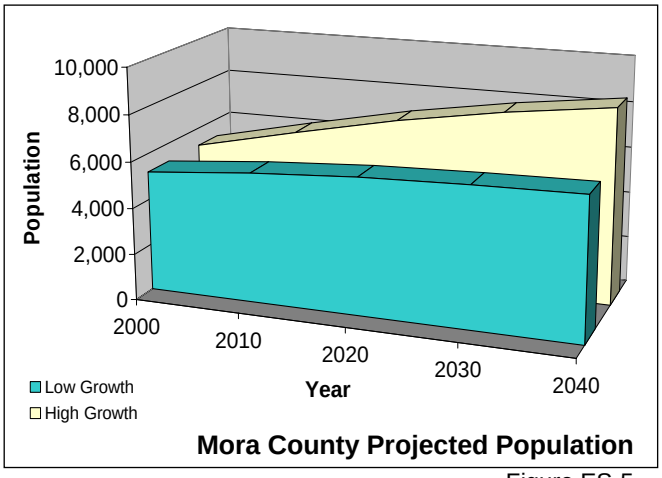


Figure ES-5

Mora County

The population of Mora County is projected to increase under both the high and low growth scenarios (Figure ES-5). Mora County's 2000 population of 5,200 is forecasted to increase to between 6,140 and 8,470 residents in 2040. Along with a positive natural population increase, the increase is expected to be due to the in-migration of new residents who are building vacation or second homes and retirement properties on former ranches.

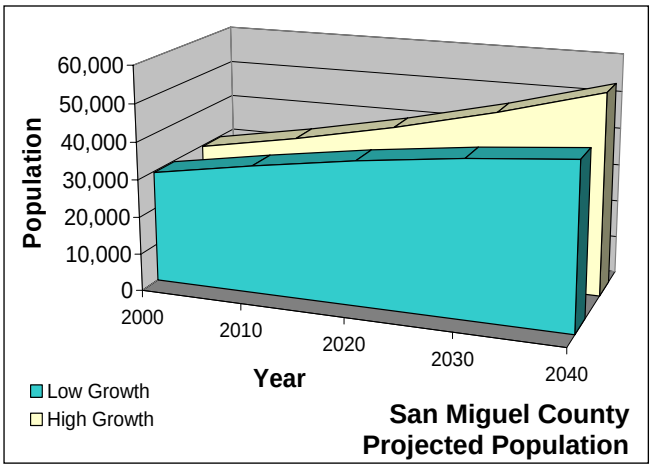


Figure ES-6

San Miguel County

Population projections for San Miguel County show an increase for both the low and high growth scenarios (Figure ES-6). San Miguel's 2000 population of 29,700 will increase under the low projection to 43,900 residents in 2040 and under the high scenario to 53,900. The low projection assumes that the City of Las Vegas population will not increase.

The high growth scenario assumes that the southern end of San Miguel County along the Interstate 25 corridor will continue to gain population because it is located within the City of Santa Fe's commuter shed and offers more affordable and rural living options compared to adjacent Santa Fe County. The high scenario also assumes that economic development efforts will be successful at attracting new businesses and new residents to Las Vegas.

Guadalupe County

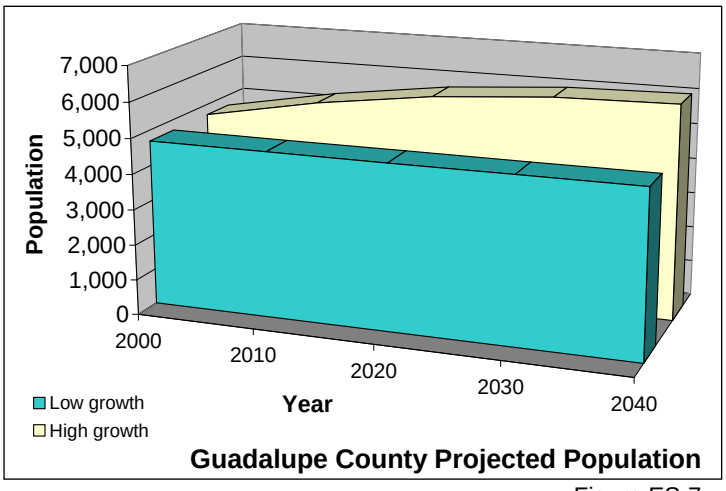


Figure ES-7

The population of Guadalupe County is projected to remain flat (low growth scenario) or grow by almost 1,400 people (high growth scenario) (Figure ES-7). The City of Santa Rosa currently contains about 55 percent of the County population and will increase that proportion to 71 percent in 2040 under the low growth projection. The rural population may continue its historical declining trend (low growth projection) or remain at the current levels (high growth), but is not expected to increase. The high growth projection assumes a continued robust tourist economy, further economic

diversification represented by industries such as the Guadalupe County Correctional Facility, and a sustained level of the region's agricultural economy.

Planning Region Population Projections

Under the low growth scenario, the population for the entire planning region of 39,620 is projected to increase by 15,140 residents. Currently San Miguel County has the majority of the population and will maintain that majority under both the high and the low growth scenarios. Under the high growth scenario, the increase is projected to be 28,820.

Current Regional Water Demand

Current and historical water demand in the Mora-San Miguel-Guadalupe Water Planning Region was obtained for the period 1975 through 2000 from the New Mexico OSE, which inventories water use in the state every five years and publishes the results in technical reports. During the 25-year period examined, the OSE has changed some of the categories it uses to define water use. Also, several OSE-defined categories, such as commercial, mining, power and industrial, have little or no historical use in the planning region. Consequently, for this regional water plan, the OSE categories were streamlined into the following water use categories to reflect regional demand over time:

- Public and domestic water supply
- Irrigated agriculture
- Livestock
- Evaporation (includes stockpond and playa evaporation during 1975 and stockpond evaporation through 1985)
- Other (commercial, mining, power, industrial and, during 1975 through 1985, fisheries, military, and recreation)

The use of surface water far exceeds groundwater use in the region, with groundwater withdrawals totaling less than 5 percent of total withdrawals. The largest demands for surface water are irrigated agriculture and reservoir evaporation, particularly from Santa Rosa and Conchas Lakes. Public and domestic uses, as well as irrigation, have been the largest uses of groundwater in the past 25 years, with livestock watering the third largest use of groundwater in the planning area.

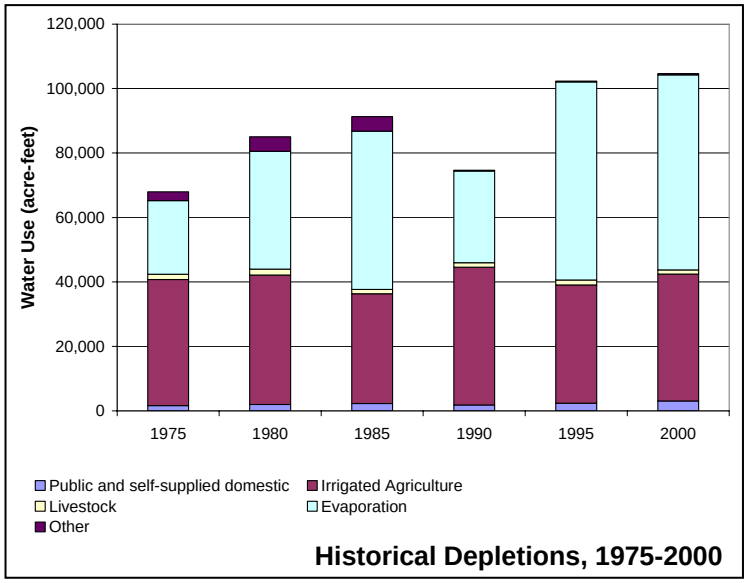


Figure ES-8

Figure ES-8 shows total depletions from 1975 through 2000. Depletion is the amount of water withdrawn less any water that returns to surface water or groundwater systems. For example, flow in agricultural drainage ditches is considered "return flow," because that water either seeps into the ground (in unlined ditches) or discharges to a surface water body.

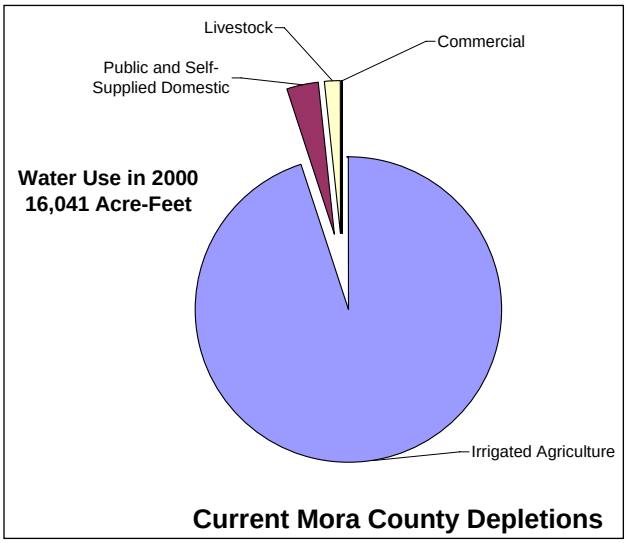


Figure ES-9

Current water use varies somewhat among the three counties. Whereas agriculture is by far the largest depletion in Mora County (Figure ES-9), evaporation from Santa Rosa and Conchas Lakes dominates depletions in Guadalupe and San Miguel Counties; nevertheless, irrigated agriculture is also a large component of depletions in those counties (Figures ES-10 and ES-11). Although reservoir evaporation is accounted for in the county where the reservoir is located, the primary benefit of the reservoirs is for downstream interests outside the planning region.

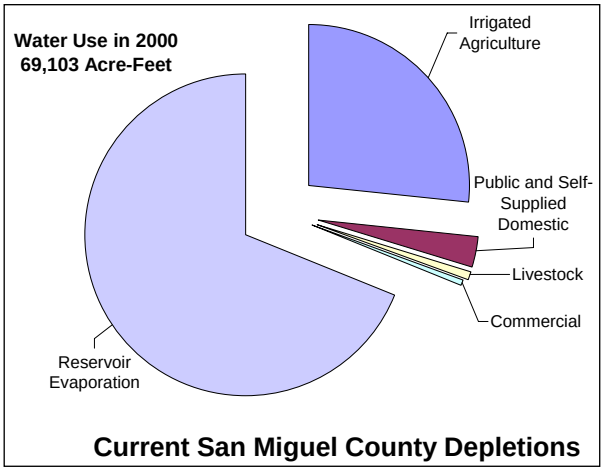


Figure ES-10

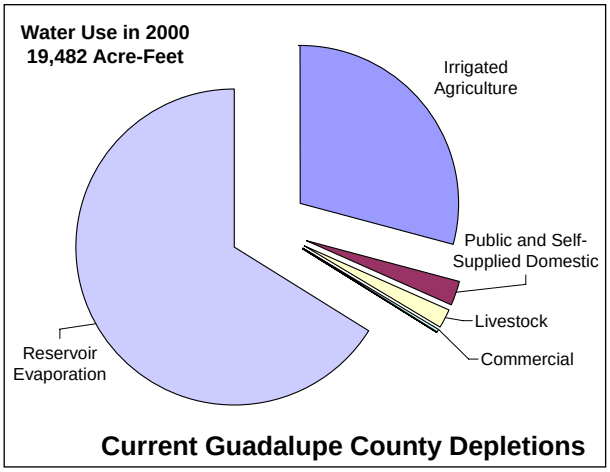


Figure ES-11

Water Budgets

A water budget is a quantification of the amounts of water moving in and out of a specified subsystem of the overall hydrologic cycle. Water budgets show the amount of renewable water available compared to the demands on the system. The Mora-San Miguel-Guadalupe Water Planning Region contains two major stream systems, parts of seven declared groundwater basins, and additional groundwater resources in undeclared areas. Separate water budgets were developed for each administrative groundwater basin and for the undeclared groundwater, and surface water budgets were prepared for the Pecos and Canadian River Basins.

Surface Water Budgets

Surface water budget analyses rely heavily on estimates of components instead of actual measurements. Although precipitation and streamflow are measurable water sources, they are typically measured at only a few locations. Evaporation, evapotranspiration by plants, infiltration, return flows, and spring and seep discharges are generally not measured directly and are therefore usually estimated. Consequently, surface water budget calculations generally have a high degree of uncertainty and should be used with considerable caution.

The vast majority of the precipitation in the planning region does not show up as streamflow due to upland evapotranspiration and other factors; therefore, the water budget discussed herein is based on the amount of surface water available in the two main drainages in the planning

region. Annual surface water budget results for representative average and drought years were prepared. The year 2000 was picked as a representative drought year because streamflow at regional gaging stations for that year are some of the lowest water yields measured over the 53-year analysis period from 1950 through 2002.

The analysis of the water budget for the Pecos River supply shows that it is sufficient to meet demands under both median and drought conditions, though shortfalls are known to occur in individual locations. However, historical demands on the Gallinas River, a tributary to the Pecos River, appear to exceed native supply under both the median and drought conditions, and a comparison of the adjudicated water rights on the Gallinas River to the available supply indicates that the water supply is not sufficient under either median or drought conditions to fulfill all the water rights on the river. Even during conditions when excess water is physically available, legal restrictions limit further use of that water.

The Canadian River system appears to meet demands under median conditions. However, under drought conditions, the inflow to Coyote Creek is insufficient to meet demand. Additionally, no inflow from the Sapello River to the Mora River, tributary to the Canadian River, is calculated under drought conditions, as reservoir evaporation and riparian evapotranspiration consume all flow measured at an upstream gage. Under drought conditions, the Canadian River also provides insufficient supply in Conchas Reservoir for the Arch Hurley Irrigation District (in Quay County); during the recent drought years, for example, only 16 percent of average demands were filled in 2002 and no diversions at all occurred in 2003.

Groundwater Budgets

Historically, groundwater has provided most of the domestic and livestock water supply needs throughout the water planning area, but only about half of the public and commercial water supply and only 2 percent of the irrigation demands. The demands on groundwater have been estimated, but the natural components of flow are not well understood for the planning region. Nevertheless, while the groundwater budgets are incomplete, they do clarify areas for which data are needed.

A comparison of the year 2000 groundwater depletions with the estimated average groundwater recharge indicates that recharge is much more than the rate of groundwater withdrawals due to man-induced mechanisms. This observation suggests that additional groundwater usage could perhaps be developed; however, impacts to surface water must be offset to maintain compliance with the existing surface water rights and interstate compacts on the Pecos and Canadian Rivers. Additionally, water quality and financial issues affect the ability to develop additional groundwater resources.

More information on the amount of evapotranspiration, stream losses and gains, and subflow in and out of each basin is needed to obtain a better understanding of the water budgets. Return flow estimates could be improved by measuring surface diversions and canal losses. Detailed water level maps could help define the flow regimes in each basin, and additional water level monitoring and hydrogeologic data collection is thus necessary to better understand the condition of the groundwater in this planning region.

Alternatives

Once the region has studied their water supply and projected future demand for water, the final component of the regional water plan is to develop alternatives for meeting the projected water demand. Alternatives are actions that the region can take to increase supply, reduce demand, protect or improve water quality, or better manage water resources so that the water supply of the region continues to be viable.

An initial list of potential alternatives was developed at Steering Committee meetings, which are open to the public, and at public meetings. The initial list of alternatives was presented at a series of community meetings around the region. The attendees at each meeting added to the list of alternatives and, as a group, identified alternatives that they considered to be most important for the region. Based on this input, the Steering Committee identified the following priority alternatives for inclusion in the plan.

- Municipal conservation, including education, rate structures, and gray water use, to reduce the demand in public water supplies

- Agricultural conservation, including on-farm improvements such as drip irrigation and delivery system efficiencies such as ditch lining, to reduce demands for agricultural use

- Watershed management, which focuses primarily on thinning in upland areas, to reduce evapotranspiration and potentially increase water yields

- Non-native vegetation replacement, focusing on removal of salt cedar and re-establishment of lower-water-use native vegetation

- Water quality protection, including development of septic tank monitoring and maintenance or replacement programs, to protect groundwater supplies

- Development of additional groundwater, to provide supplies that are less vulnerable to drought conditions

- Development of additional storage through aquifer storage and recovery, raising the height of existing dams, building new dams, or removing accrued sediment

- Transferring water rights to create a permanent pool of water in Santa Rosa Lake

- Water rights protection, including adoption of acéquia bylaws to prevent out-of-acéquia transfers without the approval of the acéquia

- Water banking, including mechanisms for short-term leasing of water rights within acéquias or within larger geographic areas within the region

- Requiring proof of water availability to ensure that new subdivisions or other growth only occurs when reliable supplies have been secured prior to development

- Completion of 40-year water plans for municipalities and counties within the planning region

- Data collection, metering, measuring, monitoring, and management, to provide more reliable information for water resources planning

In accordance with the ISC template, these priority alternatives were evaluated with regard to their technical feasibility, political feasibility, social and cultural impacts, financial feasibility, and hydrologic and environmental impacts. All of the alternatives are possible to implement, but their costs and effectiveness vary depending on many variables. Alternatives involving changing the amount of water in storage would be the most challenging to implement due to interstate compacts, while others will require only funding and the initiative of the region, with citizen participation, to implement.

Consequently, in addition to the priority alternatives, the Steering Committee identified water plan implementation and citizen participation as part of implementation as important components in the successful development of this plan and initiated the formation of an ongoing regional water planning council. The continuing involvement of this council to oversee implementation of these alternatives will be key to successfully moving forward with this plan to protect the resources of the region.