



Executive Summary

The Taos Water Planning Region (Taos Region) is one of 16 planning regions in the State of New Mexico (Figure ES-1). Regional water planning was initiated in New Mexico in 1987 with the purpose of protecting New Mexico water resources while ensuring that each region is prepared to meet future water demands. Regional water planning activities are funded through and overseen by the New Mexico Interstate Stream Commission (ISC). Taos County is the fiscal agent for the Taos regional water planning efforts.

The Taos Region includes Taos County, as well as the portion of the Embudo watershed within northeastern Rio Arriba County. For the purposes of this plan, the Taos Region has been divided into four subregions based on watershed boundaries: North, Central, South, and West.

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 the following key questions:

- What is the available water supply?
- What are the current and projected future water demands?
- What steps will the region undertake to meet future demand with available supply?

The answers to these questions are complex. Nevertheless, the remainder of this Executive Summary, including the figures, summarizes and synthesizes the information available to address these questions. To assess the available water supply, this plan discusses the physical availability of water as well as the water rights and legal constraints that affect the availability of water. Regional water demand is estimated by evaluating historical and current regional water demand and by analyzing projected population and economic growth to develop projections for

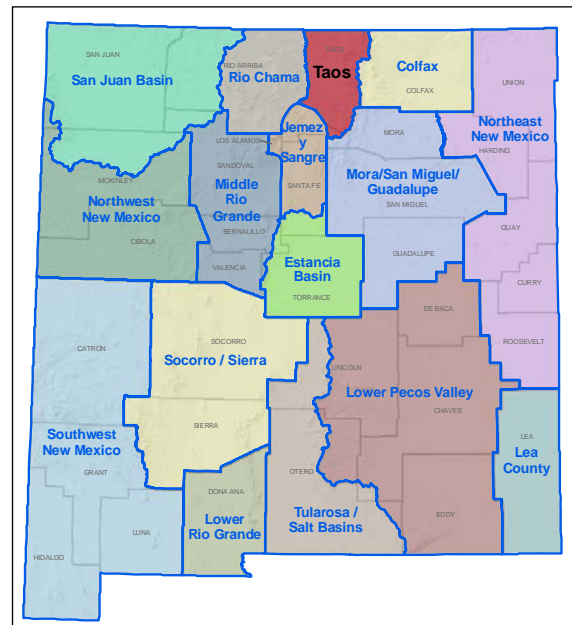


Figure ES-1. Taos Water Planning Region



future water demand. Finally, the plan identifies and evaluates strategies for meeting future water demand.

Key water issues facing the Taos Region are:

- *Rio Grande Compact and availability of water rights.* The Rio Grande is the main river in the planning region. The majority of the groundwater in the region is within the Rio Grande Groundwater Basin and is considered to be stream-connected. The Rio Grande is considered to be fully appropriated, and the Rio Grande Compact limits any new appropriations; therefore, any new diversion of surface water or groundwater requires the transfer of a valid water right or application for a new domestic or livestock well. The availability of water rights may thus be a limiting factor in meeting the future water needs of the region.
- *Drought vulnerability.* The agricultural sector in the planning region relies mostly on surface water supplies, which are highly variable and vulnerable to drought conditions. Developing drought contingency plans and shortage sharing agreements is thus important for this sector. Most public and domestic supplies rely on groundwater and are therefore not as vulnerable to short-term drought conditions.
- *Infrastructure needs.* Upgrades to address aging infrastructure are needed in communities throughout the region. The planning region includes 48 small (serving a population under 1,000) water systems such as mutual domestic water consumer associations, mobile home parks, and other small systems. These small systems have difficulty obtaining financing for infrastructure and accomplishing operational needs such as Clean Water Act compliance. Achieving optimal efficiency in water system operation and infrastructure upgrades, through cooperative associations or other means, is an important objective for the region.
- *Water quality.* Stakeholders have expressed considerable interest in protecting water quality. Key water quality concerns identified include mining and natural mineral impacts to the Red River area and septic system impacts to shallow groundwater throughout the region. The implementation of source water protection programs is important for ensuring good water quality for the many small public systems that rely on groundwater.



- *Public education.* Ensuring that the region is able to meet its water supply needs in the future requires the support and participation of the region's residents. Educating individual water users about water-related issues is key to obtaining their support and helping them to use water wisely. The region supports comprehensive public education efforts and the development of a central clearinghouse that will make water-related information easily accessible to the public and to decision-makers.
- *Protection of agriculture.* More than 300 acéquias are present in the region, and the pueblos have practiced agriculture in the region for centuries. Today's economic environment creates many pressures to transfer water rights away from the agriculture sector. The steering committee recognizes that individual pueblos, acéquias, and parciantes have the authority to make decisions regarding potential transfers. However, to protect the region overall, the steering committee supports efforts to preserve a continuing viable agricultural sector in the region.
- *Protection of water rights.* While water rights in the northern part of the planning region (Costilla Creek and Red River) have been adjudicated and an agreement upon a settlement of Taos Pueblo water rights (Draft Abeyta Settlement Agreement) has been reached in the Town of Taos area, the remainder of the planning region (South and West subregions) has not been adjudicated. The resulting uncertainties regarding water rights ownership create complexities in the planning process. Efforts to protect water rights and to ensure that water rights remain within the Taos Region were identified as key planning priorities.
- *Planning for growth.* The region is pursuing economic development opportunities, including tourism, recreation, and residential and commercial development. Ensuring that long-term water supplies are adequate to support the growth and vitality of all areas within the region is a key concern. Measures to help achieve that goal include implementing water conservation measures for optimal water use efficiency and ensuring that sufficient water rights are available within the region to support growth.
- *Watershed Protection.* Because the majority of the water supply for the Taos Region comes from surface water, protecting the watersheds that are the source for most of that



surface water is a key planning issue. Approximately 60 percent of the region is either state or federal public land (39 percent national forest, 17 percent Bureau of Land Management [BLM] land, and 4 percent New Mexico State land). An additional 8 percent of the land in the region is pueblo, and the remaining 32 percent is privately held. The large percentage of national forest and BLM land in the region indicates the importance of working with federal agencies on watershed management issues. Many community watershed restoration efforts have already been initiated, and implementing recommendations from those are an important part of this plan.

- *Data gaps.* Although numerous studies related to water resources in the Taos Region have been conducted, quantitative data on recharge, water depletions, the extent of water resources, and other factors are sparse, causing uncertainty in water planning efforts. Ongoing data collection efforts are therefore recommended for optimal water resource management in the region.

Description of the Planning Process

To ensure that each plan reflects the needs of its region, public participation is a key component of the planning effort. Early in the planning process, a public participation plan was developed to encourage and provide various opportunities for participation by the public. The plan specified four components: (1) the identification of local, state and federal agencies and citizens groups concerned about regional water planning, (2) written information, (3) public notification, and (4) public workshops. This plan was followed throughout the regional water planning process.

Development of the *Taos Regional Water Plan* was overseen by a steering committee that included representatives from public and private entities, including:

- County and municipal government
- Community water systems, including mutual domestic water consumer associations
- Taos Soil and Water Conservation District
- Farming and ranching groups, including the Taos Valley Acéquia Association and other acéquia representatives



- Federal agencies
- Watershed groups
- New Mexico State agencies
- Nonprofit organizations
- Mining and commercial (including recreational) enterprises
- The general public, including agricultural and watershed interests

The steering committee has overseen all aspects of the regional water planning process and has been active in the development of this document.

Pueblos were also informed of the regional water planning process and invited to serve on the steering committee, but chose not to participate on the steering committee. Pueblos are sovereign nations, and the information and recommendations provided in this plan do not presume to speak on behalf of the Pueblos located in the planning region.

A water rights adjudication (the Abeyta adjudication) that involved the vast majority of the surface water and groundwater users and appropriators in the Taos Valley was ongoing during development of this regional water plan. Due to a gag order entered by the presiding court on the Abeyta litigants who were negotiating a Draft Settlement Agreement, those Abeyta negotiating parties were not able to fully participate in development of the regional water plan (i.e., confidential information could not be revealed) until May 2006, when the Draft Settlement Agreement was signed.

All steering committee meetings, as well as additional meetings geared toward informing and gathering input from residents and stakeholders in the region, were open to the public. The steering committee and public meetings were held mostly in the Town of Taos, but because the steering committee felt strongly that meetings should also be held throughout the region, some meetings were held in Questa, Red River, Ojo Caliente, and Peñasco. All meetings were advertised well in advance of the meeting dates through direct mailings, press releases to local media that resulted in newspaper articles and public service announcements, and flyers posted in public venues and distributed throughout the region. Members of the public who attended any of the meetings were added to the mailing list so that they would receive advance notice of all future water planning meetings.



Public Welfare Statement

In 1987, the New Mexico legislature amended a number of water statutes to give the State Engineer the authority to deny an application for a new water right or a water right transfer if it is contrary to the conservation of water within the State or detrimental to the public welfare of the State. The legislature did not define “public welfare of the State” or the phrase “contrary to the conservation of water within the State,” nor have the OSE or the ISC. Nonetheless, should a proposed water right application appear to be contrary to a regionally defined public welfare criterion, the OSE could potentially rely on this criterion to deny or place a condition on the application. The ISC acceptance criteria for regional water plans indicate that such plans may “. . . provide guidance for the State Engineer in decisions affecting the public welfare of the state and/or region”

Accordingly, the Taos Region developed a comprehensive public welfare statement. During the early phases of the planning process, a Public Welfare Subcommittee was established and participation was open to any interested parties. The Public Welfare Subcommittee initially developed draft public welfare and conservation statements and presented those at multiple steering committee and public meetings. Input from each of those meetings was incorporated into the draft statement, which as a result, went through multiple versions. In December 2007, when consensus about the statements had still not been reached within the region, a mediated process was initiated to find compromise among the various interests. Elected officials were designated to represent the interests of the region, and agreement was reached on March 7, 2008.

The resulting Public Welfare Statement includes the following components:

- Defines public welfare criteria, including:
 - Cultural protection
 - Agrarian character
 - Ecological health
 - Long-term community and economic development potential
 - Recreational tourism
 - Public information and educational outreach



Surface water features in the region include the Rio Grande and its tributaries, including Costilla Creek, Cabresto Creek, Red River, Rio Hondo, Rio Lucero, Rio Pueblo de Taos, Rio Fernando de Taos, Rio Grande del Rancho, Rio Pueblo, Rio Santa Barbara, and Embudo Creek. In addition to these perennial rivers and streams, many ephemeral streams (e.g., Latir Creek) and arroyos (e.g., Arroyo Aguaje de la Petaca) flow following storm events. Numerous springs and alpine lakes occur at high elevations in the eastern part of Taos County.

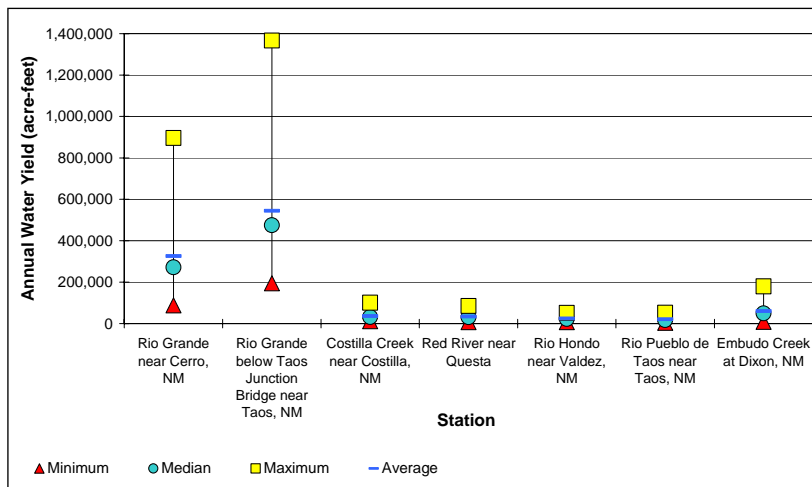


Figure ES-3. Annual Water Yield for Selected Gaging Stations

Water yield from key stream gages in the Taos Region (Figure ES-2) are shown on Figure ES-3.

Groundwater

The groundwater resources within the Taos Region are contained within the Office of the State Engineer (OSE)-declared Upper Rio Grande

Groundwater Basin. Groundwater availability is controlled to a large extent by the nature of the geology present, which in the planning region falls into three distinct geologic regions or physiographic subdivisions (Figure ES-2). Subsurface geology for the Taos Valley area is presented in Figure ES-4.

Western Taos County falls within the Taos Plateau physiographic region (Figure ES-2), where groundwater is found primarily in the fractured basalt of the Servilleta Formation and deeper sediments of the Santa Fe Group. Wells completed in this region generally yield less water than more productive areas. Depths to water range from 100 to 1,000 feet below ground surface (bgs), although groundwater is less than 400 feet deep in most wells.

Central Taos County lies within the Costilla Plains physiographic region, characterized by Pliocene-age alluvial deposits intertongued with the Servilleta Basalt and overlain by more recent Quaternary-age alluvium. Groundwater occurs primarily within these alluvial sediments

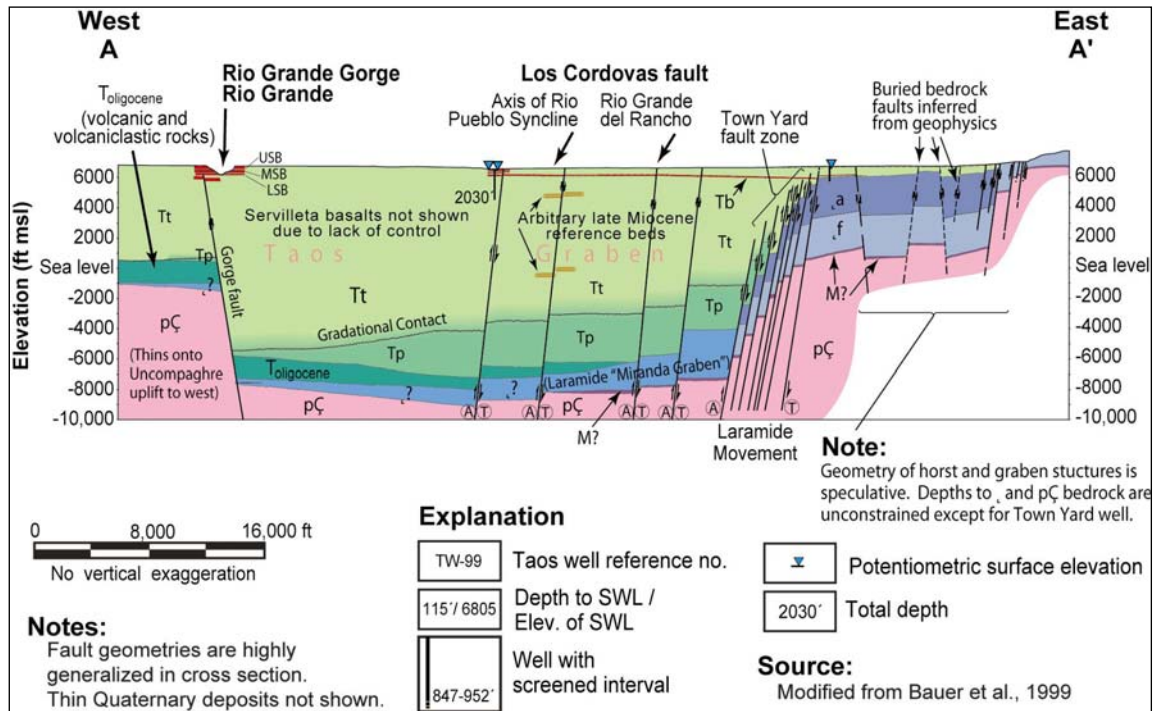


Figure ES-4. Taos Subsurface Geology

and basalt. Depths to groundwater are generally less than 200 feet bgs in this region, and most wells are productive.

Eastern Taos County and the southern tip of the Taos Region fall within the Sangre de Cristo Mountain physiographic region, where the predominant aquifers are comprised of shallow alluvial sediment in stream valleys. Older rocks produce limited quantities of water, primarily in the upper fractured zones. Depths to water in wells completed in this region are generally less than 200 feet bgs.

Water Quality

Key water quality concerns in the region include the impacts of mining and natural mineralization in the Red River area and impacts of septic tanks throughout the region.

Surface water quality concerns in the Rio Grande Basin are largely due to nonpoint (i.e., indirect) sources. Several river reaches have water quality that does not fully support their designated uses due to turbidity, stream bottom deposits, metals, pH, total ammonia,



temperature, pathogens, plant nutrients, and conductivity. The sources for these pollutants include agriculture, recreation, hydromodification, road and highway maintenance, silviculture, resource extraction, municipal and domestic point (i.e., direct) sources, land disposal, road runoff, and natural and unknown sources. The most common contaminant detected at acute concentrations in the Rio Grande Basin is aluminum, while the most common contaminants detected at chronic concentrations are aluminum and selenium.

Groundwater quality concerns include elevated levels of fluoride, arsenic, and uranium in isolated locations (particularly near fault zones) in the region, and in some areas, elevated nitrates and bacteria due to septic system impacts.

Legal Issues

Regional water planning is subject to “laws relating to impact on existing water rights” (NMSA 72-14-44.C(5)), and planners have no authority over the allocation or ownership of water rights. However, legal constraints can limit the water supply in certain circumstances and must therefore be fully understood and incorporated into actions or recommendations included in this water plan.

The State Engineer manages water rights in New Mexico, and a user must have a water right or obtain a water permit or license from the State Engineer in order to withdraw groundwater or divert surface water. In addition to requiring a permit for new groundwater withdrawals throughout the region, the State Engineer may impose additional administrative criteria that further limit usage, but such criteria have not yet been placed on the aquifers in the Taos Region. 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 forfeited, following notice from the State Engineer. They may also be deemed abandoned by the adjudication court after an extensive period of non-use.

The majority of the Taos Region is within the Rio Grande Basin, which is fully appropriated; thus no new surface water rights are available. Use of Rio Grande and tributary water is affected by the Rio Grande Compact. Groundwater withdrawals that have an impact on surface water



sources are also limited based on the availability of water rights. With the exception of new domestic or livestock wells, any new water development can only be accomplished through the transfer, through either purchase or lease, of a valid, existing water right.

Water rights in the northern part of the region have been adjudicated through the Costilla and Red River adjudications. All water rights in the Rio Pueblo de Taos and the Rio Hondo stream systems are being adjudicated in the lawsuit commonly referred to as the Abeyta adjudication, which includes both pueblo and non-pueblo claims. The recently released *Taos Pueblo Draft Water Rights Settlement Agreement* between the United States, Taos Pueblo, the State of New Mexico, the Taos Valley Acéquia Association and its 55 member acéquias, the Town of Taos, El Prado Water and Sanitation District, and the 12 Taos area mutual domestic water consumers associations, will, when adopted, adjudicate Taos Pueblo claims and expedite the adjudication of non-Pueblo water right claims. The Draft Settlement Agreement represents a very significant effort by water rights holders to settle the claims of the Taos Pueblo and other water rights holders in the region, and the agreement will be a key strategy for addressing water needs in the Central subregion. Detailed information regarding the Draft Settlement Agreement is available on the OSE web site (http://www.ose.state.nm.us/legal_ose_proposed_settlements_taos.html).

Other legal issues facing the region include the necessity to comply with federal laws such as the Clean Water Act and the Endangered Species Act, state laws such as the recently revised domestic well regulations, and county subdivision regulations. The legal rights of the acéquias relating to the transfer of acéquia water rights and the formation of water banks can also impact the allocation of water within the region.

Water Demand

To assess the Taos Region's projected future demand for water, the historical and current water demand and population were determined. Based on historical and current population and economic trends, the future population and demand for water was projected.



Historical Water Demand

According to the ISC regional water planning template, a regional water plan should compile water demand data by category of use. Information on current and historical water demand in the Taos Water Planning Region was obtained for the period 1975 through 2000 from the OSE, which inventories water use in the state every five years.

Figure ES-5 shows total withdrawals in the Taos Region 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.

As indicated in Figure ES-5, agriculture is the largest water use in the Taos Region. Agriculture is supplied almost entirely by surface water. Public and domestic water supply, which relies almost entirely on groundwater, accounts for a small percentage of total use. There are 48 small water systems and 3 municipal water systems in the region.

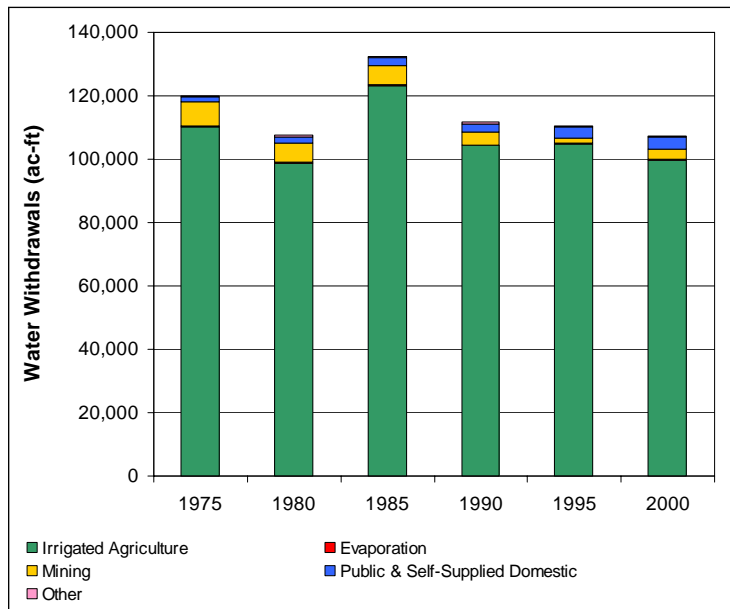


Figure ES-5. Historical Taos County Water Withdrawals

Population Projections

Following a 20-year decline from 1940 to 1960, population of Taos County has increased since the 1960s, with the greatest growth rate occurring from 1990 to 2000 (Figure ES-6). During the past decade, growth in the County has outpaced the growth of the Town of Taos, with the majority of the County growth occurring in the Taos Valley surrounding the Town.



In order to project future population from 2000 to 2050, low- and high-growth scenarios (Figure ES-7) for the Taos Water Planning Region were developed based on historical and current population and economic trends:

- The low-growth projection assumes that the growth rate will follow the existing trend at a slightly slower rate that slowly declines even further each decade. This scenario assumes that after 2020 no significant changes in the local or national economy will occur and the immigration trend that began in the 1990s of people moving into the Rocky Mountain West will slow significantly.
- The high-growth projection assumes that the immigration patterns into the Rocky Mountain West that began in the 1990s will continue over the next three decades, creating a more significant shift in the local economy than what the low-growth scenario assumes.

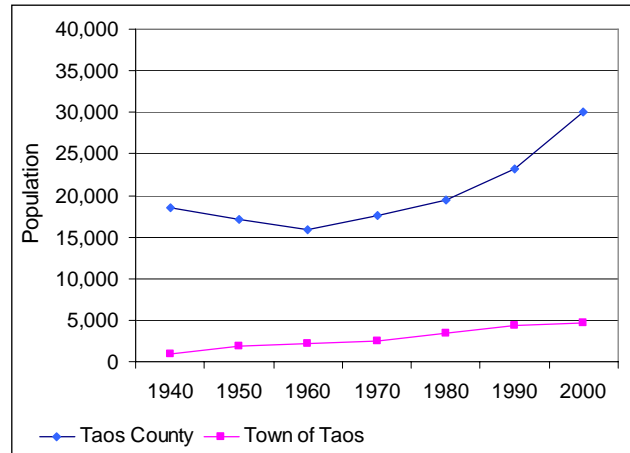


Figure ES-6. Taos County Population, 1940 to 2000

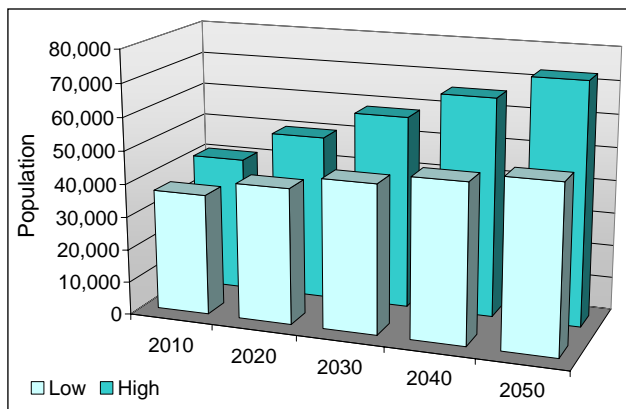


Figure ES-7. Projected Population, 2000 to 2050

The projected planning region growth was distributed among the four subregions based on historical trends, expected future trends, and the potential for residential and/or commercial build-out. The subregion trends from the past decade were applied through 2010 and then adjusted based upon the two future growth scenarios.

Water Budgets

A water budget is an accounting of the input and output volumes of water for the different components of the hydrologic cycle in a specified hydrologic system (Figure ES-8). Surface



water budgets for the Taos Water Planning Region were developed for reaches from which water is diverted (primarily for irrigation) between stream gages, where data are available to estimate inflows. Groundwater budgets were developed for each of the four subregions using the best available data for the components of the groundwater flow system.

Because several of the inflow and outflow components used to develop the water budgets are estimated and the available data are sparse, there is a great deal of uncertainty in these water budgets, and they provide only a broad overview of the supply and demand in each of the subregions. They should not be used as an indicator of the availability of supply to meet demand in individual localities, as that ability depends on water rights, infrastructure, proximity to surface water and/or groundwater supplies, and seasonal variations in supply and demand.

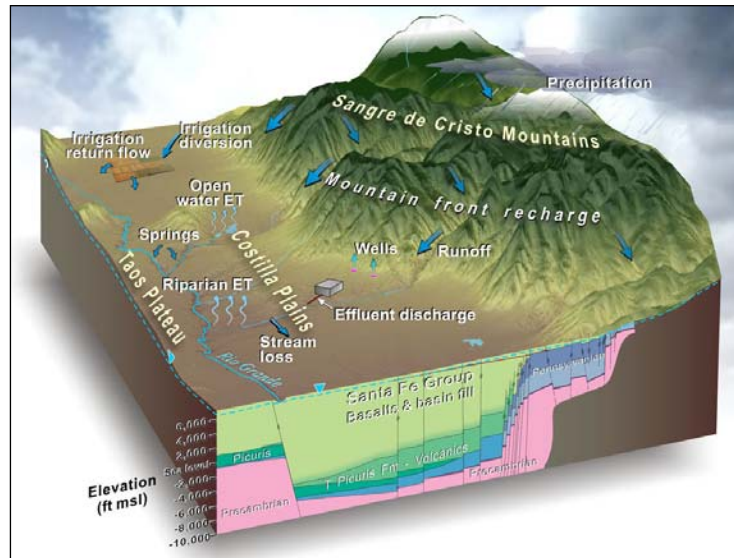


Figure ES-8. Water Budget Components

Surface Water Budgets

The following components were calculated for the surface water budgets:

- Inflow:
 - Surface inflow to stream reaches within the planning region was based on the median inflow measured at the upstream gage of each reach from 1990 through 2004.
 - For some uses, a portion of the diverted flow is not consumptively used and returns to a water body; the returned water is called return flow.



- Outflow:
 - Surface water diversions for public water supply, commercial, livestock, mining, and irrigation uses
 - Stream loss into the groundwater
 - Evapotranspiration (water lost from plants, such as transpiration through tree leaves) and open water evaporation (water lost from stream or lake surfaces)
 - Surface outflow from the planning region, based on median flow rates from 1990 through 2004 at downstream gage stations in each subregion

The gap between supply and demand in the Taos Region occurs in the portion of the irrigation sector that depends on the flow in streams during the growing season. Figure ES-9 compares irrigation surface water demand with irrigation surface water rights and stream supply during the growing season. As shown in this figure, although the growing season supply appears to be sufficient to meet the water rights under median conditions, during drought, current diversions cannot be met on Costilla Creek and on the other Rio Grande tributaries in the Central subregion, and water rights can be fully supplied only in the South subregion.

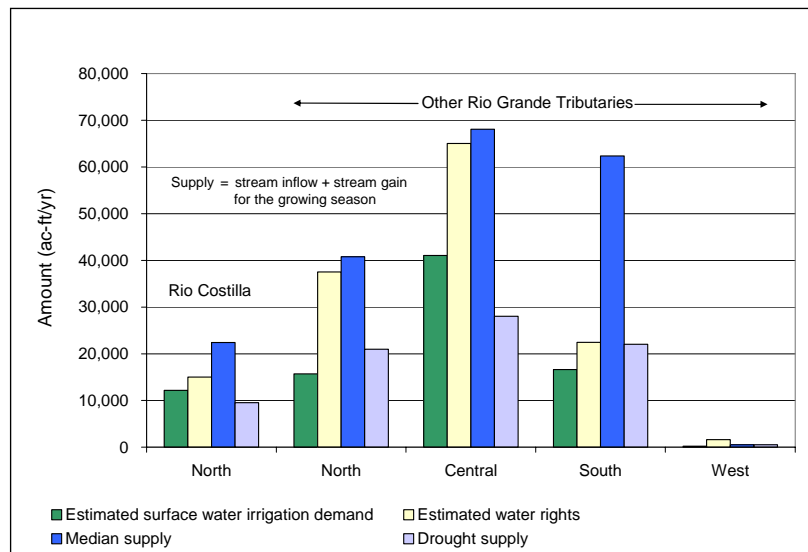


Figure ES-9. Irrigation Demand vs. Water Rights and Growing Season Supply

Groundwater Budgets

The primary inflow component of the groundwater budget is recharge from precipitation, which was calculated based on an available groundwater model for the Taos Valley, extrapolated to areas outside the model boundaries. Other inflow components include the recharge from stream seepage and return flow from irrigation or other sources, such as treated effluent from municipalities.



Outflow components used in the groundwater budgets consist of:

- Pumping water from wells for irrigation, domestic, commercial, municipal, and mining uses
- Spring discharges at the surface
- Groundwater movement from one area to another (i.e., sub-flow out of a basin)
- Riparian evapotranspiration and open water evaporation that is not included in the surface water budgets (e.g., groundwater that surfaces and evaporates, such as in a wetlands)

To understand groundwater inflows and outflows, regular measurement of groundwater levels is needed, and such monitoring data are available for only a very few wells in the planning region. The budgets developed for the Taos Region indicate that, overall, water levels in the planning region are not declining in response to pumping (though there may be some local impacts), a conclusion that is confirmed by groundwater level measurements from the relatively few monitor wells with available data.

Strategies for Meeting Future Demand

Once the region has studied its water supply and projected future demand for water, the next key component of the regional water plan is to develop strategies for meeting the projected water demand with the available supply. Strategies 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.

For the Taos Water Planning Region, an initial list of potential strategies was developed at steering committee meetings, which are open to the public, and at a series of public meetings held in communities around the region. Citizens added to the list of strategies, and each group identified strategies that they considered to be most important for the region. Based on this input, the steering committee identified the following priority strategies for inclusion in the plan:

- *Infrastructure development:* Address old leaking pipes, inadequate treatment facilities, and other infrastructure issues and consider a collaborative approach to help multiple



communities develop better water system management and be prepared to meet future demands of those systems.

- *Water quality protection:* Identify and implement programs to protect the quality of water resources, including wellhead protection programs and regional wastewater management to address impacts from septic systems.
- *Public education:* Disseminate information on water-related topics such as current regulations, the importance of water conservation, actions that individuals can take to save water, ongoing water rights transfers, and water quality data.
- *Protection of agriculture:* Keep agriculture viable in the region by managing water transfers through bylaws, establishing acéquia water banking procedures, maintaining and repairing acéquias, implementing inter-acéquia water management processes, encouraging economic agriculture, and implementing agricultural water conservation.
- *Keep water rights in the region:* Develop mechanisms to ensure that the water rights needs of the Taos Region are considered in proceedings regarding transfers of water rights to other purposes or places of use outside the region.
- *Growth management:* Manage growth in relation to the water supply, including planning land use, requiring water conservation measures for all new development, and ensuring that adequate water supplies are available before approving subdivisions.
- *Watershed management:* Improve the long-term health of watersheds through measures such as forest thinning to reduce the risk of catastrophic fires and potentially increase water yield; improve riparian alluvial aquifer storage and stormwater runoff retention while implementing management practices to protect water quality.

In accordance with the ISC template, these priority strategies were evaluated with regard to their technical feasibility, political feasibility, social and cultural impacts, financial feasibility, and hydrologic and environmental impacts. Strategies will be implemented by local governments, soil and water conservation districts, non-profit groups, and others.



In addition to the priority strategies that were identified through the public process defined above, other potential strategies may become feasible or desirable for entities within the region to pursue in the future. In particular, although the Draft Abeyta Settlement Agreement is now complete, all work on the settlement was confidential at the time that the priority strategy list was developed. Hence, strategies on the priority list do not specifically address settlement provisions such as deep well drilling. However, the regional water planning steering committee expressed general support for the Draft Abeyta Settlement Agreement.

To successfully implement the strategies and to identify other strategies that may be needed as the region develops, ongoing monitoring, data collection, and interpretation will be required. Some of the key data collection efforts include:

- Well monitoring (particularly in the Central subregion, which is experiencing the most growth) to better characterize groundwater levels and improve model calibration
- Stream gaging on perennial streams to estimate gaining and losing reaches, an important component for model calibration and developing water budgets, and to help determine water sharing, particularly in times of short supply
- Measurement of agricultural diversions to improve model calibration and resolve disputes among water right holders
- Better assessment of recharge to help the region manage water resources sustainably
- Defining existing forest conditions, including field monitoring and mapping of vegetation types and densities at a more detailed level
- Identifying septic tank locations to assess potential problem areas with regard to water quality contamination and possibilities for wastewater treatment infrastructure improvements
- Monitoring water quality in the vicinity of high-density septic tanks or other sources of contamination to identify and treat potential health hazards
- Defining domestic well locations, to assess the need for new water supply infrastructure