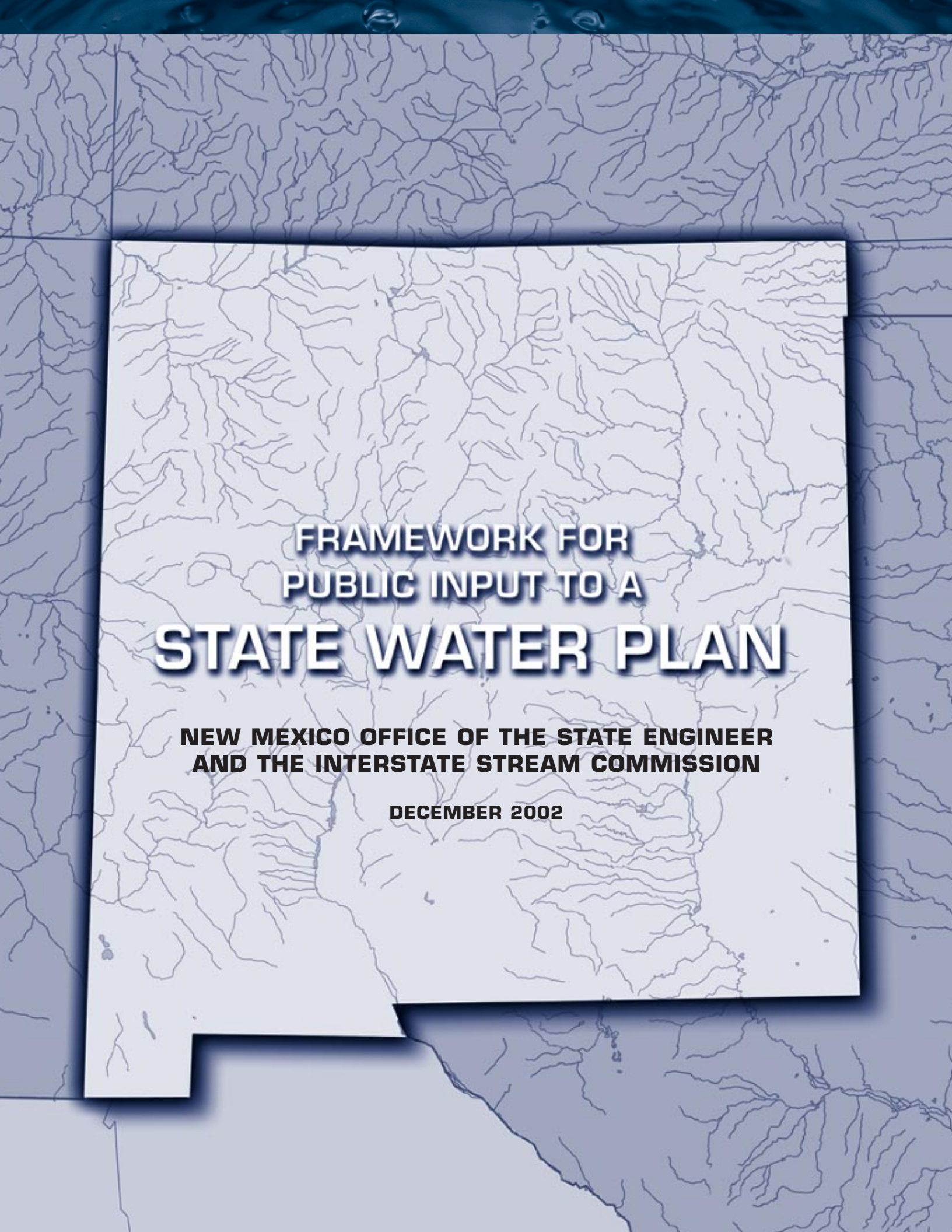

FRAMEWORK FOR PUBLIC INPUT TO A STATE WATER PLAN

NEW MEXICO OFFICE OF THE STATE ENGINEER AND THE INTERSTATE STREAM COMMISSION

DECEMBER 2002

FRAMEWORK FOR PUBLIC INPUT TO A STATE WATER PLAN

PREPARED BY THE NEW MEXICO OFFICE OF THE STATE ENGINEER AND THE INTERSTATE STREAM COMMISSION

DECEMBER 2002

Framework for Public Input to a State Water Plan

New Mexico Interstate Stream Commission

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PREFACE

This *Framework for Public Input to a State Water Plan* pulls together two important components of water planning and management. One component relates to the actual wet water available for use as a water supply and the demands that are placed on this supply. The other component relates to the prevailing administrative and legal framework that allocates water between competing demands. Both of these components work together to provide the framework for choice and opportunity in water planning for New Mexicans.

Users of this *Framework for Public Input to a State Water Plan* should review the water management questions and examine their choices in terms of both of these important components. The ultimate goal of any water plan should be to meet demand from available supply, both of these components are limits to available supply.

New Mexico is fortunate that ground water and surface water are regulated together, known as conjunctively, in most basins. The positive outcome of this administrative framework for water rights is that the diminishment of wet water supply in rivers from groundwater pumping can be managed by imposing conditions on permits to pump water. However, pumping effects are often delayed due to the slow movement of water in underground rock formations where the aquifers reside. Therefore, it is possible that groundwater usage exceeds available supply without seeing any immediate effects on surface waters. In addition, reducing pumping once the impact is recognized will not instantly stop the impact.

When surface flows are diminished due to drought conditions, failing to limit water use to available supply can lead to conflicts. Failure to act also can produce perilous conditions for species that depend upon the river for their existence. Climatic conditions that reduce surface flows can have many causes. These may include low winter snowfall, high winter temperatures that reduce total snow pack, early start dates for snowmelt runoff, high summer temperatures that enhance evaporation, and weak summer monsoon precipitation. Unfortunately, these conditions can occur in concert. The cumulative impact can be very severe. In addition, reduced supplies must be shared between New Mexico and other states on rivers

with interstate compacts. The consequences of failing to meet demand from available supply can be quite severe on rivers where the compacts are further limited by supreme court decrees.

The goal of this *Framework for Public Input to a State Water Plan* is to develop a better understanding of our water supply and the administrative and legal framework in which our water resource decisions are made. This provides a foundation to develop a state water policy that respects limits created by water availability and guides new water projects that are based on meeting demand within the limits of available water supply.

ACKNOWLEDGEMENTS

This volume of work represents the first time since 1976 that a concerted effort has been made to pull all water resource information together. It is also the first time that a New Mexico Water Resource Atlas has been published. While this work is by no means complete, it does represent a milestone on the way to completing the State of New Mexico's first ever State Water Plan.

This work could not have been complete without the hundreds of hours put into coordinating, researching and reviewing this document and the associated *Appendices*. The Interstate Stream Commission (ISC) wishes to thank staff members at the New Mexico Office of the State Engineer and the Interstate Stream Commission. Realizing the importance of this document, staff members took time from their otherwise busy schedule to make sure that the information was both concise and correct.

We would also like to thank the many contractors who contributed supporting research and documents (*Appendices*). Appreciation is extended to John Shomaker and Associates, Lee Wilson & Associates, Balleau Ground Water, Inc., Parsons Engineering, the United States Geological Survey, EJJ Communications Inc., and Schultz Communications and the many others who contributed to data review and editing.

This project could not have been realized without the vision of our elected officials, and their commitment to the importance of water to all New Mexicans.

SECTION A

OVERVIEW

Future management of New Mexico's water depends on our ability to manage the physical aspects of the river and the law. This photo shows a picture of Elephant Butte during the drought of 2002.

New Mexico's future depends on our ability to manage our water resources in a way that ensures a secure, reliable water supply. Achieving this will require forceful leadership that reflects a firm grasp of facts, the law and New Mexico's needs. Difficult decisions need to be made about complex and sensitive issues. It is critical that we leave behind our historical laissez faire style of water use management.

If we fail to more assertively manage our water resources, others are ready to step in and dictate how they will be managed. Our control over our own resources, as well as our economic vitality and quality of life, now depend on New Mexico completing the transition to forward-looking, Active Water Resource Management.

“We hope to stimulate new thinking about how New Mexico can make significant changes in our approach to water management.”

THIS DOCUMENT ARTICULATES A BROAD RANGE OF INFORMATION

This document is published to enable the greatest possible number of New Mexico’s citizens to participate in shaping a State Water Plan. We are on the threshold of an intensive planning effort that lays out the commitments we choose to make, steps we must take to protect our water and our priorities for action. Our goal is to foster inclusive discussion about the practical realities and trade-offs before us as a state. We hope to stimulate new thinking about how New Mexico can make significant changes in our approach to water management.

This booklet summarizes the initial findings of a major re-assessment of the state’s water resources—the first assessment done in 25 years and the first ever to integrate surface water (rivers and streams) and groundwater as complementary and inter-related supplies. *The New Mexico Water Resources Assessment, 2001* will be completed in the summer of 2003 and available to the public on compact disc. A summary is provided basin-by-basin and focuses on key issues for discussion and resolution. Many of these issues have been raised by regional water planning groups in seeking to define the water supply, needs and priorities of their local communities. Other issues have arisen from the mandates to the Office of the State Engineer and Interstate Stream Commission (OSE/ISC): compliance with interstate compacts and federal laws such as the Endangered Species Act, to cite just two examples.

The following sections of this booklet address subject areas where study and public input have indicated specific needs. These include the urgent topic of developing the measurement programs required to provide the factual basis for defending and managing water resources, developing inclusive public processes that foster problem solving, and outlining capital commitments required for water development projects.

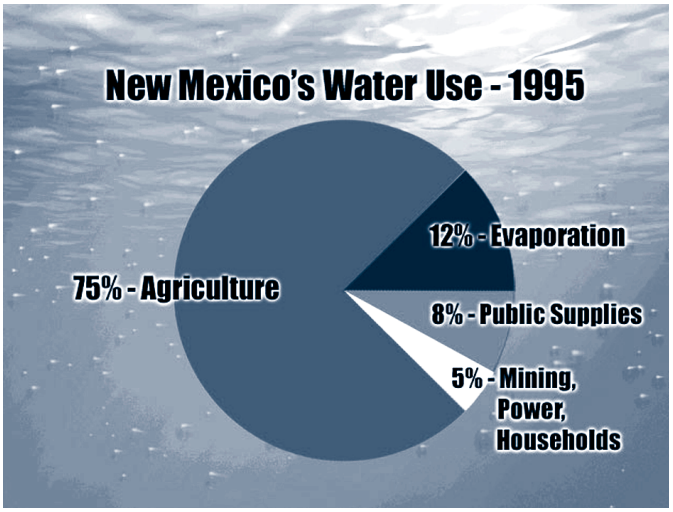
Not every important topic is discussed at length. For example, no section deals exclusively with adjudication of water rights, which has long been a knotty problem. On one hand, the adjudication backlog is a symptom of the State’s failure to focus on the building blocks of Active Water Management. On the other, the logistics of resolving every aspect of adjudication would overwhelm even a much larger organization. This issue clearly requires a new frame of reference and creative approaches.

To enhance the value of this booklet, as a tool for the public and technical experts alike, background information and data are available in appendices on compact disc. The contents of these appendices range from a compilation of public comments received at outreach meetings regarding state water planning to technical data developed over the past year with regard to the location and effectiveness of individual stream gaging stations. A DVD containing two half-hour video presentations is also available. When the comprehensive resource assessment now in progress is completed in the spring of 2003, it will also be available on compact disc. To request these resources, contact the Interstate Stream Commission in Santa Fe at 505-827-6160.

THE KEY FACT ABOUT OUR WATER: DEMAND EXCEEDS SUPPLY

New Mexico's water supply is limited. Demand, needs, and rights to use water exceed the water supply available in most years. Many of New Mexico's difficult water dilemmas arise from these facts.

During drought conditions, the imbalance becomes acute. After decades of promoting water use, New Mexico lacks both the physical facilities and the administrative infrastructure to ensure available water is delivered on the basis of water rights priorities to senior water-rights holders. The other side of the coin is that in most places we lack the means to limit water uses by junior water rights holders whose demands cannot be met from the available supply. Nor have water users been adequately informed about the serious nature of problems sparked by unauthorized use.

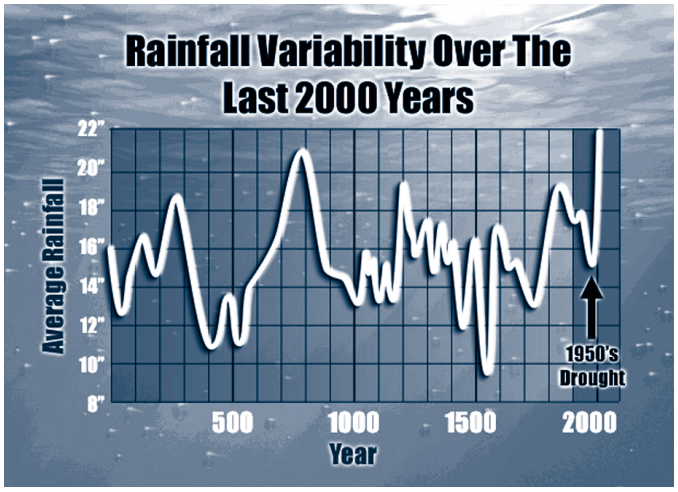


"New Mexico uses about four million ac-ft of water every year. Irrigated agriculture receives about 75% of the total. About 12% evaporates from reservoirs. Public water supplies account for about 8% and remaining 5% is used for mining, power, dometic wells, and other uses."—Norman Gaume

However, this is not the whole issue. In a state where 75% of water use is for agricultural purposes the problem becomes acute when considering the state's population has almost doubled since 1960. Growth has been the greatest in New Mexico's three Metropolitan Statistical Areas (MSAs), Albuquerque, Santa Fe and Las Cruces. Growth in each of these MSAs has at least doubled since 1960. These areas consist of one or more counties and often hold junior water rights that could be cut off during a dry year, yet supplying them is vital to public welfare. The State must therefore also provide a clearinghouse where voluntary leasing transactions can take place between senior water rights owners and municipalities and other engines of the state's economy.

A third difficulty is that simply enforcing the state's priority water rights administration produces unacceptable or unintended consequences. For example, priority administration may prevent groundwater users with junior water rights from pumping in dry years, even though the intended benefit of increased surface water flow may not occur until years—even decades—later.

This problem of demand exceeding supply affects virtually all water planning regions. Those that do not experience water shortages themselves are often viewed as a potential source of water by thirsty neighboring regions.



"New Mexico's rainfall is highly variable. Drought periods are common. On the other hand the 1980s and 1990s were unusually wet. We have averaged significantly more rainfall over the last 20 years, than the last 20 centuries."

– Norman Gaume

The unusually wet decades of the 1980s and 1990s have allowed hard decisions to be deferred despite large increases in population and water demand. The Southwest is due for a drought on the order of a 1950s

drought. Even the few dry years that have occurred in 1996, 2000 and 2002 have seriously taxed our ability to meet fundamental demand.

The priorities guiding the OSE that persisted through the early 1990s led the organization to neglect the development of the information and tools that comprise the basis of administration: workable procedures within a system of reliable measurement data and the means to limit water uses to valid, adjudicated water rights according to the available water supply and their seniority.

New Mexico must now act to complete the conversion to active management of New Mexico's water resources. We need to establish functional limits on the use of finite water resources, especially in areas where demand far outstrips supply or where failure to limit uses may create liability for the State and bad outcomes for water users.

Active Water Resource Management is the name we have given to the comprehensive, assertive approach that is needed to protect and enhance New Mexico's water supply.

Although many deficiencies are evident, New Mexico has made progress in recent years that lays the foundation for a State Water Plan that provides for Active Water Resource Management.

WATER RIGHTS AND PERMITS

The OSE has assembled an expert and effective team of lawyers, hydrologists and engineers who focus on moving controversial applications through the process while providing due process for both applicants and protestants. An intensive effort to automate all water rights documentation is taking place, but the resources needed to complete the job in a timely manner are not available.

DATA

One key building block we currently lack is the ability to measure water uses and return flows, which is vital to preventing unauthorized use of water. In addition, the section of this document entitled "Surface Water and Groundwater Measurement Programs" summarizes recent knowledge of what is needed with regard to cooperative programs with the US Geological Survey. Furthermore, major advances have been made in updating and

“Without a State Water Plan, many issues cannot be adequately addressed.”

improving the WATERS and eGIS databases, which provide rapid access for agency staff and the public to information about water. The *New Mexico Water Resource Atlas* provides a graphic example of progress. Again, there is more to do in this area. All of these data sources are needed to realistically evaluate possible options for managing our water resources.

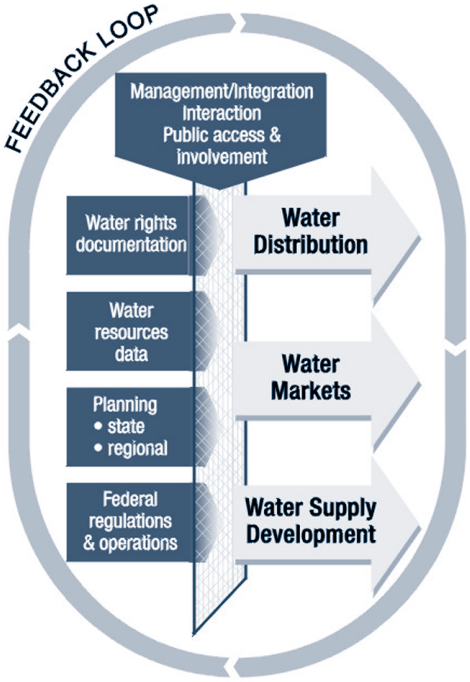
PLANNING

Regional water planning groups have been formed and are at various stages in preparing and evaluating their regional plans. Many have led outstanding public education efforts and are providing important forums for discussing local and regional needs and priorities. The ISC funds and provides technical assistance to these groups, which will continue to play a vital role in the water planning. The ISC has also built its water planning skills and staff in order to provide leadership in regional and State Water Plan development.

Without a State Water Plan to guide implementation of programs, set priorities and trace out the means of effecting controversial but essential changes, many issues cannot be adequately addressed.

FEDERAL REGULATIONS AND OPERATIONS

Federal agencies play a large role in managing reservoirs and water facilities, and as enforcers of federal laws. The OSE/ISC has taken a three-pronged approach to working with federal agencies: 1) litigating where necessary, 2) negotiating directly with individual agencies where possible, and 3) initiating and participating in collaborative efforts when they show promise. Maintaining knowledge of federal laws and regulations and creating strong working relationships with these agencies are needed to effectively implement water programs and projects. The challenges in this area are immense, as a review of the basin descriptions makes clear.



Active Water Resources Management

MANAGEMENT/INTEGRATION AND PUBLIC INVOLVEMENT

The legal documents, processes, information and administrative infrastructure that form the foundation for action must be efficiently managed and require the involvement of a wide variety of stakeholders. The OSE/ISC has taken the lead in collaborative action to seek optimum solutions.

To cite just one example, the OSE/ISC convened and worked with water users in the Lower Pecos to find a consensus solution to address problems in their area. Despite the lack of public information staff, the agency has conducted active outreach to civic groups, regional water planning groups and federal agency officials, as well as government-to-government outreach to Pueblos and Native American groups. For the State Water Plan, a variety of avenues for public involvement and education will be needed. See the Public Involvement section of this document for further information on successes to date and what remains to be done.

CORE ACTIVITIES IMPROVE OUTCOMES

The activities discussed in the previous paragraphs are essential, but they are not ends in themselves. Rather, they make it possible for the State to take effective action to preserve and develop water supplies and to facilitate water transfers. This is where the real benefits accrue.

WATER DISTRIBUTION

Ensuring that water is distributed to those with the most senior water rights when the available supply is not adequate for all uses is one of the core services that the OSE/ISC was created to perform. Without the ability to secure deliveries on a priority basis, water anarchy would prevail when supplies are limited by drought.

WATER MARKETS

Because virtually all water supplies are already allocated, providing supplies to new uses requires reducing the amount of water dedicated to an existing use. This can be done on a purely voluntary basis if we have a streamlined mechanism for leasing and sales of water rights. However, we must guard against water transfers that actually increase water depletions by converting paper water rights to new wet water uses. The institutional arrangements for efficient and proper transfers must create a fair and open market that

can benefit all New Mexicans. Here is another area where participation by a wide range of stakeholders should make it possible to find workable consensus solutions.

WATER SUPPLY DEVELOPMENT

While in many areas water users are gradually exhausting underground aquifers, the State is not now taking advantage of the opportunities to develop renewable surface water supplies. As will be evident in the section on the Capital Needs Assessment, many projects lack funding or are impeded by other factors. Fostering conservation and developing ways to enhance existing supplies are essential to accommodating New Mexico's growing population.

SEVERAL ISSUES MAY COME TO A HEAD IN 2003

The "Issues for State Water Resources Management" section of this document sets forth generic and specific questions that the State Water Plan must begin to address. Some of the State's most immediate challenges are outlined below.

PECOS RIVER COMPACT AND DECREE COMPLIANCE

There is no alternative to compliance with the Pecos River Compact and US Supreme Court Amended Decree, but there are three ways to achieve it, each with considerably different costs. The first two choices are: (a) implementation of the Pecos Consensus Plan, or (b) priority administration.

The Consensus Plan is dependent on funding and on settlement of a long-standing regional dispute, but if these can be secured, compliance will have a manageable economic impact. Priority administration alone would produce harsher conditions in the Pecos Basin and would be certain to trigger costly litigation. It would also require a major commitment of personnel and resources.

The third way is: (c) place decision-making and imposition of penalties in the hands of the US Supreme Court. Alternative (a) is clearly preferable to (b) or (c). With alternative (c), the court-appointed river master will take control of the river.

SAN JUAN RIVER "SHARING SHORTAGES" AND PREVENTION OF UNAUTHORIZED USES

"Sharing shortages" are reductions in water availability on the San Juan River system that are required by federal law whenever water supply for the Navajo Indian Irrigation Project is inadequate. Drought is likely to trigger sharing shortages for the first time in 2003.

This could affect diversions for the San Juan-Chama Project and San Juan County electrical generating plant water uses. Drought also creates the necessity for the OSE/ISC to limit water users with rights only to direct river flow from improperly using storage water from Navajo Reservoir that has been released for other purposes, including downstream flows for endangered fish.

DEFENSE IN RIO GRANDE COMPACT LITIGATION

Drought shortages are expected to affect water users in the Lower Rio Grande below Elephant Butte Dam for the first time since 1979. These shortages imperil southern New Mexico water users, as well as others further downstream. New Mexico must assure that Texas receives its proper share of the limited water supply.

Texas has appropriated $6.2 million for litigation against New Mexico to obtain more water. Texans have claimed that New Mexico uses are impairing both the quantity of water that Texas has received and the quality of that water. Texas' consistent failure to use its entitlement—among other factors—provides a strong defense. However, New Mexico must gather more and better hydrologic information to support its case. Moreover, management and limitation of uses in New Mexico are required to ensure that Texas receives its proper share.

MIDDLE RIO GRANDE AND RIO CHAMA PRIORITY ADMINISTRATION

The federal government is insisting that New Mexico enforce water rights limits below El Vado Dam in order to protect water destined for the six Middle Rio Grande Pueblos. If the State fails to do so, the federal government has indicated it will store enough water to meet the unauthorized uses plus the Pueblos' prior and paramount water rights. This federal action would decrease water deliveries to Elephant Butte Reservoir and be likely to

> *"On several New Mexico rivers, the federal government is changing previous water operations regimes as a means of providing habitat for endangered species."*

prompt Texas to claim a violation of the Rio Grande Compact—setting yet another lawsuit in motion. Clearly, New Mexico must make every effort to ensure water rights enforcement in this area.

ENDANGERED SPECIES ACT (ESA) COMPLIANCE

Recent court rulings and stays affecting management of the Middle Rio Grande in favor of the silvery minnow are just the most newsworthy example of this issue. On several New Mexico rivers, the federal government is changing previous water operations regimes as a means of providing habitat for endangered species. The result is a decrease in the water supply for other uses, including for compact compliance. ESA issues are both under negotiation and in litigation. Whatever the outcome, ESA compliance is likely to have a significant impact on both the future of water management and water users along most New Mexico rivers.

THE STATE WATER PLAN PROCESS WILL FACILITATE DECISION-MAKING

State government, including its water agencies, has not addressed and decided with water stakeholders a host of questions about how New Mexico's water supply will be managed for the benefit of all. Confronting tough issues and setting priorities for the use of scarce water, human and financial resources is vital to our ability to move forward economically while maintaining our diversity, culture and quality of life.

The Policy Issues for State Water Resources Management section of this document includes:

- Governor-elect Richardson's water policy platform; and
- New Mexico's Water: Perceptions, Reality and Imperatives, Twenty-eighth New Mexico First Town Hall (May 2002).

A report of the OSE/ISC staff's summary of key issues and questions developed in late 2002 at a series of strategic planning meetings is included in the Appendices.

This document helps us to focus on:

- Using the State Water Plan process to increase interaction with stakeholders and hone our understanding of workable bases for consensus.
- Addressing critical matters that, if left unresolved, will damage New Mexico's future.

- Setting priorities.
- Building a stronger foundation of staff and data resources for key functions, including strengthening teams that are moving adjudications forward, improving the water rights application processes and defending our resources from other states and the federal government.

The State must take great care not to perpetuate the laissez faire policies of the past by limiting itself to expedient, short-term actions that increase the water deficit or make long-term solutions more difficult.

SECTION B

ISSUES FOR STATE WATER RESOURCES MANAGEMENT

This section outlines broad issues and questions involved in managing the State's water resources. Text from Governor-elect Richardson's platform on water from the 2002 election, and New Mexico First's 28th Town Hall on Water held in Spring, 2002 follow. OSE/ISC staff's summary of specific water management issues and questions, prepared in late 2002, are listed in *Appendix B* on compact disc. The number and variety of subjects demonstrate the complexity of New Mexico's water situation, yet all share the opinion that action should be taken rather than failing to take any action.

H2O NEW MEXICO
Bill Richardson's Plan for Water Security

By Bill Richardson
Governor-Elect

With fires burning, cities and farms imposing strict water use limits and Court rulings which may force us to deny water to entire communities in the southern part of the state, New Mexico faces a water crisis. However, it is a crisis borne—in part—from a lack of leadership, long-time inaction and poor management.

The drought has brought long-simmering problems to the front burner and the time for aggressive and creative solutions—both short term and long term—is now. If I am fortunate enough to be elected Governor, I will develop a comprehensive water policy to ensure that New Mexicans have clean and safe water and that our state has the water it needs for a strong and viable future.

However, as we design this water strategy, we must be mindful of the traditions and quality of life that are so precious to us and make New Mexico the special place it is. In a Richardson water plan, our acequia culture and small farm heritage shall be recognized and preserved. We will balance rural agricultural needs with municipal and industrial uses and economic

> *"Water is the lifeblood of any community and I am determined to protect our livelihood for current and future generations."*
>
> — Bill Richardson

development. And, while we encourage conservation and protection of our watersheds, we will commit ourselves to protecting New Mexico's interests in any disputes with other states or the Federal Government.

My plan—which I call "H2O New Mexico—a Plan for Water Security"—shall commit an appropriate level of resources to solving our water crisis. The plan calls for $200 million dedicated to specific actions designed to alleviate our water problems. We will pay for it by committing 10% of our bonding capacity over the next 20 years to create a reliable funding source. It is not a small cost, but we all will pay a much higher price if we continue on the path we are currently taking. Just as we are all investing for our current Homeland Security efforts, so too must we invest to secure our water. Water is the lifeblood of any community and I am determined to protect our livelihood for current and future generations.

First, we need water plans: at the statewide, regional and community levels. These plans will provide roadmaps, to help our decisions. The statewide and regional plans must consider population growth, industry trends, compacts with neighboring states, and on-going mandates from the federal government. We must also ensure that we secure the necessary funds to protect the acequia infrastructure. The community plans will detail efforts to protect drinking water supplies, drought management, and a comprehensive conservation effort. The conservation section will outline plans to install efficient plumbing fixtures, low-water-use landscaping and irrigation, repair of distribution systems, rate structures that reward conservation, and water recycling systems—for golf courses, industrial, commercial and residential use. All plans—statewide, regional, and community—must be complete by December 31, 2003—and submitted to the 2004 session of the Legislature. This will step up the pace of the current schedule, which I consider too slow and inadequate.

Second, in order to prepare for a prosperous New Mexico economy and future, we need to settle water rights claims and determine who owns how much water. We also need to take action to stop the indiscriminate permitting of domestic wells in New Mexico. Today, ownership of 85% of NM water rights is unclear—and, at the current pace, the State Engineer estimates it will take another 600 years to complete the job! That's unacceptable. I will propose, to the 2003 Legislature, that we create the New Mexico Water Court, with sufficient judges, mediators and clerks to handle

the current backlog. The initial annual cost, estimated at $3 million, will be paid through the general fund, and it will decrease once we get through the backlog. We will also concentrate efforts to settle rights through administrative hearings and mediation. In creating the Water Court, I will consult with water users, particularly acequia associations, as well as lawyers and judges to ensure we create an efficient judicial system.

Third, I will develop a negotiation strategy to coordinate ongoing water issues with our neighbors—in other states, in Mexico and with our Native American leaders. I will immediately meet with the governor of Texas to review our differences and discuss opportunities. I prefer to negotiate—not litigate—with Texas. By working together, I believe we can increase overall water supply by improving watersheds, storing water at higher elevations to reduce evaporation, and developing a cooperative strategy with Mexico.

Fourth, we must improve our watersheds. This means we commit to clearing unnecessary brush from our forests so water can drop to the forest floor and seep into the aquifer. And we must remove salt-cedars from our river valleys. A typical salt-cedar consumes up to 400 acre-feet of water a year—more than one family uses. We must undertake these activities in an environmentally responsible way so as not to cause any unintended consequences. Experts say watershed restoration will provide us with the largest single new source of water supply.

Fifth, I support the concept of water banks, and will assist pilot projects, such as the one underway now in the Pecos River valley. The current "Use it or Lose it" water law works against conservation efforts, and I would work to repeal this concept. Water banks, on the other hand, provide the ability to lease conserved water for other beneficial uses. The original owner can maintain ownership and develop a new stream of income.

Sixth, let us harness the technology at our fingertips. Our national labs and state universities are researching the latest water technology and conservation programs: desalinization, arsenic removal, security of water supplies, quality monitoring systems, and advanced irrigation technology. We can use these new technologies to tackle some of our water challenges now. At the same time, we can develop a home-grown industry, with high-paying jobs, to market these technologies worldwide.

And, **finally**, I commit to upgrading the professional capabilities of the Office of the State Engineer. We will continue to develop a water rights file database, called WATERS, to track 100 years of water rights ownership in New Mexico. We will need these modern tools as we move forward with determining water rights and active management of our water.

These are a few, important steps we can take to immediately begin to tackle our water challenges. As we progress, I pledge to study ways we can reorganize state government to better manage these issues as well. We must be bold—now, and going forward—if we are to ensure water security for New Mexico's future.

NEW MEXICO'S WATER: PERCEPTIONS, REALITY AND IMPERATIVES

Twenty-eighth New Mexico First Town Hall
May 2002, Socorro, New Mexico

VISION OF THE TOWN HALL

A New Mexico where water is valued as the lifeblood of the state's rich cultural diversity and the basis for its economic engine.

QUESTIONS WE ASKED

1. Who has the rights to use New Mexico's water?
2. How do additional factors relevant to New Mexico affect our water resources?
3. How will we plan for the future?
4. How can we involve the public in addressing critical water issues?

GUIDING PRINCIPLE: BALANCE

- Supply and demand
- Growth and environmental protection
- Agricultural and municipal/industrial uses
- Rural and urban communities

RECOMMENDATION 1. ADJUDICATE WATER RIGHTS FOR THE ENTIRE STATE WITH A GOAL OF COMPLETION WITHIN THE NEXT 15 TO 25 YEARS.

ADJUDICATION

- First priority is interstate streams
- Create a water court system
- Establish procedures to accelerate prioritized adjudications, e.g.,
  - Alternative dispute resolution
  - Hydrological surveys

RECOMMENDATION 2. AGGRESSIVELY DEVELOP, PRESERVE AND PROTECT NEW MEXICO'S WATER RESOURCES.

NEW AND EXISTING SOURCES OF WATER

- Legal defense against external threats
- Comprehensive water model
- Identify lead entity
- Watersheds and riparian areas
- Developing technologies
- Reuse of treated effluent
- Revise building codes
- Upgrade water infrastructure
- Enforce water law
- Prevent entitlement loses
- Conservation (examples follow)
- Research institutions (examples follow)

CONSERVATION STRATEGIES

- Tax incentives
- Public education and involvement
- Conservation technologies
- Water banking
- Structured water rates

RESEARCH INSTITUTIONS

- Desalinization (desalination)
- Evaporation reduction
- Weather modification
- Real-time data collection
- E.g., Sensor technology
- Re-injection
- Reuse of treated effluent
- Water purification
- Watershed rehabilitation

RECOMMENDATION 3. PROVIDE ADEQUATE FUNDING, APPROPRIATE ORGANIZATIONAL STRUCTURE AND NECESSARY STATUTORY LANGUAGE TO ENSURE IMPLEMENTATION OF ALL ASPECTS OF NEW MEXICO'S ACTIVE WATER RESOURCE MANAGEMENT.

WATER MANAGEMENT FUNDING

- Water rights adjudication
- Water resources
- Water planning
- Compliance issues
- Interaction and cross-agency coordination
- Providing accountability to the Legislature
- Providing technical assistance
- Joint Memorials, re:
  - Native American claims
  - Funding our labs and universities

WATER MANAGEMENT FUNDING FOR THE OSE

- To limit groundwater diversions and require metering of domestic well use
- To develop legislation to close loopholes in permitting process
  - Unregulated domestic well development
  - Lack of required metering for surface & ground water diversions
  - Clarifying purpose of impounding water for unregulated uses
- To develop a comprehensive water model to determine quantities and projected longevity

WATER MANAGEMENT FUNDING FOR THE ISC

- For legal defense of external threats
- For statewide water planning
- For acquisition and management of water for environmental and quality of life uses

WATER MANAGEMENT FUNDING FOR THE WATER TRUST BOARD

- Adequate endowment
- Appropriate funds:
  - For water projects
  - To leverage Federal funds

RECOMMENDATION 4. CREATE A STATE WATER PLAN, INTEGRATING REGIONAL PLANS NO LATER THAN DECEMBER 31, 2004.

STATE WATER PLAN SPECIFICS

- Mandate creation of State Water Plan that includes:
  1. Adequate funding
  2. A process for implementation, management and regular revisions and updates
  3. Sustainability
  4. Ensure stake-holder participation
  5. Water plan as strategic umbrella
  6. A public education component

RECOMMENDATION 5. CREATE A RECURRING REVENUE SOURCE FOR FUNDING THE OFFICE OF THE STATE ENGINEER (OSE), INTERSTATE STREAM COMMISSION (ISC), AND WATER TRUST BOARD.

CONCLUSION

The Town Hall believes that it is critical to New Mexico's future to implement these recommendations in a timely fashion.

SECTION C

BASIN DESCRIPTIONS

The OSE/ISC has sponsored the first major re-assessment of New Mexico's water resources in 25 years. The comprehensive study is the first to take into account surface water and groundwater, and recognizes physical, legal, logistical and economic constraints to supply development.

This section provides a summary of water issues in major river basins or drainage areas. Information is organized by dividing the information into 12 basin areas that together cover the entire state. An attempt is made to provide focus on the major issues in each basin, however all issues are not addressed in this context. For each of the basins there is a locator map, description of geography, issues, a section on water management, as well as reference to major water projects that are planned or in progress.

A major study is underway that will be completed in the summer of 2003, entitled *New Mexico Water Resources Assessment 2001* prepared in coordination with the Interstate Stream Commission (ISC) and the New Mexico Office of the State Engineer (OSE) by John Shomaker & Associates, Inc. For excellent maps illustrating much of the information covered in this section, see the *New Mexico Water Resources Atlas*, which has been prepared by the OSE/ISC staff. In addition, appendices that provide detailed discussions of the features and issues in each basin are part of this *Framework Plan*.

WATER RESOURCE ASSESSMENT

"How much water do we have?" is the simplest and most important question to ask about our water supply. Realistic planning must be based on available water and how much more may be made available in the future to meet projected demand. The question is increasingly urgent, because it is now clear that even with the unusually wet weather of the 1980s and 1990s, supplies barely accommodate—and have sometimes fallen short of—existing uses and needs. Average water supplies will result in demand for water exceeding the supply. This problem becomes acute during drought, which is expected to be a regular occurrence.

McClure Reservoir stores water from the Santa Fe watershed as part of its municipal supply. This picture taken in the summer of 2002 shows how vulnerable drinking water supplies are to drought.

As regional and state water planners seek a meaningful, consistent approach to meet water demand needs and foreseeable requirements, an increased need to access water supply information is critical. The *New Mexico Water Resources Assessment 2001* will serve as the cornerstone of this effort. Planning efforts to date have been impaired by both a lack of enough information and by differences of opinion or interpretation of outdated or unreliable information.

SUMMARY OF MAJOR ISSUES

Total withdrawal of water from streams and aquifers in 1995 was more than 4.4 million acre-feet (ac-ft; an acre-foot is the equivalent of about 326,000 gallons). About 2.8 million ac-ft was consumed, and the remaining 1.6 million ac-ft flowed back to rivers and streams. Some current water supply is causing essentially permanent depletion of stored groundwater. Groundwater historically and currently pumped from some stream-connected aquifers will exert an increasing depletion of streamflow for years to come. Major changes are occurring.

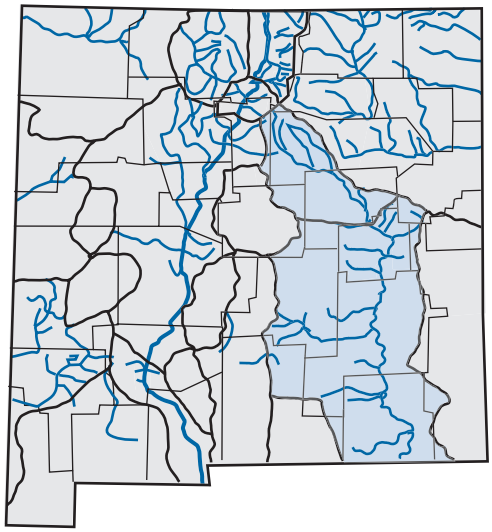
Many issues are common to many river basins and broad regions of the state, including:

- New Mexico is unprepared to see that its total water uses do not exceed its total legal entitlements from its various sources of supply.
- More than 90 percent of New Mexico residents depend on groundwater for their drinking water supply, not to mention the many areas that use groundwater for agricultural and industrial purposes. In many areas, groundwater is not replenished on time scales that have human meaning.
- More effective water management, conservation, discontinuance of existing uses of water so that new uses can proceed, and new supply development are the primary means we have for meeting new demands. Current funding is inadequate.
- Rainfall is highly variable and droughts recur. Areas that depend only on surface water supplies are especially vulnerable and must plan for dry years. Conjunctive management of interconnected groundwater and surface water rights becomes particularly challenging in times of surface water shortage. This is because of the continuing and uncontrollable diminishment of surface water flows caused by historic groundwater pumping.

- Environmental needs for water have the force of federal law and are the subject of much litigation. Legitimate environmental water needs have not been quantified and were not taken into account when New Mexico's water supplies were fully allocated to other uses. Nonetheless, these legitimate needs must be accommodated but in compliance with state laws and water resources administration.

Water demand keeps increasing—both within New Mexico and beyond our borders. Interstate and international issues are of urgent concern in many areas, owing to interstate compact obligations, unregulated groundwater pumping just across the state line, efforts to export water, or water quality desires. Starting in 1998, federal agencies and judges have imposed demands for water to comply with federal environmental law. These demands did not previously exist and have resulted in major changes in the operation of federal water supply reservoirs upon which New Mexico water uses depend.

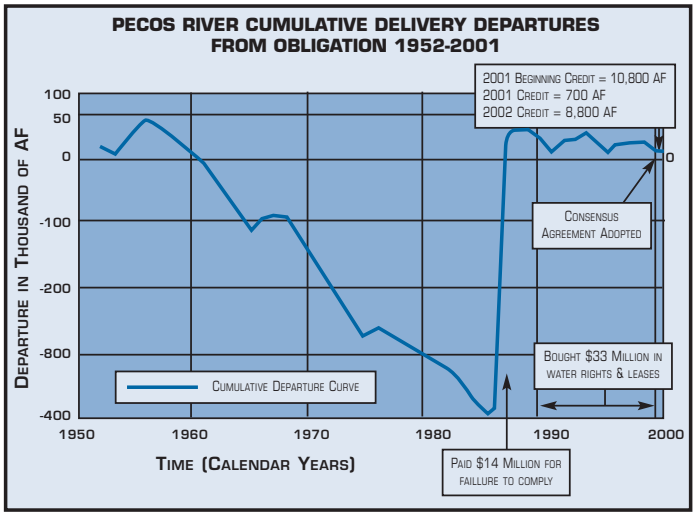
PECOS RIVER BASIN



MAJOR ISSUES

- Assuring compliance with the Pecos River Compact and the 1988 United States Supreme Court Amended Decree and Injunction has been the focus of a great deal of activity and discussion over the past few years. The OSE/ISC and Pecos Basin water users have worked to solve problems similar to ones that much of the state will soon face. Key points include:
- State efforts and investment that have assured compact compliance to date do not assure a permanent solution. Long-term compliance requires increasing the state line flow by at least 15,000 ac-ft/year and building up a delivery credit of about 120,000 ac-ft to prevent future crises.

- Implementation of the Consensus Plan for long-term Compact compliance is estimated to cost $68 million. The adjudication of Carlsbad Irrigation District (CID) water rights, which has been in litigation for many years, must be settled before any of the funds available can be used to buy water rights to implement the consensus solution.
  - If the Consensus Plan cannot be implemented, a net shortfall in deliveries seems certain to trigger priority administration, which would have a major economic and social impact on the region.
  - The Office of the State Engineer has increased its preparations, materially, to implement priority administration to remedy or prevent a net shortfall. However, such administration will result in much litigation.
  - Treatment and reuse of produced water has the potential to provide new water. Technical, economic, legal and institutional feasibility questions remain to be answered.
- New Mexico may seek to amend the Supreme Court Amended Decree if it can be demonstrated that the "inflow-outflow" method does not "reflect the realities of the river." The OSE/ISC may also request modifications to the River Master Manual.
- Endangered Species Act (ESA) compliance could have a major impact. New Mexico currently relies on the voluntary efforts of federal agencies to offset depletions resulting from revised Sumner Dam operations to meet the ESA needs. New annual incremental ESA depletions are equivalent in magnitude, under some conditions of operation and hydrology, to the historic over-depletion of water in New Mexico determined by the United States Supreme Court in *Texas v. New Mexico*.
- Recently proposed habitat protection for invertebrates in the Roswell Artesian Basin could impose constraints on ground-water development and/or management.
- New Mexico must actively participate and take a leadership role in National Environmental Policy Act (NEPA) compliance activities.



> *"Water supply impacts of watershed management remain a contentious and poorly understood subject."*

It is also critical that New Mexico conduct its own biologic investigations to provide a better scientific basis of the legitimate water needs of endangered species. This requires significant funding and staff.

- Drought planning is needed. Communities that depend on perched aquifers and fractured media aquifers high in the Sacramento Mountains (for example, Ruidoso) experience serious water supply problems during drought years.
- Water supply impacts of watershed management remain a contentious and poorly understood subject. Some communities claim watershed changes have caused surface water depletion. In addition, elimination of riparian vegetation and other water salvage methods continue to be controversial. Claims of salvaged water are quite large, given the long history of extensive water salvage efforts and meager results. Results have not been demonstrated and need to be carefully evaluated.
- How to manage increased flows created by watershed management changes merits attention.
- Water rights enforcement is needed, especially where there are instances of diversions in excess of rights.

HYDROLOGY

SURFACE WATER

The total average annual surface water supply for the New Mexico portion of the Pecos Basin is estimated to be 217,600 ac-ft/yr, composed primarily of snowmelt, flood runoff and base flows. There is extreme variability in surface water supply from year to year. The flow of the Pecos River is largely controlled by a number of mainstem dams: Santa Rosa, Fort Sumner, Brantley and Avalon that control delivery of water to the Carlsbad Irrigation District (CID). In many years, until the beginning of the ISC lease program, the entire flow of the Pecos River at Lake Avalon was diverted into the main CID canal for irrigation purposes.

ESTIMATED AVERAGE OF PECOS RIVER FLOW COMPONENTS (ac-ft/yr)*

River Reach	Snowmelt	Flood Runoff	Base Flow
Headwaters to Santa Rosa Dam	45,300	29,700	13,500
Santa Rosa Dam to Sumner Dam inflows	0	0	52,600
Sumner Dam to Carlsbad Inflows	0	33,600	27,200**
Carlsbad to the State Line Inflows	0	12,300	3,400^

*Averages are calculated on the basis 1976 to 2000 data.
**Refers to Acme to Artesia portion of the reach.
^Refers to the Carlsbad to Malaga portion of the reach.

GROUNDWATER

In the Upper Pecos Basin (above Sumner Dam), only some small alluvial aquifers occur near the river. In the Fort Sumner Basin the principal water-producing aquifers are the alluvial aquifer and Santa Rosa Sandstone aquifer. In the Lower Pecos Basin (below Sumner Dam), the principal aquifers are the Roswell Artesian aquifer and alluvial aquifer, plus the Capitan Reef aquifer and alluvial aquifers located in the Carlsbad area.

Roswell Artesian and Alluvial Basin. The Roswell Artesian aquifer is an extensive, highly transmissive, limestone aquifer extending from the Pecos River 20 miles to the west throughout the Roswell Basin. The artesian aquifer is overlain by a shallow alluvial aquifer extending from the Pecos River to several miles west of the Pecos. These aquifers are separated by a thick semi-confining unit in the southern half of the basin, where hydraulic connection between the two aquifers is poor. In the Roswell area, in the northern part of the basin, the two aquifers are in better hydrologic connection due to thinning or absence of the semi-confining unit.

Estimated average natural recharge to both aquifers is about 300,000 ac-ft/yr. About two-thirds of the natural recharge that feeds the artesian aquifer is derived from the western mountain area. Artificial recharge to the alluvial aquifer occurs from irrigation seepage.

Groundwater diversions stabilized at a level of about 250,000 ac-ft/yr after metering began in 1967. Shallow aquifer diversions have been about 110,000 ac-ft/year in the 1990s. The largest groundwater diverters in the Artesian Basin include the Pecos Valley Artesian Conservancy District (PVACD), the City of Roswell and the dairy industry.

Groundwater is under pressure in the Roswell artesian aquifer, and wells flowed freely at the surface before major groundwater development. Groundwater development has resulted in declining water levels by as much as 100 feet, and summer water levels drop more than 100 feet below winter levels in some areas, indicating that the aquifer is heavily stressed during the summer irrigation season. It is estimated that in predevelopment times, about 31 million ac-ft were stored in the Roswell artesian aquifer, and the development has reduced that figure by about 2 percent. Water levels have declined significantly in the shallow aquifer also. It is estimated that the alluvial aquifer stored 17 million ac-ft before groundwater development, and it is now estimated to be reduced by 20 percent.

Carlsbad Basin. The major aquifers of the Carlsbad Basin are part of the Capitan Reef and a shallow alluvial aquifer. The Capitan Reef is a long arcuate feature, 10 to 14 miles wide, composed of limestones in which large solution channels and caverns (such as Carlsbad Caverns) have been formed. The part of the Reef located near and west of the Pecos River is highly transmissive and produces water of good quality. The alluvial aquifer extends along the Pecos River from a few miles north of the City of Carlsbad to south of Black River. Near the City of Carlsbad, a small part of the alluvial aquifer directly overlies the Capitan Reef aquifer, and the two aquifers are in hydraulic connection.

The Capitan Reef aquifer receives natural recharge of 10,000 to 20,000 ac-ft/year in the Guadalupe Mountains and along Dark Canyon west of Carlsbad. About 15,000 ac-ft/year of artificial recharge to both Capitan Reef and alluvial aquifers occurs from Lake Avalon leakage.

Highly variable natural recharge to the alluvial aquifer occurs along arroyos and through areal recharge. Amounts range from none to 20,000 ac-ft/year from the arroyos and from none to 8,000 ac-ft/year from areal recharge, and the average is about 8,000 ac-ft/year from both sources. Irrigation seepage of 20,000 to 50,000 ac-ft/year (average: 36,000 ac-ft/year) artificially recharges the alluvial aquifer, predominately within the Carlsbad Irrigation District (CID).

During the 1990s, when CID had close to full surface water supply, irrigation groundwater diversions were between 8,000 to 13,000 ac-ft/year, most of which was from primary groundwater rights. Historically, much larger irrigation diversions occurred during periods of drought. The major active groundwater diverters include CID and non-CID irrigators, the City of Carlsbad and the potash industry.

The amount of water stored in the Capitan Reef aquifer near and east of the Pecos River is about 0.9 million ac-ft. This includes the entire thickness of the reef (up to 2,000 ft), extending to depths greater than 2,000 feet. Much of this water cannot be economically recovered, and much of the deep water would probably be of poor quality. Much of the estimated 0.75 million ac-ft stored in the alluvial aquifer is of low quality, especially within the CID where total dissolved solids are quite high.

Aquifer pumping depletes base inflows to the Pecos River. Major hydraulic head declines in the aquifers would reverse flow direction from the river to the aquifers, resulting in stream flow depletion. Flow depletion in the Carlsbad area through primary and supplemental pumping in the Carlsbad Basin directly impacts New Mexico's ability to comply with the Pecos River Compact and the Amended Decree.

WATER RESOURCES MANAGEMENT

Pecos River at San Miguel, photo courtesy of the NM Film Office, a division of the NM Economic Development Department.

In 1948, the states of New Mexico and Texas agreed that "…New Mexico shall not deplete by man's activities the flow of the Pecos River at the New Mexico-Texas state line below an amount which will give to Texas a quantity of water equivalent to that available to Texas under the 1947 condition." While this agreement set up the concept defining New Mexico's Pecos River Compact obligation, it did not clearly define a process for accounting for New Mexico's annual delivery obligation.

It was believed that salt cedar eradication would provide salvaged water for New Mexico to offset any stream depletions resulting from delayed pumping effects that might be experienced by New Mexico. This eradication program started in the mid-1960s and cleared 33,230 acres. A hydrologic evaluation by the US Geological Survey (Welder, G.E., 1988) determined that there is no conclusive evidence that the eradication increased Pecos River flow.

To increase the water it received, Texas in 1974 sued New Mexico before the US Supreme Court, with the result that New Mexico had to pay a $14

million fine. The Court also issued a final Amended Decree in 1988 to set forth other enforcement terms. The two most important terms are:

- A federally appointed River Master provides an annual accounting of New Mexico's delivery obligation.
- New Mexico may never accumulate its annual delivery shortfalls, although its delivery credits may be applied against any future shortfalls. If a net shortfall occurs, New Mexico has six months to deliver the shortfall water to Texas to comply the River Master's "Approved Plan."

WATER DEMAND AND SUPPLY

Due to a series of wet years during the 1980s and the 1990s, Carlsbad Irrigation District (CID) members have had full allotments in many years. However, their surface water allotment in 2002 was only 1.3 feet.

Through aggressive leasing and purchasing of water rights in the Lower Pecos River Basin to increase state line deliveries, the State of New Mexico has successfully maintained compliance with the Decree through 2001, including retaining a delivery credit of 9,900 ac-ft. There remains, however, a constant threat of net shortfall. New Mexico must permanently increase state line flows by at least 15,000 ac-ft/year and build up a delivery credit of about 120,000 ac-ft/year for long-term compliance.

Endangered Species Act (ESA) compliance activities have placed a new demand on the Pecos River water. For example, low flow releases from Sumner Dam to provide habitat for the threatened Pecos bluntnose shiner could deplete large quantities of the water supply in this fully appropriated river basin. Depending on the specific flow requirements for the fish, new depletions could range from 3,000 ac-ft/year to 35,000 ac-ft/year (for a target flow of 71 cubic feet per second at Acme) according to the studies being carried out by the Pecos River National Environmental Policy Act (NEPA) Team. The ISC is a joint lead agency for the NEPA compliance work, which includes preparation of an environmental impact statement.

A proposed consensus solution water rights purchase and retirement minimizes the economic impact on the basin as a whole, by providing a substitute for strict application of the seniority rule for water rights administration (known as priority administration) that would be required to meet a net shortfall in deliveries to Texas. Through implementation of this

consensus solution, many fewer junior water rights holders—which include many of the region's cities and towns—would be directly affected by the enforcement of water delivery obligations. However, the Consensus Solution has a prerequisite—settlement of long-standing water litigation between CID, PVACD and the United States. Intensive settlement negotiations are continuing as of the publication of this document.

The consensus solution accomplished two essential steps for compliance with the Amended Decree. It reduces depletions of water in New Mexico. It also gets sufficient water to and through the last dam in New Mexico for delivery to the state line. Priority administration to accomplish these two essential elements will cause intense litigation.

Implementation of either the consensus solution or priority administration—with steps including water banking to provide access to water by curtailed junior uses—is necessary in 2003.

RIO GRANDE BASIN

BACKGROUND

Colorado, New Mexico and Texas signed the Rio Grande Compact in 1938 to apportion between them the Rio Grande waters above Fort Quitman, Texas, based on 1929 water uses and an extensive water resources investigation conducted in the 1930s by the United States. The Compact requires that Colorado deliver a specified percentage of Rio Grande annual flows to the New Mexico state line. The percentage that Colorado must deliver to New Mexico is based on the amount of annual runoff in the headwaters of the Rio Grande in the Conejos, Los Pinos and San Antonio Rivers and in the Rio Grande at Del Norte. Colorado must deliver about one-third of the Rio Grande flow to New Mexico in an average year, about one-fourth of the flow in dry years, and about two-thirds in wet years.

"New Mexico's percentage of the irrigated acreage and the water supply is 57 percent."

New Mexico's water supply from the Rio Grande is guaranteed and constrained by the Rio Grande Compact. The compact provides three sets of geographically based water supply entitlements and the corresponding obligations. These three sets apply to the Rio Grande between:

- The Colorado border and the Otowi stream gage, located just south of Espanola and north of White Rock Canyon and Cochiti Reservoir;
- Otowi gage and Elephant Butte Dam; and
- Between Elephant Butte Dam and the Texas border.

In each case, New Mexico is entitled to a defined amount of water. Upstream of the Otowi gage, New Mexico is entitled to continue to deplete as much water as it was depleting in 1929. The Rio Grande Compact does not quantify this entitlement. The remaining annual flow must pass the Otowi gage. Between the Otowi gage and Elephant Butte Dam, New Mexico is entitled to deplete a specific amount of water annually. The annual amount, which varies depending on the annual flow of the Rio Grande at the Otowi gage, is specified in the compact. Most of the water passing the Otowi gage must be delivered by New Mexico to below Elephant Butte Dam. At high annual flows, all of the extra water above an annual volume of about 1.1 million ac-ft must be delivered to below Elephant Butte Dam. Downstream from Elephant Butte Dam, New Mexico is entitled to deplete a pro rata share of the available water supply based on the ratio of acreage irrigated by the Rio Grande Project. That amount is not quantified by the Compact but is quantified by agreements that were contemporaneous to the Compact. New Mexico's percentage of the irrigated acreage and the water supply is 57 percent.

About one-third of the average of 1.1 million ac-ft of native Rio Grande surface water flow leaving the Upper Rio Grande basin at Otowi Bridge comes from Colorado, one-third from the Sangre de Cristo Mountains, and the remaining third from the Rio Chama watershed. The Rio Grande Compact apportions native Rio Grande flows that pass the Otowi gage for use above and below Elephant Butte Dam. The water passing the Otowi gage is the source of most of the water available to people in New Mexico's Middle and Lower Rio Grande Basins and by Texans and Mexicans in the El Paso and Juarez areas.

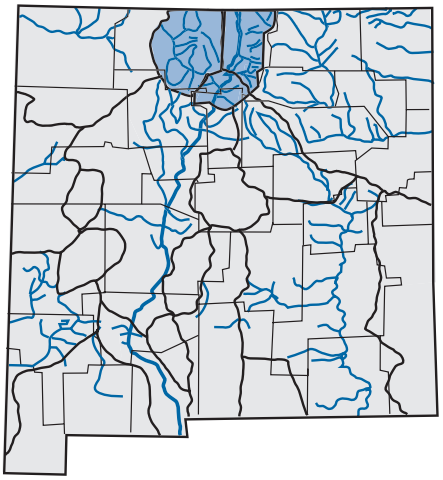
In effect, the Rio Grande Compact apportions the water of the Rio Grande, not only between the states of Colorado, New Mexico, and Texas, but also

between these three reaches of the river within New Mexico. In each geographic reach, New Mexico is obligated to see that its depletions of water do not exceed its entitlements to deplete water.

The San Juan-Chama Diversion Project imports a portion of New Mexico's entitlement of Colorado River Basin water from the San Juan River to the Rio Grande Basin. All of this imported water must be used in New Mexico.

Water resources management issues in these three geographic reaches of the Rio Grande are discussed in the three sections that follow.

UPPER RIO GRANDE BASIN



MAJOR ISSUES

The primary issues affecting this basin are:

- Operations of reservoirs and administration of water uses to comply with the Rio Grande Compact and the two compacts that govern the use of Colorado River Basin water.
- Storage of native water in reservoirs constructed after 1929 is prohibited under "Article VII" restrictions under the current low water supply storage conditions (less than 400,000 ac-ft) in Elephant Butte Reservoir and Caballo Reservoir.
- Accounting properly for uses of San Juan-Chama Project water uses above Otowi gage in order to properly determine the amount of native Rio Grande flow at the Otowi gage that New Mexico must deliver to below Elephant Butte Dam.
- Federal management of federal water development projects to provide habitat for the silvery minnow and Southwest willow flycatcher jeopardizes water projects in this basin. The OSE/ISC is participating in many venues where these environmental uses of water are being planned, negotiated and litigated.
- Completion of water rights adjudications and settlement of Pueblo claims.

    - To determine the amount of native water that should be stored in El Vado Reservoir for potential later release and use by the six Middle Rio Grande Pueblos. This water is known as "prior and paramount" water.
    - Settlement of claims of the Eight Northern Pueblos, including uses of San Juan-Chama water contracted to San Juan-Pueblo and allocated to the Taos area.
- Developing San Juan-Chama project water supplies for Upper Rio Grande Basin contractors
- Managing water use to fully use New Mexico's apportionment of Upper Rio Grande water under the Rio Grande and Costilla Creek Compacts.
    - Addressing issues associated with lack of full use of the Rio Grande Compact apportionment of water for use above the Otowi gage in New Mexico and wishes for transfer of water rights from the Upper Rio Grande Basin to the Middle Rio Grande Basin
- Concern on the part of the area's 680 acequia associations about transfers of water rights by farmers out of individual acequias, and the acequias' wish to control such transfers.
- How to balance in-stream water demands for Endangered Species Act compliance with the water rights and needs of the Pueblos, irrigators, cities and domestic well users and New Mexico's compliance with its Rio Grande Compact obligations
- Proper distribution of direct stream flows, storage of flood flows for later use and proper delivery of storage water released from reservoirs.
    - Correctly delivering San Juan-Chama Project water releases from Chama River reservoirs to its contracted owners.
    - Administration of storage of flood flows in El Vado Reservoir and potentially in Abiquiu Reservoir in the future.
    - Correct delivery of stored native water to its water right owners.

Rio Grande, at Santa Clara Pueblo, photo courtesy of the NM Film Office, a division of the NM Economic Development Department.

WATER RESOURCES MANAGEMENT

The Costilla Creek Compact. The Costilla Creek irrigation system begins at Costilla Reservoir in the Sangre de Cristo Mountains of north-central New Mexico and extends some 40 miles downstream via Costilla Creek and irrigation ditches onto the high desert plains of New Mexico and Colorado. The Compact mandates segregation and delivery of direct flow and storage water at four state line delivery locations. It imposes strict limits of direct flow use on New Mexico users, who are upstream of the state line. Use of the Costilla Creek Operations Manual by the watermaster and assistant watermaster, ISC employees who operate the system and administer water uses and state line deliveries, has helped to resolve long-standing controversies over this interstate operation. Administration is funded jointly by Colorado and New Mexico at a cost of about $100,000 per year, or $12 per irrigated acre per year.

The San Juan-Chama Project. The San Juan-Chama Project is authorized to divert water from San Juan River (a tributary of the Colorado River) tributaries into the Rio Chama watershed through a tunnel under the Continental Divide into Heron Reservoir. Native water cannot be stored in Heron Reservoir. Since Project operations started in the early 1970s, the amount diverted annually has varied from about 6,000 ac-ft to as much as about 164,000 ac-ft, and has averaged about 90,800 ac-ft/year.

All of the water has been contracted for or allocated to New Mexico entities in the Upper and Middle Rio Grande basins. Upper Rio Grande contractors—including the Jicarilla Apache Nation, San Juan Pueblo, the Department of Energy (Los Alamos), the Pojoaque Valley Irrigation District, the Cities of Española, Taos, and Red River, and the Village of Taos Ski Valley—have access to about 15,000 ac-ft/yr of the calculated firm yield of 96,200 ac-ft/yr. An allocation of the last 2,990 ac-ft of available San Juan-Chama Project

> *"About 680 acequias (community irrigation systems) are located within the Upper Rio Grande River Basin."*

water has been reserved by the United States at the request of the ISC for the Taos area including Taos Pueblo. Specific allocation of this water is being discussed in the context of settlement of the Taos Pueblo water right claims.

A number of communities in the Upper Rio Grande have contracted for San Juan-Chama Project (SJCP) water, but are not fully using it. The OSE/ISC encourages contractor communities to begin plans for direct diversion. The ISC is also a cooperating agency in NEPA compliance work by the United States that is a prerequisite to conversion of San Juan-Chama Project contracts that expire to contracts that are permanent.

MRGCD Storage in El Vado Reservoir. Storage rights for El Vado Reservoir (on the Rio Chama about 80 miles above its confluence with the Rio Grande) were assigned to the US Bureau of Reclamation by the Middle Rio Grande Conservancy District (MRGCD) in 1963. The Bureau currently operates the reservoir for the MRGCD. When the Compact Article VII prohibition is in effect (as it is currently), native water cannot be stored in El Vado Reservoir above and beyond storage sufficient to meet the Prior and Paramount water rights of the six Middle Rio Grande Pueblos.

Acequias. About 680 acequias (community irrigation systems) are located within the Upper Rio Grande Basin. Many have existed since Spanish colonization. Most acequia water rights have not been adjudicated, except in the Rio Chama valley below Abiquiu Reservoir. Many acequias may not be using as much water now as historically. Transfer of water rights from acequias is highly controversial.

During the irrigation season the ownership of the Rio Chama water flowing below Abiquiu Reservoir is complex. It includes but is not limited to: native water, MRGCD native water released from storage for the use of its irrigators, San Juan-Chama water bound for various downstream beneficial uses and conservation water released for downstream endangered species purposes or to meet Rio Grande Compact obligations. Unauthorized use of non-native flows by acequias and other users is the subject of substantial controversy. These unauthorized uses impair downstream users and may impact compliance with the Endangered Species Act and Rio Grande Compact.

Flood Control. Abiquiu Reservoir, which is owned and operated by the US Army Corps of Engineers, is the only flood control reservoir in operation in the Upper Rio Grande basin. The reservoir has a capacity of approximately 1.2 million ac-ft. Of this capacity, an estimated 200,000 ac-ft is authorized for conservation storage of either native Rio Grande water or San Juan-Chama Project water. The ISC is cooperating with two federal agencies to prepare an Environmental Impact Statement for operation or federal facilities on the Rio Grande (Upper Rio Grande Water Operations Review and EIS, or URGWOPS). This effort includes evaluation and NEPA compliance for storage of native water in Abiquiu Reservoir.

Middle Rio Grande Project. The US Bureau of Reclamation's Middle Rio Grande Project initiated in the early 1950s was designed to reduce natural depletions in the Middle Rio Grande and improve water delivery to Elephant Butte Reservoir. Construction of the Rio Grande floodway between Velarde and Caballo Reservoir was part of this project.

WATER SUPPLY AND DEMAND ISSUES

Human-related depletions in the Upper Rio Grande appear to have declined since 1929 because of a decrease in acequia irrigation that more than offset increases in municipal and industrial use. If this is the case, more native water is passing the Otowi gage than is required where it is allocated for use in the Middle Rio Grande and for delivery by New Mexico to below Elephant Butte Dam. Consequently, New Mexico may be delivering more water to Texas than is necessary if the legitimate water depletions above the Otowi gage were deployed—water which New Mexico may be entitled to use. A comprehensive study is needed to determine the volume of any difference in these depletions.

Because of contamination problems with several of its groundwater wells, the City of Española is proceeding with an environmental review for a surface water diversion and treatment facility to allow it to conjunctively manage its water resources and fully consume its annual 1,000 ac-ft San Juan-Chama Project allocation. Similarly, the City and County of Santa Fe are proceeding with the environmental review for a surface water diversion and treatment facility on San Ildefonso Pueblo to make it possible to conjunctively manage water and aid in consuming its of 5,605 ac-ft/yr San Juan-Chama Project water.

The endangered Rio Grande silvery minnow once existed in the Rio Grande up to the confluence of the Rio Chama. The Upper Rio Grande is therefore being considered for a re-population effort. The endangered southwestern willow flycatcher is also present in the basin. Its additional water needs for habitat, if any, have not been determined.

The US Court of Appeals is now reviewing a US District Court order stipulating that San Juan-Chama Project water could be reassigned from delivery to contractors in favor of providing additional water for in-stream flow for habitat for the endangered silvery minnow. This would jeopardize the current and future water supply of San Juan-Chama Project contractors and many of the basin water development projects, developed over 30 years.

The Upper Rio Grande basin includes Native American tribal lands and several Pueblos. With the exception of the Jicarilla Apache Nation, none of the Native American water rights have been adjudicated, although several suits are pending. Until all Indian rights have been adjudicated, uncertainty will remain with respect to all water rights. The Jicarilla Apache Nation water rights settlement provided it with 6500 ac-ft/yr of San Juan-Chama Project water. Future use of this water is at the discretion of the Jicarilla Tribe and has not been determined.

Because the reservoir storage limitations imposed by Article VII of the Rio Grande Compact were triggered by the current drought, the only native Rio Grande water stored and released from El Vado Reservoir may be water destined for use in the Middle Rio Grande basin by the six Middle Rio Grande Pueblos. The United States has demanded that New Mexico protect this stored water from unauthorized diversions. New Mexico must do so to prevent impairment of downstream water rights and to comply with the Rio Grande Compact.

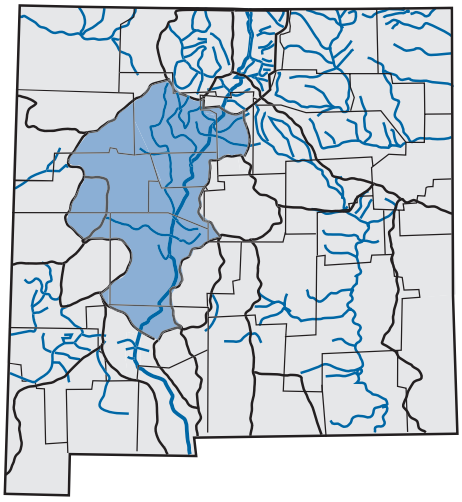
Federal agencies and the NMISC are cooperating in an expensive, joint, five-year process called the Upper Rio Grande Water Operations Review and EIS (URGWOPS). It is a comprehensive environmental review of federal water operations above Ft. Quitman, Texas, including the preparation of an Environmental Impact Statement. It includes assessment of potential flexibilities in existing river and reservoir operations to meet changing needs within the Rio Grande basin of New Mexico. The re-evaluation includes possible revision of the operation plans for Heron and Abiquiu

Reservoirs (Atlas Plate 13.1) in accordance with existing Congressional authorizations.

The Rio Grande Underground Water Basin encompasses the entire Upper Rio Grande (Atlas Plate 2). No specific guidelines for groundwater administration have been issued, but all applications, except those for domestic and stock wells and stock tanks, will be evaluated to ensure that no existing groundwater or surface-water right will be impaired. Surface water is fully appropriated, which requires that surface water rights must be transferred to offset any depletion caused by new ground or surface water uses.

A deep drilling project in the Taos Valley is underway as an intermediate step in the water rights negotiation process among the Town of Taos, Taos Pueblo, Taos area acequias and other parties. Its objective is to evaluate the possibility of pumping deep groundwater in the Taos Valley and its effect on streamflows in Taos Valley tributaries.

MIDDLE RIO GRANDE BASIN



MAJOR ISSUES

The Middle Rio Grande region extends from the Otowi gage, located on the Rio Grande a few miles upstream from Cochiti Reservoir, to Elephant Butte Dam. Most of the water supply for the Middle Rio Grande originates as water flowing past the Otowi gage. This includes both direct flow and reservoir releases of San Juan-Chama Project water and stored native water. These inflows are highly variable from year to year. Additionally, New Mexico is entitled to deplete all tributary flows in the Middle Rio Grande. These tributary flows are extremely variable. All municipal, domestic, and industrial uses are supplied from groundwater. Much of the groundwater pumping is unsustainable. Many groundwater users, including large municipalities, have not secured Rio Grande water rights to offset the delayed depletion of Rio Grande streamflow caused by their current and historic groundwater pumping.

Growing and increasingly diverse demands for water in the Middle Rio Grande region—including the State's needs for water supply for about half its population and economy, and for wildlife and ecological uses—cannot all be met. Current water consumption exceeds the long-term average supply that is legally available for use in the Middle Rio Grande. Since the surface-water system is closely interconnected with groundwater, pumping more groundwater does not solve the problem.

The Rio Grande Compact requires that most of the Rio Grande flow past the Otowi gage be protected by New Mexico and delivered to below Elephant Butte Dam for downstream users in New Mexico and Texas. New Mexico historically had major difficulty in complying with this obligation but those difficulties were overcome by federal projects that minimized conveyance losses and salvaged water though drainage. These projects are now thought to have damaged the habitat features required by the Rio Grande silvery minnow and to have contributed to its decline.

The primary issues affecting this basin are:

- Reducing depletions of water in the Middle Rio Grande over the long-term in order to meet Rio Grande Compact obligations and maintaining beneficial uses of water.
- Water conveyance conditions through the exposed sediment delta of Elephant Butte Reservoir (the sediment delta is the area between the terminus of the river channel at the upstream end of the reservoir and the reservoir pool) are very poor. Such conditions negatively affect New Mexico's compact deliveries and therefore impact all Middle Rio Grande water users. Over the past four years, the state has purchased equipment for and provided significant funding to the Bureau of Reclamation to construct a channel through the delta but progress has been painfully slow. The State, through the ISC, will assume responsibility to construct parts of this channel but it is unlikely the river will be connected to the reservoir before the Spring 2003 runoff. New Mexico's compact compliance is negatively affected.
- Improving river channel and irrigation system conveyance could contribute to Rio Grande Compact compliance. ESA compliance issues have limited the state and federal agencies abilities to improve river channel conveyance. However, the same compliance issues may force irrigation system improvements.
- Non-native vegetation such as salt cedar and Russian olive have invaded a large portion of the bosque. Research indicates these species use significant amounts of water, more than native vegetation.

Control of the non-native vegetation along with management of the groundwater table on a large scale may decrease demands for reservoir releases to meet endangered species demands and could contribute to New Mexico's Rio Grande Compact compliance.

- The proliferation of domestic wells in the basin will ultimately have an effect on Rio Grande flows. Limiting domestic well uses and permits in heavily populated areas is a consideration. Water banks could provide water rights through simple transactions to cover the incremental junior depletions of domestic wells.
- Many groundwater users, including municipalities and industries, in the Middle Rio Grande were allowed to begin pumping without securing water rights. Because of return flows of treated wastewater and the delayed impact of groundwater pumping on river depletions, this practice has not resulted in net river flow diminishment. However, the accumulated eventual need for groundwater users to acquire and transfer water rights is very large and exceeds the quantity of currently transferable water rights. Under current practices, only pre-1907 water rights can be transferred. The 1930 water rights developed by the Middle Rio Grande Conservancy District have never been available for transfer. Further, the ability of return flows from pumped groundwater to offset river depletions caused by pumping depends on ever increasing groundwater pumping. When pumping levels off, which it must, return flows will no longer be sufficient to offset the depletion of the Rio Grande caused by historic pumping.
- Fallowing irrigated farmland so that water rights can be transferred may not result in diminishment of water depletions from that land if salt cedar and Russian olive infest the former farmland.
- ESA compliance is the subject of two current lawsuits, which are under 10th Circuit Court of Appeals review or direction. The outcome of these lawsuits may have a large impact on basin water users and New Mexico's long-term ability to remain in compliance with the Rio Grande Compact.
- Human uses of water in the Middle Rio Grande account for much less than half of the depletions of water from the Middle Rio Grande's share of the river under the Rio Grande Compact. Uses by the bosque and the river itself are equivalent to agricultural depletions. Evaporation of water from reservoirs is another large component. Municipal and industrial uses are much smaller. In other words, natural depletions of water are predominant. New Mexico has historically relied on federal projects and maintenance for control of "natural" depletions as the strategy for New Mexico's Rio Grande Compact compliance. That federal work has stopped, for all practical purposes, due to ESA-

> *"New Mexico has been in compliance with its Rio Grande Compact delivery requirements since the mid-1970s due primarily to construction, operation and maintenance of the Middle Rio Grande Project."*

derived constraints and reprioritization of the use of federal agency manpower and appropriations.

- Stringent limitations on the amount of arsenic in drinking water will place a major water treatment burden on water suppliers in the Middle Rio Grande and elsewhere.
- No adjudication or other water rights quantification or settlement processes are underway in the Middle Rio Grande. This is due to the legitimate need to use limited human resources and budgets to finish adjudications that are underway in the Pecos River Basin and the Lower Rio Grande. Yet adjudication of the Middle Rio Grande water rights and adjudication or settlement of Pueblo water rights claims seems crucially important.
- The Middle Rio Grande Conservancy District has not complied with a State Engineer directive to submit documentation regarding the water that it has put to beneficial use since its permit was issued in 1930. The quantity of water that it diverts is very large compared to the acreage that it irrigates—two or more times as much water per acre as the other irrigation and conservancy districts in New Mexico. No other irrigation district in New Mexico attempts to provide unlimited access to water to its members with no mechanisms to measure or estimate members' water uses.
- In a number of areas within the basin, the Rio Grande flood control levees are in poor shape because static federal budgets and ESA compliance issues/costs have limited the ability of federal agencies to maintain them. Endangered species habitat concerns have caused historic river channel and levee maintenance procedures to now be prohibited. The U. S. Fish and Wildlife Service now requires extremely costly alternate approaches. Because the bottom of the river is higher than the floodplain in many areas, failure of a levee in these areas will cause the river to leave its channel and flood the developed floodplain, farms, communities, and irrigation and drainage infrastructure.
- The majority of San Juan-Chama Project water is contracted to municipalities in the Middle Rio Grande. Several of these municipalities wish to develop this renewable water supply but face numerous difficulties and obstacles in doing so. However, the current reliance of these contractors on groundwater is causing significant groundwater mining that cannot be continued.

Elephant Butte at low water during a fly-over in the summer of 2002. Note the large bath-tub ring around the edge of the lake where higher water levels typically exist.

WATER RESOURCES MANAGEMENT

The Rio Grande Compact. The Rio Grande Compact requires that New Mexico deliver a specified percentage of flow in the Rio Grande to Texas based on flow measured at the Otowi gage (a few miles south of Espanola). In dry years, about 60 percent of the flow at Otowi must be delivered. In wet years, over 80 percent must be delivered.

New Mexico has been in compliance with its Rio Grande Compact delivery requirements since the mid-1970s due primarily to construction, operation and maintenance of the Middle Rio Grande Project; a very wet climate; and supplementing the river thru pumping of groundwater for municipal use. History indicates that during dry periods compact compliance can be much more difficult. Should the state be entering an extended dry period, active administration of water use will be necessary to maintain compact compliance.

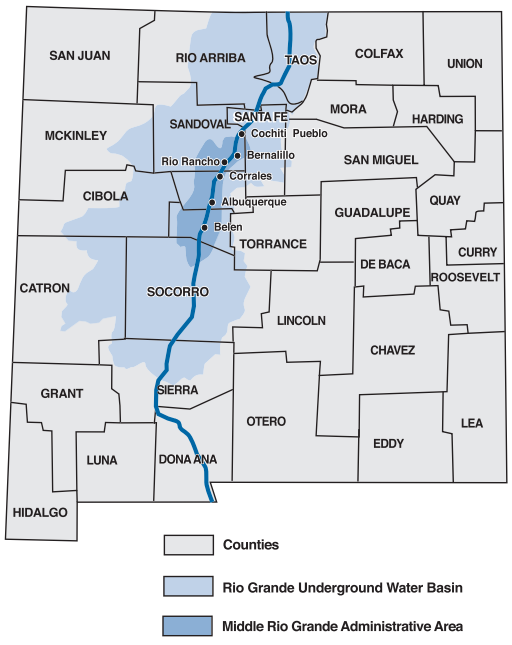
When "Usable Water in Project Storage" falls below 400,000 ac-ft, New Mexico is prohibited from increasing storage of native Rio Grande water in reservoirs constructed after 1929. This rule was invoked for the first time in over 20 years in July 2002, resulting in the loss of native water storage operations by the MRGCD in El Vado Reservoir, by the City of Santa Fe in

McClure and Nichols Reservoirs on the Santa Fe River, and by the US Army Corps of Engineers in Abiquiu and Jemez Canyon Reservoir's.

San Juan-Chama Project Water Contracted to Middle Rio Grande Entities. The San Juan Chama project is described briefly in the Upper Basin section. Middle basin contractors include the City of Albuquerque (48,200 ac-ft/yr), the Middle Rio Grande Conservancy District (20,900 ac-ft/yr), the City and County of Santa Fe (5,605 ac-ft/yr), the Town of Belen (500 ac-ft/yr), the Town of Bernalillo (400 ac-ft/yr) and the Village of Los Lunas (400 ac-ft/yr).

The Middle Rio Grande Conservancy District (MRGCD). The MRGCD has four major river diversion points and a vast network of irrigation canals and ditches stretching about 150 miles between Cochiti and the Bosque del Apache National Wildlife Refuge. Additionally, passive diversion by MRGCD occurs from the river to the adjacent riverside drains. Typically, MRGCD utilizes the native flow during spring run-off and attempts to fill El Vado Reservoir. When native flow is insufficient, reservoir releases are made. About 30,000 ac-ft of the reservoir's storage space has been used to ensure delivering the prior and paramount rights of the six Middle Rio Grande Pueblos, which are part of the MRGCD.

Flood Control by the US Army Corps of Engineers. Cochiti Reservoir on the Rio Grande, Galisteo Reservoir on Galisteo Creek and Jemez Canyon Reservoir on the Jemez River are flood control reservoirs owned and operated by the US Army Corps of Engineers. These reservoirs are not authorized for conservation storage. The North and South Diversion Channels in Albuquerque are other major flood control works.



Middle Rio Grande Administrative Guidelines. In September 2000, the OSE adopted guidelines for the administration of the Middle Rio

Grande Administrative Area (MRGAA) designed to protect water rights, Rio Grande Compact compliance and the aquifer and to minimize land subsidence. New groundwater appropriations will be approved in the MRGAA only if surface water rights are obtained and transferred to offset the corresponding streamflow depletion. MRGAA Critical Management Areas, which are now limited to parts of Albuquerque, are closed to additional pumping.

Endangered Species Act. In determining what needs to be done to protect the endangered silvery minnow—particularly in dry years—the US Bureau of Reclamation and the US Fish and Wildlife Service have focused almost exclusively on securing supplemental water supplies. Issues such as predation, minnow food sources, habitat needs at specific life cycle stages and activities such as moving the minnow to reaches of the river that have perennial flow have been ignored or given short shrift.

The Rio Grande Silvery Minnow Critical Habitat Environmental Impact Statement now being prepared will describe how, in the FWS's opinion, existing river operations affect the minnow. However, the outcome of the State of New Mexico's appeal to the U.S. 10th Circuit Court of Appeals of Judge Parker's September 2002 order may drive the entire process. If the order is upheld, the existing water supply of San Juan-Chama Project contractors is threatened.

Native American Water Rights. Pueblo water rights have not been settled, yet they constitute the most senior water claims in the basin. The amount of water available for junior water rights therefore remains uncertain.

Sandia and Isleta Pueblos have established their own water-quality standards, which means that upstream municipalities, such as Rio Rancho and Albuquerque, must discharge treated wastewater effluent that makes it possible to meet Pueblo standards.

WATER RESOURCES PROJECTS

Several major water projects or investigations are in progress or under consideration, including:

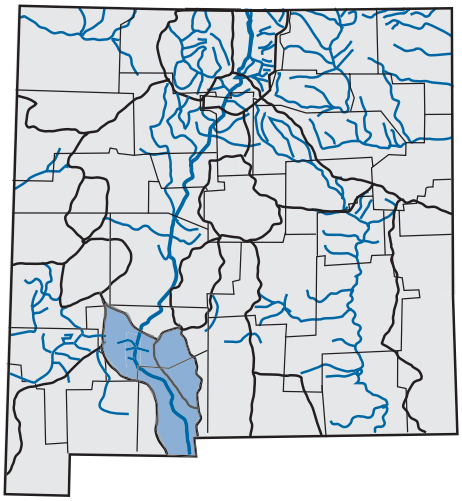
- The City of Albuquerque proposes to divert twice its annual allocation of San Juan-Chama Project water from the Rio Grande to reduce the City's unsustainable reliance on groundwater. Because half of the

diversion would end up as return flow to the river, the City maintains the project will not impair downstream water users nor endangered species. The City has submitted an application to the Office of the State Engineer for the project and several groups have protested the application.

- The City and County of Santa Fe as well as Las Campanas are planning for a direct diversion of surface water from the Rio Grande near the Buckman Well Field in the Middle Rio Grande Basin to meet current and planned demand.
- The Mount Taylor Water Supply Project would convey water from the Westwater Canyon aquifer to Gallup. Water would be available to the Laguna and Acoma Pueblos—and perhaps other users—primarily for municipal supply.
- Because of aggradation of the riverbed from the Bosque del Apache south to the headwaters of Elephant Butte Reservoir, the US Bureau of Reclamation has proposed to relocate the river and the Low Flow Conveyance Channel below San Marcial to the west side of the flood plain, where the ground elevations are substantially higher than the present river channel. The proposal as currently conceived has significant water conveyance and depletion problems that, if not modified and if the project is implemented, will affect New Mexico's Rio Grande Compact compliance.
- The US Army Corps of Engineers is re-evaluating their proposal to reconstruct the river levee from San Acacia to San Marcial, New Mexico. They are also looking at moving the San Marcial railroad bridge to reduce the significant flood threat to farms in the area, the City of Socorro, the Bosque del Apache and to the Low Flow Conveyance Channel and to allow for an increase in flood releases from upstream reservoirs, respectively. The project has been delayed since the early to middle 1990s due to threats of litigation related to Endangered Species Act compliance.
- The NMISC and US Army Corps of Engineers are conducting a detailed investigation in the Socorro area in coordination with New Mexico Tech University to better understand the connection between surface water and groundwater in the area and to determine if there are better ways to meet the varying demands for water in this critical reach of the river.

- The US Bureau of Reclamation is attempting to construct a channel through the exposed sediment delta of Elephant Butte Reservoir to the active reservoir pool using, to a large degree, funding from the NMISC. Currently, approximately 18 miles of channel need to be constructed and or maintained and approximately seven miles have been partially constructed at a cost to the state of approximately $2.0 million. Endangered species compliance issues delayed initiation of the project for several years. An additional five miles of channel need to be constructed in order to have a rudimentary connection between the river and the reservoir itself. The NMISC is coordinating with the US Bureau of Reclamation to finalize permitting and begin work on the five-mile segment. However, funding constraints may limit the state's ability to continue to support the effort.

LOWER RIO GRANDE AND SOUTHERN JORNADA BASINS



MAJOR ISSUES

The Lower Rio Grande basin has both groundwater and surface water, and in some cases these supplies are closely linked. Close proximity to El Paso and Ciudad Juarez metropolitan areas—with a population of almost 2 million—means that competition for water supplies is intense. Issues are, among others:

- Rio Grande Compact compliance must be assured.
- Intensive groundwater pumping in Texas and Mexico will negatively affect New Mexico groundwater supplies. No regulatory framework has been established to address this problem. To cite one example, the New Mexico community of Santa Teresa may be negatively impacted because of pumping in the Mesilla Bolson.
- Texas may pursue the import of both groundwater and surface water from New Mexico.

- The El Paso Water Utilities Public Service Board (PSB) has been obtaining land with irrigation water rights in the Mesilla Valley in New Mexico and seeks to use the water represented by those New Mexico rights in Texas. This marks the first attempt by El Paso to obtain surface water from New Mexico.
- The El Paso utility has also been pumping water from the Canutillo Well Field immediately across the state line. It is now installing more wells and new pipelines to increase this pumping. This affects the Rio Grande and may affect the quantity and quality of Rio Grande Project water delivered to EP No. 1.
- Texas is also threatening to sue New Mexico regarding compliance with the Rio Grande Compact in an attempt to secure more water.
- The New Mexico-Texas Water Commission formed as a result of the 1991 El Paso Water Suit Settlement Agreement has developed plans for the Las Cruces-El Paso Sustainable Water Project, which entails diverting water from the Rio Grande—possibly in Texas—for purification at the state line and use in communities in both states.
- The Rio Grande Silvery Minnow Critical Habitat Environmental Impact Statement now being prepared includes a proposed designation of critical habitat in the middle valley that includes Elephant Butte Reservoir up to the dam. If the designation is finalized in its current form, operations of the Rio Grande Project including storage in Elephant Butte Reservoir and deliveries of water to EBID and EP No. 1 farmers may be impacted.

Irrigation and return flow from the Low Flow Conveyance Channel to the Rio Grande near Escondida, New Mexico.

WATER RESOURCES MANAGEMENT

The Rio Grande Project. Caballo Dam and Reservoir and Elephant Butte Dam and Reservoir were built as part of the Rio Grande Project, as were several diversion dams, about 140 miles of canals, 450 miles of laterals and 465 miles of drains in New Mexico and Texas. The Project was designed to provide a reliable supply of surface water to specific lands in what are now EBID and EP No. 1, plus 60,000 ac-ft/year of water to Mexico under the terms of a 1906 treaty. The allocation of Project water to New Mexico and Texas is approximately 57 percent and 43 percent respectively.

Water is released from Caballo Reservior during the irrigation season and diverted at the Percha and Leasburg Diversion Dams for use in New Mexico by Elephant Butte Irrigation District (EBID) irrigators in the Rincon and Upper Mesilla Valleys. Water is also released from the Mesilla Diversion Dam for use in New Mexico by EBID irrigators and in Texas by El Paso Irrigation District (EPID) No. 1 irrigators in the lower Mesilla Valley. The American Diversion Dam supplies water to EPID No.1 irrigators in Texas below El Paso, and the International Dam supplies water to Mexico.

Adjudication. An adjudication suit has been pending in the Lower Rio Grande basin since 1986. Hydrographic surveys to establish the extent and priority date of each existing water right are in progress by the OSE.

OSE Administrative Guidelines for the Mesilla Basin. The Lower Rio Grande Underground Water Basin includes most of the Lower Rio Grande and Southern Jornada basins (Atlas Plate 2). In 1999, the Office of the State Engineer established guidelines for the review of water right applications for a sub-region referred to as the Mesilla Valley Administrative Area. Administrative standards include limiting stream flow depletion due to groundwater pumping to less than 0.1 ac-ft/year (otherwise offset is required), limiting average annual local groundwater level declines to less than one foot and designating High Impact Areas, which are areas of shallow groundwater (less than 100 feet) where pumping may have large and immediate effects on Rio Grande flows.

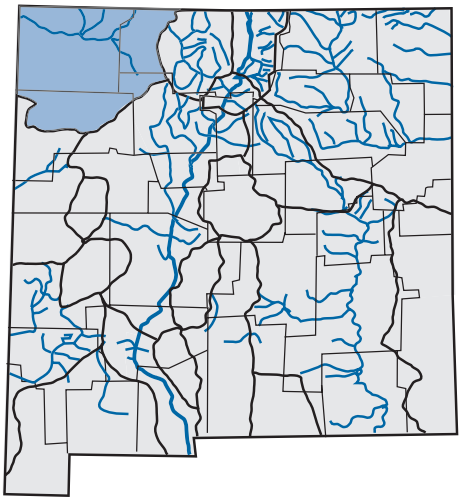
WATER SUPPLY AND DEMAND

The Las Cruces-El Paso Sustainable Water Project. The Las Cruces-El Paso Sustainable Water Project as originally planned would seek to make good-

quality surface water available to Hatch, Las Cruces and Anthony, New Mexico, and El Paso, Texas, using Rio Grande surface water diversions and surface-water treatment plants. A 32-mile pipeline across Anthony Gap would carry treated water to northeastern El Paso in the Hueco Bolson, where much of the water would be stored in an aquifer storage and recovery (ASR) project for later use.

Aquifer Storage and Recovery Projects. The City of Las Cruces and the Lower Rio Grande Water Users Organization are currently considering the feasibility of ASR projects in the Mesilla basin and Jornada basin in Doña Ana County.

SAN JUAN RIVER BASIN



MAJOR ISSUES

Representation and defense of New Mexico's interest in treaties with Mexico and interstate compacts must continue to be vigorously pursued. Among the primary matters of concern are:

- Colorado's performance under the La Plata River Compact during dry periods typically falls short.
- Planned development of the Navajo-Gallup Water Supply Project is triggering a number of needs, including:
  - US Bureau of Reclamation completion of the corresponding Environmental Impact Statement and feasibility study, which will address endangered species (Colorado pikeminnow and razorback sucker) habitat impacts, among other topics.
  - Upgrades to community water distribution systems operated by the Indian Health Service, the Navajo Tribal Utility Authority and Gallup.
  - $400 million in funding for the Project itself.
- Resolution of Compact compliance issues related to the proposed diversion of water from the Upper Basin for use in the Lower Basin.

- Proposed Navajo Dam operations changes to benefit endangered species—part of the San Juan River Basin Recovery Implementation Program—may have negative effects on tailwater trout, hydropower generation, diversion structures and water quality.
- Wastewater discharge permits to the San Juan River may need to be rewritten if the US Bureau of Reclamation implements its proposed Navajo Dam operations. The State Environment Department is now developing total maximum daily loads for stream segments in order to formulate a plan for reducing non-point pollution where this is a problem.
- Navajo Indian Irrigation Project requires funding of more than $200 million for new irrigation facilities, plus additional funds for rehabilitation of older systems and the Hogback and Fruitland irrigation projects.
- The Animas-La Plata Project, although authorized, has not been funded, nor have operating criteria been established for it. In addition, assignment of State Engineer Permit No. 2883 has not been confirmed.
- In some matters, progress hinges on adjudication of water rights. However, the hydrologic data needed to proceed is lacking and funding for data collection is inadequate.
- Settlement of Navajo Nation claims to San Juan waters (if achieved) is likely to require water rights and federal funding for construction and operation of projects such as the Navajo Indian Irrigation Project, as well as public support to gain Congressional approval.
- Drought and growing water demand are dictating the need for priority administration of water rights, which may also be needed for the state to have full use of its Upper Basin waters. The OSE is funding metering for required data gathering on irrigation ditches on the San Juan, Animas and La Plata Rivers. Specific shortage sharing criteria and hydrologic criteria still need to be developed, and an OSE-appointed task force of water users is working on related recommendations.

San Juan River West of Farmington, New Mexico, photo courtesy of the NM Film Office, a division of the NM Economic Development Department.

“The construction and operation of federal water projects must comply with federal environmental laws.”

WATER RESOURCES MANAGEMENT

Water uses in New Mexico from the San Juan River and its tributaries are subject to the 1944 Mexican Water Treaty and the Colorado River, Upper Colorado River Basin, La Plata River and Animas-La Plata Project compacts. The 1944 Mexican Water Treaty apportions the waters of the Colorado River system between the United States and Mexico. The Colorado River Compact apportions the use of waters of the Colorado River system within the United States to the Upper and Lower basins. Parts of Arizona, Colorado, New Mexico, Utah and Wyoming constitute the Upper Basin; the Lower Basin includes parts of Arizona, California, Nevada, New Mexico and Utah. The Upper Colorado River Basin Compact apportions among the Upper Basin states the use of waters that are available for use each year by the Upper Basin under the Colorado River Compact.

The State of New Mexico is apportioned consumptive use equaling 11.25 percent of the quantity of consumptive use available and remaining after deduction of the limited use made in Arizona from the Upper Basin. The Upper Colorado River Commission administers the provisions of the Compact. The La Plata River Compact governs the terms by which the waters of the La Plata River are to be distributed daily between Colorado and New Mexico, and it is administered by the State Engineers of the states. The Animas-La Plata Project Compact establishes equal priority for the water supply to be diverted by the Project between uses under the Project in Colorado and New Mexico.

The 1948 Echo Ditch Decree adjudicated non-Indian water rights in the San Juan River Basin. In addition, permits and licenses to divert and use water in the basin have been issued by the State Engineer since 1948. Some of the permits were acquired and assigned by the Interstate Stream Commission to the Secretary of the Interior for the purpose of developing New Mexico’s Upper Basin apportionment. In recent years, Congress authorized a settlement of the water rights claims of the Jicarilla Apache Nation to waters of the San Juan River Basin, and a partial final decree stating the Jicarilla’s rights for historic and future uses was entered in the San Juan Basin adjudication. The State Engineer and the Navajo Nation currently are in negotiations in an attempt to reach a settlement of the Navajo’s water rights claims in the San Juan River Basin in New Mexico. Indian uses constitute a large fraction of the total water use in the basin.

In the early 1950s, planning for development of the water supply apportioned to New Mexico by the Upper Colorado River Basin Compact was concentrated on several major federal projects that would put to use the undeveloped water available to New Mexico. The Bureau of Indian Affairs, the Bureau of Reclamation, the Navajo Nation, the State of New Mexico and several local interests were involved. Federal projects subsequently authorized by Congress include Navajo Dam and Reservoir, the San Juan-Chama Project (SJCP), the Animas-La Plata Project (ALP), the Hammond Project and the Navajo Indian Irrigation Project (NIIP). Construction of the NIIP and the ALP has yet to be completed. Water from these federal projects is supplied under contracts with the Secretary of the Interior to water users in New Mexico. The Bureau of Indian Affairs also maintains the Hogback and Fruitland irrigation projects, which serve Navajo Nation lands. The Bureau of Reclamation is in the process of developing an Environmental Impact Statement and feasibility report for the Navajo-Gallup Water Supply Project. The construction and operation of federal water projects must comply with federal environmental laws, including the National Environmental Policy Act, the Clean Water Act and the Endangered Species Act. The San Juan River below its confluence with the Animas River provides designated critical habitat for two fish species listed as endangered, and water bodies in the San Juan River Basin also support habitat for endangered bird species. The Interior Department also has certain Indian trust responsibilities.

WATER SUPPLY AND DEMAND ISSUES

New Mexico has held that its apportionment for consumptive use of water from the Upper Basin is 727,000 ac-ft/yr based on the terms of the Colorado River and Upper Colorado River Basin compacts and the hydrologic or water supply record. The use of New Mexico's apportionment is made from waters of the San Juan River, its tributaries and underground water sources and uses occur both within the San Juan River Basin in New Mexico and outside the basin in other areas of New Mexico via trans-basin diversion. The amount of New Mexico's Upper Basin apportionment that is actually available for use within the State of New Mexico is estimated to be 669,000 ac-ft/yr after deduction of the State's share of Colorado River Storage Project (CRSP) reservoir evaporation. The CRSP is operated to maintain the Upper Basin's delivery requirement at Lee Ferry under the Colorado River Compact, and all Upper Division States must share in the

evaporation loss resulting from said operation. New Mexico's estimate of its apportionment assumes a firm yield to the Upper Basin of 6.3 million ac-ft (maf) annually and accounting of salvage by use.

In 1988, the Bureau of Reclamation made a hydrologic determination that the firm yield available to the Upper Basin is at least 6.0 million ac-ft (maf) annually. However, the Upper Colorado River Commission disagrees with the assumption used by Reclamation in its hydrologic determination of a minimum release of 8.23 maf annually from Glen Canyon Dam. Also, Reclamation's hydrologic determination does not account for salvage by use. Although the Commission and Upper Division States disagree with portions of the analysis contained in the hydrologic determination, the Upper Division States at this time have not objected to assuming a yield to the Upper Basin of at least 6.0 maf per year for planning purposes and water supply studies within the Colorado River Basin. This is because the hydrologic determination does not constrain uses in the Upper Basin in the near future. Based solely on the hydrologic determination, New Mexico's Upper Basin apportionment is at least 669,000 ac-ft/yr, or about 611,000 ac-ft/yr of use within the State after deduction of CRSP evaporation chargeable to New Mexico. For planning purposes, the Upper Colorado River Commission has adopted projections of future depletions within each of the Upper Division States and the Upper Basin as a whole. December 2001, New Mexico submitted for the Commission's consideration a revised depletion schedule for projections of water use from the Upper Basin in New Mexico through the year 2060. The revised depletion schedule for New Mexico projects that consumptive uses within the State, without consideration of water salvage and excluding CRSP evaporation, will approach 600,000 ac-ft/yr during the period 2040 to 2060. The depletion schedule is not an acceptance of any assumption that limits the Upper Colorado River Basin's depletion.

Current consumptive uses within or from the San Juan River Basin in New Mexico fluctuate yearly and aggregate to a total depletion averaging on the order of 400,000 ac-ft/yr. Over half of this amount is consumptively used by irrigated agriculture, and more irrigation use will occur in the future as construction of the NIIP proceeds. The amount of acreage irrigated in recent years on the NIIP has approached approximately 50,000 acres, and the acreage for the project authorized by Congress is 110,630 acres. The depletion from the basin includes the amount of SJCP water diverted from

the San Juan Basin drainage in Colorado and exported to the Rio Grande Basin. Recent hydrologic studies suggest that a long-term average annual diversion by the SJCP of approximately 108,000 ac-ft/yr will be needed to supply the contracted yield of 96,200 ac-ft/yr from the project at Heron Dam in the Rio Grande Basin. Approximately 50,000 ac-ft of water per year is consumed in the generation of thermal electric power within the San Juan Basin, and lesser amounts of depletions occur from municipal, industrial, commercial, domestic and other uses.

In general, water uses from the San Juan and Animas rivers have a full supply of water during all but the driest years. To the contrary, irrigators on the La Plata River suffer water supply shortages nearly every summer and fall. For example, in the Chaco River drainage, lack of a dependable water supply on ephemeral tributaries limits irrigation or other uses in the basin.

Most of the water use in the San Juan River Basin is from surface water sources. Few of the rock formations are capable of yielding large quantities of groundwater, and groundwater from those that could yield large quantities is likely to be of poor quality. Groundwater is used primarily for livestock and for rural household and minerals-processing purposes. It has been estimated that large quantities of groundwater exist in the basin, but most of it may be too saline or too costly to develop to be of use. Good quality groundwater is obtainable where the San Jose formation crops out in the eastern part of the basin, in the outcrop area of the sandstone formations to the west, and in the valley alluvium adjacent to the San Juan River and its perennial tributaries. Water found elsewhere is apt to have more than 1,000 mg/liter of dissolved solids and generally is unsuited for domestic use.

ISSUES TO ADDRESS IN STATE WATER PLANNING

COMPACTS, DECREES AND TREATIES

In the San Juan River Basin, New Mexico's consumptive use apportionment is dependent on water available to the Upper Basin, and said availability is dependent on delivery requirements to the Lower Basin and Mexico and on the operation of Colorado River system reservoirs. The State Engineer represents the State of New Mexico in Seven Basin States forums to protect New Mexico's interests in Colorado River system operations. For example, the State Engineer or his designee participates in the Secretary of the

“Many communities and people on the Navajo Indian Reservation have inadequate domestic water supplies.”

Interior’s consultation with the Seven Basin States on preparation each year of an annual operating plan for Colorado River Basin reservoirs to meet the delivery requirement to Mexico, to deliver water in accordance with the decree in Arizona v. California, and to satisfy project purposes under varying hydrologic conditions. The Secretary has adopted interim surplus guidelines that provide for conditional declarations of surplus conditions as the criterion governing the operation of Lake Mead so long as California meets specific benchmarks in implementing a plan to reduce its demand for Colorado River water to its basic apportionment of 4.4 maf annually by 2015. The State Engineer also participates in the Glen Canyon Dam Adaptive Management Work Group, which is a federal advisory committee chartered to apply adaptive management to operation of Glen Canyon Dam to conserve sediment resources and sand bars in the Colorado River through the Glen, Marble and Grand Canyons for protection of fish habitat, riparian vegetation, rafter campsites and archeological sites. Of concern to the Upper Division States is the possibility that periodic releases from Glen Canyon Dam in excess of power plant capacity might be identified as necessary to conserve sediment resources and endangered fish in the canyons below the dam, thus adversely affecting the availability of water for use by the Upper Division States and power production.

Further downstream, the International Boundary and Water Commission, United States and Mexico (IBWC), adopted Minute 306 to the 1944 Mexican Water Treaty to establish a conceptual framework for international studies to prepare recommendations concerning restoration of the riparian and estuary ecology of the Limitrophe Section of the Colorado River and its associated delta. The Seven Basin States have stated their opposition to any proposed restoration measures that would involve delivery of Colorado River water from the United States in excess of the current treaty delivery obligation. Also, the United States must comply with streamflow salinity standards for the Colorado River set by Minute 242 of the IBWC. The State Engineer participates on the Colorado River Basin Salinity Control Forum to provide assistance to the evaluation and implementation of federal salinity-control measures upstream from Imperial Dam. The Yuma Desalting Plant, constructed to desalt irrigation return flows for delivery to Mexico, has been in standby status due to high operation costs but should be maintained to enable restart within a reasonable time.

WATER DEVELOPMENT

Many communities and people on the Navajo Indian Reservation have inadequate domestic water supplies. The Navajo-Gallup Water Supply Project (NGWSP) is being planned to provide good quality, renewable domestic water supplies to Navajo communities in the San Juan Basin, the Rio Grande Basin and the Little Colorado River Basin, and to the City of Gallup. The NGWSP also would serve the southern portion of the Jicarilla Apache Indian Reservation. The amount of funding that will be required to construct the NGWSP is on the order of $400 million. Community water distribution systems operated by the Indian Health Service, the Navajo Tribal Utility Authority and Gallup need to be upgraded to accommodate delivery of NGWSP water. New Mexico is working with the Seven Basin States to resolve compact issues relating to the project's proposed diversion of water from the Upper Basin for use in the Lower Basin. The total depletion by the NGWSP users in New Mexico is planned to be over 27,000 ac-ft and the project also would provide roughly 6,000 ac-ft for uses in Arizona under that state's compact apportionments.

Although Congress authorized the NIIP in 1962, appropriations for construction of the NIIP to date have been insufficient to complete construction of the project. Additional funding in an amount exceeding $200 million is needed to construct irrigation facilities on the three blocks of the NIIP that remain to be constructed. Older portions of the NIIP are in need of refurbishment. In addition, the Hogback and Fruitland irrigation projects are in need of rehabilitation. Progress on improvements to these projects is important to the Navajo Nation.

The Jicarilla Apache Nation may utilize a portion of its water rights to supply some of the water demand under the NGWSP. Also, the Public Service Company of New Mexico's (PNM) contract for water from the Navajo Reservoir supply for uses at the San Juan Generating Station expires in 2005; but, PNM has negotiated a contract with the Jicarilla Apache Nation to lease annually 16,200 ac-ft of the Jicarilla's Navajo Reservoir supply water for use at the station during the period 2006-2027.

The Congress in 2000 authorized for construction the ALP as a part of the water rights settlement legislation for the Colorado Ute Tribes. The authorization provides for a total annual project depletion averaging 57,100 ac-ft/yr for uses in both Colorado and New Mexico for municipal, domestic

and industrial uses only. In New Mexico, the San Juan Water Commission is allocated 10,400 ac-ft, the Navajo Nation is allocated 2,340 ac-ft for use by Navajo communities along the San Juan River from Farmington to Shiprock, and the La Plata Conservancy District is allocated 780 ac-ft for domestic use. Congress also authorized construction of the Farmington-Shiprock pipeline, at a non-reimbursable cost, to convey the water allocated to the Navajo Nation. Reclamation and the San Juan Water Commission negotiated a contract and funding agreement for its share of project water. A small amount of water already is being used under New Mexico diversion permits associated with the project, but the facilities need to be constructed. The States of Colorado and New Mexico need to pursue operating criteria for the ALP. The authorizing legislation also provides that upon the request of the State Engineer, the Secretary of the Interior shall assign to the New Mexico Animas-La Plata Project beneficiaries or to the Interstate Stream Commission, in accordance with the request, the Department of the Interior's interest in State Engineer Permit Number 2883, in order to fulfill the New Mexico non-Navajo purposes of the project.

INTERSTATE ISSUES

Interstate issues relating to New Mexico's apportionment under the Upper Colorado River Basin Compact and Upper Basin water development in New Mexico are summarized in the preceding sections. New Mexico also has concerns regarding the State of Colorado's performance under the La Plata River Compact. Deliveries by Colorado at the New Mexico stateline during dry periods typically fall short of its compact delivery requirement, and New Mexico believes that underdeliveries are caused in part by Colorado's river operations. Although the amount of underdelivery may be comparatively small relative to water supplies on other streams in the San Juan Basin, it is a significant amount to ditches in the La Plata River drainage in New Mexico.

FEDERAL ENVIRONMENTAL LAWS

A large portion of the water use in the San Juan River Basin in New Mexico is made possible by the operation of federal water projects, and all federal activities in the basin must comply with the Endangered Species Act (ESA). The Colorado pikeminnow and razorback sucker inhabit the San Juan River below its confluence with the Animas River, and both species are listed as endangered under the ESA with critical habitat. Operating

Navajo Dam to mimic a natural hydrograph—for example, with high flows during the spring snowmelt and low base flows at other times of the year is believed to provide for the habitat needs of the endangered fish species. Such dam operation thus is needed to provide ESA compliance for continued operation of Navajo Dam, as well as for further development of New Mexico's Upper Basin compact apportionment.

To recover the two endangered fish species in the San Juan River while proceeding with water development in the basin consistent with applicable laws, the State of New Mexico committed to participate in the San Juan River Basin Recovery Implementation Program (SJRBRIP). The SJRBRIP in 1999 adopted recommendations for flows that biologists deemed necessary to provide for the habitat needs of endangered fish in the San Juan River downstream from Farmington. In order to meet the flow recommendations, the Bureau of Reclamation has proposed operating Navajo Dam with base flow releases of as low as 250 cfs and peak flow releases of as high as 5,000 cfs. Reclamation expects to complete in 2003 a final Environmental Impact Statement on its proposed dam operations. While the proposed dam operations might benefit endangered fish recovery and both Indian and non-Indian water development and use in New Mexico, concerns have been expressed by some in the San Juan Basin regarding negative impacts of the proposal on the high-quality tailwater trout fishery below Navajo Dam, hydropower generation at the City of Farmington's Navajo Dam power plant, and diversion structures and water quality in the San Juan River between the dam and Farmington.

Federal water projects to supply uses in New Mexico that have successfully completed ESA Section 7 consultation with the Fish and Wildlife Service include the NIIP and the ALP. The operation of Navajo Dam, the SJCP and the NGWSP must still undergo Section 7 consultation. The SJRBRIP, along with the operation of Navajo Dam to meet the flow recommendations for endangered fish habitat, provides actions needed to promote recovery of the endangered fish species in the San Juan River and to mitigate impacts of water development and water management activities in the basin. The SJRBRIP has identified a need to implement capital works to recover the endangered fish at a tentatively estimated cost of about $18 million. These works include fish passage structures at diversion dams, fish screens on diversions and physical habitat modifications. Such works have been

designed and are being implemented at the Hogback, Fruitland and PNM diversion weirs. Federal legislation provides for cost-sharing of such works in the San Juan River and Upper Colorado River basins between the Secretary of the Interior, the Upper Basin States and CRSP power users. New Mexico's share of the cost is about $2.74 million.

Also, riparian habitat in the San Juan River Basin, as well as elsewhere along the Colorado River system, provides habitat for the endangered southwestern willow flycatcher, which breeds exclusively in riparian areas in the southwestern United States. River regulation and dewatering by water development has been cited as a principal cause for decline of the species due to the impacts of development on native riparian vegetation and ecosystems. In some instances, flycatcher habitat has been established along reservoir shorelines or within reservoir areas during periods of low storage. Some organizations have raised concerns regarding the impact of fluctuating water levels in reservoirs on flycatcher habitat.

Pursuant to the Clean Water Act, point source discharges are regulated by the Environmental Protection Agency pursuant to permits written to protect against violation of the State of New Mexico's stream water quality standards. Wastewater discharge permits to the San Juan River may need to be rewritten if Reclamation adopts and implements its proposed Navajo Dam operation. The Environment Department currently is in the process of developing total maximum daily loads for streams in the San Juan River Basin to develop a plan for reducing non-point pollution loadings to reaches where water quality is impaired as compared to the standards.

OTHER WATER RESOURCES MANAGEMENT ISSUES

The State Engineer is implementing a process to collect and record data needed to proceed with the current San Juan Basin adjudication. However, an updated hydrographic survey has not been started and completion of the adjudication is many years away. Proceeding with the adjudication is hampered by a lack of resources with which to conduct it.

The State of New Mexico and the Navajo Nation have executed a Memorandum of Agreement committing to formally negotiate a settlement of the water rights claims of the Navajo Nation to waters of the San Juan River Basin in New Mexico, including to contract rights from Navajo Reservoir. The negotiations are ongoing. Any settlement likely will require

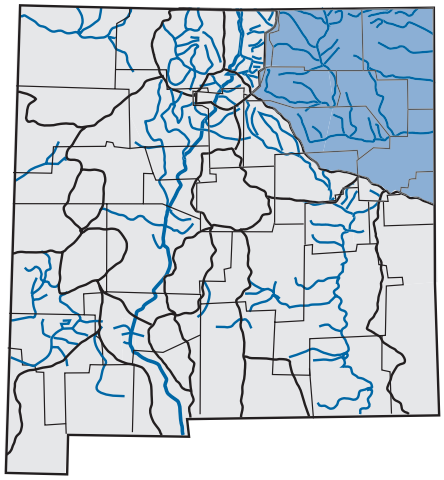
water rights and federal funding for water development (for example, construction and operation of the NIIP, the ALP and the NGWSP). A settlement also likely will need the support of water users in the San Juan Basin if it is to pass Congress. The United States has appointed a federal water rights negotiation team to assist in furthering a negotiated settlement.

NEED FOR ADMINISTRATION

The State of New Mexico, when it committed to participate in the SJRBRIP, agreed to protect from diversion the releases of water from Navajo Dam that are made to benefit the endangered fish in the San Juan River. Protecting Navajo Dam storage releases will help to maintain ESA compliance and needed water supplies for federal water projects and their contractors in New Mexico. To date, New Mexico has not administered diversions. But, record drought in the San Juan Basin during 2002, combined with dam releases to provide for endangered fish habitat while overcoming excessive diversions from the San Juan River below Navajo Dam, resulted in substantial declines in Navajo Reservoir storage and the possibility of water supply shortages to water contractors in 2003. Consequently, the Bureau of Reclamation and the Navajo Nation have requested that the State Engineer administer diversions in the San Juan River Basin in 2003.

To prepare for administration of diversions, the Interstate Stream Commission is funding cooperative installation and improvement of metering facilities on irrigation ditches on the San Juan, Animas and La Plata rivers. While the La Plata River diversions currently are measured and administered by a local watermaster, irrigation diversions in the remainder of the basin are not administered. Municipal and industrial diversions in the basin already are metered. Other factors to address before implementing administration include the development of specific shortage sharing criteria among Navajo Reservoir supply water contractors and hydrologic criteria for administration of direct flow rights in the basin. The State Engineer has appointed a task force comprised of select water users in the San Juan River Basin to evaluate current hydrologic conditions and river administration concerns, and to make recommendations as to how to operate or administer the rivers. While the request to administer diversions in the basin was brought on by drought, New Mexico eventually would have had to address these issues as it approached full use of its Upper Basin compact apportionment.

CANADIAN AND DRY CIMARRON BASINS



MAJOR ISSUES

This area relies on a combination of surface water and groundwater for its supplies. Major issues include:

- The area is susceptible to drought and needs drought planning. Surface flows provide a little less than half of supplies.
- The development of the 24,000 ac-ft/year safe yield of Ute Reservoir represents the best source of a renewable municipal supply, not only for this basin but also for all of Eastern New Mexico. The costs will be on the order of $300 million. Federal support may cover 50 percent to 65 percent of costs, though hopes remain for a greater federal cost share. Without development of this renewable water source, the viability of Eastern New Mexico communities and economies is in doubt.

Ute Reservoir, Logan, New Mexico represents the best renewable municipal supply not only for this basin but for all of Eastern New Mexico.

- Surface-water supplies above Conchas Dam are fully appropriated, and finding water supplies for growing populations along the western slopes of the Sangre de Cristo Mountains will be difficult.
- Agricultural use of the High Plains, Ogallala, and other aquifers has been extensive. Water tables in those aquifers are dropping rapidly, especially in the eastern portion of the region along the Texas-New Mexico border where unrestricted groundwater pumping in Texas is depleting the aquifer in New Mexico. Conservation, improved irrigation techniques, development of the Ute Reservoir 24,000 ac-ft safe yield, low water use and dry-farmed crops may be necessary if current regional populations and economies are to be sustained the future.
- The reach of the Canadian River from Logan, New Mexico, to just below Ute Reservoir has been declared critical habitat for the endangered Arkansas River Shiner. This has the potential to negatively affect agriculture and development of the Ute Reservoir supply.

HYDROLOGY

The Canadian and Dry Cimarron basins are parts of the larger Arkansas-White-Red River basin. The Canadian River, the principal through-flowing river in the basin, is perennial throughout its reach in New Mexico. However, prior to the construction of downstream reservoirs, it was occasionally dry in its downstream reaches. The Dry Cimarron River, which flows eastward very close to the northern boundary of the state, is perennial; but in dry years, it may only flow in its upper reaches.

Many of the important tributaries to the Canadian River flow from the east side of the Sangre de Cristo Mountains and include the Vermejo River, Cimarron Creek and Mora River. Additional tributaries, with headwaters in the eastern plains, are the Conchas River and the Ute and Revuelto Creeks. Tramperos Creek, an intermittent tributary to the Canadian that flows in Union County and crosses the Texas border, also provides some surface-water supplies. Most measurement on the Canadian River and its tributaries is done by US Geological Survey (USGS) stream gages.

Major reservoirs in the basins and storage capacities are Eagle Nest Lake (78,000 ac-ft), Conchas Lake (529,000 ac-ft) and Ute Reservoir (200,000 ac-ft). Eagle Nest Lake was completed in the early 1900s, Conchas Dam was completed in 1939 for flood control and for regulation of irrigation water of the Arch Hurley Conservancy District and Ute Dam was completed in 1963 and modified in 1984. There are several other smaller reservoirs.

The Canadian River at the Highway 54 crossing, photo courtesy of the NM Film Office, a division of the NM Economic Development Department.

Surface-water supplies above Conchas Dam are fully appropriated. Downstream of Conchas Dam, the Ute Reservoir annual yield of 24,000 ac-ft is available for beneficial use. This water is currently under contract between the Interstate Stream Commission and the Ute Water Commission for an option to purchase. The 24,000 ac-ft annual yield is intended to provide a sustainable source of water for Eastern New Mexico communities.

Estimates of surface water yield in the Dry Cimarron and Canadian River Basins are approximately 240,000 ac-ft per year. Depletions are estimated to be approximately equivalent to yield. Estimates are based on approximations of evaporation and tributary inflows calculated from rough estimates of drainage yields and less than comprehensive gaging of discharges. The average annual flow of the Canadian River at Logan, approximately 30 river miles west of the Texas border, was measured as approximately 30,000 ac-ft. The average annual flow of Revuelto Creek, joining the Canadian approximately 12 miles downstream of Logan, was gaged at approximately 26,000 ac-ft per year. The 24,000 ac-ft safe annual yield of Ute Reservoir can be used to approximate net undeveloped surface water yield.

WATER SUPPLY AND DEMAND

Irrigated agriculture relies heavily on surface flows, and surface water provides a little less than half of the water for public supplies. Eastern New Mexico communities must develop the full safe yield of Ute Reservoir if they are to have a viable future. Communities in and along the eastern slopes of the Sangre de Cristo and Rocky Mountains will have an increasingly difficult time obtaining the supply needed to provide for municipal needs.

Water quality is poor in many parts of the basin. Much of the middle and western portions of the region do not have sufficient quality or quantities of water to permit increased municipal demands.

Other than the Arch-Hurley Irrigation Project, agriculture has largely depended upon mined water out of the High Plains, Ogallala and other aquifers. The aquifer levels are dropping rapidly, especially in the eastern portion of the region along the Texas-New Mexico border where unrestricted groundwater pumping in Texas is depleting the aquifer in New Mexico. Conservation, improved irrigation techniques, and low water use and dry farmed crops will be necessary in the future.

ISSUES TO ADDRESS IN STATE WATER PLANNING

WATER DEVELOPMENT

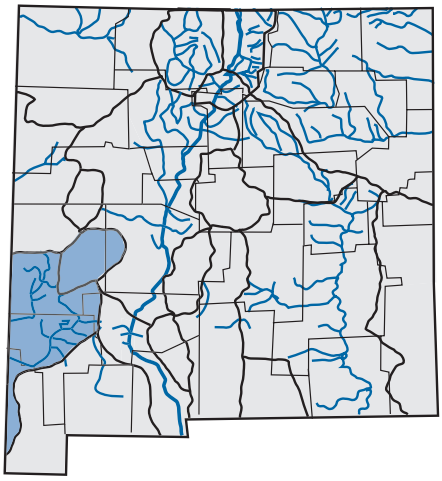
The development of the 24,000 ac-ft/year safe yield of Ute Reservoir represents the best source of a renewable municipal supply for Eastern New Mexico. The costs will be in the range of $300 million, and federal support may cover 50 percent to 65 percent of costs, though hopes remain for a greater federal cost share.

FEDERAL ENVIRONMENTAL LAWS

The Arkansas River Shiner has been listed as an endangered species and the reach of the Canadian from Logan, New Mexico just below Ute Reservoir has been declared critical habitat with potential impacts that could negatively affect agriculture and development of the Ute Reservoir supply.

“The Gila Basin area is currently experiencing severe drought conditions.”

GILA BASIN



MAJOR ISSUES

This region relies on a combination of surface water and groundwater for its supplies. Major issues include:

- The 18,000 ac-ft of Gila River water apportioned to New Mexico in the 1968 Colorado River Basin Project Act may be the last undeveloped, renewable water source in the region, key for future development in the region.
- The Southwest willow flycatcher, the loach and spikedace minnows, and the Western (or Apache) leopard frog are currently species listed under the Endangered Species Act. The Gila trout and the Gila chub, among others, have been proposed for listing.
- The area is currently experiencing severe drought conditions.
- Bayard-Silver City supplies may not be sufficient to meet needs within 40years.
- Legislation recently introduced by US Senator Kyle (R-AZ) has the potential to settle Indian water rights claims in the Upper Gila Valley and remove New Mexico users from a suit brought by the Gila River Indian Community and others that would limit groundwater pumping in the Virden Valley reaches of the Gila River.

WATER RESOURCES MANAGEMENT

Water resources in the Gila Basin are fully apportioned. A number of legal and legislative mandates affect water management in the Gila Basin region.

The Boulder Canyon Project Act of 1928 gave Arizona exclusive beneficial use of the Gila River excluding pre-existing water rights, thus limiting any further development in New Mexico on the Gila River. In the 1935 Globe Equity Act (sometimes termed the Gila Decree) in the US District Court for Arizona, water uses on the upper Gila River were essentially adjudicated.

The 1964 US Supreme Court Decree in *Arizona v. California* limited depletions and irrigated acreage in the San Simon, San Francisco and Gila streams. It limited use of San Simon Creek to irrigation of no more than 2,900 acres during any one year, and total consumptive use of such water, for whatever purpose, may not exceed 72,000 ac-ft during any consecutive 10-year period. The Decree also limits total consumptive use of such water, for whatever purpose, to 8,220 ac-ft during any one year and limits total consumptive use (exclusive of uses in Virden Valley, New Mexico), for whatever purpose, to 136,620 ac-ft during any consecutive 10-year period. In addition, total consumptive use of such water (exclusive of uses in Virden Valley, New Mexico), for whatever purpose, is limited to 15,895 ac-ft during any one year and may not irrigate more than 7,057 acres of land.

The Decree prohibits uses from the San Francisco River from exceeding a total consumptive use of 31,870 ac-ft during any period of 10 consecutive years; and from exceeding a total consumptive use of such water, for whatever purpose, of 4,112 ac-ft and irrigation of 2,269 acres of irrigated land. The Decree also apportioned water for the irrigation of additional 381 acres of land in the Virden Valley over and above the lands adjudicated rights under the Globe Equity Decree.

The 1968 Colorado River Basin Project Act apportioned an additional 18,000 ac-ft of water annually to New Mexico from the Gila River, its tributaries or underground sources.

Legislation recently introduced by US Senator Kyle (R-AZ) has the potential to settle Indian water rights claims in the Upper Gila Valley and remove New Mexico users from a suit brought by the Gila River Indian Community and others to limit their groundwater pumping in the Virden Valley reaches of the Gila River.

WATER SUPPLY AND DEMAND

Recent modeling by the Office of the State Engineer indicates that water levels in most aquifers will remain sufficient for current uses in the near future. Pumping in the Bayard-Silver City and Deming areas will reduce saturated thickness in some well fields to the point that wells may be non-productive. Bayard-Silver City supplies may not be sufficient to meet needs

within 40 years. Some data suggests groundwater levels in the San Augustin Plains are in decline.

The current drought has severely impacted water supply in the region. Stream flows have dropped to nine percent to 16 percent of average and a continuation of this drought into the next year, especially a repeat of the 2001-2002 winter snow pack that totaled less than one percent of average, could place a number of communities in a drinking water emergency and worsen the already critical livestock and irrigation supplies.

ISSUES TO ADDRESS IN STATE WATER PLANNING

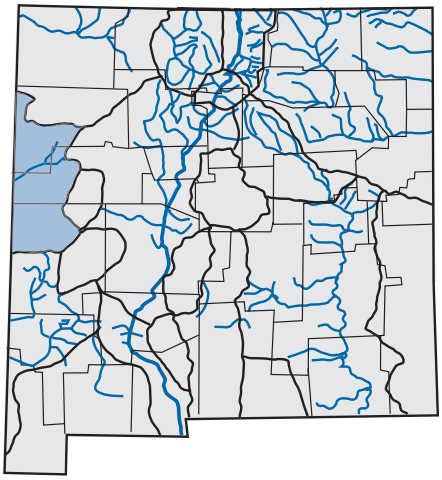
WATER DEVELOPMENT

The 18,000 ac-ft of Gila River water apportioned to New Mexico in the 1968 Colorado River Basin Project Act may be the last undeveloped, renewable water source in the region.

FEDERAL ENVIRONMENTAL LAWS

The Southwest willow flycatcher, the loach and spikedace minnows, and the Western (or Apache) leopard frog are currently species listed under the Endangered Species Act. The Gila trout and the Gila chub, among others, have been proposed for listing

LITTLE COLORADO BASIN



WATER RESOURCES MANAGEMENT SETTING

Water uses in New Mexico from the Little Colorado River Basin are subject to the Colorado River Compact, which apportions the use of water from the Colorado River system to the Upper and Lower basins. However, the State of New Mexico's entitlement within the Lower Basin apportionment to the tributary waters in the Little Colorado River Basin has not been quantified.

In addition to the water use by the City of Gallup, Indian water uses constitute a significant fraction of the total water use in the basin. The Zuni River adjudication is ongoing, in which the water rights of Zuni Pueblo will be adjudicated.

WATER SUPPLY AND DEMAND ISSUES

The availability of surface water supply in the Little Colorado River Basin in New Mexico is very limited. Black Rock Reservoir and a few other small reservoirs regulate surface flow for irrigation of small amounts of land, and agriculture is concentrated in the Zuni River drainage. Even though storage facilities exist in the basin, sufficient water in storage is not physically available to provide water for all of the irrigated lands, and seasonal shortages often occur. Annual consumptive uses in the basin, including for agriculture, municipal, industrial and domestic uses, aggregate on average to approximately 12,000 ac-ft/yr.

Most of the water used in and near the City of Gallup is pumped from the Gallup Sandstone and Dakota-Westwater aquifers. The aquifers are deep, however, and static water levels in wells tapping the aquifers have declined up to several hundred feet during the past 30 years. The groundwater use by the City of Gallup is not sustainable.

ISSUES TO ADDRESS IN STATE WATER PLANNING

WATER DEVELOPMENT

The Navajo-Gallup Water Supply Project would divert water from the San Juan River for delivery and use in Gallup and surrounding communities within the Little Colorado River Basin. The Project is being planned by the Bureau of Reclamation to provide a renewable supply of 7,500 ac-ft of water per year to the City of Gallup to both replace existing groundwater uses and meet projected future water demands. An additional 6,500 ac-ft of water per year would be delivered for use by Navajo communities near Gallup. Community water distribution systems operated by the Indian Health Service, the Navajo Tribal Utility Authority and Gallup need to be upgraded to accommodate delivery of the Project water. Federal funding and local cost shares likely will be needed to fund the Project. The financial feasibility for the Project has yet to be established. Project issues relating to compact administration, federal environmental law compliance and a

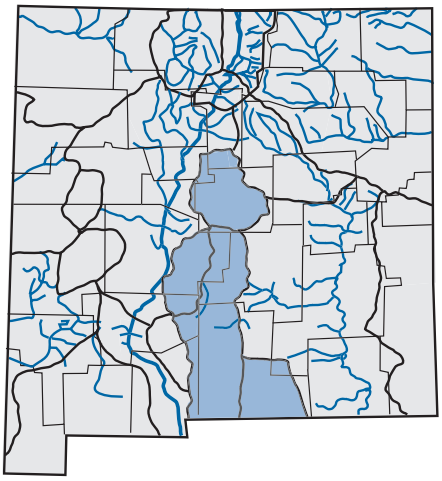
possible Navajo Nation water rights settlement in the San Juan River Basin are addressed in the section on the San Juan River Basin.

The Corps of Engineers will be constructing the Little Puerco Wash Flood Control Project to provide flood protection to downtown Gallup. The City of Gallup will sponsor and provide cost sharing for the project.

FEDERAL ENVIRONMENTAL LAWS

Riparian habitat in the Little Colorado River Basin provides some habitat for the Southwestern willow flycatcher, which is listed as endangered under the Endangered Species Act (ESA). One area that the Southwestern willow flycatcher may seasonally occupy is along the Zuni River.

CENTRAL CLOSED BASIN



The Central Closed basins (CCB) include the large closed basins in the middle of New Mexico: Estancia, Tularosa, Salt and northern Jornada basins. While all topographically closed, for the most part these basins each have distinct characteristics, water supplies and issues that separate them from their neighbors, thus these basins will be described and discussed separately.

Because these basins are, for the most part mined basins, ground water development is time-limited and utilizing these sources for M&I presumes that the water pumped will someday have to be replaced by another source.

ESTANCIA BASIN

HYDROLOGY

Surface-water supplies in the Estancia basin are minor. There are no perennial streams. Numerous small salt-water lakes, such as Laguna del Perro, occupy the central part of the basin.

Dog Lakes, Estancia, New Mexico, photo courtesy of the NM Film Office, a division of the NM Economic Development Department.

The major aquifers are the valley fill sediments and the bedrock Madera Limestone. The valley fill aquifer is located in the central portion of the basin and is composed of sand, silt and gravel. Most of the irrigation wells in the basin draw from the valley fill aquifer. Groundwater development from the valley fill is concentrated from several miles north of Moriarty to several miles south of Willard. The Madera Limestone is the principal aquifer in the west-central and northwestern portions of the basin. Groundwater in the Madera generally flows along bedding planes and along fractures. Other formations are also aquifers in certain areas.

WATER SUPPLY AND DEMAND

Groundwater furnishes nearly all of the water used in the Estancia basin. Groundwater inflow to the Estancia basin is approximately 31,000 ac-ft/yr. In 1995 an estimated 61,000 ac-ft was withdrawn with about 95 percent of this applied to irrigation. Water levels have declined over much of the area; the maximum water-level declines in the basin are around 70 ft. Irrigated agriculture totaled more than 34,000 acres in 1980 and has declined to 25,895 acres in 1995.

“Groundwater furnishes nearly all of the water used in the Estancia basin.”

Table 1. Steady-state ground-water flow balance for the Estancia basin

Flow Category	Inflow (ac-ft/yr)	Outflow (ac-ft/yr)
Recharge	30,100	
Evapotranspiration		26,430
Groundwater discharge to Galisteo basin		3,930
Groundwater discharge to Tularosa basin		420
Groundwater inflow to the Madera Group	900	
Total	31,000	30,780

Although the total groundwater in storage is substantial, much of it is unavailable for recovery, particularly in bedrock areas where fracturing has not increased the permeability of the unit sufficiently to support high well yields. Additionally, some of this water may contain high salt concentrations that preclude certain uses. Although water-quality issues are not currently affecting supplies, groundwater pumping may draw water with higher dissolved solids toward the pumping wells. Groundwater in storage is not water availability. These estimates do not reflect legal and state administrative constraints on ground water pumping for protection of existing rights nor the economic limits on access to the groundwater. Much of the total groundwater is in aquifers that would not support well yields sufficient for economic irrigation.

BASIN ISSUES

There is no central water authority or irrigation district in the Estancia basin. For the most part, water rights remain appurtenant to historically irrigated lands. Water right licenses, declarations and permits far exceed historical pumping, and the basin has not been adjudicated. As with several other mined ground-water basins in the state, the basin is administered by the Office of the State Engineer to allow gradual depletion. The most important legal constraint on water use in the Estancia basin is the recently established set of administrative guidelines for processing water rights applications. Under the guidelines and an accompanying Order, there will be no new groundwater appropriation in the basin. This restriction on new appropriations is intended to extend the life of the aquifer and to protect existing rights. The NMOSE will still consider water rights transfers, supplemental wells and applications for domestic wells.

Although some Estancia basin residents disapprove of exporting basin water, water is already moving from former irrigation wells in the northern part of the basin to the Sandia Basin. Proposals have also been made to export saline water for use by the City of Santa Fe. Whether further export projects should be built is an important planning issue.

Mining of ground water has caused serious water level declines in the valley fill aquifer. Modeling predictions show that the number of dry wells will increase in the coming decades. Some wells may be deepened to regain a water supply but the lower formations may have poorer quality water and provide less yield.

TULAROSA AND HUECO BASINS

HYDROLOGY

Surface water, including that imported through the Bonito pipeline from the Lower Pecos basin, furnishes almost one-third of the water used in the Tularosa basin. Flows from the Rio Tularosa and La Luz Creek are utilized, in addition to flows from springs along the slopes of the Sacramento Mountains. Spring flows used by the City of Alamogordo totaled 5,696 ac-ft in 1995.

Tularosa River, New Mexico

The Santa Fe Group is primarily made up of basin-fill deposits composed of gravel, sand, silt and clay. The formation is coarser grained (higher permeability) in areas adjacent to mountain-fronts and finer grained (lower permeability) toward the center of the basin. In addition, an important constraint on the use of ground water in the Tularosa basin is its quality; much of which contains concentrations of TDS greater than 1,000 mg/L (upper limit for potable water). Fresher water is found close to the recharge zones along the base of the mountains, and saline water resides in the central and

deeper parts of the basin. Alamogordo, Tularosa, and Holloman Air Force Base in New Mexico and the cities of El Paso and Ciudad Juarez utilize the aquifer.

Table 1. Annual surface flows for the Tularosa basin

Gaging Station	USGS ID	Drainage Area (sq. mi)	Time Period	Average (ac-ft/yr)	Minimum (ac-ft/yr)	Median (ac-ft/yr)	Maximum (ac-ft/yr)
La Luz Creek at La Luz, NM[a]	08484500	74	1983-1986	5,800	2,200	6,100	8,700
Tularosa Creek near Bent, NM[b]	08481500	120	1948-1995	9,500	5,800	7,900	17,200
Salt Creek near Tularosa, NM	08480595	N/A	1996-1998	700	560	580	1,060

[a] Flows influenced by upstream diversions for municipal supply for City of Alamogordo.
[b] Flows influenced by upstream diversions for irrigation of about 1,000 acres (1959 determination).

During predevelopment conditions, recharge may have totaled about 86,000 ac-ft/yr for the entire Tularosa basin. As recharge enters the sediments and flows southward the water quality degrades. Less than 0.2 percent of groundwater stored in the basin may be considered fresh (1,000 mg/L or less) and is mainly found adjacent to the mountain fronts south of Alamogordo, and next to the southern San Andres Mountains to the New Mexico-Texas state line. Because the fresh and saline water are hydrologically connected, well diversions in the fresh zone may cause saline encroachment towards potable water zones.

WATER SUPPLY AND DEMAND

While there is a considerable amount of groundwater stored in the Tularosa basin in basin-fill and bedrock aquifers, only a very small portion of the potable water may be recoverable. Additional groundwater is physically recoverable in the basin but it will require treatment. Limitations are also imposed by state administrative constraints to protect existing rights, and economic realities.

Table 2. Total groundwater in storage for Tularosa basin

Aquifer Category	Total Dissolved Solids Concentration				
	<1,000 mg/L	1,000-5,000 mg/L	5,000-10,000 mg/L	10,000 mg/L or more	Total
Basin fill, total	32,500,000	232,000,000	238,000,000	26,800,000	529,300,000
Bedrock, total	19,100,000	56,300,000	161,000	0	75,561,000
Basin fill, recoverable	8,120,000	48,000,000	43,700,000	4,700,000	104,520,000
Bedrock, recoverable	9,570,000	28,200,000	81,000	0	37,851,000

The estimated total groundwater withdrawn in the Tularosa basin in 1995 was an estimated 47,140 ac-ft. Most of the water withdrawn from the basin is for irrigation and public supplies. Public supplies are also obtained from surface water and groundwater; irrigation tends to rely more on groundwater supplies. Of the surface water withdrawn for public supplies, some is imported from Bonito Lake, in the Rio Hondo watershed of the Lower Pecos basin. Water piped from Bonito Lake provides water to Nogal, Carrizozo, Alamogordo and Holloman Air Force Base via the Bonito pipeline. Combined, these users have rights to a little more than 3,000 ac-ft/yr from Bonito Lake in Lincoln County. However, the pipeline is presently capable of supplying a much lower quantity due to pipeline conditions (new pipeline is currently being constructed).

BASIN ISSUES

In 1982, the State Engineer declared the Tularosa Underground Water Basin (see Atlas Plate 2). Basin guidelines were adopted to process water rights applications. The Hueco Underground Water Basin was declared in 1980. Water-right applications are reviewed in a manner similar to the Tularosa guidelines. Tularosa basin issues involve the limitation of additional water level declines and water quality degradation. As the fresh water supplies are extracted, saline encroachment will occur to degrade remaining fresh water supplies. The current interest in the appropriation of Tularosa basin saline waters must be considered in light of impacts on existing freshwater resources and rights. Future studies may conclude that there are geographic locations in the basin where pumping saline resource has negligible effect on existing, fresh water rights and wells.

The protection of surface water supplies is of vital importance to the region. Subdivision development allowing single household wells and septic tanks poses an ongoing concern in the protection of these resources.

The City of Alamogordo has been very progressive in managing available water resources. An aquifer storage and recovery (ASR) project is being developed to store the excess winter surface water in the aquifer by well injection and pumping it back during high summer demand. The costs are small (estimated at about $0.15 per ac-ft) because the injection will operate by gravity. Alamogordo has also filed water rights applications to extract saline water and is planning a desalination plant to remove dissolved minerals from ground water. Preliminary cost estimates for a desalination

plant in Alamogordo, which could treat 8 million gallons per day, are $15 to $20 million.

The administration of the Hueco basin is complicated by groundwater development in Texas and Mexico. Well withdrawals in Texas affect water levels and water quality on the New Mexico side. The Hueco basin is probably the most critical of the trans-international boundary aquifers in this area because both El Paso, with a population (for El Paso County) in excess of 700,000, and Cuidad Juarez, with a population of over 1.2 million, rely heavily on these aquifers and water levels have declined up to 200 ft in areas of these cities. Studies suggest that the aquifer on the Texas side may be depleted within the next few decades. There is no compact dealing with cross-border ground-water issues and the potential for out-of-state requests for New Mexico water is of ongoing concern.

SALT BASIN

MAJOR ISSUES

- Until the basin was declared, water resource issues were not regulated or monitored.
- Development pressure within the New Mexico side of the basin has been very modest, less than in Texas.
- Speculation about a large-scale water development project must be supported by much more technical analysis. It is very difficult to predict well yields and life in fractured limestone aquifers.
- The Hydrology Bureau did not evaluate the Shomaker model prepared for the ISC. That model was not intended to be an administrative model. Data to assess the accuracy of the model predictions are scant.
- Ownership dominance by federal and state entities complicates development of groundwater to be piped elsewhere.

HYDROLOGY

SURFACE WATER

The Sacramento River, Shiloh Draw and Piñon Creek are the major streams in the Salt basin; all are intermittent but the Sacramento River. There are no surface water reservoirs, other than stock ponds, in the basin. For a small study, the Sacramento River was gaged from 1985 to 1988; annual

flow ranged from about 1,800 to 5,500 ac-ft, a significant variation. Some water is diverted for irrigation from the Sacramento River.

Areal recharge from the Sacramento River and the smaller watersheds around the basin (a total of 358 square miles) is estimated at 35,000 ac-ft/yr.

GROUNDWATER

The Salt basin is a complex down-faulted basin, filled with unconsolidated sediments. The thickness of Santa Fe Group basin-fill sediments has been reported to be as much as 500 ft, but in most places it is between 25 and 300 ft. Groundwater saturation is much less. Bedrock limestone aquifers in the basin are productive where fractured, and where solution of minerals has enhanced permeability.

The basin-fill aquifer provides water in the southern Crow Flats. The bedrock aquifers comprise the main aquifer in the Crow Flats area and other parts of the basin. There are few wells and pumping tests to assess the groundwater beneath much of the basin.

Well yields depend on location, depth, and the degree of fracturing in the bedrock aquifer; reported yields in a few wells reach 6,000 gpm. Generally, irrigation wells can produce over 1,000 gpm. Where bedrock units are less fractured, well yields are generally smaller than 50 gpm.

Most of the stored and recoverable groundwater is in bedrock aquifers (Table 1). The total in bedrock storage assumes an average saturated thickness of 750 ft, and a specific yield of 0.05 gpm. One-half of that is assumed recoverable groundwater. These estimates do not reflect legal and state administrative constraints on groundwater pumping for protection of existing rights, nor the economic limits to accessing the groundwater. Additionally, much of the total groundwater is in aquifers that would not support well yields sufficient for economic irrigation. Again, these estimates are provided for comparison purposes, only. Hydrologically the basin is poorly understood. It would require many new wells and pumping tests to evaluate thoroughly.

“There are no surface water reservoirs, other than stock ponds, in the Salt Basin.”

Table 1. Total groundwater in storage and estimated recoverable groundwater, by water quality category in ac-ft—modified from J. Shomaker & Associates, Inc., 2001, draft.

Aquifer Category	Total Dissolved Solids Range				
	<1,000 mg/L	1,000-5,000 mg/L	5,000-10,000 mg/L	10,000 mg/L or more	Total
Basin fill, total	230,000	2,690,000	0	0	2,920,000
Bedrock, total[a]	30,000,000	27,500,000	0	0	57,500,000
Basin fill, recoverable	115,000	1,340,000	0	0	1,455,000
Bedrock, recoverable[a]	15,000,000	13,800,000	0	0	28,800,000

[a]Assuming 750 ft average saturated thickness and porosity of 0.05 for total volume of water in bedrock; half of the stored water was estimated to be recoverable.

Depth to water in the central part of the Salt basin is usually around 200 ft, and in upland areas surrounding the central basin, about 400 ft. East of Piñon, depth to water is about 1,000 ft. Between 1950 and 1995, groundwater declines of up to 30 ft have been recorded in the Crow Flats area.

WATER RESOURCE MANAGEMENT SETTING

Groundwater supplies most of the water used in the Salt basin. In 1995, an estimated 10,000 ac-ft was diverted for irrigation and out of that an estimated 8,100 ac-ft was consumed. An average of over 600 ac-ft/yr is used for public supply, much of it at Timberon. Livestock, commercial and industrial uses diverted 540 ac-ft of surface water and 80 ac-ft of groundwater; an estimated 10 ac-ft was diverted for other uses.

On September 13, 2000, the New Mexico State Engineer declared the Salt Underground Water Basin to be under his administrative review (Atlas Plate 2). Hunt Building Corporation had recently filed declarations of rights appurtenant to about 3,060 acres of currently and formerly irrigated lands, and there are indications that these rights, along with others across the state line in Texas, might be managed for the benefit of the City of El Paso or other users in Texas. Any such transfer out of New Mexico would be subject to water rights applications and subsequent approval of a permit from the State Engineer.

WATER SUPPLY AND DEMAND

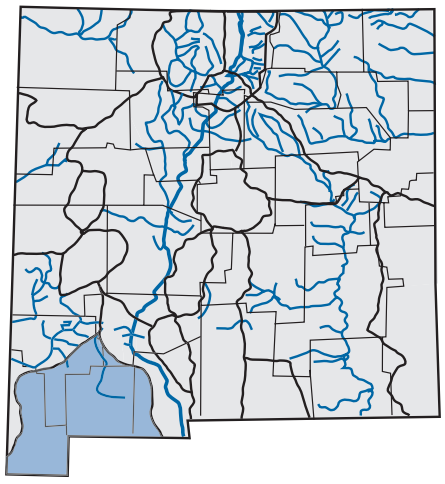
Prior to the basin being declared, water resources in the Salt basin were not administered by the NMOSE. Historical resource development and existing, established water rights have only been estimated. Like other groundwater

basins, the potential for groundwater development is time-limited in the sense that most groundwater depletions will not be replenished, in human time, by natural recharge.

Although the total diversion represented by declared water rights is more than 47,000 ac-ft/yr, the exportable water related to these rights (i.e., the historical consumptive use) is probably close to the 8,100 ac-ft/yr mentioned above. Any additional appropriation would be subject to new applications and approval by the State Engineer. Most of the groundwater that might be pumped and exported would actually come from storage and lead to significant drawdowns in the areas of well fields.

Several entities are considering the Salt basin as a water source to augment supplies across southern New Mexico and in southwest Texas. Due to the clear need for any available renewable water resources to meet growing demands in southern New Mexico, the NMISC has filed an application to appropriate water from the Salt Basin for uses throughout southern New Mexico. Other entities have also filed applications for develop and export of water to the El Paso area.

SOUTHWEST CLOSED BASINS



HYDROLOGY

The table below summarizes the main hydrologic features of each basin in the Southwest Closed Basins (SWCB) region. A discussion of the hydrology of each basin in the SWCB region follows. Refer to Atlas Plates 19.1 and 19.2 for additional hydrologic information about these basins.

The Mimbres basin is 5,140 square miles in area, 4,410 square miles of which are located in New Mexico, with the rest in Mexico. The only significant stream in the basin is the upper reach of the Mimbres River, which is typically perennial to the Grant-Luna County line and is used for irrigation. Below that, the Mimbres River is intermittent and rarely flows beyond

Summary table for the Southwest Closed Basins (unless otherwise stated, numbers apply to both New Mexico and Mexico portions of the basins).

Basin	Area of Entire Basin	Estimated Recoverable Stored Groundwater	Recharge (ac-ft/yr)	1995 Groundwater Pumping (ac-ft)
Mimbres	5,140	30,600,000	39,940	127,000
Uvas valley (Nutt-Hockett)	133	2,400,000	633	27,600
Hachita-Moscos	1,040	4,860,000	4,860	5,900
Playas	925	4,860,000	5,670	
Animas	2,448	9,500,000	12,700	30,200

Deming. Average flow of the Mimbres River at the Mimbres gage over the period of record is 10,300 ac-ft/yr, with a large range in flows. Flows greater than 3,900 ac-ft/yr occurred about four years in five flows greater than 7,200 ac-ft/yr occurred about half of the years and flows that exceed 18,600 ac-ft/yr occurred one year in five.

The principal aquifer in the Mimbres basin is the basin fill, which is composed of the Gila Conglomerate and younger sediments and associated volcanic rocks and is up to 4,000 ft thick. Estimates of recharge range between 40,000 and 80,000 ac-ft/yr. Prior to extensive development, groundwater flowed southward from New Mexico into Chihuahua at 4,100 to 6,500 ac-ft/yr. Much of this flow has been intercepted by groundwater pumping in New Mexico, and in places groundwater may now flow from south to north across the border. The total amount of groundwater withdrawn between 1931 and 1985 was about 3.4 million ac-ft. Areas of heavy ground-water development include Silver City and Hurley, primarily for municipal and mining purposes, and near Deming and Columbus, mainly for irrigated agriculture. Generally, in the northern and central parts of the basin water is suitable for most uses—total dissolved solids (TDS) less than 500 mg/L), but in the southern and eastern areas it may not be suitable for irrigation or domestic uses (TDS 500 to 1,000 mg/L).

The Uvas valley, also referred to as the Nutt-Hockett basin, occupies 133 square miles in the northeastern corner of the SWCB region. Surface-water supplies in the basin are insignificant, and groundwater in the basin represents the major water supply, used mostly for irrigated agriculture. Groundwater in the Uvas valley is stored in several aquifers, but basin-fill of the Santa Fe Group is the major aquifer in the basin. Groundwater flow in the Uvas valley is from the mountains to the northeast, toward the Rio

Grande. Recharge in the basin is estimated to be about 663 ac-ft/yr. Groundwater quality is typically good (TDS less than 1,000 mg/L).

The Hachita-Moscos basin is a trans-international-boundary basin covering about 1,040 square miles. More than half of the basin (620 square miles) is in New Mexico; the rest is in the state of Chihuahua, Mexico. There are no perennial streams in the Hachita-Moscos basin and there has not been much groundwater development. Groundwater in the basin fill flows from the northern and western parts of the basin southeast toward Mexico. Preliminary estimates of groundwater flow from New Mexico into Mexico are 2,000 ac-ft/yr or less. Recharge of some 4,800 ac-ft/yr enters the basin fill at and near the mountain fronts. Generally, the water quality in the Hachita-Moscos basin in New Mexico is suitable for irrigated agriculture (less than 500 mg/L TDS).

The Playas basin covers an area of about 925 square miles. Streams in the basin are ephemeral. Groundwater flow in the basin-fill aquifer is generally from south to north; some flow comes from Mexico. Average annual groundwater recharge has been estimated at about 5,670 ac-ft. Predevelopment groundwater discharge was to springs and to Playas Lake, and some groundwater was thought to leave the basin via underflow to adjacent basins to the east and north. The maximum basin-fill thickness in the Playas basin is 1,650 ft; however, the productive aquifer typically is not thicker than 660 ft. Historically, groundwater in the basin was pumped for irrigation, but in recent times, irrigation water rights have been transferred to mineral processing uses at the smelter at Playas, in the central part of the basin. It is estimated that about 4,913 ac-ft of water was used for mineral processing in 1995, but the smelter is now closed. Groundwater quality is generally suitable for most types of irrigated agriculture. In the southern and central parts of the basin, TDS content of groundwater is generally less than 500 mg/L. In the northern half of the basin, groundwater typically ranges from 500 mg/L to 1,000 mg/L TDS.

The Animas basin is topographically closed, but it has a drained groundwater system. The total area of the basin is about 2,448 square miles (mostly in New Mexico). There are no major perennial streams in the basin. The major aquifer is the basin fill. Recharge is about 12,700 ac-ft/yr. Groundwater generally flows to the north and northwest, and discharges beyond the Animas basin boundary as underflow into the Gila River basin.

“Within the SWCB are several declared administrative Underground Water Basins; these are the Animas, Lordsburg Valley, Playas Valley, Nutt-Hockett and Mimbres Valley.”

Irrigated agriculture in the Animas basin is located in the lower Lordsburg and Animas “valleys” and totaled about 8,600 acres in 1995. Irrigation groundwater withdrawals have drawn mainly on aquifer storage and have not significantly affected natural discharge to the Gila River basin, estimated to range from 5,913 ac-ft/yr to 12,700 ac-ft/yr. The basin-fill is up to 2,000 ft thick, but only the upper 660 ft of the aquifer is considered productive. The water is good to marginal for agricultural use, with TDS ranging from less than 250 mg/L in the southern part of the basin to greater than 250 mg/L and in some cases greater than 1,000 mg/L in the northern part.

WATER RESOURCES MANAGEMENT SETTING

Within the SWCB are several declared administrative Underground Water Basins; these are the Animas, Lordsburg Valley, Playas Valley, Nutt-Hockett and Mimbres Valley (Atlas Plate 2). The Underground Water Basins (UWBs) do not cover all areas, and wells may be drilled without water rights or State Engineer permits in the undeclared areas. Administrative criteria exist for the Lordsburg, Mimbres and Playas UWBs; criteria for the Mimbres UWB are described below.

The Mimbres UWB was declared in 1931, and in the years since additional areas have been added to it. Some areas in the basin, mostly in Luna County, were determined by the NMOSE to be fully appropriated and were closed to additional groundwater appropriation; they are still closed. The remaining parts of the basin are administered based on a groundwater flow model developed by the NMOSE and the USGS in the late 1970s. The basin is divided into four-square-mile administrative blocks based on the model grid. New appropriations are allowed if the non-pumping water level 20 years after the pumping begins is less than 128 ft below the land surface in any administrative block in which there are groundwater irrigation rights, and if the average rate of decline of the water level does not exceed 2.5 ft/yr. Critical administrative blocks are those that have a drawdown rate that exceeds 2.5 ft/yr or, in blocks with irrigation rights, where the calculated 1994 pumping level is at or below 128 ft. The criteria are also designed to protect surface-water rights in the fully appropriated Gila and Mimbres Rivers. The criteria, based on agricultural economics of the early 1970s, are still in effect.

WATER SUPPLY AND DEMAND ISSUES

Public Law 90-537 (90th Congress, S. 1004, September 30, 1968), which authorized the Central Arizona Project (CAP), gave an apportionment to New Mexico of 18,000 ac-ft/yr of Gila River system water over and above the amounts in the Gila and the *Arizona v. California* decrees, provided that CAP water is delivered to offset impacts to downstream rights. The law also authorized the completion of a reservoir or a suitable alternative in the basin in New Mexico to develop the additional apportionment. Several projects, notably dams on the Gila River at the Connor and Hooker sites, have been proposed for impounding and storing water for use in New Mexico (see *Gila-San Francisco, Water Projects*), but nothing yet has been realized. If at some point this water is developed, it would be logical to use it for municipal and industrial supplies in the southwestern part of the state.

The total amount of groundwater in storage that will be available for future recovery in the basins of the SWCB region has been estimated. Available groundwater in storage in the Mimbres basin is estimated to be 30,600,000 ac-ft. The estimated groundwater in storage in the Nutt-Hockett Underground Water Basin as of 1992 totaled about 4.8 million ac-ft, of which about half is estimated to be recoverable. About 4.86 million ac-ft of ground water may be available in the entire Hachita-Moscos basin. The total amount of recoverable ground water in the Playas basin is estimated to be 4.86 million ac-ft. There is estimated to be about 9.5 million ac-ft of recoverable groundwater in the Animas basin. None of these estimates takes into consideration the number of wells needed, the costs or the potential impacts to existing wells of recovering this water. Development of this groundwater for any particular project would require case-by-case analysis of these factors based on site-specific information.

The total water withdrawn in the SWCB in 1995 was 216,800 ac-ft, and total consumptive use was 131,400 ac-ft. Agriculture in the SWCB is the largest category of water use, withdrawing about 178,300 ac-ft of water in 1995. Mining and public supply account for much of the remainder, about 24,800 and 9,500 ac-ft, respectively. With the exception of irrigation, of which 14 percent is provided by surface water, most other use is of ground water. Irrigation represents the largest consumptive use in the basins, followed by public supplies and mining.

ISSUES

Because surface water resources are relatively insignificant in the SWCB region, and no interstate or international streams or compacts exist, management of groundwater is the primary policy issue. Supplies will need to be managed to provide for long-term availability of groundwater for agricultural, municipal and industrial demands in the region until Gila River surface water supplies may become available. Administrative criteria may need to be updated in those UWBs with existing criteria, such as Mimbres and Lordsburg Valley, and new criteria developed for those UWBs currently lacking criteria. Administering these criteria will require the development of appropriate technical tools, which may include groundwater flow models capable of evaluating effects on water supplies, water quality, and other water users of proposed development. Declaration of new UWBs, and/or extensions to existing declared UWBs, such as recently proposed for the Animas and Lordsburg Valley UWBs, may be needed to manage development as the subdivision of rural areas in the region continues. Pumping is likely to increase in the part of the Mimbres basin that lies in Mexico, with consequent effects on the water available on the New Mexico side of the border. There is no treaty or other regulation dealing with cross-border groundwater issues.

ISSUES TO ADDRESS IN STATE WATER PLANNING

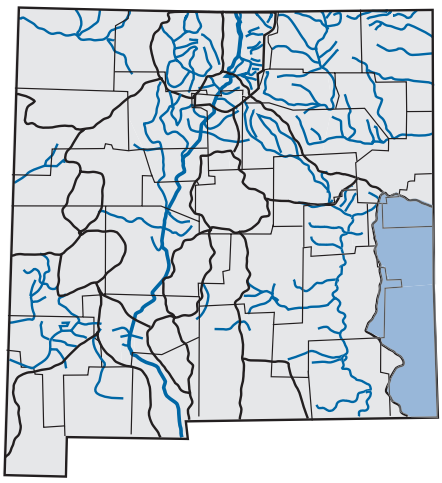
WATER DEVELOPMENT

The development of the 24,000 ac-ft/year safe yield of Ute Reservoir represents the best source of a renewable municipal supply for Eastern New Mexico. The costs will be in the range of $300 million, and federal support may cover 50 percent to 65 percent of costs, though hopes remain for a greater federal cost share.

FEDERAL ENVIRONMENTAL LAWS

The Arkansas River shiner has been listed as an endangered species and the reach of the Canadian from Logan, New Mexico, just below Ute Reservoir has been declared critical habitat with potential impacts that could negatively affect agriculture and development of the Ute Reservoir supply.

SOUTHERN HIGH PLAINS BASIN



HYDROLOGY

SURFACE WATER RESOURCES

The Southern High Plains represents the upland fringe of watersheds whose major rivers flow across Texas and into the Gulf of Mexico. Surface water in the New Mexico Southern High Plains occurs in ephemeral channels, small natural lakes, some spring flow and scattered playas or salt flats. There are no perennial streams and typically, surface water only flows following intense storms. Ranger Lake and Salt Lake in Lea County are a result of both surface-water inflow and groundwater discharge. Numerous ephemeral playa lakes cover an area roughly less than one acre, though some can be much larger. Some spring flow was historically observed in places such as the base of Mescalero Ridge, but flows are reported to have diminished due to groundwater pumping.

GROUNDWATER RESOURCES

By far the most important aquifer to date in the Southern High Plains basin has been the High Plains aquifer, a veneer of unconsolidated sand, silt, clay and gravel comprising the Ogallala Formation overlying much less permeable bedrock (Atlas Plate 5). The saturated thickness is irregular: to the north and west and in central areas (northern Lea County and southern Roosevelt County) it is generally thinner than it is near the state line. The saturated thickness in Texas is generally greater. Well yields range widely, from less than 100 to nearly 2,000 gpm; higher yields are at least partly attributable to greater saturated thickness.

Before intense pumping began, groundwater in the High Plains aquifer generally flowed to the southeast into Texas. Due to over 50 years of intensive pumping in both New Mexico and Texas, the direction of flow has shifted, particularly in areas where groundwater pumping has been the heaviest. The predevelopment rate of flow of groundwater from New Mexico into

“The Southern High Plains represents the upland frings of watersheds whose major rivers flow across Texas and into the Gulf of Mexico.”

Texas through the High Plains aquifer was significant. As shown in the following table, NMOSE models show that as the saturated thickness decreased, the flow into Texas has been less than in times before pumping began.

Predevelopment and recent groundwater flow from New Mexico to Texas in the Southern High Plains aquifer (from Musharrafieh and Logan, 1999; and Musharrafieh and Chudnoff, 1999).

	Lea County Model: Approximate Flow (ac-ft/yr)	Date	Curry and Portales Valley Model: Approximate Flow (ac-ft/yr)	Date
Predevelopment	42,500[a]	1948	34,000[c]	1909
Late 20th Century	35,000[a] to 48,729[b]	Mid-1990s	13,000[c]	1990

[a] From Musharrafieh and Chudnoff, 1999.
[b] From Leedshill-Herkenhoff et al., 2000. Calculated using Darcy’s Law and hydraulic conductivity values from Musharrafieh and Chudnoff, 1999.
[c] From Musharrafieh and Logan, 1999.

In some areas in New Mexico, groundwater levels have declined 125 feet since pumping began. Drawdowns are even greater in Texas, particularly in areas of concentrated pumping. At present day pumping rates, water levels will continue to decline and eventually wells will lose economic yields or go dry.

The quality of water from the High Plains aquifer is adequate for most uses in the basin. Problems with groundwater contamination generally have been associated with leaking underground storage tanks, nitrate from agricultural activities, dairy operations, septic tanks, public and private sewage treatment plants and oil- and gas-field operations. Thousands of oil and gas wells have been drilled through the area’s aquifers, and oil and gas operations have created some contamination problems with total dissolved solids as well as with crude oil, methane and chloride. Generally, these problems are associated with historical disposal of oil-field brine.

In areas where the High Plains aquifer is thin or non-existent, other geologic units such as alluvial deposits near the City of Jal, or Mesozoic sedimentary rocks including the Santa Rosa Sandstone and Antler Formation provide groundwater supplies. Deeper geologic units that have been reported as productive, primarily in the southern part of the basin, such as the Rustler Formation, have not been sufficiently explored to estimate their aquifer potential.

WATER MANAGEMENT SETTING

UNDERGROUND WATER BASINS (UWBs) ADMINISTERED BY THE NMOSE

The Southern High Plains basin includes parts or all of the Curry County Underground Water Basin (UWB), the Lea County UWB, Portales UWB, Capitan UWB, Jal UWB, and Carlsbad UWB (Atlas Plate 2). There is a large undeclared area between the Portales and Lea County Underground Water Basins. The Curry County, Portales and Lea County Underground Water Basins are mined aquifers, and it is recognized that continued pumping at present-day rates will deplete the aquifer. The NMOSE still accepts applications for new appropriations, subject to review using administrative criteria intended to preserve a life-expectancy for existing wells.

WATER SUPPLY AND DEMAND ISSUES

CURRENT AND HISTORICAL WATER USE

In 1995, about 511,600 ac-ft of water was withdrawn for irrigation, representing about 89 percent of water-use in the basin. The next largest water-use category, accounting for about 5 percent of total withdrawals, is public water supply, which pumped about 30,700 ac-ft of ground water in 1995. In 1995, most of the water that was withdrawn in the basin was consumed. While overall withdrawals and depletions have fluctuated over the years, withdrawals were higher in 1975 (greater than 743,000 ac-ft) and lower in 1995 (less than 565,056 ac-ft); however, depletions have increased from about 410,500 ac-ft in 1975 to about 451,300 ac-ft in 1995. Some of these changes may be related to changes in calculating irrigation agricultural water use that were implemented in 1985.

Recent estimates of stored and recoverable water, based on models published by the NMOSE, are shown in the table below. One of the largest components of the water balance in the High Plains aquifer is groundwater pumping, and most of the water pumped is from aquifer storage.

There is potential for the development of groundwater stored in aquifers beneath the High Plains aquifer. None of these aquifers possess the capacity of the High Plains aquifer, and deeper wells and pumping will increase costs. More hydrogeologic analysis will be required to assess the potential of deeper aquifers. Additionally, desalination of aquifers with high TDS

water may someday be a technology that could be combined with the development of these deeper water-bearing units.

Groundwater stored in the High Plains aquifer in areas containing New Mexico administrative Underground Water Basins

Modeled Area	Aquifer Area (acres)	Average Specific Yield	Estimated Ground-water in Storage (ac-ft)	Recoverable Ground-water (ac-ft) (45% of total)	Recoverable Groundwater, (ac-ft) (all but bottom 40 ft)	Date
Lea County UWB model[a]	1,400,000	0.21	31,100,000	14,000,000	—	1995-1998
Curry and Portales UWBs model	1,730,000	0.21	15,300,000	6,900,000	9,300,000	2000[b]

[a] Storage estimates reported in table 6-5, Leedshill-Herkenhoff et al., 2000.
[b] Storage estimates based on historical ground-water from 1909 to 1990 and projected ground-water pumping between 1991 and 2000, estimated from model files prepared in report by Musharrafieh and Logan, 1999.

BASIN ISSUES

Pumping of groundwater from aquifers underlying more than one state is not subject to any interstate regulation, and state laws manage those portions of the aquifer within their territory. Texas has a different system of groundwater appropriation than New Mexico; essentially Texans are entitled to groundwater that is underneath their land, whereas New Mexico law governs water use according to the system of prior appropriation. Lea County water users have expressed an interest in working with counties in Texas to participate in interstate management of aquifers. Continued pumping for irrigation and resulting water-level declines has created a need for administrative criteria in the declared UWBs. Groundwater contamination, while mostly localized, is an issue for consideration in basin administration.

WATER PROJECTS

EASTERN NEW MEXICO RURAL WATER SYSTEM

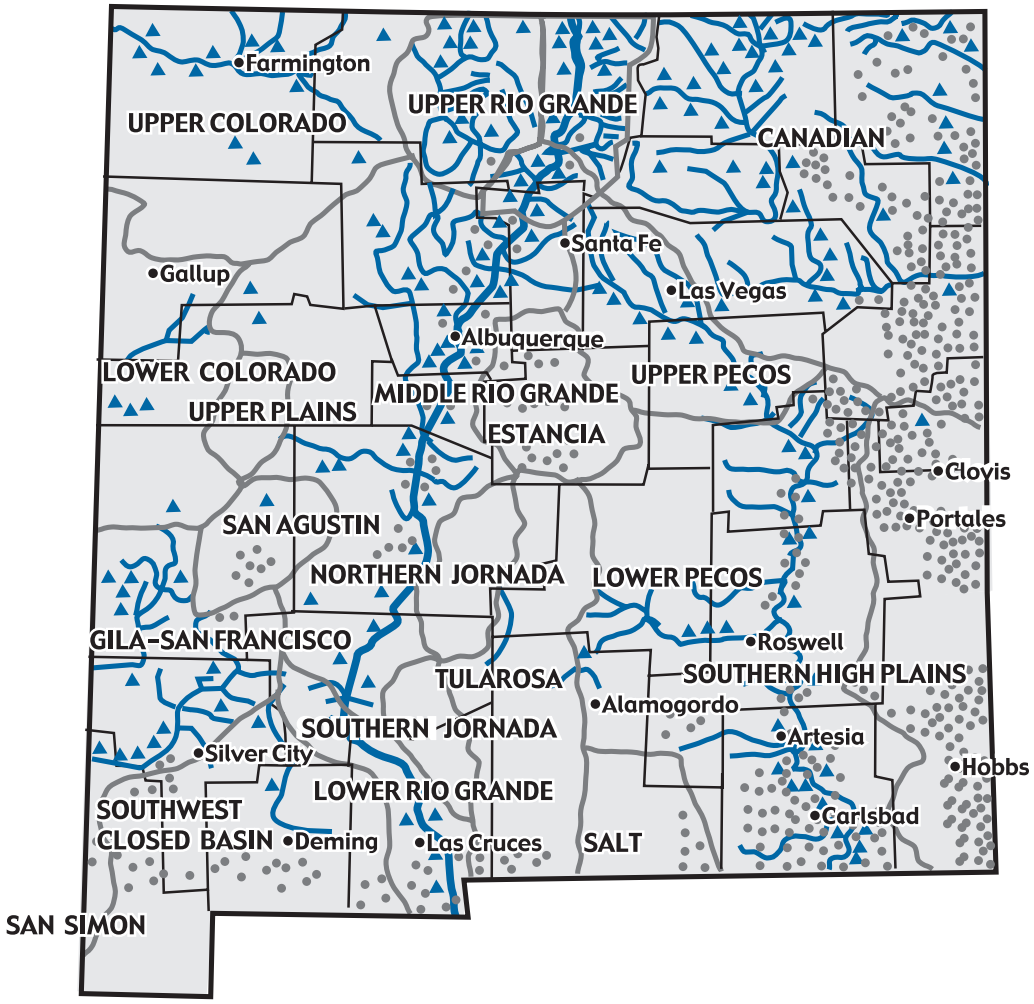
Because of declining groundwater levels and deteriorating water quality in east-central New Mexico (in the vicinity of Ute Reservoir and the area of the Southern High Plains aquifer), there is a need for an alternative water supply. The alternative of choice for most communities is water stored in Ute Reservoir. The Eastern New Mexico Rural Water System is a project

designed to pipe water available in Ute Reservoir to several communities in the northern part of the Southern High Plains basin and also to certain communities in the Canadian River basin. Specifically, this water-supply project was designed to convey up to 24,000 ac-ft/yr of treated water from Ute Reservoir to Clovis, Elida, Grady, Logan, Melrose, Portales, San Jon, Texico, Tucumcari, Cannon Air Force Base, and Curry, Quay and Roosevelt Counties. Preliminary costs to construct the pipeline project were estimated at $212 million dollars. This project remains in the planning stage.

Precipitation enhancement (cloud seeding) and agricultural conservation are other projects that have been investigated or considered to augment or extend supplies in the Southern High Plains basin.

SECTION D

SURFACE WATER AND GROUNDWATER MEASUREMENT PROGRAMS



New Mexico now receives data from about 100 stream-flow gages (shown as triangles) and more than 1,000 groundwater monitoring wells (shown as circles). The US Geological Service operates the water resource measurement programs on which the State of New Mexico relies for water accounting, as well as national programs for monitoring water resources.

Among the New Mexico OSE/ISC's many responsibilities is that of quantifying surface water flows, diversions, return flows and effects of groundwater pumping. The OSE/ISC commissioned Parsons Engineering Science, Inc. and the US Geological Survey (USGS) to assess the cooperative stream-gaging program. John Shomaker & Associates, Inc. was also commissioned to assess the *NM OSE/USGS Cooperative Groundwater-Level*

"Accurate measurement of water table levels and water flow quantities is critical for proper water resource management."

Monitoring Program. These studies document the existing programs and were valuable and in the preparation of this section of the *Framework Plan*.

This section of the *Framework Plan* evaluates past, present and probable future programs that provide measurement data on surface (i.e., river/stream) water flows, diversions (i.e., withdrawals), return flows and the effects of groundwater pumping. The section also outlines actions the OSE/ISC must take to obtain the data needed for sound water management and defense of New Mexico's waters against external claims. Although both groundwater and surface water programs are jointly funded by the OSE/ISC and the US Geological Survey (USGS), ground and surface water program assessments are presented separately below.

Surface water programs covered in this section will be of special interest to residents of the Upper and Middle Rio Grande, Pecos and Canadian River Basins, which include all or parts of the Taos, Jemez y Sangre, Middle Rio Grande, Socorro/Sierra and Lower Rio Grande Water Planning Regions. Groundwater programs covered here will be of special interest to many of the Water Planning Regions, especially the Estancia Region and others who rely on water from aquifers.

Appendices containing reports on studies done that produced most of the data cited are:

- Appendix D-1. *Assessment of the Cooperative Stream Gaging Program Between the OSE/ISC and the US Geological Survey*, prepared by Tom Morrison and Jack Frost, New Mexico Office of the State Engineer. Studies performed by Parsons Engineering Science, Inc., and the U. S. Geological Survey contributed to this assessment;
- Appendix D-2. *Assessment of the Cooperative Stream Gaging Program Between the OSE/ISC and the US Geological Survey—Executive Summary*, prepared by Tom Morrison and Jack Frost of the Office of the State Engineer;
- Appendix D-3. *Assessment of the Cooperative Stream Gaging Program Between the OSE/ISC and the US Geological Survey* prepared by the USGS;
- Appendix D-4. *Assessment of the New Mexico Office of the State Engineer-U.S. Geological Survey Cooperative Groundwater-Level Monitoring Program* prepared by John Shomaker & Associates, Inc.; and

- Appendix D-5. *An Evaluation of ISC/USGS Cooperative Stream-Gaging Program, Phase I* prepared by Parsons Engineering Science, Inc. This appendix has not been included on the CD, however it is available for review at the Office of the State Engineer.

WHAT MEASUREMENT IS NEEDED AND WHY

Accurate measurement of water table levels and water flow quantities is necessary for proper water resource management. Groundwater change tends to occur gradually and slowly. For groundwater, measurement can tell us how quickly the resource is being depleted and helps us calculate how pumping may deplete stream flow. For surface water, measurement must occur with enough accuracy to capture the enormous flow variations that occur between storm events and from drought and normal seasonal changes.

Improving the measurement of low and high flows of surface water is a high priority because the amount of flow in extreme conditions is particularly critical. Quick access to this information is important so that water managers can make important decisions based on current conditions.

Measurement provides the basis for many water management decisions, including those related to:

- Determining the amount, reliability and longevity of water resources
- Understanding where the water is used and limiting uses to the amounts authorized by water rights
- Drought management
- Endangered Species Act compliance
- New Mexico's water compacts
- Assuring New Mexico receives water due from other states
- Prioritizing funding to address supply needs and prevent costly damage

MAJOR ISSUES

Lack of water use measurement at the wellhead or diversion is the most serious deficiency. Improvements in the current stream gaging and groundwater monitoring programs are also needed.

The current stream gaging system was designed to provide large-scale resource assessments, not the detailed use measurements required by current management needs.

The USGS-OSE/ISC cooperative programs have simply been unable to keep pace with the new uses for their data and the ever-increasing demands and stresses on New Mexico's water resources.

The major problems are:

- Lack of data collection on water uses and return flows undermines water management and water rights enforcement
- Lack of enough data collection, including too few gages, lack of gages and wells in critical locations and inadequate results from existing gages
- Need for additional manual stream measurement
- Declining federal funding jeopardizes the State's ability to maintain even the existing programs
- Critical State data needs not addressed by the current joint OSE/ISC-USGS programs
- Lack of state staff and ability to replace or supplement measurement where the USGS cooperative program is deficient

There is an immediate need for about $300,000 in capital spending for surface water stream gage improvements, plus substantial increases in operating budgets to allow for more frequent field measurement at most gages.

Funding needs for groundwater monitoring are less clearly defined because of the enormous number and variety of participants and well owners involved, any or all of which might provide some of the funding and/or data needed. However, current recommendations for program adjustments would increase the OSE/ISC's share of the cost by about $46,000 annually.

WATER USE MEASUREMENT HAS BEEN AD HOC AND CRISIS-DRIVEN

Ensuring the State's ability to distribute water according to water availability and the seniority of water rights and preventing unauthorized uses requires measurement of water uses and return flows. This is yet another

area where controversial action has been deferred. The fact is that water simply cannot be administered without water use measurements.

Metering and measurement is not in use in most areas of the state. Where water deliveries to users are measured, this has generally been accomplished due to court orders or in response to crises. For example, almost all water diversions in the Lower Pecos River Basin are being measured in compliance with court orders.

In this case, local authorities maintain the measurement devices, while OSE employees read the meters and enter data into the WATERS database. In some areas, excessive diversions noted through metering require replacement of the unauthorized water. Roswell artesian aquifer users report that the single most important factor in the recovery of their water table was the insistence on measurement and limiting diversions to the amounts for which water rights are held. Measurement substantially reduced total withdrawals from this aquifer.

The State is currently funding installation and refurbishment of diversion measurement from the San Juan River below Navajo Dam and on the Animas River and the Rio Chama below El Vado Dam. This is being done in response to demands from the federal government that New Mexico prevent unauthorized uses. Limited supplies in 2003 and the crisis that could be triggered by lack of administration are the motivating factors.

Similar improvements were made several years ago on the Rio Costilla in response to demands by Colorado for New Mexico's compliance with the Costilla Creek Compact. Similar needs exist elsewhere, notably along the full length of the Rio Grande in New Mexico.

Uniform implementation of water use measurement throughout the state is vital. Who is responsible for the installation, maintenance and reading of the measurement devices and who will bear the costs are issues that will spark lively debate that must be resolved for progress to be made.

SURFACE WATER MEASUREMENT PROGRAMS NEED TO BE EXPANDED

Stream gaging stations estimate stream discharge by relating water surface height to measured flow. Operators verify gage measurements by occasional field measurements. Among the calculations that rely on these measures are

those for interstate compact delivery accounting, how much water is available for use and how much flow is being provided for endangered species needs. Data quality is generally acceptable for average flow conditions, but not good at critical high and low flows.

This picture shows how the river sometimes wanders away from the measurement gage.

MEANDERING STREAM BEDS AND WEATHER IMPAIR MEASUREMENT

Many sites have broad sand channels that shift continuously in response to variations in flow and sediment transport. Floods damage gages and deposit debris that impairs accuracy, and low flows often meander away from the gage and are not measured at all. At some locations, even the best measurements are not fully adequate for such monitoring needs as low maintenance flows for endangered species.

Most gage sites are located on natural stream reaches; few are controlled by concrete stream modifications and structures. New, constructed stream alterations may facilitate highly accurate gaging, but are not economically feasible at many sites. Without the resources for expensive structures, the only option for some sites in the near future is to take manual measurements much more frequently, and this option may not suffice.

THE NUMBER OF GAGES IN OPERATION HAS DECLINED

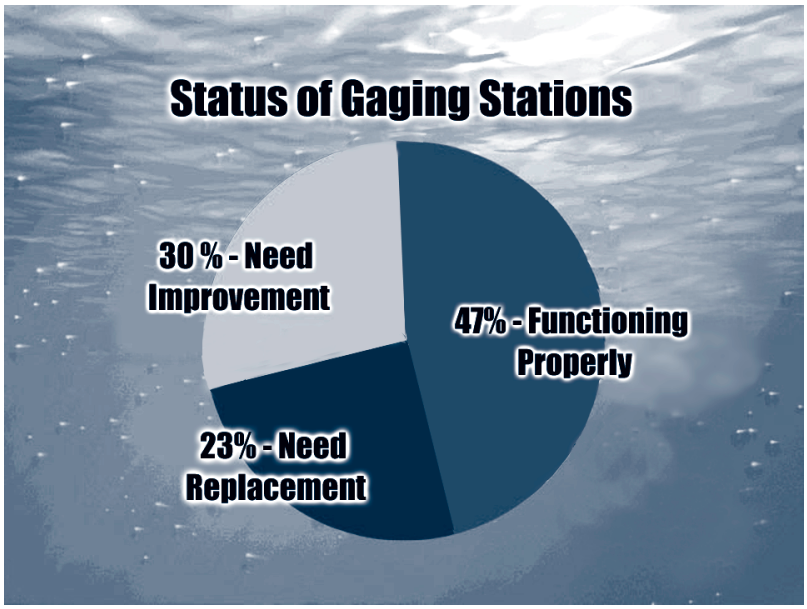
New Mexico's USGS stream-gaging program has followed a national trend of decline. Some neighboring states, like Colorado, are performing more measurement themselves as part of their own active water management programs, and this is what we believe New Mexico must do.

In New Mexico, the number of active gages has declined substantially over the past 10 years. The network now has about the same number of active gages as were used before the 1950s drought. The decline is attributed to reduced federal and state funding and to rising costs.

IMPROVEMENTS NEEDED IN DATA COLLECTION FREQUENCY AND METHODS

A vital check for calibrating the accuracy of gages is the frequency of field measurement. Measurement frequency has declined at 80 percent of New Mexico gages over the last 30 years.

This reduction is especially serious in today's environment. When flows cannot be reliably and accurately measured, water management decisions must allow a larger margin of error—a margin that means water flows downstream and is lost when it could otherwise be used later in the year or in later years.



Of 84 gages inspected, more than half are not currently providing the data required, including 9 gages critical to documenting interstate compact compliance.

Both funding reductions and management practices have adversely affected the frequency of measurement. For instance, the USGS indicates that measurements are not taken during each of their field trips to individual gages, but could be incorporated into their practices at little additional cost.

The good news is that technological advances have greatly improved real-time monitoring and data quality. Most gage data are now telemetered to

the USGS, processed and posted on the Internet. Enhancing technology at existing gages is included in the recommendations that appear below.

OVERVIEW OF STREAM GAGING NEEDS

The USGS findings for each basin are summarized below.

- Pecos Basin – Sandy channels and very low flows result in poor discharge estimation. Although important for Pecos River Compact administration and for determining if US Fish and Wildlife Service flow requirements for the Pecos blunt-nosed shiner are being met, several sites are very problematic.
- Middle Rio Grande Basin – Because of shifting and aggrading channels, many of the gages are very unstable and several sites are problematic. For example, the San Marcial Gage is critical for measuring flow during dry times so that we comply with court orders regarding protection of the silvery minnow, yet the channel has built up 15 feet, and low flows elude measurement.
- Upper Rio Grande Basin – Most of these gages are rated good but several need improvements.
- Colorado Basin – Stations were generally found to be in good condition.
- Canadian Basin – Some of this basin's gages are good, while others are not and the gage network is not complete.
- Costilla Basin – The USGS found the gages to be generally in good condition. However, the precise measurements required for daily decisions to distribute limited flows in accordance with the seniority of water rights are not available. Specifically, the core gage used to compute allocations has caused problems in this regard.

In the Pecos and Middle Rio Grande basins both accuracy and stream reach coverage are inadequate. The Pecos River at Acme Gage, for example, is essential for endangered species maintenance and for compact accounting on which millions of dollars in compliance costs hinge. Acme Gage ratings are unstable and its daily discharge estimates are rated "poor." Due to the site conditions, only manual measurements will improve accuracy.

NEW GAGES, STUDY OF NON-USGS GAGES RECOMMENDED

Additionally, as objectives for active river management on individual streams are established, new sites may be identified that require gaging.

With few exceptions, USGS gages comprise the sole source of river and stream flow measurements in New Mexico. Evaluation is also needed of the many gages that are not currently part of the USGS-OSE/ISC cooperative program because these gages are also important to water management. The USGS operates these gages with partial funding provided by local and federal government agencies.

Water-right applications for municipal direct surface water diversions are proceeding, and future gage requirements will be impacted. Measurement needs associated with irrigation districts and acequias require consideration. Programs to address these factors must be developed in an integrated gaging plan that includes stakeholder participation.

FUNDING CONSIDERATIONS

Due to federal funding reductions, the OSE/ISC's ability to maintain the program is at risk. For Fiscal Year (FY) 2002, the state and USGS each provided $442,000 to fund the surface water program. For FY 2003, the state and USGS have budgeted $516,590 and $443,490 respectively (a 17% increase for New Mexico).

New Mexico's base cost per gage for FY 2003 is $11,900, as compared to costs ranging from about $11,000 to $14,000 per gage in six surrounding states. Cost variations in other states may be due to differences in level of service.

The USGS assessed 84 gages and recommended replacement or improvements at more than half. While some of these problems will be addressed under the existing cooperative program, 17 substantial control structure improvements were identified totaling $300,000. The cost-effectiveness of these and other capital improvement options requires further evaluation.

New funds will be needed to perform additional, on-demand field measurements that will improve overall results. Other program modifications will be based, in part, on USGS recommendations.

> *"The one certainty is that more and higher-quality water resources data are essential for Active Water Management and defense of New Mexico's water supplies."*

MORE FIELD MEASUREMENT AND FURTHER STAKEHOLDER DISCUSSION ARE ESSENTIAL

The lack of frequent measurement is the greatest deficiency at critical gages Overall, the uncertainty about federal funding and staffing for the existing cooperative program poses a serious problem, as does the need for additional capital and operating funds.

Further definition of long-term objectives for individual streams and reaches is needed. The future State Water Plan should reflect efforts to create integrated gaging and measurement plans that include stakeholder participation, and in some cases, additional financial commitments.

GROUNDWATER MEASUREMENT PROGRAMS SHOULD BE ADJUSTED

Many New Mexico communities—including more than 90 percent of New Mexico's population—rely on municipal and private wells that draw on nonrenewable underground water reserves. In addition, groundwater pumping affects stream flows in many areas, thereby affecting the amount of surface water available. The groundwater program reviewed here will be of interest to many water planning regions, especially the Estancia Region, where non-renewable supplies play a vital role in maintaining community viability.

The USGS is perceived as an expert and reliable source for groundwater information. For decades, the agency has led a cooperative effort supported by a variety of participants, including the OSE/ISC, to track changes in water levels and water quality. At the same time, more careful cost accounting within the USGS program would help clarify what costs are attributable to the State of New Mexico and where inefficiencies may be occurring due to overlapping monitoring programs.

An assessment of the groundwater level monitoring program indicates that we would benefit most by reducing the total number of wells tested while increasing the frequency of testing at some wells and increasing the number of wells in high-growth areas of particular concern. For detailed information on recommended changes by county and in specific areas, please refer to Appendix D-2. *Assessment of the New Mexico Office of the State Engineer-U.S. Geological Survey Cooperative Groundwater-Level Monitoring Program* prepared by John Shomaker & Associates, Inc.

In many wells, monthly measurements are likely to be as useful as the daily water-level recording. The OSE could reap an annual $753 cost savings for every site where daily readings can be replaced by monthly readings.

Annual USGS reporting has been very useful, but adding information on precipitation and water use, some synthesis of the data and a discussion of changes during the year would enhance these reports.

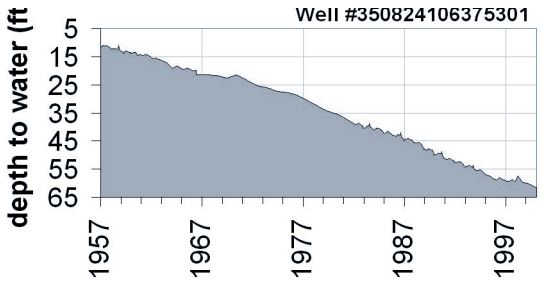
ACTIVITIES OUTSIDE THE USGS PROGRAM MERIT ATTENTION

While the cooperative program with the USGS is extensive, it does not provide all of the data required to track groundwater changes. Management actions are recommended to address additional data needs. For example:

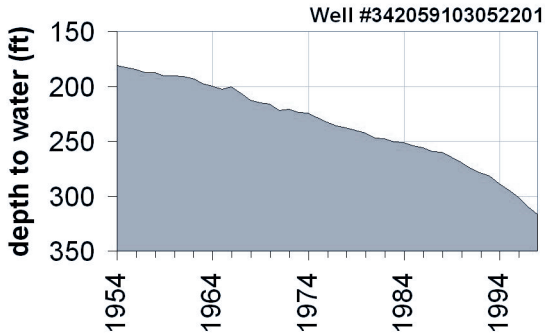
- Install piezometers (small measurement wells that track water levels underground) in critical areas, to be done either by the OSE/ISC or local agencies or through joint programs. In addition to enhancing our knowledge of specific areas where rapid growth is occurring, piezometer wells will be required to support litigation and permitting efforts.
- Develop a monitoring plan for major watersheds and groundwater basins where appropriate.
- Develop a program to measure the long-term water yield of representative small watersheds to enhance understanding of how changes in vegetation and other conditions impact watershed yield.
- Provide quality control criteria, training and assistance to irrigation districts and municipal and community water systems that make stream flow and groundwater measurements.
- Encourage water users to submit data to OSE/ISC for inclusion in the WATERS database, which is available to a wide range of users.

Overall, we must stress that the often routine and undramatic chores of measuring flows and water levels are of critical importance to understanding and responding adequately to the threats and opportunities facing New Mexicans with regard to water supply.

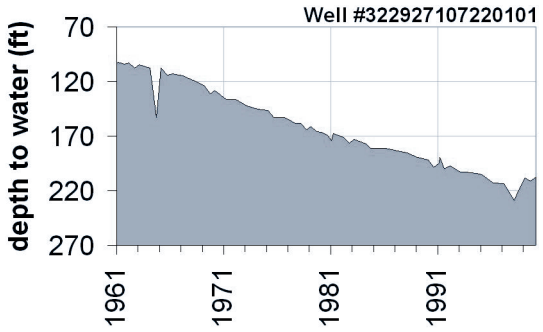
Examples of Declining Water Tables



Albuquerque



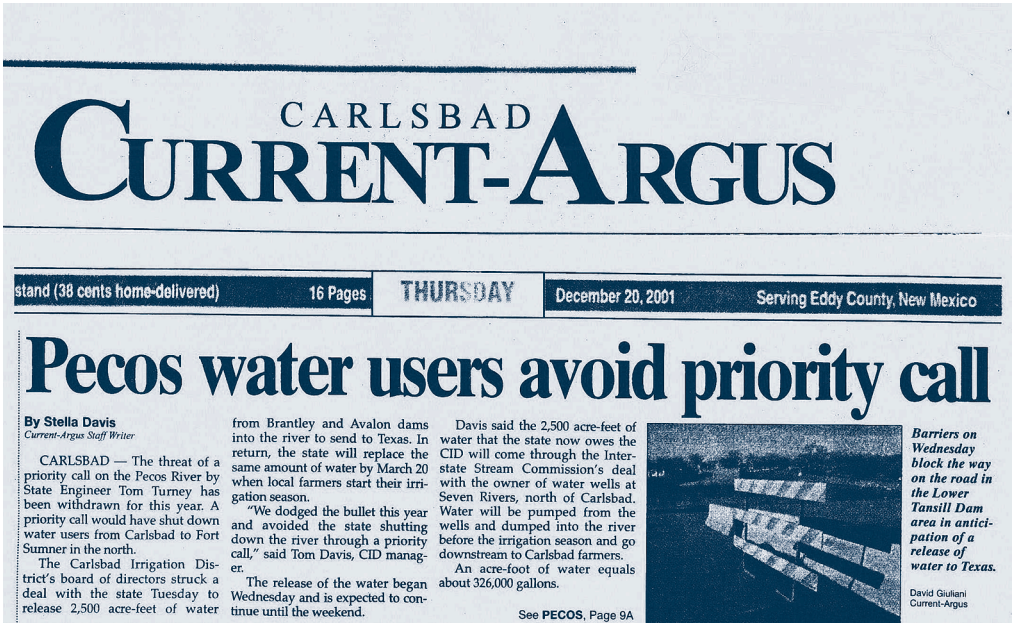
Clovis



Southwest Closed Basin

SECTION E

PUBLIC INVOLVEMENT



CARLSBAD CURRENT-ARGUS

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Pecos water users avoid priority call

By Stella Davis
Current-Argus Staff Writer

CARLSBAD — The threat of a priority call on the Pecos River by State Engineer Tom Turney has been withdrawn for this year. A priority call would have shut down water users from Carlsbad to Fort Sumner in the north.

The Carlsbad Irrigation District's board of directors struck a deal with the state Tuesday to release 2,500 acre-feet of water from Brantley and Avalon dams into the river to send to Texas. In return, the state will replace the same amount of water by March 20 when local farmers start their irrigation season.

"We dodged the bullet this year and avoided the state shutting down the river through a priority call," said Tom Davis, CID manager.

The release of the water began Wednesday and is expected to continue until the weekend.

Davis said the 2,500 acre-feet of water that the state now owes the CID will come through the Interstate Stream Commission's deal with the owner of water wells at Seven Rivers, north of Carlsbad. Water will be pumped from the wells and dumped into the river before the irrigation season and go downstream to Carlsbad farmers.

An acre-foot of water equals about 326,000 gallons.

See **PECOS**, Page 9A

Barriers on Wednesday block the way on the road in the Lower Tansill Dam area in anticipation of a release of water to Texas.

David Giuliani
Current-Argus

This section discusses avenues open to individual citizens and civic groups for learning about and participating in the development of a State Water Plan.

This section is not a summary of recent studies, but instead draws together current information about public involvement relevant to moving forward toward a State Water Plan. Appendices to this section include:

- Appendix E-1. Letter from ISC Water Planning Committee Chairman summarizing his public outreach and comments received;
- Appendix E-2. *Planning Paper Report 2040: Water for New Mexico's Future,* by the New Mexico Interstate Stream Commission, and the New Mexico State Engineer, August 2, 1993;
- Appendix E-3. *Framework State Water Plan & New Mexico State Water Planning Process Water Dialogue Workshop Report,* regarding a December 14, 2001, workshop sponsored by the Water Dialogue;
- Appendix E-4. *Annual Statewide Meeting Report,* New Mexico Water Dialogue, January 10, 2002, and
- Appendix E-5. *Charter of the State Water Plan Ad Hoc Committee* developed by the Interstate Stream Commission (ISC), October 2002.

WHAT PUBLIC INVOLVEMENT IS NEEDED AND WHY

Because the waters of New Mexico belong to the people of New Mexico, public involvement plays a central role in water planning. The technical data, expertise and management provided by the OSE/ISC must be informed by the values and priorities of both New Mexicans as a whole and regional interests.

The OSE/ISC has been a catalyst and facilitator for consensus building in the Pecos River Basin. Threatened with loss of control of the river to a federal court River Master, the ISC and major water-rights holders cooperated to develop a solution that meets interstate compact requirements and at the same time minimizes economic damage to the region. While challenges in the Pecos Basin persist, this example of the broad-based benefits of collaborative action has been widely recognized as a promising model for addressing problems in other basins.

With regard to developing a State Water Plan, OSE/ISC is forming an ad hoc advisory group (discussed below) to assist in crafting a public involvement program and is also preparing video, web-based and print materials geared to a general audience.

Regional Planning Groups and the Navajo Nation have initiated public dialogue regarding region-specific issues. The State Water Plan will have to address both statewide water management issues and water supply needs (including resolving inter-regional conflicts), as well as interstate compact compliance and Endangered Species Act water demands, to cite just a few examples.

MAJOR ISSUES

Water planning is a contentious subject because so much is at stake. If we fail to adequately address the water challenges we face, every New Mexican will be affected. To successfully address them, every New Mexican must be involved in some way. The following issues make this clear:

- **Solving water problems and protecting our supply cost tax dollars.** The public—and their representatives in the Legislature—must understand the seriousness of the water problems and the trade-offs we face in order to make wise decisions about how much spending is justified and how it should be allocated.

- **Wise water use requires behavioral change.** Whether the issue is achieving conservation goals, limiting use to authorized amounts orprotecting groundwater supplies from contamination or restoring watersheds, the behavior of individuals has enormous impact. Conservation and environmental protection are the "ounce of prevention" that can eliminate multi-million-dollar "pounds of cure"—but they are only possible through broad public awareness and participation.

Making the most of our resources requires changing behavior at home and educating even the youngest child.

- **Equitably balancing** the diverse needs and preferences of the array of communities within each watershed is a challenge that has been delegated to the Regional Planning Groups. Doing so for the state as a whole increases the complexity and difficulty exponentially. Only through information exchange and debate in which all are represented can the proper balance be found.
- **Solving virtually any water problem requires collaboration** among a large number of people: water-rights owners, municipal officials, business managers and special interest groups—to name just a few examples. An informed and involved public is essential, because many will be called on in some capacity to collaborate in solutions.
- **We must stand united in responding to claims from beyond our borders.** Other Western states and federal regulators are actively pursuing claims on New Mexico's waters. For example, Texas recently allocated more than $6 million for water litigation against New Mexico.

- **Dispelling water myths will help ensure success.** The OSE/ISC will continue to provide education and forums for dialogue to ensure that the public and their elected representatives are informed about realistic trade-offs for solving water problems, in order to prevent the waste of scarce resources or inaction owing to a lack of consensus.

REGIONAL WATER PLANNING IS ONE AVENUE FOR INVOLVEMENT

The formation of regional water planning groups has provided a structure for reaching out to New Mexicans throughout the state. Each regional water planning group is responsible for informing and engaging in water discussions as many citizens within its region as possible. Planning guidelines require that they:

- Document their public involvement plans
- Develop a strategy to maximize public involvement
- Implement and document public involvement activities

To mention just a few noteworthy examples, the regional planning group in the Tularosa and Salt Basins published an insert that reached 14,000 newspaper subscribers with information about regional water issues and how to participate. The Colfax County Group held focus sessions with four different stakeholder groups: recreation/tourism industry representatives, local elected officials, business interests and the agriculture/livestock industry.

Parciantes of the Acequia de La Joya tour an acequia improvement project done in cooperation with the ISC Acequia Program and the U.S. Army Corps of Engineers.

The Northwest New Mexico Region conducted focus groups that included tribal representatives and members of the business community. The Navajo Nation has adapted the regional water planning process to involve Chapters in decision-making about water uses. The Middle Rio Grande Water

Assembly has involved water managers, elected officials, civic groups, environmentalists and others—hundreds of participants in all—in their activities and annual meetings. The Lower Pecos Valley Region provided a speaker who presented water planning information to civic and community groups at their regular meetings, thereby reaching hundreds of people who might never attend a water planning meeting.

The OSE/ISC staff has also supported regional planning groups with guidelines for water assessment, funding for planning efforts and quarterly progress meetings with ISC staff at planning milestones to troubleshoot how the process might be improved and what additional support is needed.

As more regions complete their plans, they will be a central focus of public participation open to all citizens in each region.

A STATE WATER PLAN AD HOC COMMITTEE IS BEING FORMED

Because a State Water Plan will have to provide comprehensive, multi-regional policies and solutions, set priorities for state spending and describe how state obligations such as the interstate river compacts will be met, it will require a new type of public participation. In this new phase, reconciling desired outcomes within technical and legal constraints, as well as reconciling competing interests and demands for water, will play a central role.

The ISC Commissioners have requested that each regional planning group suggest names of a representative and an alternate who will participate in what is now simply referred to as the State Water Plan *Ad Hoc* Committee. The committee will be composed of one representative from each of the 16 planning regions, plus four members appointed by the Commission, plus four members appointed by the OSE/ISC staff. In this way, the OSE/ISC is seeking to create a forum in which diverse geographic and sector interests can be represented and can be supported by the technical expertise and data available through OSE/ISC.

Criteria for membership in the Committee for those representing regional water planning groups are as follows:

- Must have participated in the regional water planning process
- Must be familiar with key regional water issues

“Discussions with Pueblos, irrigation districts and acequias are opening up the potential for regional cooperative water resources management.”

- Must have some experience with public involvement and the planning process
- Must be committed to attending each *Ad Hoc* Committee meeting

The *Ad Hoc* Committee will receive information and advise the OSE/ISC about all the major issues to be addressed in the State Water Plan. An early subject of discussion will be public involvement and how to facilitate meaningful input from a diverse range of stakeholders.

OSE/ISC HAS A RECORD OF SUCCESS IN COLLABORATIVE EFFORTS

Collaborative efforts involving key stakeholders can often solve otherwise intractable problems. Some examples of achievements in this regard include:

- The Consensus Plan for Pecos River Compact and Amended Decree compliance that offers the prospect of minimizing economic impacts while ensuring the ability to meet obligations.
- Compromise solutions for management of public lands and interests at Ute Reservoir have settled long-standing controversies.
- Discussions with Pueblos, irrigation districts and acequias are opening up the potential for regional cooperative water resources management.
- Collaboration with the US Bureau of Reclamation and the US Army Corps of Engineers to prepare a Water Operations Plan and an Environmental Impact Statement for the Rio Grande from Colorado to past El Paso, Texas, is in progress.
- By convening a collaborative problem-solving process for Middle Rio Grande Endangered Species Act compliance, OSE/ISC obtained $16 million in federal funding for beginning to implement solutions.
- Entered into professional government-to-government relationships with the Navajo Nation and Jicarilla and Mescalero Apache tribes, in addition to participating with many Pueblos and tribes in the Regional Water Planning process.
- Participated in the development and implementation of the San Juan River Basin Recovery Implementation Program, which is designed to enable endangered fish to recover while allowing water uses and development to continue.

TWO-WAY COMMUNICATIONS ARE CONTINUING

ISC Commissioners have also conducted outreach to inform people about the planning efforts that have been underway and those needed for develop-

ing a State Water Plan. The Chairman of the Commission's Water Planning Committee has met with more than a dozen groups throughout the state to discuss work toward a State Water Plan.

In addition, other Commissioners have met with individuals and groups to outline progress and roadblocks. At these meetings, citizens have had the opportunity to be heard as individuals as well as through the Planning Groups as a whole. Although some members of the ISC's Commissioners' Planning Committee will be completing their terms of office as this document is being published, all Commissioners are available to meet with community groups concerned about water issues and provide another avenue of contact and participation.

The OSE/ISC is preparing video programs suitable for prime-time airing that outline the status of the state's many water challenges. The OSE/ISC web page (www.ose.state.nm.us) is another excellent source of information and avenue of contact with the agency. It will continue to be updated to provide access to current information and a means of providing comments to ISC water planners.

This *Framework for Public Input to a State Water Plan* has been published to enable people interested in water issues to access recently acquired information and an overview of issues. The questions raised should be addressed—and hopefully be resolved—through the State Water Plan process.

SECTION F

CAPITAL NEEDS ASSESSMENT

This capital needs assessment is a description of the water projects required for proper management and maintenance of New Mexico's water resources. The purposes of this assessment are to support planning for the financial requirements for projects and to identify the needs for additional water resource investigations.

This summary is based largely on information from the following sources:

- State Engineer Thomas C. Turney
- A presentation prepared by the State Engineer and the Director of the New Mexico Finance Authority[1]
- The 2002 Annual Report of the New Mexico Water Trust Board
- The Strategic Plan of the State Engineer and Interstate Stream Commission (August 31, 2001)
- The White Paper on New Mexico's Water Supply and Active Water Resource Management

Water is already in short supply in New Mexico, and that supply is threatened. Growth is continuing, legal challenges from outside the state are intensifying and climate predictions suggest dryer times.

New Mexico's future depends on an adequate water supply that is stable, predictable and can be used effectively and efficiently. Meeting these challenges will require enormous investment in infrastructure and management. New Mexico must begin to set aside very substantial funds and do so in a way that is consistent with long-term planning. A predictable funding stream is essential for project planning and successful requests for matching federal funds.

Capital expenditures on the order of $3.2 billion will be needed over the next 10 years for projects that are already planned or in progress.

About $1.8 billion will be required for regional water supply systems such as the Navajo-Gallup Pipeline, the Animas-La Plata Project, the Eastern New Mexico Rural Supply System and several surface-water projects in the Rio Grande valley that will divert and allow cities and water users to utilize their San Juan-Chama Project water.

[1] Turney, T.C., and Pollard, T.K., 2002, Protect New Mexico's Waters-Protect New Mexico's Future: PowerPoint presentation.

"An estimated $265 million will be required for watershed projects, rainfall enhancement and flood-control dam rehabilitation."

ISC Amphibious dredge for excavating the Elephant Butte pilot channel.

An estimated **$265 million** will be required for watershed projects, rainfall enhancement and flood-control dam rehabilitation.

- Watershed restoration projects are proposed for areas such as the Santa Fe watershed and Sacramento Mountains. These projects will treat upland watersheds to maximize water recharge to streams and aquifers. Riparian restoration projects are also planned to control excessive water loss by removing non-native species in the Pecos River, Rio Grande, Galisteo River and San Juan River Valleys.
- Summer cloud-seeding projects are proposed for rainfall enhancement in the Southern High Plains (Llano Estacado) and Union and Mora Counties. Additional winter cloud-seeding programs may be implemented in the Jemez and other northern mountains.
- More than 80 flood-control dams need rehabilitation by 2010. The Federal Dam Rehabilitation Program will provide planning, design and 65 percent of construction costs through the National Resource Conservation Service. State funding will be needed for the remainder.

Total costs for new treatment facilities at 114 community water systems to meet recently adopted drinking water standards for arsenic removal are estimated at approximately **$375 million.**

The cost of programs to generate long-term solutions for endangered species such as the Rio Grande silvery minnow are estimated at $174 million.

The total cost for programs to generate long-term, sustainable solutions to Endangered Species Act requirements is estimated at **$174 million**. These programs must maintain an adequate water supply for New Mexico water users and protect the State's control of its water resources. Programs concerning critical habitat in New Mexico for listed endangered species and environmental quality incentive programs are needed for areas in the San Juan, Canadian, Pecos, Gila and San Francisco Rivers and the Rio Grande.

SECTION

G

THE STATE WATER PLAN

Now that you have read the *Framework for Public Input to a State Water Plan*, what does it mean to have a State Water Plan? What will a State Water Plan look like? How will we get there in the timeframe desired?

The overall purpose of the State Water Plan will be to create the blueprint for statewide Active Water Resource Management (AWRM). A sustained, continuous effort (including adequate funding) will be necessary to resolve the complex technical water issues. The *Framework for Public Input to a State Water Plan* is a point of departure and necessary first step towards a comprehensive and viable State Water Plan and a successful, continuing AWRM program. An overarching State Water Plan will enable New Mexico to finally transition from a laissez faire approach to active and effective management of its water resources. Going forward with a State Water Plan will allow New Mexico to justify in-state water needs, comprehensively and accurately evaluate water resources and defend against water claims raised by out-of-state interests. The confidence provided by an overarching State Water Plan will provide the security that promotes productive development and investment, not only in water projects but in the general State economy as well.

The ISC and the OSE will need guidance and input from the Governor to establish the priorities addressed by the State Water Plan during the first year. Executive direction is also needed to improve coordination of cross cutting efforts by state agencies. It is essential to reach agreement on the joint ecological/biological, water quality and water quantity impacts of each State agency's initiatives.

A FRAMEWORK FOR PERMANENT SOLUTIONS

This *Framework for Public Involvement in a State Water Plan* presents a compilation of current knowledge and water planning issues. While the list is long, it is by no means complete. The *Framework for Public Involvement to a State Water Plan* is the first step to a final statewide plan that presents sustainable, long term solutions to the complex and difficult technical and policy questions associated with water.

We already have much of the information required to assess water resources and develop balanced water budgets and a State Water Plan. The information contained in the Atlas of the *Framework for Public Involvement in a State Water Plan*, and the additional background studies in the appendices and regional plans demonstrate there is no need to reinvent the wheel or to begin a stand-alone study. Our knowledge has improved markedly since the joint 1976 U.S. Bureau of Reclamation and the Interstate Stream Commission Assessment. Current information is now readily available on the agency website http://www.ose.state.nm.us.

To sustain progress, and avoid constant and costly short-term fixes, we must proactively focus on permanent solutions to our water resources issues. Priorities and solutions identified in the State Water Plan must be based upon:

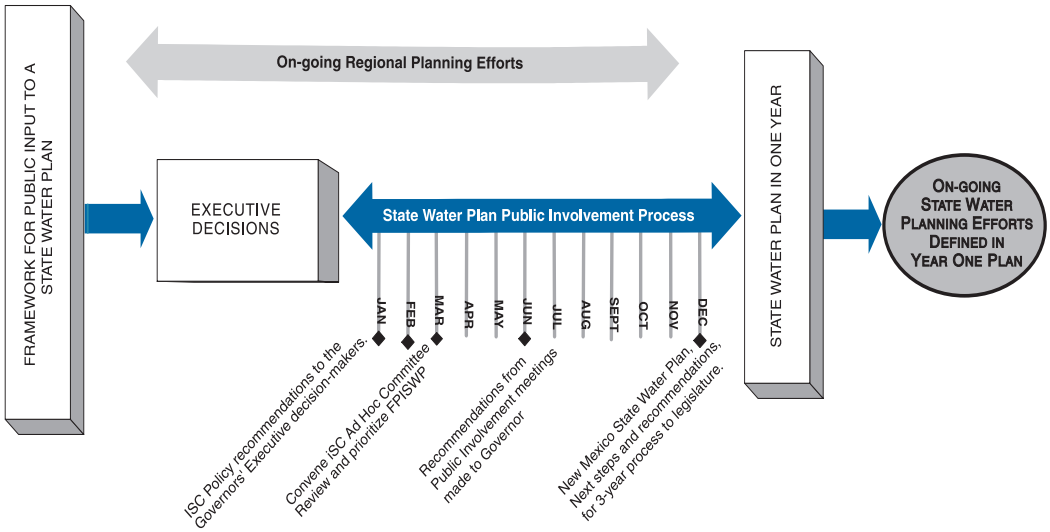
- A comprehensive assessment of statewide surface and groundwater resources;
- Sound policies to move us forward;
- Consensual and collaborative decisions on how we choose to use available supply to meet various statewide demands; and
- Priorities for available funds and human resources in the eight areas of Active Water Resource Management:
    1. Quantification of water rights—hydrographic surveys, adjudications, abstracts and administrative permits.
    2. Measurement and metering of water—water supplies and water uses.
    3. Water planning—integrated statewide, regional and local planning including water conservation.
    4. Compliance—with interstate compacts, federal environmental laws and regulations, and legally mandated federal project operations.
    5. Analysis and integration of data, plans and policies—decision support systems, public information access, public communications and involvement.
    6. Water distribution—active administration of the storage, conveyance and withdrawals of wet water supplies.
    7. Water transfers, markets and water banks—creation, coordination and regulation.
    8. Water development—projects to store, convey, and develop water resources to meet our needs; watershed improvements; weather modification.

A ONE-YEAR STATE WATER PLAN

Within one year (see Figure 1), it is possible to lay the foundation for effective, continued state water management and to address the most critical issues at hand. The goals in this process are:

- Identify and resolve the most critical issues and questions.
- Move forward with the eight components of AWRM by implementing strategic, action and financial plans.
- Coordinate cross-cutting efforts between water quantity, water quality, environmental and wildlife agencies—decide how the state as a whole will function under one overarching reality instead of as a set of poorly coordinated, narrowly focused viewpoints.
- Define the next steps in a continuing state water planning processes; create a plan and funding mechanism to address those issues and questions that can't be resolved in the first year.

Figure 1. Timeline for implementing critical State Water Plan components.



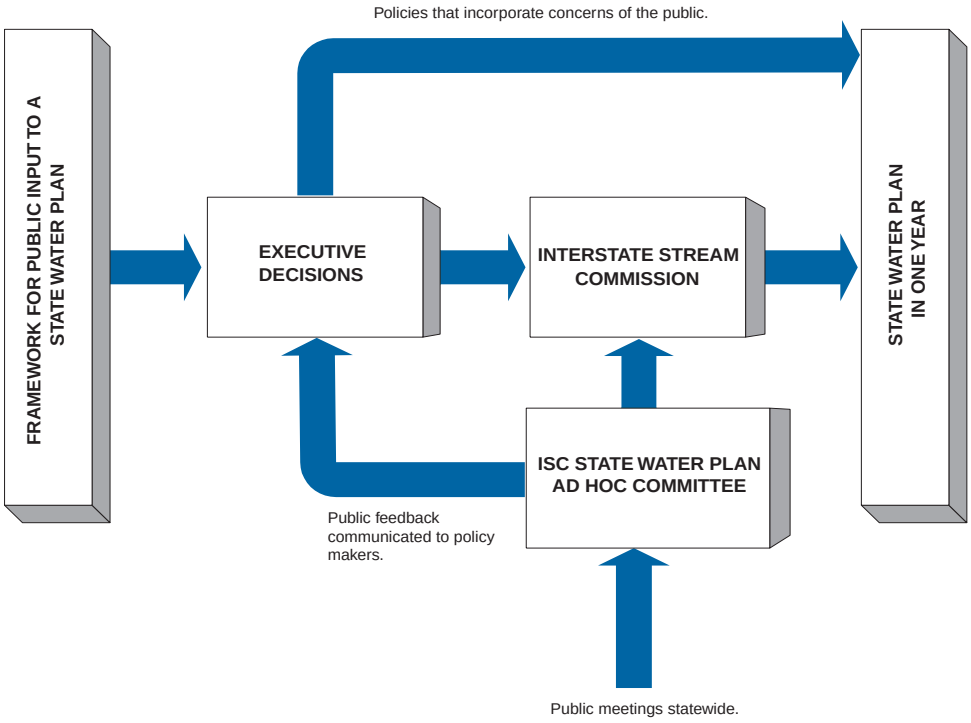
COMPONENTS REQUIRED TO ACHIEVE THESE GOALS

To achieve the goals above will require a great deal of both state and stakeholder involvement. With input from water agencies, the Executive should identify those issues and tasks in the *Framework for Public Involvement to a State Water Plan* that can and will be addressed in the first year State Water Plan. A conduit for these decisions could be the new administration's Office of Policy and Strategic Planning. If we are to properly manage our

water resources and attain long-term solutions to water resources problems, fruitful and wide-ranging communications must occur between and among all parties.

The focus for both the OSE/ISC and the Executive should be to guide these communications, address the issues and questions in the *Framework for Public Input*, and execute public outreach (see Figure 2). Each must consider the list of issues and questions, obtain public input, prioritize tasks and resources, seek input from decision-makers and the public, propose solutions, conduct public processes to consider proposed solutions, finalize proposals and support a planned and considered decision-making process.

Figure 2. Executive decisions must be communicated to the Interstate Stream Commission.



STATE RESPONSIBILITIES AND INPUT

The new administration and the legislature should help identify the roles and responsibilities of state agencies and how the interface will occur between policy-making bodies and the public. Executive direction, input and coordination will be needed for:

- Department of Finance Authority
- Office of the State Engineer and Interstate Stream Commission
- Water Trust Board
- Drought Task Force
- New Mexico Environment Department
- New Mexico Department of Energy, Minerals, and Natural Resources
- New Mexico Department of Game and Fish
- Legislature
  - Interim Water Committee
  - Legislative Finance Committee

The ISC and OSE, as the State agencies statutorily charged with water development and planning, will:

- Release an updated Assessment of the State's water resources as an integrated statewide summary of Regional Plan findings, current data and water budgets.
- Evaluate, compile and improve upon current technical and hydrologic data.
- Coordinate and conduct at least two facilitated meetings at each of the 16 regions' regularly scheduled regional planning steering committee meetings, or via another agreed-upon venue.
- Develop integrated management plans for the State's water resources and watersheds.
- Publish a State Water Plan that defines the highest action and funding priorities and a timeline for achieving them. The State Water Plan will include an analysis of projected water needs in 2050, based on population studies from the 2000 Census, and clarify and analyze public assumptions, if necessary.
- Conduct hearings throughout the state in at least four locations, inviting regions to present comments on the State Water Plan.
- Finalize the State Water Plan as an action plan submittal to the 2004 Legislature.
- Continue planning and follow-up on items identified for subsequent years, such as the legislative committee already established to look at changes in water law.

OVERVIEW OF THE PUBLIC INPUT PROCESS

Although never easy, it is possible to understand and accept unfavorable outcomes if the process of reaching them is open and participated in by all affected parties. The public input process in the FPISWP will provide such a tool. The Ad Hoc Committee for the State Water Plan will include balanced representation from water-planning regions and stakeholders from major water interests such as acequias, irrigators, municipalities, industry, Native Americans and environmentalists. The ISC Ad Hoc Committee will function as the fulcrum to bring together and reconcile differing public and state interests. The ISC Ad Hoc Committee will:

- Review and, if necessary, add to the crucial questions and issues that must be addressed in a State Water Plan
- Suggest action priorities and funding needs
- Coordinate with ISC and OSE planning staff
- Provide advice and counsel
- Seek and present stakeholder input
- Review State Water Plan resources and drafts
- Develop consensus for an overarching State Water Plan

Only through collaborative citizen involvement can we attain long-term statewide solutions that balance differing perspectives, needs and values, while still protecting New Mexico's ability to meet state needs.

PUBLIC INPUT RESOURCES

The Public Input Process will draw from and identify the following data and information resources:

- A finalized assessment of the basins in the New Mexico Water Resource Atlas, complete with a water budget to show available supplies and current demands and a supplemental CD-ROM (to be completed summer, 2003).
- Summaries of the Regional Plans' supply studies and demand analyses, incorporating regional watershed boundaries.
- A summary of endangered species water needs by basin and status of a permanent provision for ESA water needs.
- Public meetings in all sixteen planning regions to update the public and take comments on the information prepared.

- Additional studies and plans, such as a proactive and ongoing State Drought Plan, Watershed Restoration Plans, and management of river corridors for compact, environmental, and other requirements.

WATER MARKETS

Water markets are able to generate a "soft" instead of a "hard" landing in times of drought or other unexpected demand by providing a quick, efficient method to move water from senior water rights to critical junior uses on a temporary short-or long-term basis. However, water markets or water banks have been controversial topics for many interest groups.

Water market solutions must be presented openly and factually in order that interested parties can understand what options are available to satisfy legitimate and inescapable water needs, whether for cultural, growth, agriculture, municipal, environmental or other uses. The benefits of a soft landing motivates groups with competing points of view to reach consensus. The result will be a water banking and water-sharing policy based on a common, accurate formulation of water availability and statewide water needs.

COMPACT COMPLIANCE AND ENDANGERED SPECIES ISSUES

Clear choices about water use can be made only after needs are first met for critical legal requirements such as interstate compact compliance and federal environmental mandates. If the State Water Plan or regional plans do not meet these requirements, the State could have no other choice but to institute rigorous priority administration of water rights or abandon control of State water resources to federal agencies or the courts.

A failure to comply with interstate compacts will expose the State to increasingly onerous US Supreme Court sanctions. Failure to accommodate federal environmental mandates can result not only in State financial liability, but also impair the ability of the State to control its own water resources or formulate choices for water use in the manner most beneficial to New Mexico water users.

“Using the State Water Plan, the Office of the State Engineer/ Interstate Stream Commission can focus resources on top priority mandates and initiatives.”

REGIONAL WATER PLANNING

The genesis for Regional Water Planning lay in the need to define internal water needs to defend against appropriation by out of state interests. New Mexico’s 16 water planning regions were defined by political boundaries for ease of administration of the program and stakeholders. The regional water planning process has produced important hydrologic and water demand information and identified important courses of action for regions to secure a future water supply for water users. Thus, regions are not required to fully consider “state-as-a-whole” water resources issues or to address water demands for interstate compact compliance, the Endangered Species Act, drought management and interregional sharing. While future water needs developed by regions are required to consider institutional and legal constraints to their water supply, complexities arise because some regions encompass parts of watersheds or have part of more than one watershed within their boundaries. The political boundaries defining the regional planning entities preclude a complete analysis of the water supply of a river basin or underground administrative basin.

FUNDING WATER PROJECTS

Infrastructure development to increase or replace water supplies cannot occur in a vacuum. The authorizing legislation for the Water Trust Board states that funded projects should be included in completed Regional Plans. It is also important that funded projects be considered from a statewide perspective. For example, it will be necessary to develop projects that do not over-appropriate supply or contribute to further decline of endangered species. Said simply, our public finances are too limited to make the mistake of spending them on inefficient, competing or unplanned water projects—or on projects that can burden the state with liability or impair State sovereignty.

STRATEGIC PLANNING AND FUNDING

The Executive and the Legislature will be able to rely on the State Water Plan as a policy guide and blueprint for efficient funding and implementation of water resources work and infrastructure. Using the State Water Plan, the Office of the State Engineer/Interstate Stream Commission can focus resources on top priority mandates and initiatives. A State Water Plan can become the basis for the agency’s Strategic Plan goals and objectives and the guide for recommended and strategic water projects.

Additional studies or analyses can be prioritized and funded through the State Water Plan. Much of the existing data and information used in analyses of the regional plans, basin assessments and water budgets is collected within a framework of state and federally funded programs. Clearly, successful planning will require the continued maintenance of these programs. Through a State Water Plan, we will be able to set the parameters for data acquisition, measurement, administration and the associated staffing needs.

WHAT A STATE WATER PLAN WILL DO

The *Framework for Public Input into a State Water Plan* is the first critical step in development of a comprehensive, valid State Water Plan. It presents crucial questions and issues that the ISC and OSE have encountered throughout the State and that an overarching State Water Plan must resolve. The issues and questions presented in this Framework are comprehensive but not complete. They will be expanded and refined throughout the public input process. The public input process, utilizing the technical expertise of State agencies and based on accurate hydrologic and water use and demand data, can reach consensus on a State Water Plan that will provide affordable, long-term solutions to the water issues facing New Mexico.

In utilizing this *Framework* to develop the State Water Plan, it is essential to understand what the State Water Plan will do and what it cannot do.

- The State Water Plan cannot create new water where none exists nor be a panacea for water-short areas. It will however, provide the tools and resources to effectively develop, actively manage and optimize the beneficial use of New Mexico's limited water resources.
- The State Water Plan cannot eliminate competing stakeholder interests or prevent conflicts between state imperatives and regional and local needs. It will be an effective vehicle to fairly resolve these concerns and issues through open and collaborative public involvement and consensus building.
- The State Water Plan cannot remove threats to State control over or rights to its water or from exempt uses such as for endangered species. A State Water Plan will provide an integrated strategy to address these threats with the least possible impact to the citizens and future of New Mexico.

Most importantly, a comprehensive State Water Plan will provide the confidence in our water resources required if New Mexico's cultures, economy, environmental needs and future growth are to coexist and flourish. **Water is our most important resource.** Only through an ordered, comprehensive and collaborative State Water Plan will we bring the order and surety necessary if we are to keep New Mexico truly the Land of Enchantment.

PURPOSE OF THIS SURVEY

In an effort to complete the *New Mexico State Water Plan* in one year, the Interstate Stream Commission and the Office of the State Engineer would like to take this opportunity to learn about your opinions on water and water issues. We will use this feedback to help us with our public outreach efforts.

Please take a few moments to fill out the survey (both sides), fold and mail the self-addressed survey to our office.

For further contact regarding the *New Mexico State Water Plan* please contact us at:

New Mexico Interstate Stream Commission
P. O. Box 25102
Santa Fe, NM 87504-5102
Phone: 505-827-6160
Fax: 505-827-6188
Email: nmwaterplan@ose.state.nm.us

General Questions

Name _____

Address _____

City _____State_____ Zip Code _____

Occupation _____

What type of environment do you live in?

- Rural ☐
- Urban ☐
- Suburban ☐

On a scale of 1 to 5, rank what you consider the most important uses of water. (1=most important, 5=least important)

Quality of Life	1	2	3	4	5
Irrigation	1	2	3	4	5
Drinking Water	1	2	3	4	5
Recreation	1	2	3	4	5
Electrical Power	1	2	3	4	5

PLACE
STAMP
HERE

New Mexico Interstate Stream Commission
Bureau of Water Planning and Communications
Attention: Framework for Public Input
P. O. Box 25102
Santa Fe, NM 87504-5102

FOLD HERE

SPECIFIC QUESTIONS ABOUT
Framework for Public Input to a State Water Plan.

Which chapter in the document do you consider to be the most important?

- Section A. Overview ☐
- Section B. Issues for State Water Resources Management ☐
- Section C. Basin Descriptions ☐
- Section D. Surface Water and Ground Water Measurement Programs ☐
- Section E. Public Involvement ☐
- Section F. Capital Needs Assessment ☐
- Section G. The State Water Plan ☐

Why do you consider this chapter the most important?

_____

_____

_____

_____

FOLD HERE

In creating a State Water Plan for New Mexico, should we: (mark "Y" if you agree with the statement, "N" if you disagree with the statement.)

___ Increase enforcement of conservation measures and increase enforcement of those who are not complying with metering?

___ Require counties and municipalities to have developers bring valid water rights to the table with their development plans?

___ Reduce the domestic well allowance from three (3) acre-feet per year to one (1) acre-foot per year?

___ Pay farmers not to irrigate during droughts, and use the saved water for cities?

Which is more important for protecting water rights? Place an "X" in space.

___ Regional Water Plans ___ Adjudicated Water Rights

NEW MEXICO OFFICE OF THE STATE ENGINEER
AND THE INTERSTATE STREAM COMMISSION

http://www.seo.state.nm.us