

Middle Rio Grande Regional Water Plan

Río Puerco & Río Jemez Subregional Water Plan: 2000-2050

Summary

April 2004

Prepared for:
Río Puerco y Río Jemez Water Users

Sponsored by:
Cuba Soil & Water Conservation District
P.O. Box 250
Cuba, New Mexico 87013

Prepared by:
Elaine Moore Hebard
1513 Escalante SW
Albuquerque, NM 87104
&
Jennifer A. Johnson
PO Box 63
La Jara, NM 87027

This page is intentionally blank.

Preface

This document presents a summary of the subregional water plan for the Río Puerco and Río Jemez subregions of the Middle Rio Grande water planning Region. The Río Puerco and Río Jemez form two of the three watersheds in the Middle Rio Grande regional water planning district. The two subregions are rural and the populace stretched across vast landscape includes Navajo and Pueblo peoples, *acequia parciantes* or ditch users, ranchers, traditional villagers, second home owners, newcomers and a large population that traces its heritage back to early homesteaders. Federal and state agencies manage large portions of the region. Given such a broad spectrum, finding common ground has been a challenge. Likewise, the dearth of technical information to answer the questions regarding supply and demand, together with the level of funds available to locate and assemble it, cause the subregional water plan to be an more of a compilation of information for the time being.

The full draft subregional water plan was published, distributed and commented upon in the months between October and December, 2003. Notable changes from the October version include the addition of the adopted Public Welfare Statement, water planning information from the Navajo Nation, updated information on population trends and projections, an initial water projects list, a section on water quality, and an Epilogue documenting the process undertaken to obtain comment on the draft plan together with the comments themselves.

The process has been aided thanks to the involvement in the water planning Steering Committees of Jemez Pueblo and Zia Pueblo; members from the La Jara, San Ysidro, Jemez, Ponderosa and Los Pinos Acequias, among others; residents in the Villages of Jemez Springs, Cuba and San Ysidro as well as communities of La Jara, Regina, Ponderosa, Cañon, San Luis, and La Cueva; and ranchers from throughout the subregions. The shared knowledge and understanding helped to create a common ground upon which to build. The results -- especially the mission, goals and potential actions-- are based on this input and comments received through a long series of general public meetings throughout the subregion.

Not unlike elsewhere, the area is undergoing changes to customary ways of life while facing stresses on already scarce water resources. As this phase of the subregional water planning comes to a close, it is hoped that the residents in the Río Puerco and Río Jemez will find much in the plan to assist in their efforts to maintain and enhance their watersheds. Improving the information --the water picture-- will be an important step. Continuing the dialogue among the various interests will necessitate ongoing compromise and determination.

The plan is not static. As time goes on, the objectives and potential actions may change to fit the circumstances. Rather than being a mandate, the concept is that a regional water plan is a manual. It can lay out a long-term process towards finding answers and improving solutions, while establishing a vision and context for the entire watershed. Each area, such as La Jara or Jemez Springs, may choose to have a more locally-based water plan. Together, hopefully, they will ensure that the goals of the subregional water plan are met. The plan

will not take away water rights, nor absolutely protect them. The public welfare statement and the goals should guide the State Engineer regarding the community's desires.

Funding for this project came from Cuba Soil and Water Conservation District, Sandoval County, the Interstate Stream Commission and the Mid-Region Council of Governments. Funds for Phase I (\$10,000) and Phase II (\$25,000) were provided by the ISC (\$30,000) and MRCOG. In addition, MRCOG provided printing and copying, and Cuba Soil & Water Conservation District provided both funds and in-kind support in support of the program.

None of this could be accomplished without the time, talent and input of many collaborators. Particular thanks to Steve Lucero and Emmett Cart for their guidance, Judith Isaacs for her editorial assistance, Peggy Ohler for her wisdom and humor, Charlotte Mitchell for graciously handling whatever task is handed to her, and Jennifer Johnson for a superb job of detailing the public involvement and tracking the comments.

Steve Lucero, Chair, Cuba Soil and Water Conservation District
Elaine Moore Hebard, Project Coordinator
April 2004

Chapter 12 of the Middle Río Grande Regional Water Plan

Río Puerco y Río Jemez Subregional Water Plan: 2000-2050

SUMMARY

Preface	i
12.1 Introduction.....	1
What Is Regional Water Planning?.....	1
Why Do Regional Water Planning?	4
Who Is Planning?.....	4
12.2 Public Involvement.....	4
The Planning Process.....	5
12.3 Evolution of the mission statement, goals and objectives, and alternative actions	6
Mission Statement	6
Non-Prioritized Goals.....	6
Prioritized Alternatives.....	7
12.4 Physical Characteristics.....	7
12.5 A Historical Perspective	7
12.6 Water Supply	9
Precipitation Data	9
USGS Stream Gauge Records	10
12.7 Water Quality.....	12
12.8 Water Use	13
Water Usage.....	13
Drought.....	18
12.9 Population Yesterday and Today.....	19
Subregional Population.....	19
Population Growth in Río Rancho and Albuquerque	20
12.10 Quantifying Future Water Demand	21
Projections	22
<i>Based upon subregional population trends</i>	22
<i>Based upon regional population trends</i>	23
<i>Based Upon Watershed Conservation</i>	24
<i>Based on Other Criteria</i>	24
12.11 Issues And Constraints	25
Water Rights and Adjudication	25
Treaty of Guadalupe Hidalgo	30
Prior Appropriation and Beneficial Use	31
Río Grande Compact	31
Water Quality.....	32
Issues.....	32
12.12. Development of the Combined Subregional Scenario.....	32

Vision Statements & Scenarios.....	33
The Fifty-Year Subregional Water Plan	38
Public Welfare Statement	48
12.13 Implementation - The Next Steps	50
12.14. Projects & Groups.....	52
12.15 Epilogue - Process to obtain input on the draft plan.....	53
12.16 Glossary	54
12.15 Bibliography	54
Endnotes.....	56

Table of Tables	Page
12-1: Land Status in Río Jemez and Río Puerco	8
12-2: Average Precipitation and Snowfall in Río Jemez & Río Puerco Basins	9
12-3: TMDLs in Río Jemez	12
12-4: TMDLs in Río Puerco	13
12-5: Summary of Water Use in Río Jemez Watershed, 2000 (acre feet)	14
12-6: Summary of Water Use in the Río Puerco Watershed, 2000 (acre feet)	16
12-7 Summary of Water use (in acre-feet) in Sandoval county, 2000	18
12-8: 2000 Census Profiles by Data Analysis Sub-Zones (DASZs)	19
12-9: Subregional Population Trends and Projections, 1980 to 2025	22
12-10: Projection of Water Use in Río Jemez and Río Puerco 2000-2025	23
12-11: Population Projection and Water Use for Sandoval County, 2000-2060	24
12-12: Priority Dates and Acres of Pueblos	27
12-13: Priority Dates and Water Use for Non-Pueblo Acequias in Jemez Basin	27
12-14: Fifty Year Water Plan For The Río Puerco And Río Jemez Subregions	38
12-15: Table of Contents of Appendix 14 - Catalogue of Programs & Projects	53

Table of Figures	Page
12-1: Map of Middle Rio Grande Water Planning Region, Showing Subregions	2
12-2: Río Jemez Monthly Mean Streamflow, in ft ³ /s	10
12-3: Río Puerco Monthly Mean Streamflow, in ft ³ /s	10
12-4: Annual Mean Streamflow - Jemez River Compilation, in ft ³ /s, 1959 to 1990	11
12-5: Annual Mean Streamflow –Puerco River in ft ³ /s, 1952-1976	11
12-6: Río Jemez Water Withdrawals 2000 (acre feet)	15
12-7: Río Jemez Water Depletions 2000 (acre feet)	15
12-8: Río Puerco Water Withdrawals 2000 (acre feet)	18
12-9: Río Puerco Water Depletions 2000 (acre feet)	19
12-10: Río Jemez Withdrawals Without Reservoir Evaporation And Riparian Usage, 2000 (acre feet)	19
12-11: Population Trends and Projections in Sandoval County, 1910 to 2060	23

12.1 Introduction

The Río Puerco and Río Jemez subregion's water use is constrained by physical, legal, cultural and religious factors. The arid climate is quite variable. Neighbors are entitled to their share. Downstream users may also be impacting water resources, particularly in the Río Jemez. Due to increases in demand within and without the basins, the subregions must take steps now to protect and conserve available water resources.

The Key Fact About Our Water: Demand Exceeds Supply

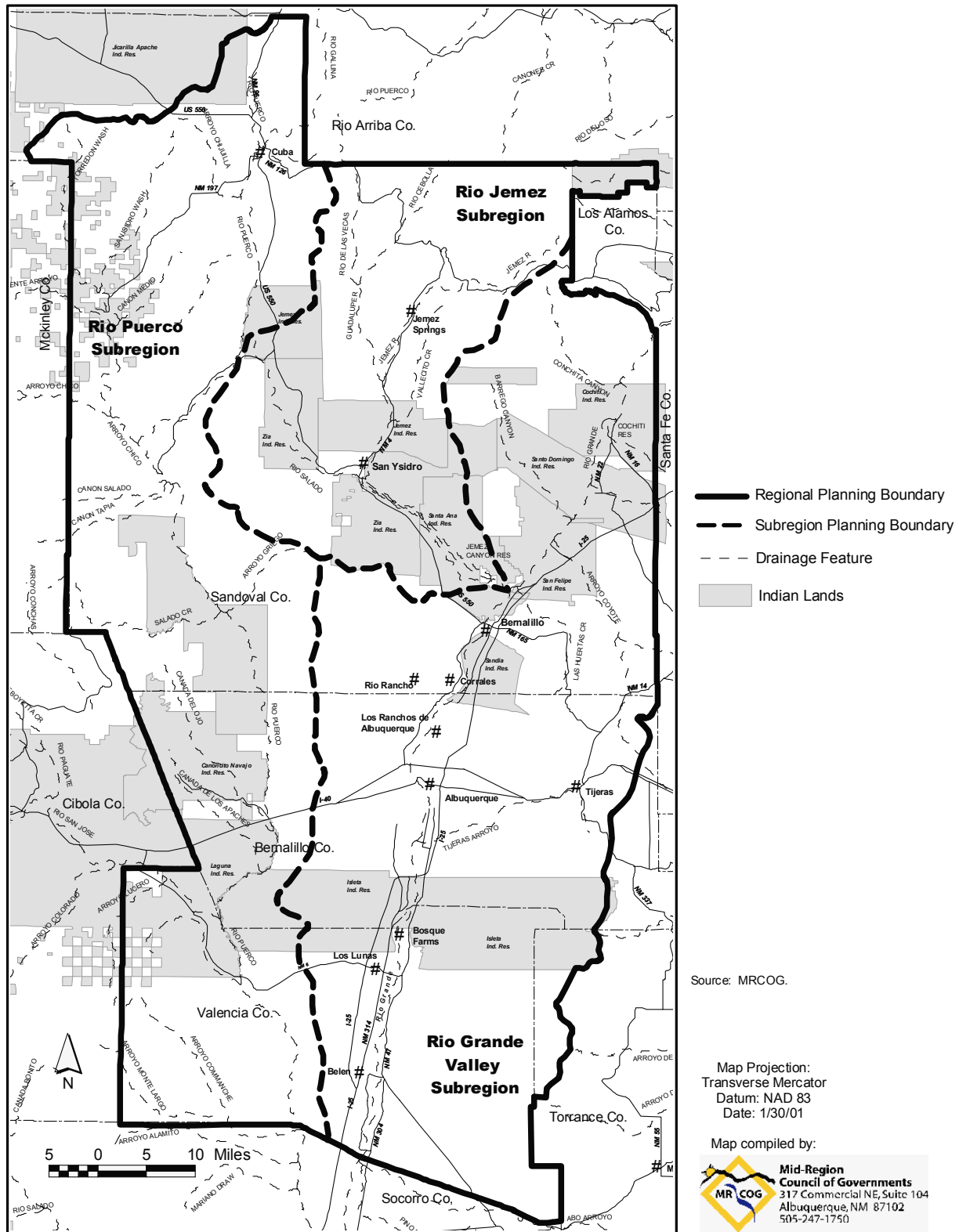
New Mexico's water supply is limited. Demand, needs, and rights to use water exceed the water supply available in most years. Many of New Mexico's difficult water dilemmas arise from these facts. During drought conditions, the imbalance becomes acute. After decades of promoting water use, New Mexico lacks both the physical facilities and the administrative infrastructure to ensure available water is delivered on the basis of water rights priorities to senior water-rights holders. The other side of the coin is that in most places we lack the means to limit water uses by junior water rights holders whose demands cannot be met from the available supply. Nor have water users been adequately informed about the serious nature of problems sparked by unauthorized use. (Framework for Public Input to a State Water Plan, prepared by the New Mexico Office of the State Engineer and The Interstate Stream Commission, December 2002)

What Is Regional Water Planning?

According to the New Mexico Regional Water Planning Handbook, water planning is "the budgeting of an essential and finite resource," and it may be used together with other planning tools at a local, regional and state level. The Handbook also strongly urges "participation, awareness and involvement of the people in the region," saying that "successful plans are marked by the support, understanding and consensus generated by the planning process." A copy of the Handbook can be obtained from the Interstate Stream Commission at (505) 827-6161 or www.seo.state.nm.us/doing-business/water-plan/rwp-handbook.html.

As part of its mandate to protect New Mexico's water, the Interstate Stream Commission (ISC) has been preparing a state water plan, recently adopted December 17, 2003. Prior to doing so, the ISC designated sixteen water planning regions throughout the state, and then asked them to prepare regional water plans in accord with the Handbook and §72-14-44 NMSA. As designated by the ISC and shown on Figure 12-1, Region 12 includes the Middle Río Grande, the Río Puerco, and the Río Jemez watersheds, together known as the Middle Rio Grande Water Planning Region (MRG WPR).

Figure 12-1: Map of Middle Rio Grande Water Planning Region, Showing Subregions



A regional water plan is to answer the five questions:

1. What is the water supply available to the region?
2. What is the region's current and projected water demand?
3. What alternatives are available to meet the projected demand with available supplies, including management alternatives to increase supply and reduction of demand via conservation or other measures?
4. What are the relative advantages and disadvantages of each alternative?
5. What is the selected set of alternatives that comprise the plan and how the alternatives may be implemented?

In order to answer the supply question, the way water is used must be considered. And the way water is used is partly a function of the land itself, partly of the land uses and partly of the administrative functions overlaying it all. As such, an investigation to the extent practical was performed. Better information will provide a better basis for future decisions. To ensure that the alternatives reflect the visions and values of the residents, public involvement is key. Watershed planning and management is a cooperative effort by stakeholders, municipalities and government agencies to create a long-term management plan for water resources within the watershed.

Chapter 12, coordinated with the regional water plan, was prepared with the aim of providing the subregions with information specifically drawn from the two watersheds for the residents to utilize in future planning. It was developed following the structure set out in the ISC Regional Water Planning Handbook template, with appropriate additions. This document blends public involvement over a several-year period with research and limited analysis. It refers to studies and material generated for the Middle Río Grande Regional Water Plan, which are presently available from the Mid-Region Council of Government or on line at www.WaterAssembly.org, under "Information."

Specifically, data required in the Handbook for the following categories is included in the subregional plan:

- a. Location, quality, and extent of the current water resource supply,
- b. Current water use, including specific categories of use in accord with the NMOSE,
- c. Projections of future water use, quantified,
- f. Current water rights status for the Río Jemez, and
- g. Methods used to solicit public involvement in developing the water plan.

An important product of the process is the "Fifty-Year Water Plan for the Río Puerco and Río Jemez Subregions," which contains goals, objectives, potential actions and benefits. Much more information is included in the appendices, including a ten-step Drought Planning Process and a Sample Conservation Ordinance. The remaining categories not yet addressed are:

- d. Impacts of conservation on water use, including (i.) the suitability of conservation measures for each region, and (ii.) the projected water savings for each measure evaluated.

- e. Source and quality of future water supply including (i.) cost effectiveness, technical feasibility, and social and political issues of using the identified future water source, and (ii.) potential for water supply contamination.
- f. Current water rights status for the Río Puerco (except for the Nacimiento Ditch).

While providing a start, the information in the plan, and thus in this summary, is not meant to be all inclusive. That will be the challenge for the future.

Why Do Regional Water Planning?

Regional water planning is necessary, not only to protect New Mexico's water but also to allow all stakeholders within a region to help determine the direction of water use within the region and between regions of the state. Without a plan, contradictory actions may result or decisions based outside the region may be made affecting the water. Broad public participation is necessary in the development of regional water plans to enhance their acceptance locally and to increase their potential contribution to state decision making with regard to "public welfare" and "conservation" determinations.

Who Is Planning?

Subregional committees to represent the rural interests of the Río Jemez watershed and the Río Puerco watershed were established in accord with the Scope of Work between the ISC and the Middle Río Grande Council of Governments (now Mid-Region, or MRCOG). In late 2002, the Cuba Soil and Water Conservation District (CS&WCD) signed a Joint Powers Agreement with the MRCOG to serve as fiscal agent for the two watersheds.

In July 2001, the Río Puerco y Río Jemez Steering Committees were formed to allow residents within the subregions to participate in the watershed planning process. The aim was and is to include local governments, sovereign pueblos and tribes, acequia associations and parciantes, soil and water conservation districts, school districts, mutual domestic water users, state and federal land and water resources management agencies, farmers and ranchers, and recreation and environmental advocacy groups. The Steering Committees have agreed that it is of vital interest to cooperatively develop and implement the subregional water plan.

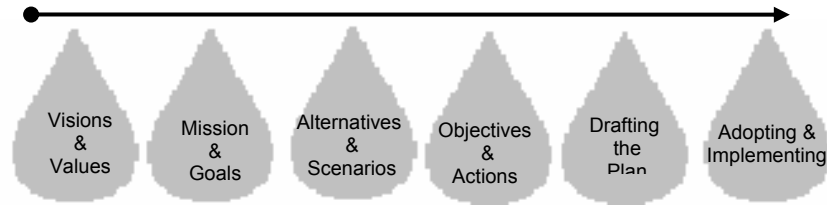
Contents of Chapter 12, the Subregional Plan

Chapter 12, numbered to fit in with the MRG Regional Water Plan, is the Subregional Plan. The summaries that follow correspond to the sections in the plan as presented in the full document. Appendix material is contained on a cd-rom, available from either MRCOG or CS&WCD, as are both the MRG and subregional water plans.

12.2 Public Involvement

This section documents the public involvement program and process in Phases I and II, summarizing the results. These reflect input by area residents who gave their time and energy to ensure the plan represents the values and visions of the residents of the Río Puerco and Río Jemez subregions. All parts of the process encouraged public involvement, input and discourse on the contents of the plan. Nearly 200 people participated in public meetings during Phases I and II.

The Planning Process



During Phase I of the planning process, which ended December 31, 2002, approximately 25 Río Puerco and Río Jemez Steering Committee meetings and several workshops were held either in Cuba or Cañon to identify issues, concerns, values, problems, mission, goals, alternatives and objectives for the subregional water plan.

Phase II, recently completed, involved more than twenty meetings of the Steering Committees, two sets of workshops in 2003, together with endorsement meetings for public officials and public open houses, also in 2003. The Steering Committees:

- a. Planned, publicized and conducted the February and May Workshops, mailing out approximately 2,000 and 5,000 flyers, respectively, for the two Workshops.
- b. Finalized the mission and goals with consent of the Workshop attendees.
- c. Edited a brochure detailing water planning and the activities of the subregions.
- d. Reviewed the 44 alternatives developed within the Middle Río Grande, together with several from the Jemez y Sangre water planning region, for relevancy to the Río Puerco and Río Jemez subregions.
- e. Incorporating the mission, goals and top three alternatives, teams developed scenarios from various perspectives --agriculture and ranching, natural balance, rural communities, environmental, and exurban/suburban/development/growth-- depending on the watershed, and presented these at the May Workshops.
- f. Discussed objectives (elaborations of the goals that describe types of management or actions, and which are quantifiable where possible).
- g. Based upon the Workshop input, the scenarios were divided into objectives and potential actions for each by watershed, which in turn were reviewed and critiqued.
- h. Finalized the Combined Subregional Scenario --being matrices of goals, objectives, potential actions, time, funding and benefits-- to serve as the "Fifty-Year Water Plan for the Río Puerco and Río Jemez Subregions."
- i. Discussed, edited and approved the public welfare statement.
- j. Planned, publicized and conducted endorsement workshops for public officials and governmental entities.
- k. Planned, publicized, edited handouts and conducted public open houses.

1. Reviewed the comments on the draft plan.
- m. Approved the Public Input - Phase I and II reports for submission.

At the two Workshops:

1. Attendees at the February 2003 Workshops in Cañon and Cuba accepted the mission and goals and prioritized the preliminary list of alternatives. After listening to the presentation of scenarios, participants worked on the common themes with the aim of creating a scenario for the Río Puerco and for the Río Jemez.
2. Attendees at the endorsement meetings in Cañon and Cuba in October 2003 heard an overview of the draft plan presented by the project coordinator. They had an opportunity to ask questions and received a sample endorsement resolution to take back to their respective governmental entities.
3. Attendees at the November 2003 Open Houses in Cañon and Cuba, received a synopsis describing the plan, reviewed and commented upon the goals, objectives and potential actions, as well as the draft public welfare statement, and had opportunities for informal conversations with all Steering Committee members present. Volunteer sign-up sheets also were available.

Outreach included extensive use of flyers, newspaper articles, visits and telephone calls. Powerpoint presentations were made to the local and county governments. An informational brochure and web page were also created. A synopsis of the draft plan was prepared and handed out at the Open Houses. Bi-weekly memos kept the Steering Committees and other interested parties up-to-date. Extensive appendix material provides information as to the content of the meetings and the attendees, together with the outreach material.

12.3 Evolution of the mission statement, goals and objectives, and alternative actions

In the full document is found the development of the mission statement, goals and alternatives during both Phase I and Phase II, as well as a discussion of the development of the vision statements and scenarios. The adopted mission statement, goals and prioritized alternatives are set out below.

Mission Statement

The residents of the Río Puerco y Río Jemez Sub-watersheds promote a sustainable balance between the availability and use of water, promote healthy watersheds, and promote retention of a rural lifestyle to benefit local communities and residents.

Non-Prioritized Goals

- Restore and manage the watersheds on public and private land to enhance water production, retention, and quality, to reduce the threat of wildfire, and to preserve natural systems dependent on water.

- Support the cultural and spiritual values of water, and the universal need for and importance of water.
- Ensure treaty, water and acequia rights to preserve and protect local agricultural traditions.
- Retain land use patterns that support and ensure a rural lifestyle and economy.
- Promote the conservation of water.
- Promote education for area residents regarding the connection between land use, water and environmental health, and ways to conserve water. These concepts should be incorporated into the curriculum of area schools.
- Provide for monitoring the implementation of the water plan.

Prioritized Alternatives

- Protect water rights
- Manage and restore our watersheds
- Manage growth and land use together
- Reduce water demand
- Increase water storage capacity in rural areas
- Manage drought
- Reuse wastewater (gray)
- Identify fire-fighting water
- Prohibit sale of water from region
- Implement public education program
- Install domestic supply wells
- Reduce water loss in acequias
- Capture flood flows
- Use surface and groundwater in combination
- Remove trace elements from water to increase supply

12.4 Physical Characteristics

By knowing geological conditions, better predictions and management can aid with planning. To a great degree, the physical characteristics of a region guide the way an area develops, considering the slope and soils found, as well as effects of climate, due to altitudes and precipitation. In the Río Puerco and Río Jemez, elevations range from over 11,000 ft. at the headwaters of the watersheds to 5,000 ft. at the respective confluences with the Rio Grande. Sources of information include *Río Puerco on Line* and *A Geologist's Touring Guide to the Jemez Mountains*, both included in the appendix material.

12.5 A Historical Perspective

The past is the key to the future. When considering water usage today and tomorrow, understanding how the land has been used, the regimes built around the geography, and thus how water has been allocated is crucial to understanding how it is used now, what structures are in place, as well as what modifications may be undertaken to improve management. Land status governs water management regimes in place and potential for change.

The Río Jemez subregion includes the watershed area of the Jemez River within Sandoval County down to its confluence with the Río Grande. It is approximately 1,017 square miles. The Río Jemez subregion occupies approximately 18% of the total MRG WPR.

The Río Puerco subregion extends from Sandoval County through Bernalillo County and into Valencia County. It has an area of approximately 2,119 square miles, or 3,867,821 acres. The Río Puerco subregion occupies approximately 39% of the total MRG WPR

Land status of the two watersheds is shown in Table 12-1. Public and tribal ownership are dominant.

Table 12-1: Land Status in Río Jemez and Río Puerco

Río Jemez			Río Puerco (In Sandoval County)		
Ownership	Acres	Percentage	Ownership	Acres	Percentage
State Lands	7,027	1.05%	State Lands	43,848	5.16%
Tribal Lands	214,099	31.94%	Tribal Lands	150,130	17.65%
Private Lands	44,244	6.60%	Private Lands	257,161	30.23%
Bureau of Land Management	64,494	9.62%	Bureau of Land Management	335,990	39.50%
Forest Service	251,108	37.46%	Forest Service	63,460	7.46%
Valles Caldera Nat. Preserve	86,942	12.97%			
State Park	268	0.04%			
National Park Service	303	0.05%			
Dept. of Defense	1,809	0.27%			
Totals	670,294	100.00%		850,589	100.00%

Source: Bureau of Land Management (2003)

Land use on tribal lands and private lands includes agriculture. As part of the water demand side of the equation, it is important to have a clear picture of what lands are under irrigation. While MRCOG's 2000 land-use map shows irrigated agriculture to be 586 acres in the Río Jemez, Shomaker reported that 1,233 acres were irrigated in 1987. Recently, the Pueblo of Jemez stated that 2,100 acres were irrigated, and the 2000 NMOSE reports that 1,655 acres were irrigated, of which 1,585 utilized surface water (Wilson 2003). The Court in the *Abousleman* adjudication established water rights for 1,234.25 acres in the Río Jemez, with an additional 3,535.40 acres reported for Pueblo irrigation. In the Río Puerco, MRCOG's 2000 land-use map shows irrigated agriculture to be 553 acres. Shomaker reported that in 1987, 3,266.50 acres were irrigated. The 2000 NMOSE reports that 2,040 acres were reported as irrigated (Wilson, 2003). The *Abousleman* adjudication established 715.62 acres for the Nacimiento Acequia (which draws water from the Río Jemez). La Jara Acequia claims to irrigate 1,610 acres (La Jara Geographical Priority Area Application 2002). Given the data discrepancies, a better picture of how land is used is needed.

Land use on tribal lands and private lands also include ranching, residential and commercial uses. In addition to recreation, land use on public lands includes logging and grazing by permittees.

12.6 Water Supply

Surface water supports the region’s industry, agriculture, commerce, environment and people, augmented with ground water. A central question to answer, according to the Regional Water Planning Handbook, is "what is the water supply available to the region?" Without knowing the quantity of the resource, how can plans be made with confidence that future needs will be met while attaining current goals?

The relationship between water supply and water demand is the basis for water planning alternatives. A clear understanding of water quantity and its limitations due to quality or availability are essential for determining the ability of the region to meet future demand for water in a sustainable fashion. Water Resource Assessment for the Planning Region, Part A - Water Quantity, Region 6 Regional Water Plan (2003).

The Middle Río Grande Water Supply Study (Papadopolous 2000 & 2003 draft) reports the gauged amount as each tributary enters the Río Grande. Outflow data indicates that the Río Jemez provides an average of about 45,000 acre feet per year of surface water to the Río Grande while the Río Puerco provides about 30,000 acre feet per year. According to Historical and Current Water Use in the Middle Río Grande Region (Shomaker 2000), surface water in both basins is limited. The Río Jemez has “no flow for many days” beneath the Jemez Canyon Dam, and the Río Puerco has “no flow for many days” to “no flow for extended periods” along most of its length.

Precipitation Data

Temperature, rainfall and snowfall vary within Sandoval County, particularly with elevation. Depending on the elevation, the average rainfall in the basin varies annually between 10 to 20 inches, but recent drought has reduced that substantially. Table 12-2 shows mean annual precipitation and snowfall for specific periods of record at four locations in the Río Puerco and two locations in the Río Jemez subregions.

Table 12-2: Average Precipitation and Snowfall in Río Jemez & Río Puerco Basins

	Regina, NM (297346)	Cuba, NM (292241)	Star Lake, NM (298524)	Torreón, NM (299031)	Jemez Springs, NM (294369)	Wolf Canyon, NM (299820)
	Period of Record: 7/1/1914 to 8/31/1969	Period of Record: 1/1/1941 to 3/31/2003	Period of Record: 1/ 1/1922 to 3/31/2003	Period of Record: 1/13/1961 to 3/31/2003	Period of Record: 1/1/1914 to 3/31/2003	Period of Record: 7/1/1952 to 3/31/2003
Average Total Precipitation (in.)	15.82	13.11	9.15	10.27	17.32	22.74
Average Total SnowFall (in.)	49.9	26.9	19.2	19.6	30.2	121.3
Average Snow Depth (in.)	1	0	0	0	0	2

Note: Dates reflect that some gauges are no longer in use. Source: Western Regional Climate Center, Nevada.

USGS Stream Gauge Records

The charts below summarize the monthly mean streamflow in the Río Puerco and Río Jemez, as shown on the named gauges. Of note, the peak flows do not occur at the same time in the two basins.

Figure 12-2: Río Jemez Monthly Mean Streamflow, in ft³/s

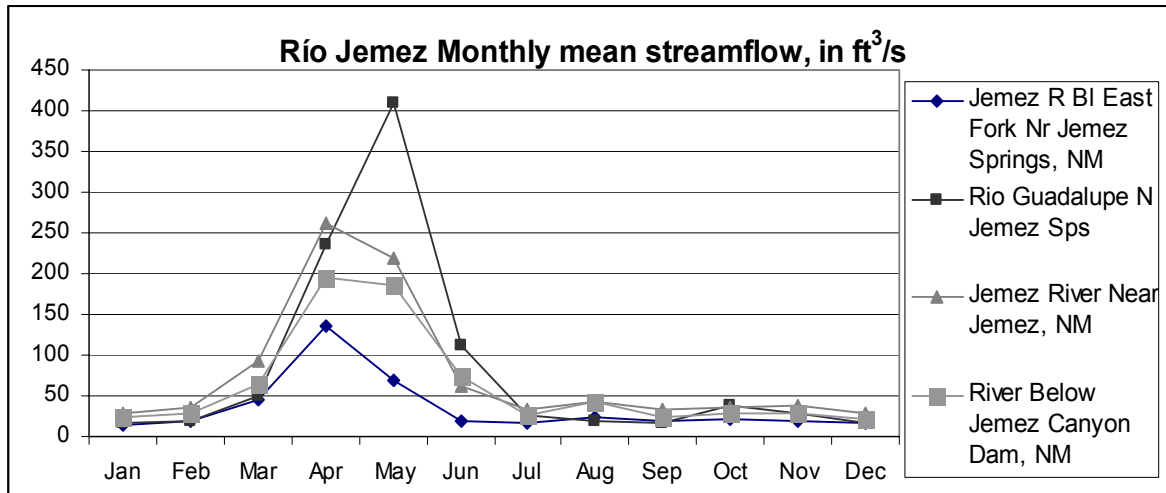
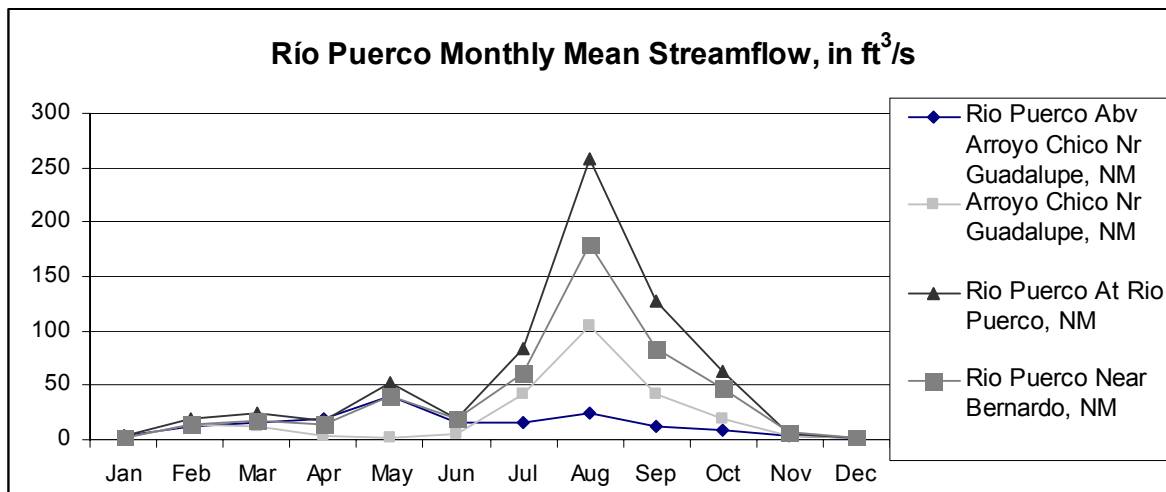
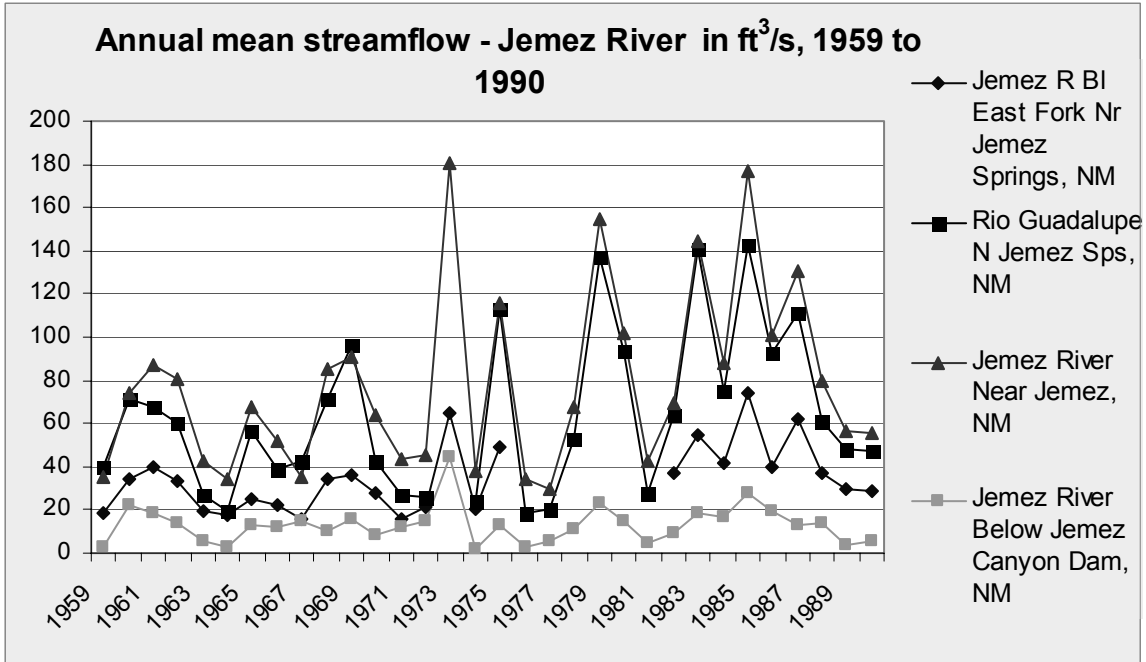


Figure 12-3: Río Puerco Monthly Mean Streamflow, in ft³/s



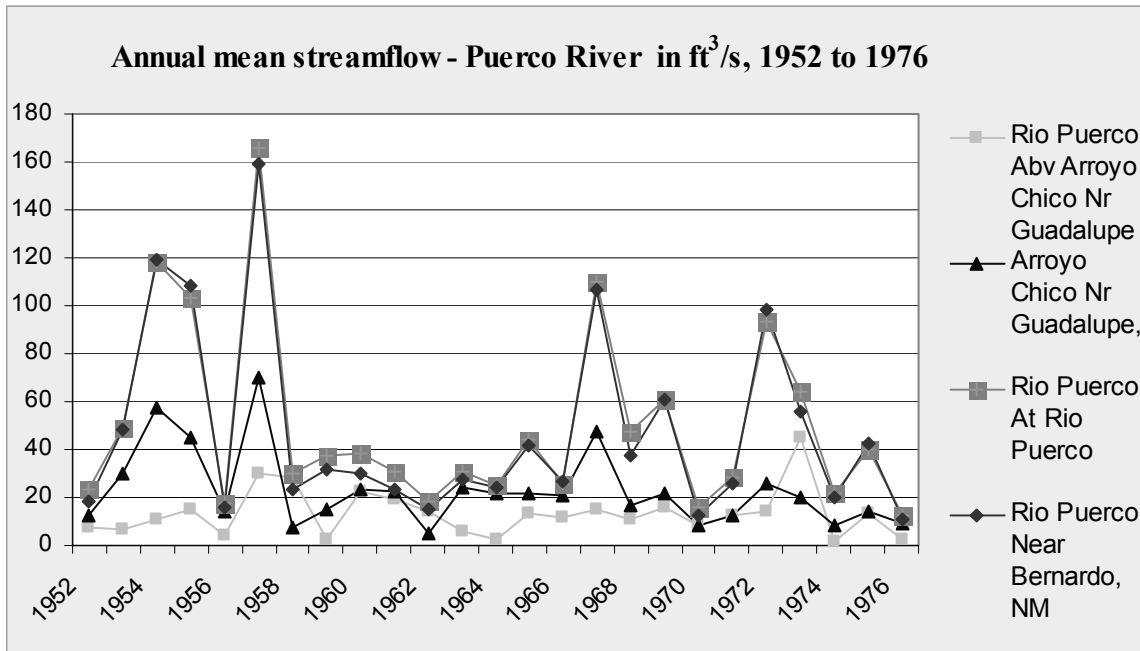
The variability in water supply from year to year can be seen in the next two graphs - one for each watershed - compiled for the years when data was available for all gauges.

Figure 12-4: Annual Mean Streamflow - Jemez River Compilation, in ft³/s, 1959 to 1990



Source: USGS

Figure 12-5: Annual Mean Streamflow –Puerco River in ft³/s, 1952-1976



Source: USGS

Although referring to the Río Grande as a whole, the following is certainly true for the subregions:

In summary, the water supply of the Middle Río Grande is marked by limitation and variability. The successful water planning process will operate in recognition of these concepts. (Papadopoulos 2000)

What is clear is that, like other watersheds in New Mexico, in the Río Jemez and Río Puerco there is a wide variation in water supply. Shortages may result in a water priority call on the river. If New Mexico is unable to meet its Rio Grande Compact obligations, there will be a search for available water, as has occurred in the Pecos River Basin.

12.7 Water Quality

There are numerous water use strictures to be found, often in connection with land use. One entails water quality standards. The designated uses of a given reach of stream has may well influence present activities and regulations. Every other year, the New Mexico Environment Department, Surface Water Quality Bureau, publishes a list of streams which do not meet federal standards. The *Approved 2002-2004 State Of New Mexico §303(D) List For Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDLs)* (June 2003), includes listings for both watersheds. A more in-depth TMDL report was released in 2002 for the Río Jemez, updating the information with concentrated testing and monitoring. The reports further set out the particular pollutants examined (such as turbidity, stream bottom deposits, temperature, and pH) for each reach and the current TMDL status. From the §303(D) List, the streams reported in the Río Jemez are set out in Table 12-3.

Table 12-3: TMDLs in Río Jemez

Stream	Location	TMDLs
Calaveras Creek	Rio Cebolla to headwaters	Stream Bottom Deposits* ¹
Clear Creek	Rio de las Vacas to San Gregorio Lake	Turbidity & <i>Total Organic Carbon</i> ²
East Fork of the Jemez River		Turbidity
Jemez River	HWY 4 near Jemez Springs to East Fork	Chronic aluminum, <i>Turbidity</i> , <i>Stream Bottom Deposits</i> ²
Jemez River	Rio Guadalupe to HWY4 nr Jemez Springs	<i>Turbidity</i> , <i>Stream Bottom Deposits</i> ²
Lower Río Cebolla	Rio de las Vacas to Fenton Lake	Stream Bottom Deposits
Redondo Creek	Sulphur Creek to headwaters	Temperature & Turbidity
Rio de las Vacas	Rio Cebolla to Rito de las Palomas	Temperature & <i>Total Organic Carbon</i> ²
Rio Guadalupe	Jemez River to confl with Río Cebolla	Chronic aluminum and <i>Turbidity</i> ²
Rito Peñas Negras	Rio de las Vacas to headwaters	Stream Bottom Deposits, Temperature & <u>Total Organic Carbon</u> ³
San Antonio Creek	East Fork Jemez R to headwaters	Temperature & Turbidity
Sulphur Creek	Redondo Creek to headwaters	pH & Conductivity
Upper Río Cebolla	Fenton Lake to headwaters	Stream Bottom Deposits & Temperature
Fenton Lake		<i>Stream Bottom Deposits & Plant Nutrients</i> * ¹

¹ Asterisked = Not listed in TMDL Report

² Italicized = found in TMDL Report and not in §303(D) List

³ Underlined = Found in §303(D) List and not in TMDL Report

Sources: Jemez Watershed TMDLs report (NMED SWQB, 2002); *Approved 2002-2004 State Of New Mexico §303(D) List For Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDLs)* (NMED SWQB, 2003)

The TMDLs listed in Table 12-4 are from the §303(D) list, since the updated TMDL report has not yet been prepared for the Río Puerco.

Table 12-4: TMDLs in Río Puerco

Stream	Location	§303D TMDLs
Nacimiento Creek	USFS bnd to San Gregorio Reservoir	Stream Bottom Deposits & Plant Nutrients
Río Puerco	Rito Olguin to headwaters	Temperature & Stream Bottom Deposits
Rito Leche	Perennial reaches above Río Puerco	Stream Bottom Deposits
San Pablo Canyon	Río Puerco to headwaters	Stream Bottom Deposits & Plant Nutrients

Source: Approved 2002-2004 State Of New Mexico §303(D) List For Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDLs) (NMED SWQB, 2003)

Río Jemez is now poised to prepare water quality plans --such as §319 ones-- to address their TMDL issues by writing Watershed Restoration Action Strategies (WRAS). Still lacking is data for various reaches as to why a given stretch has the problems seen in the testing. The increased testing and monitoring cycle for TMDLs is now beginning in the Río Puerco. The Río Puerco Management Committee has prepared a WRAS and projects are underway to address the identified issues. In both watersheds, better data and benchmarks would aid in understanding the relationship of watershed management with water quality.

One inorganic constituent that occurs naturally in groundwater - arsenic- currently is subject to an MCL of 0.05 mg/L. In January 2006, this MCL will be reduced to 10 micrograms per liter (µg/L) (0.010 mg/L), a level that is commonly exceeded in regional groundwater under natural conditions. If water quality in the subregions does not meet new federal standards for arsenic, action will have to be taken, so plans need to be prepared. Additional testing may be required to fully evaluate the extent of arsenic within the planning region.

12.8 Water Use

Water Usage

Water use is framed by how water has been used in the past as well as topography and climate. Comparing supply with use, or demand, gives a water budget of inflows and outflows. The challenge here is the lack of specific data, making it difficult to reconcile supply and demand. Particularly lacking is data as to the water usage and needs of the watershed itself. In meeting after meeting, concerns were raised about springs drying up, about the over-abundance of trees in the forest, and about new users and uses in the watershed and downstream. Suggestions were made to restore the watershed, such as reducing the number of trees by logging or fire, to build back the "sponge." In turn, the watershed would be better able to supply the needs of those in its folds. Better information and understanding with respect to water usage will in turn provide better guidance to decision-makers.

Every five years, the OSE reports water usage in New Mexico. Table 12-4 with the accompanying charts showing withdrawals and depletions is the reported water use in Río Jemez in 2000, and Table 12-5 and graphs is the same for the Río Puerco. Note that the two basins are hard to compare since no riparian usage is reported in the Río Puerco. While the OSE does not report riparian usage, it was reported for the Río Jemez by the Bureau of Reclamation. Unknown is the amount consumed by riparian vegetation in the Río Puerco, though it is likely to be substantial.

Key terms:
 Water *withdrawn* is that which is either diverted from its natural path in the surface-water system or pumped from wells. Some of this water may return to either the surface-water or groundwater system, which is why depletions are a more accurate measure.
Depletions or Consumptions are that part of a withdrawal that has evaporated, transpired, or been incorporated into crops or products, consumed by people or livestock, or otherwise removed from the water environment.
Acre foot: Enough water to cover one acre of land one foot deep, or 325,851 gallons.

Table 12-5: Summary of Water Use in Río Jemez Watershed, 2000 (acre feet)

Category	With- drawal Surface Water	With- drawal Ground Water	Total With- drawal	Depletion Surface Water	Depletion Ground Water	Total Depletion	Return Surface Flow	Return Ground Flow	Total Return Flow
public	133	76	209	47	38	85	87	38	125
domestic	0	256	256	0	256	256	0	0	0
commercial	10	68	78	10	68	78	0	0	0
industrial	0	235	235	0	232	232	0	3	3
mining	245	324	570	239	321	560	7	3	10
livestock	15	148	163	15	148	163	0	0	0
power	0	0	0	0	0	0	0	0	0
agriculture	4,429	137	4,566	1,749	72	1,821	2,680	65	2,745
Río Jemez reservoir	5,863	0	5,863	5,863	0	5,863	0	0	0
riparian & open water*	8,068	0	8,068	8,068	0	8,068	0	0	0
Totals	18,764	1,245	20,009	15,991	1,135	17,126	2,773	110	2,883

Sources: Except for *, comes from Wilson, 2003. * comes from the ET Toolbox. Assumptions included in main text

Figure 12-6: Río Jemez Water Withdrawals 2000 (acre feet)

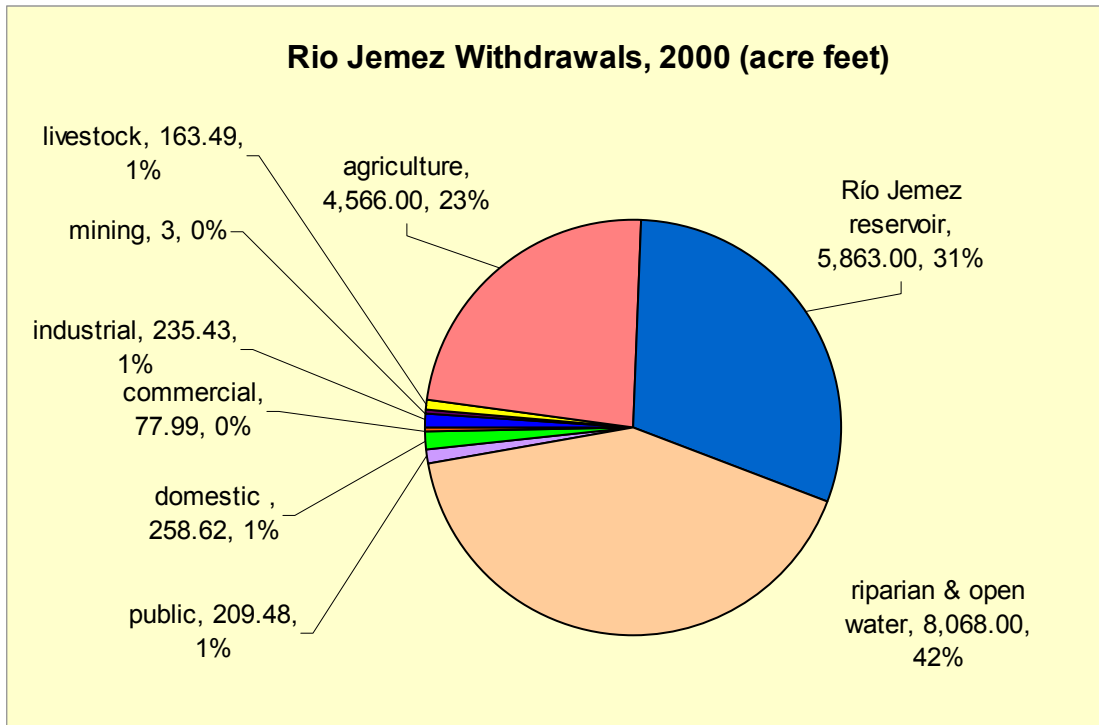


Figure 12-7: Río Jemez Water Depletions 2000 (acre feet)

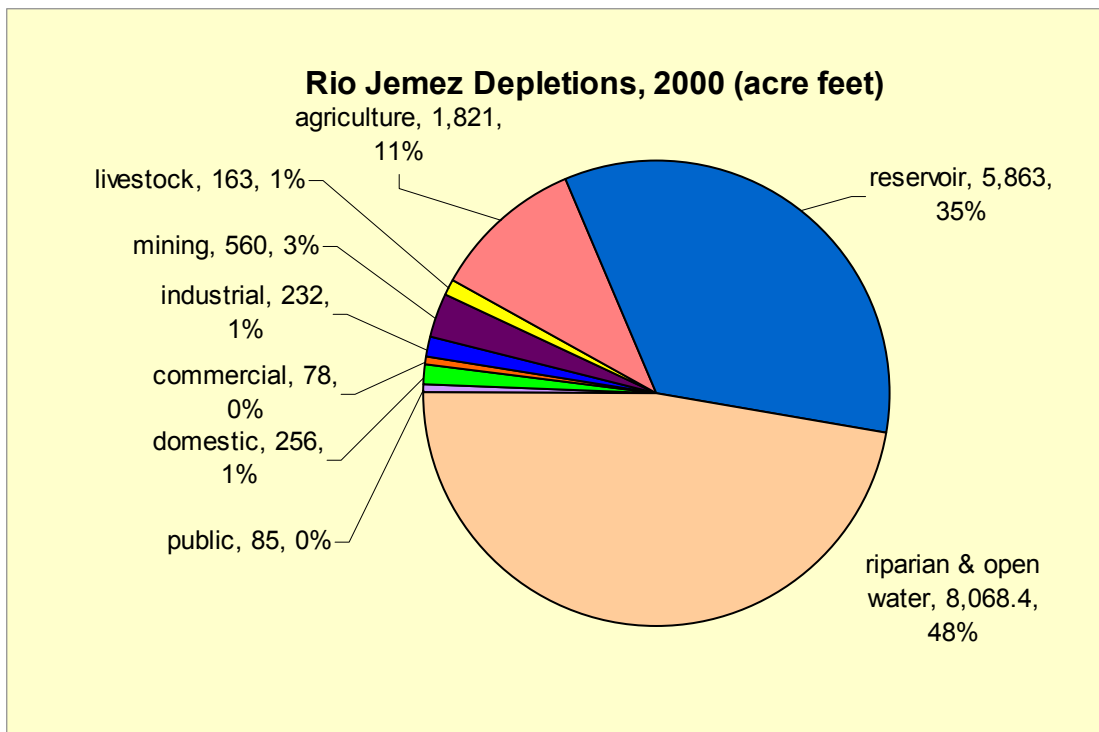


Table 12-6: Summary of Water Use in the Río Puerco Watershed, 2000 (acre feet)

Category	With- drawal Surface Water	With- drawal Ground Water	Total With- drawal	Depletion Surface Water	Depletion Ground Water	Total Depletion	Return Surface Flow	Return Ground Flow	Total Return Flow
public	17.30	133.68	150.98	8.65	66.84	75.49	8.65	66.84	75.49
domestic	0.00	256.08	256.08	0.00	256.08	256.08	0.00	0.00	0.00
commercial	0.00	3.54	3.54	0.00	3.54	3.54	0.00	0.00	0.00
industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mining	0.00	1.40	1.40	0.00	1.40	1.40	0.00	0.00	0.00
livestock	303.64	31.29	334.93	303.64	31.29	334.93	0.00	0.00	0.00
agriculture	5,733.00	0.00	5,733.00	2,303.00	0.00	2,303.00	3,430.00	0.00	3,430.00
riparian	NA	NA	NA	NA	NA	NA	NA	NA	NA
Totals	6,036.64	422.45	6,479.93	2,606.64	355.61	2,974.44	3,438.65	66.84	3,505.49

Source: Wilson, 2003; Assumptions included in main text. NA - Not available.

Figure 12-8: Río Puerco Withdrawals, 2000 (acre feet)

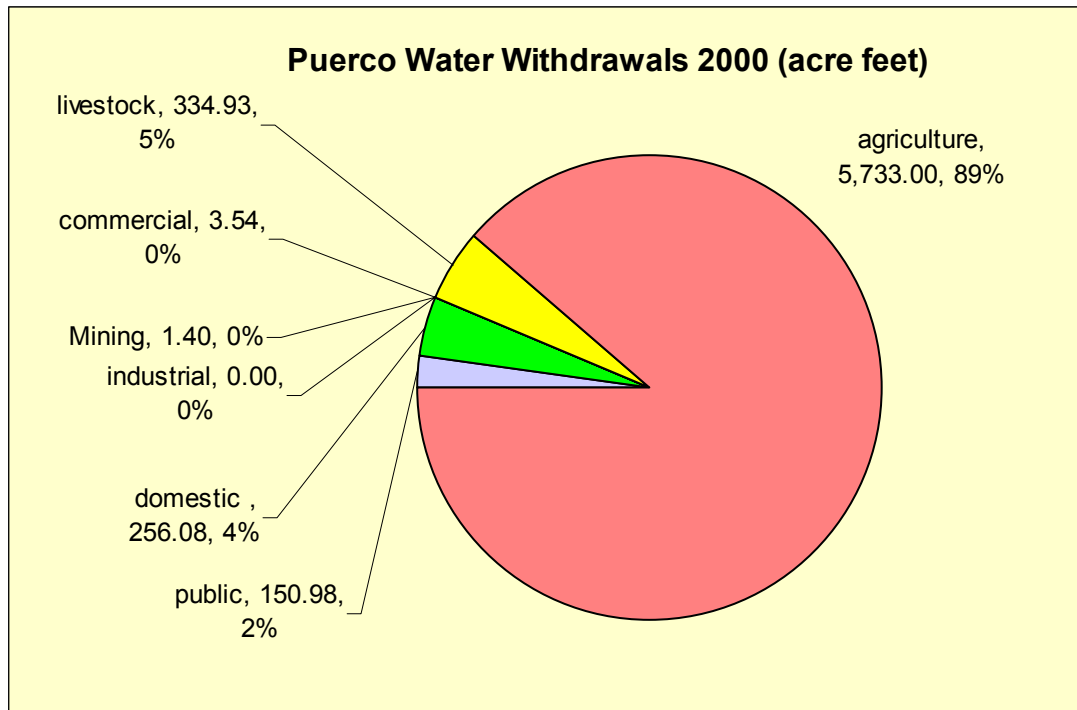
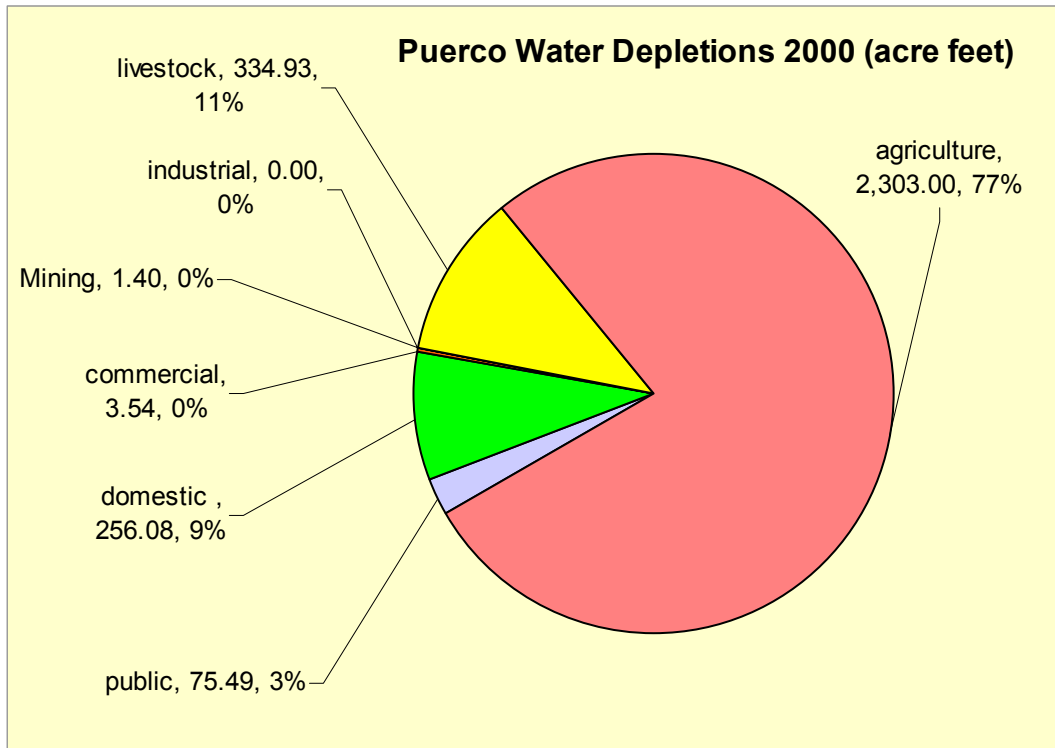
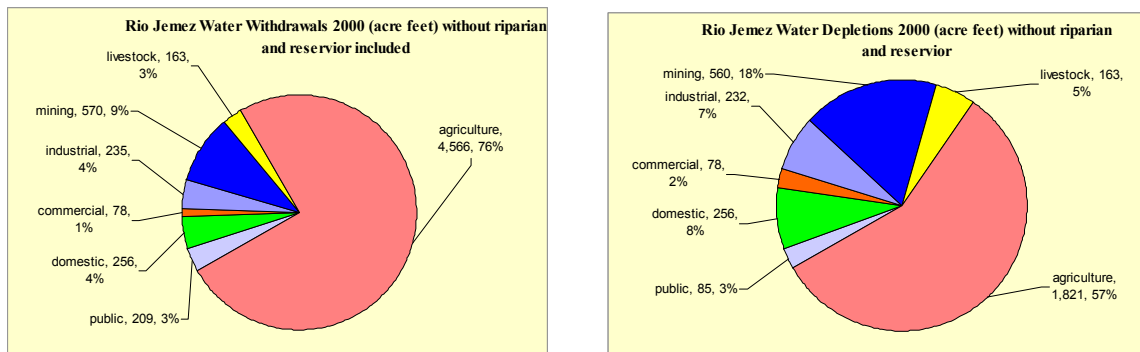


Figure 12-9: Río Puerco Depletions, 2000 (acre feet)



For comparison, the following are charts of Río Jemez water withdrawals and depletions without accounting for riparian and open water evaporation, and reservoir evaporation. While agricultural water usage is 10% of the overall usage, it is well over 50% if riparian and open water (47%) and reservoir (34%) evaporation are removed. Knowing that there is riparian usage in the Río Puerco yet be accounted for is an indicator of data needs. Reservoir evaporation provides a source of water savings.

Figure 12-10: Río Jemez Withdrawals Without Reservoir Evaporation And Riparian Usage, 2000 (acre feet)



Noteworthy is the household water usage, sometimes approximately 40 gallons per capita per day. When compared to the per capita usage in urban areas, upwards of 175 gpcpd, it

provides a contrast when considering future conservation measures. A questionnaire was sent to the water providers in the subregions. Information provided included the uses and needs as seen by the present operators. The completed questionnaires are found in the appendix material. Notable responses include:

- The water source for La Jara Water Users Association comes from the La Jara Creek, just above the diversion for the La Jara Community Acequia. The operator estimated that the present system, currently supplying approximately 300 users on 40 acre feet per year, could support additional users up to the full 47.5 acre feet of owned water rights. If were to acquire more water rights -either surface or ground water-, it would impact the acequia.
- The Regina Water Users Association is entitled to 55 acre feet, but uses about half of that. Because of drought, the system is not able to use its primary source of water, San Jose Spring, rather is relying on the San Pedro well. There are 217 meters serving approximately 500. Regina has a moratorium on new hookups and will have to find new sources of water prior to adding on additional users.
- Ponderosa Mutual Domestic Association owns 78 acre feet, and uses approximately 38 for 325 persons. The Association is working on a 40 year water plan. Even though supply and ownership is approximately double the current usage, there is a shortage of stored water for fire protection.

No category exists for cultural and spiritual water usage. One goal of the two watersheds is to "support the cultural and spiritual values of water, and the universal need for and importance of water." Other participants felt strongly that the river had a right to have water. No data is included as to the value of recreation, such as fishing, but certainly in some locales that is an important activity.

Information on Navajo water planning is included in the main text. Of note is the planned-for Cutter Lateral pipeline from the San Juan River to Torreon Chapter House, serving other communities along the way.

As a comparison, a summary of water use for Sandoval County in 2000 is set out in Table 12-7.

Table 12-7 Summary of Water use (in acre-feet) in Sandoval county, 2000

Category	With-drawal Surface Water	With-drawal Ground Water	Total With-drawal	Depletion Surface Water	Depletion Ground Water	Total Depletion	Return Flow Surface Water	Return Flow Ground Water	Total Return Flow
County Totals	72,176	22,137	94,314	28,535	16,401	44,935	43,642	5,737	49,378

Source: Wilson, 2003

Drought

In addition to the variability of the climate under normal conditions, the region also regularly incurs drought conditions. In 2003, substantially less precipitation was received

than normal. From October 2002 to September 2003, Jemez Springs received 65% of its average. Streamflow recorded near Jemez was 53% of normal for that same water year. Tree ring studies indicate that the region has seen substantially less moisture in the past. Ultimately, a Drought Plan and a Conservation Plan are expected to be included. Exemplars are included in the appended materials.

12.9 Population Yesterday and Today

Population statistics play an important part in water planning in projecting future demand. People use water in a variety of ways, all of which change the water usage from a primal state. Until fairly recently, land use in the region depended solely on surface water. Surface water users are sensitive to drought conditions and must temper usage accordingly.

As New Mexico has changed from being overwhelming rural, water usage has changed as well. Prior to having the ability to drill deep, accessing deeper aquifers, groundwater depletion was not a factor in the overall water budget. However, beginning in 1960, groundwater levels have declined in the Albuquerque basin. According to the City's Water Conservation Office's web site, the water table has declined 160' in some places.¹

Except with domestic wells, in order to pump more groundwater, since the pumping affects the surface water supply, groundwater users have to obtain existing surface water rights. The rationale is that the surface water will replenish the water being removed. For example, Rio Rancho relies on groundwater for its public water supply and Intel relies on groundwater for its industrial processes. Since all of the surface water has been allocated, surface water rights will have to come from other users and perhaps from elsewhere to meet additional needs. Thus, population growth and new urban uses in these downstream areas affect the water resource and water planning in the subregions.

Subregional Population

Table 12-8 shows the population in the watersheds in Sandoval County. Included in the subregions are not only the three incorporated communities but traditional communities, new communities and tribal communities.

Table 12-8: 2000 Census Profiles by Data Analysis Sub-Zones (DASZs)

Geographic Name	DASZ	Total Acres	Total Population
Torreón	2011	302,665	2,958
San Luis	2012	572,404	115
La Ventana	2041	36,607	0
Cuba	2061	93,031	1,478
Jicarilla	2071	135,990	11
La Jara, Regina	2072	40,866	454
Western Rio Rancho	2111	62,124	17
		1,243,687	5,033
Western Rio Rancho	1011	16,265	103
Western Rio Rancho	1012	1,460	17

Cabazon	1021	7,943	0
Western Rio Rancho	1022	10,242	0
		35,910	120
Jemez	2031	43,254	1,958
San Ysidro & Zia	2032	62,082	891
Salado	2042	41,500	0
Jemez Springs	2051	303,312	1,956
		450,148	4,805

Note: DASZ boundaries are generally bounded by major roads and other features that inhibit travel. Generally, DASZs are subdivisions of Census Tracts. Western Rio Rancho is included as it is within the Río Puerco drainage.

Source: DASZ Projections, Mid-Region Council of Governments--January 2003.

DASZ information and projections courtesy Dave Abrams, MRCOG, 11-6-03

While the census reports not much overall population growth in the subregion, that is not consistent with anecdotal evidence. While the census may not reflect it, growth is occurring in the subregions with a correlating increase in water usage. To some extent, the growth may be second home purchasers or families who still return to tend farms and ranches. Data discrepancies also include tribal population.²

Population Growth in Río Rancho and Albuquerque

"The majority of people, businesses, industries, as well as agricultural fields are located within a few miles of the Río Grande itself; therefore, the majority of water withdrawn and consumed is within the Middle Río Grande Valley subregion." (Shomaker 2000).

Even if population increase is not a factor within the subregion itself, increases elsewhere may well be a factor in water planning within the region. Population trends in the Río Puerco and Río Jemez may not fully indicate the stress that the resource is already under due to population growth in the region, nor what it might face in the future.

The Jemez River is in hydraulic connection with the aquifer system over most of its length in the basin, so changes in water-table altitude in the aquifer system adjacent to the river can influence seepage between the river and the aquifer system. (McAda & Barroll, 2002)

The majority of the growth in Sandoval County is not occurring within the subregions. From 1910 to 1970, Sandoval County's population grew from 8,579 to 17,492. The population doubled by 1980 to 34,400. Additional increases were seen in 1990 (63,319) and 2000 (89,908). The University of New Mexico's Bureau of Business and Economic Research (BBER) reports on census matters within New Mexico. It was noted in a study of the components of change between 1990 and 2000 in the Middle Rio Grande that 71% of Sandoval County's growth was due to migration from other areas. (BBER 2002)

Rio Rancho, located just south of where the Río Jemez enters the Río Grande, accounts for much of the sharp growth curve after 1970. According to US Census statistics, in 1980, Rio

Rancho accounted for 29% of the County's population, in 1990, it was 51% and in 2000 it grew to 58%. Together, the communities of Bernalillo, Corrales and Rio Rancho accounted for 22% of the County's population in 1970, 46% in 1980, 69% in 1990 and 73% in 2000. In comparison, the population in the subregions was 11% of the 2000 County Census.

Rio Rancho, for which population statistics were not reported until 1980, grew from 9,985 to 51,765 in 2000. Downstream, in Bernalillo County, Albuquerque's population and industrial growth also affects the water resource. In 1910, there were 11,020 residents, while in 2000 there were 448,607. "The Middle Rio Grande Water Planning Region doubled its population in 30 years. In 1970, 353 thousand (or about 35%) of the state population lived in the Middle Rio Grande Region. In 2000, this number expanded to over 700 thousand people or about 40 percent of the state population." (Alcantara, 2003) Growth in Sandoval County has continued. BBER reports that between April 2000 and July 2002, the incorporated communities in Sandoval County grew by 5,378, 90% of which was in Rio Rancho.

Although this growth has occurred along the Río Grande, the subregions perceive the increase in population and water usage in the Rio Rancho - Town of Bernalillo area as a driving factor in their water plan. In addition to being concerned that increased pumpage has drawn down the surface water in the Río Jemez, water transfers --to offset the pumping-- remove water from subregional use, and may increase usage. One example highlights this issue:

The water and land affected are located in San Ysidro. Under normal circumstances, the land would be fallowed when the rights are employed by Rio Rancho as an offset to their

Rio Rancho on Wednesday set the stage for buying 196 acres of land and 172 acre feet of water rights in the Jemez Valley needed for future city growth and development.

The city two years ago was given permission by the state to double the 12,000 acre-feet of water it is allowed to pump annually, but only if water rights were paid for in advance.

Arley Sanchez, *Albuquerque Journal*, Friday, March 28, 2003.

pumping. In order to recoup the \$1.9 million spent for the water rights, the land may be leased or sold. Wanting to stay rural, San Ysidro has to manage the resultant changes another community imposes in its need of water for future growth and development. Such pressures may become more the norm as water availability becomes scarcer.

12.10 Quantifying Future Water Demand

Another basic question to be answered in regional water planning is "what is the region's projected water demand?" Often that is answered by projecting population trends, recognizing population to be a driving force. Future demand can also be a function of future activities. For example, if paving Highways 550 and 126 brings more tourism to the subregions, the water usage may well increase. Visions of how a region might grow are

important considerations in projecting future water usage. Scenarios were created by teams in each watershed envisioning how it might look in 50 years (see Section 12.12).

Future water use projections are necessary to show the need for the water in the region. A common practice is to estimate future water demand based upon recent levels of water use and population growth. Many subregional water planning participants questioned the rationale of *having* to grow merely to show a need for water in the future, especially since there is a scarcity noted already. The "shortage sharing" agreement (discussed in Section 12.11) on the Río Jemez indicates the lack of extra water. Acequia farmers in the Río Puerco usually do not have irrigation water past July. A moratorium of new hookups in Regina has been declared due to drought.

Population increases, likely as they are to occur, will increase demands on water. Since all of the water is allocated, and demand exceeds supply already, over and above conservation measures from what sector or location will that water come? Planning participants were concerned that the future growth outside the subregion would be used as justification to transfer water to the growth. Concerns included that pumping downstream and transfers from the Río Jemez were already affecting the water table and long-term viability of several communities. How the shortage sharing agreement would be implemented by an urban area is yet to be determined. Additionally, many of the Pueblos and non-Pueblo residents do not have the *per capita* water usage that residents in Albuquerque and elsewhere have -- so that curtailing that usage further could create hardships.

Projections

An initial attempt has been made to project water demand to the year 2050 based on current water use and estimated growth for the subregion and Sandoval County. Two other methods are proposed, with the caveat that these all need more information and more analysis.

Based upon subregional population trends

Population projections are a science, applying various methodologies. A discussion of several methods is set out in the appendix materials. Population projections to 2025 for the data analysis sub-zones (DASZs), discussed in Section 12.9, have been prepared by MRCOG and are shown in Table 12-11.

Table 12-9: Subregional Population Trends and Projections, 1980 to 2025

	1980	1990	2000	2005	2010	2015	2020	2025
Río Jemez	3,605	4,129	4,805	5,078	5,392	5,726	--	6,177
Río Puerco	3,877	4,846	5,153	5,495	5,787	6,254	--	6,922

Source: US Census Data, 1980, 1990, 2000; DASZ Projections, Mid-Region Council of Governments, 2003

According to this projection, both basins will grow by approximately twenty-five percent in the next twenty-five years. Current water use is set out in Tables 12-5 and 12-6 in Section 12.8. Future water use was calculated by multiplying the total amount depleted in 2000,

except for riparian and open-water evaporation, by the increased growth rate within the two watersheds and is reflected in Table 12-12.

Table 12-10: Projection of Water Use in Río Jemez and Río Puerco 2000-2025

		2000	2005	2010	2015	2020	2025
Río Jemez	Population	4,805	5,078	5,392	5,726	--	6,177
	Water Use af	2,409	2,545	2,703	2,870		3,096
Río Puerco	Population	5,153	5,495	5,787	6,254	--	6,922
	Water Use af	2,974	3,172	3,340	3,610		3,996

Source: Population Projection from Table 12-11 (MRCOG); Water Usage in Table 12 5& 12-6 (Wilson)

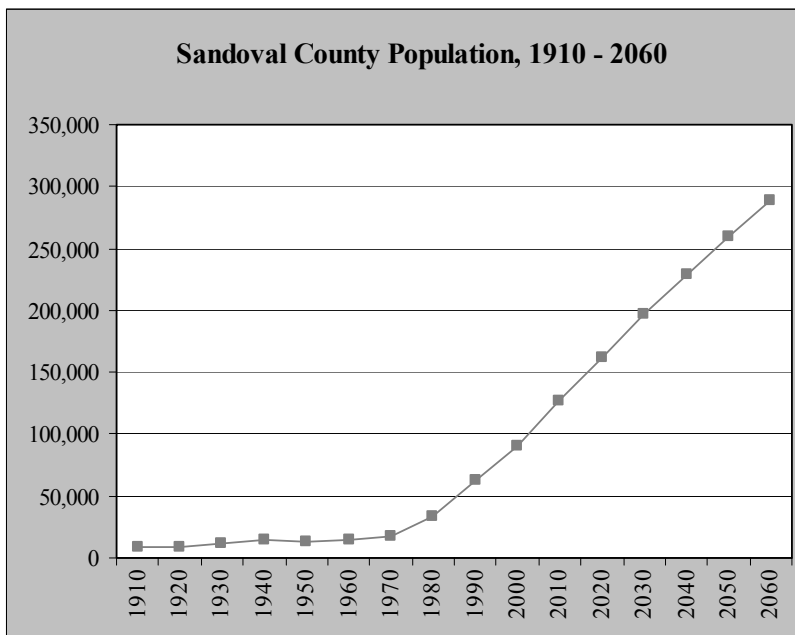
Prior to relying on such calculations, a number of caveats should be kept in mind. As noted in Section 12.9, growth seen in the subregions does not appear to have been adequately portrayed. Likewise, the water use data is not complete, as discussed in Section 12.8. Before being projected, such data really needs to be more robust, or such deficiencies will be compounded. Another important component would be to know from where the growth is coming and might be coming. As growth occurs, water may be transferred from one use to another rather than use increase, which is not captured in the above projection.

Based upon regional population trends

According to the MRCOG projections --DASZs from 2000 to 2025--, the population for Rio Rancho will increase from 52,282 in 2000 to 114,979 in 2025, or more than double. For the

Figure 12-11: Population Trends and Projections in Sandoval County, 1910 to 2060

Interstate Stream Commission, BBER calculated population trends and projections to the year 2060 for counties in New Mexico. As shown in Figure 12-11, Sandoval County population quintupled from 1970 to 2000 and is projected to more than triple by 2060, to



Source: Alcantara (BBER), 2003

approximately 290 thousand people. Bernalillo County is projected to increase from the 2000 population of 558,437 to 819,024 in 2060.

Applying a similar calculation to Sandoval County, multiplying the current water usage depicted in Table 12-4, by the BBER projections, water usage within the County would triple, as shown in Table 12-14.

Table 12-11 Population Projection and Water Use for Sandoval County, 2000-2060

Sandoval County	2000	2010	2020	2030	2040	2050	2060
Population	90,775	126,216	162,112	196,538	228,929	259,321	289,258
Water Used (af)	44,935	62,479	80,248	97,289	113,323	128,368	143,187

Source: BBER Population Projections (2003); Wilson, (2003).

This projection is to show what could occur should there be no reduction in usage, nor transfers from one usage to another. Given that the Middle Rio Grande is already over-allocated, the likelihood is small that such increases will occur. More likely is that transfers will take place. While some transfers will come from water users within the Rio Grande Valley, it is likely that some will also come from the subregion as well.

Based Upon Watershed Conservation

Population increases, likely as they are to occur, will increase demands on water. If all of the water is allocated, and demand already exceeds supply, where will that water come from? Conservation measures, while important, may not be enough. One strongly supported goal for the two watersheds was to:

Restore and manage the watersheds on public and private land to enhance water production, retention, and quality, to reduce the threat of wildfire, and to preserve natural systems dependent on water.

Unknown presently is whether such a goal will require water or will it produce water. The present lack of water in ditches and wells underscores the fears that already the water budget is overdrawn. If the budget is to be fixed, the prevailing wisdom is that the watershed needs to be restored. Restoring it will not necessarily result in increased stream flow as much as replenishing springs and satisfying needs of a growing local community.

Two projects in particular have the goal of restoring the watershed, and they are described in detail in Section 12.11 of the main text.

Based on Other Criteria

Other considerations include:

1. No extra water now exists now; the subregions are already experiencing shortages.

2. No extra water later, even if watershed restoration does result in increased water production, since the region is already in need of it.
3. Locals need water for development and to provide economic opportunities to keep families intact.
4. No category exists for cultural and spiritual water usage, so no future use is calculated in water use projections.
5. Discrepancies in current water use data may mean that benchmarks set for future use are incorrect.
6. Unquantified water rights and future water rights of the Pueblo may result in adjustments in the future.
7. Continued expansion of trade, services, construction, government, and recreation in both watersheds will require additional water.

Only by being conservative in future planning can these considerations be managed.

12.11 Issues And Constraints

The dawn of the 21st century provides a litany of issues regarding water supply and demand in the Southwest. Management of changing water supplies must contend with many traditional demands as well as new values that are not explicitly recognized in the current approach to water resource management. The stresses and pressures were underscored in 2003 by the U.S. Secretary of Interior, in the program Water 2025: explosive population growth may well result in water shortages which in turn result in conflict. Crisis management is not effective. The State of New Mexico, in a recent report, concluded that "growing and increasingly diverse demands for water in the Middle Río Grande region -- including the State's needs for water supply for about half its population and economy, and for wildlife and ecological uses-- cannot all be met. ... Current water consumption exceeds the long-term average supply that is legally available for use in the Middle Río Grande." (OSE's Framework, 2002)

Many of the issues could be said to be driving forces for water management in the two watersheds comprising the Río Puerco and Río Jemez subregions. While they might be considered resources to help supply the shortages in the Middle Río Grande, often there is not enough water to meet current needs. Watershed deterioration, erosion and forest density affect the quantity and quality of water. At the same time, water usage is increasing and new water uses are seeking water from present users. Water use is constrained by supply, as well as water rights holders and Compact obligations. Future water use is impacted by growth within the subregions as well as downstream. Traditional cultures and values, highly desired by workshop participants, may conflict with newer values and uses. Drought exacerbates the situation further.

Water Rights and Adjudication

Two agencies, the Office of the State Engineer (OSE) and the Interstate Stream Commission (ISC), have the primary responsibility for managing the water. The New Mexico Environment Department (NMED) has lead supervision over water quality.

To administer the water, the Office of the State Engineer (OSE) issues a permit for the right to use a certain amount. These permits, or “water rights,” are assigned a date, the priority of which governs administration. Water rights to all of the surface water have been issued – so new users have to acquire permits from existing users. Transfers of use or transfers from one point of diversion to another are regulated. The State Engineer has the authority to deny an application if it impairs other water rights holders, is contrary to conservation of water or is detrimental to the public welfare. A public welfare statement, a reflection of the public interest in the watershed, creates a mechanism to ensure that those things we value are not lost and those things that are needed for our future are protected. Domestic well permits are issued by the OSE, for which no water right is needed at this time.

Currently, the OSE is proceeding to adjudicate, or judicially determine, water rights in the state. In general, the OSE prepares a hydrographic survey, and identifies and investigates the legal bases and characteristics of each and every water right claim within the basin, and then reduces that finding to a written offer, with the goal of obtaining a judicial determination and definition of water rights within each stream system and underground basin. A slow process, this has yet to be done in the Middle Río Grande.

Pueblo water rights, not managed by the OSE, are paramount (have the most seniority), and have not been quantified, nor have the future needs and thus uses been quantified for tribal entities. Future "water administration of the Río Grande Compact will see greater Pueblo involvement and attention to senior Pueblo priority and water delivery requirements. The challenge for 21st century for lawyers and other water people [will be] to arrive at solutions that are fair and appropriately respectful of Indian Pueblo water rights and social needs." (Chestnut 2000)

The Río Grande Compact helps to ensure that water is shared by three states. The share of the Middle Río Grande, including the subregions, is governed by this agreement, which the ISC administers on behalf of New Mexico.

NMED, along with the US Environmental Protection Agency, monitors water quality for various users and uses. After testing, if a stream is found to violate standards, then management plans are to be written to deal with non-point sources and action taken with respect to source polluters. Water may be managed to benefit species listed as endangered due to human actions.

With the exception of the Pueblo Indians and certain federal reserved rights, the water users in the Río Jemez have had their water rights adjudicated.³ This judicial determination of water rights includes the Nacimiento Ditch on the Río Puerco since part of its headwaters begin in the Río Jemez. The Nacimiento accounts for approximately 22% of the acres irrigated by the *acequias* in the Río Puerco. Table 12-12 sets out the priority dates and acres

of Jemez and Zia Pueblos and Table 12-13 sets out the priority dates and rights assigned to the *acequias*.

Table 12-12: Priority Dates and Acres of Pueblos

Date	Ditch	Pueblo Acres*	Date	Ditch	Pueblo Acres*
First Priority			1932		
a.	Jemez Pueblo	1537.1	a.	Jemez Pueblo	126
b.	Zia Pueblo	416.8	b.	Zia Pueblo	112.5
1902	Zia Pueblo	82.6	1935		
1915	Jemez Pueblo	425.9	a.	Jemez Pueblo	60.6
1917	Jemez Pueblo	96.5	b.	Zia Pueblo	167.7
1925			1983	Jemez Pueblo	126
a.	Jemez Pueblo	59.5			
b.	Zia Pueblo	324.2	Totals		3,535.40

* Source: Pueblo acreage was supplied by Gilbert Sandoval on 8/26/003 and is based upon the *Abousleman* decree

Table 12-13: Priority Dates and Water Use for Non-Pueblo Acequias in Jemez Basin

Date	Ditch	Stream	OSE File No.	PDR	FDR	CIR	Total Acres	Total PDR
1768	Ponderosa Community	Vallecitos Creek	00973	4.03	2.82	1.41	47.41	191.06
1786	San Ysidro	Río Jemez	00646	4.94	3.46	1.74	507.84	2,508.73
	Nestor Padilla	Río Jemez	02652	4.94	3.46	1.74	1.78	8.79
1798								
a.	Cañon Community	Río Guadalupe	03094	4.03	2.82	1.41	201.48	811.96
b.	Pueblo	Río Jemez	00115	4.03	2.82	1.41	17.00	68.49
c.	West Main#	Río Jemez	00115	4.03	2.82	1.41	10.57	42.60
1815	Ponderosa Community	Vallecitos Creek	00973	4.03	2.82	1.41	252.18	1,016.29
1865								
a.	West Lateral	Río Jemez	04515	4.03	2.82	1.41	7.41	29.86
b.	East Lateral	Río Jemez	04516	4.03	2.82	1.41	11.41	45.98
c.	West Side	Río Jemez	04520	4.03	2.82	1.41	9.65	38.89
d.	Jemez Springs	Río Jemez	04517	4.03	2.82	1.41	8.95	36.07
e.	South Upper	Río Jemez	04518	4.03	2.82	1.41	45.89	184.94
f.	West	Río Jemez	04519	4.03	2.82	1.41	20.85	84.03
1873								
a.	Upper West	Río Jemez	04513	4.03	2.82	1.41	6.92	27.88
b.	Upper East	Río Jemez	04514	4.03	2.82	1.41	1.97	7.95
1882	Nacimiento Community Ditch Association		0580					
a.	Domingo Vigil		"	3.26	2.28	1.14	46.61	151.95
b.	Nerio Montoya		"	3.26	2.28	1.14	14.68	47.86
c.	Francisco Chavez # 6		"	3.26	2.28	1.14	195.58	637.59

Middle Rio Grande Regional Water Plan

Date	Ditch	Stream	OSE File No.	PDR	FDR	CIR	Total Acres	Total PDR
d.	Gabriel Montoya # 7		"	3.26	2.28	1.14	47.97	156.38
e.	Nacimiento		"	3.26	2.28	1.14	247.19	805.84
f.	Ballejos # 4		"	3.26	2.28	1.14	9.86	32.14
g.	Copper City		"	3.26	2.28	1.14	130.72	426.15
h.	Madalena Atencio # 2		"	3.26	2.28	1.14	23.01	75.01
1886 -	La Cueva	San Antonio Creek	02541A-G	2.37	1.66	0.83	53.94	127.84
1899								
a.	George E. Fenton	Río Cebolla	00602	2.37	1.66	0.83	5.45	12.92
b.	Fenton	Río Cebolla	02818	2.37	1.66	0.83	6.50	15.41
1902	Zia Pueblo							
	Pueblo	Río Jemez	00115	4.94	3.46	1.74	7.62	37.64
1948	Nestor Padilla irrigation	Río Jemez	02652	4.94	3.46	1.74	9.43	46.58
Totals							1,949.87	7,676.82

* West Main Ditch - PDR north of the Jemez Pueblo boundary is: 4.03 acre feet per acre per year. PDR south of the Jemez Boundary is 4.94 acre feet per acre per year. No acreage in this addendum is located south of the Jemez Pueblo boundary.

Source: *United States, et al. v. Abousleman, et al; Jemez River Adjudication*, United States District Court CIV. NO. 83-1041 JC. Final Orders with Appendices showing the amount of water adjudicated can be found at the NMOSE's web site, www.seo.state.nm.

Key:

- Area Surface area of an impoundment expressed in acres.
- Acres Number of irrigated acres
- cfs Flow rate expressed in cubic feet per second
- CIR Maximum Consumptive Irrigation Requirement expressed in acre-feet per acre per year for irrigation
- CU Maximum consumptive use expressed in acre-feet per year for non-irrigation uses
- Depth Depth of an impoundment expressed in feet.
- Div. Amt Maximum diversion amount expressed in acre-feet per year for non-irrigation uses
- FDR Maximum Farm Delivery Requirement (also referred to as headgate delivery amount or duty of water) expressed in acre-feet per acre per year for irrigation uses
- Map-Tract Hydrographic Survey map and tract numbers
- OSE File No. NM Office of the State Engineer's surface or groundwater file number
- PDR Maximum Project Delivery Requirement (also referred to as ditch diversion amount) expressed in acre-feet per acre per year for irrigation
- POD Point of diversion
- Total Acreage Total number of irrigated acres served by a particular ditch
- POU Place of Use
- Priority Date of first appropriation or date of application for State Engineer permit

During the adjudication process, much education and learning about the history and about each other took place - so much so that an Agreement was entered into on July 2, 1996 to address irrigation in times of varying shortages. The Agreement was renewed in 2002. This

Agreement recognizes water is used in different ways by the different entities who must share it. Representing a delicate balance between users, it is a tribute to the residents who share the knowledge and understanding of the land and of the people.

WHEREAS, the parties hereto state as follows:

A. The Pueblo Of Jemez and the Pueblo Of Zia and the Jemez River Basin Water User's Association (Jemez Springs Ditch Association, Nacimiento Ditch Association, San Ysidro Community Ditch Association, Cañon Ditch Association and Ponderosa Ditch Association), rely on the surface waters in the Jemez River Basin for irrigation purposes, and the Pueblos also rely on the Jemez River stream flows for religious and cultural purposes.

B. The Jemez River does not always have sufficient water to fully meet the irrigation requirements of the Pueblos and the Associations, and the religious and ceremonial requirements of the Pueblos.

C. The Pueblos and San Ysidro Ditch Association are at the end of the Jemez River system, and thus are often water short even in years of average moisture.

D. The Pueblos have certain water rights, which, although not declared by final court decree, are senior in priority to any other irrigation right in the Jemez River basin.

Using the US Department of Agriculture Natural Resource Conservation Service's "New Mexico Water Supply Basin Outlook," for the months of March, April and May, the Water Master, with the Pueblos and the Water Users Association, determines the rotation schedules. Lack of water may mean no irrigation by the non-Indian water users.

After this Agreement was entered into, an offer was made to each *parciante* for a specific amount of water usage. Each Ditch's Agreement and the Partial Final Judgment and Decree on Non-Pueblo, Non-Federal Proprietary Water Right have been entered in the court proceeding. Still to be finalized are the Pueblo and Federal water rights.

Entering these agreements and sharing arrangements brought these irrigators together. Together, they could see that actions needed to be taken to improve the situation so that downstream irrigators and Pueblo members had water. Not only did they agree in writing to "take steps to improve the efficiency of their diversion and irrigation systems, to work together to seek funding necessary to implement improvements, and to address the need for a storage facility (ies)," they have taken subsequent steps in fulfillment. One tangible result of the joint lobbying effort, is receipt of \$1.2 million and a list of projects now underway (See the *Río Jemez (Abousleman) Indian Water Rights Settlement Proposal for Investigation*, February 12, 2001, in Section 13 - Sample Projects and Groups).

In addition to Pueblo water rights, the Winters Reserved Indian Water Rights Doctrine (Winters vs. United States, 201 U.S. 564 (1908)) provides guidance for Navajo and Jicarilla Apache water uses within the subregions. The Supreme Court ruled that Indian water rights on reservations were based upon the quantity of water necessary to fulfill the purpose of the reservation, a major component of which is the amount of water needed to irrigate all

practicably irrigable acreage within the reservation. The priority of the right is based upon the date of the applicable treaty.

Treaty of Guadalupe Hidalgo

The Treaty of Guadalupe Hidalgo came up repeatedly in community meetings as an important underpinning of water rights. The residents of both watersheds wanted to "ensure that treaty, water and acequia rights to preserve and protect local agricultural traditions." Alternatives, such as protecting the area of origin, were considered. Included in full in the appendices, Article VIII, cited as protecting water rights from being taken away states:

Treaty of Guadalupe Hidalgo Article VIII

Mexicans now established in territories previously belonging to Mexico, and which remain for the future within the limits of the United States, as defined by the present treaty, shall be free to continue where they now reside, or to remove at any time to the Mexican Republic, retaining the property which they possess in the said territories, or disposing thereof, and removing the proceeds wherever they please, without their being subjected, on this account, to any contribution, tax, or charge whatever.

Those who shall prefer to remain in the said territories may either retain the title and rights of Mexican citizens, or acquire those of citizens of the United States. But they shall be under the obligation to make their election within one year from the date of the exchange of ratifications of this treaty; and those who shall remain in the said territories after the expiration of that year, without having declared their intention to retain the character of Mexicans, shall be considered to have elected to become citizens of the United States.

In the said territories, property of every kind, now belonging to Mexicans not established there, shall be inviolably respected. The present owners, the heirs of these, and all Mexicans who may hereafter acquire said property by contract, shall enjoy with respect to it guarantees equally ample as if the same belonged to citizens of the United States.

The Treaty is incorporated into the Constitution of the State of New Mexico Article 5, which states that "The rights, privileges and immunities, civil, political and religious guaranteed to the people of New Mexico by the Treaty of Guadalupe Hidalgo shall be preserved inviolate." Of note, under Spanish and Mexican laws, land and water were not severable. For further reading, several articles are referred to in the bibliography section in the full plan.

Two new laws, passed by the New Mexico legislature in 2003, give more control to the acequias, should they choose to exercise same:

- 1) §73-3-4.1. Commissioners; additional duties; approval of changes in place or purpose of use of water; appeals. (Effective March 1, 2004.). (2003)

Pursuant to rules or bylaws duly adopted by its members, an acequia or community ditch may require that a change in the point of diversion or place or purpose of use of a water right served by the acequia or community ditch, or a change in a water right so that it is moved into and then served by the acequia or community ditch shall be subject to the approval by the commissioners.

The change may be denied only if the commissioners determine that it would be detrimental to the acequia or community ditch or its members. The commissioners shall render a written decision explaining the reasons for the decision. If the person proposing the change or a member of the acequia or community ditch is aggrieved by the decision of the commissioners, he may appeal the decision in the district court of the county in which the acequia or community ditch is located within thirty days of the date of the decision. The court may set aside, reverse or remand the decision if it determines that the commissioners acted fraudulently, arbitrarily or capriciously or that they did not act in accordance with law.

(duplicate language is included in §73-2-21 (E) Commissioners' powers and duties; mayordomo's duties. Effective March 1, 2004, NMSA 1978 Comp. 2003.)

2) §73-2-551 Water banking; acequias and community ditches (2003)

An acequia or community ditch may establish a water bank for the purpose of temporarily reallocating water without change of purpose of use or point of diversion to augment the water supplies available for the places of use served by the acequia or community ditch. The acequia or community ditch water bank may make temporary transfers of place of use without formal proceedings before the state engineer, and water rights placed in the acequia or community ditch water bank shall not be subject to loss for non-use during the period the rights are placed in the water bank. An acequia or community ditch water bank established pursuant to this section is not subject to recognition or approval by the interstate stream commission or the state engineer.

Prior Appropriation and Beneficial Use

In 1851, the Territorial Assembly of New Mexico adopted the Acequia Laws, published in Spanish, guaranteeing the continuation of the traditional arrangement for irrigation, "as was established and exists to the present. (Rivera 2000) In 1907, a new Water Code was enacted, now found at NMSA 1978, § 72-1-1, et seq. It expressly recognized existing surface water rights, allowing for the filing of declarations with the State Engineer stating the beneficial use of rights prior to 1907. In 1931, the Legislature extended the State water code to underground waters, declaring such to be public waters subject to appropriation for beneficial use.⁴

Río Grande Compact

Around the turn of the century, farmers in the southern part of New Mexico, Texas and Mexico began to complain that farmers in Colorado and northern New Mexico were diverting all of the water. These complaints resulted in the 1906 and then the 1944 Treaty with Mexico and the 1938 Río Grande Compact between Colorado, Texas and New Mexico.⁵ The Compact allocated water among the three states, with the delivery point for the southern users being at Elephant Butte Reservoir. Of note to this region, the Compact constrains the amount of water which can be consumptively used between Otowi Gauge (at the Los Alamos Bridge) and the Reservoir. It further constrains the construction of impoundments; and any that are so constructed after 1929 cannot be utilized to hold back water if the water quantity in the Reservoir drops below a certain level.⁶ Since none of the tribal entities in New Mexico were signatories, the Compact does not apply to their uses. The ISC administers the Compact on behalf of New Mexico.

Water Quality

The designated uses of a given reach of stream may well influence present activities and regulations. NMED, along with the US Environmental Protection Agency, monitors water quality for various users and uses. Where non-point sources of pollution, such as suspended sediment from the upper watershed, exists, management plans are needed.

With an increase in septic tanks, additional monitoring may be needed. One inorganic constituent that occurs naturally in groundwater - arsenic- currently is subject to an MCL of 0.05 mg/L. In January 2006, this MCL will be reduced to 10 micrograms per liter ($\mu\text{g/L}$) (0.010 mg/L), a level that is commonly exceeded in regional groundwater under natural conditions. If water quality in the subregions does not meet new federal standards for arsenic, action will have to be taken, so plans need to be prepared. Additional testing may be required to fully evaluate the extent of arsenic within the planning region.

Issues

The above discussion considered several constraints on water use. There are a number of other issues to consider with respect to water availability and management. The following list should be seen as a preliminary one at best, highlighting issues / struggles / lessons / tools (or lack thereof) which came to light during the planning process.

- insufficient supply and demand data
- inadequate future trend data
- unknown water rights
- overgrown watersheds
- environmental concerns
- endangered species
- inadequate infrastructure
- aging infrastructure
- land struggles
- instream flow
- external forces
- market demands
- ongoing depletions
- new and additional uses

Currently, not only are there new uses and users in the region, but growth along the Río Grande Corridor presents challenges to the subregions, particularly the Río Jemez. While outside the planning subregion, the future growth and demands will continue to put pressure on the basin. If growth continues to occur in the Rio Rancho - Town of Bernalillo, as is likely, pressure on natural resources --particularly land and water-- will intensify. That additional usage may in turn affect the river and aquifer, and perhaps even the shortage-sharing agreement in the *Abousleman* case. A unifying theme for the subregions was to be able to plan for the future with water available for that future.

12.12. Development of the Combined Subregional Scenario

After reviewing the analysis for the 44 alternatives for the Middle Río Grande Regional Water Plan, and utilizing the prioritized alternatives and goals, scenario teams developed

vision statements and scenarios from various perspectives. These, in turn, became the basis of the “Fifty-Year Water Plan for the Río Puerco and Río Jemez Subregions.”

Scenarios are descriptions of possible futures. They reflect different assumptions about how current trends will unfold, how critical uncertainties will play out and what new factors will come into play. While scenarios do not predict, they may paint pictures of possible futures and explore the differing outcomes that might result if basic assumptions are changed. They form an appropriate tool in analyzing how driving forces may influence the future and in assessing the associated uncertainties. The role of policy choices in shaping the future is highlighted wherever possible. Using the alternative actions, scenarios can be told in many ways. The two most common methods used in scenario analysis have been descriptive, written narratives (qualitative scenarios) and tables and figures incorporating numerical data, often generated by sophisticated computer models (quantitative scenarios).

Vision Statements & Scenarios

The Río Puerco and Río Jemez Steering Committees divided into small groups to develop vision statements from different perspectives. The groups were Agriculture and Ranching, Environmental and Exurban/ Suburban/Development/Growth in Río Jemez and Agriculture and Ranching, Natural Balance and Rural Communities in Río Puerco.

IMAGINE THE RIO JEMEZ IN 2050

Río Jemez Agriculture and Ranching Vision Statement

Agriculture and ranching are a part of the whole ecosystem. For us, they are both a part of our livelihood and of our culture. We highly value the rural nature of the region. Our group would like to see that agriculture and ranching continue to function as an integral part of our region. As stewards, we recognize the importance of nurturing the land and husbanding the water.

Elements of our vision:

- *Maintain the current livestock numbers and the number of acres being tilled.*
- *Implement management practices that are environmentally friendly and sustainable.*
- *Maintain diversity of wildlife and livestock.*
- *Maintain the tradition of acequias, including their priority of right-of-way.*
- *Utilize new technology to enhance conservation of water and preservation of the land.*
- *Encourage local farmer markets to benefit our area and to enable future generations to farm and ranch.*
- *Share our knowledge with folks who are not farmers by trade by creating opportunities, such as community gardens.*
- *Implement land use management tools to protect the agricultural lands from development.*
- *To assist future generations in learning about water, partner with the school district to create a Natural Resource Educational Program.*

Agriculture and ranching are a part of the whole ecosystem. For us, they are both a part of our livelihood and of our culture. We highly value the rural nature of the region. Our group would like to see that agriculture and ranching continue to function as an integral part of our region. To ensure that, we want to maintain the current livestock numbers and the number of acres being tilled. We want to implement management practices that are environmentally friendly and sustainable. We also want to maintain diversity of wildlife and livestock.

Many acequias exist in our valley, and have been here for several generations. We want to maintain the tradition of acequias, including their priority of right-of-way

Not so long ago, vegetables and fruits were grown throughout the valley. Now, the reality is that many of us have to work off the land in order to maintain it. So that future generations can continue to farm and ranch, we want to encourage local farmer markets. Community gardens could be a way to share our knowledge with folks who are not farmers by trade.

As stewards, we recognize the importance of nurturing the land and husbanding the water. We look forward to new technology to enhance our conservation of water and preserve the land.

Like others in the valley, the paving and building on agricultural lands is of concern. In order to protect the health of the environment and to assure that land stays in agriculture, we would like to see land use management tools implemented to protect the lands from development.

To assist future generations in learning about water, agencies such as Cuba Soil and Water Conservation District will partner with the school district to create a Natural Resource Educational Program.

Río Jemez Vision Statement – Environmental Perspective

The environmental vision reflects a shift in attitude from exploitation of the land to stewardship of forests, rangeland and riparian areas. Our children and their children will have the economic and spiritual benefits of ancient forests, free-flowing rivers, living deserts and the abundance of life flourishing in all these areas. The water plan preserves the greatest amount of biological diversity (domestic and wild) while restoring and maintaining a healthy ecosystem. The water plan protects local history and traditions and our land-based economy (including tourism). We envision keeping people on the land by integrating conservation and environmental issues with best management practices in forestry, ranching and agriculture. In the environmental vision, management of public and private lands includes the following:

- maintains healthy and productive plant and animal communities (including threatened and endangered species)*
- controls growth by geographical or numerical limits on population*
- ensures a healthy watershed*

- *guarantees good water quality*
- *educates citizens in water use/reuse*

Río Jemez Exurban/Suburban/Development/Growth Vision Statement

In the next 5-10 years one can imagine a vision in which better-planned regional suburban growth occurs in the Jemez and Nacimiento mountain areas to the north of Albuquerque. This plan would try to encourage areas of higher density where there is the most water available, so that water rights need not be transferred. North of Rio Rancho, this growth would gently interact with the existing rural pueblo and ranching lifestyles allowing the area to maintain cultural and religious traditions as well as to maintain the environment. Education of increasing newcomers and tourists will help to minimize conflicts. Water use will be coordinated among the various municipal water systems and the pueblos and conservation practices (industrial, farming, ranching and domestic) will be mandatory.

The vision includes the following elements:

- *Immigration of people to this area to work in clean (eco-friendly) industries nearby*
- *Continuation of full-time and part-time ranches mixed with new residential dwellings (some loss of agricultural land is inevitable)*
- *Regional growth planning/zoning with rural as well as urban focus and with water as a consideration*
- *Maintenance of tribal, religious, and cultural traditions partly via education of newcomers and visitors*
- *Maintenance of ecological and scenic conditions which have attracted us*
- *Educational packages made available at Pueblo and Forest Service. Seminars/courses at school*
- *Mandatory water conservation for industry, farming/ranching and residential uses*
- *Modernized, well-maintained municipal water systems cooperating with each other*
- *Tax breaks for installation of greywater and rainwater roof runoff capture*

Looking 50 years ahead is difficult

- *We don't want to get into limited choices. Continue uses into the future.*
- *We want to keep the water so we have flexibility in the future.*
- *Water should stay with the land.*

IMAGINE THE RIO PUERCO IN 2050

Río Puerco Agriculture and Ranching Vision Statement

The vision of the Cuba area's agricultural community is to perpetuate the area's historical, cultural, agricultural, economic and ecological values by becoming actively involved in strategic planning of natural resources, implementing adaptive, viable, effective, and sustainable management practices, rehabilitating farm and range lands, and reducing, and planning rotation of, fallow acres within the area.

We envision preventing conversion of agricultural land to housing and, despite the increasing demand for water in urban areas, keeping water and agriculture in our area. We envision planning and implementing projects that will improve our lands and help to enhance and sustain the community's agrarian economy into the next century, serving as a role model to adjacent areas in their agrarian and ecological enhancement efforts, providing support to these efforts, and through improved farming and ranching methods, decreasing our contribution of sediment to both the Arroyo San Jose and the Río Puerco.

We envision implementing feasibility studies for construction of water retention facilities, and development of a local agricultural cooperative. With a perpetual source, and appropriate distribution of water a community agricultural cooperative could promote an interest in traditional crops such as corn, squash, and beans, contemporary crops such as alfalfa, and take advantage of new and emerging crop markets.

Primary Resource Concerns:

- Topography of cropland prevents the efficient application of water.*
- Construction of a water storage reservoir (facility) to supply an adequate, perpetual supply of water,*
- Need to improve irrigation water delivery systems to prevent: water loss to dirt ditches and from broken flumes and culverts; silting in and erosion of ditches; and reduced flow due to invasion of willows, trees and weeds,*
- Education about new agricultural technologies and techniques,*
- Protection and improved functioning of the watershed to increase water quantity and reduce the risk of catastrophic fire and loss of the watershed.*

Río Puerco Natural Balance Vision Statement

People living within the watershed will understand and live within the natural constraints of climate, fire, soils, and biological communities. Everyone will benefit from a fire-adapted watershed with enhanced water retention and healthier forests, grasslands and watercourses. The landscape will balance wild and cultivated lands that accommodate drought, fire, wildlife, and limited human populations.

In our climate, a properly functioning watershed will act like a sponge, absorbing precipitation and snowmelt, and storing and gradually releasing water from springs and into streams through seasonal spring droughts. It will also minimize runoff and erosion from summer thundershowers by slowing overland, arroyo, and stream flows. Because these watershed functions are primarily dependent on ecosystem conditions and processes, watershed management requires ecosystem management. Forests, woodlands, and grasslands in our watershed have lost much of their ability to carry surface fires, and forests and woodlands have become vulnerable to crown fire, due to a century of fire suppression. The competition among trees for water and nutrients leaves them all more susceptible to drought, insects, and disease, and reduces the ability of the watershed to feed perennial streams and resist erosion.

Sustainable use of water must recognize the dependence of watershed functions on ecological processes, such as fire, and ecological conditions, which are ultimately dependent on human management and use of natural resources. To sustain those ecosystems, management of natural resources must recognize and respect the limits that define the boundaries of sustainability. For example, fire suppression in ecosystems that were adapted to frequent fires extended fire return intervals far beyond their natural limits, and this has been unsustainable, leading to increasingly larger and more catastrophic fires. Likewise, we must recognize and respect ecological limits in the supply and availability of water for human use. Ecological watershed management can capture, store, and release water, but cannot extend it beyond the limits of providence. Ultimately, we must limit our use of water, and other natural resources, to what is available and excess to the needs of the larger ecological community to which we belong.

Río Puerco Rural Communities Vision Statement

A Rural Community vision foresees a future for the Río Puerco watershed which reflects its unique prehistoric and historic, natural, cultural, and economic traditions. This vision takes advantage of modern innovation to accommodate a shift to an ethic that upholds respect for land, water, air, and all living things.

In this vision Community would be built through observance of a spring Water Festival linked to the spring equinox (or Earth Day, or Cinco de Mayo) in which the knowledge of water as a sacred gift is restored. Through the blessing of the local acequias, streams, and wetlands by priests and medicine men, a spiritual approach to water is maintained. A fall harvest festival linked to the County Fair would celebrate the perseverance and cohesion of the communities.

This vision would maintain large areas of mostly vacant and predominantly undeveloped land with limited, low-density residential development, home occupations, and agricultural activities. Rural Agricultural Areas would protect and preserve areas presently and historically used for agricultural practices. These areas would be comprised of predominantly irrigated lands for farming and lands for livestock management. Areas that are within flood plains, or which have hydrologic problems such as storm water ponding, poor drainage, or a high water table, and riparian and wetland areas would be protected from development and would have limited residential uses.

This vision would insure maintenance of a rural lifestyle through land use planning, and laws that prevent development of irrigated or non-irrigated farmland, provide for planned rotation of fallow lands and insure continued existence of acequias and other agricultural pursuits. Surface water would be tied to the land and not be separated from it. Innovative ways to preserve water in the area, such as designating in-stream flow as a beneficial use and water banking would help to preserve an agrarian lifestyle. Self-sufficiency for the subregion would bolster a sustainable economy that would allow those people wanting to live in and preserve the rural lifestyle to stay and do so.

This vision would promote furthering educational pursuits while being able to stay in the area. Education would provide the technological and business skills, and hands on experience needed to create one's own work. Education would be centered on agriculture and natural systems, water and soil conservation, and alternative energy and building.

The Fifty-Year Subregional Water Plan

In August and September of 2003, the Río Puerco and Río Jemez Steering Committees met together and worked on combining the two scenarios into one scenario for both subregions. The resultant plan follows.

Table 12-14: FIFTY YEAR WATER PLAN FOR THE RIO PUERCO AND RÍO JEMEZ SUBREGIONS

GOAL: RESTORE AND MANAGE THE WATERSHEDS ON PUBLIC AND PRIVATE LAND TO ENHANCE WATER RETENTION AND QUALITY AND TO REDUCE THE THREAT OF WILDFIRE, AND TO PRESERVE NATURAL SYSTEMS DEPENDENT ON WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Restore a fire-adapted watershed 	<ul style="list-style-type: none"> • Thin forests and woodlands in an ecologically sound manner (A-66) • Treat grassland brush in an ecologically sound manner • Develop a network of natural and artificial fire and fuel breaks to define 5000+ acre fire management units throughout the watershed • Manage forage utilization to maintain ground cover and carry fire • Apply prescribed fire frequently and extensively to established fire management units • Create defensible spaces around all dwellings and structures • Provide for adequate fire protection of structures to facilitate burning 	<ul style="list-style-type: none"> • Within 30 years 	<ul style="list-style-type: none"> • New federal fuel reduction and fire prevention funds for public lands • Tax rebates and credits, and matching funds for private land • New state fuel reduction and fire prevention funds for state lands • Use Best Management Practices 	<ul style="list-style-type: none"> • Protect watershed, land and property values • Reduce potential of catastrophic wildfires • Save costs in suppression of catastrophic fires • Create many local jobs • Create value added industry, and permanent jobs
<ul style="list-style-type: none"> • Decrease soil erosion and increase water retention and infiltration 	<ul style="list-style-type: none"> • Expand watershed management programs (A-33) • Promote good soil management practices • Reduce and prevent surface water runoff on grazed lands • Reduce development and increasing use of unpaved roads 	<ul style="list-style-type: none"> • Within 15 years 	<ul style="list-style-type: none"> • New federal soil erosion funds for public lands • Tax rebates and credits, and matching funds for private land • New state soil erosion funds for state lands 	<ul style="list-style-type: none"> • Reduce deterioration of the land • Increase productivity of land • Increase benefit to landowners and producers • Retain soil nutrients,

GOAL: RESTORE AND MANAGE THE WATERSHEDS ON PUBLIC AND PRIVATE LAND TO ENHANCE WATER RETENTION AND QUALITY AND TO REDUCE THE THREAT OF WILDFIRE, AND TO PRESERVE NATURAL SYSTEMS DEPENDENT ON WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
	<ul style="list-style-type: none"> • Use low impact agricultural methods such as shallow or no plowing • Apply soil conservation techniques such as installation of field borders • Improve grazing management through methods such as fencing, pasturing, rotational grazing • Laser level irrigated fields • Line or pipe irrigation ditch systems, or segments most prone to erosion • Improve groundcover on rangeland 			topsoil and seed <ul style="list-style-type: none"> • Reduce flash runoff and gullying
<ul style="list-style-type: none"> • Reduce, prevent and repair incising of arroyos 	<ul style="list-style-type: none"> • Reduce formation of, and stabilize head cuts, gullies and arroyos • Use Best Management Practices to catch soils and fill arroyos • Repair deeply eroded cuts with heavy equipment • Repair smaller cuts with grade stabilization structures such as weirs, net wire diversions, rock and brush dams • Monitor and maintain all structures 	<ul style="list-style-type: none"> • Within 30 years 	<ul style="list-style-type: none"> • New federal erosion funds for public lands • Tax rebates and credits, and matching funds for private land • New state erosion funds for state lands 	<ul style="list-style-type: none"> • Reduce general deterioration of the land • Increase benefit to landowners and producers • Retain soil nutrients, topsoil and seed • Raise the water table and recharge springs and seeps
<ul style="list-style-type: none"> • Reduce, prevent, and repair habitat loss along streams, arroyos, and in wetland and riparian areas 	<ul style="list-style-type: none"> • Re-vegetate along streams and ephemeral waterways, plant willow and cottonwood trees at unstable banks and along non-vegetated segments • Construct fencing to protect riparian and wetland areas, and plantings from livestock • Stabilize channel banks • Re-create and induce stream meanders • Enhance and protect floodplains • Prohibit development in areas within flood plains, or which have hydrologic problems such as storm water ponding, poor drainage, high water table • Prohibit development in wetlands or riparian areas 	<ul style="list-style-type: none"> • Within 15 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> • Reduce loss of important plant species in drought years • Improve functioning of vegetation for flood and sediment control • Reduce flooding damages • Provide habitat for numerous wildlife species, and migratory birds • Increase opportunities for wildlife viewers and hunters

GOAL: RESTORE AND MANAGE THE WATERSHEDS ON PUBLIC AND PRIVATE LAND TO ENHANCE WATER RETENTION AND QUALITY AND TO REDUCE THE THREAT OF WILDFIRE, AND TO PRESERVE NATURAL SYSTEMS DEPENDENT ON WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Increase the bio-diversity and production on public and private lands including wild and domestic species 	<ul style="list-style-type: none"> • Manage sagebrush monocultures and reduce numbers of juniper trees • Remove non-native vegetation from riparian areas • Control noxious, invasive, and non-native weed species (A-1) • Seed with native grasses, and plants • Develop grass banks and other cooperative programs • Develop drought management plans for grazing 	<ul style="list-style-type: none"> • Within 20 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> • Healthy and productive plant and animal communities in an ecosystem with a diversity of species, size classes, and ages • Increase drought resistance • Increase forage, native grass production, and groundcover • Create local jobs • Increase benefit to landowners and producers
<ul style="list-style-type: none"> • Provide, consistent and sustainable sources, and adequate distribution of rangeland water 	<ul style="list-style-type: none"> • Drill wells for development of alternative upland water • Install improved well pump technology on existing wells • Install water pipelines and drinking troughs • Use various methods to reduce competition for forage between livestock and wildlife 	<ul style="list-style-type: none"> • Within 15 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> • Achieve a balanced animal-use pattern across the landscape to reduce overgrazing, and increase size and productivity of wildlife and livestock • Increase water availability and distribution to reduce competition for water resources between livestock and wildlife
<ul style="list-style-type: none"> • Maintain agriculture and ranching as part of the whole ecosystem 	<ul style="list-style-type: none"> • Implement management practices that are environmentally friendly and sustainable • Create and implement local management plans • Promote an attitude of stewardship of the integrity of the ecosystems 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Work with land management agencies to develop plans • Work with local planners to create and maintain relevant zoning 	<ul style="list-style-type: none"> • Increase sustainability of farming and ranching • Increase benefit to landowners and producers
<ul style="list-style-type: none"> • Maintain the scenic and ecological conditions which attracted our ancestors & us to the area 	<ul style="list-style-type: none"> • Create and implement local management plans • Include forests, rangelands wetland/riparian areas; ranching and agriculture 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Work with land management agencies to develop plans • Work with local planners to create and maintain relevant zoning 	<ul style="list-style-type: none"> • Promote general well being of residents • Provide sustainable tourist industry

GOAL: SUPPORT THE CULTURAL AND SPIRITUAL VALUES OF WATER, AND THE UNIVERSAL NEED FOR AND IMPORTANCE OF WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Realize the spiritual benefits of ancient forests, free-flowing rivers, living deserts and the abundance of life flourishing in all these areas, aside from the economic benefits 	<ul style="list-style-type: none"> • Promote appreciation of the dependence of all life on water • Promote the sanctity of watercourses • Promote a spring water festival in which knowledge of water as a sacred gift is restored by blessing of the local acequias and streams by priests and medicine men • Promote a fall harvest festival linked to the County Fair to celebrate the perseverance and cohesion of rural agricultural communities • Promote water events throughout the year to keep people focused on the importance of water and soil management • Develop public parks and interpretive areas along perennial streams near villages • Develop adopt-a-watercourse programs • Develop community gardens • Maintain local cultural and religious traditions 	<ul style="list-style-type: none"> • Within 10 years 	<ul style="list-style-type: none"> • Integrate community and spiritual leaders around water and land care 	<ul style="list-style-type: none"> • Promote cohesion of the community regarding care for the ecosystems that sustain us

GOAL: ENSURE TREATY, WATER, AND ACEQUIA RIGHTS TO PRESERVE AND PROTECT LOCAL AGRICULTURAL TRADITIONS				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Promote agriculture and its beneficial use of water 	<ul style="list-style-type: none"> • Form local agricultural cooperatives to work fallow land • Support acequia and agricultural land improvement programs 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Work with legislators and local officials to develop mechanisms and legislation which integrates and expands on ways to protect water for agriculture 	<ul style="list-style-type: none"> • Maintain productivity of agricultural lands • Maintain agricultural water rights • Protect and preserve areas presently and historically used for agricultural practices
<ul style="list-style-type: none"> • Maintain the integrity of the traditional acequia 	<ul style="list-style-type: none"> • Protect acequia priority of rights-of-way • Encourage acequias to pass bylaws to review any change of 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Develop federal, state, local, and charitable funding • Work with relevant 	<ul style="list-style-type: none"> • Maintains the diversity of historic, and prehistoric cultures and traditions

GOAL: ENSURE TREATY, WATER, AND ACEQUIA RIGHTS TO PRESERVE AND PROTECT LOCAL AGRICULTURAL TRADITIONS				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
systems that have existed for generations	<ul style="list-style-type: none"> diversion in accord with §73-2-21(E) Encourage acequias to pass bylaws to create a water bank in accord with §73-2-551 Map, catalog, and describe acequias including annual water use Identify, quantify, and adjudicate surface water rights and order of water utilization (A-71) 		<ul style="list-style-type: none"> agencies and non-profit organizations Work with legislators and local officials to develop mechanisms and legislation which integrates and expands on ways to protect acequias 	<ul style="list-style-type: none"> Increase benefit to landowners and producers
<ul style="list-style-type: none"> Increase efficiency of irrigation ditch systems 	<ul style="list-style-type: none"> Develop a consistent and sustained supply, and distribution of irrigation water Provide annual maintenance to all irrigation ditches Line or pipe irrigation ditch systems Construct head, and farm gates for water control Maintain and repair culverts, flumes, head, and farm gates Re-contour and repair segments of ditches to reduce gradient, and prevent incising Laser level fields 	<ul style="list-style-type: none"> Within 10 years 	<ul style="list-style-type: none"> Develop federal, state, local, and charitable funding Work with relevant agencies and non-profit organizations Work with legislators and local officials to develop mechanisms and legislation which integrates and expands on ways to maintain acequias Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> Increase productivity of irrigated land Increase availability of water during drought Provide a topography that makes application of water to fields more
<ul style="list-style-type: none"> Keep water with the land 	<ul style="list-style-type: none"> Establish a severance fee to discourage removal of water and land from an acequia system Develop mechanisms to ensure water rights are not lost if water is kept in or returned to a waterway Develop mechanisms to prevent transfer of surface and ground water rights from their locality Prevent sale of water out of sub-regions Promote customary laws & practices in existence prior to the 1848 Treaty of GH that promote agriculture and communal property 	<ul style="list-style-type: none"> Over the next 50 years 	<ul style="list-style-type: none"> Work with relevant agencies and non-profit organizations Work with legislators and local officials to develop mechanisms and legislation which integrates and expands on ways to maintain traditional communal concepts 	<ul style="list-style-type: none"> Maintains a link to the customary laws and practices of historic and prehistoric cultures and traditions Increase options for the use of agricultural water without loss of water rights
<ul style="list-style-type: none"> Promote respect for rural, tribal, farming, and ranching lifestyles 	<ul style="list-style-type: none"> Form lobbying groups Form local acequia and agricultural Associations Educate about the importance of farming and ranching 	<ul style="list-style-type: none"> Over the next 50 years 	<ul style="list-style-type: none"> Work with legislators and local officials to develop mechanisms and legislation which integrates and expands on ways to maintain rural, tribal, farming, 	<ul style="list-style-type: none"> Recognition of the importance of agriculture and rural areas

GOAL: ENSURE TREATY, WATER, AND ACEQUIA RIGHTS TO PRESERVE AND PROTECT LOCAL AGRICULTURAL TRADITIONS				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
			and ranching lifestyles • Work with school officials to develop curricula	

GOAL: RETAIN LAND USE PATTERNS THAT SUPPORT AND ENSURE A RURAL LIFESTYLE AND ECONOMY				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
• Base regional growth, planning, and zoning on retaining the health of the entire ecosystem	<ul style="list-style-type: none"> • Tie land-use to demonstrated availability of water • Manage growth within the limits of water, and a rural landscape (A-52) • Require water availability before land subdivision • Manage growth by putting geographical or numerical limits on population • Implement land use plans that differentiate between rural, suburban, and urban areas • Maintain large areas of mostly vacant and predominantly undeveloped land, with limited low-density housing • Encourage designated areas for higher density housing with clean, eco-friendly, nearby businesses, and industries • Use creative planning that does not require commuting • Include the cost of environmental damage when assessing planning alternatives • Consider the cumulative affects of development 	• Over the next 50 years	<ul style="list-style-type: none"> • Work with local and county planners • Work with legislators 	<ul style="list-style-type: none"> • Promote general well being of residents • Provide a sustainable economy • Increase ability to withstand drought
• Develop a program that systematically fosters cooperation among various sectors of the sub-regions with water as a primary focus	<ul style="list-style-type: none"> • Adopt policies to integrate land use planning and water resource management (A-30) • Create an inter-water-systems cooperation board • Enhance cooperation and coordinate water use among area water systems • Promote local control and discretionary authority • Implement and apply the right of self-determination in local governance of water issues 	• Within 10 years	• Work with federal, state, county, and local agencies and officials	<ul style="list-style-type: none"> • Share experience and knowledge • Coordinate projects and activities • Prevent duplication of effort

GOAL: RETAIN LAND USE PATTERNS THAT SUPPORT AND ENSURE A RURAL LIFESTYLE AND ECONOMY				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Create a sustainable economy that bolsters self-sufficiency of the sub-regional communities, and helps prevent loss of the agrarian lifestyle 	<ul style="list-style-type: none"> • Develop local agricultural cooperatives • Encourage development of a wide diversity of crops throughout the sub-regions such as native and traditional crops, contemporary crops, and new and emerging crops • Develop markets for locally grown produce and meat (A-11) • Promote farmers' markets • Develop creative and certified marketing of livestock • Implement new farming technologies that will help to increase production • Plan and maintain a schedule for rotation of fallow acres • Reduce the amount of presently fallow cropland • Manage the numbers of livestock and tilled acres that best benefits the environment and economy together 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Work with legislators and local officials to develop legislation and mechanisms which integrate county, state, and federal policies and processes • Promote a "Very-Small-Business Center" • Promote locally-owned businesses • Work with local banks, and agricultural associations to aid local agricultural producers who lack financial resources • Provide low interest loans for enterprises that promote a rural lifestyle, cottage industries, eco-tourism, and cooperatives 	<ul style="list-style-type: none"> • Agricultural cooperatives will promote and sustain agriculture through education, financial support, improved farming methods, crop diversity, shared use of equipment and teaching children about the importance and benefit of agriculture, and good agricultural conservation methods • Allow farmers and ranchers to work on the land, rather than elsewhere in order to maintain it • Enable future generations to farm and ranch • Provide sustainable tourist industry • New markets that are organic, predator friendly, low-impact
<ul style="list-style-type: none"> • Protect agricultural lands from development 	<ul style="list-style-type: none"> • Develop "Rural Agricultural Areas" • Develop protective zoning for acequia irrigated lands • Require that planning and zoning consider impacts on traditional cultures and lifestyles, and cumulative effects • Prevent paving over and building on agricultural lands 	<ul style="list-style-type: none"> • Over the next 50 years 	<ul style="list-style-type: none"> • Work with legislators and local officials to develop laws • Work with land trusts to develop mechanisms to retain agricultural land • Work with officials to develop land use management tools to prevent development on irrigated or non-irrigated farmland 	<ul style="list-style-type: none"> • Maintains an agricultural land base • Promote general well being of residents • Maintains rural atmosphere
<ul style="list-style-type: none"> • Protect and improve the quality of the domestic supply of surface and ground water 	<ul style="list-style-type: none"> • Identify and protect groundwater recharge areas (A-47) • Ensure modernized, well-maintained water systems • Limit and reduce vehicular water crossings • Clean up watercourses, remove garbage, trash, and vehicles from arroyos • Require sewage treatment systems in higher density 	<ul style="list-style-type: none"> • Within 10 years 	<ul style="list-style-type: none"> • Work with federal, state, county, and local agencies and officials • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> • Ensure satisfactory water quality

GOAL: RETAIN LAND USE PATTERNS THAT SUPPORT AND ENSURE A RURAL LIFESTYLE AND ECONOMY				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
	communities (A-26) • Use constructed wetlands for final sewage treatment (A-36) • Remove trace elements		• Create programs to aid rural water organizations with the proposal writing and funding process	
• Provide for increased, consistent and sustainable sources of both domestic and agricultural water	• Implement projects to thin trees and brush on public and private land • Implement controlled burn projects on public and private land • Construct water storage reservoirs and tanks • Install community domestic supply wells • Identify and provide for residential fire-fighting water • Limit domestic wells to 16 per section • Address ground/surface water interactions in state water-rights statutes (A-144) • Limit wells that could impair surface or groundwater (A-61) • Develop local drought plans (A-18)	• Within 10 years	• Work with federal, state, county, and local agencies and officials • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land • Create programs to aid rural water organizations with the proposal writing and funding process	• Water use will match water supply • Increase ability to withstand drought

GOAL: PROMOTE CONSERVATION OF WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
• Develop water-wise residents and communities	• Disseminate water-saving information (A-56) • Develop local water budgets to understand water recharge and water use • Develop local water conservation and drought plans (A-18) • Adopt graduated water rates in all domestic systems (A-21) • Institute incentives for water conservation and recycling • Adopt a conservation fee added to all water systems for promotion of water conservation • Meter all water supply wells (A-8) • Meter all surface water diversions (A-7)	• Within 15 years	• Work with federal, state, county, and local agencies and officials • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land	• Increase in public understanding of water use and conservation • Increase in water conservation

GOAL: PROMOTE CONSERVATION OF WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Increase efficiency of water use 	<ul style="list-style-type: none"> • Encourage use of new water-saving technologies (A-22) • Encourage greywater reuse (A-24) • Encourage rainwater harvesting (A-44) • Improve storm water management (A-34) • Capture flood flows • Reduce water loss in acequias • Increase irrigation efficiency (A-10) • Reduce artificial open water evaporation (A-45) • Fund domestic water cooperatives to improve their water systems • Fund acequias to increase operating efficiency (A-60) 	<ul style="list-style-type: none"> • Within 15 years 	<ul style="list-style-type: none"> • Work with federal, state, county, and local agencies and officials • Develop federal, state, local, and charitable funding • Work with relevant agencies and non-profit organizations • Tax rebates and credits, and matching funds for private land 	<ul style="list-style-type: none"> • Reduction in water waste

GOAL: PROMOTE EDUCATION FOR AREA RESIDENTS REGARDING THE CONNECTION BETWEEN LAND USE, WATER AND ENVIRONMENTAL HEALTH, AND WAYS TO CONSERVE WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Create water conscious communities and assist future generations in learning about water 	<ul style="list-style-type: none"> • Develop school curricula and outdoor projects on subjects such as soil and water conservation, and alternative energy and building methods (A-56) • Develop school curricula concerning water conservation methods, such as, mulching, composting, swales, rain barrels and other catchment systems, and uses hands on training • Provide a secondary education facility • Create a Natural Resource Educational Program (partner school districts with agencies such as Cuba Soil and Water Conservation District) • Educate about ways to wisely use and reuse water • Provide seminars and courses at local schools 	<ul style="list-style-type: none"> • Within 10 years ensure every education level includes water and land use curricula 	<ul style="list-style-type: none"> • Work with federal, state, county, and local agencies and officials, and non-profit organizations • Develop federal, state, local, and charitable funding • Work with local schools to develop water and land use projects and curricula 	<ul style="list-style-type: none"> • Understanding of healthy land and watersheds as personal and community wealth • Understanding of the interrelationship of water and land management in watersheds • Understanding of the role of watersheds to store and release water • Understanding of the central role of climate and fire in the ecology of natural communities • Understanding of the natural limits to the productivity of land • Understanding of the natural limits to plant, wildlife and human dependence on land • Understanding of factors conducive to erosion, and methods to reduce or prevent it

GOAL: PROMOTE EDUCATION FOR AREA RESIDENTS REGARDING THE CONNECTION BETWEEN LAND USE, WATER AND ENVIRONMENTAL HEALTH, AND WAYS TO CONSERVE WATER				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
				<ul style="list-style-type: none"> • Understanding of the importance of riparian and wetland areas • Understanding of alternative methods of livestock handling, • Understanding of relevant contemporary farming technologies and practices, • Understanding of the benefits and means of water conservation • Understanding of the link between detrimental impacts to the natural environment and economic losses of local producers
<ul style="list-style-type: none"> • Educate people (farmers and non-farmers) about the importance of land and water stewardship, and farming and ranching 	<ul style="list-style-type: none"> • Share local agriculture knowledge • Share local knowledge and traditions regarding nurturing the land and husbanding the water • Make educational packets available at Pueblo and Forest Service offices • Promote an attitude of stewardship of the integrity of the ecosystems • Involve children and young adults in agriculture • Educate newcomers and visitors about local traditions and lifestyles 	<ul style="list-style-type: none"> • Within 10 years ensure every education level includes curricula regarding the importance of agriculture 	<ul style="list-style-type: none"> • Work with federal, state, county, and local agencies and officials, and non-profit organizations • Develop federal, state, local, and charitable funding • Work with local schools to develop agricultural projects and curricula 	<ul style="list-style-type: none"> • Allow local residents to stay in the area • Teach technology and business skills needed to develop water and land centered occupations and enterprises • Train youth to create occupations, mini businesses and enterprises • Reduce misunderstandings between newcomers, tourists, and long time residents

GOAL: PROVIDE FOR MONITORING THE IMPLEMENTATION OF THE WATER PLAN				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
<ul style="list-style-type: none"> • Public participation in the water planning process and water management 	<ul style="list-style-type: none"> • Increase monitoring and modeling of surface and groundwater (A-38) • Develop geographic watershed information system (A-73) • Maintain watershed steering committees • Fund ongoing water planning (A-58) 	<ul style="list-style-type: none"> • Within 20 years 	<ul style="list-style-type: none"> • Use state and federal support • Legislation will create and support citizen water assemblies/forums until their functions can be integrated into all levels of executive and legislative branches 	

GOAL: PROVIDE FOR MONITORING THE IMPLEMENTATION OF THE WATER PLAN				
OBJECTIVE	ACTIONS	LENGTH	FUNDING/POLICIES	BENEFITS
	<ul style="list-style-type: none"> • Ensure continued public participation in water issues (A-53) through local water assemblies 			

* Numbers refer to corresponding alternative actions considered in the Middle Rio Grande Region Plan.

Public Welfare Statement

A similar process of drafts and discussion was conducted by the Steering Committee in drafting a Public Welfare Statement for the subregion. After obtaining comments at the Open Houses, the final product, as follows, was adopted.

Introduction

This public welfare statement is for the Río Jemez and Río Puerco watersheds, being subregions to the Middle Río Grande Regional Water Planning Region. It is part of our subregional water plan to provide guidance to the State Engineer in decisions concerning applications for transfer and new appropriations of water rights that affect the Río Jemez or the Río Puerco. This public welfare statement will accomplish its purpose if conflicts are reduced in the subregions, and if decisions reflect the long-term future needs of the subregions, rather than merely responding to immediate demands. This must not be a static, final statement, but an iterative and evolving declaration which is continuously monitored by the public to ensure that it accurately reflects the welfare of the public, always remembering that there are unknown users and perspectives concerning our water resources that will need to be given a voice in the future.

General Statement

Water has many important values to the people in our subregions which need to be appreciated and fairly balanced to ensure the overall safety, security and well-being for the subregions. Such values include cultural, spiritual, economic, environmental and hydrologic viability for the subregions. In times of scarcity, everyone must share the responsibility for living within the shortage. We recognize the current deficit situation and have a duty to balance water use with renewable supply, starting now and in the future. Decisions should be made so as to keep as many options as possible open for future generations.

Process

We believe the “public welfare” must be safeguarded by the State Engineer through active management of our limited water resources in the decision-making process used to evaluate new appropriations and transfer of water rights. A strong decision-making process supports “public welfare”. Public welfare is equal in importance to the other two statutory criteria (impairment and conservation). Transfers of water rights must be open to all affected stakeholders and use the best available science. The public will be better served if the

process encourages negotiation, not litigation. The process must provide reasonable and timely notice to and allow participation by all parties. The process must avoid automatic (or exempt) transfers or permits made outside of public review. Wet water use must be consistent with the administrative transfer of water rights (Double and triple dipping should be avoided). The evaluation of transfer must consider both the positive and negative impacts of the transfer of water rights on both the area of origin as well as the area receiving the water rights.

Future Use of Our Water Resources Consistent With the Public Welfare

The “public welfare” requires that our use of the water resources be consistent with five guiding principles:

- #1 - we respect the essential role of water in maintaining our spiritual and cultural values;
- #2 - we maintain and improve the health of our region’s water resources; i.e., the greatest benefit to water users in the watershed is to slow the rate of flow and keep as much water up here (in the mountains) and within the watersheds as we can;
- #3 - we encourage conservation and discourage waste (e.g., impractical or unreasonable use);
- #4 - we optimize the efficient use of our limited water resources in the context of restoring watersheds; and
- #5 - we enhance a rural agricultural economy as opposed to urban growth.

The state engineer should consider the following competing water demands when evaluating new appropriations and transfers of water rights: including but not limited to health and safety concerns, economic interests, agricultural interests, environmental interests, social and cultural interests, aesthetic interests, recreational interests, and municipal and domestic interests.

- When considering health and safety concerns, the state engineer should strive to maintain and improve the quality of our water resources as a basic human right to safe drinking water.
- When considering economic interests, the state engineer should evaluate both the positive and negative impacts of the transfer of water rights on both the area of origin as well as the area receiving the water rights. Economic concerns should not be a primary consideration.
- When considering agricultural interests, the state engineer should strive to develop and maintain a vibrant and efficient agricultural ecosystem, recognizing that agriculture has economic, ecologic, historic, and cultural values.

- When considering environmental interests, the state engineer should maintain and improve ecosystem biodiversity. The state engineer should also consider instream flows as being essential for the region.
- When considering social & cultural interests, the state engineer should protect water uses which support the diversity of communities, cultures and traditions existing in our region. The promises contained in the Treaty of Guadalupe Hidalgo should be acknowledged and honored.
- When considering aesthetic interests, the state engineer should strive to maintain and improve the agricultural and riparian greenbelts along the flowing waters and ditches in our communities.
- When considering recreational interests, low consumptive recreational uses should be encouraged.
- When considering municipal and domestic needs, the State Engineer should strive to sustain an adequate water supply to meet these needs. The State Engineer should connect water use decisions with local land use decisions.

12.13 Implementation - The Next Steps

Workshop participants stressed the importance of implementing the subregional plan, and building on the work and information already compiled. To carry this work forward, adequate resources (both financial and qualified personnel) need to be identified. The following steps could be a part of the process:

The first step would be to refine and supplement the paucity of current information/data, including:

- research users and uses within the subregion (riparian usage; vacation homes, etc.),
- quantify the water uses, reaching agreement as to the baseline information,
- quantify the available supplies specific to the subregions,
- review projections specific to the subregions, and
- quantify the projected demand specific to the subregions, factoring in the demands that will undoubtedly be placed on the resource from outside of the subregions (ie. growth in Rio Rancho and Albuquerque).

The second step could require preparation of the following:

- a realistic water budget that addresses the current shortages as well as projected demands,
- a Drought Contingency Plan,
- a Water Conservation Plan,
- water quality management plans, particularly for stream stretches which exceed pollutant levels,
- a technical analysis of the alternatives described in the subregional plan, including the estimated wet water yield from each and the costs of implementing each alternative,
- establishing benchmarks or measurable outcomes for each of the objectives in this subregional plan and assigning responsibilities for implementation (federal, state, local), and
- connecting the projects (already in the pipeline and those planned) to the plan's goals, describing how each project furthers the stated objectives.

Another step would be to coordinate subbasin plans, perhaps through water budgets, and establishing baselines to measure progress.

Coordination of the subregional plan with the Middle Rio Grande Regional Water Plan is a necessary step.⁷ Although the subregional plan should remain distinct and separate, the future of the subregion is intertwined with the explosive growth in the rest of the region. Coordination could include:

- careful examination of both plans side-by-side to determine potential conflicts as well as areas where both support and reinforce each other,
- meetings and educational forums to encourage representatives and the public from both the regional and subregional planning efforts to meet and consult with each other, and
- tracking implementation efforts of both plans in the future.

As interim actions, the following could be undertaken by the Steering Committees:

- establish a calendar of activities to carry out, and then assess the interest of other potential partners to accomplish the list of tasks.
- discuss what measures might need to be drafted to create and adopt a conservation plan and a drought contingency plan.
- determine what steps to follow, draft a proposal to potential funders (including the ISC), and seek ways to implement them.

- form partnerships to broaden the coalition, as well as helping with the tasks of implementation, monitoring and evaluation.
- (co) host an event, such as a workshop on acequias or a water fair to continue to engage the residents.
- teach a class at the local school or ask students to teach at an otherwise not well attended to event.

Finally, the Steering Committees could establish a monitoring program consistent with the goal to "provide for monitoring the implementation of the water plan." If the planning and implementation process continues and resources are identified, Cuba Soil and Water Conservation District has agreed to continue operating as fiscal agent for the subregion.

The subregional water plan is an effort to counter current trends by planning for the future, together. These suggested actions begin to address the goals in the plan.

12.14. Projects & Groups

On of the duties of the New Mexico Water Trust Board, in accord with §72-4A-5, NMSA 1978, is to authorize qualifying water projects. Identifying such projects in a regional water plan is a necessary first step. In the main plan can be found a list of capital projects to improve water and wastewater systems developed by local governments, together with proposed projects from various entities in the region.

While not meant to be exhaustive, Section 14 also contains a catalogue of several projects and programs underway. One of the outcomes of the regional water plan should be to act as a clearinghouse. In that way, projects can be mentioned--be they by individuals, non-profit organizations, acequias, mutual domestics, villages, Pueblos, Navajo, Bureau of Land Management, Forest Service, Cuba Soil & Water Conservation District, Natural Resource Conservation Service, or Bureau of Reclamation. Others who so desire can find out more about these efforts and learn from information already gleaned. In such a way, much of the regional water plan will be implemented. As of late 2003, this list was just beginning to be assembled, as can be seen in Table 12-15. One task for the Steering Committees will be to solicit projects to include, and to continue to update the clearinghouse. Leveraging those activities, the Steering Committee can also help to ensure that the plan is a success.

Table 12-15: Table of Contents of Appendix 14 - Catalogue of Programs & Projects

Appendix 14 - Catalogue of Programs & Projects	1
1. individuals	2
2. non-profit organizations	2
a. NM Cattle Growers' Association	2
b. Quivira Coalition	2
c. Common Ground	3

d. Valles Caldera Preserve	3
e. Forest Guardians	4
3. acequias	5
a. New Mexico Acequia Commission	5
b. New Mexico Acequia Association	5
c. La Jara	5
d. La Jara, RP	5
4. mutual domestics	6
5. Villages	7
a. Cuba	7
b. San Ysidro	7
c. Jemez Springs	7
6. Pueblos	8
a. Rio Jemez (Abousleman) Indian Water Rights Settlement	8
b. Zia	12
c. Jemez	12
7. Navajo	12
8. Bureau of Land Management	14
a. Rio Puerco Management Committee	15
9. Santa Fe Forest Service	24
10. Cuba Soil & Water Conservation District	27
11. Natural Resource Conservation Service	27
12. Bureau of Reclamation	28
13. USGS Jemez Mountains Field Station	28
14. Other	30
a. Surface Water Quality Bureau	30
b. Education - Project WILD	31
15. NRCS Field Office Technical Guide	34
16. Watershed Restoration Action Strategy for the Rio Puerco	36

12.15 Epilogue - Process to obtain input on the draft plan

After completing the draft plan and in keeping with the concept of involving the public, the Steering Committee brought it to the public for review and comment, as well as to various local governments and governmental entities in an attempt to obtain endorsements.

The drafts of the Middle Rio Grande Plan, the Subregional Plan and the Summary were delivered to various governmental entities throughout the region. Newspaper articles were published to announce the draft as well as upcoming public meetings. Letters, emails and telephone calls were made to invite public officials to Endorsement Workshops (October 21 in Cañon and October 22 in Cuba) and Open Houses (November 15 in Cañon in Cuba).

More letters, calls and emails were sent to invite the public to the Open Houses. The draft plan was placed on a web site, <http://www.waterassembly.org/9information/9_7.html, with mailbox icons to enable commenters to click and respond. Announcements regarding the Endorsement Workshops, Open Houses, and other pertinent information were also placed on the web site.

Comments were transcribed. All of those comments were reviewed by the Steering Committees on December 8, 2003, who agreed to acknowledge all of the comments by including them in an Epilogue to be printed in the Subregional Plan. The comments can be found in Section 15 of the main text.

12.16 Glossary

An extensive one is to be found in Section 16 of the main text.

12.15 Bibliography

While an extensive bibliography is to be found in Section 17 of the main text, the following references were cited in this Summary.

- Alcantara, Adelamar N. Ph.D., and Elvira Lopez, (BBER 2003) *Demographic and Population Study for Regional and Statewide Water Planning Population Projections for 16 Regions, July 1, 2000 to July 1, 2060*, University of New Mexico, Bureau of Business and Economic Research, Oct-03, Prepared for the Regional Water Planning Program, New Mexico Interstate Commission.
- Bexfield, L. M. & Anderholm, S. K. (2003). *Estimated water-level declines in the Santa Fe group aquifer system in the Albuquerque area, central New Mexico, predevelopment to 2002*. USGS Water-Resources Investigations Map Report 02-4233. Available from U.S. Geological Survey Information Services, Box 25286, MS 517, Denver Federal Center, Denver, CO 80225.
- Bexfield, L. M. & McAda, D. P. (2003). *Simulated effects of ground-water management scenarios on the Santa Fe group aquifer system, Middle Rio Grande Basin, New Mexico, 2001-40*. USGS Water-Resources Investigations Report 03-4040. Available from U.S. Geological Survey Information Services, Box 25286, MS 517, Denver Federal Center, Denver, CO 80225; <http://water.usgs.gov/pubs/wri/wri034040/#pdf> and last accessed 4/2/04.
- Bureau of Land Management (BLM). information on land ownership provided by Steve Fischer on 9/24/03 and 10/7/03.
- Chestnut, P. (2000, June). *A Pueblo perspective on the Rio Grande Compact*. Paper presented at the 44nd Annual New Mexico Water Conference Proceedings, New Mexico Water Resources Research Institute, New Mexico State University, co-sponsored by: New Mexico Riparian Council. Retrieved 8/3/03 from <http://wrri.nmsu.edu/publish/watcon/proc/proc44/chestnut.pdf>
- Kery, S. C., Utton, J. W., Sheehan, Sheehan & Stelzner, P.A., Chestnut, P. C., & Umshler, S. E. (February 2003). *Legal issues specific to the Middle Rio Grande water planning region*. Written for the Middle Rio Grande Regional Water Plan. Retrieved 8/3/03 from <http://www.waterassembly.org/pdfs2/LegalIssues.pdf>
- Kery, Susan C., John W. Utton, Peter C. Chestnut, Sue E. Umshler (January, 2003). "Overview of Water Law Applicable to The Middle Rio Grande Water Planning Region." Written for the

- Middle Rio Grande Regional Water Plan. Retrieved 8/3/03 from <http://www.waterassembly.org/pdfs2/NM%20Water%20Law.pdf>
- McAda, D.P. and Peggy Barroll. *Simulation of Ground-Water Flow in the Middle Río Grande Basin Between Cochiti and San Acacia, New Mexico*. U.S. Geological Survey Water-Resources investigations Report 02-4200, 2002.
 - New Mexico Environment Department, Surface Water Quality Bureau (2002), *Jemez Watershed TMDLs* report, accessed March 24, 2004 at http://www.nmenv.state.nm.us/swqb/Jemez_Watershed_TMDLs/Index.html.
 - New Mexico Environment Department, Surface Water Quality Bureau (June 2003). "*The Approved 2002-2004 State Of New Mexico §303(D) List For Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDLs)*," accessed on March 24, 2004 at www.nmenv.state.nm.us/swqb/2000-2002_New_Mexico_303d_List.pdf.
 - New Mexico Interstate Stream Commission. (1994, December). *Regional Water Planning Handbook*. Retrieved 8/1/03 from <http://www.seo.state.nm.us/doing-business/water-plan/rwp-handbook.html>. Last modified: 6/24/99
 - New Mexico Office of the State Engineer and the Interstate Stream Commission. (2002, December). *Framework For Public Input To A State Water Plan*. Santa Fe, NM. Retrieved 8/1/03 from <http://www.seo.state.nm.us/water-info/NMWaterPlanning/framework.html>.
 - Northwest New Mexico Council of Governments, 2003. *Region 6 Regional Water Plan*, epcog.org/nw/pdf/region6water/quality.pdf (last accessed March 23, 2004)
 - Papadopulos, S.S. and Associates, Inc. *Middle Río Grande Basin Water Supply Study*. Prepared for the U.S. Army Corps of Engineers, Albuquerque District, under contract no. DACW47-99-C-0012, and the New Mexico Interstate Stream Commission, 2000. Available at <http://www.seo.state.nm.us/water-info/mrgwss/mrgwss-final-rpt.html>.
 - Río Puerco Management Committee (RPMC), (May 31, 2001). *Watershed Restoration Action Strategy (WRAS) for the Río Puerco Watershed*, Albuquerque, New Mexico.
 - Rivera, J. A. & Martínez, L. P. (2000). *Acequias de comun and sustainable development:: Reflections from the upper Rio Grande watershed*. Paper presented at the Congreso Nacional: Gestión del Agua en Cuencas Deficitarias, October 5, 2000, Universidad Miguel Hernández, Orihuela, Spain. Retrieved 8/1/2003 from www.lmacequia.org/history/acequias_de_comun.html.
 - Shomaker, John & Associates. (2000). *Historical and current water use in the Middle Río Grande Region*. Albuquerque: John Shomaker & Associates, Inc., Water-Resource and Environmental Consultants. Retrieved 8/1/03 from <http://www.mrgcog.org/images/Documents/Shomaker%20Water%20Report.pdf>.
 - Wilson, Brian C., P.E. (1992). *Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 1990*, New Mexico State Engineer Office, Technical Report 47, July 1992. <http://www.seo.state.nm.us/water-info/water-use/county90/mcounty.html>
 - Wilson, Brian C., P.E. (1997). *Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 1995*, New Mexico State Engineer Office, Technical Report 49, 1997. <http://www.seo.state.nm.us/water-info/water-use/county95/mcounty.html>
 - Wilson, Brian C., P.E. (2003). *Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 2000*, New Mexico State Engineer Office, Technical Report 51, 2003. <http://www.seo.state.nm.us/water-info/water-use/county00/mcounty.html>

Thanks to the voices of the valleys
reflecting the strength of the mountains,
the words of the watersheds
are present in this plan.

Endnotes

¹ *Albuquerque's Aquifer and How We Meet The Challenge*, www.cabq.gov/waterconservation/insert.html. In addition to being a factor now, the consequences of long-term pumping by urban centers such as Albuquerque and Rio Rancho are not completely known. The decline is the subject of a recent USGS report, summarized in a map report. Contours of recent water levels were mapped, along with the ranges of estimated water-level change. [Bexfield 2003] USGS also studied the situation under three different scenarios. The maps tell the story. By using surface water, the decline in aquifer levels slows down so that after 40 years the water table is only down by 110' but spread out under nearly all of Albuquerque. (Bexfield & McAda 2003)

² "Jemez Pueblo is home to nearly 3,000 Jemez Pueblo members." (*Environmental Assessment Of Environmental Quality Incentives Program For Pueblo Of Jemez Tribal Trust Lands GPA* (2002) while the census shows 1,953. The Navajo Department of Water Resources includes the population for Torreon, Ojo Encino and Star Lake Chapter Houses in information provided in Section 9.9 of Region 2 Regional Water Plan. In the report, 1990 Census figures are used, showing the population to be 3,797.

³ Such judicial determination of rights are made pursuant to §72-4-17 NMSA 1978 Comp. The Jemez adjudication is *United States, et al. v. Abousleman, et al; Jemez River Adjudication*, United States District Court CIV. NO. 83-1041 JC. See also the NMOSE's publication, "What is an adjudication?".

⁴ *Prior appropriation and beneficial use*: Because water is an essential but scarce resource in New Mexico, the State has a compelling interest in regulating water use. No individual owns the water. However, one may acquire a real property right "to use the water consistent with the procedures under State law," up to the amount which can be put to a beneficial use. New Mexico's Constitution recognizes beneficial uses as the basis, the measure, and the limit of the right to use water. Beneficial use means application of water to a lawful purpose that is useful to the appropriator and at the same time is a use consistent with the general public interest. The State of New Mexico, like most Western states, uses the doctrine of prior appropriation to allocate water use. This doctrine has these essential principles: (1) the first user (appropriator) in time has the right to take and use water; and (2) that right continues against subsequent users as long as the appropriator puts the water to beneficial use. (*Overview*, page 3, citations omitted, Kery 2003)

⁵ Also see "Other Public Entities Regulating Water Rights (Kery 2003). For more discussion of legal issues, also see "Issues Specific to The Middle Rio Grande Water Planning Region," (Kery 2003).

⁶ In the summer of 2003, the water level was so low that no water could be retained in either of Santa Fe's two reservoirs. Because there was "credit" water stored at Elephant Butte Reservoir, which was released, Santa Fe was able to store water upstream. However, not only were there ramifications to new recreational users at the lake but the reduction of credit water may have serious consequences if the drought continues another year.

⁷ Since the Middle Rio Grande RWP will need to coordinate with the State Water Plan, this could be a test case.