

Summary of the Middle Rio Grande Regional Water Plan 2000-2050

Volume I – April 2004



General Summary The Middle Rio Grande Regional Water Plan April 2004

Funding provided in part through
the New Mexico Interstate Stream Commission,
the Mid-Region Council of Governments, and
the Water Assembly

Preface

This document is a summary of the Middle Rio Grande Regional Water Plan. It provides a general synopsis of the longer, more detailed planning document.

This Middle Rio Grande Regional Water Plan has been developed through a collaboration among the Water Assembly, the Mid-Region Council of Governments and its Water Resources Board. See “Who Plans?” for more details.



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Water Plan Summary

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The Region

The Middle Rio Grande (MRG) is one of sixteen water-planning regions in New Mexico. Encompassing approximately 5,495 square miles, it consists of Sandoval, Bernalillo, and Valencia Counties, and includes various federally owned lands as well as lands belonging to thirteen Native American tribes. The region is subdivided along the boundaries of three watersheds, and contains all of the Jemez River watershed, and portions of the Rio Grande and Rio Puerco watersheds. An arid region averaging only nine inches of rain per year, the Middle Rio Grande is home to about two-fifths of the state's population, and is the largest urban water user in the state. In addition to the three streams mentioned above, aquifers associated with the Rio Grande supply drinking water to most of the metropolitan population.

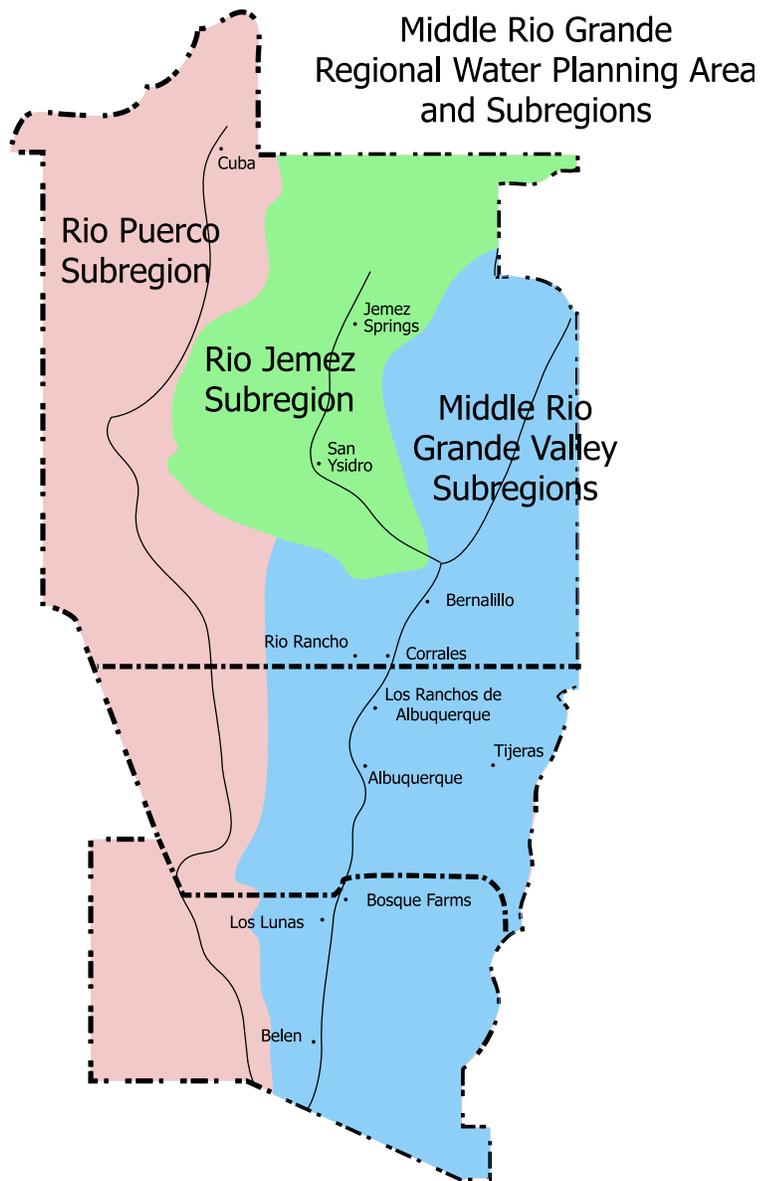


Figure 1

An arid region averaging only nine inches of rain per year, the Middle Rio Grande is home to about two-fifths of the state's population...

The Issue

The mission of the regional water plan is to balance water use in the region with renewable supply. Renewable supply is the amount of water that comes into the region each year that we are legally entitled to use. We now use on average about 55,000 acre-feet per year more than our renewable supply. Population in the region has grown by 21% since 1993 and continues to expand by about 1.5% per year, which will result in even greater deficits in the future if we do nothing.

The difference between use and renewable supply is currently being made up by “mining” groundwater. Although there is some recharge of the aquifer, we are presently using much more groundwater than is recharged each year. As a result, the aquifer has declined as much as 160 feet in some areas of Albuquerque since 1960. This is not sustainable. Continued aquifer declines would soon cause land subsidence in Albuquerque and damage to buildings on the surface, and in the long run, Albuquerque would run out of potable water in the aquifer.

The water plan is designed to address these key issues.

How Much?

An acre-foot is enough water to cover one acre of land one foot deep. It is equivalent to 325,851 gallons.

In the Middle Rio Grande, we have been *using 17,921,805,000 more gallons (55,000 acre-feet) each year than the region receives, enough to fill a football field eleven miles deep.*

Aquifer Drop Since 1960: *As much as 160 ft. (in some areas)*

Population Growth Since 1993: *21%*

Current Population Expansion: *1.5% per year*

Current Aquifer Depletion Rate: *55,000 acre-feet per year*

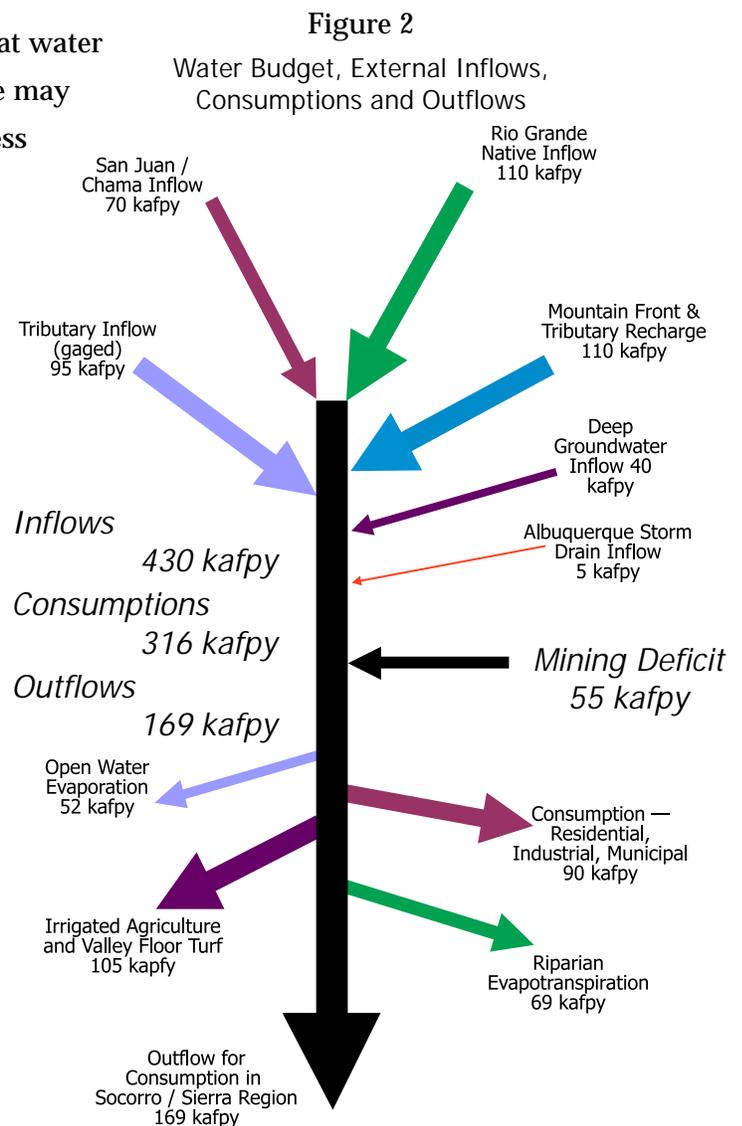
Why Plan?

In addition to the need to ensure that we are able to meet our future water needs, a number of other factors are driving the need to create a water plan for the state.

1. In 1982, the U.S. Supreme Court ruled that water is an article of commerce, and that a state may not restrict its flow across state lines unless the exportation can be shown to be contrary to water conservation in the state, or detrimental to the public welfare. If we do not plan for use of our waters, we risk losing our water to Texas.
2. Under the Rio Grande Compact, New Mexico is required to deliver a certain amount of water to Texas each year, depending on how much water is in the Rio Grande. Failure to meet our delivery requirements could result in severe penalties. In recent years, New Mexico has been able to meet its delivery requirements. This situation could change in the future, especially in view of the fact that regional demand already exceeds renewable supply.

Without a water plan, we risk the financial costs of water shortages and failure to meet downstream obligations; mandatory restricted use; federal control of water; outside appropriation of water supplies; and impacts to the environment, including degradation of water quality, land subsidence, loss of cottonwood bosque and farms, and damage to those amenities and cultural attributes that make the Middle Rio Grande region unique.

In 1987, the New Mexico legislature initiated a regional water planning program so that the various regions of the state could calculate and reserve sufficient water for their future needs. The Interstate Stream Commission was tasked with oversight of these regional plans, and eventually with development of a state water plan to help protect New Mexico water supplies from interstate claims. This plan is necessary to ensure an adequate supply of affordable, quality water to meet human and environmental needs while maintaining a variety of desirable New Mexican lifestyles.



Data relative to the three county region; averages for last quarter of the twentieth century. Water delivered to Elephant Butte Reservoir has been excluded from both inflows and outflows.

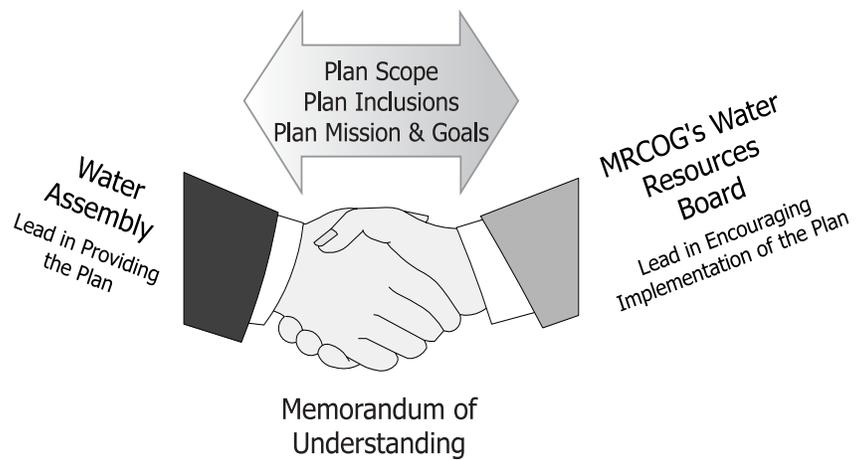
Who Plans?

In the Middle Rio Grande region, the planning process is guided by the volunteer Water Assembly (WA), in partnership with the Mid-Region Council of Governments' Water Resources Board (WRB).

Working Together

In December of 1998, the Water Assembly and MRCOG signed a Memorandum of Understanding to work together to create a regional water plan. The WA has responsibility for preparing the plan, while MRCOG, through the WRB, is responsible for adopting and implementing the final product.

To coordinate their efforts, the WRB and the WA's Action Committee met jointly in January of 2001 to produce an annotated table of contents outlining what the plan should cover, and held several additional sessions in 2003 to reach consensus on what the final plan would include. They also worked together to develop the mission and goals for the planning process outlined in Figure 9.



A Public – Private Partnership

Figure 3

Water Assembly

Figure 4 shows the organization of the Water Assembly, a non-profit public forum that consists of five Constituency Groups, an Action Committee, an Executive Committee, and various Working Teams. The Assembly's four officers are elected at each Annual Assembly.

Constituency Groups

To advocate for specific views and interests, five Constituency Groups were formed. Five representatives and alternates from each group are elected to the Action Committee at the Annual Assembly. The groups also select a Chair who serves on the Water Assembly's Executive Committee. The Constituency Groups meet intermittently throughout the year to aid in the planning process and to provide input on various issues.

Specialist Constituency Group (SC)

Members include academics, researchers, scientists, data managers, consultants, and agency staff. The group's role is to provide feedback on the technical soundness of planning proposals.

Managers Constituency Group (MC)
 Members are representatives of firms, agencies, or jurisdictions responsible for water provision or water management. They furnish input as to potential constraints or concerns from a management standpoint.

Environmental Advocates Constituency Group (EAC)
 Includes citizens and groups urging preservation of environmental values in water management.

Agricultural, Cultural and Historical Water Use Advocates Constituency Group (ACHUA)
 Includes acequia and irrigation system members, and other traditional water users.

Urban Users and Economic Development Advocates Constituency Group (UUEDA)
 Members represent various development, urban, and suburban interests.

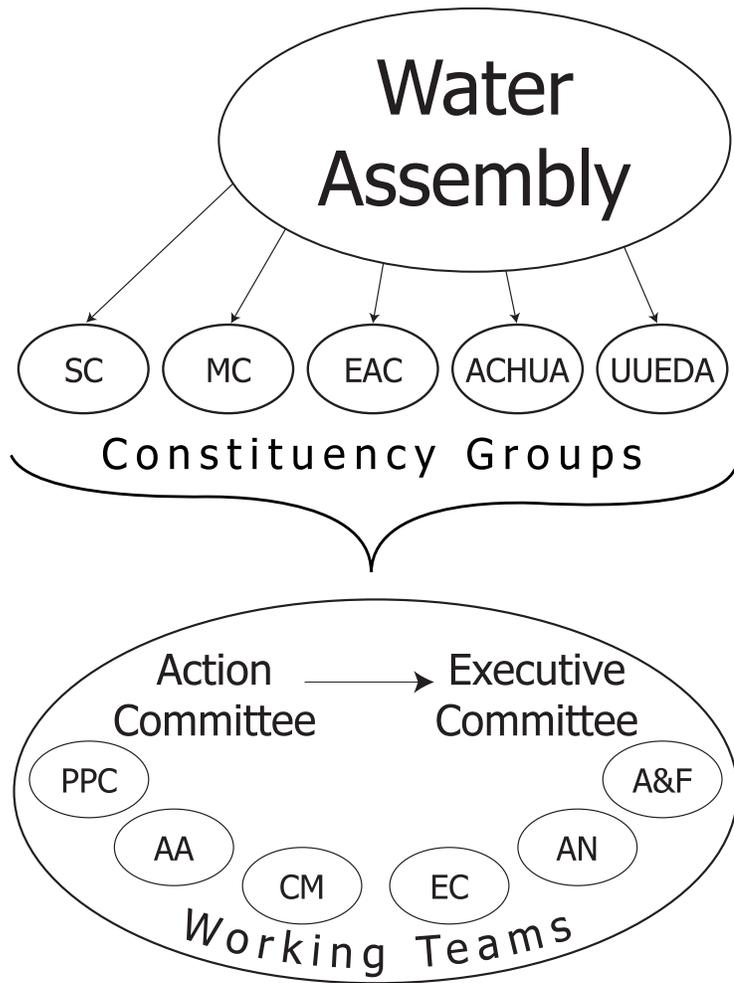


Figure 4

Action Committee

At least once a month, Constituency Group representatives and Executive Committee members meet as the Action Committee to conduct the business of the Water Assembly. The Action Committee is the Assembly’s decision making body and custodian of the integrity of the planning process, as it engages in broad discussions about MRG water issues and the planning process.

Executive Committee (EC)

Twice each month, the officers of the Water Assembly and the Constituency Group chairs meet to address administrative issues related to the water planning process.

Working Teams (WT)

Working Teams are responsible for carrying out the tasks of the planning process. Throughout the development of the water plan, six permanent Working Teams and several ad hoc teams were formed, with members from the Constituency Groups, and from the public at large.

Public Participation and Communication (PPC)

This team coordinates public outreach and media relations; organizes and conducts public meetings for the planning process; produces all informational materials, including handouts, slide presentations and newsletters; and reports back to the public the results of all forums and events.

Alternative Actions (AA)

Members of this Working Team compiled and analyzed public input on possible alternative actions, producing a family of forty-four final alternatives to be considered in creating the plan.

Cooperative Modeling (CM)

Working with experts from Sandia National Laboratories, this team helped develop a computer model to examine the impacts of various combinations of alternatives on the region's water future. Because the model was integral to the planning effort, the team was intentionally structured to include one representative from each Working Team and Constituency Group.

External Coordination (EC)

This team communicates with neighboring planning regions and interacts with various water managers, including federal agencies, to keep them apprised of progress on the plan, and to receive feedback on potential issues the plan needs to address.

Analysis (AN)

Members of this team are largely technical experts who are "on call" to respond to technical questions from other Working Teams.

Administration and Finance (AF)

This team manages administrative functions, maintains a website, administers the Internet list serve and handles the budget for Water Assembly activities.

Subregional Steering Committee (SSC)

In addition to the overall regional plan, residents of the Rio Puerco and Rio Jemez watersheds developed a water management plan specific to the two subregions through a contract between the MRCOG and the Cuba Soil and Water Conservation District. An independent effort, it is for the most part consistent with the Middle Rio Grande Regional Water Plan, and constitutes Chapter 12 of that document.

... the planning process is guided by the volunteer Water Assembly (WA), in partnership with the Mid-Region Council of Governments' (MRCOG) Water Resources Board (WRB).

Temporary Working Teams included the following:

Scenario Development Committees

As the planning process matured, the Water Assembly formed five Scenario Development Committees charged with using the computer model to combine various alternative actions into 'scenarios'. Members from each Constituency Group were distributed among the Scenario Development Committees. These teams created scenarios that reflect an

environmental view, an agricultural/historical view, an urban view, a 'synthesis view,' and a scenario called 'Water for the Future' that did not employ the computer model. The five scenarios were then "converged" to become the framework for the regional plan.

Public Welfare Team

An ad hoc team drafted a Public Welfare Statement for the water plan which was endorsed by the WA and the WRB. The statement is an expression of regional values, and is designed to guide decision-makers, including the State Engineer, as to what the public deems important regarding water in the Middle Rio Grande.

Recommendations Working Team

An ad-hoc team created a set of recommended actions that track with the converged scenario. These were also endorsed by the WA and the WRB.

While the broad base and loose organization of the Assembly make accurate counts difficult, the participant mailing list numbers over 3000 individuals.

Their efforts represent 30,000 person hours contributed to the water planning project.

The Mid-Region Council of Governments

Various governments and governmental entities, including municipalities, counties, conservation districts and others, affect the way in which we use water. Through the regional water planning process, local governments are developing mechanisms that will help achieve and maintain a balance between water use and renewable supply. Local governments should be encouraged to implement sustainable water resource management plans in coordination with the Water Resources Board, its Water Providers Council, and with the State Engineer, to:

- Reduce water consumption
- Minimize impact on water resources
- Encourage conservation-oriented economic development
- Ensure adequate water supplies for proposed development by considering the carrying capacity and location of development
- Integrate with other major plans in the Region

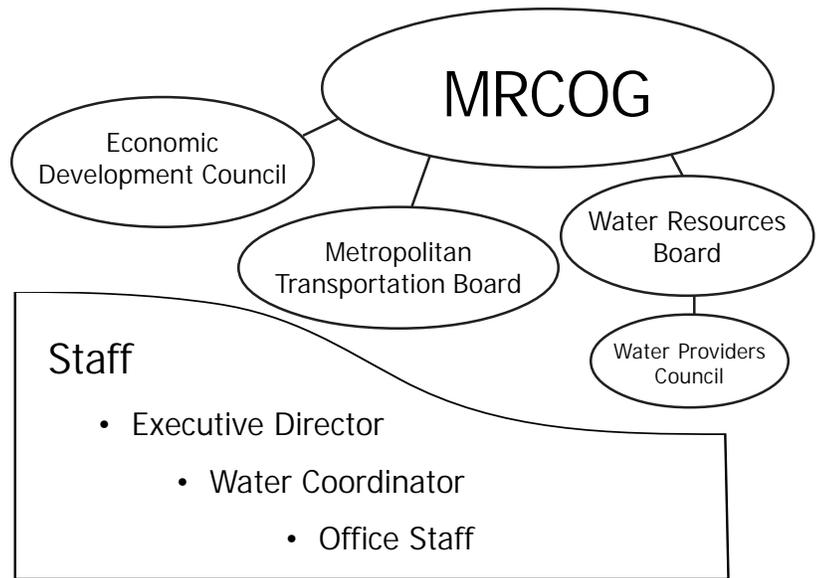


Figure 5 The Mid-Region Council of Governments Organizational Structure Relevant to the Regional Water Planning Process

The Mid-Region Council of Governments is an association of local governments that takes a regional approach to urban and rural planning in central New Mexico. The MRCOG mission is to strengthen individual communities by identifying and initiating regional planning strategies through open dialogue and collaboration between the member governments.

As Figure 5 shows, MRCOG's structure includes Special Purpose Boards, which have specific planning tasks. Pertinent to the regional water plan is the Water Resources Board (WRB). Established in 1998 to provide a decision-making process for regional water issues, the WRB is responsible for adopting and coordinating the implementation of the regional water plan. The board's members include sixteen governmental entities with jurisdiction and authority in water planning and management in the region, six tribal governments, and three ex-officio members.

The **Water Resources Board** was created to achieve the following objectives:

- To establish an intergovernmental forum for discussion and possible resolution of significant water resource issues affecting the Middle Rio Grande Water Planning Region;

- To provide for the preparation, coordination, and adoption of a regional water plan that is applicable to a diversity of jurisdictions and communities in the Middle Rio Grande Water Planning Region, and to carry out a planning process in partnership with other regional water planning organizations such as the Middle Rio Grande Water Assembly;
- To promote the voluntary coordination of individual and collective actions of local governments, tribal governments, and other water management entities in order to implement a regional water plan; and
- To make recommendations to appropriate entities for the implementation of the regional water plan.

As an adjunct to the WRB, a **Water Providers Council** was established to ensure that water rights are protected and appropriately utilized. The Water Providers Council employs a weighted voting procedure based on the nature and extent of water rights held by each of its members: those with more and/or senior water rights have more influence in decisions.

Water Management Principles Established by the WRB

The members of the MRCOG Water Resources Board, which represent these entities, have concurred on a set of principles that may lead to the establishment of consumptive water use budgets for various jurisdictions in the region. The principles are:

– Principle Policy I: Ground Water

We encourage adoption and implementation of policies that conserve use of groundwater in the Rio Grande mainstem sub-region to create a reserve to deal with drought, prevent subsidence, and mitigate other negative effects of groundwater depletion.

– Principle Policy II: Surface Water

We encourage adoption and implementation of policies that conserve use of surface water. Any additional water that is available should be stored upstream and/or returned to the aquifer using appropriate technology. This principle seeks to reduce evaporative losses.

– Principle Policy III: Designing Implementation Mechanisms

We encourage jurisdictions in the region to work together to design implementation mechanisms for the plan that are effective, fair, wise, equitable, legal and appropriate to local community concerns.

Water Board members have also agreed to establish a fair and equitable means for bringing the region's consumptive use and renewable supply into balance. Each jurisdiction should play a part in accomplishing this through incentives, publicity, ordinances, regulations, rights purchases, pricing, and other means that manage the consumptive use of water.

How to Plan

An open, inclusive and participatory process

The Middle Rio Grande Water Assembly is a volunteer organization and its planning process is therefore a public one. A key element of the Assembly’s mission has been to develop a regional water plan through an “open, inclusive and participatory process.”

The volunteer-led Assembly offered a unique opportunity for constituents in the three-county region to directly influence the Regional Water Plan. The Assembly’s strategy for encouraging broad participation has included ongoing electronic debate via an open Internet list serve, making all meetings open to the public, providing educational information and presentations to any individual or organization upon request, and hosting numerous public gatherings designed to solicit public input. More than 3000 individuals attended one or more of these gatherings, and many of them eventually contributed substantial time, energy, and talent to the planning effort.

The following is a snapshot of the activities sponsored by the Water Assembly and the Mid-Region Council of Governments.

Annual Assemblies

Every year since 1997, an Annual Assembly has been held to inform members of the public about progress on the plan. Attendees are invited to comment on the planning process and/or plan content and encouraged to participate in one or more of the Constituency Groups or Working Teams. The Annual Assembly is also the venue for Water Assembly elections.

Community Conversations

From 2000 through 2003, the Water Assembly held a series of six Community Conversations, with one to two meetings in each of the three counties. These gatherings were designed to be more intimate than the Annual Assembly and to offer rural residents a local venue for participation. Community Conversation topics included regional issues and problems; planning goals and objectives; alternative options; balancing the water budget; and preferences for actions to balance our water budget.

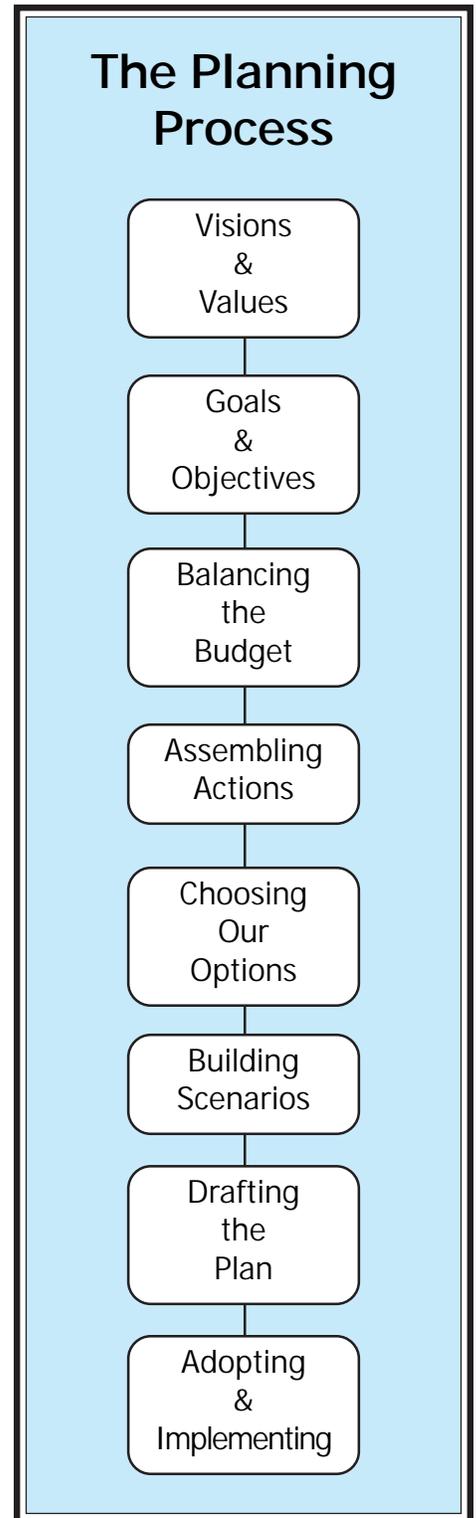


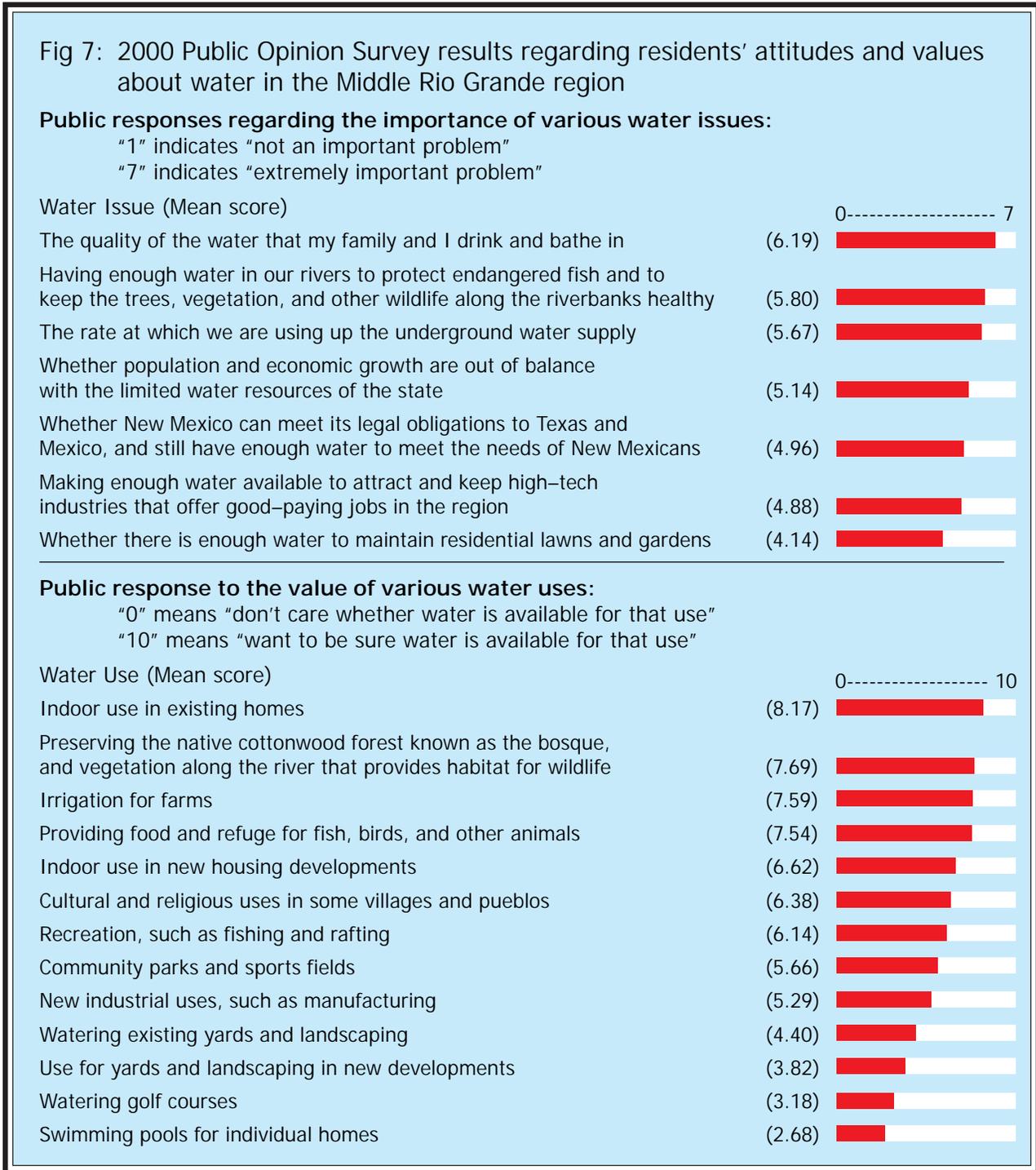
Figure 6

Regional Forums

Following the 3rd, 5th, and 6th series of Community Conversations, facilitated Regional Forums were held to refine and coordinate the feedback received from the respective Community Conversations.

Public Opinion Survey

The Institute for Public Policy at the University of New Mexico conducted a public opinion survey on water issues in the Middle Rio Grande. The results were incorporated into the overall decision process. Findings from the first survey are shown in Figure 7.



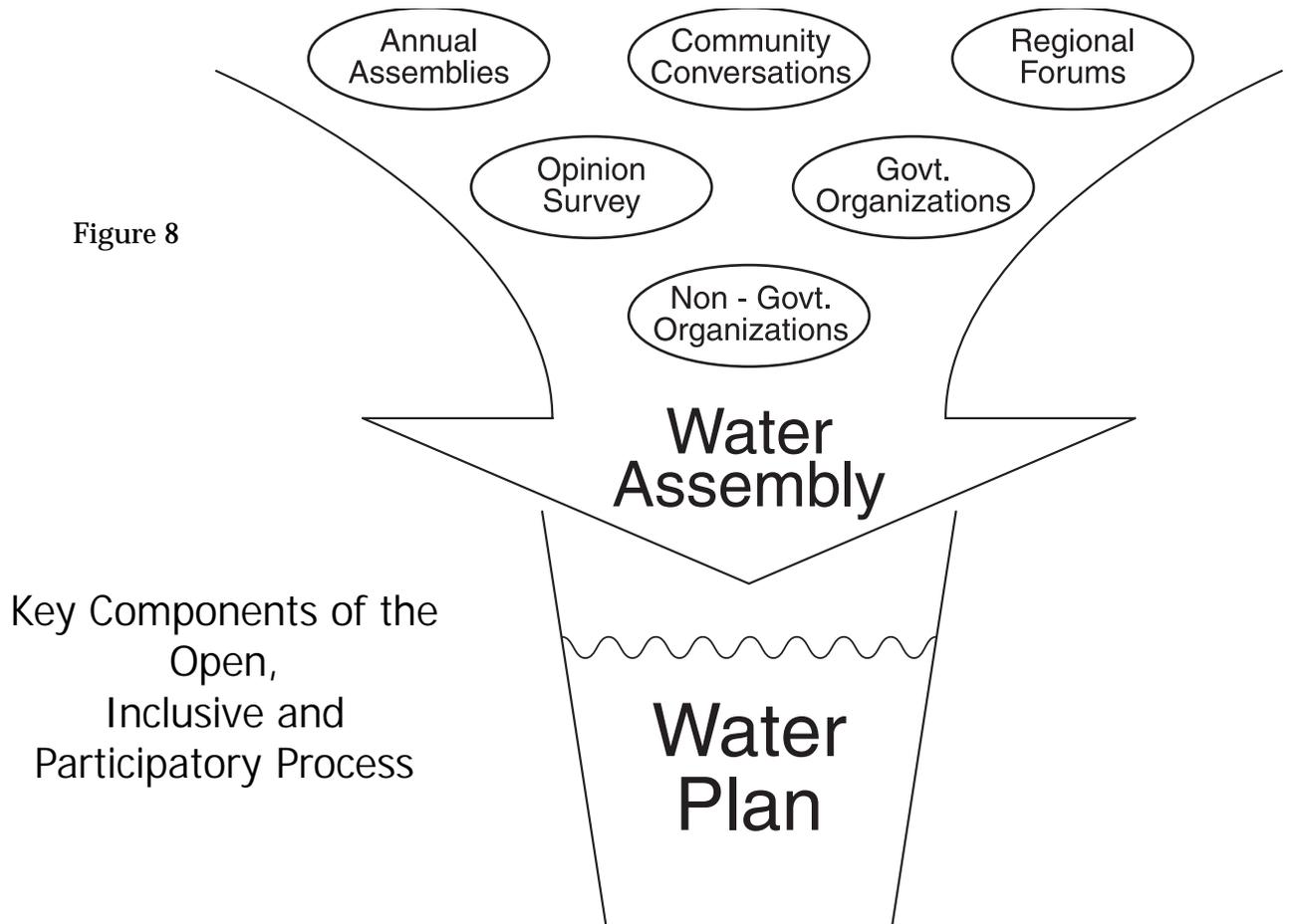
Interaction with Governmental Organizations

Water Assembly volunteers and the Mid-Region Council of Governments staff have kept elected officials, tribal organizations, and other decision-making bodies in the three-county region apprised of the planning process through formal presentations and informal communication. Additionally, the External Coordinating Working Team meets with representatives from federal and state water management agencies, and elected officials to keep them informed about the planning process, and to accept input to the plan.

A Water Assembly list serve, courtesy of the City of Albuquerque, constitutes a particularly important archive of public sentiment, and a record of the regional debate on water problems, policy and politics.

Interaction with Non-governmental Organizations

To ensure that the views of a wide variety of special interests were represented in the Middle Rio Grande Plan, Water Assembly volunteers gave presentations to non-governmental organizations upon request, and individuals active in these groups were encouraged to participate in the water planning process.



The Water Plan Mission and Goals

As a result of public input from the Community Conversations and Regional Forums along with input from WA participants and representatives from governmental entities on the WRB a mission statement and a set of goals for the Water Plan were defined. They appear in Figure 9.

Fig 9 - Middle Rio Grande Regional Water Plan Mission and Goals

Preamble:

The development and implementation of the Regional Water Plan is intended to support policies, programs and projects that meet the goals of the plan. Recognizing the limited resource and consistent overuse of the region's water, the following mission and supporting goals are established for the regional water plan.

Mission:

Balance Water Use with Renewable Supply

Goals:

Based on extensive public input, the Water Resources Board and the Water Assembly have adopted the following eleven goals to support the mission of the Middle Rio Grande water planning process:

- Ensure that the mission is fulfilled through fair, open and inclusive public planning and implementation processes
- Preserve water for a healthy native Rio Grande ecosystem
- Preserve water for the region's agricultural, cultural, and historical values
- Preserve water for economic and urban vitality
- Preserve water for the quality of life valued by residents in the region
- Develop broad public and official awareness of water facts and issues, especially the limited nature of water resources
- Conserve water
- Promote a system of water laws and processes that support the regional water plan and its implementation
- Provide appropriate water quality for each use
- Manage water demand consistent with the stated mission
- Balance growth with renewable supply (adopted by WA but not by the WRB)

Water Supply and Demand

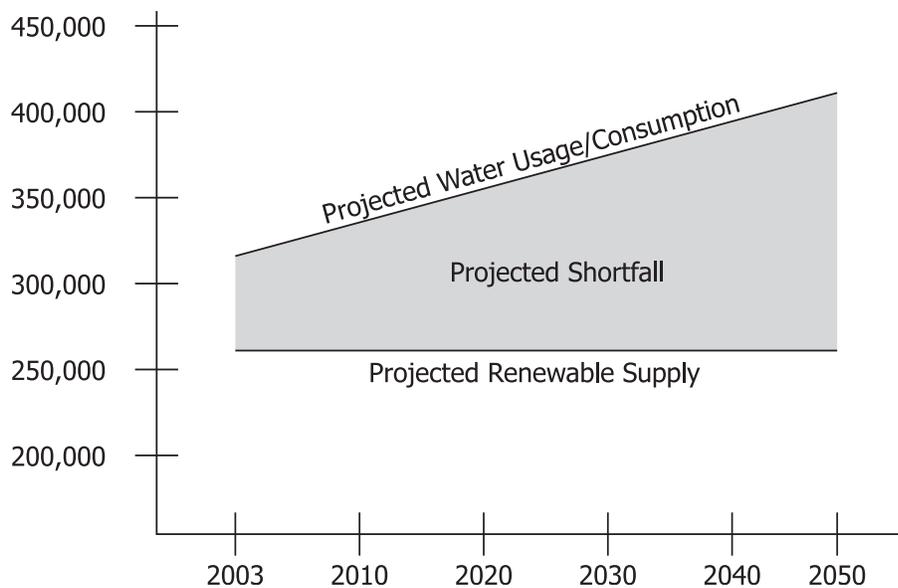
The main objective of the Regional Water Plan is to balance the demand for water with the water available to us, now and in the future. Researchers and planners do this by creating a “water budget,” which shows how much water enters a region, how much water is used within the region, and how much water leaves the region.

It is the mission of the Middle Rio Grande Regional Water Plan to balance water use with renewable supply.

In 1999, the Water Assembly published the Middle Rio Grande Water Budget, to be used in drafting the regional water plan. A group of technical experts (all Water Assembly volunteers) created the balance sheet using data drawn from a number of existing studies. The original document addressed the reach of the Rio Grande between Cochiti and Elephant Butte, but the water budget has since been adjusted to reflect only the three-county planning area. (See Figure 1 on page 1 and Figure 2 on page 5.)

The region receives water from a variety of sources, including native Rio Grande inflow, San Juan-Chama inflow (defined below), mountain front and tributary aquifer recharge, tributary inflow, and storm drain inflow. The river is further augmented by pumped ground water in the form of ‘return flows’ of treated sewage, and there is an ongoing exchange between surface water and the shallow aquifer. Water is consumed or “depleted” by domestic, industrial, municipal, agricultural, and riparian uses.

On average, the region is using 55,000 acre-feet more water each year than is renewable. The shortfall is currently being met by “mining” ground water. While there are clear limitations and consequences to continued aquifer pumping, (land subsidence, diminished water quality, water cost, river leakage, etc.,) it does make a significant contribution to the state’s ability to comply with Rio Grande Compact obligations (defined below).



Clearly, something needs to be done if we expect to be able to meet the future water needs of the region.

Figure 10

Summary of Present and Future Water Demand

Previous sections show an average deficit of 55,000 acre-feet per year, based on a consumptive use of 316,000 acre-feet per year, and a renewable supply of 261,000 acre-feet per year observed for the relatively wet period since 1975. If we take no remedial actions, our consumptive use in fifty years could balloon to 411,000 acre-feet per year—leaving us with a deficit of 150,000 acre-feet per year.

Clearly, something needs to be done if we expect to be able to meet the future water needs of the region. The Regional Water Plan provides information on how the region's water use and water supply might be adjusted to address the deficit in our water budget, as well as the constraints that face us in trying to meet this challenge.

Legal Issues

The basic tenet of water law in the West is the doctrine of prior appropriation. This doctrine has two key elements:

- The first user (appropriator) in time has first right to the water.
- The first user retains that right as long as the water is put to beneficial use.

Beneficial use means the water is applied to a lawful purpose that is useful to the appropriator, and is consistent with the public interest.

New Mexico statutes govern water usage in the state. The statutes' stated purpose is the "conservation, protection, and development of public waters of the state and their application to beneficial use." The Office of the State Engineer (OSE) manages water rights in New Mexico and has the authority to issue permits recognizing a user's right to surface or ground water. The State Engineer can issue compliance orders, and can penalize individuals or entities for overuse, or for using water to which they are not entitled. Water rights can be inherited,

and may be transferred (or sold) to another party (without losing priority of right) who intends to put the water to beneficial use. Water right transfers are subject to certain conditions. A transfer may change the point of diversion or purpose of use of the water, but any change must be "without

The first user has first right and will retain that right as long as the water is put to beneficial use.

detriment to existing water rights" (non-impairment), "not contrary to the conservation of water" and "not detrimental to the public welfare of the state." Water may be temporarily leased from a water right holder.

The State Engineer has authority over ground water uses after a source has been declared to have "reasonably ascertainable" boundaries. This is done one basin at a time, so the date that marks the beginning of the State Engineer's authority is different for each basin. In the Middle Rio Grande region, the underground basin was declared in 1956.

In considering application related to water use, the State Engineer must examine whether the new use will impair existing water rights, and whether it is contrary to the conservation of water in the state, or to public welfare.

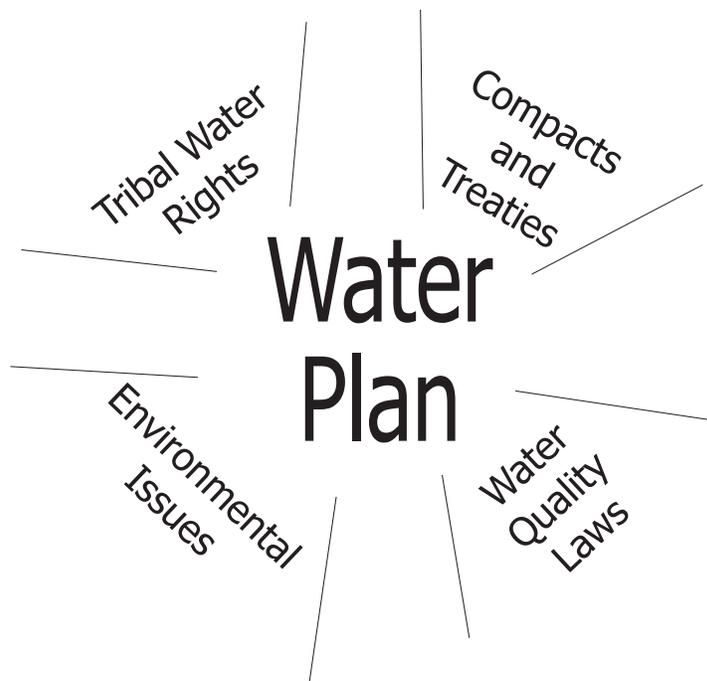


Figure 11

Tribal Water Rights

Because of their unique political status in the United States, New Mexico's pueblos have several different types of water rights. Though most of these have not been quantified or adjudicated, their priority dates supersede the priority dates of all other water rights in the state. Tribal water rights may affect other rights and uses once they are quantified and declared by a court of law.

Tribal Rights supersede all others, but many have not yet been adjudicated nor has their impact been determined.

Compacts and Treaties

New Mexico has entered into a number of binding water agreements, or "compacts," with neighboring states. These compacts govern New Mexico's use of the Rio Grande and other rivers. The compacts determine the amount of river water that New Mexico is entitled to use and the amount the state must pass along to other states.

The Rio Grande Compact dictates how Rio Grande water is distributed among the states of Colorado, New Mexico, and Texas. As Colorado developed in the late 19th century, it began to deplete river flow downstream. To address this issue, a commission was formed in 1923 to study the water supply, and to draft an agreement to equitably divide water among the three states. Signed in 1929 and re-approved in 1938, the Rio Grande Compact is administered by a commission of one representative from each state, and chaired by a non-voting representative of the United States, appointed by the President. The Compact does not account for the entitlements of tribes and pueblos.

The Rio Grande Compact dictates how Rio Grande water is distributed among the states of Colorado, New Mexico, and Texas.

Rio Grande Compact delivery requirements are determined annually, based on the flow past designated gage stations in Colorado and New Mexico. Both upstream states can accumulate debits and credits for under or over delivery of water. A debit greater than 200,000 acre-feet inhibits New Mexico's ability to store water in certain reservoirs, but the state cannot accrue a debit of more than 150,000 acre-feet in a single year.

Another water agreement with particular importance for the Middle Rio Grande is the Upper Colorado River Basin Compact. New Mexico was apportioned 11.25% of the flows of the Upper Colorado because two Colorado tributaries—the San Juan and Animas Rivers—drain the northwestern portion of the state. Water is imported annually from the San Juan River into the Rio Grande Basin by the San Juan-Chama Project as part of New Mexico's entitlement under the Upper Colorado River Compact. This water is stored in Heron Reservoir on the Rio Chama. The Upper

Colorado River Basin Compact governs its use, and it is accounted for as distinct from native Rio Grande flows. The imported water must be fully consumed within the state, and cannot be used to meet Rio Grande Compact deliveries.

In addition to these compacts, New Mexico's obligations under two international treaties also affect water use in the Middle Rio Grande. One, the Treaty of Guadalupe Hidalgo, recognizes existing rights on lands acquired from Mexico, and another requires the United States to deliver 60,000 acre-feet of Rio Grande water to Mexico each year.

Environmental Issues

The Middle Rio Grande is home to not only people, but also to a diversity of plants and animals. It parallels a major flyway for migrating waterfowl and songbirds, and contains the largest remaining example of riparian cottonwood forest, known locally as the bosque. Human communities have prospered here, but there have been consequences for the natural river system. Surface water diversions and groundwater pumping have diminished river flow; dams have altered seasonal flooding and flow patterns, and divided the river into disconnected segments; levees protect human property at the expense of a narrowed floodplain, and 80% of the regions natural wetlands have been drained. At the same time, the routine discharge of effluent to ground and surface waters, the mishandling of waste materials, and the increase of pollutants in stormwater runoff have degraded water quality.

These changes have diminished the number of native species and the size of some remaining populations that depend on the Rio Grande. Any action that impacts the river is therefore subject to federal and state legal requirements pertaining to species protection and water quality.

Endangered Species

Portions of the Rio Grande between Cochiti and Elephant Butte have been designated critical habitat for the endangered Rio Grande silvery minnow. Some reaches of the river also provide habitat for the endangered southwest willow flycatcher. Unless Congress overrides the application of the Endangered Species Act in the Rio Grande, any action that affects designated species or their critical habitats must involve the federal agencies.

Water Quality Laws

There are numerous federal, state and tribal laws that address water quality and so have an impact on water planning efforts. These include the Clean Water Act; the Safe Drinking Water Act; the Resource Conservation and Recovery Act; the Comprehensive Environmental Response, Compensation, and Liability Act; state-level Groundwater Standards and Regulations; the Aquifer Storage and Recovery Act; and surface water quality standards adopted by several of the region's pueblos.

Balancing the Budget

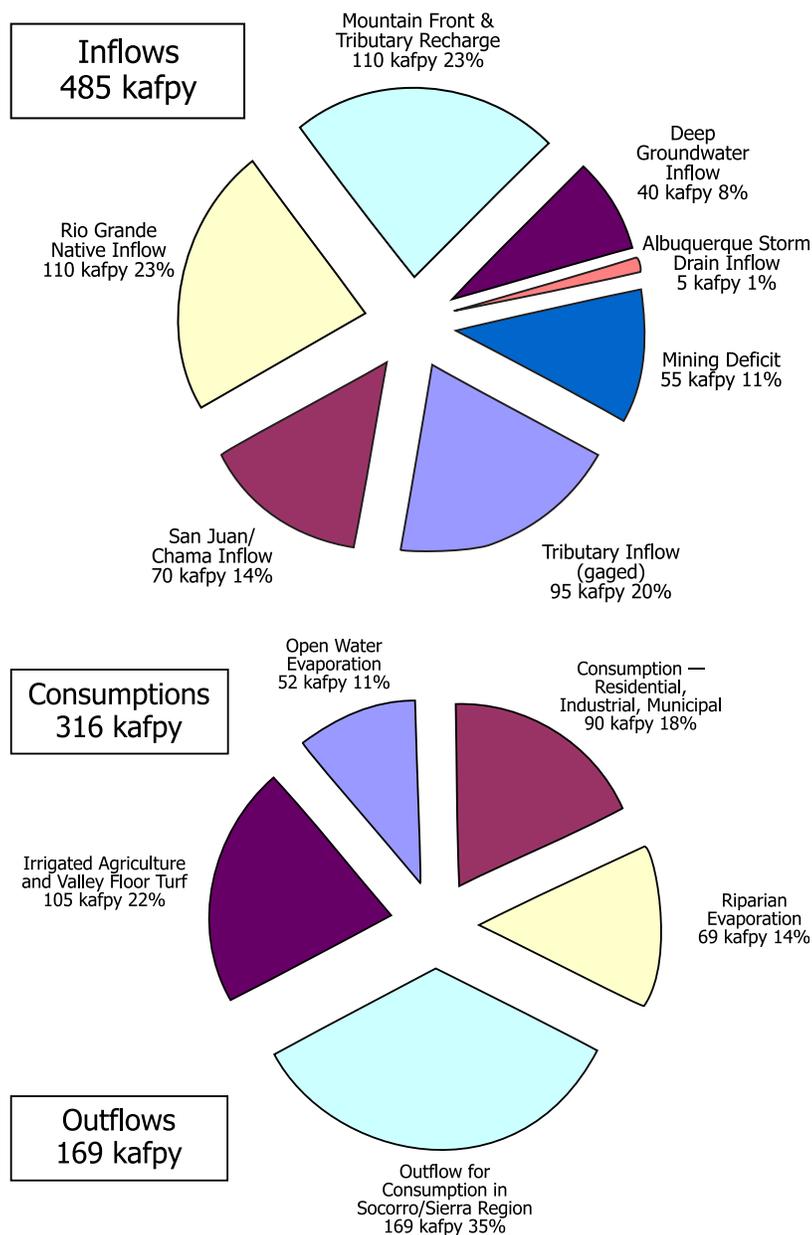
In 2001 and 2002, the Water Assembly conducted a Water Balancing Exercise to see if the region's water budget could be balanced by the year 2050. Constituency Groups were given a set of baseline numbers assembled from the best available data, and were asked to set targets for each water use sector based on the group's values. Attendees at the 4th Community Conversation in March, 2002, were asked to try their hand at balancing the water budget, too. The exercise helped both planners and public understand the tradeoffs that will be necessary if the region's future water needs are to be met.

Key Baseline Data

Using research from several sources, the Analysis Team created baseline numbers for current water use and for use in 2050 under a 'no change' scenario. Key numbers include:

- Groundwater mining at 55,000 acre-feet per year
- Current irrigated acres at 50,000 acres
- Future irrigated acres at 36,000 acres
- 23,000 acres in riparian acreage
- 23,000 acres in riparian acreage in 50 years
- 64% of 90,000 acre-feet per year for consumed ground water granted to domestic uses
- 36% of 90,000 acre-feet per year for consumed ground water granted to office, business, commercial, and industrial uses
- Population estimated to grow at about 1.5% per year
- Job growth estimated to grow at about 1.5% per year

Figure 12



Data relative to the three county region; averages for last quarter of the twentieth century. Water delivered to Elephant Butte Reservoir has been excluded from both inflows and outflows.

Details about the data sources and the decision making process for agreeing on these baseline data are available in the full Regional Water Plan.

The Exercise

Along with the baseline data, each Constituency Group received detailed instructions, including the following points taken from the Middle Rio Grande Water Supply Study (Papadopoulos 2000):

- On average, *the present water supply is barely adequate* (including San Juan-Chama Project water and groundwater withdrawals) to meet present demands in the Middle Rio Grande region.
- *The water supply is highly variable*, due to the high variability in Otowi inflow and the high variability in evaporation from Elephant Butte Reservoir.
- Given the variability of water budget terms, Rio Grande Compact *debit conditions are expected to occur nearly as frequently as credit conditions*.
- *Under conditions of increased water use in any sector, a reduction of water use from other sectors is required to maintain an overall water supply balance, and to avoid increasing the likelihood of incurring Rio Grande Compact debits.*
- The groundwater supply is not an independent, disconnected water supply. *Use of groundwater results in diminished flows of the Rio Grande* that will occur in the present and continue into the future.
- The location of groundwater well fields affects short-term timing of impacts to the river; however, *regardless of location, the impacts of groundwater pumping eventually reach the river and require offset.*
- *Recharge of groundwater from the stream system reduces the flow of the Rio Grande* available to meet obligations under the Rio Grande Compact and other uses.
- *The water supply from Otowi to Elephant Butte is essentially a single supply*; water use in every sub-region of the Middle Rio Grande affects the water available to the entire region.
- *The water supply is only depleted by consumptive use*; reductions in diversions and return flows resulting in better delivery efficiency do not necessarily increase the water supply.

...regardless of location, the impacts of groundwater pumping eventually reach the river...

"In summary, the water supply... is marked by limitation and variability... successful water planning [will recognize] ... these concepts."

Following are a few definitions pertinent to the balancing process:

- Consumptive use is the water removed from the system as in evaporation or evapotranspiration.
- Diversion is the redirection of water from a natural system by means of a man-made structure.
- Return flow is water returned to the source after having been diverted for beneficial use.

With this information, the Constituency Groups worked to balance the water budget by 2050.

To aid in balancing their water budgets, the Constituency Groups had at their disposal a computer software program developed by a Sandia National Laboratories' modeling team. The program was an attempt to represent the balance among categories of inflow and use, to indicate how increases or decreases in water use in various sectors might affect the overall water budget. The mini-model was also a vehicle for presenting the concept of water balancing at community conversations and other forums, affording members of the public a chance to try their skills at balancing the regional water budget.

Exercise Conclusions

The Water Balancing Exercise was intended as a first step toward balancing the budget, and it showed just how difficult that task might be, given constraints present in the region. It suggested that a balanced budget can be obtained in different ways, depending on the values applied to the process. The exercise also highlighted how useful a water management model can be, since the implications of reducing water use in various sectors can be seen immediately.

Overall, the exercise did not create a single set of numbers by sector; rather, each approach presented an alternative vision of how to tackle the problem. Despite the differences in approach, the results of each did reveal a surprising similarity in the percentage of their water budget they devoted to each sector. Figure 13 shows how similar the range of change was among groups for all sectors.

The various Constituencies came to similar conclusions.

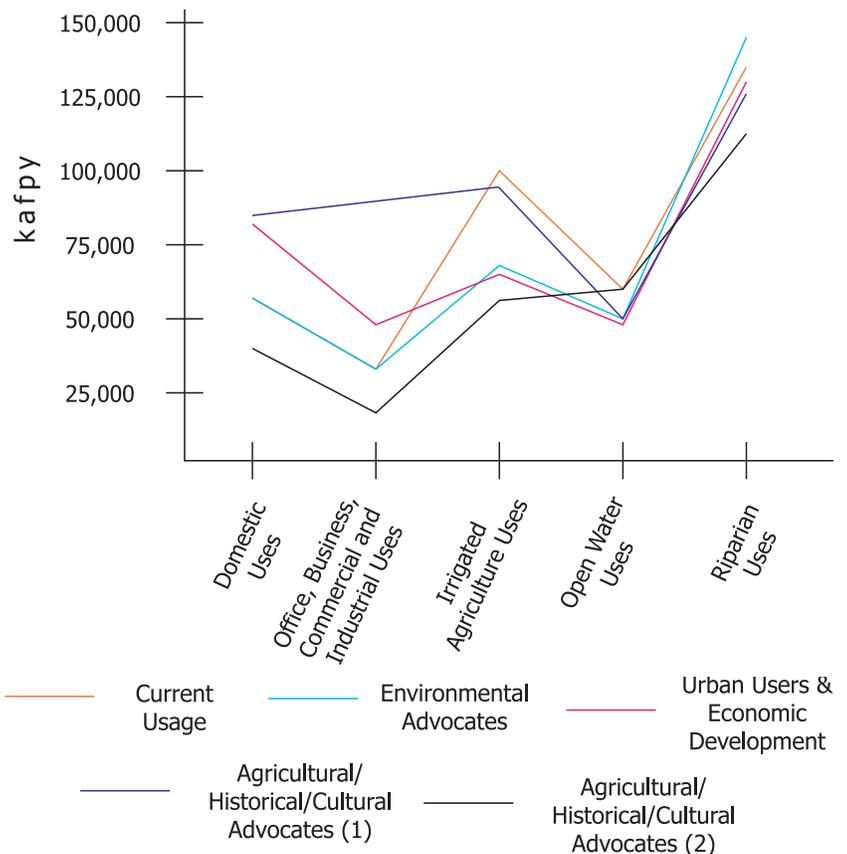


Figure 13

Alternative Actions

At a variety of public meetings and workshops over a two-year period, the Water Assembly asked members of the public, technical experts, and water managers to suggest alternative actions that could or should be included in the plan to reduce water consumption in the region, use our water resources more efficiently, and develop new sources of water. This process generated two hundred and seventy-three alternatives. The Alternatives Working Group screened these initial proposals to eliminate duplication, and to consolidate them into a smaller number of alternative actions. The resulting list of forty-four alternative actions was then analyzed in terms of feasibility and popularity. For organizational purposes, the alternative actions were classified into seven broad categories:

- Increase water supply
- Decrease or regulate water demand
- Change water use
- Water rights regulation
- Water quality protection
- Implementation of the water plan
- Funding

The list was presented to the general public in September 2002, and at a series of Community Conversations held that month, attendees were asked to select the most preferred and least preferred alternatives.

In October 2002, the Mid-Region Council of Governments hired a consultant to provide detailed feasibility analyses and prepare fact sheets on twenty-five of the alternatives. The large number of alternatives, combined with limited funding, precluded conducting detailed analyses on all forty-four. Consequently, the Alternatives Working Group and the Analysis Team (both of which include technical experts as members) conducted a preliminary review of the entire list of alternatives and identified the twenty-five that were the most complex. Each alternative was analyzed for how much it might cost, how much water might be saved or demand reduced, how much time it would take to implement, and what were some of the key tradeoffs. The contractor evaluated the twenty-five alternative actions on the basis of technical (*i.e.*, physical, hydrological, and environmental), economic, legal, and social/cultural feasibility analysis. Using a less intensive, qualitative approach, the Alternatives Working Group evaluated and prepared fact sheets on the remaining nineteen alternatives. The contractor then provided a feasibility rating for all forty-four alternatives.

Scenario Development

The ranked alternatives were then used to construct a number of scenarios. Scenarios are descriptions of possible futures. They attempt to identify different assumptions about how current trends will unfold, how critical actions may play out, and what additional factors may 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 for 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 are descriptive, written narratives (qualitative scenarios), and tables and figures incorporating numerical data, often generated by sophisticated computer models (quantitative scenarios).

Water Assembly volunteers established Scenario Development Committees (SDCs) to develop draft scenarios that encompassed three key goals of the overall planning project:

- Preserve water for a healthy native Rio Grande ecosystem
- Preserve water for the region's agricultural, cultural, and historical values
- Preserve water for economic and urban vitality

The SDCs subsequently built the following initial scenarios that were later merged into the Preferred Scenario:

- an environmentally-oriented scenario
- an agriculturally-oriented scenario
- an urban-oriented scenario
- a blended scenario (*based on a synthesis of the Constituency Group water budgets and visions*)
- a non-modeled scenario called "Water for the Future"

Each SDC used information provided by its relevant constituency group, including the groups' vision statement and water balancing exercise. These four SDCs used the computer model as an aid in balancing the budget.

A fifth SDC developed a non-modeled scenario called "Water for the Future," as a challenge to others to (1) assume the current "drought" is normal, (2) cease mining the aquifer immediately, (3) include water quality as a consideration, (4) refuse to violate the Rio Grande Compact, and (5) to manage land use and water use together.

The scenarios were presented to the public during Community Conversations in the summer of 2003.

The Preferred Scenario

After receiving public input at Community Conversation sessions, the SDCs worked to merge the five scenarios into a single “Converged Scenario”. This vision of the future was presented to the public for comment during a Regional Forum in 2003. Following up on that public comment, the WA and the WRB worked in collaboration to improve the Converged Scenario into a “Preferred Scenario”. The Preferred Scenario was then used as a basis to establish the Recommendations of the Plan (see figure at right).

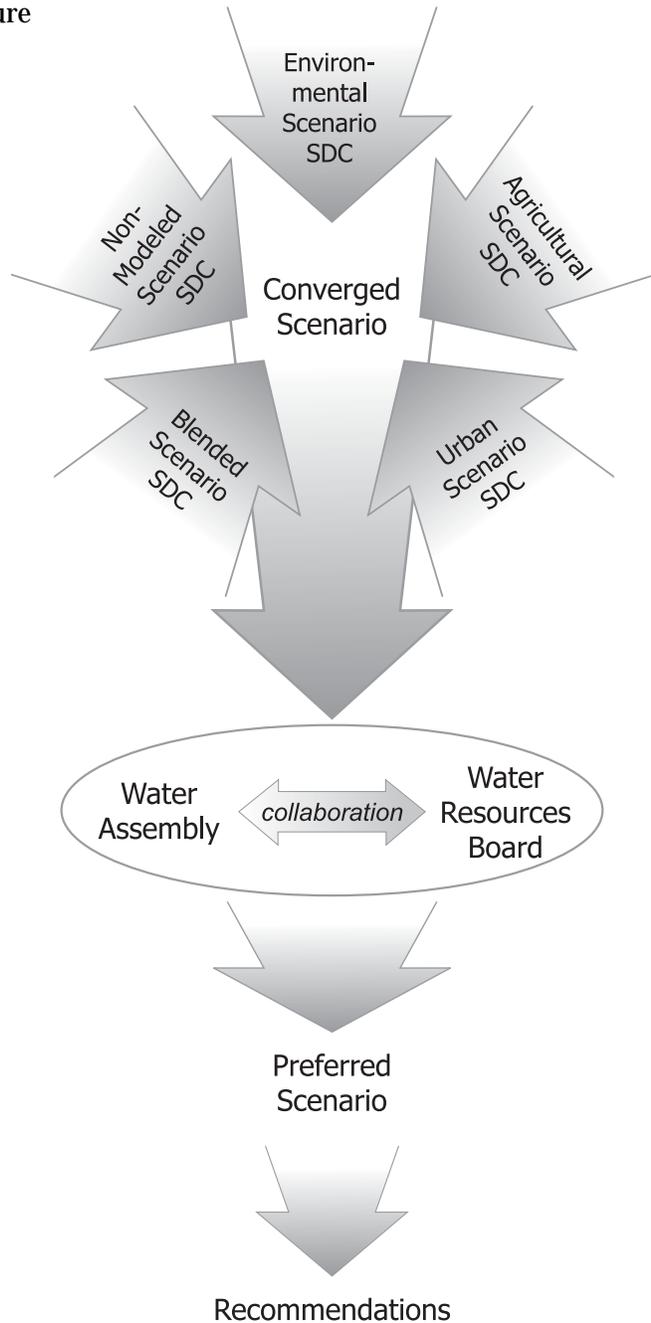


Figure 14

Public Welfare

Below is the text of a public welfare statement that was developed for the Region. A requirement of the Regional Water Planning Handbook, the Public Welfare statement is designed to provide guidance to the State Engineer regarding transfer applications and new appropriations of water that affect the Middle Rio Grande Region. Though the State Engineer is obligated to assess possible impairment to existing rights and contrariness to water conservation and public welfare when considering water transfers and applications, no definition of public welfare has been provided by statute. Instead, regional water plans serve as a means for defining 'public welfare' locally. The adoption of a statement that is genuinely representative of regional public welfare is an arduous and heartfelt process, and it succeeds only if future conflicts over water are reduced, and if water transfer decisions reflect the long-term needs of the region as a whole. Neither must it be a static declaration, for there are unknown perspectives and unknown users that will require a voice in the future. Instead, the definition of public welfare is iterative and evolving, and should be monitored continuously by the public itself.

...no definition of public welfare has been provided by statute... the adoption of a statement that is genuinely representative of regional public welfare is an arduous and heartfelt process.

The Public Welfare statement presented on the next two pages has four parts, all equally important:

- Introduction
 - General Statement
 - Water Transfer Process
 - Public Welfare Principles and Considerations
-

Introduction

This public welfare statement is part of the Regional Water Plan and is presented to provide guidance to the State Engineer in decisions concerning applications for transfer and new appropriations of water rights that affect the Middle Rio Grande Region as required in the Regional Water Planning Handbook. This public welfare statement will accomplish its purpose if conflicts are reduced in the region, and if decisions reflect the long-term future needs of the region, 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 region which need to be appreciated and fairly balanced to ensure the overall safety, security and well-being for the region. Such values include cultural, economic, environmental and hydrologic viability for the region. 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 to keep as many options as possible open for future generations.

Water Transfer 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 other 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. Public review must be a part of the State Engineer’s decision-making process. 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. Bona fide reduction in wet water use at the source site must match the transferred water right. When considering water rights, the State Engineer should respect an individual’s right to use, lease, sell or transfer that right, to the extent consistent with Public Welfare as defined herein.

Public Welfare Principles and Considerations

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

1. Maintain, improve, and where possible, increase the quality and quantity of the region’s water resources.
2. Promote conservation and reuse of the region’s water resources.
3. Encourage efficient use of the region’s water resources.

The State Engineer should consider the diversity of water demands and factors 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 needs.

- 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 recognize that the Middle Rio Grande Region is a vital part of the New Mexico economy. Agreements and transfers of water rights should result in long-term economic benefit to the region and the state as a whole.
- When considering agricultural interests, the State Engineer should strive to sustain a vibrant and efficient agricultural system, recognizing that agriculture has economic, ecological, 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 and cultural interests, the State Engineer should protect water uses which support the diversity of cultures and traditions existing in our region. In particular, the sovereignty of tribal nations and pueblos must continue to be recognized. In addition, 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, the State Engineer should encourage low consumptive rather than new consumptive recreational uses.
- 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 consider local land use plans and decisions.

Middle Rio Grande Regional Water Plan 2000-2050

Plan Recommendations

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Introduction

This section recommends specific actions that the general public, state and local governments and water management agencies could take to meet the water plan's goals and objectives. These recommendations were derived from the list of alternative actions and the preferred scenario described in a previous section. The order of the individual recommendations aligns with the order presented in the preferred scenario, and in no way suggests any hierarchy of preference.

The recommendations in this section have been taken from technical analysis, modeling and the judgment of various participants in the process.

Assumptions

Regional Inflows and Rainfall

In summary, two predictions are considered: The "recent historical prediction" is based upon the average inflows and precipitation for the last half of the twentieth century. The "tree ring prediction" is taken to be about 94% of the recent historical prediction. For drought planning, a ten year period was used with inflows about 89% of the above two prediction levels.

Population Projections

In summary, population growth was modeled to match the estimates from the UNM Bureau of Business and Economic Research. (BBER 2002)

Imported San Juan / Chama Water

In summary, it was assumed that the entire contracted amounts of imported San Juan / Chama water (after transit losses) will be available, will come into the region, and will be diverted to contractors starting in 2006. It is understood that even though the plan assumes the full San Juan / Chama Project allotment, there is a possibility that it will not be received every year.

*"The Key Fact About Our Water -
Demand Exceeds Supply"
(OSE/ISC 2002)*

Urgent Shortfall Reality

The initial implementation schedule for the Preferred Scenario may leave a Rio Grande Compact delivery shortfall for ten to twenty years. We need to accelerate implementation of the water planning actions. We need to eliminate the predicted short-term deficits in our compliance with the Rio Grande Compact until the other measures in this plan have had time to take effect. All users must share in the substantial contributions to the effort. The state and the region should work openly and cooperatively to address this issue.

Specific urgent actions should be identified, studied, evaluated, and implemented that are focused on avoiding defaulting on the Rio Grande Compact. These actions will have urban and rural economic impacts, but such impacts should be temporary. Unless there is a priority call, water-rights holders must be fairly compensated for the temporary loss of use rights when water is reallocated to meet compact delivery requirements. All necessary actions should be taken to ensure that water necessary to meet the shortfall is acquired. In doing so, the acquisition of water should not be limited to any one primary source or sector.

Considerations in achieving a balanced plan of action should include accelerated bosque and riparian restoration, a method for performing priority administration in advance of adjudication, a residential conservation program, a municipal and industrial conservation program, an agricultural conservation program, reduction in urban pumping, state leasing of urban water, state leasing of agricultural water, increase in upstream instead of downstream storage of water, and a moratorium on new authorizations of consumptive use.

Need for Balanced Decisions During Water Shortages

With the advent of ground-water pumping, consumptive uses have been temporarily insulated from the effects of water shortage. We now know that surface and ground water are linked, each affecting the other. No one usage should be insulated from water shortages. In balancing decisions during water shortages, additional considerations should include senior rights priorities, and the ability of each individual to absorb additional conservation while recognizing historic uses and community values.

Detailed Recommendations

The increase in demand for water is an ongoing phenomenon. This section recommends specific actions to meet the region's future demands. State and local governments, water management agencies and water users should implement these in order to align with this plan's goals and objectives.

These recommendations were derived from individual alternative actions and the Preferred Scenario, and can be traced back to suggestions from the public as well as experts in their respective fields. The recommendations in this section have been taken from technical analysis, modeling and the judgment of various participants in the process.

This document contains a total of 43 recommendations that are grouped into 9 different categories. Each category has been given a designation (R1, R2, etc.) and then each recommendation is similarly numbered so they can be easily referenced (R1-1, R3-1, etc.)

- Urban and Rural Conservation Activities (9 recommendations – category R1)
- Water Resources Planning and Management (12 recommendations – category R2)
- Water Monitoring and Measurement (1 recommendation – category R3)
- Agriculture (5 recommendations – category R4)
- Water Quality (3 recommendations – category R5)
- Bosque and Other Riparian Habitats (4 recommendations – category R6)
- Water Storage to Reduce Evaporative Losses (4 recommendations – category R7)
- Desalination (3 recommendations – category R8)
- Public Education (2 recommendations – category R9)

Urban and Rural Conservation Activities (R1) *(9 Recommendations)*

In these recommendations, separate policies are needed for residential, industrial, municipal, institutional and commercial uses. Recommendations R1-4, R1-5, and R1-7 within this category serve to protect the aquifers at the cost of making Rio Grande Compact deliveries more problematic.

Establish a Domestic Well Policy *(R1-1)*

The region is seen to be significantly increasing its draw upon water resources in many areas due to the installation of new domestic wells and their associated consumptions. The State Engineer should establish a policy to reduce pumping from domestic wells and restrict drilling of domestic wells where surface waters or the aquifer could be impaired.

Outdoor Conservation Programs *(R1-2)*

Most of the urban and suburban consumptive use of water comes from outdoor uses, particularly lawns and trees. This recommendation is for local governments to implement incentive, regulatory, and/or public education policies so as to reduce high-

water use landscaping and convert to xeriscaping to the greatest extent possible. It is recommended that existing programs are strengthened and that new programs broaden the geographical coverage so as to meet the target percentages provided in the Preferred Scenario in residential, municipal, industrial, commercial and institutional uses across the region.

Rainwater Harvesting (R1-3)

Most of the urban and suburban consumptive use of water comes from outdoor uses, particularly lawns and trees. This recommendation is for local governments to implement incentive, public education and/or, if deemed appropriate, regulatory policies to encourage rainwater harvesting to achieve the scenario targets.

Conversion to Low Flow Appliances (R1-4)

High flow appliances contribute to unnecessary use of water. Local governments should implement incentive, public education and/or, if deemed appropriate, regulatory policies so as to encourage all construction, new and old, to utilize effective low flow appliances such as toilets, clothes washing machines, dishwashing machines, showers, automatic shutoff faucets, and broken sprinkler cutoffs. This recommendation should be converted from the current casual to a highly vigorous campaign in residential, municipal, industrial, commercial and institutional uses across the region.

Urban Water Pricing (R1-5)

The plan recommends that jurisdictions examine a variety of water pricing mechanisms and adopt those that are most effective at conserving water.

Greywater Reuse (R1-6)

“Greywater” is water from showers and washing machines for use in outdoor plantings. It does not include toilet water or water from kitchen sinks. Funding technical and educational activities to promote safe and effective greywater reuse should also be considered.

Municipal and industrial (M&I) use of greywater should be encouraged. Installation of dual piping may be appropriate for new M&I construction. Incentives should be provided to retrofit existing M&I to greywater reuse where the quantities are sufficiently large.

Treated Effluent Re-use (R1-7)

Treated effluent reuse does not necessarily result in less overall system water consumption. However, it does result in less ground-water withdrawal. Because every utility system is different, each reuse option should be studied to correctly analyze reuse potential in terms of technical feasibility, conservation benefits and legal implications.

It is recommended that treated effluent in urban areas be reused where safe and practical, especially in new construction where it can more easily be implemented. Dual

pipings should be installed where practical in new construction to facilitate this use.

Growth of Parks and Golf Courses (R1-8)

It is recommended that technologies be applied to achieve an 80% reduction in the current growth rate of water use in parks and golf courses.

Recognize Urban and Economic Vitality in the Region (Goal D) (R1-9)

This planning region is defined in terms of it being the largest urban population center in New Mexico and being a major center of current and future economic development in the State as well. Urban life and vitality has a long and proud history in the State and has grown up alongside our agricultural tradition becoming a successful and vibrant part of the regional and New Mexican lifestyle and experience. For instance, the City of Albuquerque was founded in 1706.

Today the regional and state economy are primarily a function of its urban areas and maintaining and expanding the urban economy contributes to the quality of life in the region and the State. Providing economic opportunities for the existing and future populations is vital to this region and protecting existing and future water supplies for this purpose provides benefits for the region and the State as a whole. It is important to the region and the State to ensure that municipalities have adequate existing and future water supplies. Some of the key realities that shape urban, municipal and industrial water use in the region are:

- Municipalities in our region provide significant economic overall benefit to the region and to the State.
- Urban areas provide employment opportunities for the existing and future populations.
- While municipalities in the region are meeting today's water demands via the aquifer, transitioning to renewable supplies meets the mission of this water plan and maintains the quality of life in the region.

Water Resources Planning and Management (R-2) (12 Recommendations)

Adjudication and Water Rights Settlement (R2-1)

Identifying, quantifying and prioritizing water rights are paramount to better water management. Currently, the State Engineer uses the process of adjudication to accomplish this. It is recommended that this process be utilized in the region unless a more expedient, equitable, and less costly process is created. Alternative dispute resolution should be considered as an option. Furthermore, this plan recommends that the legislature appropriate and the State Engineer direct sufficient funds to prepare the necessary information, including hydrographic surveys, to identify, quantify and resolve priority ownership rights.

Conjunctive Use Management

(R2-2)

Ground water and surface water are two parts of the same system in the Middle Rio Grande Region; each interacts with and markedly affects the other. For water resources in such a system to be managed effectively, they must be managed together, that is, “conjunctively.” New Mexico is presently unable to conjunctively manage its ground and surface waters effectively because of state laws that are mutually incompatible and that have led to overdrafts that greatly exceed sustainability.

Some of the main impediments to good conjunctive-use management are: junior ground-water rights that intercept and draw the flow of ground water away from nearby rivers, thereby impairing older surface-water rights; uncontrolled domestic well development in some local high density areas; inability to strictly apply the priority system; and woefully inadequate requirements for metering and reporting water diversions.

This plan recommends strengthening conjunctive-use management by encouraging the state legislature to define state water management aims and by directly addressing aspects of New Mexico water law that now prevent conjunctive management of our ground and surface waters. What are needed at the most fundamental level are four things. First, the state should decide the fate of the priority system — including whether and how it should be modified. Second, the state should decide how to make the management of ground water and surface-water rights mutually consistent, and consistent with how water-right priorities are to apply. Third, it should decide what transitional adjustments will be needed to phase in any changes in a fair and equitable manner from our present unbalanced system. Fourth, it should provide clear guidance to its water officers, especially the State Engineer, on the philosophy and principles that are to govern administration of this state’s water affairs.

Funding Source for Water Activities

(R2-3)

In order to have a reliable funding source for water projects, planning and conservation, a dedicated and reliable recurring revenue stream augmented with federal funds needs to be established. The state is seen as the most appropriate level of authority to impose such a revenue source and to manage the proceeds for the benefit of the state and for the region.

Elephant Butte Loss Accounting

(R2-4)

The Office of the State Engineer and Interstate Stream Commission (ISC) should assure that evaporative losses from Elephant Butte Reservoir are apportioned fairly between the two water-planning regions, Socorro-Sierra and Middle Rio Grande. Spring 2004 information from the ISC indicates that the compact has already apportioned the waters of the basin; evaporative losses are considered neither an asset nor a liability. Therefore, this does not seem to be a viable option

Active Administration

(R2-5)

The plan encourages active administration by ISC. The State Engineer should establish an improved enforcement program to ensure that only the necessary and allowable water is drawn for municipal uses, agriculture, and other uses.

In addition, the region is increasing its draw upon water by transferring the rights from one point to another, and then continuing to consume water at the location from which the water rights were transferred. It is recommended that a program be instituted for enforcing water retirements after transfers (both permanent and temporary). It is particularly important that land whose water rights have been retired, transferred or leased not continue to use part or all wet water to which it had been previously entitled.

Water Resource Database

(R2-6)

A regional water resource database needs to be established and maintained within the region and made accessible to all interested parties. This regional data and information can be available as a basis for historical trend analysis, current conditions profile, and future projections of water supply and demand. Currently, the data applicable to this region is maintained by a number of agencies and may not be suitable for centralized accumulation and storage. It is recommended that a regional compilation of data could be achieved through a cooperative networking process with a directory of source locations and other necessary references for retrieving the data.

Technical studies calculating inflows, consumptive uses, and interaction between ground water and surface water in the region still contain uncertainties. While within reasonable ranges of each other, different studies yield somewhat different numbers. It is also recommended that further studies be conducted to enhance the credibility of the results and recommendations of this water plan, to help appraise the success in solving the region's water problems, and to guide the region to improve remedial actions.

On an operational basis, most of the larger public water supply, flood control, and irrigation system entities in the planning region already employ a geographic information system (GIS) as part of their overall system management practices. It is further recommended that use of GIS data be expanded and coordinated by establishing an integrated water use and water budget database and be compiled into a regional database organized according to standards that would allow for ready exchange of information. The data should include, but not be limited to: surface water gauging, ground water levels, public water supply, irrigation flows and returns, domestic wells, flood, and water quality data. This data can be available for historical trend analysis, current conditions profile, and future projections of water supply and demand.

All of the databases and GIS should be integrated and be usable by different agencies and in different plans.

Watershed Management Plans

(R2-7)

The preservation and management of water resources must be conducted on a regional basis of watersheds and geologic basins. It is recommended that specific watershed management plans should be established in the Middle Rio Grande planning region to achieve common objectives such as: increasing water yield; reducing storm water runoff and preventing soil erosion; improving woodland and rangeland health; increasing infiltration and protecting aquifer recharge zones, and ensuring water quality protection from non-point source pollution. However, watersheds should not be managed to increase water yield at the expense of habitat degradation. It is recommended that a basin-wide coordinating function be established.

It is recommended that governmental jurisdictions, water management agencies, and private water system developers should utilize standard best management practices (BMPs) for watershed protection.

Comprehensive, Integrated, and Continued Water Planning

(R2-8)

There must be connection and continuity between water resource planning and other major planning elements in the regional planning process. It is therefore recommended that local government jurisdictions and regional planning agencies work cooperatively to integrate water plans with planning for land use, transportation, economic development, and other planning efforts of regional significance. The scope of regional water resource planning must cover any and all water-related issues.

Regional water planning should continue through an open, inclusive, and deliberative process to ensure diverse stakeholder participation in the decision making process (A-53).

In implementing the regional water plan, the WRB and the WA should work together to establish a process for monitoring and measuring progress toward achieving success of the plan.

In addition, it is recommended that continuing efforts be made to enhance the quality and quantity of hydrological data for water budgeting. For instance, while well studied, the inflows, consumptive uses, and interaction between ground water and surface water in the region still contain uncertainties. While within reasonable ranges of each other, different studies yield somewhat different numbers. Further study would enhance the credibility of results and recommendations, would help to appraise our success in solving the region's water problems, and would guide us to improved remedial actions.

Storm Water Management Plans

(R2-9)

Storm water runoff can and should be utilized by the region when practicable. It is recommended that local government storm water plans be enhanced and expanded to control runoff, using swales, terraces and retention structures to minimize erosion,

enhance infiltration, and recharge, and prevent pollution of surface and ground water. It is recommended that flood control authorities include infiltration, seepage, pollution control and aquifer recharge in their mission.

Cooperative Regional Water Management (R2-10)

Jurisdictions within the region are encouraged to work together to design implementation mechanisms for the plan that are effective, fair, wise, equitable, legal, and appropriate to local community concerns and to meet the plan's mission and goals. This plan recommends that the local jurisdictions explicitly share the task of balancing the regional water use with renewable supply and implement sustainable water resource management to:

- reduce water consumption
- minimize impact on water resources
- encourage conservation-oriented economic development
- ensure adequate water supplies for any proposed development
- protect and enhance the environment
- consider the carrying capacity and location of development
- integrate with other major plans in the region.

This recommendation could create a mechanism for funding larger projects by pooling resources.

Water Banking (R2-11)

Water banking is a term used for several different concepts for leasing water. Only senior water rights that can actually be fulfilled, taking into account the hydrologic system's demands on wet water, may be transferred or "banked". Leasing of water through a water-banking system or entity can only be workable if clearly defined policy is developed. Legislation is recommended that will provide individual and other vested water right holders with a range of options for short-term leasing of water (less than five years) for purposes such as aquifer recharge, Compact deliveries, environmental needs, and meeting demands of other senior users in times of shortage, thereby increasing water management flexibility.

Agricultural forbearance should be investigated and, encouraged if feasible, to facilitate the leasing of agricultural water on a voluntary basis from farmers willing to enter into such leases.

The scenario permits the emergency leasing of agricultural water to meet Rio Grande Compact obligations and environmental needs. It also proposes protective mechanisms to support the overall value of agricultural lands, including:

- * benefits to ecosystem health
- * potential in terms of recharge, compact delivery, food security and economics

- * cultural and historic value
- * contribution to the regional air quality and regional vistas
- * agricultural economy

Land Use Management and Planning

(R2-12)

Encourage local jurisdictions to integrate the land use, transportation, economic development, and water resource management components in each of their comprehensive plans; and to integrate their comprehensive plans with the regional water plan.

Local jurisdictions should:

- Increase urban building densities and infill development through adoption of local government land use policies, incentives, and regulations. Higher-density development would reduce the relative footage of landscaping and associated water use.

The following four items were approved by the WA, but the WRB wants to be on record as opposing their inclusion at this time:

- Prepare and adopt water budgets which provide specific annual targets/limits for new development based on known available water resources. Water budgets should be reviewed annually and revised as necessary.
- Adopt policies to integrate land use and transportation planning and water resource management in all government jurisdictions in the Middle Rio Grande water planning region, and take water supply availability into account when making land use development decisions. Adopt policies that coordinate water impact considerations with all land development and other uses of water.
- Develop a sustainable and coordinated growth management plan for adoption and implementation by local governments in the Middle Rio Grande region in order to: 1) reduce water consumption; 2) minimize impact on water resources; 3) encourage conservation-oriented economic development and 4) ensure adequate water supplies for any proposed development. Local governments and/or the State Legislature should establish a review process so that each new industrial, commercial, residential and municipal development is reviewed to ensure ongoing availability of adequate water supplies, including recognition of cumulative impacts on water.
- Establish, assess and collect development impact fees that include the marginal full cost of extending the water service area and the marginal full cost to purchase and transfer associated water rights.

Water Monitoring and Measurement (R3) *(1 Recommendation)*

Measure All Water Uses *(R3-1)*

Unmeasured water is seen to be a major encouragement to casual or excessive water use. The recommendation is that all uses of water in the region be measured and reported at the single user level. Measuring only particular types of users or particular individual users is publicly seen to be unfair. The recommendation is to establish the measuring program immediately for all new uses, and as a gradual retrofit to existing uses, as soon as possible. This recommendation is for local and state governments to implement incentive, regulatory, and/or public education policies so as to stimulate the prompt installation of appropriate retrofit measurement devices. Besides the direct benefit of water savings, this recommendation will enable much more incisive and efficient management of our surface-water and ground-water supplies. This will entail costs, and the appropriate bodies should consider how these costs would most fairly be borne.

Agriculture (R4) *(5 Recommendations)*

Upgrade Agricultural Conveyance Systems *(R4-1)*

The recommendation is to line or pipe a limited number of Middle Rio Grande Conservancy District and on-farm ditches so as to obtain a greater efficiency in delivering water to fields. Areas to be lined should be selected after consideration of the impact on water quality, domestic wells, riparian vegetation, wildlife habitat, so as not to lose vital shallow aquifer recharge. New turnouts and improved irrigation water management could also allow for a decrease in diversions while meeting crop needs.

This savings in diversions would allow, when possible, stored water in upstream reservoirs to last longer in dry years, which would both help farmers and keep water in the river later in the irrigation season, and thus relieve some of the pressure for helping species and other environmental concerns. It is recommended that upstream reservoirs should be utilized to store saved water due to reduced diversion. This recommendation is seen to require some major funding and construction effort. Federal funding should be sought immediately. Work should commence as soon as funds are available. Because of existing and increasing Endangered Species Act pressure, progress on this recommendation is seen to be urgent.

Irrigation efficiencies, studies, and programs as implemented in California should be studied as well.

Level Irrigated Fields *(R4-2)*

Many farm fields in the region have been laser-leveled. This recommendation is to encourage farmers through incentive programs to laser level those fields that have not

been leveled or that may require a change in grade to facilitate an improved delivery system. This recommendation is for local and state governments (or federal if possible) to implement incentive, regulatory, and/or public education policies to facilitate more efficient delivery of water to those fields. Lobbying of all agencies to broaden the incentive program should commence immediately.

Establish a Local Marketing Infrastructure (R4-3)

A marketing infrastructure should be developed for locally-grown produce, value added products and low-water use alternative crops. In particular, increasing production of low-water alternative crops would reduce overall dependence on water. Research is required to identify the crops and the markets, and a plan for the transition.

Acequia Efficiency Programs (R4-4)

Acequia culture and rights can be at risk in the environment of increased marketability of water and water rights. It is recommended that special measures be taken to help preserve traditional acequia culture and rights. Traditional community acequias in this region typically require assistance to improve the efficiency of their irrigation networks. The recommendation is that funding for traditional acequias should be made available for purposes of increasing water efficiency within the local acequia system.

Recommendations further include providing education to farmers, ranchers, newcomers, and delivery system operators about available support programs and ways to operate more efficient water conveyance systems.

Recognize Agricultural Traditions in the Region (Goal C) (R4-5)

Preservation of the region's agricultural base will support the goals of maintaining quality of life present in the region, rural and suburban economies, and the culture and tradition that we value so highly. It should be recognized that the conversion of agricultural land to other uses alters the landscape irrevocably. It is recommended that value based decisions recognize the strong cultural and historical role of agriculture in the region, and the overall benefits that agriculture provides to the MRG Region, and to the State as a whole.

- Agriculture represents an important economic sector in New Mexico, and has for centuries.
- Agriculture benefits ecosystem health.
- Agricultural lands have significant potential in terms of aquifer recharge, flood control, Compact delivery, food security and economics.
- Agriculture is integral to overall ecosystem health, providing greenbelt, open space, and wildlife habitat, and contributing to the quality of the airshed and viewshed.
- Agriculture has cultural and historic value.

- More than 95% of irrigation is supplied by recycled and non-potable surface water which also provide aquifer recharge.
- Agriculture improves water quality through percolation and infiltration.

While some reduction is likely, the Preferred Scenario does not recommend a reduction in crop acreage. Decisions as to crop-type distribution will be left to individual farmers. The State should support the goals of the Federal Farmland Protection Policy Act, as well as any programs that preserve the region’s agricultural heritage. It is also recommended that the State share in funding these programs. It is further recommended that the state administer water rights according to the priority system, while considering agricultural use of junior rights equally with other junior uses of water.

Water Quality (R5) *(3 Recommendations)*

Mitigate Septic Tank Impacts *(R5-1)*

In some areas there is a potential health risk to water users or a contamination risk to the ground water resulting from conventional septic systems. It is recommended that, where such a potential health risk exists, conventional septic systems be replaced by the construction of new or expanded centralized or distributed wastewater treatment systems, including wetlands, or by the use of advanced technology or re-siting for on-site wastewater treatment.

Improved Water Quality Sampling and Testing *(R5-2)*

It is recommended that the water testing and sampling capabilities be significantly upgraded. The additional testing capabilities should include all of the biological, chemical and radiological threats to public and environmental health that are described in existing state and national water quality guides. In addition, special sampling and testing programs are needed to identify any contaminants that may be introduced into the water supply system. In addition to upgrading the quality of testing of potable water, it is important to improve the quality of testing of wastewater, storm water, and large-scale greywater. Many of these may be continuous automatic testing programs and they may require advanced techniques, which might be developed in cooperation with the national laboratories, state universities and private industry.

Protect Water from Contamination *(R5-3)*

It is recommended that programs be established to protect the region’s water from contamination and to ensure compliance with federal, tribal, state and local standards for water quality pertaining to surface waters, drinking water, storm water, and wastewater. It is also recommended that programs be established to enforce and protect wellheads from contamination on all public water supply wells within local government jurisdictions.

Bosque and Other Riparian Habitats (R6) *(4 Recommendations)*

Riparian Habitat Restoration *(R6-1)*

This Regional Water Plan recommends that a program of restoration of the bosque and other key riparian areas throughout the region be instituted. Restore and manage the bosque and other riparian habitat to reduce evapotranspiration and improve habitat by selectively removing non-native vegetation and promoting native plants.

Non-native species in the bosque and other riparian areas consume large quantities of water. Provided replacement vegetation is appropriately chosen, removal of non-native species is seen to present an opportunity to substantially reduce consumption in the region. The major effect would be to provide more water in the river to meet Compact obligations and to meet environmental obligations. This would reduce the pressure from various sources to divert water from other consumptive uses for Compact and environmental purposes.

Constructed Wetlands *(R6-2)*

This recommendation calls for considering the creation of constructed wetlands for ground-water recharge, storm water capturing, habitat improvement, and hydrological management of riparian areas.

River Restoration *(R6-3)*

In meeting the water needs of the state, the needs of the region's rivers should not be neglected. River restoration will provide for the needs of wildlife, provide residents of the region with opportunities for outdoor recreation, and assure that the state is in compliance with endangered species requirements. It is recommended that the state provide the required cost share, if any, of federal restoration programs. The state should also engage in and collaborate with programs designed with the goal of restoring the ecological functioning of the region's rivers and floodplains, including replication of the natural hydrograph of the rivers within the levees. The state should seek to assure that an appropriate quantity of water is available for endangered species and river needs without depriving priority water rights holders or San Juan-Chama Project water contractors of their water except from willing sellers or lessors.

To allow support of the river and its riparian environment, the scenario includes recognizing instream flow as a beneficial use.

Recognize the Importance of Healthy Native Ecosystems of the Rio Grande and its Tributaries (Goal B) *(R6-4)*

Healthy native riparian ecosystems mean a river and floodplain habitat adequate to support a viable population of a diverse array of plants and animals native to the region. Healthy native riparian ecosystems are important for their own sake, for the ways in which they enhance our quality of life, and for the services that they provide to us.

The Rio Grande is important for what it symbolizes and means to the people of the

region. The Rio Grande is a mythic river in the history of the region, the state, and America. A living Rio Grande embodies the spirit of our region. It is independent, free, tough, hard-working, and enduring.

Riparian ecosystems support a myriad of plant and animal species, from magnificent cottonwoods and sandhill cranes to unnoticed minnows. They support that portion of creation of which we are stewards. Rivers and bosques provide refuges where human inhabitants of the region can relax, enjoy the scenery and the water, hike, fish, raft, watch birds, and otherwise enjoy nature and the outdoors.

The Rio Grande and its tributaries provided the water that made human habitation possible in the region. A clean and healthy Rio Grande is essential to the agricultural traditions of the middle valley, as well as to urban populations that will increasingly depend on the river for domestic and other uses now and in the future. The bosque protects the levees from flood waters and therefore protects our property. It filters and cleanses water entering and leaving the river. Finally, though not least important, a clean and healthy Rio Grande is important to the spiritual and cultural traditions of our region.

Water Storage to Reduce Evaporative Losses (R7) *(4 Recommendations)*

Implement Upstream Surface Water Storage *(R7-1)*

An average of 140,000 afpy evaporates from Elephant Butte Reservoir (EBR) due to the large surface area and the hot, dry, windy conditions. EBR could be used to store water up to the top of the narrows (i.e., the deep water portion of the reservoir), thereby greatly reducing surface area, and still be used to make downstream deliveries. The recommendation is to obtain the necessary permissions to store water in upstream reservoirs with lower evaporation rates if this can be done without significant harm to the riparian environment. So as to minimize impact to the local economy of Elephant Butte, it would be desirable to manage flows to keep Elephant Butte Reservoir storing steady but minimal quantities of water (e.g., 400,000 acre-feet of usable water to allow storage of water in upstream reservoirs constructed after 1929 per Rio Grande Compact requirements. Usable water is that water legally available for release for downstream use and is defined as the combined content of Elephant Butte and Caballo Reservoirs less any New Mexico or Colorado credit water and less any San Juan/Chama project water in Elephant Butte Reservoir.”). The OSE should pursue necessary agreements and authorizations to permit this upstream storage.

Implement Upstream Aquifer Water Storage *(R7-2)*

Pump surplus water into the aquifer so as to supplant the requirements to store large quantities in Elephant Butte Reservoir. Technology assessment and engineering feasibility for this recommendation should be started so as to determine whether the option is really practical within this region.

Implement Aquifer Storage and Recovery for Drought (R7-3)

Subject to water rights and environmental issues, in order to ameliorate the short term fluctuations in regional supply, it is recommended that surplus water be pumped into the depleted aquifers during wet years, and be retrieved for use during dry years. This system would be smaller than one used to supplant EBR evaporation. Technology assessment and engineering feasibility for these recommendations should be started so as to determine whether these options are really practical within this region.

Water Modeling (R7-4)

The state and appropriate federal agencies should improve and increase monitoring and modeling of the surface water system, improve water management at the watershed level, and retain excess water flow from EBR during wet cycles. It is recommended that the state use the modeling data to anticipate and manage EBR spills and to better administer upstream retention and aquifer recharge.

Desalination and Transfer of Water (R8) *(3 Recommendations)*

The *Regional Water Planning Handbook* states that “all future water needs must be met by management of the water supply currently available to the region. If that is not feasible, as supported by analysis in the planning report, other sources of supply may be proposed if feasible in economic and engineering analysis.” (OSE/ISC 1994)

Develop New Water Supplies through Desalination (R8-1)

Substantial supplies of brackish and saline water exist in New Mexico. It is estimated that increases in the price of water, project development time, and technological improvements will make the desalination and importation of brackish water practical within twenty years. The recommendation is for the region to explore the possibility of developing brackish and saline water supplies, both from sources within and outside of the region. The region should track technological advances that would make desalination cost effective. It is further recommended that the region implement projects that will make such water available for use within the region or provide the region with appropriate Rio Grande Compact credits.

Investigate the Potential for Importing Water (R8-2)

Examine the potential of securing and importing large volumes of water from currently unused sources. This option should be interpreted broadly to include the availability of water from sources such as abandoned mines, and desalinated seawater. Water should not be imported where it would cause environmental harm or economic hardship to communities in the watershed from which water is being imported, or where projects rely upon large federal subsidies to provide limited economic benefits.

Undeclared Water

(R8-3)

The State Engineer should declare all waters in the State, regardless of depth and quality, so as to enable proper administration and protection of all of the waters in the State.

Public Education (R9) (2 Recommendations)

Develop a Water Education Curriculum for Schools

(R9-1)

This plan recommends that school curricula and projects be developed to teach children the importance and value of water in the region. Especially important are issues of water conservation, where water comes from, and cultural values associated with water.

Implement Adult Public Education Programs

(R9-2)

Establish region-wide and local public education programs to encourage a more complete awareness of the full range of water related subjects among the citizenry, and to enhance voluntary water conservation programs recommended elsewhere in this section.

Implementation

A number of factors are needed in order for this plan to be successfully implemented:

- Political will and local government capacity
- The necessary tools and financial resources
- Coordination and cooperation among the jurisdictions
- An informed citizenry.

Governmental and non-governmental entities in the region must assume a variety of shared as well as independent responsibilities to carry out the recommendations described above. This plan can be achieved only to the extent that there are adequate resources and coordinated local initiatives to manage water more efficiently.

Implementation of the regional water plan will be effected through the combined actions of numerous entities working together to achieve the mission and goals stated in this plan. Region-wide cooperation is essential to conserve the water resources of this region, particularly during times of drought or water shortages.

The implementation strategy includes several categories of action.

- Establishing an effective implementation team to actively encourage the needed activities
- Actively involving the diverse local jurisdictions of the region in the implementation.
- The creation of regional water monitoring processes utilizing local standards that are compatible with state standards.
- Development and maintenance of a regional water-management database to characterize the unique communities and conditions in this region.
- Developing the needed public education.
- Updating the regional water plan as time elapses and new information is developed.
- Funding and financial assistance in development of water management infrastructure.”

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