STATE APPROPRIATION OF UNAPPROPRIATED GROUNDWATER: A STRATEGY FOR INSURING NEW MEXICO A WATER FUTURE

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New Mexico
Water Resources Research Institute and
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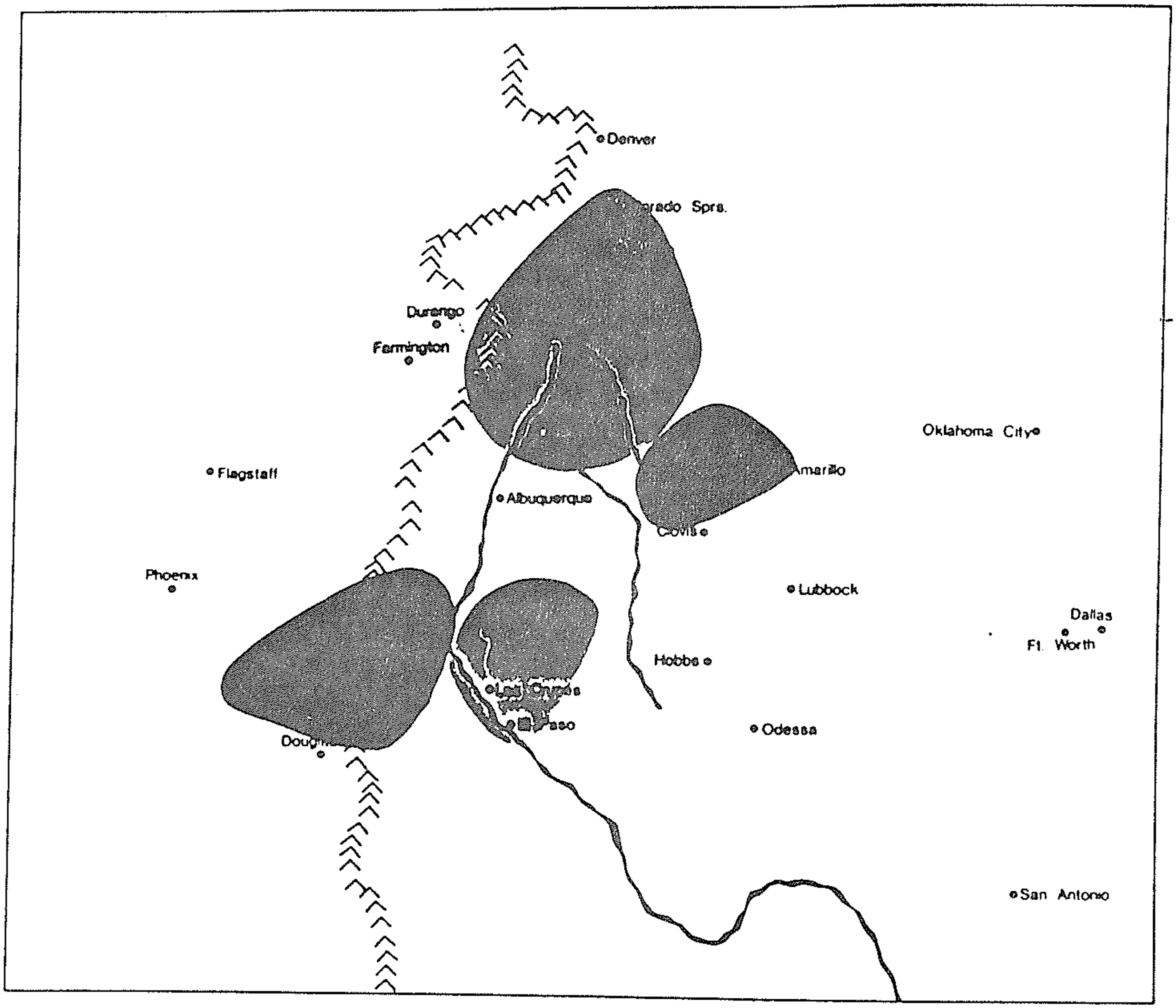
*Special thanks is extended to Carol Kennedy for her work in editing and word processing of the report. We also extend our thanks to the staff of the Institute of Public Law, the WRRI, and to the many graduate students in law and economics who provided assistance.

The Interstate Market



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EXECUTIVE SUMMARY AND RECOMMENDATIONS

This study has been conducted as a joint venture between the Natural Resources Center at the University of New Mexico School of Law and the Water Resources Research Institute at New Mexico State University. The study has been assisted by an advisory board consisting of the following persons: Governor Jack Campbell, Dr. Gerald Thomas, Robert B. Anderson, Les Davis, Carol Christiano and Judge Joe Galvan. These people have been directly involved with the preparation of this report and reflect a cross-section of political, economic and academic interests with respect to the state of New Mexico and its water resources. The State Engineer of New Mexico, Steve Reynolds, has also provided valuable information and critiques of various sections of the report.

The study team has evaluated New Mexico from three perspectives: (1) How much water is there and where is it located? (2) When will it become sufficiently scarce to cause concern for development and socioeconomic perpetuation of the regions of the state relying on those water supplies? (3) What can New Mexico do about the problem now?

This executive summary describes this report, sets out our findings concerning community opinion with respect to water problems, perceptions concerning state appropriation, data on overall supplies of unappropriated groundwater, data concerning the demand for that water supply and projections of future periods in which water will be increasingly scarce. Finally, it lists advantages that have led the study team to conclude that state appropriation could ensure a water future for New Mexico by assisting the various regions of the state to plan and control their water futures. Specific legislative recommendations are made.

I. ORGANIZATION OF THE REPORT

Chapter 1 explains the series of events giving rise to the need for this study. It explains the Supreme Court case of Sporhase v. Nebraska, the conceptual creation of an interstate water market and the concept of state market participation as an exception to that doctrine. Chapter 2 contains a hydrologic description of the kinds of groundwater in New Mexico and the impact of extracting that water on the overall hydrologic system. Chapter 3 describes the existing state institutions for water allocation and our system of water law and how the state as a market participant would fit into that system. Chapter 4 describes the legal limitations, based on New Mexico law, on the state's ability to participate in the water market, and Chapter 5 explores the federal limitations on the state's activity in this area. Chapter 6 details the demand for unappropriated groundwater in various regions of the state. Chapter 7 develops benchmarks for water scarcity in all the declared groundwater basins in the state, providing dates when agricultural and water-dependent economic activity in these areas will have to be cut back due to lack of water. Chapter 8 describes the methodology we used to calculate possible costs for interstate water transfers as the first step to determine whether interstate transfers are economically feasible. Finally, Chapter 9 puts the economic feasibility data together with the potential demand for water from interstate users and describes the regional water markets that now exist in New Mexico's area of the Southwest. Chapter 10 describes the water problems encountered by us in different regions of the state. Chapter 11 describes the activities in other states in the area of state appropriation, and Chapter 12 discusses why the study team has tentatively concluded that the Interstate Streams Commission is the New Mexico institution most suited to administer a program of state participation in the water market.

II. COMMUNITY OPINION

With more than two hundred or so individuals having attended one or another of the community meetings organized by the research team, it is not surprising that a wide range of opinions were expressed, sometimes conflicting. It should also be made clear that no effort was made to scientifically catalog or weigh the relative strength of any particular opinion. The format for all meetings was the same. They began with a short presentation by Charles DuMars, as head of the study team, in which he outlined the origin of the study, its purpose, and the reason for the community meeting. Participants were asked to describe water problems faced by their communities and to comment, if they wished, on the concept of state appropriation as a policy for New Mexico. This open-ended structure led to many brief exchanges between participants and research team members or advisors on a wide range of water subjects, sometimes quite far removed from the immediate topic of state appropriation. As a consequence, the summary provided below encompasses more than just the strict subject of state appropriation. However, taken as a whole, the variety of opinions expressed provides a general reflection of just what is on the minds of many New Mexico citizens and leaders when they turn their attention to water.

To begin, water concerns in the state are much broader than single-minded preoccupation with out-of-state water demands. While this subject was understandably particularly prominent in the minds of southern New Mexicans, even in that region of the state local competition for water was also a major concern as represented in conflicting points of view among municipal, business, and agricultural interests. In general, there seemed to be as much concern statewide about the stresses caused by conflicting interests in water whether those conflicts were cast as rural/urban, Indian/non-Indian, big city/small city, or acequia/developer. There was little by way of a remedy suggested for these conflicts beyond noting the need for a remedy. Some participants seemed to imply that the development of a state plan could help, though there were others who feared any more bureaucratic "hurdles" in water administration. This widespread concern over local or regional water competition did not appear to affect opinion about the general desirability of a state appropriation policy, though it clearly colored the views about just how such a policy might be implemented. They will be discussed more fully below.

The opinions voiced at the community meetings also reflected substantially different degrees of concern about water scarcity both across regions of the state and within them. In Gallup and Clovis not only were future water supplies a subject of serious concern, but identifying sources of financing to transport supplies was even more problematic. In other community meetings, such as in Taos and Las Cruces, there was less concern about actual scarcity of physical supplies and more about perceived threats to the existing supply.

Of course, in the southern part of the state demands upon the regional water supply have already been made explicit by El Paso. Concern was expressed in the Clovis area about water demand from West Texas.

Sentiment that physical supplies were presently adequate in an area, however, should not be mistaken for an eagerness, or even willingness, to see local supplies transported to water-short areas in other basins. While little absolute opposition to such notions was expressed, there was clear concern that local supplies should serve local populations first. In one of the few comments that clearly contemplated interbasin transfers, a strong sentiment was expressed that such projects should never go forward until the importing basin had met strong conservation criteria.

On the question of state appropriation, the reaction was broadly and even strongly positive. Paraphrasing one elected official, if state appropriation was what it would take to preserve New Mexico water supplies for the future, he did not see how anyone could oppose it. Some also saw it as a means for financing water projects by selling some portion of the physical supply at market rates to buyers whether they be in state or out of state. This broad support was not unqualified, however. The two most frequently mentioned reservations were: (1) that it would create additional bureaucracy and (2) that its implementation should allow a strong measure of regional or local control, presumably over the allocation of whatever water was involved and any revenues raised. The basis for the first concern seemed to be both philosophical and pragmatic. For some there was simply a basic wariness of strengthening state governmental power in principle; while for others the concern seemed to be practically directed at the additional delays that might result. One suggestion aimed at eliminating, or at least reducing, these concerns, was for a joint state/private organization with responsibility for water appropriation, allocation, and financing functions. The second qualification to the general support arose from the variety of local/regional concerns discussed above. Because of the significant differences from one region or locality to the next, there was large concern that each area have a strong share of power in making decisions relating to that area.

There were a number of other opinions expressed with varying degrees of frequency, but all germane to the manner in which the concept of state appropriation might be implemented. Since all are generally self-explanatory, they are simply listed here without comment and in no particular order:

(1) Any implementation of the concept should not adversely affect existing, privately held water rights.

(2) Any plan to implement the concept should not adversely affect existing or prospective Indian water rights.

(3) There would be a need for a state water plan at least with regard to whatever water was appropriated by the State and possibly for more general reasons.

(4) Water quality considerations should be part of any implementation program.

(5) Water conservation considerations should be part of any implementation program.

(6) There is need for a broad program of public education generally about water and particularly about any state appropriation policy.

(7) Any new water policy developed in the state should encompass both ground and surface water rather than being limited to the former.

If New Mexico were to adopt either a broad or limited policy of state appropriation, it seems clear that the above concerns would have to be addressed by one means or another.

III. FINDINGS CONCERNING WATER SCARCITY AND THE REGIONAL WATER MARKET

The body of this report and the endnotes to its chapters explain the study team's methodology for conducting its analysis of water scarcity conditions in the state and the prospective regional water market. In general terms, the economics chapters in this report address two questions in depth: (1) What is the likely nature of the state's future water situation? (2) What is the likely extent of the prospective regional water market for water resources within New Mexico? In answering these questions, two types of data are required: water supply and water demand. We first summarize the extent of unappropriated water in New Mexico based on information provided by the State Engineer's office.

The State Engineer estimated that there are around 25.93 million acre-fee of unappropriated groundwater in various declared underground water basins in which a mining situation exists. These are groundwater basins that are essentially independent of surface streams within the state. In addition, there are substantial physical stocks of water in these basins that cannot be termed "unappropriated" under the administrative rules set by the State Engineer, but which could be available for future use either through change in administrative rules or purchase of existing water rights in those basins.

For example, the State Engineer estimates that there are approximately 82.8 million acre-feet of water in the Mimbres, Animas, and Lordsburg basins in the thickness between 230 and 1000 feet even though administrative rules for determining the availability of unappropriated water only consider the physical supply above 230 feet. In other declared groundwater basins, the lower one-third of the basin is treated similarly to the "below 230 feet" volume of the Mimbres, Animas, and Lordsburg basins. Thus, there is a substantial volume of water that is available for future users even though some of it has been administratively defined to be outside the appropriation system.

Another category of water available to future users combines the small amount of unappropriated surface flow with unappropriated water in what is termed stream-related aquifers. While technically complex to estimate and difficult to describe in non-technical terms, this category includes an amount of unappropriated water ranging from a lower range of 27 million acre-feet of water to an upper range of 46 million acre-feet, or even more, in the Rio Grande, Pecos, and San Juan stream systems.

Finally, there are large geographic regions of the state that have not yet been included with declared basins and for which there is little precise information on groundwater availability. In this last category, however, the State Engineer estimates supplies to be minimal.

A partial inventory of available supplies either unappropriated or administratively defined, currently, as outside the appropriation system, is somewhere between 135 million acre-feet and 155 million acre-feet. And this total does not include several categories for which no quantified estimates exist. To put this figure in perspective, that amount of water is around four hundred to four hundred fifty times the current annual consumptive use of water from the Rio Grande system in New Mexico, which is approximately 345,000 acre-feet. If this water were valued at $250 an acre-foot (a value between agricultural and municipal and industrial prices), the value of unappropriated groundwater stocks in New Mexico would be between 33 and 38 billion dollars.

Interestingly, the Annual Resources Report of the New Mexico Energy and Minerals Department (1984) concluded that our state oil reserves as of December 31, 1983, were 857 million barrels of oil, which, if valued at $26.50 a barrel, would result in an asset worth $22.7 billion—an amount less than value of our unappropriated water.

Turning to the question of water demand, we projected future demand based on three scenarios: Scenario A assumes that water demand will not be reduced through increased conservation efforts by water users. That scenario undoubtedly overstates the ultimate demand for water, but is included to show what could happen. The second two scenarios decrease projected demand based on assumed increased water conservation over time. Scenario B assumes water conservation will reduce water consumption in the different sectors by 10 percent over 50-year periods, and Scenario C assumes increased water conservation will reduce consumption by 25 percent over 50-year periods.

After Sporhase, however, the potential demand for water is regional and is not limited by state lines. For this reason, it was essential to try to define, at least in economic terms, the market for water supplies located in New Mexico. The key issue as to the geographic range for New Mexico's water market was determined by the ability of an area to pay to transport water. We calculated that agriculture could pay up to $75 to $125 an acre-foot per year to transport water and that the municipal and industrial sectors could pay as high as $500 an acre-foot per year. Based on the ability to pay these amounts and on estimates of economically feasible transportation costs, we were able to approximate the distances water could be transported both within and without the state of New Mexico, thereby defining the relevant geographic range of New Mexico's water market.

The findings of the scope of the water market, both in state and out of state are illustrated by the following charts, labeled Figures 1 through 6. They reflect the range of the water market at transportation costs per mile ranging from $1 to $2.50 a mile per acre-foot. Based on these charts, it is clear that the geographic scope from which water may be imported into New Mexico or exported from New Mexico is extraordinarily expansive. The potential for importation is probably slight due to present and potential shortages in neighboring states.

Indeed, virtually every groundwater basin is potentially part of the regional interstate market. While agricultural demand is quite limited by transportation costs, municipal and industrial demand can move water great distances.

The final task was to put the <u>in-state demand</u> figures with the <u>in-state supply</u> figures to determine when areas of the state would be affected by water scarcity. We did this by calculating what we called benchmarks of water scarcity. These benchmarks reflect three different events.

In the closed. non-tributary aquifers, designated as C-1, C-2, C-3 on the chart, when the first benchmark is reached it means that there is no more unappropriated groundwater—to acquire a water right one must buy and transfer someone else's right. When the second benchmark is reached, municipal and industrial uses are taking 10 percent of the water that previously had been used by agriculture. It is assumed at this point that most of the agricultural sector remains viable through increased conservation measures. When the third benchmark is reached, it is assumed that agricultural water use is reduced by 25 percent. At this point, the agricultural tax base is reduced dramatically and basic life style changes must be made. These regions must seek solutions to these fundamental changes.

For tributary aquifers, the benchmarks are described as T-1, T-2, and T-3. We assume that acquiring a right in these tributary aquifers requires the immediate purchase of agricultural rights since surface streams are essentially already fully appropriated. When T-1 is reached it means that 10 percent of the agricultural rights are gone. T-2 means that 25 percent are gone. When T-3 is reached, 50 percent or more of the surface rights are no longer applied in irrigation.

The charts showing when these benchmarks may be reached in each groundwater basin follow. The benchmarks will be reached in the near future. In 7 of the 10 closed basins studied, estimated dates for benchmark C-1 (all water appropriated) are within 50 years. These include the Animas, Jal, Lea County, Lordsburg, Mimbres, and Nutt-Hockett Basins. In three of the tributary aquifers, Upper Rio Grande, Middle Rio Grande and San Juan Basins, the first benchmark will also be reached within 50 years. Furthermore, in the eastern High Plains, an area the size of some states, which is not included in any basin, extensive shortages are anticipated as early as the year 2010.

Areas of Potential Water Transfer

(Cost = $1.00 per acre-foot per mile)

Key

1. Municipal and Industrial Use Area
2. Agricultural Use Areas

Assuming 1 acre-foot produces $ 75 in benefits

Assuming 1 acre-foot produces $100 in benefits

Assuming 1 acre-foot produces $125 in benefits

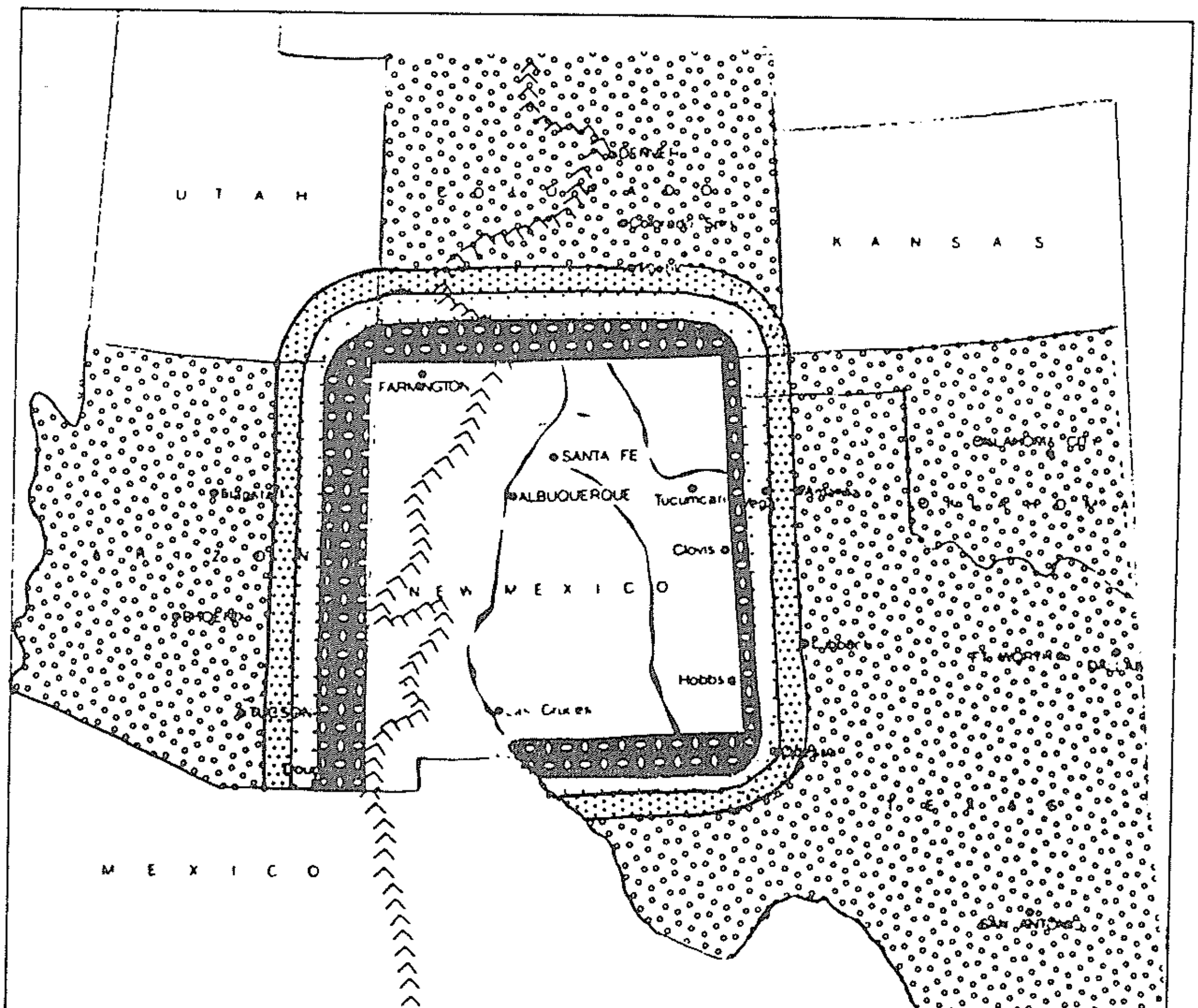


FIGURE 1

Areas of Potential Water Transfer

(Cost = $2.00 per acre-foot per mile)

Key

1. Municipal and Industrial Use Areas
2. Agricultural Use Areas
   - Assuming 1 acre-foot produces $ 75 in benefits
   - Assuming 1 acre-foot produces $100 in benefits
   - Assuming 1 acre-foot produce $125 in benefits

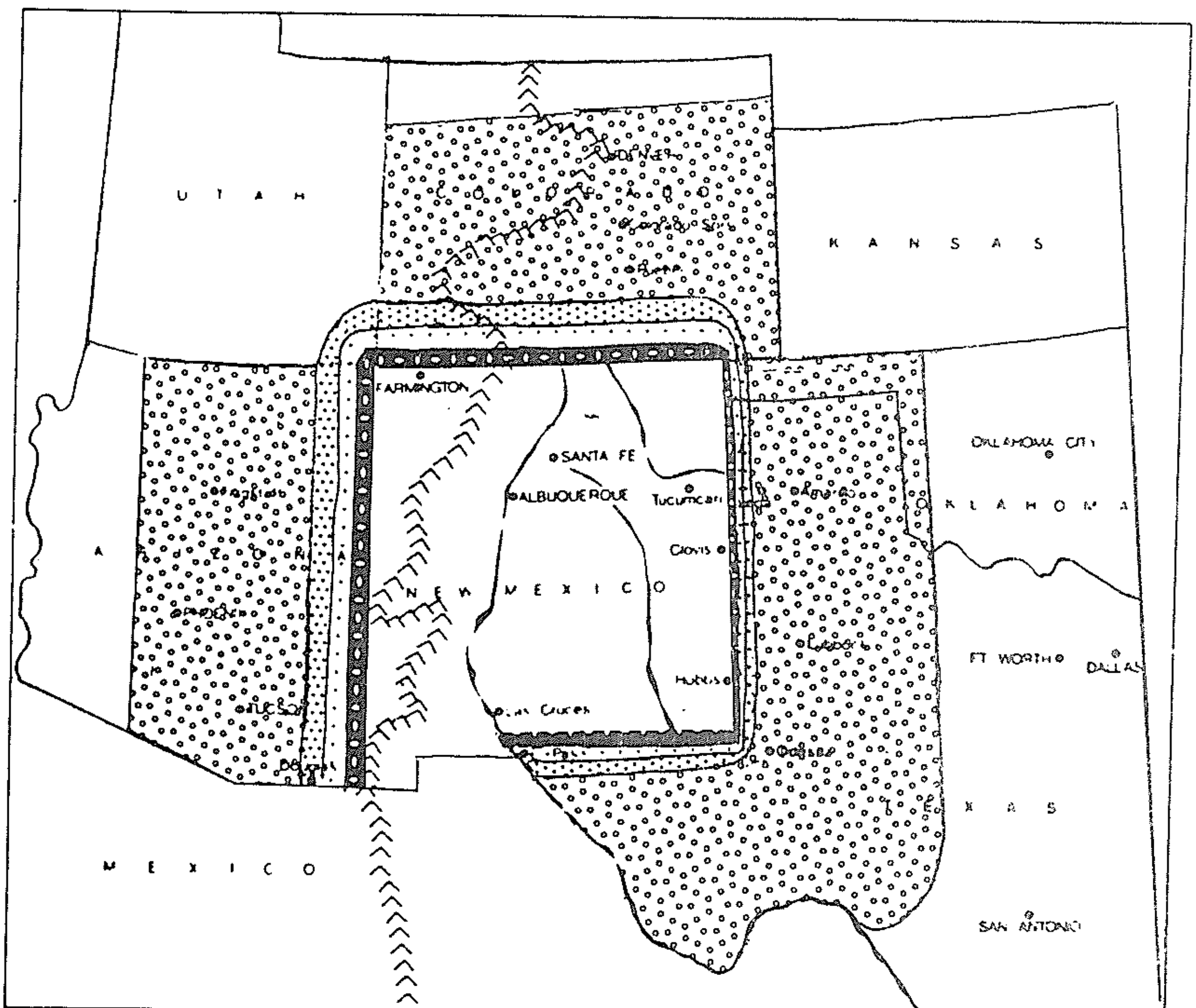


FIGURE 2

Areas of Potential Water Transfer

(Cost = $2.50 per acre-foot per mile)

Key

1. Municipal and Industrial Use Area
2. Agricultural Use Areas
   - Assuming 1 acre-foot produces $ 75 in benefits
   - Assuming 1 acre-foot produces $100 in benefits
   - Assuming 1 acre-foot produces $125 in benefits

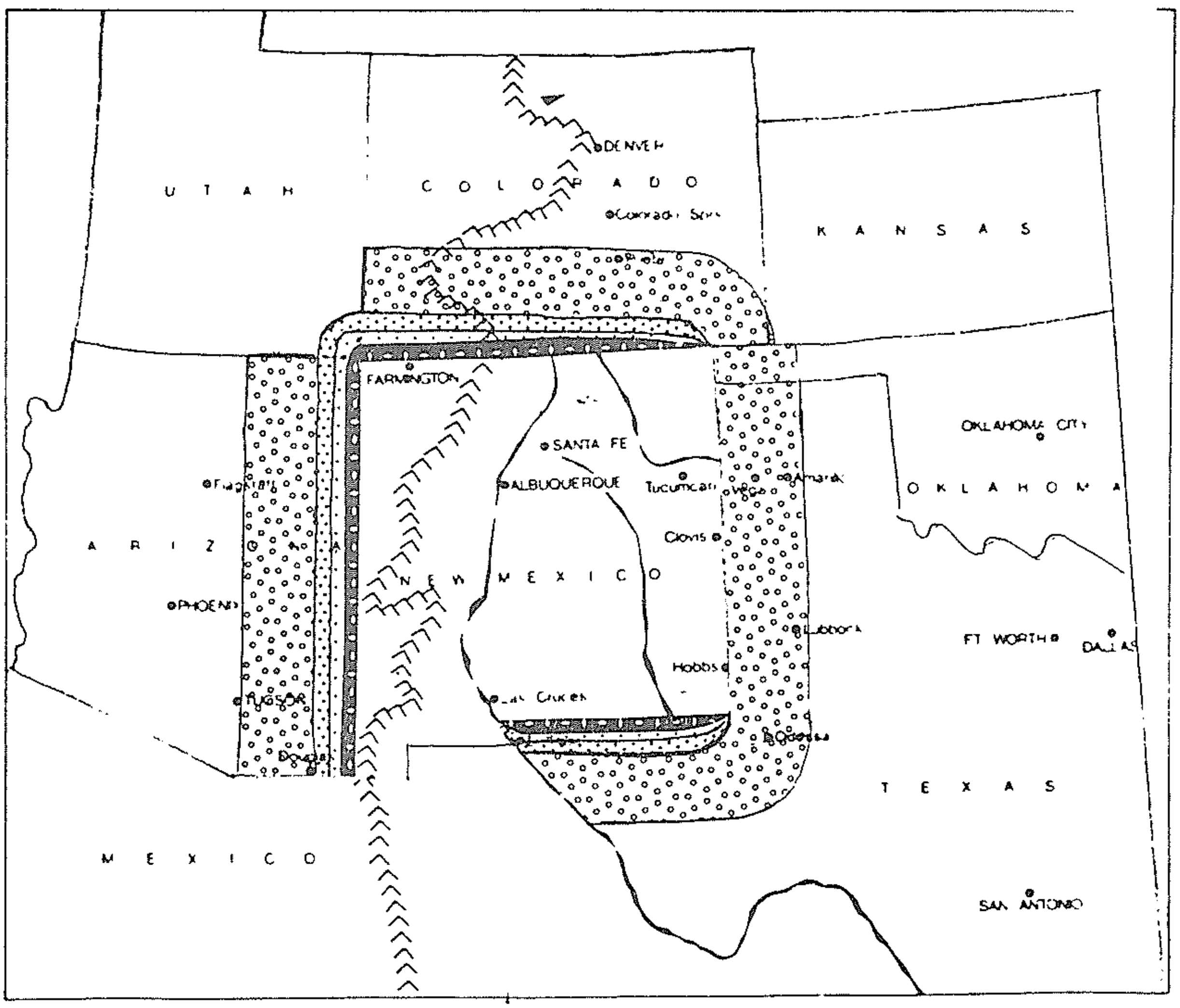
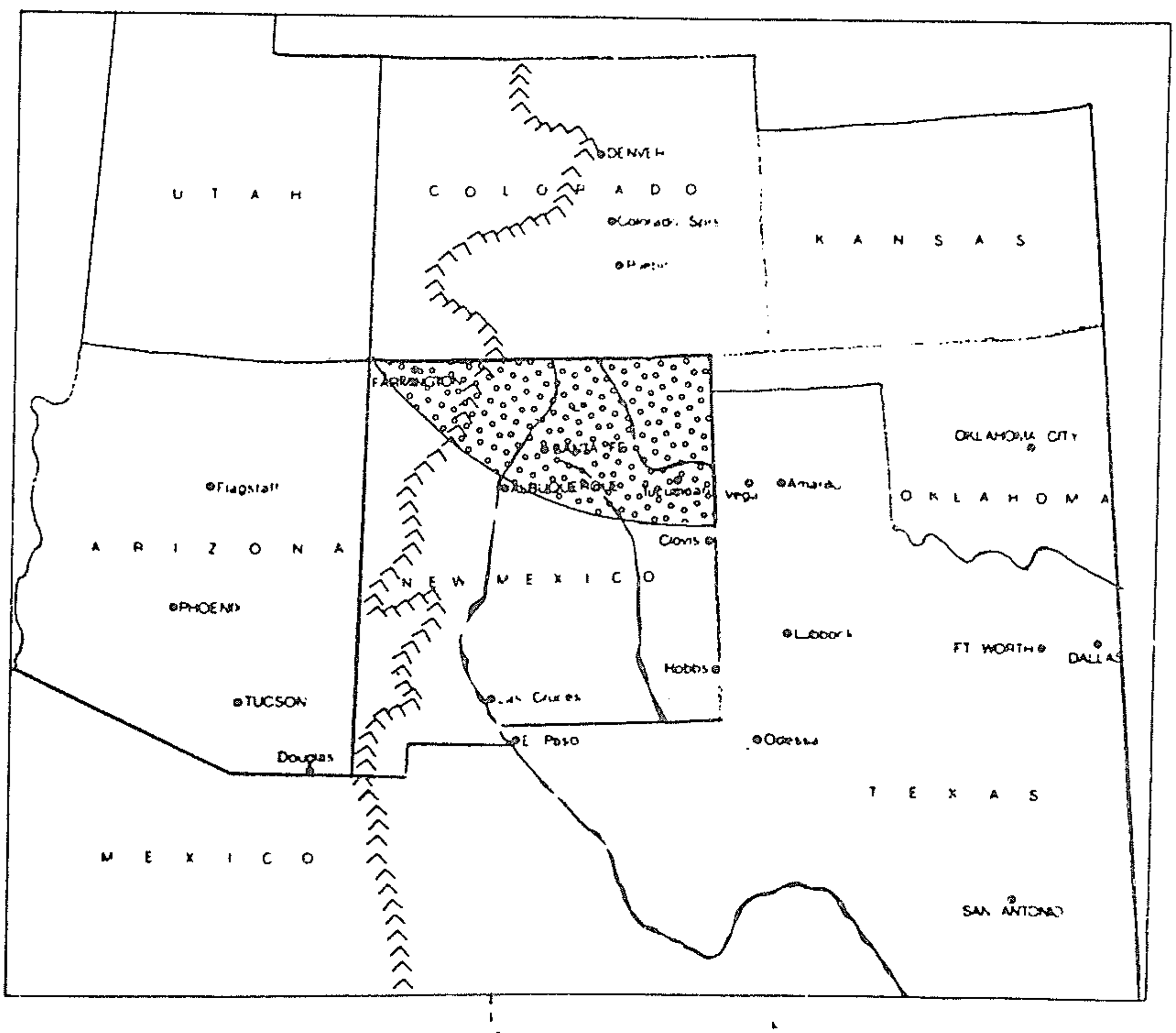


FIGURE 3

FIGURE 4

Areas of New Mexico Subject to Potential Water Transfers for M & I Use

(Cost = $2.00 per acre-foot per mile)

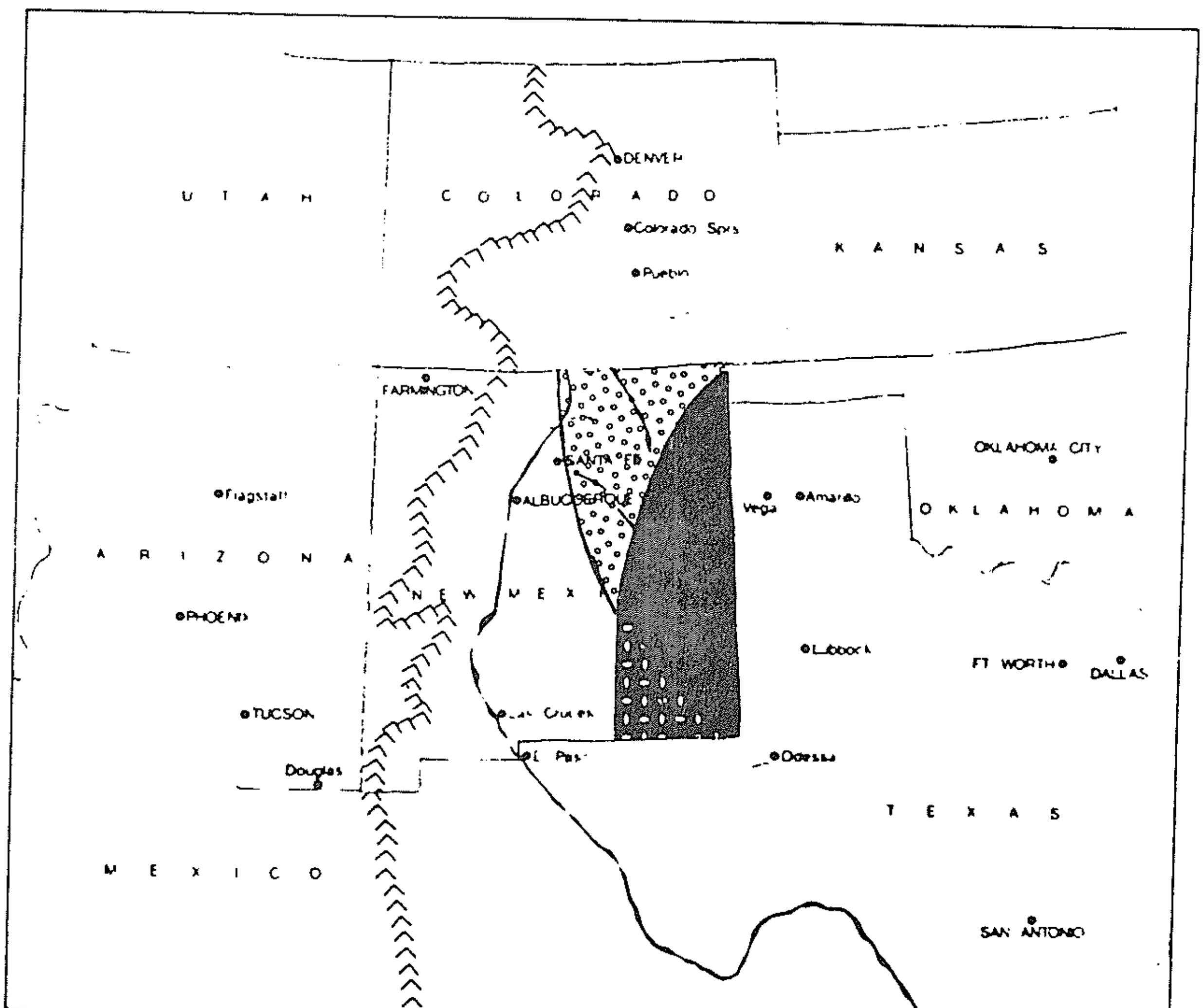


Pueblo, Colorado

FIGURE 5

Areas of New Mexico Subject to Potential Water Transfers for M & I Use

(Cost = $2.00 per acre-foot per mile)



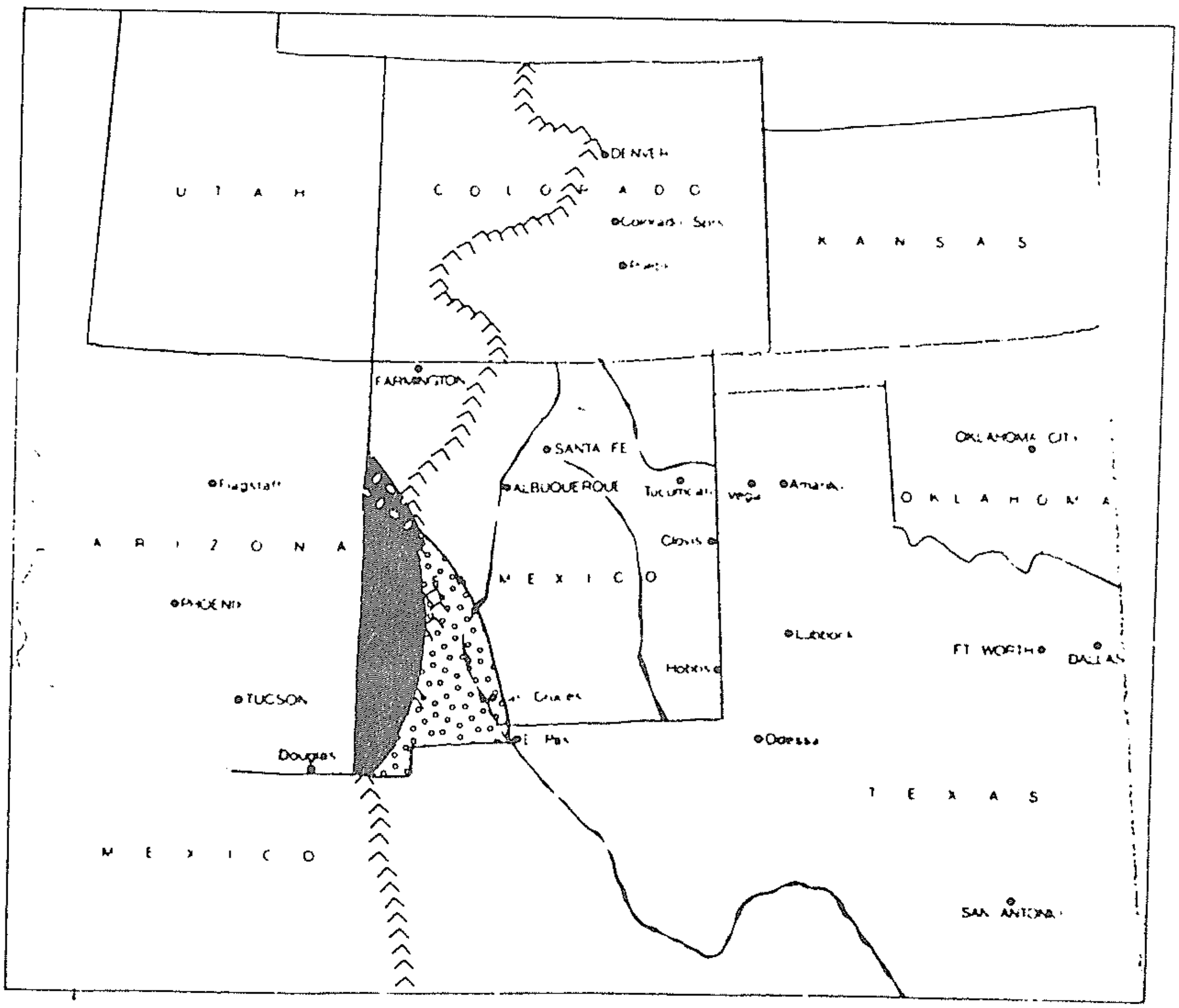
Amarillo, Texas

Lubbock, Texas

FIGURE 6

Areas of New Mexico Subject to Potential Water Transfers for M & I Use

(Cost = $2.00 per acre-foot per mile)



Phoenix, Arizona

Tucson, Arizona

FIGURE 1

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-1 FOR CLOSED BASINS

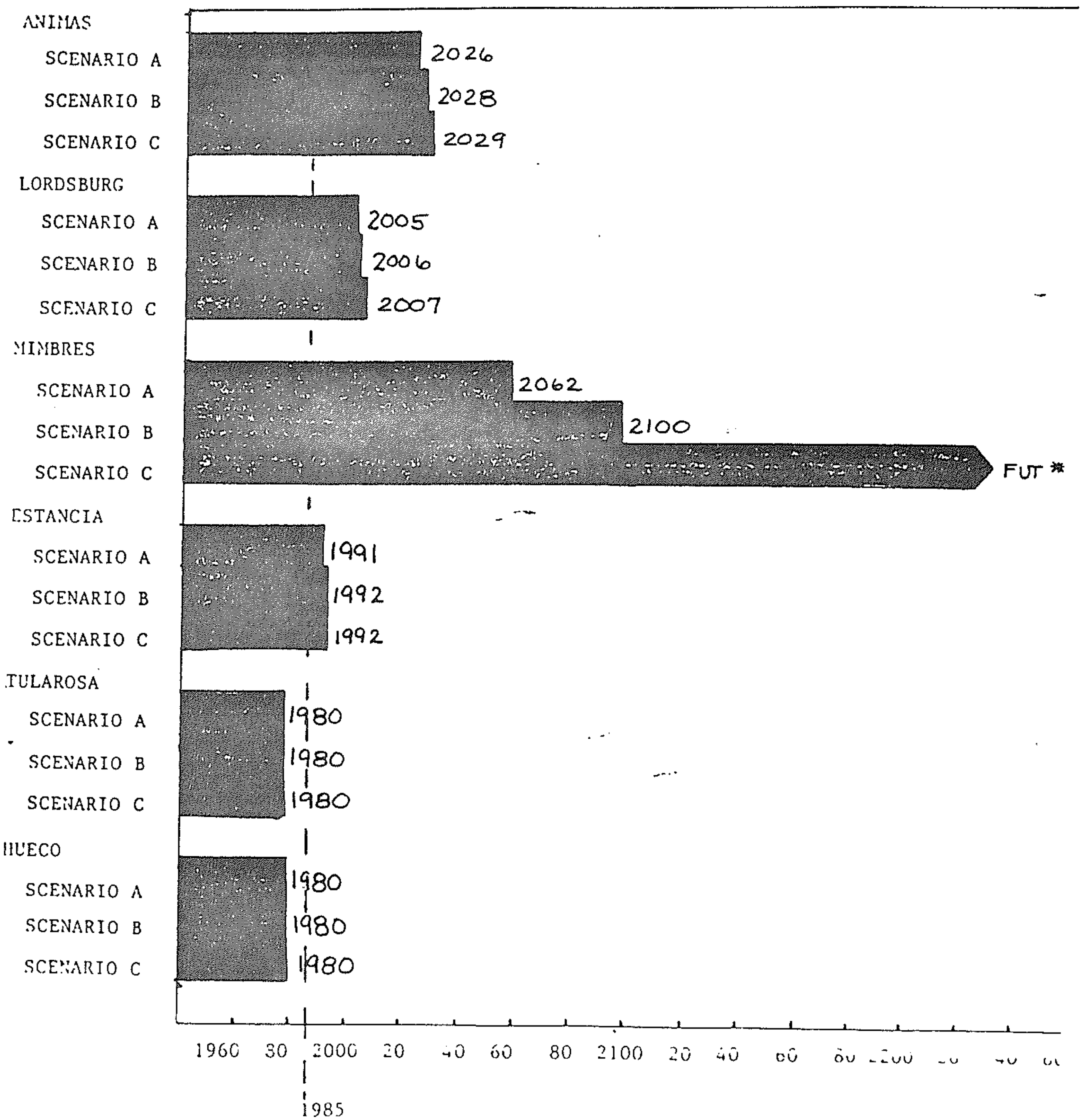


FIGURE 2

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-2 FOR CLOSED BASINS

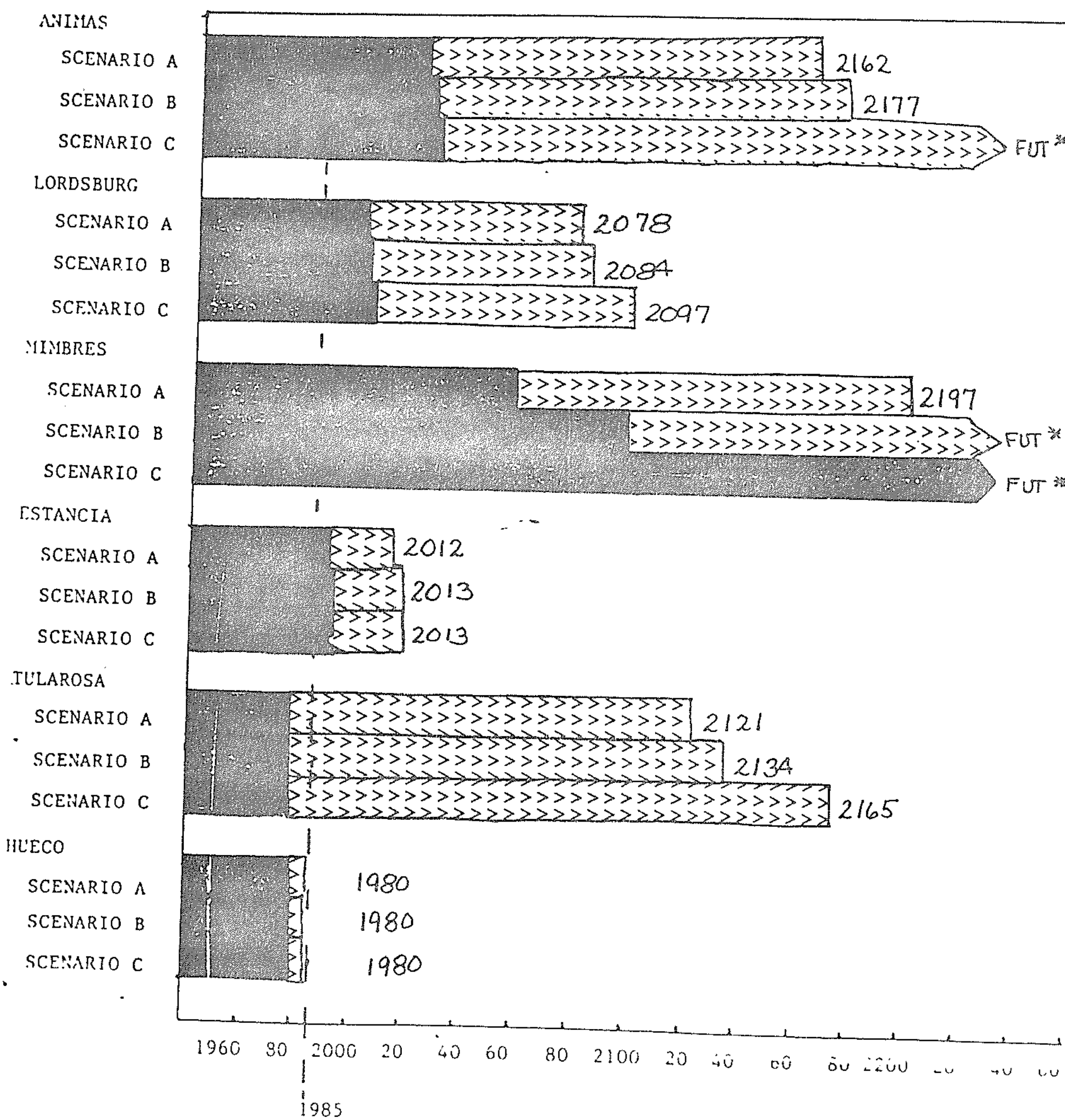


FIGURE 3

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-3 FOR CLOSED BASINS

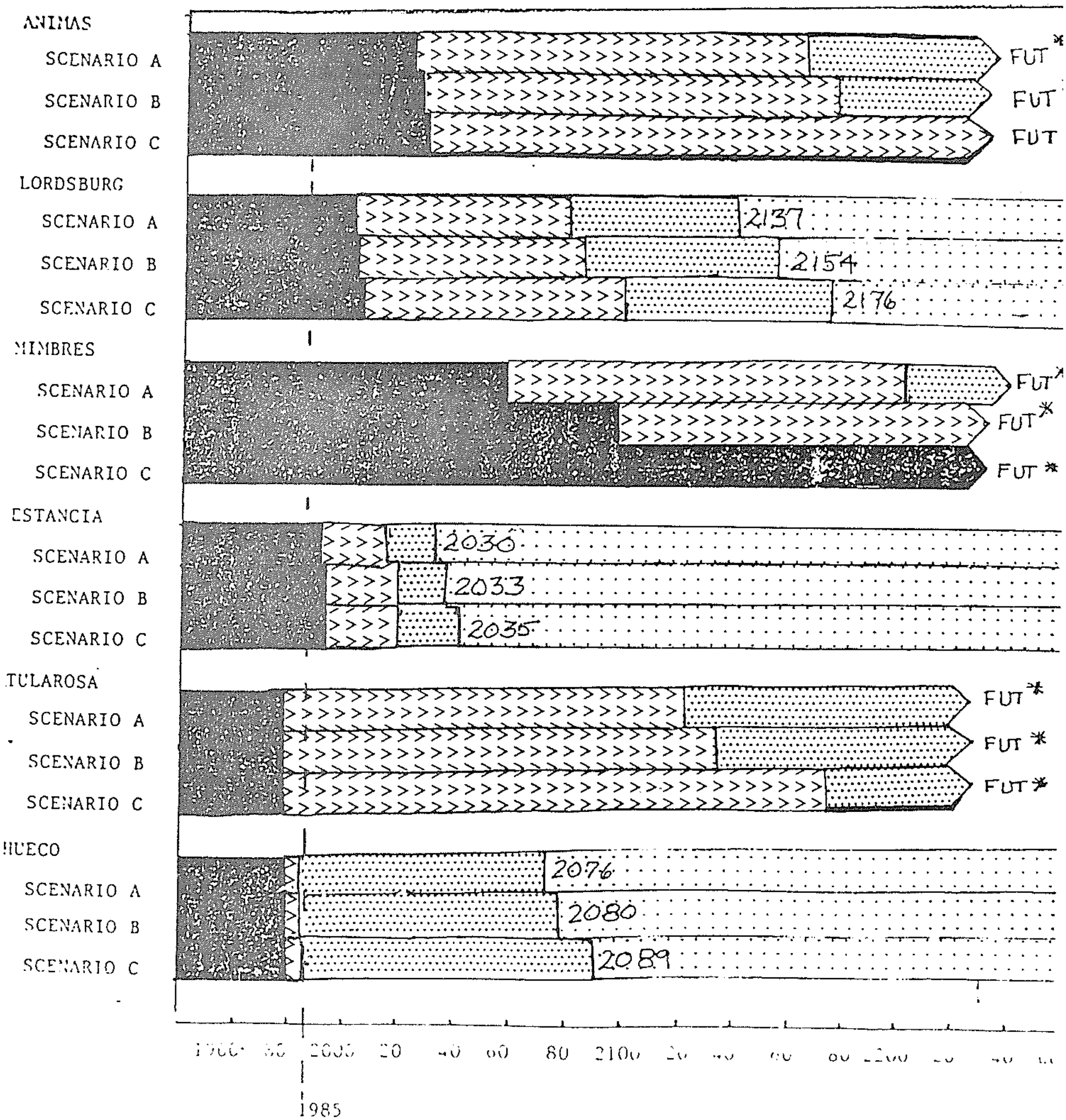


FIGURE 4

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-1 FOR TRIBUTARY BASINS

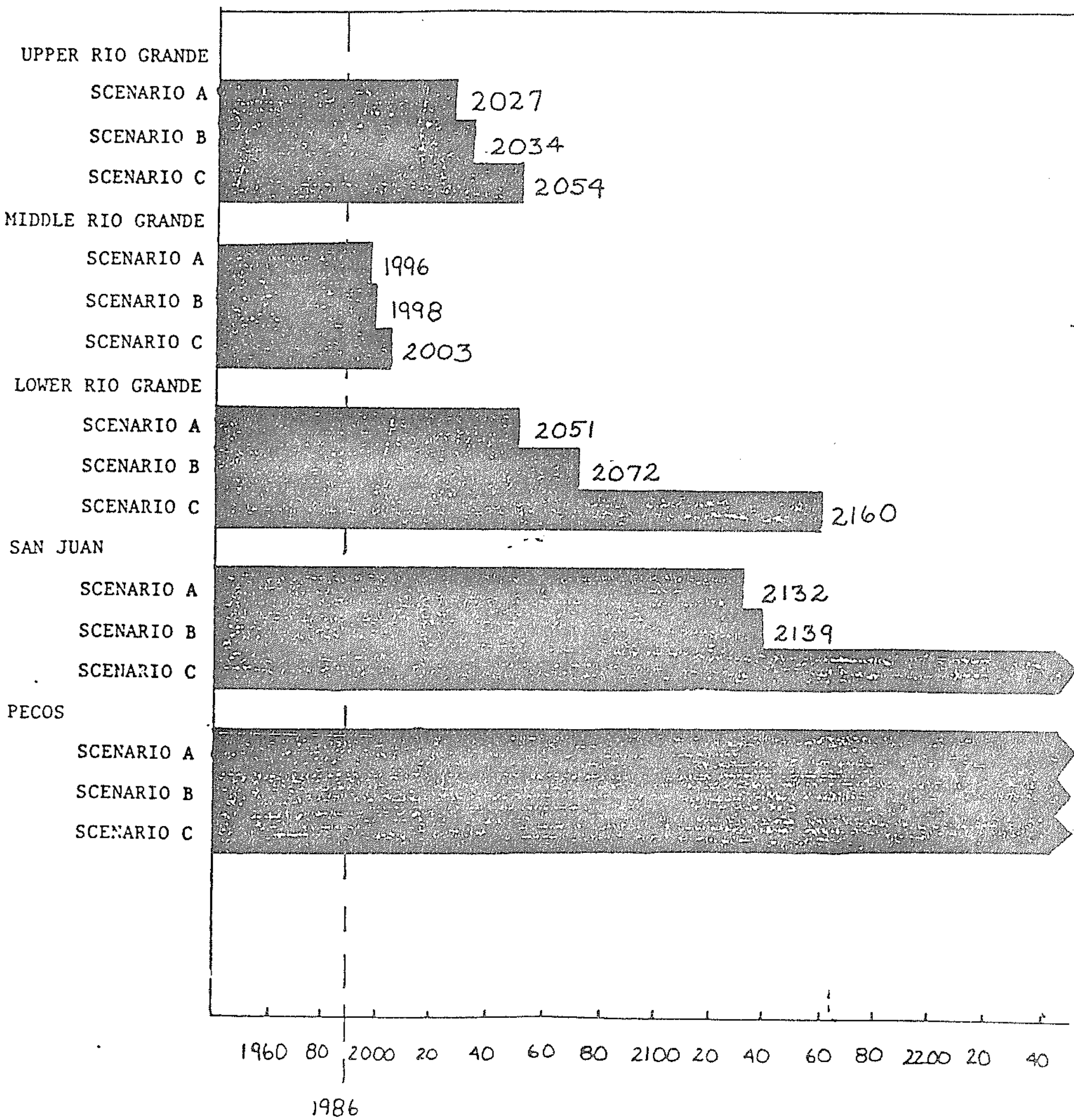


FIGURE 5

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-2 FOR TRIBUTARY BASINS

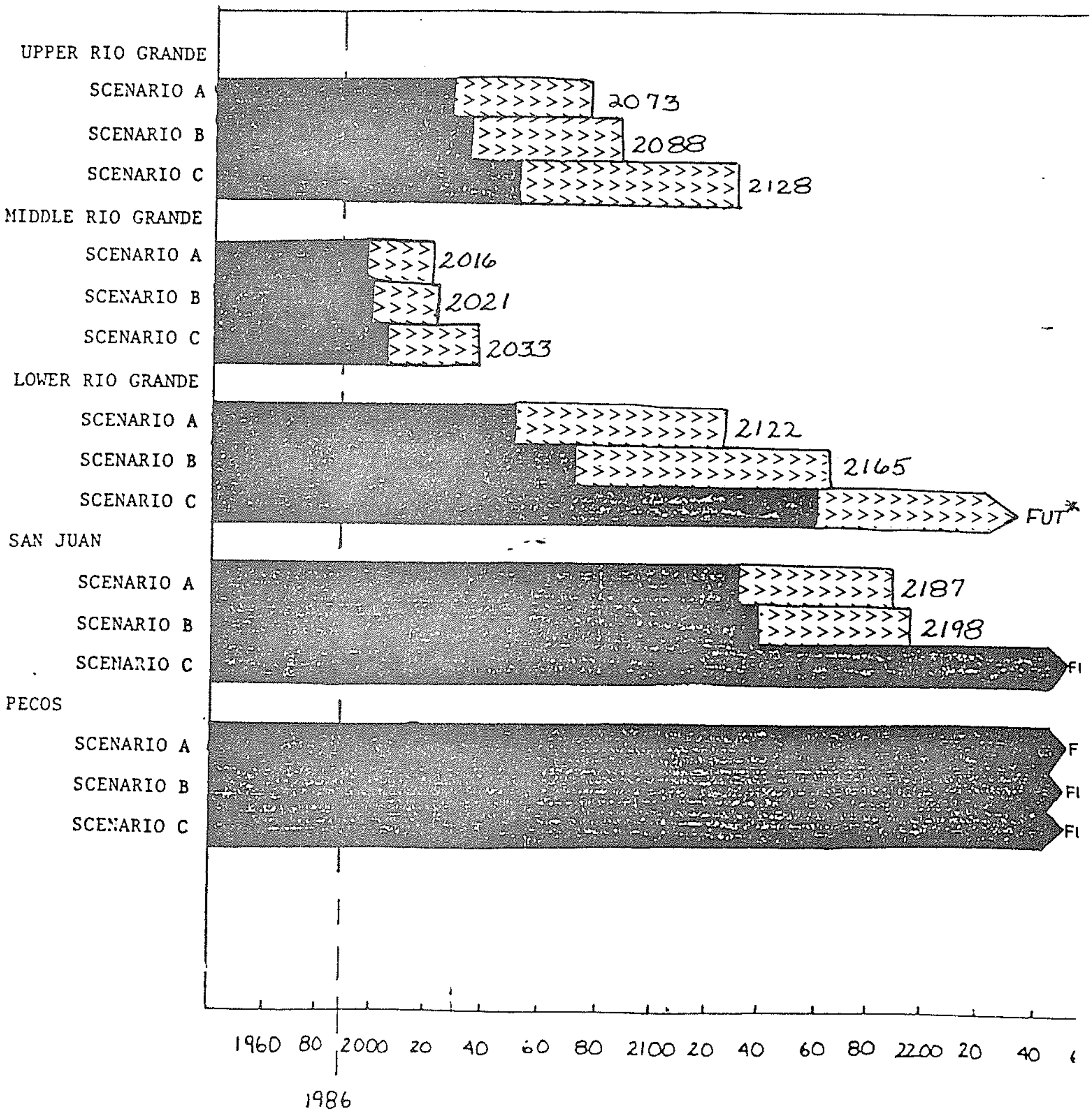
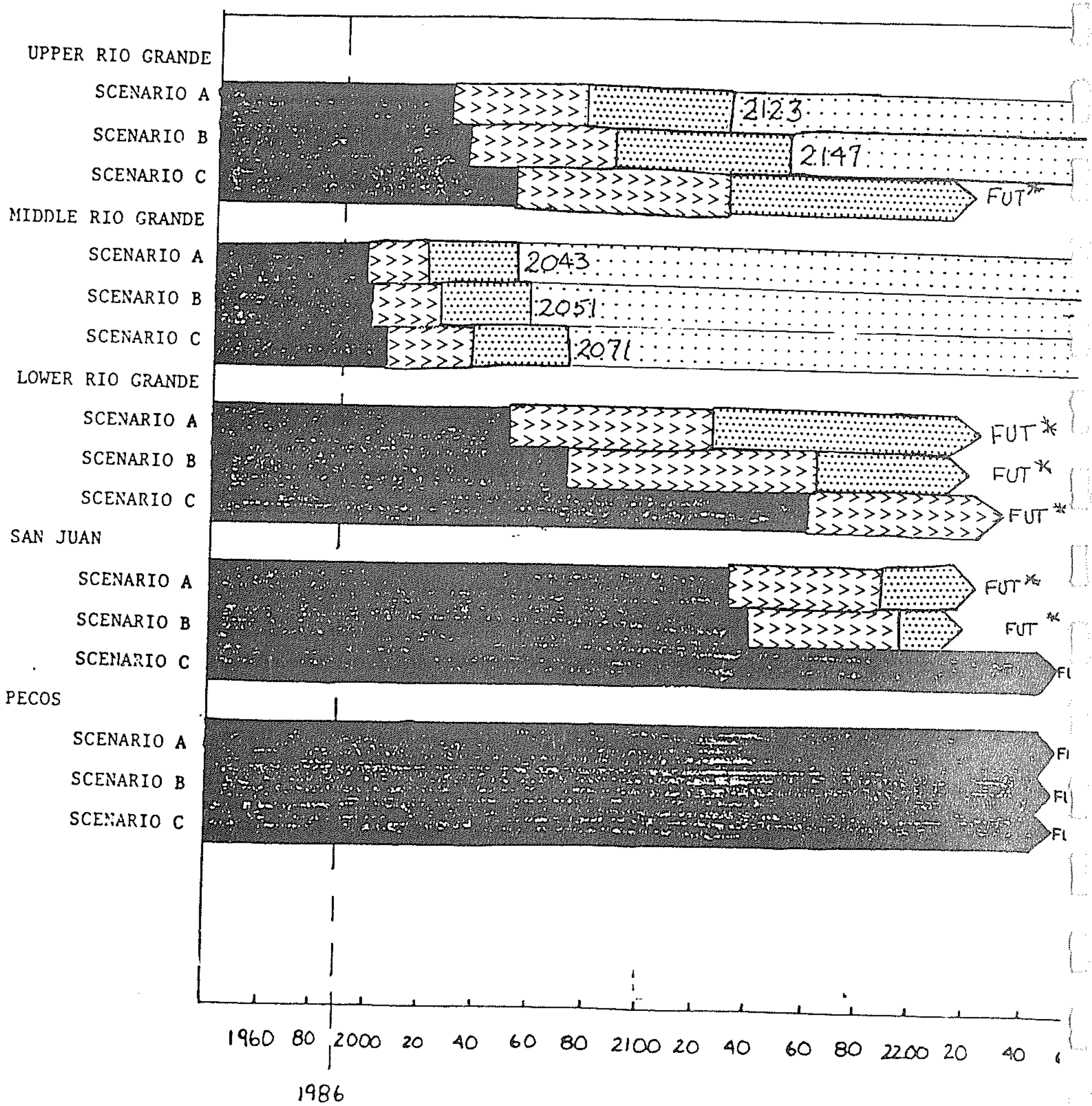


FIGURE 6

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-3 FOR TRIBUTARY BASINS



Two obvious conclusions can be drawn from this: Water scarcity in New Mexico will cause basic lifestyle changes in the very near future, based strictly on in-state demand for water alone. Add to this conclusion the fact that we are now part of a regional water market covering virtually every region in the state and including Albuquerque, Las Cruces/El Paso, Lubbock, Amarillo, Tucson, and even parts of Southern Colorado, and the speed with which these benchmark dates are approaching is alarming and demands some action now.

IV. FINDINGS CONCERNING NEW MEXICO'S OPTIONS IN THE INTERSTATE WATER MARKET AND REGIONAL WATER PROBLEMS

As noted above, our overall study design has been to review the available literature with respect to the legal flexibility for regulating the state's water supplies and to review the existing literature with respect to the water supplies themselves. We have also traveled to various parts of the state to gain an overview of local perceptions concerning state appropriation and general water problems. Our findings are as follows:

(1) There is and will be an interstate market for water, and water supplies in New Mexico are part of that market. No trick legislation will protect these water supplies from that market, and the Supreme Court is not likely to reverse itself on this issue.

(2) It is legally possible, however, for a state to enter the market as a participant by appropriating and developing its own water supplies. By developing its own water supplies, a state may guarantee future water

supplies for various regions of the state as a part of regional planning and may market water to other states to raise revenue for in-state water development projects. Numerous reasons argue for participation in the water market; they are set out below in the section entitled "Benefits from State Appropriation."

(3) While New Mexico has developed a surface water plan through the State Engineer's office by construction of reservoirs, most of which have been completed, no provision has been made for guaranteeing regions of the state sufficient future water supplies from groundwater sources, for state support of the development of regional water supply systems, or for possible interstate exchanges.

(4) In most rural areas of the state, people are unsure of their water future, unsure of the mechanisms to acquire water rights, unsure of the period of time their water supplies will last and unsure of the leadership provided by the legislature in this area. Individuals are beginning to speculate in water rights futures.

(5) In the Dona Ana County area, the El Paso lawsuit and basic conflicts between agricultural and municipal uses have caused tremendous uncertainty about water availability. Many more applications have been filed for water than actually exists in the ground.

(6) In Gallup, the physical shortage of water is of great concern. While studies have been done with respect to

the possibility of bringing water from the San Juan River, the cost of the project is high. Also, hydrologic studies are being conducted throughout the area.

(7) Throughout the eastern part of the state, there is a great deal of concern over the declining groundwater table and the possibility of demand from Texas municipalities. This area of the state is studying its problem and is anxious to take action toward a solution, but the necessary capital is not available. There is much interest in water conservation and a desire to see that this area has a guaranteed quantity of water available to it in the future.

(8) In the Taos area, there is a great deal of concern about the transfer of water rights from traditional acequia uses into other uses. There is a case before the Court of Appeals in which a district judge has ruled that a private person's water rights could not be sold to another because the sale would, in effect, be detrimental to the culture of the area and therefore not in the public interest.

(9) In the Albuquerque area, the city of Albuquerque, with its San Juan/Chama water and its water rights purchase program is proceeding well with its water development plans, but areas outside the city and the smaller municipalities, in the long run, are going to have a difficult time competing with the City of Albuquerque for the surface rights needed to offset their groundwater

pumping. There appears to be great concern about the inability to transfer water rights outside the conservancy district to facilitate new uses. In the area east of the Sandias, there is interest in establishing a long-term potable water supply without destroying water quality.

(10) In response to the El Paso case, our system of water law appropriation and transfer has been fundamentally changed. An amendment to state law in response to the El Paso litigation has introduced into the initiation of every water right the criteria of the public welfare and water conservation. This may mean that with respect to every water right that has been purchased in the water market, the question whether that transfer is consistent with the "public welfare" and whether it should be allowed will have to be litigated and ultimately decided by the courts.

(11) The policy of extracting tributary groundwater to provide short-term supplies for the state is not well understood. While many of our municipalities and industries may be able to survive for a period of years, maybe even hundreds of years, the only reliable supplies in the future are our surface supplies. Because of present pumping of tributary aquifers, in the future surface water in these areas will be taken exclusively through wells. This concept and its ultimate impact on

the environment of the river is little understood by hydrologists and lay people alike.

(12) In most areas of the state, if new industry were to come in and ask the question, "Is there a reliable guaranteed supply of water and is there one agency I can go to get it without being involved in lawsuits?" the answer would have to be no. Possible exceptions are Ute Reservoir, where the state has developed water for commercial and other purposes, and the City of Albuquerque.

V. BENEFITS FROM STATE APPROPRIATION AND LEGISLATIVE RECOMMENDATIONS

The study team and the advisory board are of the opinion that state appropriation could assure a water future for the state by assisting the various regions of the state to plan and control their water futures. Therefore, this course of action should be adopted by the legislature of the state of New Mexico.

The study team has worked from certain basic assumptions: The first is that each area of the state is intrinsically valuable--the rural areas as well as the more economically developed urban areas. Therefore, as a matter of policy these areas cannot be allowed to languish or deteriorate for lack of financial and technical help to develop their water resources. Second, the state is interested in controlling its water future rather than being controlled by it. Third, the citizens of the state are willing to make necessary lifestyle changes in the area of water conservation to insure that we have enough water in the future.

Fourth, our traditional and fundamental prior appropriation system of water law should be maintained with the minimum change possible.

Based on these assumptions, a review of the extensive literature on the subject, and discussions with water officials throughout the western United States, the study team, with substantial assistance from its advisory board, has isolated possible ways that New Mexico may control its water future by actively participating in the marketplace for water (state appropriation). The task for New Mexico is naturally divided into two distinct categories: (1) ensuring the rational use of water supplies for the long term future of the state, and (2) coordinating the timely development of water projects in those areas of the state in which water shortages already exist or will exist in the very near future.

A. Long-Term Benefits from State Appropriation

As demonstrated earlier, the demand for water resources in the United States is regional and not confined by state lines. Furthermore, no legislation aimed at embargoing a state's resources will survive constitutional challenges. Fortunately, however, states are free to participate in the interstate marketplace just as any other entity, and the state of New Mexico is certainly free to utilize its own resources to guarantee a future water supply if it chooses to do so. Therefore, the state is faced with a choice: watch the interstate marketplace allocate resources in the region and take no action, or compete in the marketplace for the benefit of its citizens. Using the market participation technique, the state may achieve the following goals with respect to its long term water future:

1. <u>State Appropriation of groundwater or purchase of groundwater rights could guarantee future long-term supplies</u>.

The state may elect to appropriate a substantial amount of groundwater where available supplies exist, using a time horizon for development of 80-100 years. It would need to, concomitant with its application to appropriate water, develop a long-term plan for the use and development of the water resource and ultimately make the water available to actual water users for beneficial use. The most significant result of this strategy would be securing water supplies for future needs. In some areas of the state, the same result could be achieved through purchase by the state of existing rights with a lease-back arrangement to the owner until the owner no longer needed the rights. For example, in many areas of the state, the maximum depth to which a farmer can pump and still remain profitable is 230 to 250 feet. There may, however, be substantial amounts of water below that depth that could be put to other commercial uses in the future. Therefore, as noted above, in those areas of the state, the state may wish to act now to begin to purchase rights and give the farmer a lease-back (in a sense, purchase "water futures") so that the balance of the aquifer is available over the long term if and when the financial base of these agricultural communities changes to other types of industries.

2. State Appropriation or purchase of groundwater may allow short-term marketing of water interstate to support New Mexico water projects.

The state may also wish to appropriate water in areas where the best market, at least in the near term, is out of state. Since water is an asset that can bring a high lease price and since the state needs revenues to develop other water projects throughout the state, leasing a portion of its water rights for use out-of-state or sale of water in bulk to out-of-state users could provide a source of badly needed revenues for areas of the state that need substantial funds to develop public supplies. The benefit of this solution is that it allows New Mexico to capture revenue from an asset that otherwise is made available for free on the interstate market under the Sporhase decision. It would, of course, have to be understood that when the water is needed in New Mexico, the out-of-state use would end.

3. State Appropriation or purchase of groundwater could permit the state to develop and coordinate water transfer projects.

There will be areas of the state that, notwithstanding full use of water conservation technologies, may need to import water from other sources in New Mexico. This type of project could conceivably create conflict between the source area and the area to which the water is being transported. The only entity with jurisdiction over both areas is the state. The state, as owner, could appropriate water in one area of the state for use in another while ensuring that: (1) the area from which the surplus water is taken is fully compensated for it, and (2) the area into which the water is being imported has met acceptable water conservation standards in advance. If such water transfer projects are left exclusively to regional development, experience in other states teaches us that intrastate water conflicts can develop that waste time and the limited economic resources of the state.

4. State Appropriation or purchase of groundwater could permit the state to develop and coordinate water importation projects where such plans are economically and hydrologically feasible.

There may be areas of the state where the most rational source of a long term water supply is an out-of-state source that is proximate to a New Mexico community and distant from any water needs in a neighboring state. If the neighboring state has developed the water supply, the choice may be to purchase the water from that state. If the neighboring state has not developed these supplies, and it is not inconsistent with the public welfare of that state, then New Mexico may seek to develop the water supply and make it available not only for New Mexico users, but also for users in the other state.

B. Immediate Benefits from State Appropriation

1. State Appropriation or purchase of groundwater could aid in the creation of regional water development projects.

There are areas of the state that face water shortages now or in the very near future. Many of these areas rely on small water associations or small municipal systems for their domestic supply. Many areas lack the funding to do the necessary engineering studies and planning, and many may even lack the resources to put together the applications to appropriate or to purchase water rights in the water market for future use. The state has played an active role in developing the state's surface water resources through the construction of reservoirs with state and federal funds. It has compacted these surface resources with the hope of guaranteeing a future supply and, through the Interstate Streams Commission, has assisted in their development. Yet, there are areas of the state whose major source of water is groundwater. The state may elect to play a development role with respect to groundwater similar to its role with respect to surface water supplies. While the surface water infrastructure has been reservoirs, the infrastructure for groundwater may be engineering assistance, water rights acquisition systems and distribution.

2. <u>State Appropriation or purchase of groundwater could provide certainty of water supply for new industry and thereby promote future economic development</u>.

Every state in the arid Southwest is competing for new industry. High on the list of concerns for any industry that moves into an area are: (1) educational quality of the work force, (2) the ambience of the state as a place to live, (3) the stability of the state government, and (4) a reliable water supply. In New Mexico, when considering water we are often confronted with two basic uncertainties. The first uncertainty has to do with quantity. Simply stated, we don't always know exactly how much is available because we have not undertaken the costly hydrologic studies to find out. The State Engineer's office is working on this problem and is obviously capable of coming to grips with the task. It is, for example, currently updating the 1976 Assessment of Water Resources for Planning Purposes. The second kind of uncertainty in the water arena is legal uncertainty. To acquire a water right in many areas of the state frequently requires a series of hearings before the State Engineer in which the transfer is protested by persons on all sides with differing interests, which produce a host of conflicting testimony and which is still subject to de novo review in district court. All of these steps are not only costly financially, but they also discourage economic development in the state since the legal uncertainty may be fatal. If the state were to appropriate water now for future industrial use consistent with a development plan that attempted to accommodate many of these conflicting interests, there could be a substantial improvement from an economic development perspective. Under these circumstances, when an entity comes to the state and asks the question, "Is there one entity I can go to and get the water supply I need without lawsuits and antagonism from the community?" the answer could be yes. If the water supply were already appropriated and placed in a water development bank, with plans for a specific beneficial use it could be more readily available.

3. State Appropriation or purchase of groundwater rights could assist the state in the promotion of water conservation.

It is inevitable that most, probably all, areas of the state will eventually have to engage in more stringent water conservation. The appropriation of water by the state would aid this process in three different ways.

First, since the bulk of the water resources in the state are currently used in agriculture, it is in this sector that water conservation could produce the greatest savings. The technology is expensive, however. Further, once water is saved or conserved, the question becomes: Saved for whom? Phrased another way: Even if the agricultural interests use less, how can we be sure that the water saved inures to the benefit of future generations? One example illustrating the coordination of benefits and costs from conservation can be drawn from California. It is a hydrologically unique example, but it is relevant to us here in New Mexico because of the incredible potential for water savings. The Metropolitan Water District of Southern California (MWD), has contracted to construct ten million dollars worth of water conservation capital improvements in the Imperial Irrigation District. In exchange, MWD receives one hundred thousand acre feet of conserved water. While this is an extreme and uniquely situated circumstance, the concept is worth exploring. If the state were to act now to provide water conservation technology to areas where it is needed in exchange for title to the water conserved and guarantee that the saved water would be used in those areas in the future, perhaps all would benefit.

Second, in those areas where the state may seek to appropriate water and develop it for use either in that area or other water-short areas, all potential users could, for reasons of fairness, be required to comply with reasonable water conservation standards. Finally, the state could use the revenues from its water development projects to fund experiments in water conservation.

4. State Appropriation or purchase of groundwater rights could, through the dissemination of good price information, aid the movement of water to higher economically valued uses.

Where water supplies are fully appropriated, the state may be purchasing water rights and leasing them back to the seller until the seller's use is no longer commercially feasible. In this process, the state would acquire price information about water rights. An additional function the state might serve could be to provide accurate price information on the value of water rights, available to all who are in the marketplace. Very rarely does that information exist today. If a farmer wishes to sell his water right to the state or a municipality or industry, he should know its value. Likewise, the potential buyers should have access to good price information. If the state were able not only to participate in the market, but also to act as a clearinghouse for price information for both buyers and sellers, perhaps all would benefit.

5. State Appropriation or purchase of groundwater rights could help coordinate regional and local water planning for the future.

If the state were participating in the water market in various parts of the state, it would, by necessity, obtain substantial hydrologic information about each region. In effect it could work in partnership with each region of the state to ensure its water future. This amounts to the development of a series of regional water plans. However, since the state would be in effect a partner with each region, when all these regional plans are put together, the state will have a state water plan. The critical fact is that it would be a plan developed from localities and regions rather than from Santa Fe. South Dakota has used a similar procedure to prioritize its water development projects, and Texas also adopted a similar approach during the past year.

6. <u>State Appropriation or purchase of groundwater could aid local and private interests by coordinating water information-sharing throughout the state</u>.

As the state developed water resources in various regions, it could make all of the data it acquired available through a clearinghouse such as the New Mexico Water Resources Research Institute which could then place it on computer for easy access. Oregon has begun a similar process of water data exchange.

7. <u>State Appropriation or purchase of groundwater could preserve key sectors of the economy and areas of the state that make a singular contribution to New Mexico society and culture</u>.

There may be areas of the state that need preservation because the culture or the land or both constitute irreplaceable assets. Certainly, it is unwise to allow the very best agricultural lands to go out of production. Continued use of water in agriculture in certain areas of the state may be critical for a variety of reasons. Agriculture may not be able to compete with municipalities and other industries for water from a strictly economic viewpoint. Yet, the long-term interest of the state may best be served by sustaining a healthy agricultural industry in selected areas. As discussed in Chapter 9, the value of the agricultural industry is far greater than any simple calculation based on the price of crops alone. And our unique cultures in the North, both Indian and Hispanic, create part of the ambience that makes New Mexico unique. Further, no one seriously questions that the wildlife and fish resources of the state need protection, and protection of these resources need not be inconsistent with our market system of water rights. Because the state values its best agricultural lands, its unique cultures and other fundamental resources such as the bosques and the wildlife, it may have to acquire water rights in the marketplace to keep them. This is not a new or radical suggestion; the State Game and Fish department has consistently done this. In the view of the study team, if the citizens wish to maintain these values, the State should compete directly in the marketplace to support these special values.

8. <u>State Appropriation or purchase of groundwater could aid the goal of protecting the water quality in the state</u>.

If the state were a partner with a region of the state in the development of water supply systems, it could insist that those using the water systems comply with acceptable water quality standards. It would have access to groundwater quality information as it developed its own supplies, and it could coordinate the dissemination of this information statewide.

9. <u>State Appropriation or purchase of groundwater resources could aid in the protection of our surface water resources</u>.

In Chapter 2, we note that New Mexico has correctly decided that it is in the public interest to develop tributary groundwater in storage. As this water is developed, however, the stream systems of the state are eventually affected. Indeed, in some areas of the state, substantial amounts of stream flow will effectively be diverted into groundwater wells and no longer actually move through the stream itself. The environmental and economic impacts of this process are potentially immense. Environmentally, the lowering of the water table in the river area will have an impact on vegetation. Economically, persons will be buying up surface rights in order to have access to the groundwater. Finally, the location of wells is critical. In general, the farther from the river, the more groundwater can be taken. The hydrology of this phenomenon is far from clear as demonstrated in the testimony in El Paso v. Reynolds. A full understanding of the hydrologic implications of this process is extremely expensive to acquire. The state may ultimately assert some control over this process by purchasing surface rights to ensure that local needs are met and that the hydrologic facts are fully developed and understood. Indeed, if the impacts on the river are miscalculated, the state may have to use some of its previously purchased rights to offset these impacts.

C. Specific Legislative Recommendations

Because of the substantial need for regions of the state to plan for their water future and because state appropriation could go far in serving that need, the study team and advisory board recommend that the concept of State Appropriation of Unappropriated Groundwater be adopted in principle in the 1986 legislative session. The concept is one in effect of forming state-regional partnerships for water development and cooperation in promoting water conservation. The study team and advisory board recommend further that the study team be funded to study implementation of state appropriation by examining three final specific issues:

(1) How much would it cost to implement state appropriation in various regions of the state?

(2) What is the best source of revenue for financing state-regional partnerships for appropriation of water?

(3) What is the best administrative agency in New Mexico for implementing state appropriation?

The study team and advisory board are of the view that the Interstate Streams Commission appears to be the agency best suited to the task; however, great care should be taken to determine what legislative changes, if any, need to be made to ensure that this agency is politically and geographically representative and responsive to the needs of each of the distinct regions of the state.

The legislation funding the study should further provide that the study team make formal presentations of its findings to the appropriate standing committees of the legislature prior to the 1987 legislative session so that these committees are prepared to deal with the substantial policy questions presented by actual implementation of this concept. Legislation accomplishing these objectives is attached.

AN ACT

MAKING AN APPROPRIATION FOR A STUDY OF THE SPECIFIC COST OF IMPLEMENTATION OF STATE APPROPRIATION OF UNAPPROPRIATED GROUNDWATER, DESCRIBING THE MAKE-UP OF THE APPROPRIATING AGENCY AND IDENTIFYING SOURCES OF FUNDING FOR SUCH APPROPRIATIONS: DECLARING AN EMERGENCY.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF NEW MEXICO:

Section 1. FUNDING AND IMPLEMENTING OF STATE APPROPRIATION OF UNAPPROPRIATED GROUNDWATER--STUDY.--

A. The legislature finds as a result of the report from New Mexico State University and the University of New Mexico regarding the feasibility of state appropriation of unappropriated groundwater that such state appropriation could assist the different regions of the state in planning and controlling their water futures. Unanswered questions remain, however, as to the type of agency that should operate such a program to ensure responsiveness to all regions of the state and how much such a program would cost and how such a program should be funded. It is therefore necessary to fund a study of these issues to be completed prior to the 1987 legislative session.

B. The office of the governor shall coordinate and contract with the New Mexico Water Resources Research Institute of New Mexico State University and the University of New Mexico School of Law in developing a study of the cost of implementing a program of state appropriation of unappropriated groundwater in New

Mexico, the possible sources of funds for such a program and the types of agencies that could operate such a program. The Interstate Streams Commission now appears to be the proper agency to appropriate unappropriated groundwater; therefore, the feasibility of that agency carrying out that function should be the principle focus of the agency analysis. Therefore, the study team will coordinate and work with the office of the State Engineer in carrying out this aspect of the study. The final study report shall contain an analysis of specific proposals with costs and benefits itemized under each proposal, recommendations concerning any modifications or amendments to New Mexico laws necessary to implement the proposals analyzed in the report. This report shall be submitted to the Governor and Legislative Council no later than January 20, 1987. Prior to the January 1987 legislative session, the results of the study will be presented to the Legislative Finance Committee, the Legislative Council and all other relevant committees so that these entities are fully aware of any legislative proposals before the legislative session.

Section 2. APPROPRIATION.--______________________ dollars (________) is appropriated from the general fund to the office of the governor for expenditure in the seventy-fifth fiscal year to carry out the provisions of this act. Payments from this appropriation shall be made upon vouchers signed by the governor or his authorized representative. Any unexpended or unencumbered balance remaining at the end of the seventy-fifth fiscal year shall revert to the general fund.

Section 3. Emergency.--It is necessary for the public peace, health and safety that this act take effect immediately.

CHAPTER 1

LEGAL BACKGROUND AND EVENTS LEADING TO PREPARATION OF THIS REPORT

I. THE FEDERALIZATION OF GROUNDWATER RESOURCES

The state of New Mexico has followed a system of prior appropriation since before statehood. Under this system the first person to put water to beneficial use obtains a transferable property right in the water used. The law also promotes maximum beneficial use of water resources by allowing transfers of these rights by sale to others. The New Mexico "public," in effect, has been considered the owner of the water resource, with the state as trustee for its citizens. Individuals can obtain and retain a property right to use it so long as it is not wasted or abandoned. If wasted or abandoned, the right is forfeited and made available for others to use.

Because the New Mexico "public" was considered sole owner of the resource, only New Mexicans could use the resource. This doctrine was reflected in a statute which prohibited transportation of groundwater for use out of state. This concept of exclusive state use of water resources was acknowledged by Congress in legislation unilaterally approving the division of surface waters between states and by congressional approval of interstate compacts that gave exclusive use of surface water to each of the signatory states. The issue of ownership of groundwater in a state, however, has rarely been before Congress either as part of a specific act of Congress authorizing exclusive use within a state or as part of an interstate compact, except where the groundwater is tributary to surface water. Based on an early Supreme Court case, however, many legal scholars had concluded that a state's groundwater was the property of the state and could be limited to uses within its boundaries.

In Sporhase v. Nebraska,[1] the United States Supreme Court considered the question whether the federal (commerce clause) interest in the free flow of goods between the states invalidated state statutes like Nebraska's that prohibited the interstate transportation of groundwater unless the receiving state permitted exportation.

The Supreme Court struck down the reciprocity clause of the Nebraska groundwater transportation statute and extended commerce clause principles to groundwater transfers, treating water like a "good" sold in interstate commerce. In doing so, however, the Court showed its concern that water in the arid West is different—that arid states need to conserve water for the future. It indicated that federal legislation authorizing states to maintain groundwater stocks within their borders would be an acceptable solution. Likewise, interstate compacts were cited as an appropriate way to resolve this problem. Finally, the Court concluded that water conservation is a legitimate purpose that could justify a state's prohibiting the exportation of its groundwater.

II. NEW MEXICO'S RESPONSE TO THE FEDERALIZATION OF ITS WATER RESOURCES

In 1983, in El Paso v. Reynolds (I),[2] the New Mexico federal district court ruled that New Mexico's absolute embargo on groundwater exportation was unconstitutional. It held that the statute was "tantamount to economic protection."[3] While acknowledging that states have a legitimate interest in the conservation and optimum use of their water supply, an absolute barrier was held not to be narrowly tailored to meet these goals. The district court naturally relied on Sporhase v. Nebraska. In response to the El Paso (I) decision, New Mexico amended its water appropriation statute and repealed the embargo.

III. NEW MEXICO'S NEW EXPORTATION STATUTE.

The statute struck down in El Paso v. Reynolds (I) explicitly banned transportation and use of New Mexico groundwater out of state.[4] The new statute, in contrast, provides that "under appropriate conditions" interstate transportation and use of New Mexico's public waters do not conflict with the public welfare of the state's citizens or conservation of the state's waters.[5] The new water exportation statute has been upheld in El Paso v. Reynolds (II),[6] and the El Paso applications are pending before the State Engineer.

In addition to amending the statute, in 1983 the New Mexico legislature created the "Water Law Study Committee." The committee was charged with the obligation to study, examine and evaluate the impact and implications of recent court decisions concerning water and interstate commerce for the water resources available to the state. The legislation stated further that the

Committee's report "shall include recommendations concerning any modifications or amendments to New Mexico water laws."[7]

IV. REPORT OF THE WATER LAW STUDY COMMITTEE.

The committee report started with the premise that the Sporhase case conveys the following message loud and clear: if a state wishes to control its groundwater resources, it must establish that control by becoming the owner of those resources. The committee isolated three constitutionally acceptable methods for doing this and made the following specific recommendations:

(1) The state should make every effort possible to have the Congress of the United States act in some way to allow New Mexico to maintain its water resources within its boundaries. (No federal legislation has been enacted implementing this recommendation.)

(2) The state should enter into compact negotiations with the state of Texas to clarify the division of surface water of the Rio Grande below Elephant Butte Dam and thereby clarify the status of the related groundwater as well. (No compact has been entered into to implement this recommendation.)

(3) The state should act immediately to place a five-year moratorium on the granting of new permits for unappropriated groundwater where there is hydrologic uncertainty, where demand exceeds water supply and where there is confusion regarding the state's allocation of

the water. (A two-year moratorium was established, but was struck down in El Paso (II).

(4) The state should fund immediately a study of the possibility of state appropriation of unappropriated groundwater and investment of the capital necessary to extract and distribute the water.

This study is being conducted to carry out the fourth recommendation of the Water Law Study Committee pursuant to 1984 N.M. Laws chapter 114.

V. A BRIEF SUMMARY OF THE CONCEPT OF STATE APPROPRIATION

The commerce clause gives Congress plenary power to regulate interstate commerce. If a state statute conflicts with federal laws concerning interstate commerce, the federal law will control. Where no conflict exists, the federal power to regulate commerce still limits a state's action. This limitation, known as the "dormant" commerce clause, requires a state statute regulating interstate commerce to be non-discriminatory in its treatment of residents and non-residents, to further a legitimate state interest, and not to unduly burden interstate commerce.[8]

When a state acts not as a market regulator but as a market participant, however, the dormant clause limitation does not apply. This is because the state, acting as a buyer or seller in the marketplace, does not actually regulate commerce. Instead, a state that buys or sells in the market has rights similar to those of a private business in deciding the who, what and when of buying and selling.

While the state as owner and allocator of water rights can elect to deal with whomever it chooses, it cannot use its choice to regulate a secondary downstream market. If water rights are sold outright by the state, and the buyer elects to sell those rights to a third person in the private water market, the state may be powerless to stop it. Similarly, if water is leased, and if a "downstream" market for sub-leases is allowed to exist, then the state cannot condition its initial leases on the lessee's promise to sub-lease in any way that discriminates against commerce. If, however, the state leases and makes those leases non-assignable, then the state can lease to whomever it chooses, free of commerce clause constraints. The critical prerequisites are: (1) that the state has really made a decision to purchase or appropriate water rights and be a market participant; (2) that the state is making specific plans to put the water to beneficial use overtime; and (3) that the state is willing to expend its taxpayer's capital to do so. A program of state appropriation that is not real, but merely an attempt to discriminate against out-of-state users in the regulation of water rights, would be unconstitutional.

VI. THE ROLE OF PLANNING IN SUSTAINING A POSITION OF STATE OWNERSHIP IN WATER MARKETING

As noted above, unappropriated water in a state is not the exclusive property of that state simply because it is within the state's boundaries. See Sporhase v. Nebraska[9] and Colorado v. New Mexico.[10] Even though the constitutions of both Nebraska and New Mexico proclaim water to be a public good, Sporhase squarely held that public ownership of the water in Nebraska was a "legal fiction" and El Paso v. Reynolds[11] followed Sporhase. Indeed, according to Colorado v. New Mexico, the geographic fact that water originates within a state is irrelevant to the issue of state ownership. The Supreme Court "rejected the notion that the mere fact that the Vermejo River originates in Colorado automatically entitles Colorado to a share of the river's waters." It stated later that "the source of the Vermejo River's waters should be essentially irrelevant to the adjudication of these sovereigns' competing claims."[12]

The issue, then, is: What are the criteria for a valid state appropriation of water resources? As noted above, merely passing a statute that says, "It's ours and we really mean it this time" will not get the job done. The state will have to expend its own capital to develop its water resources, and, where water is not currently needed but will be needed in the future, the state will have to engage in long-range planning to use the water within the state to its maximum as part of a state plan. This point was made clear in Colorado v. New Mexico:

> Colorado objects that speculation about the benefits of future uses is inevitable and that water will not be put to its best use if the expenditures necessary to development and operation must be made without assurance of future supplies. We agree, of course, that asking for absolute precision in forecasts about the benefits and harms of a diversion would be unrealistic. But we have not asked for such precision. We have only required that a State proposing a diversion conceive and implement some type of long-range planning and analysis of the diversion it proposes. Long-range planning and analysis will, we believe, reduce the uncertainties with which equitable apportionment judgments are made.[13]

Colorado failed to gain even a drop of water from a river originating within its borders in this equitable apportionment because it had not, at a minimum, acted to study the future uses and water conservation measures available to it. The Court stated that "it may be impracticable to ask the state proposing a diversion to provide unerring proof of future uses and consistent conservation measures that would be taken. But it would irresponsible of us to apportion water to uses that have not been, at a minimum, carefully studied and objectively evaluated...."[14] Chapters 3, 4, and 5 fully explore legal issues concerning state appropriation and contain the study team's conclusions.

VII. THE RESEARCH STUDY DESIGN

The study team identified four basic tasks to be performed: (1) gathering information concerning the perceived concerns of several representative communities with respect to water supply and interaction with state water agencies, particularly the State Engineer; (2) identifying the amount of unappropriated groundwater available and the demands on that groundwater; (3) analyzing the legal implications of state appropriation, both from the federal and the state viewpoint; and (4) surveying the activities of other states and the possible lessons to be learned from an evaluation of those activities.

A. Initiating the State Appropriation Study: The Advisory Board

Given the legislative mandate that the State Appropriation Study consider the appropriation of unappropriated groundwater throughout the state, an important first step in designing the study was identifying groundwater problems in all parts of the state and inquiring as to how those problems might be solved by state appropriation. The study team thought it critical that water problems, as well as possible solutions, be considered within the context of local concerns and perceptions. Indeed, if the study was to adequately serve its policy purposes, the advice and guidance of concerned citizens of New Mexico were considered important at each phase of the research process. In response to this need, an advisory board was formed that includes concerned and informed New Mexicans from various parts of the state. These individuals, listed in Table 1, graciously offered their time and expertise as members of a board that provided the research team with invaluable guidance in structuring the scope and depth of this study.

B. Community Involvement

The study team held public meetings in Gallup, Las Cruces, Albuquerque, Taos, Clovis and Tucumcari and met with various local groups from these areas. It also reviewed the available literature with respect to these areas and has included the information in Chapter 10 and in the Executive Summary and Recommendations. A summary of the perceived problems in each of these areas and community reaction to the ideas proposed by the study team is also included.

C. Water Availability Data, Water Demand Data and Benchmarks of Water Scarcity

The study team analyzed state water supply data provided by the State Engineer, calculated future in-state water demand in all of the declared underground water basins and generated "benchmarks" of water scarcity for each of these areas. It then went further and calculated possible economically feasible distances for the transportation of water within and without the state in order to provide realistic rather than purely speculative parameters for the regional market for water supplies in New Mexico. Generation of the parameters of the regional water market in our area helps explain the overall demands on New Mexico's water supplies in the future. This data is contained in Chapters 6 through 9.

D. Legal Analysis of State and Federal Limitations on State Appropriation Activities of Other States and the Interstate Streams Commission as a Possible Appropriator of Groundwater

The study team analyzed how the concept of state appropriation fits into the overall existing system of state water law. It reviewed state law limitations on the state's ability to participate in the water market and federal limitations on the ability of the state to participate in the water market. Finally, it analyzed the activities of other states in this area and examined the Interstate Streams Commission as a possible appropriator of groundwater. This data is contained in Chapters 3 through 5 and 11 and 12.

E. Recommendations

The study team makes specific findings regarding state appropriation and specific recommendations for the legislature in the 1986 Session. This information is contained in the Executive Summary and Recommendations.

TABLE 1

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CHAPTER 1 ENDNOTES

1. 458 U.S. 941 (1982).

2. 563 F. Supp. 379 (D.N.M. 1983). For an excellent description of the facts and issues in this case see Comment, _New Mexico's Water Exportation Statute; Will It Float?_ _Natural Resources Journal_ (to be published July 1984).

3. 563 F. Supp. at 390.

4. N.M. Stat. Ann. § 72-12-19 (1978).

5. N.M. Stat. Ann. § 72-12-(B)-1 (Cum. Supp. 1983).

6. 597 F. Supp. 694 (D.N.M. 1984).

7. 1983 N.M. Laws ch. 98.

8. _Pike v. Bruce Church_, 397 U.S. 137 (1970).

9. _Id._ at 4635 n.1.

10. _Colorado v. New Mexico_ (original equitable apportionment action decided by United States Supreme Court, June 4, 1984).

11. _Id._ n.2.

12. _Colorado v. New Mexico_, slip op. at 12.

13. _Id._ at 11 (emphasis added).

14. _Id._ at 9.

CHAPTER 2

HYDROLOGIC FACTORS RELATING TO THE ADMINISTRATION OF WATER RIGHTS IN NON-STREAM-RELATED AND STREAM-RELATED AQUIFERS

As part of the research team's efforts to determine the extent of the problem facing the state, the State Engineer was asked to provide data concerning the amount of unappropriated groundwater available in New Mexico. As became clear, calculation of the amount of unappropriated groundwater is a difficult task, requiring a combination of hydrologic estimates and knowledge of administrative records. For this reason, this chapter on groundwater hydrology and administration is included as background for the discussion that follows.

The following summarizes the hydrologic factors that must be considered in any effort to administer water rights in a non-artesian groundwater basin, whether tributary to a stream or not. The technical aspects are greatly simplified, with emphasis placed on broad concepts rather than technical precision.

I. NON-TRIBUTARY AQUIFERS

A "non-tributary aquifer" is one that is neither recharged from outside its area nor drained by a through-flowing stream. Such an aquifer is recharged only by precipitation in its own drainage area and, in the extreme case, is drained only by evaporation and transpiration. An example of such an aquifer is the body of saturated rocks in the Estancia Basin of New Mexico, which is a topographically closed basin with no stream flowing in or out.

Withdrawal of groundwater from an aquifer that is not a tributary to a stream is easy to understand, and the factors that must be considered in administration of such withdrawals are relatively simple. The groundwater stored in such an aquifer may be withdrawn through wells, but its withdrawal is analogous to the mining of a mineral deposit. Production in excess of recharge, which is usually extremely small compared to withdrawals, results in an equal reduction of the volume in storage. Theoretically, an amount equal to the annual recharge could be pumped each year so that the volume of water in storage does not change, but in practice, however, recharge is so small that any useful development of this type of groundwater can be thought of as a net withdrawal from storage, or "mining." As a practical matter, groundwater in a non-tributary aquifer is a finite resource.

The administrator of water rights in such a basin, in supervising the mining of the groundwater, must ascertain the volume available and attempt to regulate the places and rates of pumping in order to maintain production for some predetermined period and to minimize interference among appropriators.

It may be helpful at this point to discuss the mechanisms governing movement of water in the aquifer. If the non-tributary aquifer behaved as a simple container of water, then pumping would cause the water level to fall evenly and immediately. But such is not the case for actual aquifers.

Water is not free to move rapidly enough in a real aquifer to allow the water level (or "head") at one well to be distributed instantaneously and equally throughout the aquifer. Instead, the water is generally present in the small spaces between the grains of either unconsolidated sediments or porous rocks. Pumping of a particular well produces a "cone of depression." This cone is a depression in the surface of the water level at a point in the aquifer. The shape and dimensions of the cone are governed by the rate of pumping and by two principal characteristics of the aquifer's material: its transmissivity and its storage coefficient. Transmissivity is a measure of the rate at which water moves through the aquifer in response to a difference in the head between any two points. The storage coefficient is a measure of the volume of water that a unit area of the aquifer will release from (or accept into) storage in response to a unit change in head.

To return to the case of the non-tributary aquifer, it should be noted that the effects of the interrelated cones of depression are as important as the total volume of water available in the aquifer. The effects of pumping a particular well can be calculated. Consequently, the administrator may choose to regulate wells so that these effects are widely distributed and result in a general lowering of the water level thereby allowing all appropriators to pump for about the same length of time. At a minimum, he may choose to prevent substantial interference of one well with others.

The kinds of aquifers that exist range from the non-tributary aquifer described above to aquifers where the interrelationship with surface waters is very important because of a sizable nearby stream. The continuum reaches a limit at the other extreme where there is <u>no</u> aquifer. A stream simply passes over impermeable rocks that contain and transmit virtually no water. In order to understand all cases between the two extremes, a fuller explanation of the movement of groundwater, as influenced by change in head, transmissivity, and storage coefficient, is required.

The best image of an aquifer is as a container filled with saturated sand. The rate at which the aquifer material will permit water to move through it between one point and another is a function of the difference in head, or water level, between the two points. Gravity is the force that causes the flow. Transmissivity, once again, is the rate of flow through a section the full thickness of the aquifer and of unit width, in response to a unit difference in head. Transmissivity depends on the distribution of grain sizes in the material, the degree to which it contains natural cementing, the degree of fracturing, and a variety of other physical factors including, of course, the thickness of the aquifer. A thick aquifer will transmit proportionally more water than a thin one of the same material, given the same difference in head between points.

The range in transmissivity is enormous, from near zero in extremely fine-grained materials (clay, or unfractured shale) to high values in thick sections of clean, well-rounded, uniformly sized gravel. Transmissivity may be expressed in various units, the most convenient here being gallons per day per foot (gpd/ft). The values of transmissivity commonly seen in New Mexico range from a few gpd/ft for aquifers in which the weakest of usable domestic or livestock wells may be located, up to values on the order of 1,000,000 gpd/ft for the thickest and most productive aquifers of the Rio Grande trough.

The other principal aquifer characteristic, the storage coefficient, is expressed as a fraction. For the aquifers that are considered here, the coefficient is essentially the same as the volume of water that will drain by gravity, expressed as a fraction of a unit volume of the saturated aquifer material. This storage coefficient is generally in the range 0.1 to 0.3. Again, this is equivalent to saying that a cubic foot of saturated aquifer material would contain from about 0.1 to 0.3 cubic feet of water that can be drained from it by gravity.

The effects of transmissivity and storage coefficient upon the shape of a cone of depression can be pictured by considering the limiting cases. As transmissivity approaches infinity, the aquifer can transmit water so rapidly that water levels adjust very quickly in all parts, and the cone is nearly flat. All other things being equal, a well in a high-transmissivity aquifer will have less effect, in terms of drawdown of nearby wells, than if it were in an aquifer of lower transmissivity. But, of course, the effects at any particular moment will be felt farther away, because of the rapid expansion of the cone. On the other hand, if transmissivity is low, the cone will be relatively deep and steep near a pumping well because the movement of water requires a large head difference from point to point.

When a pump in a new well is turned on, the head in the well and the aquifer adjacent to it moves rapidly downward, producing a difference in head between the well and more distant points in the aquifer. Gravity will cause water to flow from the higher heads in the aquifer away from the well, down to the lower head in the well. At a short distance from the well, the perimeter through which the water is flowing is small. Because the volume of water moving across any perimeter in a particular period of time must always equal the volume pumped (otherwise there would be a "hole" left somewhere), the difference in head between two points in the path of flow must be relatively large. That is, if transmissivity is fixed, then the amount of water that moves across a perimeter is a function of the difference in head. Near a well the perimeter is small, so the head difference must be large in order to move the same amount of water across it as will be moved across a much longer perimeter, far from the well, by a small head difference. As a consequence, the slope of the cone is steepest near the well and flattens out with distance from the well until it intersects the water table. The cone of depression, then, is not a "right circular" cone, but is instead a cone with increasing slope toward the "point of pumping." When the pump is turned on, the cone starts to expand. Its perimeter moves outward very rapidly at first but at an ever-decreasing rate. The volume of the cone is established by the storage coefficient and by recharge. Ignoring recharge for the moment, the volume of the cone (i.e., the volume of the aquifer that has been dewatered) is equal to the volume of water pumped divided by the storage coefficient. If the storage coefficient were at a typical value, say 0.2, then the volume of the cone would be five times the volume of water withdrawn from it.

The perimeter of the cone moves outward at a continually decreasing rate. This condition occurs because the volume of a cone increases much more rapidly than its perimeter; therefore, if the change in volume is at a constant rate (the pumping rate is held constant) the perimeter expands more and more slowly. The cone continues to expand until the pumping reaches equilibrium with the recharge to the aquifer. If there is no substantial recharge, as in the non-tributary aquifer, the cone will continue to grow.

The characteristics of an aquifer may be estimated from its geologic makeup and may be measured in a number of ways. In general, the measurement involves determining the position and slope of the cone of depression in response to a known pumping stress or determining the head difference between points that is resulting in a known rate of movement of water and then working backward to find transmissivity and storage coefficient.

With this technical background, it is now possible to discuss tributary aquifers.

II. TRIBUTARY AQUIFERS

A tributary aquifer may be imagined as a large sand-filled tub with a stream of water running across its surface. The stream is supplied from some source outside the system that drains into the land overlying the aquifer.

Assume, to begin with, that the aquifer is fully saturated and that the flow of the stream is constant, inflow matching outflow. Assume further that at some time in the past, the water with which the sand is now saturated was brought in by the stream and that the stream's outflow must have been less than the inflow while that was occurring. It follows that if the sand is ever less than fully saturated, the stream will replenish it (the stream will sink into the sand) and during the period of replenishment there will be less flow in the stream across the tub (possibly none at all) and less (or even no) outflow. While recognizing that there is a large volume of water in storage in the aquifer, none of it can be withdrawn without inducing a corresponding reduction in the total flow of the stream to replace it. Thus, if a well were drilled into the tub, water could be taken out, but the stream will flow downward into the sand to replace the water removed.

Although this process seems clear enough in considering a tub full of sand, the operations are somewhat more subtle in a natural system. A new well drilled and pumping in the tributary aquifer will cause a cone of depression to form. The cone will grow, as described above, as water is taken from storage in the aquifer. (For the purpose of this discussion, it is assumed that the water produced from the well is the net amount removed from the system and not permitted to return to the aquifer.) If the well is some distance from the stream, for a period of time (which can be calculated because the radius of the cone can be determined if pumping rate, transmissivity, and storage coefficient are known) the cone will represent only withdrawal from storage. Eventually, however, the periphery of the cone will arrive at the stream. Then a difference will be produced between the head of water in the stream and the head just inside the edge of the cone of depression. Water will start to flow from the stream into the cone or cease to flow from the aquifer into the stream. The cone will continue to expand with continued pumping of the well until an equilibrium is reached in which recharge balances the pumping. As the stream is the source of recharge, just as in the tub analogy, the cone will expand until its periphery along the stream is long enough, and the head gradient is sufficient, to cause a flow from the stream into the cone that is equal to the rate of pumping from the well. In other words, just as the stream across the tub flowed down into the sand to replace water taken out, a stream will flow down into the cone of depression of a groundwater well. The length of time before an equilibrium is reached is a function of many variables, including the distance between the well and the stream.

It is a useful concept, incidentally, to think of the stream as part of the aquifer. While the common notion holds that a river is a self-contained entity, with even a certain dominance in natural and human affairs, it is clear that the river is allowed to exist only to the extent that it keeps up with its duties in recharging its tributary aquifer.

Once the well's cone has reached an equilibrium size and shape, all of the pumping is balanced by flow diverted from the stream. Using the tub analogy again, if a well is drilled and keeps dewatering the sand from one point source, the water eventually flows directly from the stream to the well. Eventually there is <u>no</u> difference, given the simplifying assumptions that have been made, between a right to withdraw groundwater from the well, as described, and a right to divert from the stream at the same rate. A <u>crucial</u> point, however, is that in advance of the equilibrium (before all water is coming directly from the stream) the two rights are not the same. Until the perimeter of the cone reaches the stream, the volume of the cone represents a volume of water that has been taken from storage in the aquifer, over and above the subsequent diversions from the river. It is this volume that may be called "groundwater depletion." This groundwater, depleted before the stream is completely affected by pumping, is what is commonly called unappropriated tributary groundwater. While the groundwater was originally made available by the stream, that event occurred far enough in the past that the water in storage can legally be considered groundwater.

The timing of impact on the river varies greatly, depending on pumping rate, aquifer characteristics, and distance from the stream. High transmissivity hastens the contribution by the stream. Greater distance results in a larger cone, later onset of diversion from the stream, and therefore a larger "groundwater depletion." Generally, if the wells are distant from the stream, the scale of timing before their influence is felt is measured in tens or hundreds of years.

Based upon an understanding of hydrology, the water administrator may allow certain actions. The withdrawal of this unappropriated groundwater can make currently available a large amount of water that could otherwise never be used, though only at the cost of some diversion from the stream sooner or later. The amount of groundwater that can be made available depends upon the locations of wells, pumping rates, aquifer properties, and, most important, the rate of diversion from the stream that can be allowed at any particular time without impairing pre-existing surface rights on the stream. "Mining" has a different meaning with respect to a tributary aquifer. When a non-tributary aquifer is mined, there is no obligation to pay it back. When you mine from a tributary aquifer, you are incurring some type of obligation to the stream.

Even though a well may produce only from stored groundwater for a period, with the diversion of streamflow delayed until a later time, the cumulative production from the well will eventually approach the cumulative volume diverted from the stream. Eventually, only stream water will be drawn from the well. Thus, the administrator must consider mining of the groundwater in storage to be equivalent at some point to a perpetual right to withdraw from the stream, thereby requiring offsetting action to prevent impairment of surface rights.

Even if groundwater withdrawal were limited, either in time or volume, so that the well production was entirely from groundwater storage and was stopped as the effect reached the stream, a cone of depression that would ultimately refill would still exist at the end of pumping. The water to fill it will come, in this simplified picture, from the stream. Even if the cone were to be refilled by transfer of water from elsewhere in the aquifer, it would still affect the stream because the head over the entire area would be lowered, eventually creating a head difference at the stream resulting in movement of water from the stream into the aquifer.

The most conservative position in the administration of the aquifer would not contemplate any allowance for the pumpage from storage and would treat all withdrawal from groundwater as if drawn directly from the stream. In the case of a fully appropriated stream, this would mean that any permit to appropriate groundwater would be subject to the retirement, at the same time, of an equal right in the stream.

A more liberal position (still consistent with the requirement of preserving existing surface rights to the stream) would be to calculate the effect upon streamflow year by year, and require retirement of rights according to that schedule. It would even be theoretically possible, because of the lag in effect on the stream, to allow pumping at rates higher than the total depletion available in the stream for limited time periods. Yet the administrator faces several uncertainties when he allows pumping of groundwater in excess of the surface water rights that can be retired to offset the effect of pumping. In addition to large uncertainties in the calculations required to determine the effect upon the stream, he must be sure that the scheduled retirement of surface rights is timed so that the schedule matches the effect. Further, he must have adequate means to guarantee that the required retirements in the distant future can and will occur. If the administrator errs in this regard, the stream may disappear entirely for periods of time until a balance is reestablished.

A second, related problem is that the stream may carry waters that are committed to downstream users beyond the limits of the aquifer system and perhaps beyond the administrator's jurisdiction; e.g., the share of water committed to Mexico from the Rio Grande. In such cases, great care must be exercised if permits are issued to appropriate groundwater in excess of the rights retired year by year. If the effect of pumping exceeds retired rights, in the natural system the first duty of water in the stream will be to recharge the aquifer, in utter disregard of the priorities of legal claimants.

It should be recognized that the unappropriated groundwater available may be only a small fraction of the total volume in storage depending on transmissivity, the storage coefficient, and the distance from the wells to the stream.

The following further illustrates the hydrologic and administrative rules governing a tributary aquifer. The preliminary City of Albuquerque 1982 Effect Study, prepared by the Albuquerque Office of the State Engineer indicates that Albuquerque was pumping a total of 89,284 acre-feet in 1980 with a net depletion of the Rio Grande of only 5,142 acre-feet. Even after adjustment for return flows, these figures reveal the capacity to account for the lag between groundwater pumping and effect upon the river. As projected for 2060, a rise of 460 percent in total diversion through groundwater pumping to 410,450 acre-feet is accompanied by a rise of 2328 percent in net depletion of the Rio Grande as the hydrologic effect of previous pumping reaches the river. However, through this process, Albuquerque will have been able to take a substantial amount of unappropriated groundwater from the aquifer.

CHAPTER 3

EXISTING APPROPRIATIONS BY THE STATE

I. THE EXERCISE OF THE STATE POLICE POWER AND THE PUBLIC TRUST DOCTRINE DO NOT CONSTITUTE STATE APPROPRIATIONS OF WATER AND MARKET PARTICIPATION

A. Assertion of the Public Trust Interest in Water Is Not a State Appropriation of Water or Market Participation

In Sporhase v. Nebraska,[1] the state argued that the commerce clause of the United States Constitution did not apply to its water because the water was not owned by individual appropriators, but by the state as trustee for the public by virtue of the public trust doctrine. The Supreme Court rejected the view that the public trust doctrine created a proprietary interest for the state in its water supplies, concluding that Nebraska's asserted "state ownership" was merely a legal fiction, a shorthand description of the importance of the resource to the welfare of a state's citizens.[2] While the Court rejected the notion that the public trust interest in water constitutes ownership, it recognized that a state has a heightened police power, or regulatory interest, in water resources by virtue of the doctrine.

This view is similar to that adopted by many states. North Dakota's Supreme Court has held that the public trust doctrine creates an affirmative duty on the state to manage and plan for the use of the resource for the common good.[3] In contrast to North Dakota, California courts interpreted that state's doctrine to create publicly held proprietary rights in a post-Sporhase decision enjoining diversions of feeder streams to Mono Lake by the City of Los Angeles.[4] The State Supreme Court held that the decision maker must consider the impact on public trust uses of any new appropriation even when there is no permit associated with the public trust use. This expressly acknowledges the validity of the public trust use, in effect creating publicly held appropriations by prescription. The New Mexico public trust doctrine was the focus of substantial legislative activity during the last session. To understand the significance of the changes, one must first comprehend the previous interpretation.

The New Mexico Constitution, Article 16, Section 2, is the basis for the public trust over water in New Mexico. In State ex rel. State Game Commission v. Red River Valley Co.,[5] the Supreme Court of New Mexico addressed the scope of the state's Public Trust Doctrine. Some of the crucial aspects of that decision are listed below:

(1) The public trust doctrine of New Mexico is not derived from English common law, but from the civil law of Spain and Mexico. Therefore, even though the public trust is now part of the state constitution and the state constitution was subsequent to the confirmation of Spanish and Mexican grants by the United States government, application of the doctrine to those lands does not diminish the rights of grant owners as confirmed by the United States government.

(2) The New Mexico Court, like that of North Dakota, found that the state's power to regulate water use was derived from the public trust doctrine: "The power of reasonable regulation rests

in the state so that not only navigation may be free to the public but as well such other uses as usually pertain to public waters."[6]

California's recent attempt to assert proprietary rights to land on the basis of the public trust doctrine derived from Spanish and Mexican law was rejected by the United States Supreme Court in _Summa Corp. v. California ex rel. State Lands Commission_.[7] The Court held that the state had forfeited any public trust easement over the property that might have existed under Mexican law when it did not raise the easement in the patent proceedings before the Surveyor-General in the 1850's. The state had waived its "public trust" rights by not intervening in the federal proceeding. This holding is directly contrary to that of the New Mexico court in _Red River_. While the Surveyor-General proceedings in New Mexico were different from California's and _Summa_ is distinguishable, it should be noted that a substantial amount of water use in New Mexico can be traced to property rights that were patented pursuant to proceedings before the Surveyor-General or the Court of Private Land Claims. No specific public trust over the water or the lands was raised by New Mexico in the patent proceedings.[8] This fact could be important should New Mexico try to rely too heavily on the public trust doctrine derived from Spanish and Mexican law as a basis for state ownership.

Some additional points from the _Red River_ case must be understood. Traditional public trust uses of water are beneficial uses. The concept of beneficial use is not limited to acts of private appropriators, but also includes public uses such as recreation, fishing, and any other public purpose.

> While the public right may have originated in the older use or capacity of waters for navigation, such public right having once accrued, is not lost by failure of pecuniary profitable navigation, but resort may be had thereto to any public purpose....[9]

> If it were the intention that these waters should have been public only in the sense that they could be diverted from the natural channel through specific appropriations for irrigation, mining and other beneficial uses, apt language could have been employed in the early, and successive legislative enactments as well as in the constitutional declaration upon the subject. We find no place for a narrow construction of the language whereby waters are declared 'to belong to the public' and say: 'The waters belong to the public only so far as they are subject to diversion from their natural course."[10]

Based upon this language, it is conceivable that under the public trust doctrine the state could regulate water use to insure an adequate future supply. The problem is not whether state law would allow such regulation, however, but how such acts would be viewed by the federal courts. Both Sporhase[11] and El Paso (II)[12] hold that state regulatory actions are subject to commerce clause scrutiny. Even though state law might uphold a public trust appropriation, if it violates federal law it is invalid.

If Sporhase and El Paso (II) were not sufficient to show that a heightened regulatory interest is not enough to vitiate the federal commerce power, the point is made clear in Bacchus Imports Ltd. v. Dias.[13] There, the Supreme Court balanced the state's authority pursuant to the twenty-first amendment, an express constitutional recognition of each state's heightened regulatory interest over the distribution and use of alcoholic beverages, against the federal commerce power. In Bacchus, the

Court struck down a Hawaiian excise tax on wholesale transactions that exempted some but not all locally produced alcoholic beverages. The admitted purpose of the exemptions was to encourage development of the Hawaiian liquor industry. The state argued that section 2 of the twenty-first amendment permits states to enact laws otherwise in violation of the commerce clause where Congress has not acted. Using an analysis described as a "pragmatic effort to harmonize state and federal powers,"[14] the Court concluded that the excise tax was unconstitutional discrimination against interstate commerce.[15]

Under Bacchus and Sporhase, it is clear that denial of a permit to export water to protect even present economic development based solely on the public trust doctrine could be struck down as unconstitutional discrimination against interstate commerce.[16] Nor could the public trust doctrine support a state regulatory scheme that allowed water to be reserved for undefined future agricultural or municipal development in the state and had the effect of denying access to the waters by those out of state for present needs. Such a "public trust" management scheme would most likely fall in the face of a commerce clause challenge. To survive a challenge, the scheme would have to provide for future uses by out-of-state entities. While public trust uses to protect qualitative values, for example a Mono Lake or a way of life provided by agricultural development, are more than mere regulation, under Sporhase they are clearly insufficient to establish the state as the owner of its water resources.

The New Mexico Supreme Court in Red River held that public waters need not be appropriated by the public for a specific use before they can be used by the public. The court stated:

> Nor can we approve the theory that, even though these be public waters, subject to such appropriation, nevertheless, they cannot be used by the public until appropriated by the public for such use. That would be saying that the public must first appropriate its own property, the very waters reserved to it and which have always "belonged" to it, subject, of course, to being specifically appropriated for private beneficial use.[17]

This language, while generally positive for state ownership, unfortunately does not mean that state appropriation is not necessary to assure future water supplies for the state of New Mexico. It is simply a statement that public trust uses might be a reason to limit private appropriations on an even-handed basis. This interpretation was apparent in recent amendments to New Mexico's appropriation and transfer statutes, which require consideration of the public welfare before approval by the State Engineer.[18] State agencies have been given standing to raise public welfare protests without holding specific appropriations that might be impaired. For example, should a particular application pose a threat to water quality, the Water Quality Commission could object to approval of the application.[19]

Little guidance has been provided by the legislature as to what types of appropriations would be contrary to the public welfare. The United States Supreme Court has recognized very broad definitions in the context of voting rights cases[20] and land use issues. In Berman v. Parker (a challenge to an urban renewal condemnation proceeding), the Court stated:

> The concept of public welfare is broad and inclusive. (citation omitted) The values it represents are spiritual as well as physical, aesthetic as well as monetary. It is within the power of the legislature to determine that the community should be beautiful as well as healthy, spacious as well as clean, well-balanced as well as carefully patrolled.[21]

Initial surface water appropriations have always been subject to public interest considerations in New Mexico,[22] but prior to this past year there was only one instance where an appropriation was denied on those grounds. In 1910, in Young & Norton v. Hinderlider,[23] the Territorial Supreme Court upheld the authority of the Territorial Engineer to deny a permit on public welfare grounds. Both parties sought a permit to appropriate waters from the LaPlata River for storage and eventual distribution for irrigation. Hinderlider's application, although first in time, was rejected by the Territorial Engineer because the proposed project was more expensive, irrigation would cost more per acre and the competing project of Young & Norton was more within the available water supply. On appeal to the Board of Water Commissioners, the Board agreed that an application could be denied if contrary to the public interest, but that "public interest" only encompassed health and safety concerns. The Board's interpretation was appealed to the supreme court, which held that the term "public interest" could not be limited only to public health and safety. Some of the factors thought to be dispositive by the court are set out below:

(1) That the state's waters should be used to secure the greatest possible benefit for the public;

(2) Whether the proposed project was for speculative purposes;

(3) Whether the cost of a project was so excessive that participants could not afford to pay for it;

(4) Whether the project was efficient;

(5) Whether the project would benefit the residents of the area.[24]

The recent amendments to statutes governing appropriations and transfers of water rights may have moved the state's authority over water under the public trust from the heightened regulatory interest described in Red River to something approaching the prescriptive public rights approved by the California courts in the Mono Lake case. Given the United States Supreme Court's decisions in Sporhase and Summa, however, which denied the existence of any proprietary interest based on the public trust doctrine, the doctrine alone is insufficient to create an appropriation of water by the state and state market participation.

B. Exercise of the State's Regulatory Power over Water Is Not State Appropriation of Water and Market Participation

The state has never directly used its regulatory power to reserve future water supplies; however, the State Engineer has developed a method to manage non-tributary groundwater basins that creates what might be thought of as an implied reservation of water for domestic use. In Mathers v. Texaco, the court stated:

> In determining what constitutes full appropriation in each township, and thus in the basin as a whole, [The State Engineer] calculated the amount of water that could be withdrawn from each township and still leave

> one-third of the water in storage at the end of forty years. At that time it was contemplated that some of the remaining water could be economically withdrawn for domestic, and perhaps other uses, but that it would no longer be economically feasible to withdraw the water for agricultural and most other purposes.[25]

This method of determining the economic life of an aquifer creates an implicit reservation of the waters remaining after forty years for future domestic needs. It insures an adequate supply for basic human survival, but this amount may not be sufficient to maintain a regional economy to support the population. The reservation for future use is only to meet domestic needs and perhaps other minimally consumptive uses, and arguably it is an important aspect of the public trust to provide for such needs.[26] State regulation to protect water quality could also create implied reservations. An example would be limitations placed on uses of aquifers by the Oil Conservation Commission to protect those that are vulnerable to contamination.[27] These types of implicit reservations for future use by regulations to protect the integrity of aquifers would be upheld as valid public welfare measures in the face of a commerce clause challenge unless applied to out-of-state users in a discriminatory manner.[28] However, should the state, under its regulatory power, simply declare itself the owner of water within the state without appropriation or a plan for beneficial use, such efforts would undoubtedly be challenged under the commerce clause.

C. <u>Conclusions Regarding the Public Trust Doctrine and Regulatory Power</u>

The public trust doctrine strengthens significantly the state's powers over water use. It can justify implied reservations for future use, primarily to protect human survival and clearly noneconomic uses. This legal doctrine does not, however, provide either an adequate foundation for the appropriation of water for a variety of future uses or even maintenance of present economic uses.

In New Mexico, public use, by itself, is not sufficient to create an appropriation in the absence of action by the State Engineer, either in determining the economic life of an aquifer or by issuing a permit for an appropriation by a state agency that would be protected from subsequent private appropriations. The public trust doctrine does, however, provide for the recognition of non-pecuniary beneficial uses if water is otherwise appropriated. The traditional means of protecting such uses is for state agencies and other quasi-governmental entities to obtain valid appropriations. This is the topic of the next section.

II. NEW MEXICO HAS ESTABLISHED OWNERSHIP OVER SOME WATER RESOURCES THROUGH APPROPRIATIONS BY STATE AGENCIES

In the absence of any specific statutory directive, state agencies are subject to the general laws of the state governing water use.[29] An agency is given no preference over private appropriators; it must apply for a permit in the same manner and, with a few statutory exceptions, be subject to the same regulations. An example of appropriations made by an agency under the general statutes would be the water rights held by the Game and Fish Commission for fisheries throughout the state. In contrast, an example of specific statutory directives would be the statutes that apply to water rights held by the State Highway Department.[30] These statutes provide water to state highway projects all over the state on a temporary basis.

These state agency water rights are perfectly valid and have been obtained pursuant to the regulatory powers of the state for public welfare purposes. The state is not, however, attempting to become the owner of the resource, for the purpose of participating in the water rights market. These appropriations are the clearest kind of public welfare reservations. The validity of these public welfare uses, if challenged under the commerce clause, would depend on a number of factors, including: (1) whether the state was pursuing a non-economic public welfare purpose as part of its governmental function as trustee to provide water for its citizens; or (2) whether it was merely regulating to provide economic gains for in-state residents. The motive would be the crucial factor. The first would be a valid legislative motive, but the second would never be appropriate under current United States Supreme Court case law. In many cases where courts are trying to determine legislative motive, there will be no easy, clear answer. As stated by Judge Bratton:

> Admittedly, except to the extent that it refers to bare human survival, every aspect of the public welfare has economic overtones.... However, when the state exercises a preference for its citizens under the rubric of protecting their public welfare and economic interests are implicated, the resulting burden on interstate commerce must be weighed against putative, noneconomic local benefits.[31]

This is a weighty calculus.

The Interstate Stream Commission (ISC) holds significant water rights in the state and these appropriations have many proprietary characteristics. Unlike other agencies that have rather discrete areas of interest, the statutory charge to the ISC is quite broad. It is authorized by statute to do the following:[32]

(1) Negotiate compacts with other states;
(2) Match federal appropriations for investigating the development of interstate streams;
(3) Investigate water supply;
(4) Develop, conserve and protect the waters and stream systems of the state;
(5) Institute legal proceedings necessary to carry out these purposes;
(6) Acquire, by purchase or otherwise, water rights;[33] and
(7) Sell or Lease water rights for a wide variety of purposes.[34]

The primary duty of the Commission is to protect the state's interests with respect to waters that are shared with other states. A good example of an ISC project involving proprietary rights is the construction and operation of Ute Reservoir, just outside Tucumcari. Under the terms of the Canadian River Compact,[35] New Mexico has limited storage rights to the surface waters of the river below Conchas Dam. In order to establish those rights other than on paper, the state, through the ISC, built Ute Dam. Chapter 12 includes a thorough discussion of ISC market participation in Ute Dam waters.

Unlike some state agency water rights that might be characterized merely as the product of regulation under the public trust doctrine, the ISC has proprietary rights to the waters stored in Ute Dam. The ISC is an active participant in the water rights market, both appropriating water and then distributing it for profit. Through these activities, the Commission has been able to ensure that a future water supply will be available for at least a portion of the needs of communities located on the east side of the state.

III. APPROPRIATIONS BY POLITICAL SUBDIVISIONS

A. Appropriations by Municipalities and Counties

Appropriations by municipalities and counties are not subject to all of the same statutory provisions that apply to private appropriators. At least one city claims a so-called "Pueblo" water right based upon interpretation of Spanish and Mexican law. Both the "Pueblo" right and modern statutory exceptions treat municipal rights differently from those of private appropriators, because municipalities are in a constant state of growth causing a concomitant increase in the need for water. The New Mexico statutes allow municipalities of the state to plan for future water use, and such planning is in the best interests of everyone.

Presently, there is some confusion about whether a community is acting in a proprietary or regulatory capacity in supplying water to residents. Exactly how these rights are characterized might be important if a municipality were asked to provide water out of state and refused to do so. If municipalities are simply complying with statutory duties when they distribute water, their interests in the water would not be proprietary. Not being proprietors, they might not be given the same flexibility in allocating their water resources. The legal results with respect to this issue are often inconsistent.[36] Since this is a study of "state" and not "municipal" appropriation, this issue will be only briefly discussed.

In general, cities distribute water to their citizens as part of their "governmental functions." While a city could appropriate a quantity of water necessary to meet projected noneconomic and domestic needs, even under Sporhase it could not engage in acquisition of water rights for other purposes solely because of its role as a municipality. Statutes could be amended, of course, to allow municipalities to invest their constituents' money in the water market, but there are no statutes presently existing explicitly allowing this and, further, it is beyond the scope of this study.[37]

If a municipality is merely serving the domestic needs of its residents, it is of no great importance in which capacity it does so because preservation of water for domestic use in the state is constitutionally permissible whether done as a proprietary or as a governmental function. Absent specific legislation permitting other uses, as with Albuquerque's San Juan-Chama water, preferential appropriations for primarily economic uses would have to be characterized as essentially proprietary activities to withstand the limitations imposed by the dormant commerce clause under current legal theory.

Even if the state legislature were to expressly provide that municipal rights are either proprietary or regulatory, this would not bind a court to that characterization. The ultimate result would depend on the way the municipality functioned, not on a formalistic declaration. In Hughes v. Oklahoma,[38] the Court held that a court must make its own determination by looking at the impact of the law. In El Paso (II), the alleged practical impact of the moratorium statute was held to be proof of an invalid, discriminatory legislative intent.[39] An equally divided United States Supreme Court summarily affirmed without opinion a Ninth Circuit opinion that recently held that setting fees for the leasing of state lands was a regulatory action over California's assertion that it was acting as a proprietor.[40]

B. Statutory Exceptions to Forfeiture for Municipalities and Counties

The modern statutory exceptions that apply to political subdivisions, specifically counties and municipalities, are codifications of earlier case law. In State v. Crider,[41] a private appropriator challenged a determination by the State Engineer giving the city of Roswell a right based not on the amount of water presently put to beneficial use, but based on the capacity of the city's wells. In response to this claim, the court looked to general principles concerning irrigation uses, particularly the due-diligence and relation-back rules.

> [T]he rule is that, at the time of the inception of an [irrigator's] claim, he may lay the foundation for the appropriation of such quantities of water as will be necessary, when economically used, for the reclamation of his entire tract of land, and he will not lose his priority of right, provided he makes use of all the water claimed within a reasonable time....

> We see no reason why the rule stated should not apply to the future use of water by cities intended to satisfy needs resulting from normal increase in population within a reasonable time.[42]

Subsequent cases have expanded upon this notion of a need for cities to have present rights for future uses. In <u>State ex rel. Reynolds v. Rio Rancho Estates</u>,[43] the holding of <u>Crider</u> was expanded: "When determining the extent of a municipal water right, it is appropriate for the court to look to a city's planned future use of water caused by an increasing population."[44] As noted above, this judicial doctrine has been incorporated into our statutory law as a special exception to the general forfeiture provisions. As to surface water, the statute states: "Periods of non-use when water rights are acquired by incorporated municipalities or counties for implementation of their water development plans or preservation of municipal or county water supplies shall not be computed as part of the four year forfeiture statute."[45] In 1983, substantially similar language was added to the groundwater forfeiture statute.[46] This now mirrors previously existing State Engineer regulations allowing a 40-year planning horizon.[47] Counties and municipalities are encouraged to appropriate water for up to forty years in the future in accordance with water development plans. Thus, notwithstanding earlier cases, cities and counties can now obtain their appropriations for a time horizon of no more than forty years and the appropriation must be made in accordance with a plan reflecting this period of time.

C. <u>Political Subdivisions Holding "Pueblo" Rights</u>

One final and unique right that may be held by a political subdivision is the "Pueblo" water right. New Mexico courts have recognized the applicability of the Pueblo Rights Doctrine in New Mexico. The doctrine, as adopted by the State Supreme Court in Cartwright v. Public Service Co.,[48] provides that where a colonization grant was made under Spanish or Mexican Law, it conveyed to the community not only the land, but a paramount right to the use of water to the extent necessary to meet the needs of the inhabitants and for other general municipal purposes. Unlike the prior appropriation system, this paramount right continually expands to meet future needs. The doctrine expressly appropriates water for the future of the community, but its application is extremely limited in New Mexico. Las Vegas is the only New Mexico municipality that may have a Pueblo right, by virtue of the Cartwright decision.[49]

The reluctance of the courts to apply the Pueblo Rights Doctrine may be due to the fact that such an unquantifiable right is contrary to the prior appropriation system. Given the limited quantity of water available for use in New Mexico, the notion of an ever-expanding, paramount right in a particular kind of use could pose severe problems for water resources management. In all likelihood the state courts will continue to grant such rights sparingly, giving the doctrine a very narrow interpretation in New Mexico.

IV. CONCLUSIONS

From the foregoing discussion, certain conclusions can be drawn:

(1) The state of New Mexico has the legal capacity, in its own right, to obtain proprietary rights in water resources.

(2) The state, through various agencies and sub-governmental units, presently participates in the water market, as both a buyer and a seller, and obtains proprietary rights in water.

(3) In specific situations, present appropriations for future use already exist in New Mexico. Cities and counties can appropriate now water that will not be distributed for use for forty years. The administration of the waters in Ute Reservoir by the ISC and the management of non-recharging basins are other examples of present appropriations for future use. Whether the state is considered a proprietor or a regulator depends on its motive and actions in holding the water, but certainly in the case of Ute Reservoir the state is a proprietary holder of water resources.

CHAPTER 3 ENDNOTES

1. 458 U.S. 941 (1982).

2. Id. at 951.

3. United Plainsmen Ass'n v. North Dakota State Water Conservation Comm'n, 247 N.W.2d 457 (N.D. 1976).

4. National Audubon Soc'y v. Superior Court, 658 P.2d 709 (Cal.), cert. denied, 104 S. Ct. 413 (1983).

5. State ex rel. State Game Comm'n v. Red River Valley Co., 51 N.M. 207, 182 P.2d 421 (1947).

6. Id. at 222, 182 P.2d at 430.

7. 52 U.S.L.W. 4433 (U.S. Apr. 17, 1984).

8. Unlike California, New Mexico was not a state, but a territory, at the time of the Surveyor-General hearings in New Mexico.

9. 51 N.M. at 225, 182 P.2d at 432.

10. Id. at 228, 182 P.2d at 434.

11. 458 U.S. 941 (1982).

12. City of El Paso v. Reynolds (II), 597 F. Supp. 694 (D.N.M. 1984).

13. 104 S. Ct. 3049 (1984).

14. Id. at 3058 (quoting California Retail Dealer's Ass'n v. Midcal Aluminum, Inc., 445 U.S. 97, 107 n.10 (1980)).

15. Id. at 3059.

16. It is hard to reconcile the Court's analysis in Bacchus with its recent decision in Northeast Bancorp, Inc. v. Board of Governors, 105 S. Ct. 2545 (1985), in which state action discriminating against interstate commerce pursuant to a federal statute that only allowed interstate bank acquisitions "specifically authorized by the laws of the State in which such bank is located" was permissible. 12 U.S.C. § 1842(d). The plaintiffs in Northeast Bancorp had argued that the statute gave states a choice whether to allow interstate banking or prohibit it all together, but not to discriminate selectively. The Court held that this was an

instance where Congress had sanctioned otherwise invalid state regulation of commerce. The twenty-first amendment, although not merely a congressional act, was passed by Congress prior to ratification by at least two-thirds of the states.

17. State ex rel. State Game Comm'n v. Red River Valley Co, 51 N.M. 207, 225, 182 P.2d 421, 432 (1947).

18. 1985 N.M. Laws ch 201.

19. A commission member confirmed that due to inadequate staffing the Commission is not able to monitor applications to determine impacts on water quality.

20. Day-Brite Lighting, Inc. v. Missouri, 342 U.S. 421 (1952). States "are entitled to their own standard of public welfare." Id. at 423.

21. 348 U.S. 26, 33 (1954).

22. N.M. Stat. Ann. § 72-5-7 (1978).

23. 15 N.M. 666, 110 P.2d 1045 (1910).

24. Id. The existence of the Young decision was important to the Court in the El Paso (II) decision as to the validity of the public welfare standard and its applicability to out-of-state uses.

Since El Paso (II), the public interest/public welfare criterion has reemerged as an important consideration in water rights disputes. In the southeastern area of the state, use of relatively scarce "fresh" or "potable" water in secondary oil recovery was alleged to be contrary to the public interest. After passage of the amendments but prior to their effective date, a state district court held that the State Engineer must consider the effect of a transfer on the public welfare even though existing statutes required such considerations only for initial appropriations.

> To my mind, it is an astonishing argument that the State Engineer need not consider the public interest in making decisions regarding the state's waters. I am unsurprised that the legislature has seen fit to include the public interest in future decisions regarding the transfer of water rights.... It merely means that the Legislature no longer implies that the public interest ought to be considered in the Engineer's decisions, it now declares it expressly to be so.

Memo to Counsel in Ensenada Land & Water Ass'n v. Sleeper, at 5-6 (Apr. 16, 1985), No. RA-84-53(C) (Dist. Ct. 1st Jud.

Dist.). The court took a holistic view of the relationship between the community and land and water use, finding that a proposed transfer did not benefit the community. This made it contrary to the public interest.

A purely economic cost/benefit approach to determine public interest needs was rejected by the court, insisting that the public interest protects non-pecuniary cultural values of a community.

> The second main line of argument pits economic values against cultural values. Here it is simply assumed by the Applicants that greater economic benefits are more desirable than the preservation of a cultural identity. This is clearly not so.
>
> Northern New Mexicans possess a fierce pride over their history, traditions and culture. This region of northern New Mexico and its living culture are recognized at the state and federal levels as possessing significant cultural value, not measurable in dollars and cents. The deep-felt and tradition-bound ties of northern New Mexico families to the land and water are central to the maintenance of that culture.
>
> While these questions seem, at first, far removed from the simple question of the transfer of a few acre feet of water the evidence discloses a distinct pattern of destruction of the local culture by development which begins with small, seemingly insignificant steps.
>
> I am persuaded that to transfer water rights, devoted for more than a century to agricultural purposes, in order to construct a playground for those who can afford to pay is a poor trade, indeed. I find that the proposed transfer of water rights is clearly contrary to the public interest, and, on that separate basis, the Application should be denied.

Id. at 7-8.

25. 77 N.M. 239, 242-43, 421 P.2d 771, 774 (1966).

26. Under Spanish and Mexican law there was a preference for domestic use. See Reynolds v. Aamodt, No. 6639-M Civ. (D.N.M. 1985) (mem. op.) This preference is still found in our statutes. If water is available, a permit for a domestic well cannot be denied. N.M. Stat. Ann. § 72-12-1 (Repl. Pamp. 1985).

27. Oil Conservation Commission Order No. R-3221. The Idaho Supreme Court addressed this aspect of the public trust in a recent decision, Shokal, Reed & Reed v. Dunn, Docket No. 15227, Op. No. 141 (1985; filed Sept. 24, 1985). Although water quality matters were under the authority of a different agency, the court found that issuance of a permit by the Department of Water Resources that resulted in a violation of water quality standards would be contrary to the public interest. Slip Op. at 19.

28. The United States Supreme Court has stated that a state may not place the full cost and burdens of environmental quality on interstate commerce. See Philadelphia v. New Jersey, 437 U.S. 617 (1978). Although there is precedent for the notion that perfect symmetry of treatment of intrastate and interstate commerce is not required, Douglas v. Seacoast Prods., 431 U.S. 265 (1977) (Rehnquist, J., concurring), this has not been the approach followed by the federal courts.

29. N.M. Stat. Ann. § 72-5-1 (Repl. Pamp. 1985).

30. Id. § 72-5-34.

31. City of El Paso v. Reynolds (II), 597 F. Supp. 694, 700-01 (D.N.M. 1984).

32. N.M. Stat. Ann. § 72-14-3 (1978).

33. Id. § 72-14-10.

34. Id. § 72-14-6.

35. Id. §§ 72-15-2 to 72-15-4.

36. The issue has been raised in relation to municipal liability in civil matters and in relation to federal tax provisions. In these two areas the courts have abolished the use of these categories to determine intergovernmental tax immunity and the scope of sovereign immunity from tort liability. In both instances, regulatory activities were immunized. Like the theory overruled in Garcia, these doctrines carved out express areas of state authority. While the issue of civil liability is different from the constitutional challenge under the commerce power, these cases are nevertheless relevant because municipal rights have been characterized and that characterization could easily be carried over into other contexts. As for municipal liability, if a city was found to be exercising the function of a regulator when distributing water, it was immune from municipal liability. If, however, the city was acting in a proprietary capacity when distributing the water, the city was not immune from suit. This issue has also been described in terms of governmental versus corporate functions. If delivery of water was a governmental function, the city was immune from suit.

If it was a corporate function, it was not. Under the regulatory/proprietary test, operation of a water and sewer system has been considered a proprietary function. Apodaca v. Wilson, 89 N.M. 516, 524 P.2d 876 (1974). The governmental/corporate distinction, however, does not always yield the same result.

A city is performing a governmental function when: (1) it performs a duty imposed by the state legislature; (2) the duty is one that the state can perform; (3) the duty pertains to the administration of government; and (4) the city is acting for the public benefit generally. Barker v. City of Santa Fe, 47 N.M. 85, 89, 136 P.2d 480 (1943). When this type of test is combined with the growing acceptance by society of the duty to provide minimum subsistence needs, Id.; see also Reynolds v. Aamodt, No. 6639-M Civ. (D.N.M. Sept. 18, 1985) (mem. op.), the result could be that any rights obtained to meet these needs would be either through exercise of the police power or regulatory acts, not those of a proprietary nature.

37. An argument supporting the view that municipal rights have already been classified by the legislature as proprietary rights is the following: Municipalities and Counties are given forty years to actually distribute water without risking forfeiture. For other appropriators, the law allows only four years. Forfeiture is essentially statutory estoppel, in that one cannot maintain an inchoate right forever. The right must be exercised or the holder is estopped from using it or can be said to be guilty of laches. Estoppel and laches do not run against the state so as to prevent its acting in a governmental capacity. State ex rel. Erickson v. McLean, 62 N.M. 264, 308 P.2d 983 (1957). Therefore, if water is appropriated by the Fish and Game Commission, for example, to provide for fisheries, but is not put to use within four years, it still would not be subject to forfeiture. Thus, if municipalities and counties were exercising delegated governmental powers when obtaining water rights for subsequent distribution, forfeiture would not apply to them and there certainly would be no need to alter the forfeiture statute to give them protection. Intergovernmental tax immunity cases have held municipal water distribution systems to be both governmental actions and those of a proprietor. In New York v. United States, 326 U.S. 572 (1946), the Supreme Court concluded that the distinctions between governmental and proprietary functions in this area were "untenable" and must be abandoned. Since the forfeiture statute has been amended recently with respect to municipalities, this may suggest that the legislature viewed municipal water rights acquisitions as proprietary activities and therefore in need of special protection.

38. 41 U.S. 322 (1979).

39. *City of El Paso v. Reynolds* (II), 597 F. Supp. 694 (D.N.M. 1984).

40. *Cory v. Western Oil & Gas Ass'n*, 726 F.2d 1340 (9th Cir. 1984), *aff'd sum.*, 53 U.S.L.W. 4431 (U.S. Mar. 26, 1985).

41. 78 N.M. 312, 431 P.2d 45 (1967).

42. *Id.* at 316, 431 P.2d at 49.

43. 95 N.M. 560, 624 P.2d 502 (1981).

44. *Id.* at 564, 624 P.2d at 506.

45. N.M. Stat. Ann. § 72-5-28(C) (Repl. Pamp. 1985).

46. *Id.* § 72-12-8(F).

47. *Mathers v. Texaco*, 77 N.M. 239, 242-43, 421 P.2d 771, 774 (1966).

48. 66 N.M. 64, 343 P.2d 654 (1958).

49. Other municipalities have been unsuccessful in asserting this type of right. Tularosa attempted to claim a Pueblo right, but it was denied on the basis that Tularosa did not exist as a municipality or Pueblo during the Spanish or Mexican periods. *State ex rel. Community Ditches v. Tularosa Community Ditch*, 19 N.M. 352 (1914). Santa Fe, which most certainly was a town during both the Spanish and Mexican periods, was denied a pueblo water right because the Court found that it was not settled under a colonization grant, but merely as a colony of "squatters." *New Mexico Prods. Co. v. New Mexico Power Co.*, 42 N.M. 311 (1937). Albuquerque also has claimed a Pueblo water right. Unlike Santa Fe, Albuquerque began as a colonization grant in 1706. The city argued that by virtue of the Pueblo Rights Doctrine the State Engineer could not condition the city's use of groundwater on the retirement of surface water rights to maintain the integrity of the Rio Grande. The court avoided the issue by an extremely narrow interpretation of its jurisdiction over appeals from decisions of the State Engineer, suggesting that a Pueblo right could only be asserted in an adjudication of a river system rather than an individual permit proceeding. *City of Albuquerque v. Reynolds*, 71 N.M. 428, 432 (1962).

CHAPTER 3 APPENDIX

GROUNDWATER STUDY

by
Robert R. Lansford

Water Supply Plans

A major water-resources planning effort for New Mexico was recently carried out by the Bureau of Reclamation in cooperation with the New Mexico Interstate Streams Commission. The project was initiated in 1967 and completed in 1976 with the publication of New Mexico Water Resources: Assessment for Planning Purposes. The study presents an appraisal of present and future water requirements for the state of New Mexico. Water requirements were estimated for the years 1980, 2000, and 2020 based on three different projected population levels. The study presents no specific plan of development but does present a number of management and development alternatives.

Water Quality Plans

Other water-related planning activities in New Mexico involve satisfying the requirements of the Federal Clean Water Act (Pub. L. No. 92-500, as amended by Pub. L. No. 95-217). Planning under the Act includes: facilities plans (Section 201), river basin water-quality management plans (Section 303(c)), and the statewide water quality management plan (Section 208).

Each community that receives federal construction grant funds for planning and construction of wastewater treatment facilities must complete a facility plan. The facility plan examines community needs for collection and treatment of sewage, the service area, and design alternatives. Based upon an analysis of cost-effectiveness, the plan recommends a design alternative and analyzes the environmental impact of the selected design over alternative designs.

River basin water quality management plans have been prepared for all eleven water quality basins in New Mexico. Each basin plan summarizes existing water quality and water quality problems in the basin, reviews water quality management activities, and makes recommendations addressing significant problems. The focus is on point sources of pollution.

The National Assessment

The Water Resources Council Second National Assessment investigated New Mexico's water problems. This assessment was complicated by the fact that New Mexico falls within five planning regions (11, 12, 13, 14, and 15) and thirteen subregions. Implementation of recommendations made in this assessment will be further complicated by the fact that 12 of the 13 subregions found in New Mexico overlap one or more additional states.

The assessment identified at least one problem area in each of the five planning regions. Despite the regional dissimilarities, there are common problems identified for the entire state. Foremost among these is the lack of sufficient water supply. The water supply problems involve both water quantity and water quality. Of particular concern in this area is the mining or overdraft of groundwater supplies. In addition to the actual physical problems of an adequate water supply, the assessment identified potential socioeconomic problems that will accompany water depletion in the future.

In contrast to water scarcity problems, the assessment identified regions of the state where flooding has caused significant difficulties. An additional complication, addressed in the assessment, is the current unresolved state of Indian reserved water rights and their potential impact on both Indian and non-Indian users in the state.

The basic problems that face the state planning agencies for water (ISC and SEO) were defined by Bahr and Hermann (1982) as:

1. declining groundwater table and inadequate surface water supply to meet projected needs;

2. need for improved water use management in irrigated agriculture;

3. poor water quality;

4. inadequate knowledge of present and future water supplies;

5. definition of water rights with respect to Indian litigation and interstate transfers; and

6. haphazard and booming development at the state and municipal levels.

State Agencies

There are six state agencies with significant interest in water management and research: (1) Water Resources Research Institute; (2) New Mexico State Engineer Office; (3) New Mexico Interstate Stream Commission; (4) New Mexico Environmental Improvement Division; (5) New Mexico Bureau of Mines and Mineral Resources; and (6) New Mexico Game and Fish Department. All carry out research or monitoring activities, often in cooperation with the Institute, each other, or with federal agencies.

Water Resources Research Institute. The New Mexico Water Resources Research Institute (WRRI) is a federal/state partnership agency established to foster research with the goal of solving important water problems of the state and region. The WRRI, located on the campus of New Mexico State University and reporting through its Board of Regents, works with all qualified institutions of higher education in New Mexico to:

1. Encourage and sponsor water resources research,

2. Provide those who manage New Mexico's water resources with the results of research, and

3. Encourage the training of young scientists.

New Mexico State Engineer Office. The principal state water management agency is the State Engineer Office. It is the state regulatory agency charged with supervising water withdrawals, transfer of rights, issuance of drilling permits, and similar administrative functions. The research and monitoring activities carried out by this agency are principally in support of its regulatory role. The State Engineer Office has a large stream flow, groundwater quantity, and groundwater withdrawal monitoring program. The program is carried out both by its own personnel and in cooperation with the U.S. Geological Survey.

New Mexico Interstate Streams Commission. The New Mexico Interstate Streams Commission (ISC) is the state agency responsible for all of New Mexico's interstate water compacts. It is also responsible for the investigation of the state's water supply and taking actions to conserve, protect and augment it. The ISC maintains a technical staff for these purposes. It also works closely with the State Engineer Office and the USGS. As one of its functions, the ISC administers the State Water Research, Conservation, and Development Fund with the goal of developing information, techniques, or devices that will result in water conservation or which will improve the quality or quantity of the water supply. In addition, this body administers the Water Resources Council Title III funds in New Mexico.

New Mexico Environmental Improvement Division. The New Mexico Environmental Improvement Division (EID) is the principal state water quality agency. It serves as the enforcement arm of the state Water Quality Control Commission. It has an in-house data collection and research effort to support its regulatory mission. It also supervises an extensive program of data collection from industries. The EID has prepared a five-year plan for the period 1980 to 1985.

New Mexico Bureau of Mines and Mineral Resources. The New Mexico Bureau of Mines and Mineral Resources is the state agency responsible for investigating and reporting on the geology and mineral resources of the state. The New Mexico Bureau of Mines carries out a water research and data collection effort, frequently in cooperation with other state and federal agencies. Its water-related studies are a significant part of its overall activities and include published comprehensive water resources reports.

New Mexico Department of Game and Fish. The New Mexico Department of Game and Fish collects water quality data related to fisheries requirements for much of the state's surface waters. It also collects and makes available fish species data for these waters. In addition, it carries out and sponsors research in fisheries management and other water-related subjects in cooperation with other agencies.

Federal Agencies

U.S. Bureau of Reclamation. The U.S. Bureau of Reclamation has plans to initiate programs that will include projects with a high potential for development, low environmental impact, and high local support. These projects will fall within a scheme of federal priorities including energy development, Indian and other federal reserved water rights, conservation, nonstructural alternatives, and others. The only significant development in irrigated agriculturel will be the completion of the Navajo irrigation project. The completion of this project will increase the total irrigated acreage in the state in the near future; however, the Bureau of Reclamation anticipates decline in total irrigated agriculture in the future due to retirement of agricultural water rights for municipal and industrial water use.

The U.S. Bureau of Reclamation sees the need for research in a number of areas including agricultural water conservation, desalinization and saline water use, water reuse, phreatophyte management, Indian water rights, and , particularly, energy-related question. It will be reevaluating the hydroelectric potential of existing structures in New Mexico and considering the adaptability for pump back options to aid in peak load energy generation. It also intends to look at solar and wind energy production and the integration of these energy outputs into the energy grid. It anticipates planning activities in playa lake utilization and saline water use. In cooperation with state and other federal agencies, it has initiated a study for saline water utilization in the Tularosa Basin of New Mexico.

U.S. Army Corps of Engineers. The District Engineer for the Albuquerque District, U.S. Army Corps of Engineers, states that today's problems require more and better information that we have and that many of these problems are likely to persist through 1985. He believes that the Corps' major federal mandate is in the broad area of conservation. The Corps will continue its activities in stream surveillance and gaging as well as other activities that will improve the Corps' predictive capabilities for stream flow and flood warning. The other major area of research will be in reservoir management, both the hydraulic parameters as well as legal aspects. The Corps expects that more effective reservoir management should increase the amount of water available to downstream users without impairing the flood control functions for which many of its projects were originally designed.

U.S. Geological Survey - Water Resources Division. The Water Resources Division of the USGS (Albuquerque office) maintains a very large data collection program both nationally and in the state of New Mexico. It anticipates that there will be major financial constraints on its activities in the future, and has as a goal to increase the efficiency of data collection and equipment to allow real time data collection that is not manpower intensive. Another area of future research activity will deal with groundwater quality, especially groundwater chemistry. Water use (demand) is an area of current and future study.

In addition to its research and data collection activities, the USGS operates a major water depository system, WATSTORE. This system contains not only federally gathered information for New Mexico but also those data generated by the State Engineer Office and the Environmental Improvement Division. In addition, the USGS maintains the NAWDEX system to help identify whether specific data has been collected and where it is located.

Other Federal Agencies. Two federal agencies, the Bureau of Land Management and the U.S. Forest Service, are responsible for the administration of 22 million acres of land in New Mexico. The enhancement of water quality and water yields are included at activities with these agencies. Both maintain water data collection programs and conduct studies in-house and in cooperation with other agencies.

Boiled down to basic arguments, these problems concern whether or not New Mexico has sufficient water quantity and quality for present and future growth and stability. The rest of the problems are concerned with maintaining these sufficient supplies in light of the socio-economic and legal constraints confronting a rapidly growing region.

The duties and responsibilities of the Interstate Stream Commission are (1) to negotiate contracts with other states to settle interstate controversies or looking toward equitable distribution and division of waters in interstate stream systems, (2) to match appropriations made by Congress looking toward the development of interstate streams originating in or flowing through New Mexico, (3) to investigate water supply, to develop, conserve, protect, and to do any and all other things necessary to protect, conserve and develop the waters and stream systems of this state, interstate or otherwise, and (4) to institute or cause to be instituted in the name of the state of New Mexico any and all negotiations and/or legal proceedings as in its judgment are necessary (N.M. Stat. Ann. § 75-34-3 (1978)).

CHAPTER 4

INTEGRATION OF STATE APPROPRIATION INTO NEW MEXICO'S WATER ALLOCATION SYSTEM

I. INTRODUCTION

Under the state constitution, the doctrine of prior appropriation controls water use in New Mexico.[1] In its purest form, prior appropriation gives those who first put water to use a better right than subsequent users. This right continues as against subsequent users as long as the appropriator puts the water to beneficial use.[2] Described by some commentators as a "rule of capture," modified in response to the uncertainty of supply in arid regions, the doctrine has evolved largely in the courts.[3] All surface water and most groundwater can only be appropriated under procedures set out in the New Mexico statutes. There are, however, significant supplies that lie outside the jurisdiction of the State Engineer, who has the authority to regulate water use.[4]

Under New Mexico statutes, when the State Engineer chooses to do so he may declare a groundwater basin to be within his jurisdiction. Within declared basins one must follow the process set out in the statutes to obtain a water right. Outside those basins the existence of a valid use is determined by the law of appropriation developed by the courts.

The elements of prior appropriation have been summarized by Clark to include a diversion of water and application to beneficial use.[5] There is no uniform body of prior appropriation law. The doctrine "evolved and [was] applied in an era when a theory of state ownership or control of water was encouraged."[6] The prevailing theory was that full power over water resources passed from the federal government to the states as they entered the Union. As a result, each prior appropriation state developed a separate and distinct body of law to govern the allocation of water uses shaped by the historical needs of the people of the diverse states. This explains why there are at least three theories as to the origin of the doctrine. The most prevalent theory is that it grew out of the customs of California goldrush miners.[7] But prior to the goldrush, Mormon settlers developed a similar system to allocate water for agricultural uses, thereby turning the desert into productive farmland.[8] New Mexico has its own view, which suggests that prior appropriation existed under the Mexican Republic.[9] Subsequent historical research has shown that there were differences between the Spanish/Mexican system and the modern prior appropriation system, but that some of the same factors are applicable to both methods of allocation. According to several historians,[10] previous use or "prioridad" and "need" were essential considerations for allocating water.

Since each state developed its own system, interpretations by one state court may have absolutely no relationship to the doctrine as applied by other states. Some examples are useful.

(1) The Idaho Constitution provides that the right of an individual to appropriate shall never be denied.[11] In

contrast, there is no analogous language in the New Mexico Constitution.[12]

(2) Constitutions or statutes of many prior appropriation states require a physical diversion to perfect an appropriation. New Mexico has no express diversion requirement in its constitution.[13]

(3) Each state has its own definition of beneficial use. Some prioritize uses, usually giving a preference for domestic and agricultural uses. Others specifically prohibit some uses by declaring the use not to be beneficial, especially coal-slurry pipelines. In contrast, New Mexico does not attempt to construct a hierarchy of values for water use with the exception of a possible implicit preference for domestic use in the appropriation permit provisions.[14]

The recognition of proprietary federal reserve rights in _Winters v. United States_[15] and the denial of state ownership of its waters under the public trust doctrine in _Sporhase v. Nebraska_[16] have limited the powers of the states in making allocations under the prior appropriation doctrine. These decisions have thrown into chaos state attempts to conserve water for the future. The conceptual problem is best illustrated in the circumstance where a state decides to "reserve" some quantity of water in storage for future use without actually appropriating it.

Under the prior appropriation doctrine, the courts require some evidence of an intent to appropriate to establish a valid water right.[17] Physical works to divert the water are evidence of the necessary intent to reserve some quantity of water in storage for future use. A dam is a diversion, establishing intent where surface water is stored, but with groundwater there is no mechanistic counterpart because reservation of groundwater for future use requires that the water be left where it is—in the ground. This did not pose any great problem if a state was the owner of all waters within its borders based on the public trust doctrine. No diversion was necessary to establish possession. Early descriptions of aquifers by New Mexico courts reflect the view that the state owned the water in the ground:

> One definition of a reservoir is "A place where water is collected and kept for use when wanted" (Webster).... We know that the valley fill is a reservoir form which billions of gallons of water are pumped to irrigate annually 45,000 acres of land, so it must be collected there; and the legislature aptly called such containers of water reservoirs or lakes.[18]

In Yeo v. Ulibarri,[19] the New Mexico Supreme Court specifically held that the word "reservoir" contemplated the storage of water in a natural condition and, in dicta, suggested that it would be stupid to require groundwater to be pumped above ground to be stored in a surface reservoir.[20] Later cases have agreed with this approach.[21]

Unfortunately, the Sporhase decision holds that simply leaving water in the ground does not make the state the owner of its water resources in any proprietary sense. Therefore, New Mexico must explore other ways to establish possessory rights in groundwater it hopes to reserve for future use.[22] Since New Mexico follows the doctrine of prior appropriation with respect to both surface and groundwater and the study team is of the view that this should remain the law in New Mexico, this doctrine must form the basis for establishing state ownership of groundwater.

The feasibility of state appropriation of unappropriated groundwater, then, depends upon whether New Mexico can integrate this concept into its current system. Sections II and III below discuss the provisions of the state constitution and statutes respectively.

II. STATE CONSTITUTIONAL PROVISIONS

A. The Language—Article XVI

Article XVI of the New Mexico Constitution is entitled "Irrigation and Water Rights." Its five sections are the foundation for all New Mexico water law:

> Section 1. [Existing water rights confirmed] All existing rights to the use of any waters in this state for any useful or beneficial purpose are hereby recognized and confirmed.
>
> Section 2. [Appropriation of water] The unappropriated water of every natural stream, perennial or torrential, within the state of New Mexico, is hereby declared to belong to the public and to be subject to appropriation for beneficial use, in accordance with the laws of the state. Priority of appropriation shall give the better right.
>
> Section 3. [Beneficial use of water] Beneficial use shall be the basis, the measure and the limit of the right to the use of water.

Section 4 authorizes drainage districts and systems and Section 5 pertains to appeals from state agencies.

Water rights in New Mexico are property rights,[23] particularly if the water right antedates the Constitution. There is no guarantee in Article XVI, however, of an individual's right to appropriate water in the future free of state interference.[24]

When the state first attempted to regulate groundwater withdrawals in 1927, the statute was challenged by an owner of lands overlying the aquifer as a taking of property rights. The challenge was based upon the riparian principle that the landowner held title to everything between the surface and the center of the earth. The New Mexico Supreme Court held that the English common law had never been applied to water in New Mexico, that the statute was merely declaratory of existing law and therefore regulation of groundwater did not result in a denial or taking of an inchoate water right of overlying property owners.[25]

B. Caselaw Interpretation of Constitutional Provisions

These constitutional provisions establish four important concepts: (1) that New Mexico water belongs to the public (discussed above and in Chapter 3) and (2) that it is subject to appropriation (3) for uses (4) that are beneficial.

1. The State of New Mexico Has the Constitutional Power to Appropriate Water

Some water resources experts have argued that constitutional provisions such as New Mexico's implicitly recognize an individual's right to appropriate water as against the state. State appropriation, they would argue, would result in a denial of the individual's implicit right. Case law has rejected this approach in New Mexico. Two cases, United States v. Ballard and State ex rel. State Game Commission v. Red River Valley Co., addressed this argument.[26] In Ballard, the state's water rights law was held to extend to all parties, including the State Game Commission. In Red River, Justice Sadler said: "We find no place for a narrow construction of the language whereby waters are declared 'to belong to the public' and to say: 'The waters belong to the public only so far as they are subject to diversion from their natural course.'"[27] Numerous state agencies appropriate water for both regulatory and proprietary purposes (see Chapter 3). No application by the state has been denied because of interference with any inchoate right of an individual to appropriate.

2. <u>If the State Does Appropriate Water, It Must Have a Plan for Use of the Water</u>

While the state plainly may have the power to appropriate groundwater, as noted above, a prerequisite is that it meet the conceptual requirement to "use" the water. Storage of surface water may be easily perceived as a use of water because the means of storage are mechanistic and quite visible: water tanks catch rainfall; dams store surface flows.[28] There is no similar counterpart for groundwater storage: it appears to be a non-use and suggests an unneeded surplus.

In New Mexico, aquifers have been perceived to be underground reservoirs <u>of the state</u> based, in part, on the constitutional mandate of public ownership.[29] Case law development of this provision requires that the state make tangible efforts to appropriate groundwater similar to that of persons in the private sector.[30] An appropriator only has a right to that quantity of water it uses for its beneficial purposes. There is no individual right to surplus; it reverts to the state for uses by others or by the state.

Since <u>Sporhase</u> holds that New Mexico's "public ownership" of water is a "legal fiction," basic problems emerge.[31] Can a state exercise any greater right, as a proprietor, than that accorded other would-be property owners? How does one distinguish between non-use that suggests unneeded surplus and storage for future use? The answer lies in case law, the role of the state in the federal system and general rules of prior appropriation.

Storage alone does not generally constitute a use of water because there is no actual application to beneficial use.[32] The reasoning behind the rule is that speculation in water rights should be avoided because it precludes more substantial present uses.[33] This, in turn, prevents maximum use of the resource. When coupled with a plan for future use, storage does, however, show evidence of intent to appropriate, thereby avoiding prohibitions on speculation.[34] The following New Mexico cases have developed this distinction.

In Keeney v. Carillo,[35] a case from the territorial period, the New Mexico Courts adopted the doctrine of "relation back" to protect the priority of rights initiated but not fully perfected by actual application to beneficial use. The doctrine has been described as follows:

> The rule is that, at the time of the inception of [the] claim, [the appropriator] may lay the foundation for the appropriation of such quantity of water as will be necessary, when economically used, for the reclamation of his entire tract of land, and he will not lose [the] priority of right, provided he makes use of all the water claimed within a reasonable time.[36]

In case after case, the validity of a priority earlier than actual application to beneficial use has been upheld. In these cases, prior appropriation is described as a process; if the process terminates with a valid appropriation, the priority date relates back to when the process began.[37]

Although the doctrine of relation back was first applied in the context of surface waters used for irrigation purposes, state and federal courts have expanded its application to groundwater[38] and a variety of uses, including future use by the state's political subdivisions. In State v. Crider,[39] the court applied the rule to the future needs of cities: "We see no reason why the rule stated should not apply to the future use of water by cities intended to satisfy needs resulting from normal increase in population within a reasonable period of time."[40]

The limitation on what can be claimed by political subdivisions and even states, just as any other appropriator, is linked to prohibitions on speculation. In Jicarilla Apache Tribe v. United States,[41] the Tenth Circuit Court of Appeals held a water storage contract between the City of Albuquerque and the Bureau of Reclamation to be invalid, because the proposed eventual uses were so speculative as not to constitute any use at all:

> We do not deny that Albuquerque could take the quantity authorized in order to provide its purchasers for beneficial use regardless of the economic results to the City. But it cannot take the water now with a mere hope of possible sales in the future, most of which sales are yet to materialize.
>
> The United States argues that the City has a reasonable time to develop use for the water and to thus perfect its appropriation. This right, however, is not unlimited. The City cannot divert the water which looks to future negotiation for various beneficial uses....
>
> In sum, it is essential that there shall have been a beneficial use which is more than speculative. The Bureau cannot deliver the water to the City under a plan which is nothing more than speculative with respect to the beneficial uses.[42]

The United States Supreme Court has implicitly applied the prohibition against speculation in Arizona v. California[43] (1963) and Colorado v. New Mexico[44] (1984). The Arizona v. California Court refused to recognize any rights based on future uses absent clear and convincing evidence of future need. In Colorado v. New Mexico the same reasoning was applied to deny any right of Colorado to the Vermejo river at that time. If Colorado had had a plan for the water based upon future need, the result might have been different.

The difference between non-use and storage for future use depends on the existence of planned future uses that do not rely on speculation. Thus, New Mexico can appropriate groundwater for future use pursuant to a plan for future use of the water.[45] An appropriation for future use without a plan, however, would be no appropriation at all.

3. The State's Use of the Water Must Be Beneficial

New Mexico does not create any hierarchy of beneficial uses, thus distinguishing New Mexico water law from that of many other states. Many states exclude specific uses by statute.[46] Other states have created hierarchies or preferences of uses by statute[47] or regulation.[48] The New Mexico Constitution requires only "the use of such water as may be necessary for some useful and beneficial purpose."[49] The only limitations are derived from general notions of civic responsibility: the use cannot be unreasonable, wasteful, or contrary to the public interest.

Individual freedom to choose what use is "beneficial" may be based on the section of the state constitution that protects the inherent rights of each individual embodied in the elusive concept of liberty: the right to possess property, to seek happiness, to pursue a livelihood, to maintain separate values.[50] The right to maintain a separate view of what is beneficial, however, is not absolute. It is subject to the state's paramount right to impose reasonable regulation to protect the public welfare[51] and to protect the rights of others.[52]

New Mexico traditionally has relied on the water market to create new uses. Under classic resource economics theory, as the resource becomes scarce, a less efficient use will be transferred to more efficient uses. Some economists argue that there should be no state controls on the market. They argue further that the courts should consider <u>only</u> cost-benefit analyses in ruling on water rights transfer cases. Water is more than a commodity, however,[53] and the courts often have had to balance economic and political efficiency.

The concept of beneficial use and its corresponding limits have been interpreted by New Mexico courts to recognize non-pecuniary values associated with water use, so long as unreasonable burdens are not placed on other users' needs.[54] In <u>Keeney</u>, the court rejected an economic efficiency test to determine an appropriator's "due diligence."[55] The federal court in <u>Jicarilla</u> refused to tie beneficial use exclusively to economic feasibility: "Albuquerque could sell the water at a loss or even give it away without depriving it of its character as a beneficial use."[56] At least one New Mexico district court has determined explicitly that, assuming a cost-benefit analysis is proper to measure competing uses, the analysis is not dependent on pecuniary determinations to measure benefit.[57] The purist economists' argument has failed for a very sound reason.[58] To adopt their view would give a preference for uses that maximize economic value in a state that does not recognize any preference in regard to the beneficial uses of water. A lovely fountain may have great aesthetic value but little economic value; nonetheless, it would be considered a beneficial use in New Mexico. While New Mexico courts might wish to see water use produce revenues, they have not abandoned aesthetics and other values. If the state were to appropriate water, it must be applied to "beneficial use," but there is no requirement that the state profit economically from its allocations.

IV. NEW MEXICO STATUTORY REQUIREMENTS FOR STATE APPROPRIATION

As noted above, laws regulating and allocating water use have a long history in New Mexico. Unlike most eastern states, the applicable law before 1848 was Spanish or Mexican civil law, not English common law.[59] The harsh realities of life in this arid region required collective action to ensure an adequate water supply. Collective action, in turn, required that someone be given the authority to manage the supply for the benefit of all users and to arbitrate disputes. Thus, from the days of the Spanish colonial system to the present, the majordomo has had the legal authority to allocate waters among ditch users.[60] The New Mexico Statutes have continued this tradition and have established a statewide administrative system for regulating water use.

A. The Authority of the State Engineer

Chapter 72, Article 2, of the New Mexico Statutes authorizes the State Engineer to manage water resources in the state: "[The State Engineer] has general supervision of waters of the state and of the measurement, appropriation, distribution thereof and such other duties as required."[61]

The jurisdiction of the State Engineer extends to all surface water and groundwater in declared underground basins. The State Engineer has the authority to declare underground basins with reasonably ascertainable boundaries at any time.[62] All appropriations of water under State Engineer jurisdiction must be initiated and completed in the manner prescribed in the statutes and regulations of the State Engineer. The State Engineer must also approve all transfers of water rights from one type of use to another or from the initial place of use. Absent a statutory exemption, such as that for groundwater located outside declared basins, all appropriations held by the state in a proprietary capacity would have to be initiated accordingly.

B. Initiating an Appropriation of Groundwater

1. Undeclared Basins

Until there is an affirmative action by the State Engineer declaring a groundwater basin, the State Engineer cannot exercise jurisdiction over those groundwaters.[63]

> Upon becoming effective [the surface water code] was immediately applicable to all surface water. On the other hand [the groundwater code] upon becoming effective was not self-executing and did not alter any

> rights. The changed condition resulted from exercise of the authority expressed therein and the declaration of a basin by the State Engineer. Accordingly, the right to continue to develop underground water under the general law was in no way altered pending a declaration.[64]

The New Mexico statute relating to underground waters states clearly that the State Engineer has no jurisdiction if he has not declared an area a "declared basin": "No permit and license to appropriate underground waters shall be required except in basins declared by the state engineer to have reasonably ascertainable boundaries."[65] In 1983 the legislature amended the statute to give the State Engineer jurisdiction if water is appropriated for use out of state.[66] Thus, under the state statutes as now written the state would not have to apply to the State Engineer to use groundwater from undeclared basins if there is no intent to use the waters outside New Mexico. Should the state attempt to lease water rights for use out of state it would have to appropriate water in the same manner as appropriators in declared basins.

It is clear that the state could appropriate water in undeclared basins by giving some evidence of an intent to appropriate and meeting the other elements set out in Section II, above, regardless of the intended place of use.

2. <u>Declared Basins</u>

Where the State Engineer has issued a declaration, the statutory method of appropriation is exclusive. New Mexico law sets out certain requirements in the application process. The applicant must state:

(1) the particular underground stream, channel, artesian basin, reservoir or lake from which water will be appropriated;

(2) the beneficial use to which the water will be applied;

(3) the location of the proposed well;

(4) the name of the owner of the land on which the well will be located;

(5) the amount of water applied for;

(6) the place of the use for which the water is desired; and

(7) if the use is for irrigation, the description of the land to be irrigated and the name of the owner of the land.

B. If the well will be located on privately owned land and the applicant is not the owner of the land or the owner or the lessee of the mineral or oil and gas rights under the land, the application shall be accompanied by an acknowledged statement executed by the owner of the land that the applicant is granted access across the owner's land to the drilling site and has permission to occupy such portion of the owner's land as is necessary to drill and operate the well. This subsection does not apply to the state or any of its political subdivisions. If the application is approved, the applicant shall have the permit and statement, executed by the owner of the land, recorded in the office of the county clerk of the county in which the land is located.

C. No application shall be accepted by the state engineer unless it is accompanied by all the information required by Subsections A and B of this section.[67]

The statutes governing applications to use groundwater are not always consistent with those governing the use of surface water. With respect to surface water, the New Mexico Statutes provide for the filing of a notice of intention to make formal application for a permit to appropriate certain public waters.[68] A plan of use must be filed within a reasonable time as determined by the State Engineer.[69] According to the State Engineer, the filing of a notice of intention creates a recognizable property right to the use of the stored waters.[70] This was the procedure used by the Interstate Stream Commission to appropriate surface waters stored in Ute Dam.[71]

With respect to groundwater, there are special forfeiture exemptions allowing appropriations for future use by counties and municipalities that, arguably, have the same effect as an intent to appropriate surface waters.[72] State agencies are not given special rights to appropriate for future use. The reason for this is probably because of the pre-Sporhase view that all groundwater was owned by the state and was in storage for future uses in the state. Since all groundwater was thought to be the property of the state, plans of municipalities and counties for eventual beneficial use were sufficient evidence of an intent to appropriate by political subdivisions.[73]

Notwithstanding the different procedures set out for the appropriation of groundwater and surface, the water rights obtained under either procedure are virtually identical.[74] If filing an intent to make formal application creates a property right in surface water, there surely must be a similar substantive right in groundwater. If the state is to appropriate groundwater for future use, the groundwater statutes should be amended to allow the filing of an intent to use groundwater, consistent with the surface water statute.

Once an application is filed, notice of the filing is published in "the county in which the well will be located."[75] Objections to the application may be filed with the State Engineer within a specified time period. After the time period has expired and if there are no objections, the State Engineer must grant the application and issue the permit if he finds:

(1) unappropriated waters are available;

(2) the proposed appropriation

(a) would not impair existing rights from the source;

(b) is not contrary to conservation of water within the state; and

(c) is not detrimental to the public welfare of the state.[76]

If someone has objected to the application or if the State Engineer concludes that the permit should not be issued, the application can be denied without a hearing or the State Engineer can order that a hearing be held.[77] If the application is denied, appeal would be made to the state district court for trial <u>de novo</u>.

C. <u>Transfers of Water Rights</u>

New Mexico statutes allow water rights to be transferred from one owner to another, from one place of use to another, and from one type of use to another.[78] A water right is a property right and may be transferred in the same manner as any other property interest; it can be sold,[79] leased,[80] or even given away.[81] This does not mean that no limitations exist. Federal Reclamation Laws may prevent transfers out of reclamation districts[82] and some compacts and apportionments prohibit transfers. According to the State Engineer, the Rio Grande Compact prohibits transfers beyond specific accounting points. The equitable apportionment decree on the Gila River prohibits transfers from certain areas to protect downstream users in Arizona.[83]

The New Mexico Statutes expressly allow transbasin transfers and transfers beyond the state line, but special standards apply.[84] In most instances, the same statutory requirements apply as in the case of an initial appropriation. The owner must apply to the State Engineer and obtain approval from that office. If the statutory criteria are met, what is transferred is the right to use a certain quantity of water with the same priority as the predecessor-in-interest.

1. Sale or Gift of Water Rights

Except for the requirements that any transfers of the place of use or type of use be approved by the State Engineer and that assignments be filed with the State Engineer, there are no other statutes expressly addressing the sale or outright gift of a water right.[85] A transfer of a parcel of land is presumed to carry any existing water rights unless specifically excluded. To sever the water right from the land requires the consent of the owner. Once severed it can be conveyed in the same manner as any other property interest.

2. Leasing of Water Rights

Special provisions apply to the leasing of a water right.[86] The state's ability to be a lessor or lessee is expressly provided for in the statute.[87] The substantive provisions are as follows:

> Any owner may lease to any person all or any part of the water-use due him under his water right, and the owner's water right shall not be affected by the lease of such use. The use to which the owner is entitled

> under his right shall, during the term of the lease, be reduced by the amount of water so leased. Upon termination of such lease, the water-use and location of use subject to the lease shall revert to the owner's original use and location of use.
>
> The lease may be effective for immediate use of water or may be effective for future use of the water covered by the lease, however, the lease shall not be effective to cumulate water from year to year, or to substantially enlarge the use of the water in such manner that it would injure other water users. The lease shall not toll any forfeiture of water rights for nonuse, and the owner shall not, by reason of the lease, escape the forfeiture for nonuse prescribed by law; provided, however, that the state engineer shall notify both the owner and the lessee of declaration of nonuser as provided in Sections 72-5-28 and 72-12-8 NMSA 1978. The initial or any renewal term of a lease of water-use shall not exceed ten years.[88]

The Act explicitly provides for leasing of water rights for future use, but also prevents the use of this mechanism to avoid forfeiture for non-use. This implicitly recognizes that leasing water rights, in and of itself, is not a use of water. Thus, leasing does not avoid the future use-nonuse problems discussed in Section III of this chapter. The fact that a lease need not result in immediate use of water by the transferee makes it an attractive tool in conjunction with a plan of future uses. Since the term of the lease is limited to ten years, with a ten-year limitation on renewal, the state could lease a right for up to twenty years before it was needed for use by the state. The statute could easily be amended to provide for leases for longer periods of time or for consecutive renewal periods.

Procedurally, the general transfer statutes and the specific leasing statute differ significantly. With regard to leasing, the standards for State Engineer approval are:

> The engineer shall approve the application if the applicant has shown that his proposed use and location of use is a beneficial use and will not impair any existing right to a greater degree than such right is, or would be impaired, by the continued use and location of use.[89]

The statute does not require any finding that the lease is not contrary to conservation of water within the state and that it is not detrimental to the public welfare of the state. Although one state district court has held that the State Engineer must make a public welfare determination even where there is no explicit statutory directive to do so,[90] the lack of any statutory directive would likely preclude consideration of the public welfare or conservation in evaluating a lease application.

The leasing statute has been of great use to municipalities and counties in planning for future needs. The City of Albuquerque presently purchases surface and groundwater rights, leasing them back to the former owners until it needs the water. With San Juan-Chama waters, the city does not lease out its federal contract rights, but sells specific quantities of water for a term of years subject to the future needs of the city.

The Roswell Development Corporation, owned by the City of Roswell, purchases land and associated water rights near Roswell and then leases them to farmers until such time as the city's growth extends close enough to the property to make a tie-in to the city water system feasible. In contrast, Silver City finances water purchases with two mechanisms: (1) a fund derived from access fees, and (2) marketing water to other nearby communities for municipal uses. The proceeds may be used to purchase future supplies.

3. Out-of-State Uses

After New Mexico's complete prohibition on out-of-state use was declared unconstitutional in City of El Paso v. Reynolds (I),[91] the legislature drafted a new statute expressly permitting exportation under special conditions. In addition to the conservation and public welfare criteria, the State Engineer must take into account the following factors as part of his determination of the effect of the exportation on the public welfare:

> D. In acting upon an application under this act, the state engineer shall consider, but not be limited to, the following factors:
>
> (1) the supply of water available to the state of New Mexico;
>
> (2) water demands of the state of New Mexico;
>
> (3) whether there are water shortages within the state of New Mexico;
>
> (4) whether the water that is the subject of the application could feasibly be transported to alleviate water shortages in the state of New Mexico;
>
> (5) the supply and sources of water available to the applicant in the state where the applicant intends to use the water; and
>
> (6) the demands placed on the applicant's supply in the state where the applicant intends to use the water.[92]

The constitutionality of the new statute on its face has been upheld as to initial appropriations from declared groundwater basins. However, the federal court cautioned that it would be unconstitutional to apply the new statute in a discriminatory manner.

There is yet another issue concerning state appropriation and the transfer statute. This is a matter of statutory construction with an incredible gloss of contradictory case law. Unlike the Water-Use Leasing Act, the term "person" in section 72-12B-1 is not defined to include the state. In other areas of the law, specifically public utility regulation, the state courts have held that the term "person" does not include the state itself unless expressly defined to do so.[93] Under this approach, none of the statutes regulating water use and transfers, with the exception of the leasing statute, would apply to the state as an owner or appropriator. However, the cases, especially if read in conjunction with federal case law, suggest that whether the term encompasses the state depends on legislative intent and context.[94] The argument is that the legislature, in enacting the water code, sought to make it the exclusive means of establishing a water right; therefore, all entities, including the state, its agencies and political subdivisions, are governed by the statutes.[95]

D. <u>Statutory Requirements as to Forfeiture</u>

1. <u>Statutes</u>

In Section II, above, we discussed the prohibition on speculative uses. This appears in the statutes in the form of forfeiture. Both surface and groundwater use rights are subject to forfeiture if not applied to beneficial use.[96] The general rule is that after four years of non-use the State Engineer gives an appropriator notice that the right is subject to forfeiture. The appropriator will forfeit the right if it is not put to use within one year of the notice from the State Engineer.[97] No notice was required prior to June 1965. The law provides for extensions of time to put the water to use upon "a proper showing of reasonable cause for delay or for non-use, or upon the state engineer finding that it is in the public interest."[98] The rest of the statute sets out a variety of exceptions to the forfeiture rule, most of which relate to conservation of land and water resources for future use. When irrigated lands are taken out of production pursuant to the Soil Bank Act[99] for a period of time, that period is not computed as part of the four-year forfeiture period.[100] Should an artesian conservancy district acquire rights to be placed in a water conservation program, that is not treated as non-use invoking forfeiture.[101] Although the right of cities and counties to hold rights for future use grew out of concepts of due diligence and the relation-back doctrine, the statutes also exempt municipalities and counties from forfeiture for a period of forty years.[102] El Paso has challenged the application of this statute to its applications to appropriate groundwater. This case is now before the state district court in Santa Fe.[103]

Taken together, these exemptions emphasize the distinctions between non-use and storage for future use described in Section III of this chapter. When non-use is desired for conservation purposes to insure an adequate supply for planned future needs, it is not the same as non-use for speculative ends. Should the legislature resolve to adopt a plan of state appropriation, a statutory exemption from forfeiture for the state would be desirable and consistent with the New Mexico version of prior appropriation. The period of exemption, if adopted pursuant to a plan, could extend as long as 80 years, if this were the planning horizon adopted by the state.

CHAPTER 4 ENDNOTES

1. N.M. Const. art. XVI § 2.

2. 1 R. Clark, Water and Water Rights § 18.2(B) (1967).

3. 1 id. § 4.1, at 30.

4. See infra at pp. 101-102.

5. 1 R. Clark, supra note 2, § 408.1:

> Long before the adoption of broad water legislation in all the mountain states, the courts upheld certain beneficial uses, and solid rules emerged. For any appropriation to be perfected the water had to be applied beneficially within a reasonable time; no right attached to the water in excess of the quantity to be used beneficially; if there was an insufficient amount to be applied beneficially, none could be appropriated....The other elements of a valid appropriation, including intention, due diligence and, except in rare instances, an actual diversion are essential but subordinated to the beneficial purpose.

6. 5 R. Clark, supra note 2 § 400, at 3.

7. 1 R. Clark, supra note 2, § 18.1(C). See generally The Mining Act of 1866, 30 U.S.C. § 51; 43 U.S.C. § 661.

8. 1 R. Clark, supra note 2, § 18.1(B). Date of settlement: 1847.

9. United States v. Rio Grande Dam & Irrigation Co., 9 N.M. 292 (1898), rev'd on other grounds, 174 U.S. 690 (1899).

10. Testimony of William Taylor and Michael Meyers, in State of New Mexico ex rel. Reynolds v. Aamodt, No. 6639-M (D.N.M. 1985).

11. Idaho Const. art. 15, § 3. This seemingly restrictive language has been interpreted not to prevent state appropriations for in-stream beneficial uses. See generally Idaho Dept. of Parks v. Idaho Dept. of Water Admin., 96 Idaho 440, 530 P.2d 924 (1974).

12. See infra at p. 93.

13. With respect to groundwater, the well is the diversion and the statutes require an applicant to state the location of the well. Of course, unlike surface water, no application of water can be made without a proposed well. With respect to surface water, a diversion requirement has been recognized in cases involving agricultural use or where non-diversionary uses resulted in extreme waste. State Engineer surface water regulations require a diversion, but non-diversionary rights do exist in this state. An example of a non-diversionary right is Blue Hole near Santa Rosa. Blue Hole is a lake fed by an artesian spring with a flow of 3,000 gallons per minute. The property and water rights were donated to the city by the federal government in 1973. Now it is a city park and use of it for scuba diving is a prominent feature of the recreational offerings of Santa Rosa.

14. See infra note 24. N.M. Stat. Ann. § 72-12-1 (Repl. Pamp. 1985) limits the authority of the State Engineer to deny applications for domestic use. The forfeiture provisions that apply to municipal and county uses are also essentially exceptions to protect domestic uses (see discussion in Chapter 3).

15. 207 U.S. 564 (1908), made applicable to groundwater in Cappaert v. United States, 426 U.S. 128 (1976). The existence of federal proprietary rights does not undercut state authority as much as the standard applied to determine the quantity of the right—the amount of water necessary to fulfill the purposes of the reservation. This, in some instances, might be an ever-expanding right that does not mesh with the prior appropriation doctrine.

16. 458 U.S. 941 (1982). See Chapter 3.

17. See supra note 5 and accompanying text.

18. State ex rel. Bliss v. Dority, 55 N.M. 12, 30-31, 225 P.2d 1007 (1950).

19. 34 N.M. 184, 279 P. 509 (1929).

20. "If it were proposed to construct a huge surface reservoir, to be supplied wholly by pumping from underground sources, we might, under present conditions, doubt the practicality of the scheme; but it would be difficult to show its illegality—the only respect in which we may question it." Id. at 192, 279 P. at 513.

21. Compare State ex rel. ISC v. Reynolds, 71 N.M. 389, 738 P.2d 622 (1963).

22. Prior appropriation is tied to historical patterns of land and water use; it is most easily applied to surface water

diversions for traditional land uses, specifically agriculture and ranching. Blanket application of its elements to groundwater and non-traditional uses raises several issues. An example would be the concept of priority. In the West there are great fluctuations in annual surface flows. An early priority date acts to protect senior appropriators in dry years. Comment, Protection of the Means of Groundwater Diversion, 20 Natural Resources J. 625 (1980). With groundwater, fluctuations are not the problem, permanent overdraft is. Senior priority does not mean that all junior wells will be shut down if the water table drops. Mathers v. Texaco, 77 N.M. 239, 421 P.2d 771 (1966); Maestas v. Elephant Butte Irrigation Dist., No. 78-13813 (D.N.M. 1979). Rather, the junior user's appropriation will not be cut off unless the use "impairs" that of a senior user.

23. New Mexico Prods. Co. v. New Mexico Power Co., 42 N.M. 311, 77 P.2d 634 (1937).

24. One might argue that an individual right to appropriate water could be found in section 4 of article III, entitled "Inherent rights":

> All persons are born equally free, and have certain natural, inherent and inalienable rights, among which are the rights of enjoying and defending life and liberty, of acquiring, possessing and protecting property, and of seeking and obtaining safety and happiness.

Although there is no case law directly addressing the right an individual has to water, it is arguable and logical that this provision confers on each individual the amount of water needed for domestic use—that needed for human subsistence. N.M. Stat. Ann. § 72-12-1 (1978) seems to follow this view. See also discussion of preference for domestic uses under Spanish and Mexican Law in Reynolds v. Aamodt, No. 6639-M, slip op. at 8 (D.N.M. Sept. 18, 1985) (mem. op.).

25. Yeo v. Tweedy, 34 N.M. 611, 286 P 970 (1929); State ex rel. Bliss v. Dority, 55 N.M. 12, 225 P.2d 1007 (1950). Although it has saved New Mexico from the political problems associated with adoption of groundwater control provisions in Texas and Arizona, the court's view relies more on custom than legal precedent. According to Clark, [citing of Galvan] Spanish law treated groundwater as the property of the overlying landowner. Keeney v. Carillo, 2 N.M. 480 (1883), a decision from the territorial period, distinguished subterranean flows from percolating waters. As to percolating waters, the court cited to Angell's treatise, finding that groundwater was so intimately related to the land that use by another would be an interference with the rights of the landowner. In contrast, water disputes during the Spanish

and Mexican period suggest that the same principles were applied to water from whatever source it was derived.

26. 184 F. Supp. 1 (D.N.M. 1960); 51 N.M. 207, 182 P.2d 421 (1947). See supra discussion of Idaho constitutional provisions at note 11 and accompanying text.

27. State ex rel. State Game Comm'n v. Red River Valley Co, 51 N.M. 207, 228, 182 P.2d 421, 434 (1947).

28. Reynolds v. Aamodt, No. 6639-M (D.N.M. Sept. 18, 1985) (mem. op.); N.M. Stat. Ann. §§ 72-10-1 to 72-10-10 (Repl. Pamp. 1985) (community springs or tanks); N.M. Stat. Ann. § 72-9-3 (Repl. Pamp. 1985) (tanks or ponds for stock watering); N.M. Stat. Ann. § 72-5-1 (Repl. Pamp. 1985) (dams over 30 feet high).

29. State ex rel. Bliss v. Dority, 55 N.M. 12, 225 P.2d 1007 (1950). See supra discussion at 92.

30. Jicarilla Apache Tribe v. United States, 657 F.2d 1126 (10th Cir. 1981). See also State ex rel. Reynolds v. King, 63 N.M. 425, 321 P.2d 200 (1958). Defendant J.H. King owned Pritchard Lake. The Lake was fed by overflow from Hagerman irrigation canal. The waters of Pritchard Lake then seeped into the ground, recharging the declared Roswell underground basin. King drilled a well in the declared basin without obtaining a permit from the State Engineer and used the water for irrigation purposes. The State Engineer sought to enjoin King's use of groundwater. King's defense was that the groundwater he was pumping was drainage water that was primarily private and not subject to appropriation. See N.M. Stat. Ann. § 72-5-27 (1978). King asserted that water pumped from the well was private water stored in the aquifer that he, as the owner, had the right to withdraw when needed. See State ex rel. Erickson v. McLean, 62 N.M. 264, 308 P.2d 983 (1957); Kelley v. Carlsbad Irrigation Dist., 76 N.M. 466, 415 P.2d 849 (1966). The court's holding in King, was grounded in the notion of public ownership. It extended a basic surface water rule to groundwater; when private waters pass unused beyond the domain of the owner and are deposited in a natural stream for a period of four years, the water becomes publicly owned and subject to appropriation (compare forfeiture provisions discussed infra at 110). Implicit in the rule is that public ownership was actual possession, not a legal fiction.

31. In Sporhase, public ownership was held to create a heightened regulatory interest, not the property interest implicit in the King case. If a state's heightened regulatory interest can preclude storage of private appropriations, does it also preclude state storage in a proprietary capacity? The scope of the public trust doctrine is discussed in Chapter 3.

32. 5 R. Clark, supra note 2, § 408.1.

33. See infra discussion of forfeiture at p. 110.

34. See Meridian, Ltd. v. City of San Francisco, 13 Cal. 2d 424, 90 P.2d 537 (1939); Farmers Union Oil Co. v. Anderson, 129 Mont. 580, 291 P.2d 604 (1955); East Side Canal & Irrigation Co. v. United States, 76 F. Supp. 836, 839 (Ct. Cl. 1948); Miller v. Wheeler, 54 Wash. 429, 103 P. 641 (1909); Cache le Poudre Res. Co. v. Water Supply & Storage Co., 25 Colo. 161, 53 P. 331 (1898). 1 Weil, Water Rights in the Western States § 378 ("Storage as an aid to irrigation or other use (as opposed to speculation) is a useful purpose, and water may be appropriated for storage.").

    It is clear that, absent waste or a speculative intent, there is no caselaw suggesting that storage for the purpose of conserving water would not be beneficial. See United States v. Ballard, 1 F. Supp. 1 (D.N.M. 1960). The problem lies in the requirement of actual use.

35. Keeney v. Carillo, 2 N.M. 480 (1883).

36. 2 Kinney, Irrigation and Water Rights (1912).

37. See State ex rel. Reynolds v. Mendenhall, 68 N.M. 467, 362 P.2d 998 (1961).

38. Id.

39. 78 N.M. 312, 431 P.2d 45 (1967).

40. Id. at 316, 431 P.2d at 49.

41. 657 F.2d 1126 (10th Cir. 1981).

42. Id. at 1135.

43. 373 U.S. 546 (1963).

44. 104 S. Ct. 2433 (1984).

45. The State Engineer Regulations are quoted with respect to short-term planning for essentially private uses, but the time allowed before actual use depends on the size and complexity of the proposed project. When the State Engineer issues a permit, a date is set for actual use (normally not more than five years for construction and an additional four years for actual use). Extensions can be granted for a total period of generally no more than five years. N.M. Stat. Ann. § 72-5-14 (1978) provides that in no event can extensions go more than ten years beyond issuance of the permit unless one-fourth of the actual construction is completed within the extension period and the State Engineer is

satisfied with the good faith of the applicant and believes the project is in the interest of the development of the state. If the requirements are met, a two-year extension can be granted.

46. _See_, _e.g._, Mont. Code Ann. § 85-2-104 (1983).

47. _See_, _e.g._, Cal. Water Code § 1257 (West 1971).

48. _See_, _e.g._, Ariz. Rev. Stat. Ann. §§ 45-561 to 45-579 (Cum. Supp. 1984).

49. N.M. Const. Art. XVI § 1 (1978); _see also_ _State ex rel. Erickson v. McLean_, 62 N.M. 264, 273, 308 P.2d 983 (1957).

50. _See supra_ note 24 and accompanying text.

51. _State v. Spears_, 57 N.M. 400, 259 P.2d 356 (1953).

52. N.M. Stat. Ann. § 72-5-5.1 (Repl. Pamp. 1985); N.M. Stat. Ann. § 72-12-18 (Repl. Pamp. 1985).

53. E. Englebert & A. Scheuring, _Water Scarcity Impacts on Western Agriculture_ 415 (1984).

54. _State ex rel. Erickson v. McLean_, 62 N.M. 264, 308 P.2d 983 (1957).

55. _Keeney v. Carillo_, 2 N.M. 480 (1883).

56. _Jicarilla Apache Tribe v. United States_, 657 F.2d 1126, 1135 (10th Cir. 1981).

57. Memo to Counsel, _Ensenada Land & Water Ass'n v. Sleeper_, No. RA-84-53-(C) (First Judicial District Court, County of Rio Arriba. Apr. 16, 1985).

58. Like old theories of economic substantive due process, this view implicitly creates property rights in laissez-faire economic policy. The United States Supreme Court has consistently disavowed this approach since 1937.

59. See Chapter 3.

60. N.M. Stat. Ann. § 72-9-2 (Repl. Pamp. 1985).

61. _Id._ § 72-2-1.

62. _State ex rel. Reynolds v. Mendenhall_, 68 N.M. 467, 362 P.2d 998 (1961).

63. _State ex rel. Reynolds v. Mendenhall_, 68 N.M. 467, 362 P.2d 998 (1961); _McBee v. Reynolds_, 74 N.M. 783, 399 P.2d 110 (1965).

64. Mendenhall, 68 N.M. at 472, 362 P.2d at 1002.

65. N.M. Stat. Ann. § 72-12-20 (Repl. Pamp. 1985).

66. N.M. Stat. Ann. § 72-12B-1(B) (Repl. Pamp. 1985). The revised statute may be challenged on constitutional grounds, based on the commerce clause. If an Arizona municipality were denied the right to appropriate water from an undeclared basin because of this statute and an in-state use given the right to appropriate without control by the State Engineer, New Mexico might have to face the following arguments: (1) it discriminates against out-of-state use; and (2) because the statute requires special treatment of water appropriated only for use out of state, it was passed with a discriminatory motive. See generally City of El Paso v. Reynolds (I), 563 F. Supp. 379 (D.N.M. 1983); City of El Paso v. Reynolds (II), 597 F. Supp. 694 (D.N.M. 1984). A second discrimination argument might be made under the equal protection clause. See discussion on the effect of federal limitations, Chapter 5. Given the reasoning of Mendenhall, that the groundwater statutes are not self-executing, the amended statute might not be sufficient to invoke State Engineer jurisdiction because it is the intent of the appropriator which triggers the purported exercise of jurisdiction, not an act of the State Engineer. Whether the amendment's delegation of authority to invoke agency jurisdiction to future appropriators is valid is beyond the scope of this study.

67. N.M. Stat. Ann. § 72-12-3 (Repl. Pamp. 1985). Under section B of the statute, the state and its political subdivisions are exempted from obtaining the landowner's consent to place a well on the property of another. Again the issue raised is whether this exemption is available to the state when it acts in a proprietary capacity. If this is viewed as an exercise of eminent domain powers, thereby creating a prescriptive, publicly held easement when acting as a proprietor, it would be more consistent for the state to obtain the consent of the landowner.

68. N.M. Stat. Ann. §§ 75-5-1 to 7-5-7 (Repl. Pamp. 1985).

69. N.M. Stat. Ann. § 72-5-1 (Repl. Pamp. 1985).

70. See Chapter 12.

71. Id.

72. N.M. Stat. Ann. § 72-12-8(F) (Repl. Pamp. 1985); see Chapter 3 and forfeiture discussion, infra p. 110.

73. See supra notes 14-20 and accompanying text.

74. See City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1962).

75. N.M. Stat. Ann. § 72-12-3(D) (Repl. Pamp. 1985).

76. N.M. Stat. Ann. § 72-12-3(E) (Repl. Pamp. 1985); see infra discussion of special requirements for out-of-state use at pp. 109-110.

77. N.M. Stat. Ann. § 72-12-3(F) (Repl. Pamp. 1985).

78. N.M. Stat. Ann. §§ 72-5-23, 72-5-24, 72-12-7 (Repl. Pamp. 1985).

79. No statute prohibits the sale of groundwater. N.M. Stat. Ann. § 72-5-22 provides for transfer of water rights by assignment. The assignment is only binding on the parties unless it is filed of record in the office of the State Engineer. If the transfer involves a change in use or the locations of use, there are additional requirements. N.M. Stat. Ann. §§ 72-5-23, 72-5-24, 72-12-7 (Cum. Supp. 1985).

80. See N.M. Water-Use Leasing Act (N.M. Stat. Ann. §§ 72-6-1 to 72-6-7 (1978).

81. See discussion of ISC activities in relation to Ute Dam in Chapter 12. The only area where water right transfers do not conform to other property rights is the doctrine of adverse possession. One does not gain a property interest in water by adverse possession because water use rights, a specific statute makes rights subject to forfeiture if not used in four years, far short of the ten-year statute of limitations that allows adverse possession of real property. Cf. New Mexico Prods. Co. v. New Mexico Power Co., 42 N.M. 311, 77 P.2d 643 (1937).

82. In re Application of NM Natural Resources Dept., State Parks and Recreation Div. for permit to change point of diversion, etc., No. CV-84-210-F (5th Jud. Dist. Ct, Eddy Co.).

83. Arizona v. California, 373 U.S. 546 (1963).

84. See N.M. Stat. Ann. § 72-5-26, § 72-12B-1 (Repl. Pamp. 1985).

85. Supra note 82.

86. N.M. Stat. Ann. § 72-6-1 to 72-6-7 (Repl. Pamp. 1985).

87. Id. § 72-6-2(C).

88. Id. § 72-6-3.

89. Id. § 72-6-5.

90. Memo to Counsel, Ensenada Land & Water Ass'n v. Sleeper, No. RA-84-53-(C) (First Judicial District Court, County of Rio Arriba. Apr. 16, 1985).

91. City of El Paso v. Reynolds, 563 F. Supp. 379 (D.N.M. 1983).

92. N.M. Stat. Ann. § 72-12B-1(D) (as amended 1985).

93. Southern Union Gas Co. v. New Mexico Public Serv. Comm'n, 82 N.M. 405, 482 P.2d 913 (1971).

94. The breadth of the term may depend on the circumstances: the effect and purpose of the statute as a whole, the legislative intent, etc. See generally Jefferson County Pharmaceutical Ass'n v. Abbott Laboratories, 460 U.S. 150 (1983).

95. United States v. Ballard, 184 F. Supp. 1 (D.N.M. 1960); State ex rel. State Game Comm'n v. Red River Valley Co., 51 N.M. 207, 183 P.2d 421 (1947).

96. N.M. Stat. Ann. §§ 72-5-28, 72-12-8 (Repl. Pamp. 1985).

97. Id. § 72-12-8(A).

98. Id. § 72-12-8(B). See supra note [50].

99. Pub. L. No. 540, 84th Cong., 2D Sess. 1956.

100. N.M. Stat. Ann. § 72-12-8(C) (Repl. Pamp. 1985).

101. Id. § 72-12-8(D).

102. Id. § 72-1-9.

103. Petition for Declaratory Judgement, City of El Paso v. Reynolds, No. SF85-1069 (N.M. Dist. Ct. filed July 12, 1985).

CHAPTER 5

FEDERAL LAW LIMITATIONS ON THE STATE'S PARTICIPATION IN THE WATER MARKET

I. INTRODUCTION

In previous chapters we addressed the feasibility of state water market participation under the laws of New Mexico. Chapter 3 described the public trust doctrine, New Mexico's heightened regulatory power pertaining to water resources, and circumstances where the state is presently participating in the water market. Chapter 4 examined state constitutional provisions and statutes regulating water use that would be applicable to the state as a market participant. This chapter examines the extent to which federal law may limit state participation in the water market.

This chapter begins with a brief review of the concept of state participation in the water market. Then, the possible limitations imposed on state market participation by the equal protection clause, the due process clause and the privileges and immunities clause are analyzed.[1] Finally, the limitations imposed by principles of federalism are examined in section III, with particular emphasis on the property clause, the commerce clause, and interstate compacts.

A. The State as a Market Participant

A state is a participant in the interstate market for goods or resources rather than a regulator of the market if a state expends its revenues to acquire goods and services in the market or to produce goods and services that are subsequently sold in the market. (Essentially the state acts like an individual proprietor, buying and selling goods in the same manner as other market participants.) When state activity has these characteristics, the state is free to make the same market choices as any other market participant. (See discussion of present state market participation in Chapter 12.) Many state activities might fall into these categories. A fundamental limitation on state market participant activity is that it cannot be used as a subterfuge to regulate the activities of other markets or unrelated transactions in the same market.[2] If a state's real goal is to regulate a secondary market and favor its own citizens over citizens of other states, then this is not true market participation.

B. Market Regulation Versus Market Participation

Although state legislation often recites the explicit purpose to be served by it,[3] courts are not obliged to accept that stated purpose. The court must "determine for itself the practical impact of the law."[4] Thus, a statute that impermissibly regulates the market might be invalid even though it states expressly that it is not designed to regulate the market. The South-Central Timber[5] decision exemplifies this principle. Alaska adopted a primary manufacture requirement for the sale of timber on state-owned lands. One could buy the timber only upon agreeing to have the initial processing done in the state. Although the state was acting in a proprietary capacity when selling the timber, the Supreme Court struck down the primary manufacture requirement because the effect was indirect regulation of a secondary market—timber processing—in a manner that violated the commerce clause. Rather than affecting state market activity, it only limited the activities of the state's trading partners in a completely different market.

Cory v. Western Oil & Gas Association[6] is a good example of some of difficulties that can arise when a court is trying to discern the purpose of state action by looking to its practical effect. California introduced a new system for calculating fees for the use of state-owned lands that increased state land revenues substantially. A lessee challenged the new fee schedule as an undue burden on commerce. California insisted that it was merely a market participant, leasing its property on the "open market." The lands in question were submerged tidelands, the bulk of which were owned by the state. The lessee had been leasing the property for a number of years and had made substantial improvements. Therefore, the lessee was not in the same position as one who could obtain the same "good" from another seller in the market. From the standpoint of the lessee the state was the only seller, using its inordinate bargaining power in a coercive manner. The court of appeals rejected California's argument that it was a market participant, preferring to describe promulgation of a fee schedule as a regulatory activity and therefore the fee as a tax. As a tax the new fee schedule was unduly burdensome because it was not reasonably related to services provided by the state.[7] One commentator has said, "when a proposed government business mirrors so closely what is now being done without proprietary coloring, a court could be expected to examine the enterprise very closely to determine its justification."[8] Thus, the first overall federal limitation on state market participation is that it must, in fact, be real market participation, not disguised regulation.

II. LIMITATIONS DERIVED FROM INDIVIDUAL RIGHTS

The fourteenth amendment provides:

> ... No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

As can be seen by its plain language, the fourteenth amendment applies to any state action regardless of whether the state is acting as a market participant. The discussion is divided into three questions: (1) What are the due process limitations on market participation? (2) What are the privileges and immunities limitations on market participation? and (3) What are the equal protection limitations on market participation?

A. Due Process

The due process clause prevents the taking of private property for a public purpose without compensation. Although one cannot own a body of water, the right to use water is a transferable property right in New Mexico. Should state action as a market participant result in a "taking" of property, compensation would have to be paid. When a state exerts its sovereign authority it may act by eminent domain. The property is taken and the owner is compensated, but, unless otherwise unconstitutional, the owner cannot prevent the taking.[9]

State market participation anticipates no condemnation of private water rights. Where the state is a market participant, acquisition is a market transaction; consent of the parties is the vital element; there is no sovereign coercion. Therefore, if a state wishes to participate in the water market, it should either appropriate or purchase water. It should restrict its condemnation activities to uses of water for public purposes of the state government as it has in the past.

1. State Entry into the Water Market

a. State Appropriation of Free Unappropriated Non-Tributary Water

Where unappropriated non-tributary groundwater is acquired by appropriating water rights in the same way as a private party, no takings issue is raised. Under New Mexico law no right to water exists based merely on the ownership of overlying lands (see Chapter 4). Therefore, the only way that a due process issue might arise would be in conjunction with a protest alleging that the state's appropriation, if granted, would impair an existing private or publicly held right.

b. State Purchase of Unappropriated Non-Tributary Groundwater Rights

Numerous present users of non-tributary groundwater are agriculturalists. As water levels decline these users may not be able to maintain present uses due to increased pumping costs.[10] The state might want to acquire an option to buy these rights once pumping costs make agricultural use impractical. No violation of due process would arise from purchase of these rights.

c. State Appropriation of Free Unappropriated Tributary Groundwater

Unlike non-tributary groundwater, which can be freely appropriated, appropriation of tributary groundwater requires purchase of sufficient surface water rights to counteract the effects of groundwater withdrawals on the related stream. Again, no violation of due process would arise from purchase of these rights.

2. The State as a Seller

a. Delivery Systems

Should the state need to acquire easements in connection with a water delivery system, it is not likely that it would be limited to private market transactions. In New Mexico, even private appropriators may utilize inverse condemnation to obtain easements over private property to transport water to the place of use.[11]

B. The Privileges and Immunities Clause

Individual rights under the privileges and immunities clause of the fourteenth amendment are those held by individuals as citizens of the United States. Early cases interpreting the fourteenth amendment construed this clause quite narrowly.[12] It has not been a prolific source of law for the modern court and will not be discussed. Of greater importance to this study is the individual rights protected by the privileges and immunities clause of article IV, section 2: "The citizens of each State shall be entitled to all the Privileges and Immunities of Citizens in the several States." The difference between the two may not seem to be great, but the purposes behind the two are distinct. By virtue of the article IV clause, a state cannot deny to citizens of other states the fundamental rights it recognizes in <u>its own citizens</u>. Individual rights under this clause are most analogous to prohibitions on state regulation derived from the commerce clause. It protects the right of people to move freely across state borders,[13] just as the commerce clause protects the flow of goods in the interstate market. Privileges and immunities issues arise primarily in cases involving conditions placed on receiving state-distributed goods and services.[14]

The clause "was designed to ensure to <u>a citizen of state A who ventures into state B</u> the same privileges which the citizens of state B enjoy."[15] Given that interstate commerce in water turns on where water is to be used and not on where the user resides, it is not clear that a refusal to distribute water outside the state would invoke prohibitions based on this clause. In all western states, a citizen from state B is free to come to state A and use the water in state A, consistent with the laws of state A. Only if place-of-use requirements were equated with residency requirements would this clause of the Constitution be of importance.

When a privileges and immunities issue is raised, the Court employs a two-part analysis to determine the validity of the challenged state activity. First, the party challenging the activity must show that it has the effect of denying a fundamental privilege. If no fundamental privilege is found the clause is of no force. "Only with respect to those privileges and immunities bearing upon the nation as a single entity must the State treat all citizens, resident and non-resident, equally."[16] The second inquiry is whether state residency is a legitimate basis for discrimination. "The inquiry in each case must be concerned with whether [substantial] reasons do exist and whether the degree of discrimination bears a close relationship to them."[17] Essentially, it would have to be shown that those uses that were refused constituted "a peculiar source of the evil at which the statute is aimed."[18]

The Supreme Court discussed the effect of the privileges and immunities clause on state market participant activity in United Building & Construction Trades Council v. Mayor of Camden,[19] in which labor organizations challenged state agency approval of a municipal ordinance that was very similar to Boston's executive order affirmed in White v. Massachusetts.[20] The Court, refusing to "transfer mechanistically" to the privileges and immunities clause an analysis fashioned to fit the commerce clause, found that characterizing state activity as market participation did not obviate concerns stemming from the privileges and immunities clause:

> The Commerce Clause acts as an implied restraint upon state regulatory powers. Such powers must give way before the superior authority of Congress to legislate on (or leave unregulated) matters involving interstate commerce. When the State acts solely as a market participant, no conflict between state regulation and federal regulatory authority can arise.... The Privileges and Immunities Clause, on the other hand, imposes a direct restraint on state action in the interests of interstate harmony. This concern with comity cuts across the market regulator-market participant distinction that is crucial under the Commerce Clause. It is discrimination against out-of-state residents on matters of fundamental concern which triggers the Clause, not regulation affecting interstate commerce. Thus, the fact that Camden is merely setting conditions on its expenditures for goods and services in the marketplace does not preclude the possibility that those

conditions violate the Privileges and Immunities clause.[21]

This does not mean, however, that any resident preference tied to state market activity would violate the privileges and immunities clause. As mentioned above, it must constitute a denial of a fundamental privilege. Camden involved one of the most fundamental privileges in a free society: the pursuit of a common calling, to seek employment. It is unlikely that refusal to sell a commodity that is available from others in the market would deny a fundamental privilege. The Court also made it clear that state ownership of a marketable good and the fact that a state is spending its own revenues are factors to be considered in evaluating whether a substantial reason exists to support discrimination against non-residents. The Court suggested, however, that it would be impermissible for a state to indirectly regulate the private market transactions of other than the state's trading partners.[22] This, of course, is true under the commerce clause. If the state is not a true market participant, it cannot avail itself of the market participant doctrine.[23]

C. <u>The Equal Protection Clause</u>

State activity as a market participant is subject to limitations imposed by the equal protection clause for the same reason that the privileges and immunities clause poses limitations. When denial of equal protection is raised, the burden of proof on this issue is weighted heavily in favor of the state: unless violation of a fundamental right is alleged, a classification will only be declared invalid if it is not rationally related to a legitimate purpose and it does not substantially further the asserted state objective.

For many years, state action pertaining to social or economic welfare was accorded great deference by the Supreme Court.[24] There was rarely a question as to the legitimacy of the asserted state purpose or motive; the focus was whether a rational relationship existed between the purpose and the statutory classification chosen to effectuate it.

There is, however, one recent case that has left many people guessing on this issue. In Metropolitan Life Insurance Co. v. Ward,[25] the Court struck down an Alabama domestic preference tax that imposed a higher tax rate on out-of-state insurance companies. A federal law authorized the express discrimination against interstate commerce. The question before the Court was whether two legislative purposes offered for the tax were valid: (1) to promote the in-state insurance industry and (2) to encourage investment of insurance revenues in the state. The Court reviewed both purposes closely and found them to violate the equal protection clause because of their discriminatory effect. A completely opposite result was reached in a later decision, Northeast Bancorp v. Board of Governors;[26] therefore, the broad application of equal protection principles in Metropolitan Life appears to be of little precedential value. However, the lesson to be learned from Metropolitan Life is that if a state adopts a market participant stance for the express purpose of discriminating against interstate interests, it might violate not only the commerce clause but also the equal protection clause.[27]

III. LIMITATIONS DERIVED FROM FEDERAL-STATE RELATIONSHIPS

The federal government is the primary guardian of the right of self-government through application of various constitutional provisions. Federal activity can create exclusive state rights to water resources, just as it does for federally recognized Indian tribes. Conversely, it may limit the amount of waters available for the state to appropriate. This section examines those constitutional provisions that give substance to the federalist doctrine. We begin with the tenth amendment.

A. Limitations Implied by the Supreme Court's Interpretation of the Tenth Amendment

> The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the states respectively, or to the people.

Republican values do not always fit into modern notions of a democratic society. Throughout our constitutional history the federal courts have vacillated between two distinct conceptions of this constitutional provision.[28] One theory is that the amendment acts as a barrier to congressional or executive action, giving the state regulatory power in certain areas free from federal restraints derived from plenary federal power. After a few dormant decades, this view of the amendment was revived nine years ago in National League of Cities v. Usery.[29] During the past year National League of Cities was expressly overruled in Garcia v. San Antonio Metropolitan Transit Authority.[30] Garcia represents the other view of the amendment—the guarantees that states will be free to function in the federal system are to be found within the power of states in the federal Congress set out in the Constitution rather than through judicial interpretations of the tenth amendment. Under Garcia, then, states must look to Congress, not the Court, to maintain their sphere of authority under the amendment.

> In short, the Framers chose to rely on a federal system in which special restraints on federal power over the States inhered principally in the workings of the National Government itself, rather than in discrete limitations on the objects of federal authority. State sovereign interests, then, are more properly protected by procedural safeguards inherent in the structure of the federal system than by judicially created limitations on federal power.[31]

The process whereby states formulate compacts approved by Congress is one of the best examples of how the federal system can accommodate the diverse states' sovereign or quasi-sovereign interests. In general, Congress participates by encouraging states to negotiate compacts. Once a compact is agreed to by the party states it must be approved by Congress under the compacts clause of the Constitution. It has then been approved by a majority of representatives from all the states and becomes federal law. In essence, absent a constitutional defect, the court is institutionally incapable of interfering with a compact's allocation of authority. This is consistent with the Court's view of its role as advanced in Garcia, that if states can allocate power through Congress the Court should not upset that allocation.[32]

B. Commerce Clause Considerations and Interstate Compacts: Issues and Concerns

Interstate compacts form the backbone of New Mexico's water plan for its surface water. The compacts are integral to the New Mexico state water plan because, ultimately, surface water is our only reliable renewable supply. The state's need for these supplies in the future seems obvious.

The New Mexico State Engineer and many legal scholars argue persuasively that the primary reason for entering into compacts is the concept of apportioning a permanent water supply to each party to a compact. Therefore, a subsequent court ruling that finds no such apportionment would undercut years of difficult and significant negotiations and would make the compacts meaningless. There is great weight in this argument both from the legal standpoint and the concept of fairness. The decision in Sporhase, however, has thrown into question the certainty of future water supplies in individual states. The court has placed into the matrix a countervailing need—the need in our federal system for water to flow to its highest economic use in the interstate water system. Here, we analyze in general terms the possible impacts of Sporhase and other cases on congressionally approved compacts between states.

The argument that congressionally approved compacts provide each state with a fixed amount of water outside the interstate market is straightforward. First, a water compact between states that regulates an interstate stream becomes a federal law enacted pursuant to the commerce clause when approved by Congress. Under the commerce clause, Congress can authorize states to impede interstate commerce. Therefore, when Congress approves a compact, it expressly authorizes states to retain compacted waters in perpetuity and Sporhase is not applicable.

While the argument that congressional approval of compacts creates exclusive state apportionments of water seems clear on its face, there is sufficient uncertainty to suggest that there are circumstances where the protection might not be absolute. Indeed, a former chief legal counsel to the State Engineer has concluded:

> [M]y guess is that the Court, in the absence of explicit territorial limitations [in the compact], will tend to be unfavorably disposed to state restrictions which interfere with providing water to expanding population centers and it will not construe compacts as placing territorial limitations on water use that avoid commerce clause scrutiny. The Court will be more inclined to solve the population problems than to read the intent of state legislatures into federal law.[33]

The key issue raised by the former chief counsel is as follows: If a compact is ratified by Congress, does it provide a state with the exclusive use of a quantity of water if it makes no mention of a state right to the exclusive use of some quantity of water? Stated in other terms: How specific must a compact be in providing a state with the exclusive use of a quantity of water for the Court to conclude that the commerce clause has been waived by Congress?

In many cases, the specificity of a compact may not be an issue. For example, the Upper Colorado River Basin Compact provides that each state has the "exclusive beneficial consumptive use" of a portion of water in perpetuity. The Klamath River Compact prohibits the transportation of water outside the Klamath River Basin. The Snake River Compact, the Yellowstone River Compact and the Kansas-Nebraska Big Blue River Compact condition out-of-basin use of the water on the approval of the signatory states or the compact commissions. The express language of the Yellowstone River Compact has been upheld by the Ninth Circuit Court of Appeals in the face of a constitutional challenge on commerce clause grounds. This is encouraging news for New Mexico, although such decisions do not answer the question of what would occur in the case of a compact that is vague or makes no reference to the potential place of use of the water.

In recent decisions, the Supreme Court has addressed the issue of the degree of specificity necessary in a congressional act to vitiate the commerce clause. In South-Central Timber Development, Inc. v. Wunnicke, the Court stated "[F]or a state regulation to be removed from the reach of the dormant commerce clause, congressional intent must be unmistakably clear."[34] It stated further that congressional action in this area is not a "wooden formalism," but rather it must be clear that Congress has made a "collective decision" to benefit one state. Requiring states to prove that Congress affirmatively contemplated a waiver of the commerce power "reduces significantly the risk that unrepresented interests will be adversely affected by restrictions on commerce."[35]

In short, the issue of how express a compact must be to give the states exclusive use of compacted waters is sufficiently unclear at this time to be of concern to states relying exclusively on their compacts as the basis for a state water plan, if the language of those compacts does not expressly restrict use of the waters to the territory of the respective compacting states.

Even if a compact ratified by Congress pursuant to the commerce clause expressly apportions water, if the state allows the water, in effect, to be severed from the state and be freely traded in the water market as a private commodity, does the compact nevertheless permit the state to regulate that market in a discriminatory manner? A compact, if properly drafted and approved by Congress, must make the state the owner of the supplies compacted to each state. Suppose, however, the state relinquishes that ownership in favor of private citizens and allows a secondary market in water to develop. Does the compact necessarily prevail? Since many compacts cover water that is already appropriated by private persons, if those persons could transfer the water out of state, the compact would appear to be meaningless if it didn't bind the state's citizens as well. Certainly, the Hinderlider[36] case supports this argument. There, the Supreme Court held that the states have the power to agree to a compact allocation irrespective of the private rights of citizens and that the state, as sovereign or quasi-sovereign, can bind its citizens.[37]

The dean of western water lawyers, Professor Frank Trelease, however, appears to support the view that apportioned waters, like state-owned timbers, once placed in purely private ownership, must be allowed to move freely in interstate commerce.[38] Again, there may be sufficient unclarity on this issue to cause concern for our compact-based state water plan.

Even if a compact is ratified by Congress and provides an express congressional apportionment of water to a state, if the state allows the water to pass into purely private hands and the private party does not sell his water right to an out-of-state party (does not sever the right from the state) but simply leases it for use out of state, does this violate a compact? A lease of water out of state does not necessarily sever the state's ultimate right in the long run to have the water rights remain in the state. Rather, it merely changes the place of beneficial use in the short run. New Mexico's water use leasing act, for example does not prohibit leases for out-of-state use.

With respect to tributary groundwater, the issues are the same as with surface water, with two important distinctions. The first is that compacts rarely expressly include groundwater in their apportionment. A possible reason is that most interstate compacts were created prior to the Sporhase decision and it was generally assumed that states owned groundwater located within the territory of the state. This is obvious from the legislative history of many compacts. The second distinction is that even though a compact may not expressly include groundwater, states have to regulate tributary groundwater use to insure deliveries of surface water required by compacts. Therefore, tributary groundwater is included in the compact, no matter what it says on its face.

This indirect inclusion of tributary groundwater in the compact can be best illustrated by a hypothetical. Assuming the State Engineer through hydrologic calculations determines that there are ten million acre-feet of tributary groundwater in storage that could be extracted from an aquifer over a hundred-year period if wells were ten miles from the river (recall the earlier discussion of tributary aquifers in Chapter 2). Assume further that there is a compact between two states apportioning the stream between them. Could the downstream state enter the upstream state and take groundwater in addition to its surface water apportionment under the compact?

Assuming the downstream state did put in wells and began pumping, the depletions would not initially affect the river. However, every drop of water pumped from a tributary aquifer sent to the downstream state eventually would be surface water. Therefore, the downstream state would be taking surface water not only in the river bed but also through wells. Such activity (indirectly increasing a state's surface water share in excess of the compact amount) must violate the compact. Thus, the surface water compact also indirectly applies to the tributary groundwater. This concept of indirect application of the compacts to tributary groundwater is a cornerstone of our compact-based water plan.

Given that compacted surface water can never be legally taken in excess of the compacted amount, through either wells or surface diversions, is it theoretically possible for a downstream state to take the tributary groundwater in storage <u>without taking surface water</u> and thereby violating the surface water provisions of the compact? The answer is unclear.

This may be hydrologically possible if we recall that a compact governs the place of use of the surface water and not the "user" of the water. Assume that a water user from a downstream state puts in a wellfield and begins pumping water to the downstream state. Because of the distance of his well from the river, initially no water is taken from the river. Gradually, however, the river will be affected and ultimately all water from his well will be taken from the river. He therefore asks the State Engineer to calculate a curve that reflects the proportion of water pumped from his well over time that will be taken from the river. The proportion of the surface water that will be taken from the well would range from zero initially to 100 percent eventually.

As the well begins to pump surface water, the compact will obligate the downstream user to leave that surface water in the state. The well owner has two choices—he can simply pump the surface water back into the river and keep the river whole, or he can buy and retire a surface right elsewhere equal to the surface water coming from his well and become the owner of the pumped surface water. If he bought and retired a surface right elsewhere and transferred it to his wellhead, he would, of course, be free to put the water to beneficial use in the state of origin himself, or market the surface water from the well like any other person. However, <u>the surface water from his well must be used in the state of origin</u>. Eventually, when the well is pumping only surface water, no water can be sent out of state and all of the well water will have to be used in the state of origin. Until this happens, the downstream user can, in effect, "mine" all of the tributary groundwater and send it out of state. Whether this is economically and technologically feasible depends on the particular basin involved. This theoretical possibility may create uncertainty regarding federal compacts as applied to tributary groundwater.

From the above discussion, it should be clear that New Mexico desperately needs to support its congressionally approved compacts. It must promote its compact-based water plan with vigor. Justice and fairness certainly appear to be on New Mexico's side in this issue. But New Mexico must also acknowledge the existence of an interstate market for water, carefully study the impact of that market on its compacts, and do everything possible to ensure the integrity of those compacts as applied to both surface water and tributary groundwater.

C. Limitations Imposed by the Property Clause

The federal property clause provides as follows: "The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States."[39]

Prior to the turn of the century, the federal government did not assert any proprietary interest in water resources. The general rule was that states held the waters within their boundaries in trust for the people of a state (see discussion of the public trust doctrine in Chapter 3). In the humid, riparian east there was no scarcity so there was no need to protect federal uses from uses allowed by state law.

With the growth of the western prior appropriation systems, it became evident that there was a need for a means of asserting federal proprietary interests in water. In Winters v. United

States,[40] the Supreme Court was asked to address the issue of the existence of federal proprietary rights in water. The rule announced in Winters is as follows: When the federal government reserves or withdraws lands from the public domain, it also reserves or appropriates that unappropriated water necessary to fulfill the purposes of the reservation or withdrawal of land. In most instances the priority date is when the reservation or withdrawal is made by the federal government.[41] A relatively recent case has narrowed the standard: where lands are withdrawn for a variety of purposes, the federal reserve right is for the quantity necessary to meet the primary purpose of the reservation.[42]

Federal proprietary rights do not affect the ability of the state to appropriate water. State appropriation might raise some novel issues, though, if it were used to deny an appropriation by the federal government. In United States v. California,[43] the Supreme Court held that federal actors are subject to state regulation to some extent; they must obtain permits pursuant to state law. If the state appropriated all the presently unappropriated water, there would be none to meet the reserve right, especially those that may expand over time. The federal government, then, would have to condemn state-held rights or enter the water market, either leasing or purchasing water from the state or private parties. This argues for considering potential federal rights in any planning process.

Perhaps the greatest property clause issue is the potential extent of congressional power. As pointed out in other studies,[44] a simple amendment to the Desert Lands Act could effectively federalize all unappropriated groundwater underlying federal land, thereby precluding any state appropriation system as far as these waters are concerned.

D. The Commerce Clause

The commerce clause provides: "Congress shall have the power ... [t]o regulate commerce ... among the several states...."[45]

Congress' plenary power to regulate commerce under this provision is the greatest limitation on state activity in the interstate market. Even where Congress has not acted, the clause prohibits state regulation that discriminates against or unduly burdens the free flow of commerce among the states. Unlawful discrimination arises in two ways: (1) if a statute expressly prefers intrastate commerce over interstate commerce; and (2) if the statute is neutral but the motive behind the statute is to discriminate against the interstate market or the statute has a discriminatory effect when applied in a particular instance. Due to the state's heightened regulatory interest over water resources, however, a state may prefer primarily non-economic uses in the state over interstate uses (See Chapter 3 for a full discussion of this issue).

When Congress acts to regulate commerce it is usually done in conjunction with other federal duties such as its duty to protect the national public welfare, to meet federal treaty obligations, to approve compacts or to enforce individual rights recognized in the Constitution. In these instances, Congress acts because the majority manifests a national preference in favor of some value over those related to the unbridled market's purely economic preferences. Congress can take action that impedes the market, or it can direct the states to take otherwise discriminatory actions.[46] If a state is acting pursuant to federal law, it can burden commerce. The issue is congressional intent: Did Congress intend to allow the state to impede commerce in the manner being challenged? As pointed out in our discussion of compacts, courts are reluctant to find congressional direction of burdensome state action in vague or unspecific federal legislation.

State market participation activity is subject to congressional regulation under the commerce power. If Congress has not acted, however, the Commerce Clause does not apply unless the state is said to be regulating commerce.[47] Thus, the state can acquire water rights and sell them without running afoul of this constitutional provision; however, a federal law could preempt the state if Congress chose to enact one.

Congress has, in the past, enacted legislation to counteract the ill effects of unrestrained market participation by private enterprise. The anti-trust laws prohibit monopolistic trade practices. In _Parker v. Brown_[48] the Supreme Court held that federal anti-trust acts do not apply to state regulatory programs. Thus, California could adopt a marketing program that prevented raisin producers from freely marketing their crop without violating federal anti-trust laws. In a subsequent decision, the Court concluded that "the Parker doctrine exempts only anti-competitive conduct _engaged in as an act of government by the State as_ sovereign ... pursuant to state policy to displace competition with regulation or monopoly public service.[49]

It is unlikely that the state would ever be subject to anti-trust actions as a market participant even though technically it was made subject to the anti-trust laws. State market participation is not aimed at acquiring a large market share to drive the price of water up artificially so as to make inordinate profits for the state. Furthermore, given the number of presently existing private rights, it is unlikely that the state could monopolize the water market. In any event, an attempt by the state to monopolize water rights and make excessive profits by making the price artificially high and discriminating against commerce would violate principles of anti-trust law or the dormant commerce clause or both.

CONCLUSION

Many would say that New Mexico's present water supply is, in part, due to the expenditure of state resources to regulate water a resource already owned by the state. This was certainly the view prior to Sporhase. Unlike other states that shied away from regulating groundwater uses, allowing the development of economic uses without a care as to a future water supply, New Mexico chose to conserve its water supply and, in doing so, sought to insure a supply for future economies. Why, then, should it have to do more? The answer is clear--the Supreme Court has held this regulatory action alone does not make the state the owner of its water resources. While a state's regulatory powers over water resources are heightened by virtue of the public trust doctrine, a state cannot rely on this authority alone to ensure water supplies for continued present and expanded future uses. Any regulatory action is subject to the constraints of the commerce clause and the interstate water market. A controversy concerning denial of an out-of-state application will boil down to the value-laden perceptions of judges trying to decide whether under the commerce clause the action protects primarily non-economic uses or is economic protectionism. This ad hoc case-by-case approach is hardly a good method for shaping a state's water future. It is costly, both emotionally and economically.

State participation in the water market is a positive alternative to this process; however, it cannot be a disguise for otherwise impermissible regulation of private transactions. The state may not give up to the private sector freely transferable water rights and later limit the transfer of those rights at the state line. No matter what constitutional provision serves as a basis for a challenge, preferential economic protectionism through regulation of private transactions is not valid under current constitutional doctrine.

The state market participant doctrine is not a method for "getting around" the commerce clause. It recognizes the existence of the interstate market and simply anticipates operation within it. By participating in the interstate market, the state is able to determine the terms of any transaction as would a private buyer or seller. Through this mechanism, the state could capture the equity interest in water resources that it has carefully created through water regulation and investment of its taxpayers' capital.[50] It could decide when to sell or lease water for uses in a manner that maximizes the benefits to the state.

CHAPTER 5 ENDNOTES

1. "The federal and state governments are in fact but different agents and trustees of the people, constituted with different power, and designed for different purposes; most of a state's rights must ultimately be derived from the rights of its citizens." The Federalist No. 46 (J. Madison).

2. South-Central Timber v. Wunnicke, 104 S. Ct. 2237 (1984). Essentially a state may not use its sovereign authority to control downstream or secondary markets, which would be similar to an illegal restraint on trade and thus viewed as a regulatory subterfuge. The line between valid market participation and regulatory subterfuge is not easy to see. Some commentators have argued that distinctions between state proprietary actions and regulatory actions are artificial and serve no purpose. See Varat, State Citizenship and Interstate Equality, 48 U. Chi. L. Rev. 487 (1981). For a different approach, see Easterbrook, Anti-trust and the Economics of Federalism, 26 J. Law & Econ. 23 (1983). In the past, courts have used the proprietary/regulatory distinction in other contexts, particularly inter-governmental tax immunity. For a brief discussion of why the distinction is no longer used in tax immunity cases, see Garcia v. San Antonio Metropolitan Transit Auth., 105 S. Ct. 1005 (1985).

3. For an example, see N.M. Stat. Ann. § 72-12A-2 (Repl. Pamp. 1983), which sets out the legislative purposes of the Mine Dewatering Act.

4. Hughes v. Oklahoma, 441 U.S. 322, 336 (1979).

5. 104 S. Ct. 2237 (1984).

6. 726 F.2d 1340 (9th Cir. 1984), aff'd without opinion by an equally divided court, 53 U.S.L.W. 4431 (U.S. Mar. 26, 1985). Compare Merrion v. Jicarilla Apache Tribe, 455 U.S. 130 (1982), in which an oil company alleged that a tribal tax was not a regulatory act, but merely on invalid increase in royalties to be paid to the tribe in a proprietary capacity. The Supreme Court found that the power to tax was a valid tribal governmental activity, distinct from proprietary activities.

7. In Complete Auto Transit v. Brady, 430 U.S. 274 (1977), the Supreme Court adopted a four-part test to determine the validity of state taxes on goods in interstate commerce. The state must show nexus with the taxing state, proper apportionment between states, non-discriminatory application, and that the tax is fairly related to services provided by the

taxing state. The California fee schedule did not meet this last requirement and, therefore, constituted impermissible taxation.

8. Note, New Mexico Continues to Study Water Embargo Measures: A Reply to the State Water Law Study Committee, 16 Texas Tech L. Rev. 939, 948 (1985).

9. A taking would be otherwise unconstitutional if not taken for a public use. The public use requirement has been interpreted in a liberal manner, to be coterminous with the scope of the state's police power. Hawaii Housing Auth. v. Midkiff, 104 S. Ct. 2321 (1984). In Midkiff, the Supreme Court upheld Hawaii's Land Reform Act, which created a condemnation scheme whereby title to real property is taken from lessors and transferred to their lessees. Lessors challenged the act, asserting that the condemnation was not for a public use since the property is redistributed to private persons, not the public. The Court disagreed, finding that it is only the taking's purpose, not its mechanics, that is subject to judicial scrutiny; regulating oligopoly and associated evils is a legitimate public purpose.

10. See generally Chapter 7.

11. N.M. Stat. Ann. § 72-1-5 (Repl. Pamp. 1985).

12. The Slaughterhouse Cases, 83 U.S. 36 (1873). No definitive enumeration of rights protected by the clause was given by the Court in this case, but it was suggested that it protected those "which owe their existence to the Federal Government, its national characters, its Constitution, or its laws." Id. at 79. As examples, the Court referred to the right of access to the seat of government and to the seaports, subtreasuries, land officers, and courts of justice in the several states and rights secured by treaty.

13. Crandell v. Nevada, 73 U.S. (6 Wall.) 35 (1868); Edwards v. California, 314 U.S. 160 (1941); see L. Tribe, American Constitutional Law § 6-32 (1978) ("[This clause] builds a bridge between federalism and personal rights....").

14. Hicklen v. Orbeck, 437 U.S. 518 (1978); Baldwin v. Montana Fish & Game Comm'n, 436 U.S. 371 (1978).

15. Toomer v. Witsell, 334 U.S. 385, 395 (1948) (emphasis added).

16. Baldwin v. Montana Fish & Game Comm'n, 436 U.S. 371, 383 (1978).

17. Toomer v. Witsell, 334 U.S. 385, 396 (1948).

18. Id. at 398. Due to the close connection between this clause and the commerce clause, it was not clear until recently that this clause could limit a state if it were merely participating in a market. In White v. Massachusetts, 103 S. Ct. 1042 (1983), an executive order issued by the Mayor of Boston requiring that city-funded construction projects be performed by a work force, half of which had to be Boston residents, was challenged as an undue burden on commerce. The Court found that city spending on construction projects was merely state participation in a labor market and therefore the residency requirement was not violative of the commerce clause. The Court did not address whether state market participation was subject to limitations imposed by the privileges and immunities clause. It did suggest, however, that where market participation was used by the state to affect parties unrelated to the market transaction, residency requirements would be invalid. Hicklen v. Orbeck, 437 U.S. 518 (1978), the classic privileges and immunities clause case, was cited to support this proposition.

> In Hicklen we considered an Alaska statute which required employment in all work connected with oil and gas leases to which the State was a party to be offered first to 'qualified' Alaska residents in preference to nonresidents. The State sought to justify the 'Alaska Hire' law on the ground that the underlying oil and gas were owned by the State itself. Analyzing the case under the Privileges and Immunities Clause of Art. IV, §2, cl. 1, we held that mere ownership of a natural resource did not in all circumstances render a state regulation such as the 'Alaska Hire' law immune form attack under that clause. We summarized our view of the Alaska statute in these words:
>
> > In sum, the Act is an attempt to force virtually all businesses that benefit in some way from the economic ripple effect of Alaska's decision to develop its oil and gas resources to bias their employment practices in favor of the State's residents.

White, 103 S. Ct. at 1046. Boston's executive order, by comparison, only covered "a discrete identifiable class of economic activity in which the city is a major participant." Id. at 1046, n.7.

19. 104 S. Ct. 1020 (1984).

20. Pursuant to a state-wide affirmative action program, the Camden City Council adopted an ordinance setting minority hiring goals on all public works contracts. The ordinance also created a hiring preference for Camden residents by establishing a goal that a least 40 percent of the employees

of contractors and subcontractors be Camden residents. The ordinance defined "resident" as "any person who resides in the city of Camden." Developers, contractors and subcontractors were to make "every good faith effort" to comply with the goal.

21. 104 S. Ct. at 1028-29.

22. Id. at 1030.

23. This approach is consonant with the historic relationship between the unexercised federal commerce power and the privileges and immunities clause. One of the earliest fundamental rights associated with the privileges and immunities clause is the right "to take, hold and dispose of property." While states have authority under the police power to define the incidents of property ownership, if the state allows individuals to hold transferable property interests it cannot prohibit interstate transfers merely because the purchaser is a resident of another state. Euclid v. Ambler Realty Co., 272 U.S. 365 (1926). As noted by Professor Trelease, "The possibility that the regulation may be economically inefficient ordinarily gives rise to no substantial constitutional objection. The Constitution did not enact Adam Smith's "Wealth of Nations." State Water and State Lines: Commerce in Water Resources, 56 U. Colo. L. Rev. 347 (1985) (citing to Hellerstein, Hughes v. Oklahoma: The Court, the Commerce Clause and State Control of Natural Resources), 1979 Sup. Ct. Rev. 51, 73). Joseph Sax points out that "[t]o characterize [the state's] behavior as inappropriate or illegitimate, or to hold it to some specified test of efficiency is simply to deny the possibility of a distinctive collective preference." The Legitimacy of Collective Values: The Case of the Public Lands," 56 U. Colo. Law Rev. 537 (1985).

24. McGinnis v. Royster, 410 U.S. 263 (1973); see Dandridge v. Williams, 397 U.S. 471 (1970).

25. 470 U.S., 105 S. Ct. 1676, (1985).

26. 105 S. Ct. 2545 (1985). In both cases the states argued that federal legislation authorized the facially discriminatory treatment of interstate commerce. In Bancorp the Court upheld the validity of Massachusetts and Connecticut statutes allowing acquisition of banks in those states only by holding companies in the New England area. The Court found the statutes met the traditional rational basis for judging equal protection claims. In a concurring opinion, Justice O'Connor found no meaningful distinction between the statutes in Northeast Bankcorp and the statute at issue in Metropolitan Life, and describes the Northeast Bankcorp decision as more in line with traditional equal protection analysis.

27. Another view of Metropolitan Life would be that a statute that discriminates against interstate commerce creates a new "suspect" classification requiring that a "compelling" state interest be endangered for the law to be valid. Admittedly, this is an unusual equal protection case. Alabama's statute could not be challenged under the commerce clause because Congress had specifically authorized this type of statutory regulation. There was no violation of the privileges and immunities clause because the clause protects "citizens" or individuals, not businesses. Thus, the equal protection clause was the only basis available for asserting that the statute was unconstitutional. Perhaps this is the most crucial aspect of the decision: the Court's willingness to use equal protection to reach out and strike down what it perceives to be irrational and discriminatory legislation that works its way through the cracks in constitutional theory.

28. Given that the U.S. Supreme Court is the least democratic institution, its interpretation of the amendment says as much about the Court's view of its constitutional role as it does about federal-state relations.

29. 426 U.S. 833 (1976). The Court retreated from this broad view of the amendment almost immediately.

30. 105 S. Ct. 1005 (1985).

31. Id. at 4141. The structural argument is given force by the constitutional provisions concerning state equality or equal representation in the Senate. U.S. Const. art. 1, § 3; U.S. Const. art. V. If the Senate adopts a measure, then the states have consented to it. Absent some clear failure of the constitutional scheme, the Amendment doe not preclude federal action that the states find later to be merely onerous. Two standard types of legislative action bolstered the argument of the Garcia majority: (1) federal statutes that have special provisions when the law acts upon the state, or express exemptions applicable to the states, and (2) statutes that direct federal revenues to the states for services.

32. Federal legislation in the area of natural resources, though not in the form of a compact, often directly reflects state input. The Clean Water Act is an excellent example of this. The Act expressly recognizes that state authority for water quality is desirable as long as minimum federal standards are met. 33 U.S.C. § 1251 states:

> (b) Congressional recognition, preservation, and protection of primary responsibilities and rights of States
>
> It is the policy of the Congress to recognize, preserve, and protect the primary

responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this chapter. It is the policy of Congress that the States manage the construction grant program under this chapter and implement the permit programs under sections 1342 and 1344 of this title. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution....

(g) Authority of State over water

It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is the further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.

Federal protection of state authority over water resources is explicitly stated in other sections as well.

§ 1253. Interstate cooperation and uniform laws

(a) The Administrator shall encourage cooperative activities by the States for the prevention, reduction, and elimination of pollution, encourage the enactment of improved and, so far as practicable, uniform State laws relating to the prevention, reduction and elimination of pollution; and encourage compacts between States for the prevention and control of pollution.

(b) The consent of the Congress is hereby given to two or more States to negotiate and enter into agreements or compacts, not in conflict with any law or treaty of the United States, for (1) cooperative effort and mutual assistance for the prevention and control of pollution and the enforcement of their respective laws relating

> thereto, and (2) the establishment of such agencies, joint or otherwise, as they may deem desirable for making effective such agreements and compacts. No such agreement or compact shall be binding or obligatory upon any State a party thereto unless and until it has been approved by the Congress.

Other sections of the Art provide for federal grants to the individual states to promulgate and enforce water quality programs.

33. R. Simms, Paper presented at Rocky Mountain Legal Foundation Seminar, June, 1985, at p. 30.

34. 104 S. Ct. 2237 at 2242.

35. Id. at 2243. This specificity requirement has been consistently followed by the Supreme Court. For example, the twenty-first amendment to the Constitution prohibits "the transportation or importation into any State, Territory or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof." On its face, the amendment appears to give expressly to the states the exclusive power to control the importation of liquor into the state irrespective of considerations of interstate commerce. Yet the Supreme Court held that it granted no such power. In United States v. Taylor, the First Circuit Court of Appeals refused to find a federal waiver of the commerce clause when interpreting a federal statute similar to the twenty-first amendment but relating to state fish and game laws. The court stated that to waive the commerce clause it must find an "unmistakably clear design to validate state laws." 752 F.2d 757, cert. granted 54 U.S.L.W. 3293 (U.S. 1985).

36. Young & Norton v. Hinderlider, 15 N.M. 666, 110 P.2d 1045 (1910).

37. Sporhase and South-Central Timber, however, may undercut this view. First, in Sporhase, the Court found that state ownership of water is a legal fiction and, therefore, if the state has relinquished its compacted right to control the use of water to private citizens then the commerce power may dictate that the water be allowed to move in interstate commerce. In Alaska, no one could seriously doubt that timber on state lands belongs to the state. Unlike the purely private water rights in Sporhase, where the state was not the owner of the resource, in Alaska the state can initially distribute its timber resources to whomever it chooses. On the other hand, once severed from the state lands and put in private hands, the commerce clause controlled distribution of the timber, not Alaska's previous ownership.

38. He draws a distinction between unappropriated compacted water, such as exists on the Powder River in Wyoming and which the state may keep for the future, and water appropriated into private ownership, which must be allowed to move in interstate commerce:

> In 1945, when Nebraska sued Wyoming for allowing its citizens to violate Nebraskans' priorities, the Supreme Court refused to appoint a federal water master to enforce priorities across the state line. Instead, the Court decreed a percentage division of the water: 25% to Wyoming and 75% to Nebraska. When this was subdivided according to intrastate priorities, interstate priorities were sufficiently protected. The North Platte percentages, however, do not have the same effect as the Powder River division. Suppose that a Nebraska power plant purchases the water right of a Wyoming rancher and closes the Wyoming headgate, so that 76% of the river flows down to Nebraska and only 24% is used within Wyoming. Wyoming could not enact an embargo statute to prevent the sale and keep the benefits within it: this is exactly what Sporhase outlaws. A Wyoming water right is a transferable right; if it is transferable within Wyoming it can be transferred outside of the state.

See Trelease, State Waters and State Lines: Commerce in Water Resources, 56 U. Colo. L. Rev. 347, 350-51 (1985).

39. U.S. Const. art. IV, cl. 3.

40. 207 U.S. 564, (1908).

41. Arizona v. California, 373 U.S. 546, (1963).

42. United States v. New Mexico, 438 U.S. 696, (1978).

43. 438 U.S. 645, (1978).

44. 43 U.S.C.A. § 321. "The Impact of Recent Court Decisions Concerning Water and Interstate Commerce on Water Resources of The State of New Mexico," A Report to Governor Toney Anaya and the Legislative Council pursuant to laws, 1983, Chapter 98, prepared by the Water Law Study Committee.

45. U.S. Const. art. I, § 8, cl. 3.

46. See discussion of Yellowstone Compact at pp. 135-36.

47. Reeves v. Stake, 447 U.S. 429 (1980); Hughes v. Alexandria Scrap, 426 U.S. 794 (1976).

48. 317 U.S. 341 (1943).

49. City of Lafayette v. Louisiana Power & Light Co., 435 U.S. 389 at 413. In Town of Hallie v. City of Eau Claire, 105 S. Ct. 1713 (1985), the Supreme Court found that municipality's anti-competitive activities involving the collection and transportation of sewage were also protected by the state action exemption to the federal anti-trust laws established by Parker. These activities must be authorized, but need not be compelled, by the state. Since municipalities are not sovereign, the anti-competitive activities must be pursuant to a clearly expressed state policy. The court did not impose an active state supervision requirement because the actor was a municipality rather than a private entity.

It is unlikely, however, that the exemption would extend to State activities as a market participant. In South-Central Timber v. Wunnicke, the dissent states that the anti-trust laws apply to a State only when it is acting as a market participant. A State is immune from antitrust scrutiny only when it acts as a market regulator.

50. See Trelease, State Water and State Lines: Commerce in Water Resources, 56 U. Colo. L. Rev. 347 (1985). Trelease argues persuasively that where water is distributed for out-of-state uses a state should still be able to capture the secondary benefits it would have received if water had been used in the state. The state should be able to bargain to prevent collateral harms. "The in-state user pays his toll in property taxes and the production of wealth, and the exporting appropriator pays an approximate equivalent in cash or works for local development." Id. at 372.

CHAPTER 6

QUANTIFYING DEMANDS FOR UNAPPROPRIATED GROUNDWATER IN NEW MEXICO

I. INTRODUCTION

In this chapter, current uses of groundwater in New Mexico, as well as potential New Mexico future demands, will be estimated. This will be done by developing estimates for current and future water demand in each New Mexico county and then converting these estimates into projections of groundwater demand in groundwater basins in New Mexico. These long-range projections will, for obvious reasons, be conjectural in nature and constitute no more than an "outline" of different water futures that New Mexico might face.

The reason for including "rough" estimates for long-range water futures is clear: state appropriation of unappropriated groundwater is an extraordinary measure. It should only be undertaken to ensure that there will be sufficient water to meet the state's future water needs. Whether future needs will be met depends on existing and future supply and demand conditions. Therefore, formulation of future water demand scenarios is essential. In Chapter 7, these demand estimates will be brought together with existing supply figures to project possible times of future groundwater scarcity in New Mexico.

This chapter is organized as follows. In Section II estimates of current water use will be given for each county in New

Mexico, with twelve categories of consumptive use being considered. Three different methods are then used to calculate future demands from these current estimates. These future county demand calculations are set out in Section III. In Section IV, estimates of future water demands by county are converted into future water demands in groundwater basins.

II. ESTIMATED CURRENT WATER USE IN NEW MEXICO COUNTIES

Current (1980) water use figures for each New Mexico county were obtained from a 1982 report by the State Engineer's office.[1] Water use estimates in the report were compiled under a cooperative agreement between the Water Resources Division, New Mexico District, U.S. Geological Survey, and the New Mexico State Engineer. The report presents withdrawals and depletions of both surface water and groundwater. The term "withdrawal" refers to the amount of water taken from its source for use by industry, agriculture or other purposes. "Depletion" is a term meaning water withdrawn that is no longer available for use because it has been either evaporated, transpired, incorporated into products or crops, consumed by man or livestock, or otherwise removed. The water demand figures developed in this study will refer to depletions; that is, water no longer available for use.

Twelve separate categories of water use are presented in the State Engineer's report. These are:

Urban	Minerals
Rural	Military
Irrigated Agriculture	Power
Livestock	Fish & Wildlife
Commercial	Recreation
Industrial	Evaporation (Reservoir and Stockpond)

Sources of data for the State Engineer report were numerous. Whenever possible, measured withdrawals were used. These data were obtained from cities and towns, many of which are served by water utilities, from facilities and installations such as power plants, industrial and commercial enterprises, and mines and smelters; from diversion records of water supplied into the canal systems of most of the irrigation districts in New Mexico; and from the records of water pumped from groundwater sources and used for irrigation in the San Simon Valley and in the Roswell Basin. In addition, records of surface water diversions in 1980 were available for all of the irrigation projects constructed by the U.S. Bureau of Reclamation; namely, Arch Hurley Conservancy District, Carlsbad Irrigation District, Elephant Butte Irrigation District, Fort Sumner Irrigation District, Hammond Irrigation District, Middle Rio Grande Conservancy District, Navajo Indian Irrigation Project, Pojoaque Valley Irrigation District, and the Vermejo Conservancy District.

Where measured data were not available, withdrawals were estimated. Gallon-per-capita/per-day rates were used to estimate livestock drinking requirements, recreational use at parks, national monuments and campgrounds and the withdrawals for rural populations where measured records were not available. Finally, evaporation from major reservoirs was computed for 1980 conditions. Evaporation from smaller reservoirs and natural lakes was estimated by multiplying average lake surface areas by average annual net evaporation rates.

Measured withdrawals were available for eight of the twelve water use categories. These categories and the percentages of total withdrawals measured are given in Table 6-1. In total, 50 percent of the reported withdrawals were actually measured. Only 43 percent of the total withdrawal shown for irrigation occurred through 1980 measured diversions, but the remaining withdrawals were estimated by using the Blaney-Criddle method, a technique that has been demonstrated to be quite accurate in obtaining consumptive irrigation requirements.[2]

After determining how much water was taken out of the system—withdrawn—the report had to determine how much was "consumptively used"; i.e., depleted. The distinction is important, because some water uses may divert a great deal of water, but actually "consume" only a small amount. Therefore, the actual depletion of the stream from such a use may be slight. Except for irrigation, a number of flow studies have established the percentage of water that is depleted for various water withdrawal categories—these percentages were used to estimate the 1980 depletions. Irrigation depletions were derived by computing the consumptive irrigation requirements for the 1980 cropping patterns, again employing the Blaney-Criddle method.

III. PROJECTIONS OF FUTURE WATER DEMANDS

Based on the State Engineer's estimates of water demands in

TABLE 6-1

Percentages of 1980 Withdrawals that Were Measured Rather than Estimated

Category	Percent
Irrigation	43
Urban & Rural	90
Commercial & Industrial	68
Minerals	92
Military	100
Power	100

Source: Sorenson, 1982, p. 8.

1980 discussed above, three sets of projections for future demand are developed. The projections differ primarily in their handling of water demands for irrigated agriculture and in their assumptions regarding conservation in the municipal sector. Because over 80 percent of New Mexico's groundwater depletions in 1980 (1,249,430 acre-feet) were used for irrigation,[3] assumptions made regarding water use in irrigated agriculture will have substantial effects on estimated future demands. The specific assumptions made for each demand projection are detailed in each of the following subsections. To simplify the presentation of future water demands somewhat, the twelve water use categories are modified as follows: Irrigated Agriculture and Livestock are combined to form an Agricultural Use category; Commercial, Industrial and Minerals are grouped as Industrial Use; Urban and Rural household uses are labeled Municipal; and the remaining categories are simply called "Other."

The methodologies described below do not apply to estimates for future water demands used in this study for seven counties: Catron, Curry, Harding, Lea, Quay, Roosevelt and Union counties. Annual depletions in Catron County are held at 1980 levels due to a federal mandate that does not allow new depletions pending the resolution of ongoing litigation concerning water use on the Gila River. The remaining six counties overlie the Ogallala aquifer, an expansive but relatively shallow, closed aquifer that has been the subject of extensive studies by New Mexico's Water Resources Research Institute (WRRI) since 1983. Thus, for these six counties, we take advantage of the future water demand estimates derived in the WRRI study and formulate water use projections based on those developed in the WRRI study. Demand growth rates in the WRRI study are used for other projections as well.

A. Scenario A

In the State Engineer's Report,[4] there was no significant change recorded in groundwater depletions for irrigation between 1975 and 1980. Therefore, in Scenario A, this situation is assumed to continue; that is, irrigation depletions are held to their 1980 levels for all projected future years. For the other water use categories, the following assumptions are made concerning growth rates. Municipal uses (urban and rural) are assumed to grow at the rate of population growth, with water consumption being held at the 1980 level (234 gallons per capita per day).[5] Population growth rates for each county were obtained from a 1985 Bureau of Business and Economic Research (BBER) report.[6] Using the projected population growth rates for each county and per capita consumption, we simply calculated the growth in municipal water use (depletions) over time up to the year 2005. Per capita water consumption is assumed constant in this scenario with no allowance made for increased conservation efforts of any kind. Table 6-2 presents the assumed population growth for each New Mexico county. It should be noted that the BBER report only projected population figures to the year 2005. Scenario A of this study takes the implied growth rates for the decade 1995-2005 and extends them to the year 2130. Several other water use categories are also assumed to grow at the same rate as population. These are power, recreation, fish and wildlife, and commercial.

Table 6-2

Annual Population Growth by County (Scenario A)
(percent)

COUNTY	ANNUAL GROWTH RATE
Bernalillo	1.185
Catron	0.0
Chaves	1.269
Cibola	1.6584
Colfax	1.2691
Curry	1.0555
De Baca	0.0
Dona Ana	1.6029
Eddy	1.5501
Grant	1.2775
Guadalupe	0.4505
Harding	0.0
Hidalgo	1.6326
Lea	2.7907
Lincoln	1.5646
Los Alamos	1.1114
Luna	0.8714
McKinley	1.6656
Mora	0.0
Otero	1.6464
Quay	0.3515
Rio Arriba	1.3830
Roosevelt	0.4132
Sandoval	2.2182
San Juan	1.9938
San Miguel	0.7423
Santa Fe	1.1854
Sierra	0.2033
Socorro	1.1204
Taos	1.7149
Torrance	1.4266
Union	1.5923
Valencia	1.4366

Source: Wombold, Lynn B., "Projections of the Population of New Mexico by County, 1980-2005", Bureau of Business and Economic Research, University of New Mexico, June, 1985.

Military uses, evaporation, and livestock demands are held constant in this first series of projections.

Finally, industrial and mining depletion projections are based on growth estimates developed by Data Resources, Inc. In the DRI report, employment, investment, and output were forecasted nationally for a variety of economic activities.[7] The possible development of water-saving production techniques in response to higher water prices is not considered under the broadbrush approach used in Scenario A. Table 6-3 presents the assumed mining and manufacturing growth figures used for each county.

It should be noted that due to the assumptions made concerning irrigated agricultural use and the absence of increased conservation efforts in municipal and industrial uses, Scenario A will almost certainly dramatically overstate future demands on New Mexico's groundwater resources. Nevertheless, it provides an interesting look at what could happen if no additional efforts whatsoever were made to recognize the limited nature of the resource. In Table 6-4 the future water demands for each county are reported using Scenario A assumptions. As noted above, the exception to this methodology occurred in the counties overlying the Ogallala Aquifer. Projections for these counties were derived by determining 1995-2000 growth rates from the High Plains-Ogallala Study and extending them to the year 2130. Agricultural depletions in these counties were not held constant but were allowed to run out in the year specified in the the High Plains-Ogallala Report (see Table 6-7). The effects of increases in population and economic activity were picked up by trending depletions against time for the years 1977 through 2020.

B. Scenarios B and C

As noted above, the projections developed under Scenario A undoubtedly overstate future water demands; as water becomes increasingly scarce, its price will rise, thereby providing incentives for more efficient water use (conservation). Therefore, the second and third scenarios involve modifications of Scenario A's estimates to reflect "moderate" conservation efforts by municipal and industrial sectors and a reduction in the agricultural sector's water use. The assumed reductions in agricultural use may result from improved technology, conservation or simply the retirement of some irrigation land as rising real water prices force some marginal lands out of production.

In Scenario B, a ten percent reduction in municipal and industrial uses is assumed for each 50-year period; for Scenario C, conservation is assumed to reduce water demand in these sectors by 25 percent over each 50-year period. These assumptions are consistent with those suggested in the High Plains-Ogallala Study,[8] which examines the conservation issue and provides an interesting overview of the impact that conservation programs have had on municipal water use in New Mexico and in other parts of the country. The Ogallala report concludes that New Mexicans could probably voluntarily reduce their municipal water use by at least 10 percent, and a minimum 25 percent reduction in water use could be realized if mandatory restrictions were imposed.

The same assumptions are used for agricultural uses in all but the eastern part of the state. Scenario B assumes that irrigation water use will be reduced by 10 percent over each 50-year period. Scenario C assumes that irrigation water use will be reduced by 25 percent over each 50-year period. With agricultural use accounting for over 80 percent of total groundwater depletions in the state, assumptions made regarding this sector obviously have a tremendous impact on the overall projections.

The water conservation assumptions of 10 percent (Scenario B) and 25 percent (Scenario C) represent fairly realistic decreases in agricultural water use in the foreseeable future. Several factors could contribute to such reductions. First, New Mexico ranks among the top twelve states in her reserves of every major energy resource. National and even international pressures to develop these energy resources might place strong demands on New Mexico's water supplies; such development might (or might not) be seen as desirable, both politically and economically, to the state. Should such developments take place, water prices would rise as efforts are made to shift water from agricultural uses to these other users who could likely pay more for the water. New energy technologies (such as coal liquification and gasification) will also tend to require even larger amounts of water than the traditional technologies they will be replacing (oil and natural gas production and refining).

Finally, combined with the harsh economic realities facing many farmers—record borrowing, huge debts, and falling land values—it is possible that a large portion of New Mexico's farm acreage could be priced out of irrigated agriculture over the next several decades.

For those counties in the eastern part of New Mexico (counties with an asterisk in Tables 6-4 - 6-6), declines in agricultural depletions are calculated using information provided by the High Plains-Ogallala Study.[9]

In calculating water demand in Scenario B, the Ogallala study projections for agricultural water depletions are based on a "voluntary strategy" of water conservation for eastern New Mexico. This assumes that neither the state nor the federal government will initiate new policies or programs to reduce demands on the Ogallala aquifer or other resources. Neither will they augment the water supply during the study period. Only those changes in resource management already underway are considered to influence long-term baseline projections. In other words, current trends in both public and private sector resource demand and supply management will continue throughout the study period.

For Scenario C, the Ogallala Study's "mandatory" strategy is used. This strategy assumes that incentives are provided for technological change and assumes that federal or state mandates exist for water-saving technological change. The Ogallala Study forecasts a series of years when irrigation will actually cease in the counties overlying the Ogallala Aquifer under differing assumptions regarding conservation efforts. Table 6-7 presents the estimates for years when the Ogallala counties will be forced out of irrigated agriculture entirely. By using this and all of the other relevant information, Tables 6-5 and 6-6 report the

TABLE 6-3

Mining and Manufacturing Annual Growth Rates

Manufacturing	3.1%
Mining	0.3%

Source: DRI Long-Term Forecast, Spring, 1985; these rates are applied to every New Mexico county.

TABLE 6-4

Scenario A: Water Depletions by County
(acre-feet)

County	Use	1980	2030	2080	2130
Bernalillo:	AG	2,812	2,812	2,812	2,812
	IND	1,113	2,170	5,421	17.598
	MUN	54,441	99,916	180,072	324,528
	Other	6,493	9,129	13,879	22,442
Catron[1]:	AG	519	519	519	519
	IND	15	15	15	15
	MUN	73	73	73	73
	OTHER	0	0	0	0
Chaves:	AG	188,662	188,662	188,662	188,662
	IND	239	318	447	663
	MUN	6,818	12,808	24,061	45,200
	OTHER	331	621	1,168	2,194
Colfax:	AG	375	375	375	375
	IND	2	2	3	3
	MUN	95	898	2,407	5,241
	OTHER	71	133	251	471
Curry:*	AG	201,493	0	0	0
	IND	180	3,616	7,052	10,488
	MUN	4,747	10,560	16,373	22,168
	OTHER	1,233	1,464	1,695	1,962
De Baca:	AG	8,619	8,619	8,619	8,619
	IND	7	7	8	8
	MUN	168	168	168	168
	OTHER	0	0	0	0
Dona Ana:	AG	38,972	38,972	38,972	38,972
	IND	231	524	1,428	4,645
	MUN	9,528	21,102	46,732	103.495
	OTHER	4,979	9,558	19,700	42,160

TABLE 6-4 (Cont'd)

Scenario A: Water Depletions by County
(acre-feet)

		1980	2030	2080	230
Eddy:					
	AG	92,518	92,518	92,518	92,518
	IND	8,062	9,365	10,878	12,635
	MUN	6,927	14,947	32,254	69,598
	OTHER	676	1,899	4,537	10,230
Grant:					
	AG	4,829	4,829	4,829	4,829
	IND	9,779	12,010	14,602	17,616
	MUN	1,951	3,681	6,943	13,098
	OTHER	520	981	1,851	3,491
Guadalupe:					
	AG	1,054	1,054	1,054	1,054
	IND	6	8	9	12
	MUN	357	447	560	701
	OTHER	108	135	169	212
Harding:*	See Union County[2]				
Hidalgo:					
	AG	38,591	38,591	38,591	38,591
	IND	5,178	6,015	6,986	8,115
	MUN	482	1,083	2,434	5,470
	OTHER	783	1,760	3,954	8,886
Lea:*					
	AG	160,765	163,632	166,499	169,367
	IND	4,891	12,417	19,943	27,469
	MUN	6,146	18,297	30,448	42,599
	OTHER	9,068	9,674	10,280	10,886
Lincoln:					
	AG	3,909	3,909	3,909	3,909
	IND	91	137	227	412
	MUN	792	1,960	4,500	10,020
	OTHER	331	719	1,563	3,398
Los Alamos:					
	AG	0	0	0	0
	IND	2	3	6	10
	MUN	2,153	3,741	6,502	11,299
	OTHER	149	259	450	782

TABLE 6-4 (Cont'd)

Scenario A: Water Depletions by County (acre-feet)

		1980	2030	2080	2130
Luna:					
	AG	73,924	73,924	73,924	73,924
	IND	322	386	467	573
	MUN	1,803	2,782	4,294	6,626
	OTHER	255	393	607	937
McKinley:					
	AG	265	265	265	265
	IND	8,754	10,168	11,811	13,720
	MUN	2,290	5,230	11,946	27,286
	OTHER	60	60	60	60
Mora:					
	AG	230	230	230	230
	IND	0	0	0	0
	MUN	193	193	193	193
	OTHER	0	0	0	0
Otero:					
	AG	24,525	24,525	24,525	24,525
	IND	24	28	32	38
	MUN	1,227	4,800	12,884	31,176
	OTHER	1,859	2,344	3,441	5,923
Quay:*					
	AG	8,939	0	0	0
	IND	0	0	0	0
	MUN	65	65	65	65
	OTHER	0	0	0	0
Rio Arriba:					
	AG	915	915	915	915
	IND	136	175	245	410
	MUN	773	1,701	3,545	7,211
	OTHER	146	290	577	1,146
Roosevelt:*[3]					
	AG	148,304	29,138	0	0
	IND	141	959	1,778	2,597
	MUN	2,205	15,402	28,598	41,795
	OTHER	0	0	0	0

TABLE 6-4 (Cont'd)

Scenario A: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
San Juan:					
	AG	246	246	246	246
	IND	3,104	3,606	4,188	4,865
	MUN	758	13,394	47,301	138,288
	OTHER	211	566	1,519	4,077
San Miguel:					
	AG	587	587	587	587
	IND	43	61	87	123
	MUN	212	840	1,747	3,062
	OTHER	152	220	318	461
Sandoval:					
	AG	636	636	636	636
	IND	258	740	2,177	6,476
	MUN	2,583	7,737	23,171	69,400
	OTHER	122	365	1,094	3,278
Santa Fe:					
	AG	16,124	16,124	16,124	16,124
	IND	60	98	214	589
	MUN	2,091	5,020	10,678	20,876
	OTHER	68	123	220	399
Sierra:					
	AG	7,817	7,817	7,817	7,817
	IND	4	5	5	6
	MUN	802	887	983	1,088
	OTHER	174	193	213	236
Socorro:					
	AG	17,373	17,373	17,373	17,373
	IND	88	108	138	180
	MUN	1,451	2,533	4,421	7,718
	OTHER	522	911	1,591	2,776
Taos:					
	AG	3,562	3,562	3,562	3,562
	IND	680	954	1,589	3,710
	MUN	884	2,068	4,841	11,327
	OTHER	119	278	652	1,525

TABLE 6-4 (Cont'd)

Scenario A: Water Depletions by County (acre-feet)

		1980	2030	2080	2130
Torrance:					
	AG	32,171	32,171	32,171	32,171
	IND	0	0	0	0
	MUN	348	707	1,435	2,913
	OTHER	0	0	0	0
Union:* (includes Harding County[2])					
	AG	87,548	134,111	180,647	227,237
	IND	84	467	849	1,231
	MUN	537	1,063	1,590	2,117
	OTHER	130	130	130	130
Valencia:					
	AG	7,010	7,010	7,010	7,010
	IND	5,611	6,577	7,782	9,408
	MUN	3,597	7,339	14,976	30,559
	OTHER	256	522	1,066	2,175

*"Eastern" New Mexico Counties overlying the Ogallala aquifer. Base (1980) estimates derived by extrapolations from the 1977 base year used in the High Plains study.

[1]Total depletions for Catron County cannot exceed the total that were federally mandated. All future year depletions must equal the total set for the year 1980 (607 acre feet).

[2]Projections for Harding County were aggregated with those for Union County as in the High Plains Study (WRRI, 1983).

[3]Includes projections for the Causey-Lingo area for all but irrigation water uses.

TABLE 6-5

Scenario B: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Bernalillo:					
	AG	2,812	2,531	2,278	2,050
	IND	1,113	1,953	4,879	15,838
	MUN	55,441	89,924	162,065	292,075
	Other	6,493	9,129	13,879	22,442
Catron:[1]					
	AG	519	467	420	378
	IND	15	34	123	176
	MUN	73	66	59	53
	OTHER	0	0	0	0
Chaves:					
	AG	188,662	169,796	152,816	137,534
	IND	239	286	402	597
	MUN	6,818	11,527	21,655	40,680
	OTHER	331	621	1,168	2,194
Colfax:					
	AG	375	338	304	273
	IND	2	2	3	3
	MUN	95	808	2,166	4,717
	OTHER	71	133	251	471
Curry:*					
	AG	198,939	0	0	0
	IND	180	3,616	7,052	10,488
	MUN	4,483	9,364	14,245	19,126
	OTHER	1,233	1,464	1,695	1,926
De Baca:					
	AG	8,619	7,757	6,981	6,283
	IND	7	6	7	7
	MUN	168	151	136	122
	OTHER	0	0	0	0
Dona Ana:					
	AG	38,972	35,075	31,567	28,411
	IND	231	472	1,285	4,180
	MUN	9,528	18,992	42,059	93,146
	OTHER	4,979	9,558	19,700	42,160

TABLE 6-5 (Cont'd)

Scenario B: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Eddy:					
	AG	92,518	83,266	74,940	67,446
	IND	8,062	8,428	9,790	11,372
	MUN	6,927	13,452	29,029	62,638
	OTHER	676	1,899	4,537	10,230
Grant:					
	AG	4,829	4,346	3,911	3,520
	IND	9,779	10,809	13,142	15,854
	MUN	1,951	3,313	6,249	11,788
	OTHER	520	981	1,851	3,491
Guadalupe:					
	AG	1,054	949	854	768
	IND	6	7	8	11
	MUN	357	402	504	631
	OTHER	108	135	169	212
Harding:*	(See Union County[2])				
Hidalgo:					
	AG	38,591	34,732	31,259	28,133
	IND	5,178	5,414	6,287	7,304
	MUN	482	975	2,191	4,923
	OTHER	783	1,760	3,954	8,886
Lea:*					
	AG	151,538	137,977	124,416	110,855
	IND	4,891	12,417	19,943	27,469
	MUN	5,807	16,337	26,867	37,397
	OTHER	9,068	9,674	10,280	10,866
Lincoln:					
	AG	3,909	3,518	3,166	2,850
	IND	91	123	204	371
	MUN	792	1,764	4,050	9,018
	OTHER	331	719	1,563	3,398
Los Alamos:					
	AG	0	0	0	0
	IND	2	3	5	9
	MUN	2,153	3,367	5,852	10,169
	OTHER	149	259	450	782

TABLE 6-5 (Cont'd)

Scenario B: Water Depletions by County
(acre-feet)

Luna:		1980	2030	2080	2130
	AG	73,924	66,532	59,878	53,891
	IND	322	347	420	516
	MUN	1,803	2,504	3,865	5,963
	OTHER	255	393	607	937
McKinley:					
	AG	265	238	215	193
	IND	8,754	9,151	10,630	12,348
	MUN	2,290	4,707	10,751	24,557
	OTHER	60	60	60	60
Mora:					
	AG	230	207	186	168
	IND	0	0	0	0
	MUN	193	174	156	141
	OTHER	0	0	0	0
Otero:					
	AG	24,525	22,072	19,865	17,879
	IND	24	25	29	34
	MUN	1,227	4,320	11,596	28,058
	OTHER	1,859	2,344	3,441	5,923
Quay:*					
	Ag	8,647	0	0	0
	IND	0	0	0	0
	MUN	118	249	380	511
	OTHER	0	0	0	0
Rio Arriba:					
	AG	915	824	741	667
	IND	136	158	220	369
	MUN	773	1,531	3,190	6,490
	OTHER	146	290	577	1,146
Roosevelt:*[3]					
	AG	138,424	62,455	0	0
	IND	141	959	1,778	2,597
	MUN	2,082	13,765	25,449	37,133
	OTHER	0	0	0	0

TABLE 6-5 (Cont'd)

Scenario B: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
San Juan:					
	AG	246	221	199	179
	IND	3,104	3,245	3,769	4,378
	MUN	758	12,055	42,571	124,459
	OTHER	211	566	1,519	4,077
San Miguel:					
	AG	587	528	475	428
	IND	43	55	78	111
	MUN	212	756	1,572	2,756
	OTHER	152	220	318	461
Sandoval:					
	AG	636	572	515	464
	IND	258	666	1,959	5,828
	MUN	2,583	6,963	20,854	62,460
	OTHER	122	365	1,094	3,278
Santa Fe:					
	AG	16,124	14,512	13,060	11,754
	IND	60	98	214	589
	MUN	2,091	5,020	10,678	20,876
	OTHER	68	123	220	399
Sierra:					
	AG	7,817	7,035	6,332	5,699
	IND	4	4	4	5
	MUN	802	798	885	979
	OTHER	174	193	213	236
Socorro:					
	AG	17,373	15,636	14,072	12,665
	IND	88	97	124	162
	MUN	1,451	2,280	3,979	6,946
	OTHER	522	911	1,591	2,776
Taos:					
	AG	3,562	3,206	2,885	2,597
	IND	680	859	1,430	3,339
	MUN	884	1,861	4,357	10,194
	OTHER	119	278	652	1,525

TABLE 6-5 (Cont'd)

Scenario B: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Torrance:					
	AG	32,171	28,954	26,059	23,453
	IND	0	0	0	0
	MUN	348	636	1,292	2,622
	OTHER	0	0	0	0
Union:* (includes Harding County[2])					
	AG	87,203	114,784	142,365	169,947
	IND	84	467	849	6,231
	MUN	500	975	1,450	1,925
	OTHER	130	130	130	130
Valencia:					
	AG	7,010	6,309	5,678	5,110
	IND	5,611	5,919	7,004	8,467
	MUN	3,597	6,605	13,478	27,503
	OTHER	256	522	1,066	2,175

*"Eastern" New Mexico Counties overlying the Ogallala aquifer. Base (1980) year estimates derived from extrapolations from the 1977 base year used in the High Plains report.

[1]Total depletions for Catron County cannot exceed the total that were federally mandated. All future year depletions must equal the total set for the year 1980 (607 acre feet).

[2]Projections for Harding County were aggregated with those for Union County as in the High Plains Report (WRRI, 1983).

[3]Includes projections for the Causey-Lingo area for all but irrigation water uses.

TABLE 6-6

Scenario C: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Bernalillo:					
	AG	2,812	2,109	1,582	1,186
	IND	1,113	1,628	4,066	13,198
	MUN	55,441	74,937	135,054	243,396
	Other	6,493	9,129	13,879	22,442
Catron:[1]					
	AG	519	389	292	219
	IND	15	28	103	357
	MUN	73	55	41	31
	OTHER	0	0	0	0
Chaves:					
	AG	188,662	141,496	106,122	79,592
	IND	239	238	335	497
	MUN	6,818	9,606	18,046	33,900
	OTHER	331	621	1,168	2,194
Colfax:					
	AG	375	281	211	158
	IND	2	2	2	2
	MUN	95	674	1,805	3,931
	OTHER	71	133	251	471
Curry:*					
	AG	175,203	0	0	0
	IND	4,483	9,346	14,245	19,126
	MUN	4,108	7,672	11,235	14,798
	OTHER	1,233	1,464	1,695	1,926
De Baca:					
	AG	8,619	6,464	4,848	3,636
	IND	7	5	6	6
	MUN	168	126	94	71
	OTHER	0	0	0	0
Dona Ana:					
	AG	38,972	29,229	21,922	16,441
	IND	231	393	1,071	3,484
	MUN	9,528	15,826	35,049	77,621
	OTHER	4,979	9,558	19,700	42,160

TABLE 6-6 (Cont'd)

Scenario C: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Eddy:					
	AG	92,518	69,388	52,041	39,031
	IND	8,062	7,024	8,158	9,476
	MUN	6,927	11,210	24,190	52,198
	OTHER	676	1,899	4,537	10,230
Grant:					
	AG	4,829	3,622	2,716	2,037
	IND	9,779	9,008	10,952	13,212
	MUN	1,951	2,761	5,207	9,824
	OTHER	520	981	1,851	3,491
Guadalupe:					
	AG	1,054	790	593	445
	IND	6	6	7	9
	MUN	357	335	420	526
	OTHER	108	135	169	212
Harding:*	(see Union County[2])				
Hidalgo:					
	AG	38,591	28,943	21,707	16,281
	IND	5,178	4,511	5,240	6,086
	MUN	482	812	1,826	4,102
	OTHER	783	1,760	3,954	8,886
Lea:*					
	AG	138,610	78,289	17,968	0
	IND	4,891	12,417	19,943	27,496
	MUN	5,281	13,393	21,505	29,617
	OTHER	9,068	9,674	10,280	10,886
Lincoln:					
	AG	3,909	2,932	2,199	1,649
	IND	91	103	170	309
	MUN	792	1,470	3,375	7,515
	OTHER	331	719	1,563	3,398
Los Alamos:					
	AG	0	0	0	0
	IND	2	2	4	8
	MUN	2,153	2,806	4,876	8,474
	OTHER	149	259	450	782

TABLE 6-6 (Cont'd)

Scenario C: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Luna:					
	AG	73,924	55,443	41,582	31,187
	IND	322	290	350	430
	MUN	1,803	2,086	3,220	4,970
	OTHER	255	393	607	937
McKinley:					
	AG	265	199	149	112
	IND	8,754	7,626	8,858	10,290
	MUN	2,290	3,922	8,960	20,464
	OTHER	60	60	60	60
Mora:					
	AG	230	172	129	97
	IND	0	0	0	0
	MUN	193	145	109	81
	OTHER	0	0	0	0
Otero:					
	AG	24,525	18,394	13,795	10,346
	IND	24	21	24	28
	MUN	1,227	3,600	9,663	23,382
	OTHER	1,859	2,344	3,441	5,923
Quay:*					
	AG	7,154	3,392	0	0
	IND	0	0	0	0
	MUN	65	65	65	65
	OTHER	0	0	0	0
Rio Arriba:					
	AG	915	686	515	386
	IND	136	131	184	308
	MUN	773	1,276	2,659	5,408
	OTHER	146	290	577	1,146
Roosevelt:*[3]					
	AG	125,984	26,537	0	0
	IND	141	959	1,778	2,597
	MUN	1,922	11,362	20,803	30,244
	OTHER	0	0	0	0

TABLE 6-6 (Cont'd)

Scenario C: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
San Juan:					
	AG	246	184	138	104
	IND	3,104	2,434	3,141	3,649
	MUN	758	10,046	35,476	103,716
	OTHER	211	566	1,519	4,077
San Miguel:					
	AG	587	440	330	248
	IND	43	46	65	92
	MUN	212	630	1,310	2,296
	OTHER	152	220	318	461
Sandoval:					
	AG	636	477	358	268
	IND	258	555	1,633	4,857
	MUN	2,583	5,803	17,378	52,050
	OTHER	122	365	1,094	3,278
Santa Fe:					
	AG	16,124	12,093	9,070	6,802
	IND	60	82	178	490
	MUN	2,091	4,184	8,898	17,396
	OTHER	68	123	220	399
Sierra:					
	AG	7,817	5,863	4,397	3,298
	IND	4	4	4	4
	MUN	802	665	737	816
	OTHER	174	193	213	236
Socorro:					
	AG	17,373	13,030	9,772	7,329
	IND	88	81	104	135
	MUN	1,451	1,900	3,316	5,788
	OTHER	522	911	1,591	2,776
Taos:					
	AG	3,562	2,672	2,004	1,503
	IND	680	716	1,192	2,782
	MUN	884	1,551	3,631	8,495
	OTHER	119	278	652	1,525

TABLE 6-6 (Cont'd)

Scenario C: Water Depletions by County
(acre-feet)

		1980	2030	2080	2130
Torrance:					
	AG	32,171	24,128	18,096	13,572
	IND	0	0	0	0
	MUN	348	530	1,076	2,185
	OTHER	0	0	0	0
Union:*	(includes Harding County[2])				
	AG	80,309	70,709	61,109	51,509
	IND	84	467	849	1,231
	MUN	471	819	1,167	1,515
	OTHER	130	130	130	130
Valencia:					
	AG	7,010	5,258	3,943	2,957
	IND	5,611	4,933	5,836	7,059
	MUN	3,597	5,504	11,232	22,919
	OTHER	256	522	1,066	2,175

*"Eastern" New Mexico Counties overlying the Ogallala aquifer. Base (1980) year estimates derived via extrapolations from the 1977 base year used in the High Plains study.

[1]Total depletions for Catron County cannot exceed the total that were federally mandated. All future year depletions must equal the total set for the year 1980 (607 acre-feet).

[2]Projections for Harding County were aggregated with those for Union County as in the High Plains Study (WRRI, 1983).

[3]Includes projections for the Causey-Lingo area for all but irrigation water uses.

TABLE 6-7

Estimated Year That Water Scarcity Results in Cessation of Irrigation Water Uses In Counties Overlying the Ogallala Aquifer

County	Assumption Used: Baseline	Voluntary Water Demand Reduction
Union	2060	2060
Harding	2063	2063
Quay	2010	2013
Curry	2015	2017
Roosevelt	2021	2027
Lea	2085	2096

Sources: *High Plains - Ogallala Aquifer Studies* for Curry County, Lea County, Quay County, Harding County, Union County, and Roosevelt County. WRRI reports, New Mexico State University, Las Cruces, New Mexico, 1983.

future county water demands for each county for Scenarios B and C.

IV. FUTURE WATER DEMANDS BY GROUNDWATER BASIN

The estimates for future water depletions discussed above are, of course, for counties in New Mexico. Groundwater supply information (the topic of Chapter 7 below), however, is reported by groundwater basin. To construct demand-supply comparisons for analyses of Benchmark dates for water scarcity, we have converted estimated future demands for water by county (see Tables 6-4 - 6-6) into future water demands by groundwater basin. This task is made difficult (in many cases, leading to somewhat arbitrary results) by the lack of precise data concerning the geographical distribution of water demands across counties and county lines. For agricultural uses, county-level water demand is related to basin-level water demands by a method based on various reports.[10] Municipal, industrial and "other" water use from a given basin in a given county is generally assumed to be the percentage of its total non-agricultural water use, determined by the percentage of county urban population residing in areas overlying the basin in question.

Calculations of basin water use and implied growth rates in annual M&I use rates are given in Table 6-8.

TABLE 6-8

ESTIMATED WATER USE BY GROUNDWATER BASIN: BASE YEAR, 2080 AND IMPLIED ANNUAL GROWTH RATES

BASIN		PERCENT OF COUNTY'S AG/M&I USE	TOTAL WATER USE 1980 AGRI.	TOTAL WATER USE 1980 M&I	TOTAL WATER USE 2080 AGRI.	TOTAL WATER USE 2080 M&I	IMPLIED GROWTH RATE
			(000	A.F.)			
Animas	Hlgo	34.3/47.2	13.2	3.0			
A					13.2	6.3	.73
B					13.2	5.9	.66
C					13.2	5.2	.54
Estancia	Bern	1.4/0	.1	0.0			
	StaFe	61.5/5.5	9.9	.1			
	Torr	100.0/5.5	32.2	.0			
A					42.1	.7	1.64
B					42.1	.7	1.63
C					42.1	.6	1.45
Hueco	D.Ana	3.0/3.0	1.2	.4			
A					1.2	2.0	1.51
B					1.2	1.9	1.46
C					1.2	1.7	1.34
Jal	Lea	1.7/4.8	2.7	1.0			
A					2.7	2.9	1.11
B					2.7	2.8	1.07
C					2.7	2.6	1.00
Lea	Lea	96.8/89.8	155.6	18.1			
A					155.6	53.9	1.11
B					155.6	52.3	1.07
C					155.6	48.4	.99
Lordsbg	Hlgo	21.9/52.8	8.5	3.4			
	Grant	30.2/0	1.5	0.0			
A					9.9	7.1	.73
B					9.9	6.6	.66
C					9.9	5.8	.54
Mimbres	Grant	22.1/100	1.1	12.3			
	Luna	70.5/100	52.1	2.4			
A					53.2	28.8	.68
B					53.2	26.1	.58
C					53.2	22.2	.42
Nutt-Hoc	D.Ana	.4/0	.2	0.0			
	Luna	14.7/0	10.9	0.0			
	Sierra	4.7/0	.4	0.0			
A,B,C					11.4	no growth	
Tularosa	Linc	13.9/50	.5	.6			
	Otero	50.0/50	12.1	1.6			
A					12.6	11.3	1.67
B					12.6	10.4	1.59
C					12.6	9.1	1.45

TABLE 6-8 (Cont'd)

ESTIMATED WATER USE BY GROUNDWATER BASIN: BASE YEAR, 2080 AND IMPLIED ANNUAL GROWTH RATES

BASIN		PERCENT OF COUNTY'S AG/M&I USE	TOTAL WATER USE 1980 AGRI.	TOTAL WATER USE 1980 M&I	TOTAL WATER USE 2080 AGRI.	TOTAL WATER USE 2080 M&I	IMPLIED GROWTH RATE
			(000 A.F.)				
Tucumc	Quay	0.0/63	0.0	.1			
A					0.0	.3	1.30
B					0.0	.2	1.18
C					0.0	.2	1.09
Upper Rio Grand				8.85			
A						21.1	.87
B						18.8	.75
C						15.4	.55
Lower Rio Grand				35.7			
A						62.4	.56
B						54.7	.43
C						44.2	.22
Middle Rio Grande				75.8			
A						196.9	.96
B						176.4	.85
C						145.9	.66
San Juan				12.5			
A						71.1	1.75
B						64.9	1.66
C						53.6	1.01
Pecos				3.8			
A						6.4	.36
B						4.1	.09
C						--	--

CHAPTER 6 ENDNOTES

1. E. Sorenson, Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 1980 (Tech. Rep. 44, NM State Engineer 1982).

2. See H. Blaney & E. Hanson, Consumptive Use and Water Requirements in New Mexico (Tech. Rep. 32, NM State Engineer 1965).

3. E. Sorenson, supra note 1, at 9.

4. See E. Sorenson, supra note 1.

5. E. Sorenson, supra note 1, at 48.

6. L. Wombold, Projections of the Population of New Mexico by County, 1980-2005 (BBER 1985). In the 1985 BBER report, population projections were prepared for 1985, 1990, 1995, 2000, and 2005 using a cohort component model, which projects each component of population change—fertility, mortality and migration—separately.

7. Data Resources, Inc., DRI Long-Range Projections (Spring 1985). The national manufacturing and mining output projections are used to predict future water needs for the Industrial and Minerals categories in New Mexico for this study. Production elasticities are assumed to be equal to one; therefore, if DRI forecasted five percent real growth in the mining sector's output for some given time period, it is then assumed that water needs for that mining sector also increased by five percent. The DRI projections were only extended to the year 2010, but as in the case of the population projections these rates were continued over all time horizons considered in this study. By setting the production elasticities equal to one, the possibility of conservation is again being ignored.

8. Memorandum (Attachment B), to New Mexico High Plains Water Resources Evaluation ch. A-38: "Water Demands and Available Supplies for Alternative Development Strategies in the Southern and Northern Subregions in New Mexico" (Nov. 1981).

9. New Mexico Water Resources Research Institute Report, New Mexico State University, High Plains-Ogallala Aquifer Studies (for Curry County, Lea County, Quay County, Harding County, Union County and Roosevelt County) (1983). The general purpose of the WRRI study was to estimate the economic impacts over a 40-year planning horizon on regional income

and employment, population, irrigated and dryland cropping patterns, agricultural output, and farm income in those counties overlying the Ogallala Formation, a major aquifer supplying most of the water needs of the area's large agricultural economy. The study was undertaken because rapidly rising energy costs and declining water tables were threatening the area's economic activities that depended on irrigated agriculture. Using a linear-programming farm enterprise model, in conjunction with various state and regional input-output models, a national crop pricing model, a national economic projections model, and the area's groundwater supply levels, a variety of economic variables were projected, including groundwater use, to the year 2020.

10. Lansford, et al. (1983 and 1984). The method used was to consider the number and percentage of acres irrigated within a county that could be attributed to water obtained from a specific groundwater basin; the percent of any county's agricultural water use (Tables 5-7) assumed to come from the basin in question was then taken to be the percent of the county's irrigated acreage overlying the basin.

CHAPTER 7

BENCHMARKS FOR WATER SCARCITY IN NEW MEXICO'S FUTURE

I. INTRODUCTION

In the previous chapter we looked at potential in-state demands for water based on projected depletions. In this chapter, we examine the question: What will these demands cause in terms of relative water scarcity in New Mexico, assuming the supply is unappropriated groundwater in the state? There are two important assumptions to note in this chapter. We look only at future scarcity in New Mexico's groundwater basins where unappropriated water now exists and we assume there will be no projects to transfer water from those basins. Section II, below, briefly describes groundwater supply, and Section III compares the demand for the water with the supply available and develops what we call benchmarks of water scarcity in New Mexico's water future. Section IV discusses the unique case of mined groundwater aquifers and gives an example of the "Inventory Method" used by the State Engineer to determine the availability of unappropriated groundwater and the implications of this method for our efforts to analyze demand/supply conditions. This section also discusses tributary aquifers. Finally, estimated benchmark dates of water scarcity in New Mexico's future are described in Section V.

II. NEW MEXICO'S UNAPPROPRIATED GROUNDWATER

Unappropriated groundwater means water that is essentially free—it has not yet become anyone's property in the form of a water right. The amount remaining in New Mexico's declared groundwater basins is estimated by the State Engineer's Office in a recent report for UNM's Natural Resources Center.[1] From these reports, along with unpublished data from the Roswell office of the State Engineer,[2] the amounts of water available for new appropriations can be obtained for both tributary and non-tributary (closed) aquifers, as shown in Table 8-1.

The estimates in Table 8-1 should be viewed with caution given the difficulties involved in determining the exact amount of usable water in a groundwater basin.[3] In principle, determining the quantity of water in storage available to wells is simple: multiply the volume of saturated material by the specific yield. The "specific yield" of an aquifer is the quantity of water that a formation will yield under the force of gravity, if it is first saturated and then allowed to drain; the specific yield ratio is the percentage of the above-described yield to the volume of water in the saturated material. In reality, both of these factors (yield and storage) vary continuously. In the Ogallala Formation, for example, the thickness of the zone of saturation ranges from less than 50 feet in many places to more than 250 feet in eastern Lea County. Fairly detailed data on water-level fluctuations in observation wells, along with data on pumpage, are essential in keeping track of the status of groundwater resources. This information is published regularly by both

TABLE 7-1

Water Available for New Appropriations in Declared Underground Water Basins

BASIN	UNAPPROPRIATED GROUNDWATER
A. Closed Aquifers	(million acre feet)
Animas	0.00[1]
Estancia	2.04[2]
Hueco	6.20[3]
Jal	0.04
Lea County	0.77
Lordsburg	0.60[1]
Mimbres	3.70[1]
Nutt-Hockett	0.13
Tucumcari	0.40
Tularosa	10.70[3]
B. Tributary Aquifers(1980 Surface Depletions)[4]	
Upper Rio Grande (44,200 a.f.)	9.30[5]
Middle Rio Grande (125,630 a.f.)	2.70
Lower Rio Grande (173,920 a.f.)	5.00
Pecos River (83,300 a.f.)	8.00
San Juan (1.6 million a.f.)	21.50[5]

Source: "The Impact of Recent Court Decisions Concerning Water and Interstate Commerce on Water Resources of the State of New Mexico." A Report to Governor Toney Anaya and the Legislative Council Pursuant to Laws, 1983, Chapter 98, Prepared by the Water Law Study Committee, Charles T. DuMars, Chairman, Gov. Jack Campbell, Robert B. Anderson, Les Davis, Christina G. Chaves, pp.87-90.

[1]To pump depths of 230 feet. Unappropriated, but unappropriable, water in the following amounts are available between 230-1,000 feet: Animas, 0 a.f.; Lordsburg 4.9 million a.f.; Mimbres 70 million a.f..

[2]Non-saline water.

[3] To 1,000 feet.

[4]Allows 500 years for pumping effects on rivers.

[5]Amended as per letter to C. DuMars from S.E. Reynolds dated December 26, 1985.

[6]Assumes non-artesian conditions; storage coefficient of .1 used.

the U.S. Geological Survey and the State Engineer. But still more information is needed on all phases of groundwater hydrology to even begin to understand the dynamics of such a complex system. This includes saturated thicknesses and hydrologic characteristics in areas of few wells, hydraulic properties of alluvial materials, quantity of water discharged by phreatophytes, amount of recharge from irrigation water, relationship of ground and surface water (in the case of tributary aquifers), and perhaps most important, water quality.

III. POTENTIAL BENCHMARKS IN NEW MEXICO'S WATER FUTURE

Three sets of benchmarks will be used for our analysis of alternative water futures that may face New Mexico in groundwater basins where unappropriated water now exists. These benchmarks are based upon the hydrological characteristics of the unappropriated groundwater stocks in different areas of the state. There are benchmarks for non-tributary aquifers and for tributary aquifers. These benchmarks are described in the following subsections.

A. Benchmarks for Closed Aquifers

Closed aquifers included in this study are set out in Table 8-1 above. As we continue to mine these aquifers, we can expect several manifestations of growing water scarcity. First, continued withdrawals of water will obviously exhaust remaining supplies of unappropriated water; the exhaustion of all unappropriated water supplies represents the first benchmark. We designate this as Benchmark C-1 in our study of non-tributary aquifers.

When there is no more unappropriated water, "new" water uses can be introduced only by the "new" user obtaining (purchasing) the right to pump water from an entity that already owns a water right. Most likely, such "new" uses will be municipal and industrial uses. One might expect the development of new uses to cause a reduction in irrigated agricultural activity in the groundwater basin as municipal/industrial users purchase water rights from farmers.

Retirement of water use in the agricultural sector defines our second and third benchmarks. For reasons cited below, it is likely that the agricultural sector might be capable of responding to a 10 percent reduction in levels of water use without substantial reductions in irrigated acreage; this is accomplished by essentially substituting <u>capital investments</u>, such as lined canals, for water. Simply stated, farmers can sell 10 percent of their water rights and use the cash to put in lined canals, more efficient distribution systems, etc. With these improvements they can be as productive as before but use 10 percent less water. Thus, our second benchmark, <u>Benchmark C-2, occurs when municipal/industrial uses of water increase beyond Benchmark 1 levels by 10 percent of agricultural water use</u>. Stated another way, when all unappropriated water is taken and 10 percent of agricultural water use has been transferred to municipal and industrial use, Benchmark C-2 is reached.

When reductions in agricultural water use go beyond 10 percent, these reductions will inevitably cause the retirement of agricultural lands and changes in the character of local institutions and life-styles. Our third benchmark, Benchmark C-3, occurs when municipal/industrial uses increase, beyond Benchmark 1 levels, by amounts equal to 25 percent of agricultural water uses (pre-Benchmark 1 levels). Stated another way, Benchmark C-3 occurs when all unappropriated water is taken and 25 percent of agricultural water use has been transferred to municipal and industrial uses. At this point, farmers are going out of business, communities are looking for an alternative tax base and basic life-style changes are being made.

Of course, as water becomes increasingly scarce, with more and more agricultural water rights purchased from farmers, the price of water rights will rise; urban water users will pay more and more for water. Also, continued mining of closed aquifers will lower water tables, increasing still further the costs of obtaining water; rural and urban residents will face increasingly higher water bills.

Thus, the major effects, or manifestations of scarcity caused by increased pumping from the closed aquifers will be reductions in irrigated agriculture and a basic change in the economic, socio-institutional and life-style characteristics in the affected area. Our benchmarks for closed aquifers are intended to reflect these changes. Benchmarks for the closed aquifers (listed in Table 8-1) are summarized below:

BENCHMARK C-1: Unappropriated groundwater supplies are exhausted.

BENCHMARK C-2: Agricultural water use declines by 10 percent.

BENCHMARK C-3: Agricultural water use declines by 25 percent.

B. Benchmarks for Tributary Aquifers

"Tributary" aquifers in New Mexico are found along the Rio Grande, the Pecos River and the San Juan River. Tributary aquifers are also found in the Gila River area, but these aquifers are subject to the previously mentioned federal mandate that prohibits new depletions. The process of mining tributary groundwater is discussed in Chapter 2 of this report. In this chapter we assume that when pumping from a tributary aquifer begins, corresponding water rights for surface water must be retired by the pumper. Thus, the effects—scarcity manifestations—of increased pumping from the tributary aquifers are those associated with reductions in irrigated agriculture and, as with the case of the closed aquifer, the result will be a basic changes in the economic, socio-institutional and life-style characteristics of the affected area.

Since one cannot separate the exhaustion of unappropriated tributary groundwater from the retirement of surface water rights we do not have a Benchmark 1 for the tributary aquifer that corresponds with that for the closed aquifer. Rather, benchmarks for tributary aquifers are based entirely on reductions in agricultural water use (farmers hold just about all of the surface water rights).

Paralleling Benchmark C-1, the first benchmark for the tributary aquifer, Benchmark T-1, occurs when 10 percent of surface water rights held by farmers are retired to offset pumping from the tributary aquifer. The second and third benchmarks for the tributary aquifer, Benchmark T-2 and Benchmark T-3, occur when surface water rights are retired in amounts equal to 25 percent and 50 percent of pre-pumping levels. The impacts of reaching these benchmarks are the same for the closed aquifers. Farmers will go out of business, basic life style changes will be made and these regions will look for alternative tax bases. Benchmarks for tributary aquifers (listed in Table 7-2) are summarized below:

<u>BENCHMARK T-1</u>: 10 percent of surface water rights are retired.

<u>BENCHMARK T-2</u>: 25 percent of surface water rights are retired.

<u>BENCHMARK T-3</u>: 50 percent of surface water rights are retired.

IV. THE "INVENTORY METHOD" FOR DETERMINING UNAPPROPRIATED WATER SUPPLIES

While we have reported the State Engineer's estimates for unappropriated groundwater supplies in Table 8-1, we cannot bring together Chapter 7's demand estimates with these supply estimates to quantify the above-described benchmarks without understanding how unappropriated water supplies are defined by the State Engineer. In this section we attempt to provide such an understanding. The authors wish to emphasize the obvious: we do not pretend to speak for the State Engineer and recognize that the State

Engineer does not have one single method that is used in all basins for making this determination. Targeted limits on water table declines are central to administrative rules used by the State Engineer in many groundwater basins, but in other basins longevity indices are a major concern. The "Inventory Method" described below is simply the result of the authors' efforts to set out one simple methodology that captures the essence of the several methods used by the State Engineer in his efforts to manage the state's unappropriated groundwater stocks.

In New Mexico's Declared groundwater basins—the basins of concern in this report—one must obtain a permit from the State Engineer's Office (SEO) prior to pumping water from the basin. Before issuing a permit, the State Engineer must be assured that other rights are not impaired by the new uses, that such uses conform with state law and that unappropriated water exists. Of interest here is the method used by the SEO in determining the existence of unappropriated water, a method referred to here as an "Inventory Method." This follows from the fact that, in the simplist of terms, in determining whether unappropriated water exists in any given groundwater basin the State Engineer takes an inventory of water in the aquifer, subtracts current appropriations, and the balance is "unappropriated" water. The specifics of the method as it applies to closed aquifers are as follows; tributary aquifers are discussed below.

A. Determining the Inventory Area

In an effort to protect the rights of holders of water rights, in terms of pumping lifts and water supplies, inventories do not necessarily include the entire saturated zone of a declared, closed aquifer. The extent of the saturated zone included in an inventory will vary depending on the hydrological conditions peculiar to any given basin. In general, however, in "deep" aquifers (the Mimbres, Animas, Lordsburg, Hueco and Tularosa Basins in Table 7-1), the inventory of available water extends only to pumping lifts of around 230 feet, the limit for feasible pump lifts for agricultural pumpers as estimated in the 1970's. Of course, the saturated zone in these aquifers extends well beyond 230 feet and well in excess of 1,000 feet in most cases. As noted in footnote 1 to Table 7-1, the State Engineer calculated that there is water in the saturated zone between 230 feet and 1,000 feet in these deep aquifers; but, while it exists, it is unappropriable under the administrative rules used by the State Engineer. In more shallow aquifers, varying amounts of the saturated zone are included in the State Engineer's inventory. As examples, the bottom third of the saturated zone is excluded from the State Engineer's inventory of the Lea Basin and the bottom 200 feet of the Estancia Basin's aquifer is excluded from the State Engineer's inventory.

B. Given the area to be included in the State Engineer's inventory, assumptions as to the appropriate land area overlying the basin, the appropriate storage coefficient for the specific basin and the average depth of the saturated zone to be included are combined to yield an estimate of the total amount of water in storage in the "relevant" saturated zone. We will denote this total water supply as TS.

C. Total water appropriations are then calculated. Let F denote the <u>annual</u> water pumping rights held by farmers for agricultural water uses. <u>Based on the assumed amount of water in the inventory</u>, the farmers' annual water rights are expected to last on an economically viable basis for 40 years; thus, "appropriated" water rights by farmers are calculated as $F^* = \underline{40 \text{ times } F}$. In a fully appropriated, all-agricultural basin, then, all of the farmers' annual pumping times 40 years equals the State Engineer's assumed inventory. Municipalities (generally viewed as municipal/industrial uses in this report), are allowed to appropriate water in amounts equal to their anticipated needs over a 40-year horizon. Thus, let M measure M&I uses at the time of the inventory and let such uses be expected to grow at the rate r% per year in the future. In year 40, M&I will use water at the rate of $(M)(1 + r)^{40}$; as in the case of agricultural the M&I annual appropriation is protected for 40 years in the inventory process. Again, strictly for purposes of the inventory, M&I "appropriations" can be viewed as $M^* = M \text{ times } (1 + r)^{40} \text{ times } 40$, the last factor being the number of years a municipality is allowed to reserve water.

D. At the time of the inventory, unappropriated water U is then defined as $U = TS - F^* - M^*$. Unappropriated water equals total water supply minus the amount farmers need to stay in business for 40 years and municipalities need for a reasonable rate of growth for 40 years.

It is important to understand that an inventory most likely would be taken when evaluating any new application for a water permit in a declared basin. Thus, <u>agricultural and M&I "appropriations"--F* and M*--continue through time; they are not diminished as a result of use through time</u>. In other words, for holders of water rights, each year's use effectively comes out of "unappropriated" water. As an example, consider the following calculation of Benchmark C-1 (the exhaustion of all unappropriated water) for the Mimbres Basin.

1. Annual agricultural water use in 1980 was 53,146, implying F* = 2,125,840 a.f.. 1980 M&I uses were 14,630 a.f. and expected to increase (see Table 6-8 in Chapter 6, 1980-2080 rates) at the annual rate of .68%; thus, the M&I "appropriation" for inventory purposes is calculated as follows.

$$M^* = (14{,}630)(1.0068)^{40}(40), \text{ or}$$
$$= (19{,}185)(40) = 767{,}419 \text{ a.f.}$$

2. With unappropriated groundwater in the amount 3,700,000 a.f. (Table 7-1; this corresponds to water rights to pump at an annual rate of 92,500 a.f.:3.7 million divided by 40), the implied 1980 inventory is 6,593,259, which equals the sum of F*, M* and U.

3. Suppose that there are no new applications for groundwater pumping in the Mimbres Basin for 48 years. In the year 2028 (48 years after the inventory year 1980), farmers would have pumped 2,551,008 a.f. (53,146 a.f. per year for 48 years); M&I users would have pumped a quantity equal to (see Appendix):

$$([(1.0068)^{49} - 1]/(.0068))14{,}630 = 847{,}364 \text{ a.f.}$$

The 2028 inventory would then be 6,593,259 (the 1980 inventory) less the amounts withdrawn by farmers (2,551,008 a.f.) and by M&I users (847,364 a.f.), or 3,194,887 a.f.

4. With 3,194,887 a.f. in inventory in the year 2028, we must determine total appropriation against this inventory. For farmers, the total appropriation is the same as it was in 1980: 53,146 a.f. per year for 40 years, or 2,125,840. In 2028, M&I users now pump (14,630)(1.0068)48, or 20,254 a.f. per year. Since M&I users can appropriate for needs up to 40 years in the future, however, with use in 40 <u>more</u> years at the rate $(20,254)(1.0068)^{40}$, or 26,561 a.f./year, M&I users in 2028 can "appropriate" $M^* = (40)(26,561) = 1,062,445$ a.f..

5. With an inventory of 3,194,887 a.f. and "appropriations" of $F^*=2,125,840$ and $M^*=1,062,445$, there is virtually <u>no</u> (6,602 a.f.) unappropriated water in 2028. Agricultural and M&I uses between 1980 and 2028 have exhausted the 1980 unappropriated groundwater stock; i.e., annual uses by holders of water rights effectively represent reductions in the unappropriated groundwater stocks.

6. Finally, suppose that in 1980, given the 1980 inventory, an entity (user "x") applied for and received the right to pump 92,500 a.f. per year. With the 40-year accounting period used in the Inventory Method, the total "appropriation" associated with this right is 40 times 92,500, or 3,700,000 a.f. (See 2 above), the unappropriated groundwater stock. The new user, user x, would exhaust all unappropriated water. In the year 2028, farmers would have used 2,551,008 a.f. as in the above; M&I users

would have pumped 847,364 as in the above; and user x would have pumped 3,700,000 a.f. over the 48-year period. This total water use over 48 years would have exhausted the 1980 water stock to depths of 230 feet (actually, total use would have exceeded the 1980 stock by about 8 percent). Thus, all users, including user x of course, would continue pumping from the unappropriable water stock between 230 and 1,000 feet.

It should be recognized that, at any point in time, the State Engineer could essentially "create" additional unappropriated groundwater supplies in some areas. This would be the result of a change in the area to be included in the inventory (step (a) above). Thus, in our Mimbres example, if the State Engineer should decide to include as "appropriable" all waters within, say, a 280-foot pumping depth (instead of the current 230-foot depth), then additional unappropriated water would have been "created". Given the purposes sought in the State Engineer's exclusion of parts of aquifers when doing an inventory of appropriable water supplies—protecting rights of existing holders of water rights—the conditions which the State Engineer might find compelling for "creating" new appropriable water are not immediately clear.

Thus, with the inventory method—a method designed by the State Engineer as a means to protect rights of holders of water rights while allowing for continued, orderly development of new water uses—any given water stock defined as unappropriated in a closed aquifer at one point in time does not remain so over time. For the purpose of determining available unappropriated groundwater the rights of existing appropriators <u>are continually projected</u> 40 years through time so long as there is sufficient water in inventory for such projections. Thus, in the absence of "new" appropriators, the unappropriated water stock declines each year by the volume of water pumped by holders of existing water rights.

As applied to the tributary aquifer, the Inventory Method is at once less and more complicated. It is less complicated in that hydrology sets the limit on appropriations: since any sustained pumping level must eventually reduce surface water flows by the same level, surface water flows set the limit. It is more complicated in that the timing of when surface flow are reduced is influenced by a wide range of factors, about which, generally, not enough is known; examples include storage and transmissivity coefficients, precise locations of wells, etc. Given our assumption of an "immediate" effect on river flows associated with any increase in pumping, these complications will not be addressed in our discussions.

V. MATCHING GROUNDWATER USE AND GROUNDWATER SUPPLIES

In this section, we explain methods used for matching water <u>demand</u> estimates (developed above in Chapter 7) with the estimates for unappropriated water <u>supplies</u> (detailed above). Estimates of "supply" and demand are made conditional upon assumptions used, of course. Obviously, then, the extent that future, real-world conditions vary from our assumptions will determine the ultimate usefulness of the scenarios that are developed below. At this point, one further caveat must be explored in order to understand the analyses of scarcity benchmarks in New Mexico's possible "water futures" that follow.

The caveat is that the price of water is assumed to remain unchanged, in real terms, in this study. Stated more simply, we all know that people react to higher prices in a commodity by using less of it. In our study we were not able to calculate exactly how people would react in specific instances. While water use by farmers and M&I users is assumed to decline by 10 percent and 25% over 50-year intervals in demand scenarios B and C (Chapter 6), and such "conservation" effects are consistent with rising prices for water as it becomes more scarce, an explicit price-conservation relationship is not developed.

A great deal of evidence suggests that water demands are responsive to price, both in the short and long runs. In 1967, for example, a study by researchers at Resources for the Future, Inc.[4] demonstrated significant differences in water use patterns between households that were metered (thereby putting a price on each gallon used) and those that were not. In the areas where households were not metered (a fixed monthly fee usually being charged), not only was average daily water use much higher than in metered households, but maximum daily use rates and peak hour use were much higher. To investigate the permanence of price effects, Hanke[5] gathered and analyzed data from two major meter routes in Boulder, Colorado, prior to and after the installation of meters. The analysis showed a dramatic, permanent drop in water usage. In several other studies, the price responsiveness of industrial demands and agricultural irrigation demands has also been demonstrated fairly convincingly.[6]

Interestingly, the above-reported evidence tends to contradict the extreme interpretation of the argument that water is "different" from other natural resources inasmuch as we "can't get along without it." The above-cited studies tend to emphasize a simple economic fact: every individual, farm enterprise, and industry has numerous uses of water, and depending on the cost to the user, these economic agents will use certain quantities, applying the water first to the vital or high value uses first, and then to less important things. Therefore, as the price of water rises, all else equal, less water will be used to some extent; we will indeed "get along" with less and less water as water becomes more expensive. While water conservation is assumed in our data, the inability to anticipate specific responses to price within each sector means that the demand estimates presented in this report may overstate future water demands. We do, however, put these scenarios forward as reasonable, subject to the stated limitations. We leave the task of special region-by-region and category-by-category price/conservation calculations to others with considerably more resources for raw data collection.

With this caveat in mind, we turn to our methods for matching groundwater demands and supplies for closed, non-tributary groundwater basins and tributary aquifers. Much of what follows simply involves the application of the Inventory Method described above to "new" applications that are filed as the number of municipal and industrial users increases.

Closed Aquifers. For closed aquifers, with agricultural uses maintained at 1980 levels and M&I uses growing at rates set out in Chapter 6 (Table 6-8), Benchmark C-1 is found by applying the Inventory Method until all unappropriated water becomes appropriated (see the Mimbres Basin example given above). Benchmarks C-2 and C-3 are obtained by applying various mathematical formulas that track the Inventory Method to determine unappropriated groundwater.[7]

Tributary Aquifers. Calculating benchmark dates for tributary aquifers is also based upon application of a straightforward mathematical formula.[8]

VI. BENCHMARKS FOR WATER SCARCITY IN SELECTED GROUNDWATER BASINS IN NEW MEXICO

Estimated dates for reaching the water scarcity benchmarks defined above and given in Table 7-2 for Closed and tributary aquifers. To understand our methodologies, the reader is asked to recall the assumptions made in the preparation of the demand projections in Chapter 6.

Scenario A: What could happen if there were no water conservation response and agricultural and municipal demand remained constant?

Scenario B: As each 50 year period of time passes a 10 percent reduction in water demand occurs, as a result of conservation.

Scenario C: As each 50 year period of time occurs a 25 percent reduction in water demand occurs as a result of conservation .

We would also ask the reader to recall the significance of the benchmark calculations.

For non-tributary aquifers, Benchmarks C-1, C-2 and C-3 occur when unappropriated water is depleted, when agricultural water use is reduced 10 percent and when agricultural water use is reduced 25 percent, respectively.

> BENCHMARK C-1: Unappropriated groundwater supplies are exhausted.
>
> BENCHMARK C-2: Agricultural water use declines by 10 percent.
>
> BENCHMARK C-3: Agricultural water use declines by 25 percent.

For Tributary aquifers, Benchmarks T-1, T-2 and T-3 occur when agricultural water use is reduced (by the purchase and retirement of surface water rights) by 10 percent, 25 percent and 50 percent, respectively.

> BENCHMARK T-1: 10 percent of surface water rights are retired.
>
> BENCHMARK T-2: 25 percent of surface water rights are retired.
>
> BENCHMARK T-3: 50 percent of surface water rights are retired.

Two observations are important in interpreting the data in Table 7-2. First, when Benchmark dates are more than 200 years in the future, estimates for dates are not given; these dates are well in the future and are simply denoted FUT. Second, in basins wherein M&I uses are very small, relative to unappropriated water supplies, changes in M&I growth rates across scenarios will typically leave benchmark dates unaffected by changes in demand scenarios. Referring to Table 7-2, this is the case for the Estancia, Hueco, Jal, Lea County, Nutt-Hockett (with no M&I uses), Tularosa and Tucumcari Basins.

TABLE 7-2

ESTIMATED BENCHMARK DATES FOR WATER SCARCITY IN SELECTED GROUNDWATER BASINS IN NEW MEXICO

Groundwater Basin	Scenario	Benchmark	Benchmark Year
A. Closed Basins.			
Animas	A	C-1	1980
	A	C-2	2030
	A	C-3	2081
	B	C-1	1980
	B	C-2	2035
	B	C-3	2092
	C	C-1	1980
	C	C-2	2047
	C	C-3	2116
Estancia	A,B and C	C-1	2028
	A,B and C	C-2	2195
	A,B and C	C-3	FUT
Hueco	A,B and C	all	FUT
Jal	A,B and C	C-1	1989
	A,B and C	C-2	2010
	A,B and C	C-3	2034
Lea County	A,B and C	C-1	1985
	A,B and C	C-2	2151
	A,B and C	C-3	FUT
Lordsburg	A	C-1	2019
	A	C-2	2046
	A	C-3	2079
	B	C-1	2020
	B	C-2	2051
	B	C-3	2087
	C	C-1	2022
	C	C-2	2061
	C	C-3	2106

TABLE 7-2 (Cont'd)

ESTIMATED BENCHMARK DATES FOR WATER SCARCITY IN SELECTED GROUNDWATER BASINS IN NEW MEXICO

Groundwater Basin	Scenario	Benchmark	Benchmark Year
A. Closed Basins (continued)			
Mimbres	A	C-1	2028
	A	C-2	2062
	A	C-3	2102
	B	C-1	2030
	B	C-2	2064
	B	C-3	2104
	C	C-1	2032
	C	C-2	2093
	C	C-3	2162
Nutt-Hockett	A,B and C	C-1	2031
	A,B and C	n.a.*	
Tularosa	A,B and C	all	FUT
Tucumcari	A,B and C	all	FUT
Tributary Aquifers			
Upper Rio Grande	A	T-1	2027
	A	T-2	2073
	A	T-3	2123
	B	T-1	2034
	B	T-2	2088
	B	T-3	2147
	C	T-1	2054
	C	T-2	2128
	C	T-3	FUT

TABLE 7-2 (Cont'd)

ESTIMATED BENCHMARK DATES FOR WATER SCARCITY IN SELECTED GROUNDWATER BASINS IN NEW MEXICO

Groundwater Basin	Scenario	Benchmark	Benchmark Year
A. Tributary Aquifers (continued)			
Middle Rio Grande	A	T-1	1996
	A	T-2	2016
	A	T-3	2043
	B	T-1	1998
	B	T-2	2021
	B	T-3	2051
	C	T-1	2003
	C	T-2	2033
	C	T-3	2071
Lower Rio Grande	A	T-1	2051
	A	T-2	2122
	A	T-3	FUT
	B	T-1	2072
	B	T-2	2165
	B	T-3	FUT
	C	T-1	2160
	C	T-2	FUT
	C	T-3	FUT
San Juan	A	T-1	2132
	A	T-2	FUT
	A	T-3	FUT
	B	T-1	2139
	B	T-2	FUT
	B	T-3	FUT
	C	T-1	FUT
	C	T-2	FUT
	C	T-3	FUT
Pecos	A,B and C	all	FUT

*All pumping from Nutt-Hockett is for agricultural uses; thus, withdrawels are assumed constant over time.

FIGURE 1

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-1 FOR CLOSED BASINS

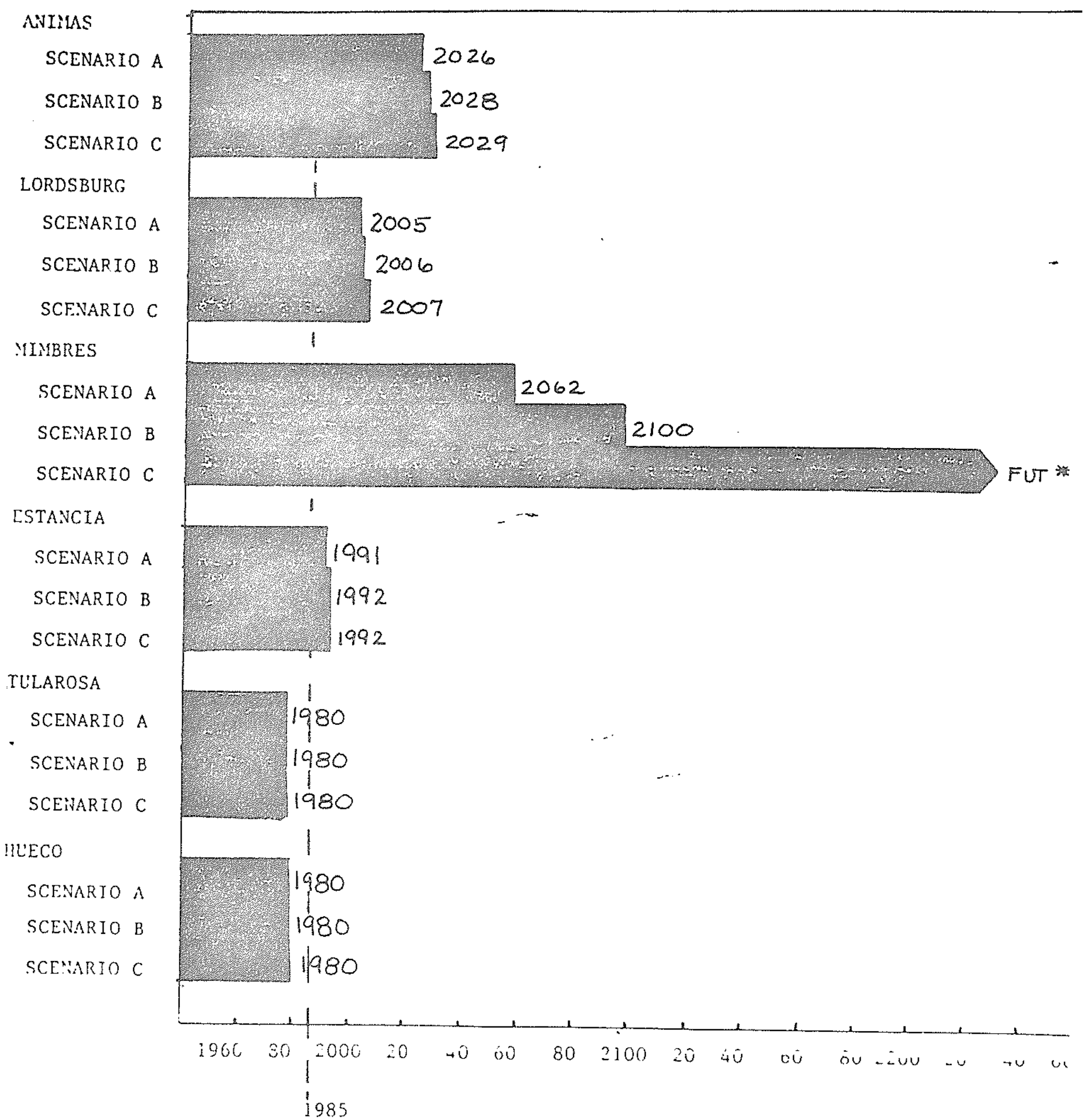


FIGURE 2

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-2 FOR CLOSED BASINS

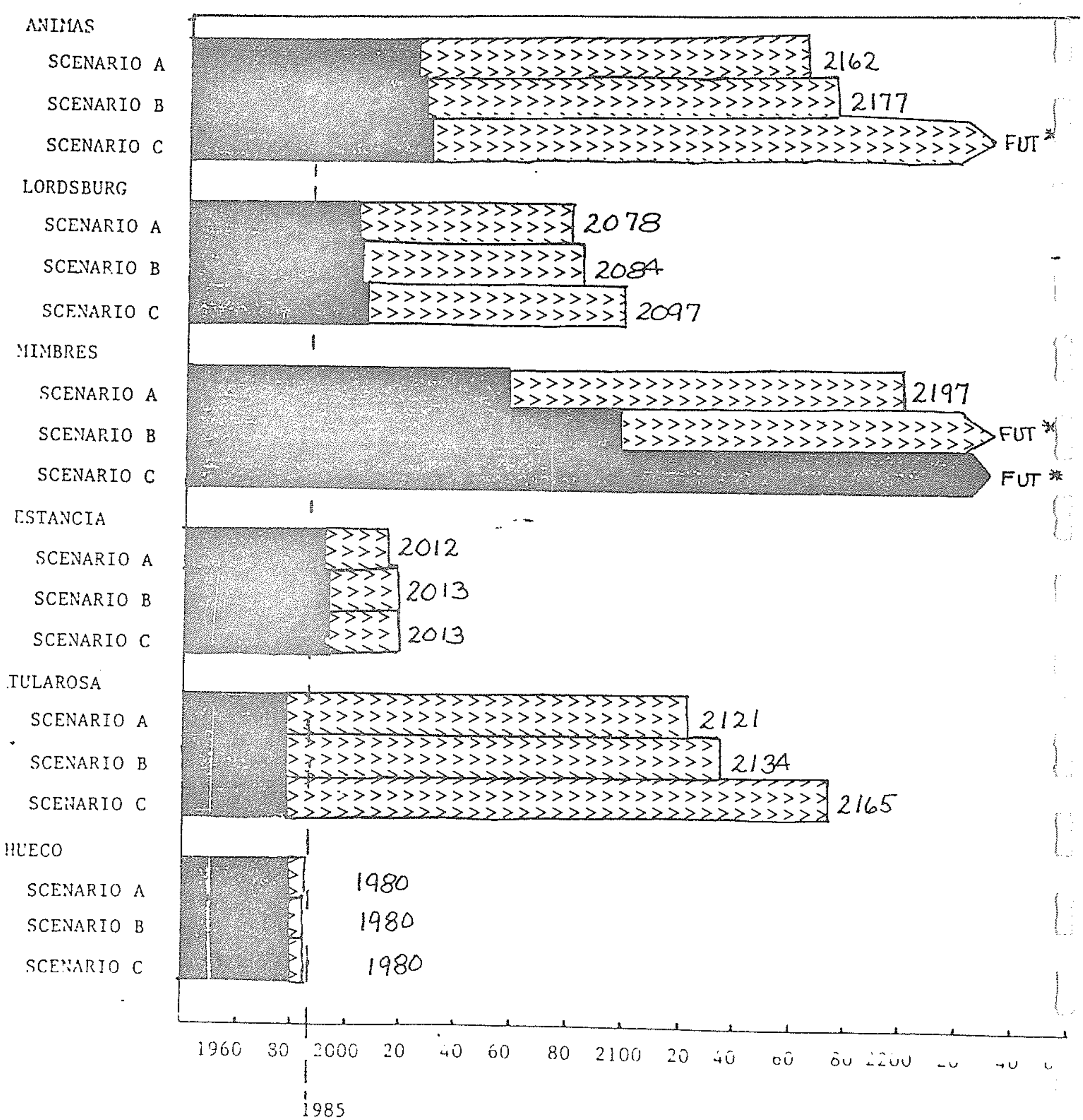


FIGURE 3

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK C-3 FOR CLOSED BASINS

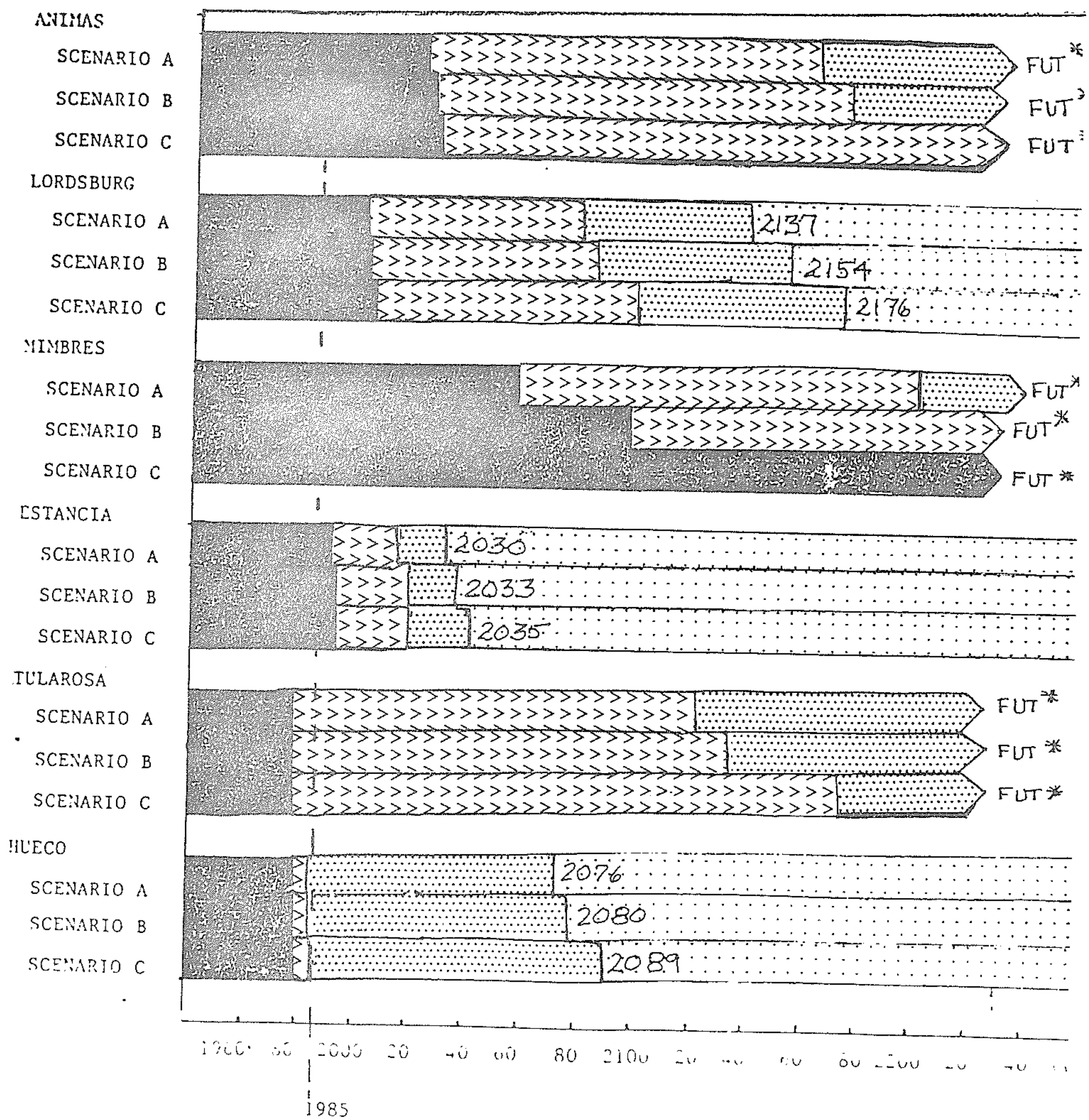


FIGURE 4

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-1 FOR TRIBUTARY BASINS

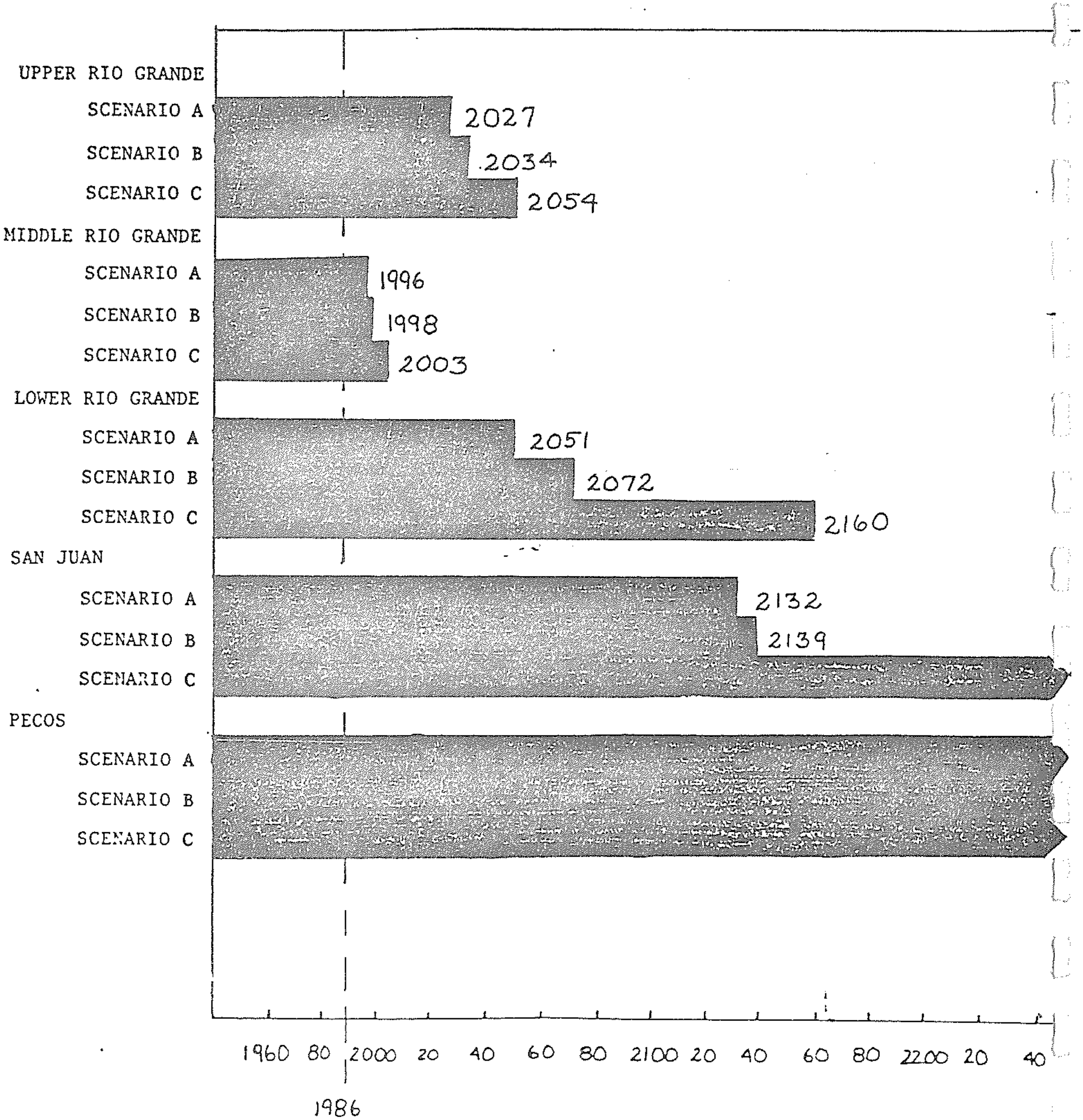


FIGURE 5

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-2 FOR TRIBUTARY BASINS

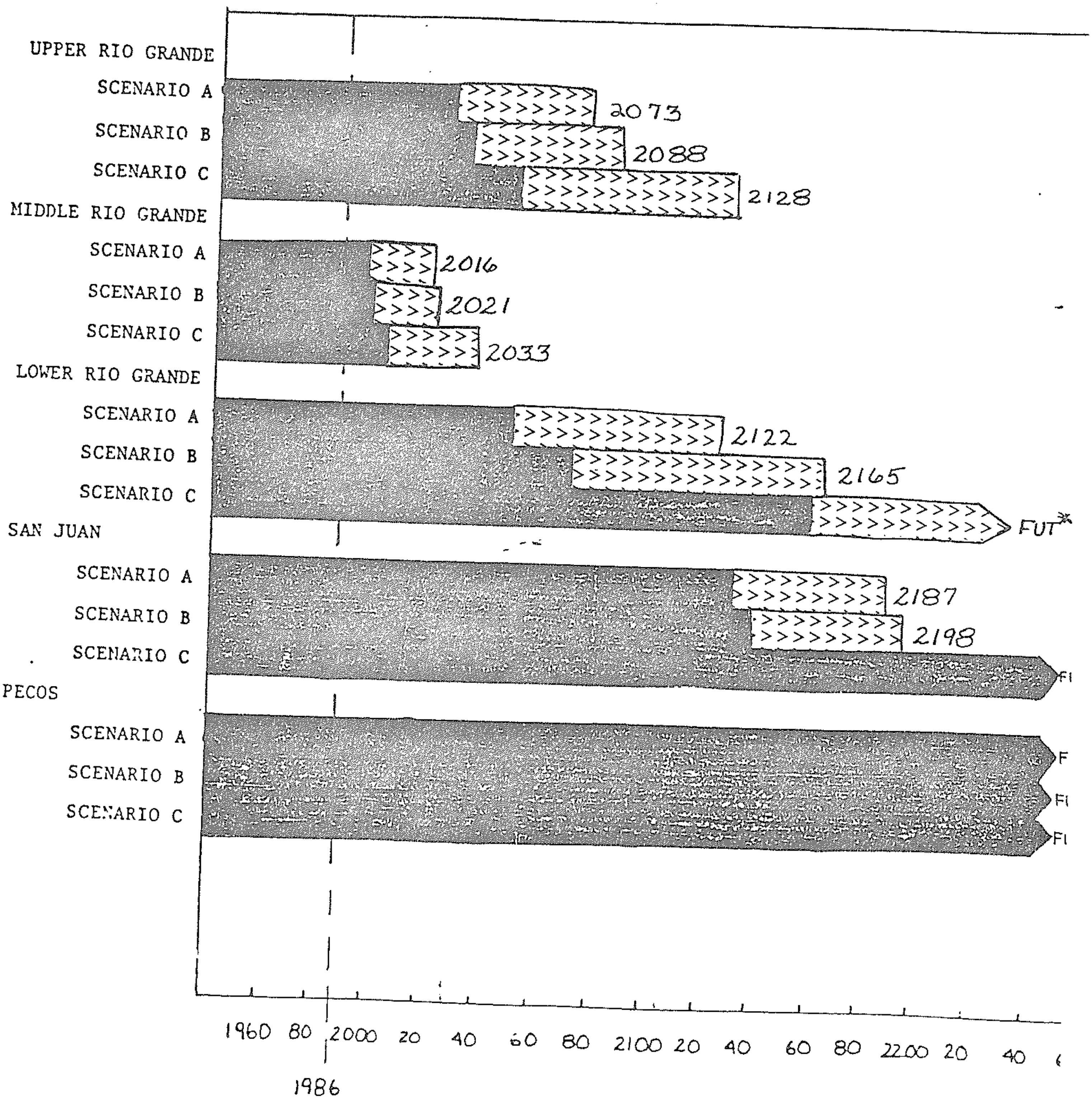
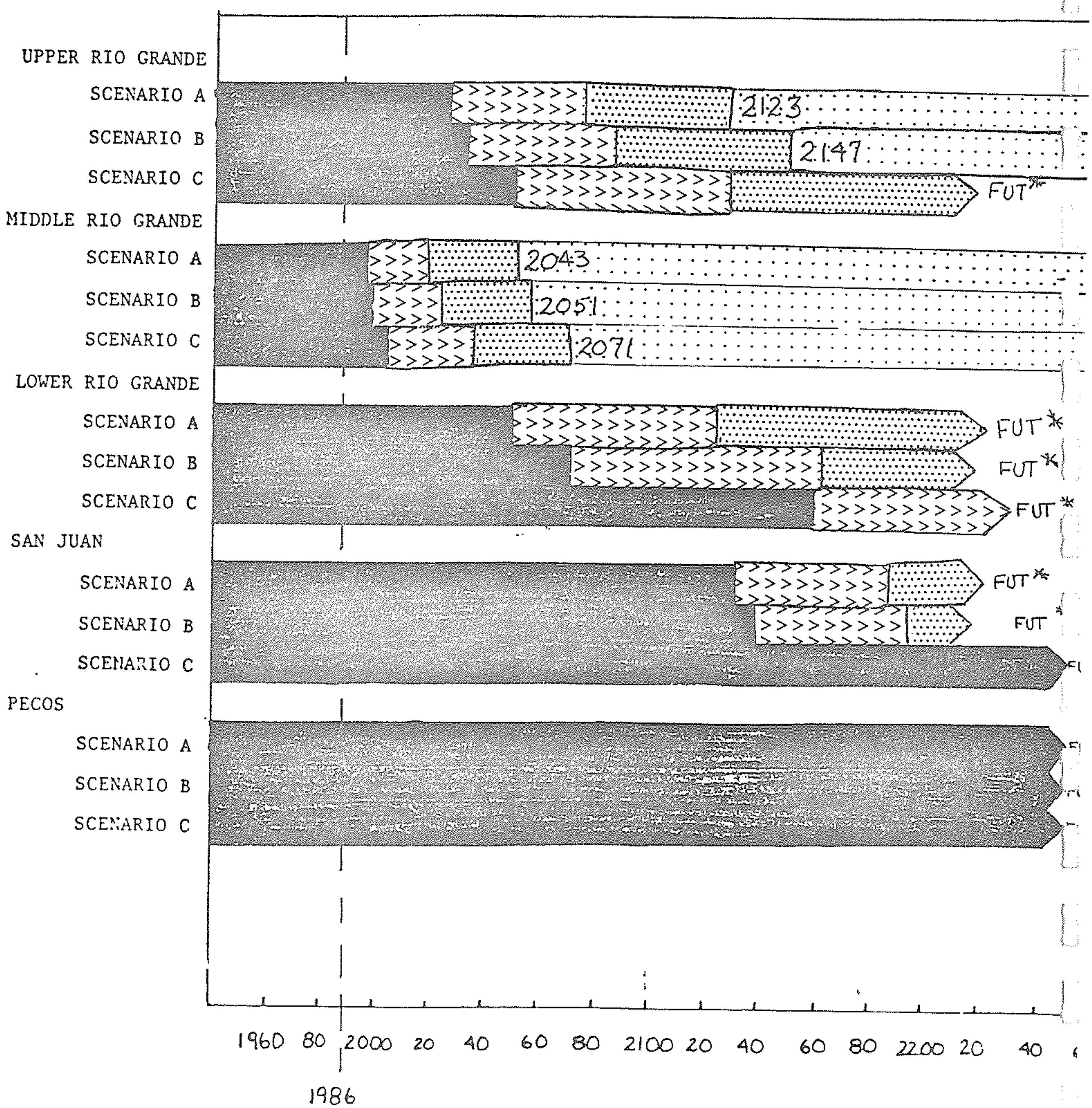


FIGURE 6

ESTIMATED BENCHMARK DATES

FOR ALTERNATIVE WATER DEMAND SCENARIOS

BENCHMARK T-3 FOR TRIBUTARY BASINS



In Closed Aquifers relatively "immediate" appropriation of unappropriated groundwater happens in Animas, Jal and Lea County Basins. Appropriation of all unappropriated water is estimated to occur within the next 50 years (by around 2030) in the Estancia, Lordsburg, Mimbres and Nutt-Hockett Basins regardless of the Demand Scenario used. All else equal (i.e., in the absence of water transfer projects), unappropriated groundwater in New Mexico's closed aquifers may extend beyond 50 years only in two of the nine basins that now have unappropriated groundwater supplies: the Tularosa and Tucumcari Basins. A similar pattern is seen in terms of declines in agricultural uses in New Mexico's closed basins. Major adjustments by farms to water scarcity (Benchmark C-2) can be expected in most basins within the next 50 years; major reductions in irrigated acreage (Benchmark C-3) can be expected within 50 years in the Jal Basin and within 100 years in the Animas, Lordsburg and Mimbres Basins.

As for Tributary aquifers, adjustments of 10 percent reduction in agricultural water use (Benchmark T-1) are estimated to be required within 20 years in the Middle Rio Grande Basin and within 50 to 100 years in the Upper and Lower Rio Grande Basins. Substantial retirement of irrigated acreage (Benchmarks T-2 and T-3) is not generally expected until well beyond 100 years, except in the Middle Rio Grande Basin. In the Middle Rio Grande Basin, the retirement of irrigated acreage may occur between the years 2022 and 2039.

The major conclusion suggested by the data in Table 7-2 are as follows:

(1) In many basins New Mexicans will feel the effects of water scarcity in the near future even if interstate demand is not accounted for; and

(2) There are some basins where severe water shortages may be several decades away, and in these basins more stringent conservation and management can provide orderly growth and development of basin economics—absent any distortion attributable to substantial reductions in available supply.

CHAPTER 7 ENDNOTES

1. C. DuMars, The Impact of Recent Court Decisions Concerning Water and Interstate Commerce on Water Resources of the State of New Mexico (Report to Governor Toney Anaya and the Legislative Council Pursuant to 1983 N.M. Laws ch 98 (1984).

2. Estimates for the High Plains counties are based on the study of the Ogallala Aquifer reported in New Mexico Water Resources Research Institute, Reports 146-150 (1982).

3. Indeed, for the tributary aquifers they may even be considered minimum amounts, since they assume wells would only be drilled within six miles of the river. To the degree that wells could be drilled at greater distances, more water could be considered "in storage."

4. Howe & Linaweaver, The Impact of Price on Residential Water Demand and Its Relation to System Design and Price Structure, Water Resources Research, Vol. 3, at 12-32 (First Quarter 1967).

5. Hanke, Demand for Water Under Dynamic Conditions, Water Resources Research, Vol. 6, at 1253-61 (Oct. 1970).

6. See, e.g., Callaway, et. al. Industrial Economic Model of Water Use and Waste Treatment for Ammania," Water Resources Research, Vol 10, No. 4 (Aug. 1974); Moore & Hedges, Economics of On-Farm Irrigation Water Availability and Costs, Giannini Foundation Research Report No. 263 (University of California, Berkeley, 1963).

7. These formulae are:

   Benchmark C-2: $t = {}^{2}\ln[(10\%\text{ of annual agr. use})/(\text{base year M\&I use})]^{3}/\ln(1+r)$, where r is the annual rate of increase in M&I uses.

   Benchmark C-3. $t = {}^{2}\ln[(25\%\text{ of annual agr. use})/(\text{base year M\&I use})]^{3}/\ln(1+r)$, where r is the annual rate of increase in M&I uses.

8. Benchmarks T-1, T-2 and T-3 require solution of the equation: $B(1+r)t = z\%(\text{surface flows})$, where r is the rate of increase in M&I water uses (see Table 6-9 in Chapter 7) and z is 10%, 25% and 50% for T-1, T-2 and T-3, respectively (relevant surface flows are given above in Table 1).

9. See *Water Supply Alternatives for El Paso*, at C-7 (a report prepared for El Paso Water Utilities by Lee Wilson & Associates, Inc., Santa Fe, New Mexico, 1981).

CHAPTER 7 APPENDIX

Several technical issues underlying the computation of Benchmark dates in the text of Chapter 7 are clarified in this appendix. First, for M&I uses, define B as base year water use; r is the annual rate at which M&I uses are to grow through time. Cumulative water use between the base year and any future year t is given by the following equation.

$$\frac{(1+r)^{n+1} - 1}{r}$$

Second, the following estimates of 1980 pumping depths in closed aquifers were used:

BASIN	1980 PUMPING DEPTHS
Estancia	125 feet
Tularosa	250
Hueco	500
Animas	175
Lordsburg	175
Mimbres Valley	160

Third, at the time that unappropriated groundwater supplies are depleted in closed aquifers (at Benchmark C-1), M&I users have appropriations for annual pumping rates sufficient to satisfy annual pumping requirements for 40 years; thus, technically, M&I users would not need to acquire agricultural water rights for 40 years. Waiting for 40 years would not be advisable for obvious reasons: the greater the degree of relative scarcity, the higher one the price of water rights that one might expect. Thus, in this study we assume that M&I users maintain a 40-year planning horizon. The practical effect of this assumption is that, in the calculation of Benchmark dates C-2 and C-3, M&I users begin "acquiring" agricultural water rights in any year t which they will require to satisfy M&I demands for water in year t+40.

Finally, the hydrology of river-related, tributary aquifers is very complex and not easily explained in intuitive terms; a reasonably cogent description of the workings of the tributary aquifer is given in DuMars, et.al. (1984). Two characteristics of such aquifers are of primary concern for our purposes: (a) if one pumps at the level L acre-feet/year from the aquifer into perpetuity, after a few years river flows will be reduced by some fraction (f) of L; the fraction f will increase over time, eventually rising to (and remaining at) unity. Thus, eventually, river flows are lowered by the full pumping amount L. (ii) the fraction g = 1-f measures the fraction of the pumping level L that reflects the dewatering (mining) of the unappropriated groundwater stock; paralleling (i), g declines over time—the fraction of L that comes from dewatering the aquifer falls as "river effects" rise.

The major implications of the above for our study are as follows: given that our basin-wide demand for water estimates are couched in terms of changes in perpetual water uses, an increase in water demands of L acre-feet/year implies the <u>eventual</u> <u>necessity to retire surface water rights in the amount of L acre-feet</u>. The upper limit on increased pumping (perpetual pumping) is, therefore, independent of the unappropriated ground water stock per se; it is limited by annual surface river water depletions which can be acquired by the pumper. The volume of unappropriated ground water in the tributary aquifer is of in direct relevance: it affects the timing of river effects from pumps; and, therefore, the time at which surface water rights must be available for retirement. Thus, referring to Table 1, the "supply" data of relevance for any given groundwater basin involving a tributary aquifer is "surface depletion," not unappropriated groundwater.

Given the above, our calculation of dates at which benchmarks are achieved is straightforward. Let B0 be baseline (1980) water depletions. Let dS be the percent retirement of surface water rights associated with a given benchmark (dS = as a percent of river flows in a given basin, 10%, 25% and 50% for benchmarks 1, 2 and 3, respectively). Define r as the average, weighted growth rate in water demands, calculated as above in the case of closed aquifers. Our interest is simply in the value of t that satisfies the equation

$$B0 + dS = B0(1 + r)(\exp t),$$

or

$$t = \ln[(B0 + dS)/B0]/\ln(1 + r).$$

CHAPTER 8

COSTS OF WATER TRANSFER PROJECTS

I. INTRODUCTION

In this and the following chapters, attention is focused on issues related to potential interbasin and interstate water transfers—moving large amounts of water from sources of "excess" supply over fairly large distances to places of water shortages. Since the Sporhase decision, any calculation of future demand for water must include all of the demands in the region, whether in state or out of state. The potential out-of-state demand is only realistic if based on water transportation projects that are economically feasible. In this chapter, therefore, we develop ranges of probable costs for water transportation projects. In the following chapter, Chapter 9, these costs are used for analyses of potential economically feasible demands for New Mexico's unappropriated groundwater supplies from out-of-state sources.

The discussion is organized as follows. We begin in Section II with a general overview of the major components of the cost structure for any given water transportation project. In Section III, costs for western transfer projects that are either in the planning process or have already been constructed are reported on the basis of cost per acre-foot per mile that the water is transferred. This information is the basis for the discussions in Section IV, in which we suggest a plausible range for water transfer costs that can be used in Chapter 9's discussions of interstate demands for unappropriated groundwater supplies in New Mexico.

II. COSTS COMPONENTS FOR WATER TRANSFER PROJECTS

Efforts to estimate water transportation project costs must inevitably deal with the uncertainties characteristic of any large construction project. In what follows we briefly sketch the major components of direct and indirect[1] costs for such projects and, when appropriate, comment on the uncertainties associated with such estimates.

The costs of interbasin water transfers depend on a large number of factors. Obviously, the distance over which water is to be transferred will substantially affect costs. Also, geographic variables (e.g., elevation and general terrain) can be important cost determinants. Pumping water uphill requires more energy and is, therefore, more costly; likewise, construction of canals through rough terrain can be much more difficult and costly than the same canals built through "normal" terrain. Kuiper has estimated that the existence of "difficult" as opposed to "easy" geographic conditions can result in average capital cost escalations by a factor of 2 to 5 times for pipelines and canals, respectively.[2]

Despite the number of variable involved in water transport, most projects have certain characteristics in common. Water must be moved through some type of conveyance system from an initial point of diversion to a point of delivery, where it can be distributed to its final consumptive users.[3] In what follows we examine some of the specific cost elements that have to be considered in a "typical" water transport system. Water supply systems are comprised of acquisition facilities, treatment plants (where needed), and transmission systems. Each of these cost components is briefly discussed below.

A. <u>Acquisition</u>

Acquisition involves either tapping a source of water that is sufficient in quantity to satisfy present and potential future demands or to convert an intermittent source into a continuous supply by storing surplus water for use during periods of low flows.[4] For a surface water diversion, dam construction costs are usually the largest expenditure. When groundwater is used, on the other hand, large well development costs may be incurred. Obtaining legal rights-of-way to acquisition facilities is another potential cost element at this stage. (Right-of-way costs are also involved in the transmission stage for pipelines, electric transmission lines and access roads.)

B. <u>Treatment</u>

If the water to be transferred is not of satisfactory quality at the point of acquisition (this is more often a problem with surface water than groundwater), treatment is required before the water can be used. The two main elements of treatment costs are capital construction costs of the facility and operating and maintenance costs. With relatively large construction projects, the average costs associated with treatment facilities are typically assumed to decline as the quantity of service provided increases. Treatment steps can include settlement (to remove grit and turbidity), filtering, chlorination, and disinfecting (of polluted water), among other things. Locating the treatment plant at the initial diversion site allows for the use of potable water all along the transport route.

C. Transport

Most conveyance systems will consist of a series of pumping stations connected by high pressure pipelines for uphill portions and gravity transmission lines on downhill portions. Therefore, the major costs involved are construction and right-of-way costs for pumping stations and pipelines, energy costs for the pumping, and annual operating and maintenance costs for the system. Specific item costs are, of course, dependent upon the exact nature of the water project. Transport costs are exemplified by the Silver City project,[5] parts of which are given in Table 8-1. The study team has been informed that this project is not presently an "active" project because it is too costly. Examination of the transport cost components for the Silver City project given in Table 8-1 yields the following observations:

(1) Direct construction costs are typically calculated by taking quantities from preliminary engineering designs, and multiplying by appropriate unit prices.

(2) Cost analyses are made using annual project costs. Capital costs alone do not provide a meaningful basis with which to compare alternate projects, as they ignore certain annual costs which can contribute a significant amount to total costs.

TABLE 8-1

Cost Summary for Silver City Project
High Transmission (66 cfs) System - 1981 Dollars

Cost Element	Number of Units	Unit Cost ($)	Total Cost ($1000)
1) Land and Right-of-Way			
a. Dam	6 acres	$500/acre	30
b. Pumping Stations (4)	4 acres	1250/acre	5
c. Pipelines	16 miles	1000/mile	16
d. Off-Stream Reservoir	100 acres	1250/acre	125
2) Diversion Dam	1	$841,000	841
3) Pipelines			
48" diam. pressure line	23,600 ft	PL equation*	6,962
48" diam. gravity line	61,200 ft	GL equation	9,853
4) Pumping Station #1	TDH 450 ft	PS equation	3,244
#2	486		3,444
#3	420		3,078
#4	152		1,594
5) Off-Stream Reservoir			546
6) Service Roads	10 miles	$20,000/mi.	200
7) Power and Communications			1,500
8) Mobilization (5% of Construction Subtotal)			1,572
Sub-total: Total Field Costs		$33,010	
9) Construction Costs (25% of Field Costs)			8,253
10) Interest During Construction (r = 3.342%)			2,758
TOTAL COSTS			$44,021

TABLE 8-1 (Cont'd)

Annualized Costs

a) Annulized Construction Costs n = 30 yrs, r = 3.342%	2,346
b) Annual Operating, Maintenance and Replacement (5% of 2,3,4,5,6, and 7)	1,563
c) Power ($0.11 per kwh)	1,742
TOTAL ANNUAL COST ($1000)	$5,651

*Specific cost equations were used to estimate pipeline (both pressure and gravity line) and pumping station costs. The pipeline cost equations are given as follows: PL = 7.8D - 79, where PL is the estimated in-place cost (in 1981 dollars) per foot of pressure pipe of diameter D (in inches); GL = 3.95D - 28.5, where GL is the estimated cost (in 1981 dollars) per foot of gravity line of diameter D (in inches), where water flows under the force of gravity. To estimate pumping costs the following equation is used: PS = 11.4Q + 9.19 x 10-2 QH - 1.21 x 10-4 Q2H, where PS = cost in 1000s of 1981 dollars for a pumping station to lift a volume of water Q (cu.ft. per sec.) against a total dynamic head of H feet where the efficiency of the pumping unit is 0.78.

Source: Hernandez, J.W., W.G. Hines and F.D. Trauger, "Evaluation of a Municipal Water Supply for the Silver City Area Using Groundwater Recharge of Water from Conner Reservoir on the Gila River" Report prepared for Town of Siver City and New Mexico Interstate Stream Commission, August 1984, Table IV-1, pp.140-141.

(3) There are a number of indirect cost elements involved in water transfer projects. These include mobilization, contingency and engineering costs, interest charges, and a number of often neglected, but highly relevant, opportunity costs,[6] each of which can make up a substantial portion of total project costs.

Aside from the direct costs described above, a number of indirect costs are typically relevant for a water transfer project. One example of such indirect costs[7] is seen in the allowance that is usually made for "contingencies," which represents expenditures that are possible but not certain, or perhaps costs that may come up but are as yet unforeseen.[8] The allowance for contingencies can be as high as 20 percent of the total direct capital costs (see Table 8-1), due to the preliminary nature of most project designs and the uncertainty of future cost trends.

Engineering costs are usually treated as an indirect cost item, with allowances ranging up to 15 percent of the direct capital costs in some studies.[9] It has been pointed out that advance cost estimates of engineering projects are at best intelligent guesses.[10] This is due in part to the preliminary nature of the design on which cost estimates are based, but is mostly due to the difficulties of guessing at the intensity of competition among contractors a few years, or even one year, in advance.[11] Still another indirect cost for water transfer projects results from the capitalization process.[12]

One's choice of a discount rate is another important variable.[13] Costs may be quite sensitive to one's choice for such a rate and, regrettably, not much objective guidance exists for the choice of an "appropriate" discount rate for public projects. Thus, we can do little more than note the existence of this class of problems.

In sum, the difficulties inherent in making precise project cost estimates are substantial. A number of unforeseeable factors—future interest rates, the competitive climate between contractors, and even the general state of the economy—all contribute to the uncertainty. The best that should be hoped for initially is some sort of "ballpark" figure, where at least the order of magnitude of expected future costs is accurate.

III. COSTS FOR WESTERN WATER PROJECTS

This section examines project costs for several existing and planned water transportation projects. Obviously, no one plan can be chosen as a "typical" water transfer project, since there are such a large number of varying factors involved. Our purpose is simply to provide an approximate cost range for such projects. The determination of precise costs for any future project is subject to all of the caveats discussed above. In each of the projects reported below, annualized cost figures have been converted to a common scale (1983 dollars) with an interest rate of 10% and expected project life of 50 years. Costs per acre-foot and cost per acre-foot per-mile figures are reported, where possible, for each case.

A. Second Los Angles Aqueduct Project[14]

This project involved the transport of an additional 152,000 acre-feet of Inyo-Mono water to the San Fernando Valley area of California, a distance of approximately 250 miles. Being an extension of an existing system, some economies of construction were probably present that would not exist in the construction of a completely new system. Expected annual costs for this project ranged from:

\$ 46.76 - \$ 58.46 per acre-foot	(1967 dollars)
\$139.50 - \$174.40	(1983 dollars)

with the annual cost per acre-foot per mile being:

\$0.187 - \$0.22	(1967 dollars)
\$0.56 - \$0.66	(1983 dollars)

B. <u>California State Water Project</u>[15]

This project was designed to deliver 4.23 million acre-feet of water per year to the San Joaquin Valley and the Southern Coastal Area, approximately 150 miles and 425 miles, respectively. In addition, the Southern Coastal deliveries involved crossing the Tehachapi Mountains. The original total capital cost estimate was \$2.8 billion, with annual costs ranging from:

\$33 per acre-foot	(1967 dollars)
\$98	(1983 dollars)

for the San Joaquin water to:

\$120 per acre-foot	(1967 dollars)
\$357	(1983 dollars)

for the Southern California deliveries. Cost per acre-foot per-mile calculations yield a range of:

\$0.22 - \$0.28	(1967 dollars)
\$0.66 - \$0.84	(1983 dollars)

C. <u>Pacific Southwest Water Plan</u>[16]

As a possible solution to water problems in the Southwest (in August 1963), the U.S. Department of the Interior proposed to transmit 2.4 million acre-feet of Northern California water to Southern California and Lake Havasu on the Colorado River, a distance of approximately 850 miles, with each area receiving 1.2 maf. Annual costs were estimated at:

$180.71 per acre-foot	(1967 dollars)
$539.00	(1983 dollars)

or

$0.21 per acre-foot per mile	(1967 dollars)
$0.63	(1983 dollars)

D. Alternate Southwest Water Plan[17]

An alternative to the Pacific Southwest Plan was proposed by Samuel B. Nelson, former General Manager and Chief Engineer of the Los Angles Department of Water and Power. Nelson's plan called for the diversion of 2.4 maf of Snake River water near Twin Falls, Idaho, to the Colorado River at Lake Havasu, a distance of roughly 450 miles. By lifting the water some 3200 feet, and then dropping it 4500 feet into Lake Mead, a net power gain of 10 percent (over pumping energy costs) could be realized. Nelson's cost estimates of the project were $32 per acre-foot in 1963. The use of a 10 percent interest rate and 50-year time horizon brings this up to $92.37 (1967 dollars), $275.54 (1983 dollars) per acre-foot, or $0.205 per acre-foot per mile.

E. Modified Snake-Colorado Project[18]

This plan involved the diversion of 5 maf of water per year from McNary Dam on the Columbia River near Pasco, Washington. After being pumped to an elevation of 5150 feet for storage, conduits would transport it over 1000 miles to Lake Mead. The plan called for an ultimate delivery of 15 maf annually, with annual costs ranging from:

\$ 74,04 - \$105.22	per acre-foot	(1967 dollars)
\$220.86 - \$313.87		(1983 dollars)

with costs per acre-foot per mile approximately:

\$0.074 - \$0.105	(1967 dollars)
\$0.22 - \$0.313	(1983 dollars)

F. Western Water Project[19]

As proposed by Colonel F.Z. Pirkey, this project involved the initial diversion of 15 maf from the lower Columbia River at Dallas, Oregon, with ultimate deliveries at Lake Mead and along the Owens Valley aqueduct route to Southern California. Based on the 1963 estimated cost, the annual cost per acre-foot of water delivered from this project is:

\$116.46	(1967 dollars)
\$347.40	(1983 dollars)

Over a transport distance of about 750 miles, the annual cost per acre-foot per mile is \$0.155/\$0.46.

G. Oklahoma Comprehensive Water Plan[20]

As part of this plan, a proposal was initiated for a water conveyance system, which would divert surplus flows at Lake Eufaula on the Canadian River and at Robert S.D. Kerr Reservoir on the Arkansas River, both in eastern Oklahoma, and transport the water for use in North Central and Northwestern Oklahoma. The system was to deliver about 855,000 acre-feet per year at an estimated construction cost (1978 dollars) of \$5.3 billion. The annual cost of delivered water is \$625 per acre-foot, or \$2.50 per acre-foot per mile, assuming that the water is moved over roughly 250 miles.

H. High Plains Importation Studies

One of the objectives of the High Plains-Ogallala Aquifer study was to develop plans to increase water supplies in the High Plains area. In keeping with this objective, the U.S. Army Corps of Engineers presented a cost analysis of potential importation sources to the area. Four different water transport routes were examined, each of which is presented below. The cost figures given here refer only to the initial diversion and movement of water to a terminal storage point. Subsequent distribution is not considered. Obviously, the cost of distributing the imported water to its ultimate users (mostly farmers in all likelihood) can vary tremendously depending on the locations and elevations of the users relative to the terminal storage sites. (The Corps of Engineer's project estimates are summarized and cited below in Table 8-2.)

The following routes were proposed: Route A called for the movement of water from the Fort Randall area of South Dakota, southwesterly across Nebraska to terminal storage near Bonny Reservoir in eastern Colorado. Route B involved transporting water from St. Joseph, Missouri, southwesterly through Kansas with terminal storage near Ness City, Kansas. An alternate route from the same source to final storage in Oberlin, Kansas, was also planned. Route C called for the delivery of water from Clarendon and Camden, Arkansas, and Tatum, Texas, westward through Arkansas and Texas, then westward through Oklahoma to terminal storage in Canadian Lake and Lake Meredith, Texas, and Optima Lake, Oklahoma. Route D involved water transfers from Clarendon and Pine

TABLE 8-2

Estimated Water Import Costs to the High Plains

Route	Size of Water Transfer	Total Length of Route	Elevation Difference	Total Costs Construction & Interest
A	1.91	813	2,400	5.4
	3.40	813	2,400	8.9
B	1.62	376	1,745	3.6
	3.40	376	1,745	6.5
C	1.26	611	3,280	7.0
	7.51	1,135	3,600	27.8
D	1.55	568	2,610	5.3
	8.68	860	2,725	20.6

Route	Annual Cost per AF	Annual Cost per AF per Mile
A	\$434 - \$469	\$ 0.58 - 0.53
B	317 - 363	0.84 - 0.98
C	614 - 921	0.54 - 1.51
D	393 - 567	0.46 - 0.99

Source: High Plains Study Council, 1982, Op. Cit.

Bluff, Arkansas, southwesterly across Arkansas to northeast Texas, then westward to terminal storage at Blanco Canyon in the Southern High Plains of Texas.

The cost figures in Table 8-2 point out several aspects regarding the economics of water transfers. First, the elevation difference over which water must be transported seems to be directly related to the cost of delivery per acre-foot. Moving water to higher altitudes obviously requires more extensive pumping facilities and greater amounts of energy. Also, there appear to be general economies of scale in the construction of water transport, with average costs declining as the size of the water transfer grows.

I. The El Paso Plan[21]

As a part of the analysis of water supplies for El Paso, this study concluded that if the City had to obtain its water supply from within Texas, it would be necessary to import water from considerable distances. Costs of building pipeline and operating pumping stations were estimated to be about $1.84 per thousand gallons (1983 dollars) or $602.30 per acre-foot. Over the projected distance of 100-150 miles, the per acre-foot per-mile cost would range between $4 and $6. Transfers of water from shorter distances (water from New Mexico) involved a delivered cost in the neighborhood of $0.66 per thousand gallons, or $220 per acre-foot.

J. Four Corners Plan[22]

This plan was designed to deliver up to 42,260 acre-feet of

San Juan River water to 312 Navajo Indian communities and to the city of Gallup, New Mexico. To accomplish this, 42,720 acre-feet would be diverted from the river at Farmington into a closed delivery system consisting of a water treatment plant, pipelines, pumping plants, and terminal storage tanks. Total construction costs for the project were estimated to be \$302,622,000. With annual costs for project operation, maintenance, replacement, and energy estimated to be \$5,657,000 (which includes a \$16 per acre-foot charge for obtaining water from Navajo Reservoir), the total annual costs of the project equal \$846.90 per acre-foot (1981 dollars) or \$3.33 per acre-foot per mile over the transmission distance of 255 miles. It can be noted that specific features designed to preserve and enhance the environment, as well as provide for fish and wildlife needs, were included in the plan. Among other things, the plan provided \$100,000 to investigate the endangered Colorado squawfish and its habitat requirements, specific efforts to avoid the threatened mesa verde cactus during pipeline construction and the provision of a fish ladder in the diversion structure. Additional measures were planned to be taken during construction to minimize general environmental impacts.

IV. CONCLUSION

It is difficult to generalize about the costs of water transfer, as is made apparent by the summary of costs for transfers Table 8-3. With the many variable factors affecting project design (geographical diversity—terrain, elevation and

TABLE 8-3

SUMMARY OF WATER TRANSFER COSTS

PROJECT	ANNUAL VOLUMN OF WATER TRANSFERRED (000 acre feet)	DISTANCE (miles)	COST PER AF PER MILE (1983 $)
L.A.Aqueduct	152	250	$ .56 - .66
Cal. State	4,230	150 425	.22 .84
Pacific S.W. (alternate)	2,400 (2,400)	850 (450)	.63 (.21)
Snake-Colo (Mod)	5-15,000	1,000	.22 - .31
West. Water Proj	15,000	750	.46
Okla Compr.Plan	855	250	2.50
High Plains Import			
Plan A	1,900-3,400	813	.53 - .58
Plan B	1,600-3,400	376	.84 - .98
Plan C	1,300-7,500	611-1135	.54 -1.51
Plan D	1,600-8,700	568-860	.46 - .99
El Paso	500 (approx)	100-150	4.00 -6.00
Four Corners	42.3	255	3.33

Source: Individual studies cited in text.

distance—power costs, and power recovery opportunities) it is obviously difficult to be specific about direct or indirect costs of unknown future projects.

As shown in Table 8-3, cost estimates provided by the various studies discussed above range from \$98 per acre-foot for San Joaquin deliveries of the California State Water Project to \$920.91 per acre-foot for Route C of the High Plains Importation Study. Costs per acre-foot per mile are as low as \$0.22 for the Modified Snake-Colorado Project and more than 20 times higher for the El Paso project (\$4.00-6.00 per acre-foot per mile). Despite the range in costs per acre-foot, the similarity of many of the cost estimates gives some credibility to the general range of cost figures.

It must be kept in mind that a wide variety of geographic areas and project designs are included in these studies. Nonetheless, as a rough guideline, these studies seem to indicate that a likely cost range for moving "large" amounts of water would be between \$300 and \$600 per acre-foot. In terms of acre-foot per mile units, a range of \$0.50 to \$2.50 is probably reasonable although this figure seems to be very sensitive to the distances involved in the water transfer projects. There are substantial economies of scale in operation; that is, the longer the distance covered, the lower the cost per acre-foot per mile of moving water. The drastic differences in some of the reported costs per acre-foot per mile can be attributed mainly to relative transmission distances: "short" distances will generally imply higher unit transfer costs.

Finally, several other points revealed in these studies can provide some factors that must be considered when planning future water transfer projects.

(1) There are always cost trade-offs to be considered in any project design. For example, to design a pumping station and pipeline for a given discharge, one must consider the variable and dependent elements of the capacity of the pump and the size of the pipeline. If one is larger, then the other can be smaller, and vice-versa. Determining the least-costly combination can present an interesting exercise in hydrologic and economic analysis.[23]

(2) Annual cost estimates are extremely sensitive to the interest rate used for capitalization.[24]

(3) There are substantial economies of scale to be realized in the construction of water transfer systems.[25]

(4) The extent to which power recovery is possible (by harnessing the energy of the moving water) can be an important factor in determining final project costs.[26]

CHAPTER 8 ENDNOTES

1. Much of the following discussion draws on analyses in Chapter 10 of E. Kuiper, Water Resources Project Economics (1971).

2. Based on a total discharge of 10,000 cubic feet per second (approximately 724,000 acre-feet per year). For greater discharges, the cost differences can be even larger. See id. at 181.

3. Final distribution costs will not be considered here. An excellent discussion regarding the costs of distributing water to a single urban area is given, however, in Clark & Stevie, A Water Supply Cost Model Incorporating Spatial Variables, 57(I) Land Economics 18 (Feb. 1981.)

4. The following discussion of water supply economics is based on concepts presented in Clark & Stevie, supra note 3, and in J. Hernandez, et al., Evaluation of a Municipal Water Supply for the Silver City Area (report prepared for the Town of Silver City and the New Mexico Interstate Stream Commission 1984).

5. See Hernandez, supra note 4.

6. "Opportunity costs" are the values foregone when a resource such as water is put to one particular use.

7. We acknowledge the potential importance of other indirect costs such as opportunity costs (mentioned earlier) and "externality" costs. These classes of indirect costs are discussed at some length in C. Howe & W. Easter, Interbasin Transfers of Water: Economic Issues and Impacts chs. 4, 5 (1971), and in R. Haveman & J.Krutilla, Unemployment, Idle Capacity and the Evaluation of Public Expenditures: National and Regional Analysis (1968). Extensions of these concepts to issues concerning environmental quality begin with the pioneering work by Kruitlla, Conservation Reconsidered, 47 American Economic Review 777 (Sept. 1967).

8. See Kuiper, supra note 1, at ch. 5.

9. Involved here are expenditures associated with engineering activities such as preliminary field studies (groundwater hydrologists are needed to review previous reports, and examine groundwater availability and quality in the study area, for example), consulting services, detailed design,

and final supervision of the construction of the project itself.

10. *See* Kuiper, *supra* note 1, at ch. 5.

11. For example, when there is not enough manpower and equipment to take care of all the necessary construction, the final costs of projects may exceed the estimated costs by as much as 50 percent. On the other hand, if contractors are not working, and are desperate to keep their equipment and key personnel from periods of prolonged idleness, projects may be built for up to 50 percent less than originally estimated. Whereas in the first case, the contractor may earn substantial profits due to the nature of the competitive environment, in the second case the contractor may be willing to undertake the job "at cost," in order to stay alive as a firm and retain his trained personnel. Obviously, in the presence of such uncertainties, it is somewhat pointless to expect preliminary cost estimates to exhibit a great deal of precision.

12. In addition to the operating and maintenance costs, an important annual cost item is the interest payment made on funds borrowed at the beginning of the project to finance construction. The capitalization of this initial cost is typically accomplished over a specific time period, determined by the project's estimated useful life, and at a certain discount rate, reflecting the time value of borrowed money. In many cases, a 50- to 100-year useful life is assumed. This choice may be somewhat arbitrary; however, such choices are not terribly important as far as annualized costs are concerned. For example, a water development project involving an initial $4 million construction cost, with a useful life of 50 years and financed at a 10 percent rate of interest, will have to bear an annual capitalized cost of around $403,440. The annual cost of the same project spread over a life of 100 years will be about $400,030, a difference of less than one percent. Annual costs are, therefore, not very sensitive to changes in the project's useful life, as the present value of money received or paid for in the future (in this case between years 50 and 100) is quite low. In view of all the other uncertainties inherent in cost estimating, this particular item (choice of the project's useful life) can become relatively insignificant.

13. Hanke & Anwyll, *On the Discount Rate Controversy*, 28(2) Public Policy 171 (Spring 1980).

14. Taken from Socha, *Construction of the Second Los Angeles Aqueduct*, J. Amer. Water Works Ass'n 699 (June 1965).

15. Taken from data reported in Engineering News Record (May 18, 1967).

16. U.S. Department of the Interior, Pacific Southwest Water Plan: Report and Appendix (Aug. 1963).

17. See S. Nelson, Snake-Colorado Project: A Plan to Transport Surplus Columbia River Basin Water to Arid Pacific Southwest (Department of Water and Power, City of Los Angeles, 1963).

18. See Dunn, Statement on Modified Snake-Colorado Project (Dunn Plan), statement prepared for presentation before the Sub-comm. on Irrigation and Reclamation, Comm. on Interior and Insular Affairs, U.S. House of Representatives (1965).

19. F. Pirkey, Water for All (cited in Howe & Easter, supra note 7).

20. Taken from High Plains Study Council, A Summary of Results of the Ogallala Aquifer Regional Study (Dec. 13, 1982).

21. L. Wilson, Water Supply Alternatives for El Paso (prepared for El Paso Water Utilities Public Service Board, El Paso, Texas, Lee Wilson and Associates, Santa Fe, New Mexico).

22. U.S. Department of the Interior, Gallup-Navajo Indian Water Supply Project (Jan. 1984).

23. A specific example is seen in the Silver City Project, where the cited High Transmission System (Plan 2) yielded much higher per-acre-foot costs than an alternative, Low Transmission Plan (Plan 1). However, construction of the lower capacity conveyance system would reduce the possibility of lowering reservoir evaporation losses. Plan 2, with its higher pumping rate, could minimize the need for the multi-year carryover storage and reduce the necessary reservoir size (and cost). To select between these two alternatives, one should consider not only direct costs but also certain hydrologic information pertaining to the functional relationships between evaporative losses and the capacity and cost of each conveyance system.

24. As an example, consider that the total capital cost of the California State Water Plan of $2.8 billion (1967 dollars) implied an average annual capital cost of $35 per acre-foot, assuming a 50-year life and a 5 percent interest rate. If a 10 percent rate of interest is used, however, the annual capital cost rises to $64.44 per acre foot, an increase of over 80 percent.

25. There are relatively large fixed costs involved in the movement of even small amounts of water, but greater economies can be reached with larger diversions from the same source. The High Plains Importation Study cost estimates pointed this out particularly well, with each of the four proposed routes showing lower annual per acre-foot costs with larger water transfers. The annual costs per acre-foot of Route A,

for example, amounted to $468.66 for the yearly movement of 1.91 million acre-feet over 813 miles with an elevation difference of 2400 feet (uphill). Moving 3.4 million acre-feet over the same route resulted in annual per acre-foot costs of only $433.91. Similarly, costs calculated on a per acre-foot per mile basis revealed substantial economies to be gained over longer distances as well.

26. In the Alternate Southwest Water Plan proposed by Samuel Nelson, for example, water was to be lifted some 3200 feet and then "dropped" 4500 feet into Lake Mead. This would result in a new power gain (over pumping energy costs) of 10 percent for that section of transfer and would provide considerable cost savings. Obviously in some sections of the Southwest where the terrain is relatively flat, this type of natural power recovery may not be as feasible.

CHAPTER 9

DEFINING THE ECONOMIC LIMITS OF MARKETS FOR UNAPPROPRIATED GROUNDWATER IN THE NEW MEXICO REGION

I. INTRODUCTION

Generally speaking, New Mexico's surface water resources and much of its groundwater resources are fully appropriated. As will be developed in this chapter, water resources in states contiguous to New Mexico are also fully appropriated. As a consequence, existing and anticipated future water deficits in those states may provide strong incentives for them to consider the potential for importing New Mexico waters as a means for easing their own water shortages.[1] It is important for our purposes of assessing future demands on New Mexico water supplies to determine these states' economic capacity to actually implement efforts to import water from New Mexico. Where exportation to a neighboring state is economically feasible, that demand must also be included in New Mexico's water future.

For a state water transfer to be economically feasible, the benefits generated from additional water use should at least equal the costs involved in obtaining that water. In Chapter 8 the issue of costs of water transfer projects was described. Section II of this chapter discusses "benefits" from such transfers to water users. These "benefits" are translated into the users' willingness to pay for transferred water. Stated more simply, Section II discussed how much water users will pay for water transfer projects in order to get the water. In Section III we bring together our estimates of "benefits" with Chapter 8's estimates for transfer costs to try to define the limits of the regional markets for New Mexico's unappropriated groundwater. Conclusions concerning this issue are set out in Section IV.

II. WATER USERS' WILLINGNESS TO PAY FOR WATER TRANSFERS

In what follows, we review a number of studies which provide a range of estimates for the "willingness to pay" for water by various water using groups. User groups of primary interest for our purposes are in the irrigated agricultural, residential, commercial and industrial sectors.

A. Irrigated Agriculture

The following studies provide a range of estimates for irrigation benefits attributable to water that might serve as rough approximations for the willingness to pay for imported water by farmers or farming sectors in sister state economies.

1. Colorado

By analyzing farm sales data from the North Poudre Irrigation Company, Hartman and Anderson[2] were able to estimate the value of supplemental irrigation water in northeastern Colorado. The company issued shares that entitled the holder to a specified percentage of the area's total water supply available in a given year. There existed an established market for these shares within the company. The results indicated that the annual value for incremental water was approximately $3 per acre-foot (using a 10 percent capitalization rate). In 1983 dollars, this equals about \$10 per acre-foot for direct benefits of water in irrigated agriculture.

In another Colorado study, Anderson examined the irrigation water rental market in the South Platte Basin.[3] In an area such as the South Platte Basin where water rights are owned by irrigation companies, are readily transferable, and where there are many potential buyers of temporary rights to excess water, rental prices for water may be viewed as a measure of water's marginal value in irrigated agriculture. Therefore, these prices reflect the irrigation sector's annual willingness to pay for water at the margin. The Anderson study reported that rental prices charged by representative irrigation companies ranged from \$2.50 to \$8.00 per acre-foot (in 1959 dollars). This suggests direct values for water in the irrigation sector (in 1983 dollars) that may lie somewhere between \$10 and \$35 per acre-foot.

Looking beyond direct, on-farm values of water in agriculture to economy-wide values that may be attributed to the use of water in irrigation—i.e., to "total" benefits accruing to agricultural or even statewide economies[4]—Hartman and Seastone analyzed the income losses resulting from the diversion of water from agriculture to other uses in northeastern Colorado.[5] When translated to 1983 dollars, the range of income loss if water were diverted from agricultural to other uses was about \$43 to \$100 per acre-foot. Total—direct and secondary—benefits to agriculture attributable to water (a potential range for a state's willingness to pay for transferred water to be used in the agricultural sector) would range between $53.00 to $135.00 (1983 dollars) per acre-foot.

2. Arizona

Stutts[6] analyzed the impact of falling groundwater levels on agriculture in Pinal County, an area which accounts for about one-fourth of the state's cropped area. By examining the changes that would likely take place between 1966 and 2006, the study determined that the value of income foregone in agriculture would average $13 per acre-foot by the year 2006; in 1983 prices, this direct value of water in irrigation would be about $40 per acre-foot.

Goss and Young collected data on the pricing policies of the major water distributing agencies in Central Arizona.[7] They found that the prices charged for additional water beyond the basic allotment ranged from zero to $10 per acre-foot (a direct value of about $30 per acre-foot in 1983 dollars).

By constructing budget studies for a "typical" farm in Central Arizona, Young and Martin[8] also studied the direct value of water in Arizona agriculture. They calculated an "average short-run ability to pay" for water for each of a number of crops by examining differences between revenues and variable costs. Results from this work would seem to place the marginal value of water at less than $21 per acre-foot for the production of barley, alfalfa, and grain sorghum—crops that account for around half of the total water consumption in Arizona. (In 1983 dollars, this direct value is about $60 per acre-foot).

By adding water costs to data on personal income (wages, rents, profits, and interest) derived by Young and Martin, Howe and Easter[9] estimated the value added directly and indirectly per acre-foot of water intake for different agricultural sectors of the Arizona economy. They calculated value added per acre-foot of $28, $30 and $104 for the food and feed grain sector, forage crops sector, and high value intensive crops sector, respectively. Such figures imply a range of total (direct and secondary) agricultural benefits of $90-$300 per acre-foot in 1983 prices.

3. Texas

The value of irrigation water to the Texas High Plains was studied by Grubb.[10] He projected direct benefits estimates to 2020 for a "representative" High Plains agricultural acre and found that the marginal direct benefits of water for the High Plains were no more than $27 per acre-foot (in 1980), with this figure gradually increasing over time as irrigation efficiency increased.

In addition to estimating direct benefits, Grubb also studied the incomes generated indirectly by irrigated agriculture in the Texas High Plains.[11] In the study, direct benefits plus value added in related industries ranged from $81 per acre-foot to $119 per acre-foot after 1980. Howe points out that with the implicit assumption that all indirect inputs would be unemployed in the absence of irrigated agriculture, these figures probably substantially overstate total economic benefits per acre-foot of water supplied.[12]

Based on all of the above, in general the value of direct benefits to the agricultural use of water seems fairly low in the southwestern states, probably below $100 per acre-foot. When secondary benefits are taken into account, total benefits seem to range between $30 and $150 per acre-foot.[13] At least one of the studies cited did indicate larger short-run benefits (almost $300 per acre-foot for high-value intensive crops in Arizona), but this does not necessarily imply that the long-term willingness and ability of direct users to pay for water will be comparably large. Many of the value-added components that were counted in generating the total benefit figures represent out-of-pocket costs to the farmers involved. These total benefit figures, therefore, are only the upper bounds on agriculture's willingness to pay for water.

B. <u>Municipal and Industrial (includes Commercial)</u>

To estimate the benefits generated from water use for municipal and industrial purposes, a simpler procedure is employed. Basic demand theory dictates that the price charged for water can be loosely interpreted as representative of the direct benefits realized by the immediate user when certain market conditions prevail. Stated more simply, if the City Council members raise water rates too high, they will be voted out of office. Therefore, the current amount that people pay for their water probably reflects what they are willing to pay.

By using actual residential and commercial (large and small-scale) water rates in selected southwestern cities, then, estimates of the total benefits obtained from these water applications can be generated. For these analyses, current water schedules from Tucson, Arizona, Lubbock, Texas, and Amarillo, Texas are used, along with those for Albuquerque. The Texas and Arizona municipalities are included primarily due to their proximity to New Mexico.

Table 9-1 presents residential water rate schedules for the four cities examined. Each city employs a slightly different pricing technique. For example, Tucson's rate schedule is progressive in nature, charging higher marginal rates as water use expands. Amarillo and Albuquerque, on the other hand, charge a flat rate for initial use followed by a commodity (per unit) charge that is also constant. The rate schedule of Lubbock, Texas, is regressive in nature, charging lower marginal rates as water use increases.

By applying the rates from each city to a "typical" residential family using 13,000 gallons of water per month, an approximation of "willingness to pay" for municipal, residential water can be estimated. Table 9-2 reports our results. The value of residential water, as implied by the current rates of Table 9-1 and Table 9-2, ranges from \$436.28 to over \$700 per acre-foot. It must again be pointed out that these figures only provide a rough, lower estimate of the value of residential water.

Municipal water rate schedules for commercial and industrial (C&I) uses are given in Table 9-3. While C&I rates are the same as residential rates in Lubbock, the other cities employ slightly different rate structures for such water use. In Amarillo, for example, initial rates are higher, but for larger quantities the

C&I rates are lower than the residential rates. The Tucson C&I rate structure is still progressive in nature, but overall is on a lower scale than the residential rates and even includes a special discount rate for large water users. Finally, Albuquerque charges its C&I users the same commodity charge, but higher flat fees. To present an approximate range of the benefits associated with C&I water use, Table 9-4 shows hypothetical monthly water bills in each of the four southwestern cities, based on assumed water use of between 25,000 and 500,000 gallons per month, and the implied cost per acre-foot involved.

Thus, the implied value of municipal water seemingly ranges from $335 to over $700 per acre-foot for residential use and from less than $200 to more than $1000 pre acre-foot for C&I uses. It must be kept in mind that these figures were generated in a crude manner and only provide very rough estimates of the value of water in the municipal sector. It is significant to note, however, that these figures are several times larger than the values calculated for irrigation use, thereby supporting the notion that willingness to pay for additional water will be significantly greater for the municipal and industrial sectors rather than for agricultural users.

III. ESTABLISHING THE LIMITS OF THE REGIONAL WATER MARKET

Two basic set of facts have been developed in this chapter and in the preceding chapter:

TABLE 9-1

Monthly Residential Water Rate Schedules in Selected Southwestern Cities*

Lubbock, TX (per 1000 gallons)	1st 1000 gallons	$5.46
	1000 - 50,000	1.13
	51,000 - 250,000	.97
	250,000 - up	
Amarillo, TX (per 1000 gallons)	1st 2000 gallons	$4.35
	2000 - up	.83
Tucson, AZ (per 100 cu.ft.)**	1st 500	$ .80
	2nd 500	.90
	next 1000	1.24
	next 1000	1.54
	next 2000	1.74
	over 5000	1.96
Albuquerque, NM Flat Fee:	$4.00 Type 1	
	7.10 Type 2	
	11.09 Type 3	
	15.97 Type 4	

plus commodity charge of 47¢ per 100 cubic feet

*All rates obtained from phone conversations with various city water department representatives, May 1985.

**Summer rates; winter rates are approximately 25% lower.

TABLE 9-3

Commercial Monthly Water Rate Schedules
in Selected Southwestern Cities

Lubbock, TX		
(per 1000 gallons)	1st 100 gallons	$5.46
	1000 - 50,000	1.13
	51,000 - 250,000	.97
	250,000 - up	.91
Amarillo, TX		
(per 1000 gallons)	1st 2000 gallons	$4.55
	2000 - 50,000	.55
	51,000 - 500,000	.49
Tucson, AZ	Small-Scale Commercial	
(per 100 cu.ft.)	1st 1000	$ .80
	2nd 1000	.86
	3rd 1000	1.15
	next 2000	1.19
	next 2500	1.44
	over 7500	1.62
	Large-Scale Commercial	
	$ .89 per 100 cubic feet	
Albuquerque, NM		
Flat Fee:	$25.89 Type 5	
	35.49 Type 6	
	63.09 Type 7	
	141.95 Type 8	
	252.36 Type 9	

plus a commodity charge of 47¢ per 100 cubic feet.

(1) We have demonstrated that a reasonable range for the <u>costs</u> of water transfers would be $0.50 to $2.50 per acre-foot per mile.

(2) We have also demonstrated that reasonable ranges for the <u>willingness to pay</u> by two major user groups for transferred water would be $75.00 to $125.00 per acre-foot for agricultural users and $535.00 to $1,700.00 and up for municipal/industrial users.

These facts are used to analyze the regional demand picture for water supplies in New Mexico. To this end, we first ask the question: (1) to what extent do water deficits in neighboring states imply pressures, and therefore benefits/willingness to pay, for their importation of water? We then ask the second question: (2) to what extent might transfer <u>costs</u> limit the interstate demands on unappropriated groundwater supplies in New Mexico?

To answer the first question, one must ask if present and future conditions in neighboring states might provide incentives to pursue the importation option. In this regard, we need only refer the reader to the recent study by DuMars, et al.[14], in which present and future water deficits in neighboring states are examined. Thus, in areas that lie in "bands" of economically feasible water transfers, DuMars, et al. estimate annual water deficits (by the year 2000) on the order of 10 million acre-feet in Texas, .75 million acre-feet in Oklahoma, 9,000-plus acre-feet in Colorado and 1.5 million acre-feet in Arizona. These numbers plainly demonstrate a willingness to pay for a water transfer project importing water into these states.

There are two ways to address the second question: to what extent might water transfer costs limit transfers of water from New Mexico. First, assume that unappropriated groundwater supplies are available near New Mexico's borders (as is the case, for example, along New Mexico's eastern and southeastern borders). Then examine how far from New Mexico's borders one might economically transfer New Mexico groundwater. Tables 9-5, 9-6 and 9-7, and the associated Figures 9-1, 9-2 and 9-3, define limits to water transfers under conditions where transfer costs are \$1.00, \$2.00 and \$2.50 per acre-foot per mile. Figures 1-3 can be interpreted in the following manner. Each figure shows a map of the southwestern United States, with the areas surrounding New Mexico characterized by different colored bands. These bands depict areas in surrounding states where water importation seems to be economically feasible, given the assumed water transfer costs and user benefits. The different colors are related to the varying assumptions as to benefits generated in water application. For example, the first three colors (pink, turquoise, purple; see Figure 9-1) relate to potential agricultural uses, assuming benefits of \$75, \$100, and \$125 per acre-foot. Obviously, the greater the benefits generated from its use, the farther water can be transferred economically. The light blue region depicts the extent to which water can be transported for potential municipal and industrial uses. With assumed M & I benefits of at least \$500 per acre-foot, it follows that this zone is the largest of all the bands, and the narrower agricultural zones as well.

Given the assumptions regarding costs and benefits, water movement for M&I uses seems economically feasible for large areas of Texas, Arizona and Colorado with transfer costs up to about \$2.00 per acre-foot per mile. With transfer costs at \$2.50 per acre-foot per mile (Table 9-7 and Figure 9-3), the economically feasible area for transfers for municipal uses reduces to 200 miles, thereby eliminating the bulk of municipalities in Arizona, Colorado and Oklahoma from the band of "feasible" transfers. Note, however, major municipal water-users in Texas remain in the feasible area with costs at \$2.50 per acre-foot per mile (Table 9-7).

Transfers for agricultural uses extend over a surprisingly broad band where benefits are \$75.00-\$125.00 per acre-foot and transfer costs are \$1.00 per acre-foot per mile (Table 9-5 and Figure 9-1). Of course, as transfer costs rise, areas of feasible water transfers for agricultural uses diminish rapidly. When transfer costs reach \$2.50 per acre-foot per mile (Table 9-7 and Figure 9-3), water transfers for agricultural uses do not appear likely.

A second way that one might address the question whether water transfer costs might limit transfers of water from New Mexico is to pose the question: What are the economic parameters of the regional market for water supplies in New Mexico based on municipal demand? Figures 9-4, 9-5 and 9-6 depict distances into New Mexico for which water transfers would be economically feasible (at a cost of $2.00 per acre-foot per mile) for several municipalities in Arizona (Phoenix and Tucson), Colorado (Denver) and Texas (Lubbock and Amarillo). Large parts of New Mexico's unappropriated groundwater supplies in the Ogallala, Mimbres, Lordsburg, and Upper and Lower Rio Grande basins are within areas from which interstate transfers are economically feasible at $2.00 per acre-foot per mile. Note that 11 of the 14 water transfers reviewed in Table 8-3 of Chapter 8 involved water transfers with costs <u>less</u> than $2.00 per acre-foot per mile.

IV. CONCLUSION

It must be pointed out that thus far the analysis of regional demands for New Mexico's water supply has proceeded on strictly <u>economic</u> grounds. That is, an attempt has been made to compare the likely cost of moving water with the possible benefits that could be generated from its application. Such a methodology is based on the presumption that water importations can be limited by economic considerations. This argument warrants additional consideration.

Consider first the general question: To what extent have costs, relative to returns or benefits, historically limited the construction of water reclamation projects? For water reclamation projects constructed by the Bureau of Reclamation, costs do not seem to have effectively limited project initiation. For a sample of 28 projects constructed by the Bureau, Burness et al.[15] show that, on average, direct benefits were equal to only 72

TABLE 9-5

AREAS OF POTENTIAL INTERBASIN WATER TRANSFERS FROM NEW MEXICO
Transfer Costs = $1.00/acre foot/mile

Use Sector	Maximum Number of Miles for a Feasible Interbasin Water Transfer
Municipal/Industrial	500 Miles
Agriculture, assuming benefits at:	
$ 75.00 per acre foot	75 Miles
100.00 per acre foot	100 Miles
125.00 per acre foot	125 Miles

In the 500 mile band for Municipal users, the following major municipalities are included:

Virtually all municipalities in Arizona, Colorado and Western Oklahoma, all of the Texas panhandle and Western Texas.

Areas of Potential Water Transfer

(Cost = $1.00 per acre-foot per mile)

Key

1. Municipal and Industrial Use Area
2. Agricultural Use Areas

Assuming 1 acre-foot produces $ 75 in benefits

Assuming 1 acre-foot produces $100 in benefits

Assuming 1 acre-foot produces $125 in benefits

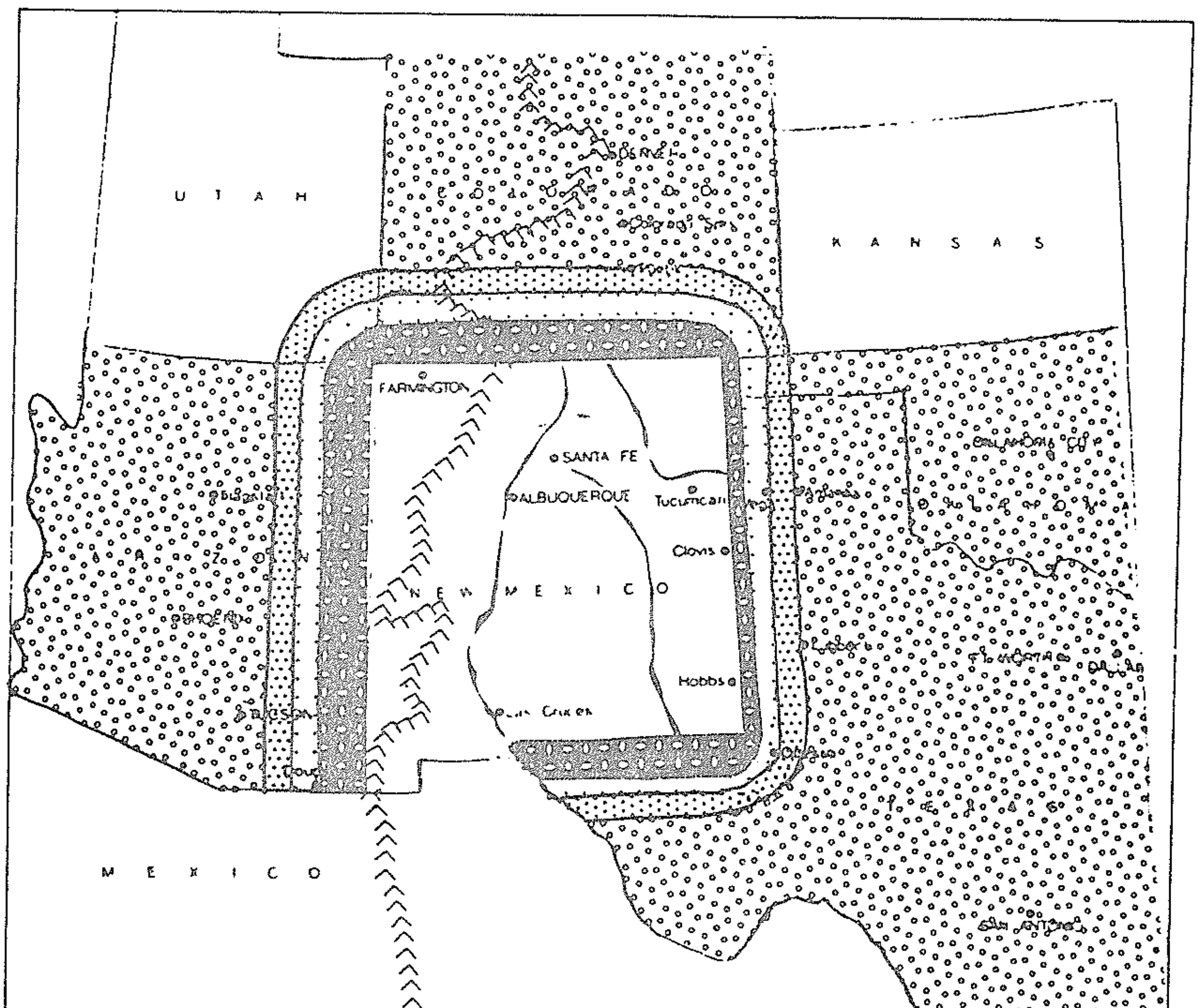


FIGURE 1

TABLE 9-6

AREAS OF POTENTIAL INTERBASIN WATER TRANSFERS FROM NEW MEXICO
Transfer Costs = $2.00/acre foot/mile

Use Sector	Maximum Number of Miles for a Feasible Interbasin Water Transfer
Municipal/Industrial	250 Miles
Agriculture, assuming benefits at:	
$ 75.00 per acre foot	38 Miles
100.00 per acre foot	50 Miles
125.00 per acre foot	63 Miles

In the 250 mile band for Municipal users, the following major municipalities are included:

Arizona:
- Phoenix
- Tucson
- Flagstaff

Colorado:
- Denver
- Colorado Springs
- Pueblo
- Durango

Oklahoma:
- Clinton

Texas:
- Dalhart
- Amarillo
- Lubbock
- Odessa
- Ft. Stocton
- El Paso

Areas of Potential Water Transfer

(Cost = $2.00 per acre-foot per mile)

Key

1. Municipal and Industrial Use Areas
2. Agricultural Use Areas
   - Assuming 1 acre-foot produces $ 75 in benefits
   - Assuming 1 acre-foot produces $100 in benefits
   - Assuming 1 acre-foot produce $125 in benefits

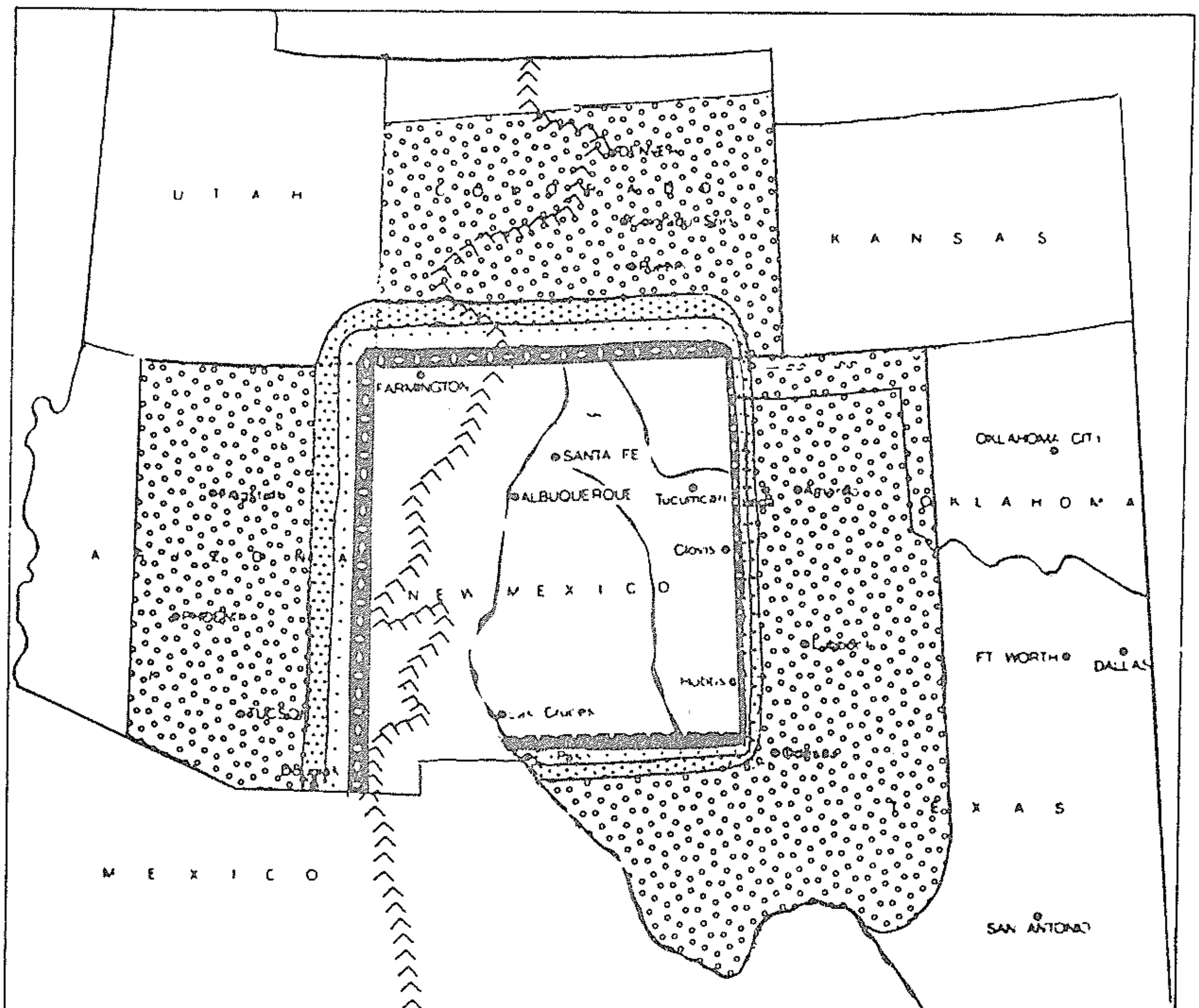


FIGURE 2

TABLE 9-7

AREAS OF POTENTIAL INTERBASIN WATER TRANSFERS FROM NEW MEXICO

Transfer Costs = $2.50/acre foot/mile

Use Sector	Maximum Number of Miles for a Feasible Interbasin Water Transfer
Municipal/Industrial	200 Miles
Agriculture, assuming benefits at:	
$ 75.00 per acre foot	30 Miles
100.00 per acre foot	40 Miles
125.00 per acre foot	50 Miles

In the 200 mile band for Municipal users, the following major municipalities are included:

Arizona:
- Globe
- Springerville
- Douglas

Colorado:
- Cortez
- Durango

Texas:
- Dalhart
- Amarillo
- Lubbock
- Odessa
- Ft. Stockton
- El Paso

Areas of Potential Water Transfer

(Cost = $2.50 per acre-foot per mile)

Key

1. Municipal and Industrial Use Area
2. Agricultural Use Areas
   - Assuming 1 acre-foot produces $ 75 in benefits
   - Assuming 1 acre-foot produces $100 in benefits
   - Assuming 1 acre-foot produces $125 in benefits

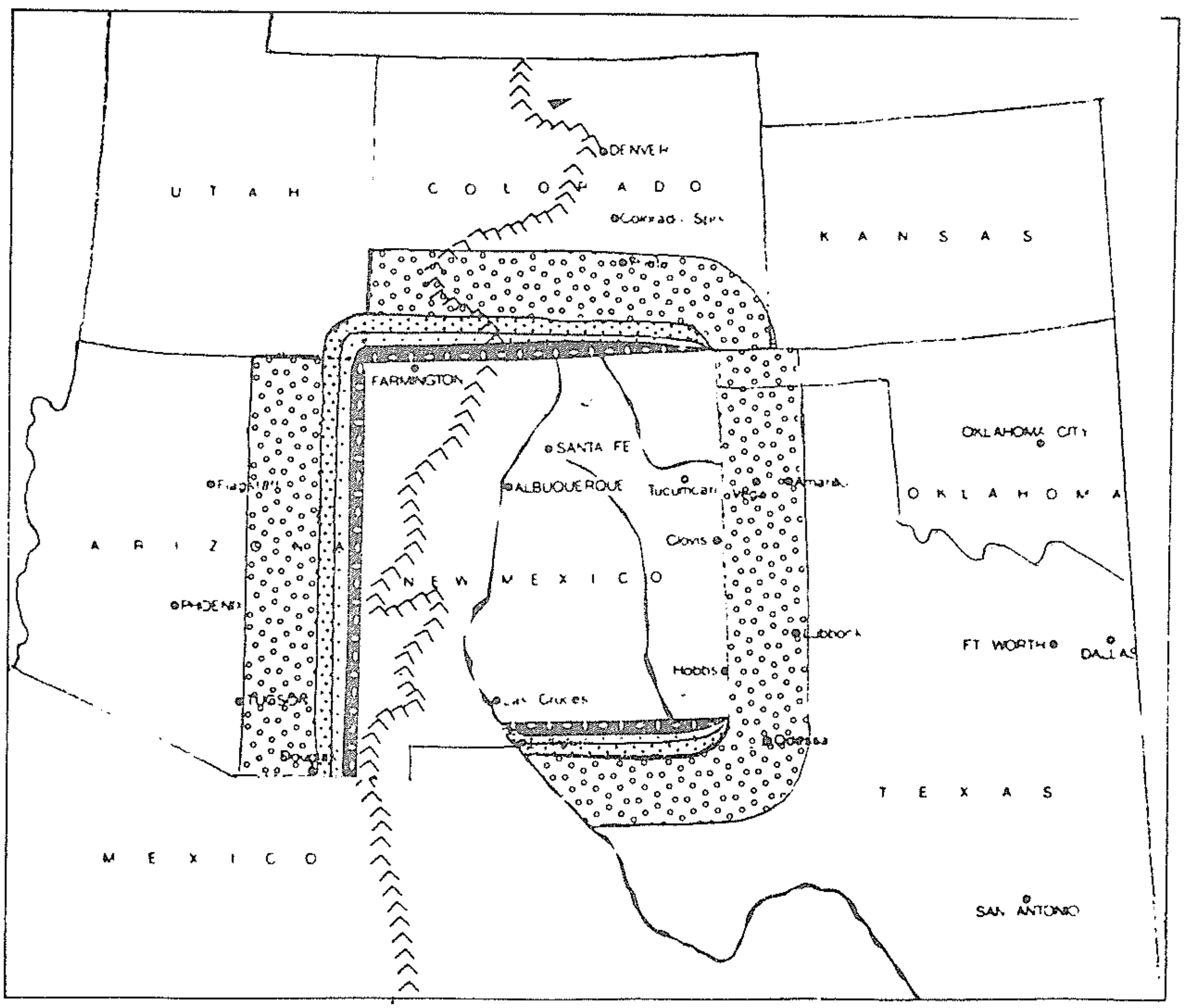
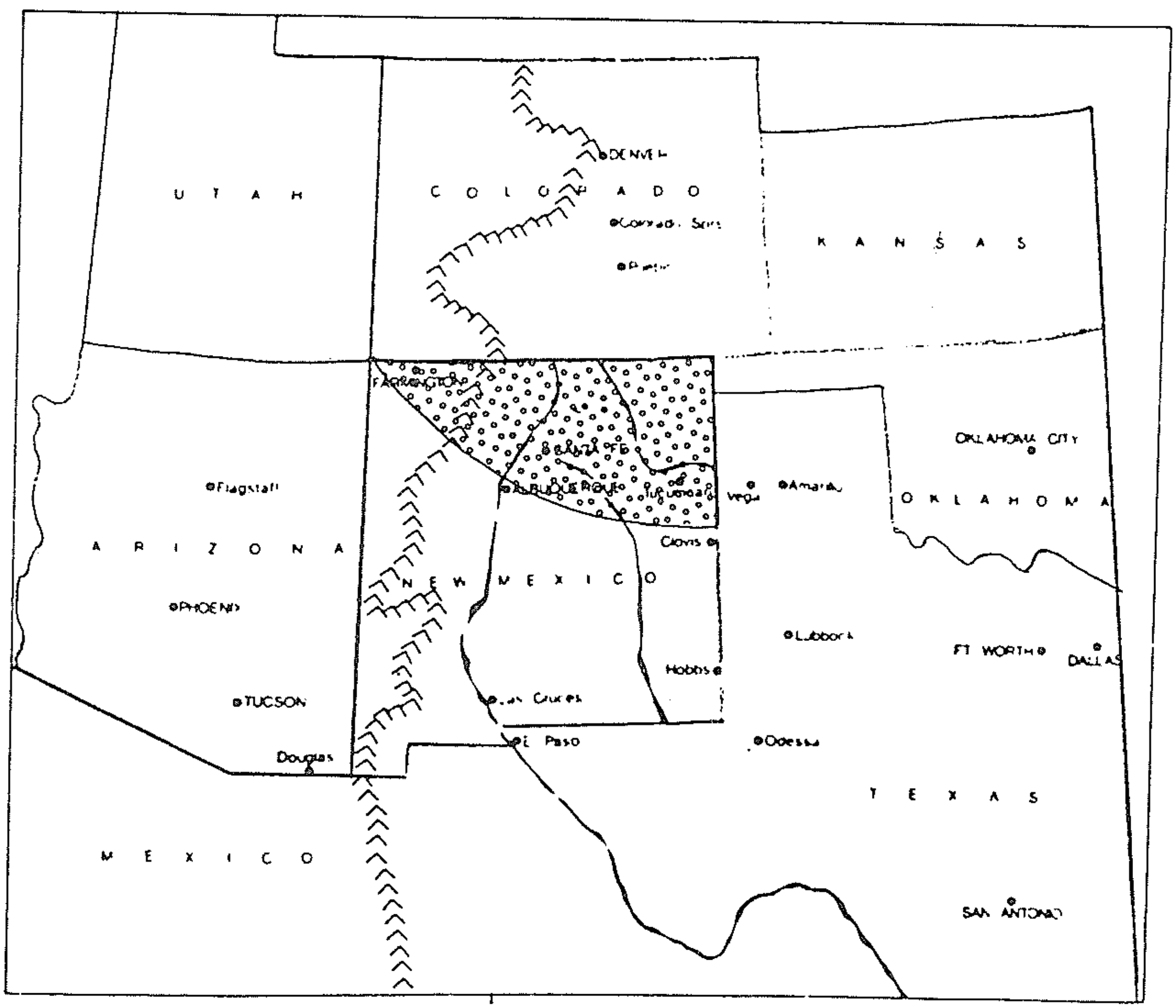


FIGURE 3

FIGURE 4

Areas of New Mexico Subject to Potential Water Transfers for M & I Use

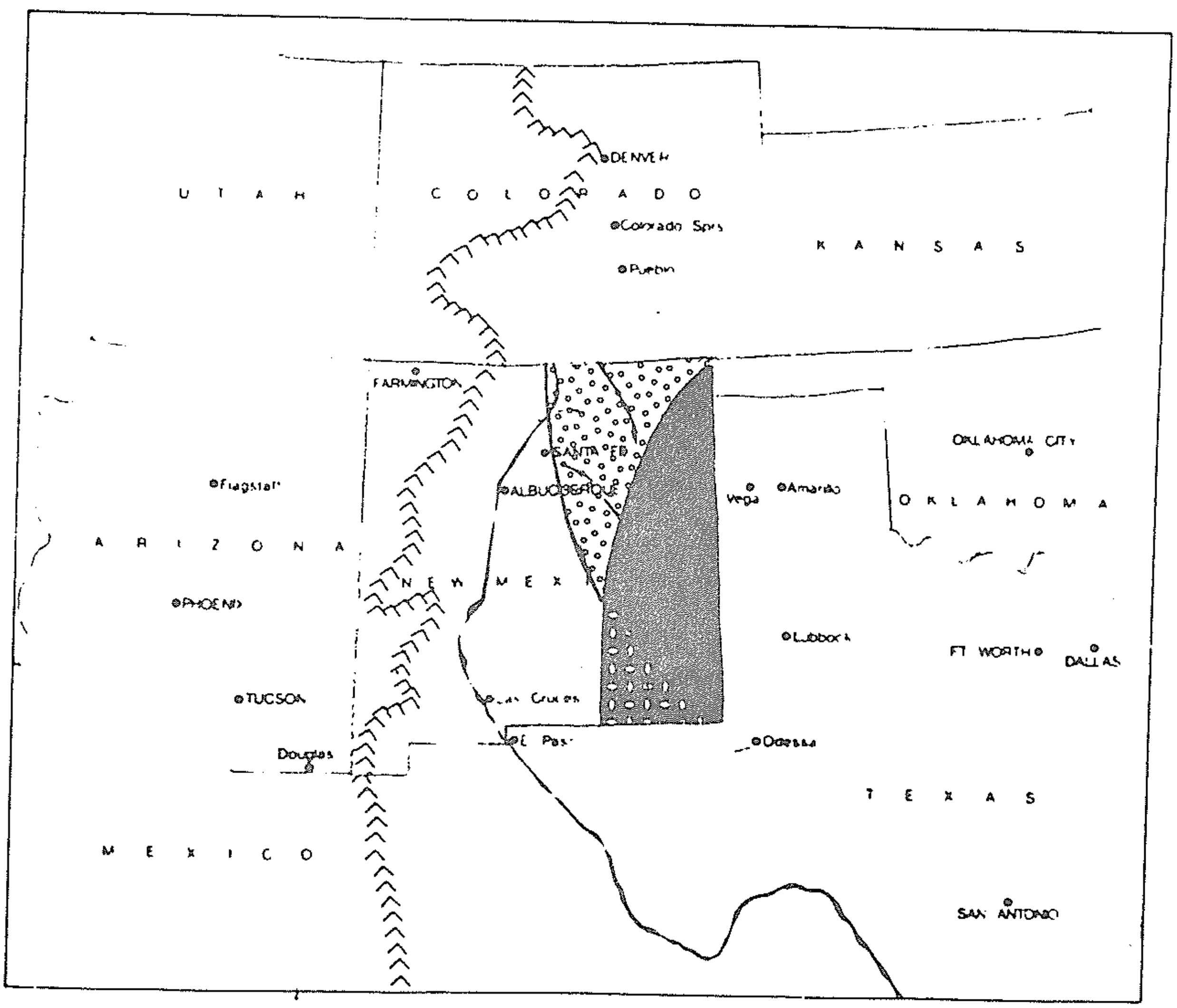
(Cost = $2.00 per acre-foot per mile)



Pueblo, Colorado

FIGURE 5

Areas of New Mexico Subject to Potential Water Transfers for M & I Use
(Cost = $2.00 per acre-foot per mile)



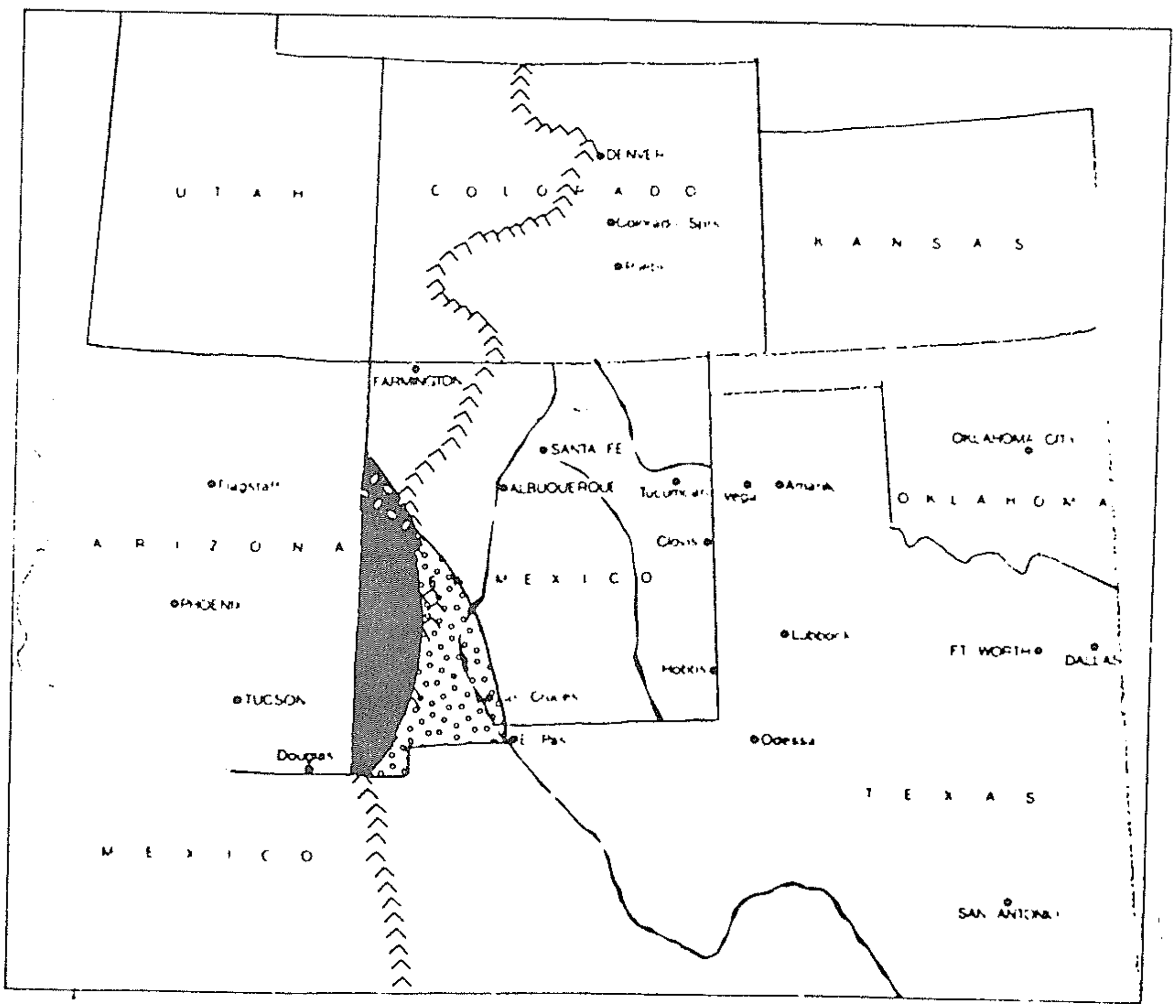
Amarillo, Texas

Lubbock, Texas

FIGURE 6

Areas of New Mexico Subject to Potential Water Transfers for M & I Use

(Cost = $2.00 per acre-foot per mile)



Phoenix, Arizona

Tucson, Arizona

percent of costs and, for 10 of the 28 projects, direct benefits were less than 50 percent of costs.[16]

The politics of modern water development projects may be undergoing a change, however, in at least one fundamental respect. Virtually all of the large transportation projects of the past were built using federal appropriations. For most new water projects, however, the beneficiaries will be expected to pay a more substantial share of the costs. While Westerners may have been willing to pay any price for projects funded through federal tax dollars, it is not clear that they will be willing to pay these costs when they must be borne more directly out of their own pocketbooks. Texas voters several times turned down major capital expenditures that would have implemented elements of the High Plains transfer plan before finally approving the most recent plan. Also, Oklahoma has yet to approve its Statewide Water Conveyance System. The logical conclusion seems to be that such massive plans will receive much more scrutiny than in the past and that an actual political consensus for their construction will be more difficult to achieve.

The data demonstrate one fact very clearly: the overall demand for New Mexico's unappropriated groundwater supply is regional. In Chapter 6, we limited our demand analysis to in-state demand. If we were to add potential demands from all of the out-of-state users, the benchmarks for scarcity would speed toward the present. Based on interstate and intraregional demand, one could easily assume that tomorrow applications could be filed for all of the unappropriated groundwater in virtually any closed aquifer in the state.

CHAPTER 9 ENDNOTES

1. C. DuMars, et al., The Impact of Recent Court Decisions Concerning Water and Interstate Commerce on Water Resources of the State of New Mexico (report to Governor Toney Anaya and the Legislative Council Pursuant to 1983 N.M. Laws ch. 98, 1984).

2. Hartman & Anderson, Estimating the Value of Irrigation Water from Farm Sales in Northeastern Colorado, 44(1) Journal of Farm Economics 207 (1962).

3. Anderson, The Irrigation Water Rental Market: A Case Study, 13(2) Agricultural Economics Research 54 (1961).

4. To estimate total benefits, it is necessary to consider not only direct benefits to water users, but also return flows and related secondary benefits as well. The figures obtained on direct benefits up to now have neglected to allow for values generated from the return flows, and subsequent reuse, of irrigation water initially applied. In some areas of the west, these return flows could be as high as 50 percent, and depending upon the timing of the flows, could result in the generation of twice as many agricultural benefits as originally estimated. In much of Central Arizona and in the High Plains of Texas, however, it is much more likely that return flows have little effective value because they move into aquifers where percolation rates are less than the rate of fall of the water table. Such return flows are not easily recovered, making a return flow "multiplier" in excess of 1.0 questionable.

   In calculating secondary benefits, it is important to recognize that, as was the case of indirect costs (see Chapter 8), there are also backward and forward economic linkages involved on the benefit side of water applications. Direct water users are related to other sectors of their local, regional, and even national economies. As their activities contract or expand, so can the activities (and incomes) of those they supply or from whom they buy.

   To estimate secondary benefits, it is important to address the following kinds of questions:

   (1) Which related industries will expand or contract?

   (2) Do any economies of scale exist in these industries?

(3) What type of capital and labor immobilities exist, and how are they finally resolved?

Though these are difficult questions to resolve, several studies have attempted to measure the total benefits related to water used in agriculture.

5. Hartman & Seastone (1975) supra [not previously cited]. They used a multi-county input-output model and found that the direct profit and rent components tied to a one acre-foot application of water in agriculture was about $14.50. With labor assumed immobile, however, the total wage and salary income related to the agricultural water use, $17.20, would also have to be added to the opportunity cost of transferred water. They concluded, then, that the secondary benefits lost from water transferred from agriculture ranged from $14.50 to $31.70, depending upon the degree of labor mobility.

6. H. Stutts, Predicting Farmer Response to a Falling Water Table: An Arizona Case Study, in Water Resources and Economic Development of the West, Report No. 15 (Conference Proceedings, Committee on the Economics of Water Resources Development of the Western Agricultural Economics Research Council, Las Vegas, Nevada, Dec. 1966).

7. J. Goss & R. Young, Organization and Pricing Policy of Major Water-Distributing Organizations in Central Arizona (File Report 67-5, Dept. of Agricultural Economics, University of Arizona 1967).

8. Young & Martin, The Economics of Arizona's Water Pollution, 16(3) Arizona Review 9 (1967).

9. Howe & Easter (1971), Op. Cit. [not previously cited].

10. H. Grubb, Importance of Irrigation Water to the Economy of the Texas High Plains (Texas Water Development Board Rept. No. 11. (1966).

11. Id. Specifically, he estimated value added in the marketing and processing of irrigation output, in the provision of agricultural inputs, and in the satisfying of consumer demands resulting from those additions to income.

12. Howe & Easter (1971) Op. Cit. [not previously cited].

13. Though this figure was derived from several studies that are somewhat dated, it appears to be quite reasonable. A 1979 Department of the Interior Study on western irrigation suggested that a 4.3 million acre-feet increase in crop water consumption would help increase farm output by $500 million per year, implying per acre-foot benefits of about $120.

See U.S. Dept. of the Interior, et al., Irrigation Water Use and Management: An Inter-Agency Task Force Report (1979).

14. C. DuMars, et al, supra note 1, at 47 & app D.

15. Burness, et al., The "New" Arizona v. California: Practicably Irrigable Acreage and Economic Feasibility, 22 Natural Resources J. 520 (1982).

16. Looking more specifically to water transfer programs, the state of Arizona continues to support the Central Arizona Project (CAP) despite research by University of Arizona agricultural economists that not only demonstrated costs far in excess of benefits but also the inability of proposed agricultural users of CAP water to pay even the subsidized costs of the project. See W. Martin & R. Young, The Need for Additional Water in the Arid Southwest: An Economists Dissent, 3(1) The Annals of Regional Science 22 (1969). By the same authors, see The Economics of Arizona's Water Problem, 16 Ariz. Rev. 9 (1967). Further, see the newspaper report "CAP Should Not Be Built, Say Two of the U. of A.," Tucson Daily Citizen, Feb. 17, 1967. The State's support of the CAP has continued even after later "second thoughts" by Arizona citizens concerning the economic feasibility of the project. See "Do We Need More?" The Arizona Daily Star, Tucson, Aug. 5, 1973; "State's Water Quandary Needs Sharper Focus," The Arizona Daily Star, Tucson, July 12, 1973.

Another example of a state's willingness to consider a water transfer project which, on the surface, would seem to be without merit if evaluated strictly on an economic benefit-cost basis can be seen in the Statewide Water Conveyance System proposed in Oklahoma. This proposed massive project involves the movement of nearly 2.5 million acre-feet per year through northern and southern sections of the state. See Olson, The Economics of Interbasin Water Transfers in Oklahoma, 3(1) The Southwestern Review of Management & Economics 101 (1983). Despite projected benefits of between \$128 million and \$200 million annually for the time period analyzed, the total undiscounted costs of the project were estimated to range from \$18-21 billion (in 1978 dollars), yielding negative benefit-cost differences of over \$4 million in present value terms. Here it is important to note that the authors of the Oklahoma Plan recommended construction of the project, even though its expected costs were significantly higher than its benefits. This case, along with the other cited examples, helps to point out that states apparently do not rely solely on economic considerations in determining the feasibility or desirability of new water transport schemes. The calculus of economics may have little relevance where commodities such as water are involved—commodities which are viewed, rightly or wrongly, as "priceless."

CHAPTER 10

WATER CONCERNS AROUND THE STATE AS EXPRESSED TO THE COMMITTEE

In this chapter we set out briefly the concerns expressed to us in the public meetings or in reports or other public documents. We do not purport to have covered every issue and expressly disclaim that we have addressed the very complicated question of Indian water rights. Due to lack of resources and narrowness of statutory mandate, we leave that issue to another study.

Public meetings were held in the following areas:

Albuquerque	Las Cruces
Clovis	Taos
Gallup	Tucumcari

I. SOUTHWESTERN NEW MEXICO

Uncertainty of water supply in this region can be attributed to a combination of natural and artificial constraints. There is only one renewable source of water, the Gila River and its tributary, the San Francisco. Due to many factors, including the rugged terrain of the Gila Basin, the population centers of the area, Silver City, Bayard and Deming, are not in the Gila Basin, but in the adjoining Mimbres Basin. The primary source of water in the Mimbres Basin is groundwater from an essentially non-tributary aquifer, which is being mined to support the existing population. Thus, absent any possibility of transfers from the

Gila to the Mimbres Basin, there are tremendous natural constraints on water availability in the southwestern area of the state. (See discussion of the Mimbres Basin in Chapter 7.)

Water is transported from the Gila to the Mimbres Basin at present, but not in quantities sufficient to maintain Mimbres Basin community uses in the future. Any increase in the quantity of diversions is very uncertain due to numerous constraints on the use of Gila Basin waters. First, under federal law New Mexico cannot increase its use of the Gila until sufficient water is delivered to Southern Arizona by the Central Arizona Project to make up for increased Gila uses in New Mexico. Several issues remain unresolved that make any additional future uses speculative at best.

Another possible solution might be purchasing existing rights in either the Mimbres or Gila Basins. Indeed, Silver City does purchase rights when they are available in the market. Given the depressed condition of the copper industry in this area, some commentators have suggested that future municipal needs can be met by purchasing copper industry rights. This solution is based on two assumptions that raise several other issues. The first assumption is that communities can afford to cannibalize their existing economic base and still purchase the water. Residents without jobs can't pay taxes. The second assumption is that Silver City will be able to compete in a regional water market that includes Southern Arizona. The mining industry increasingly views water rights as assets, only to be sold if retention produces a loss, and then only to the highest bidder. It is far from clear that the communities of Southwestern New Mexico can, ultimately, compete effectively in a regional market that includes competitors with the ability to pay substantially more for the water.

II. WEST CENTRAL NEW MEXICO

The causes of uncertainty in this region are very different from those in the Gila. There is legal uncertainty due to the assertion of significant federal reserve rights by four Indian tribes, the Navajo, Zuni, Laguna and Acoma. Another source of legal uncertainty is that the area's surface supplies are tributary to the Little Colorado, one of the few interstate streams yet to be apportioned.

Even if all these claims to the water resources of the region were quantified, there would still be uncertainty of supply because of many natural factors. Like Silver City, most communities in the region rely on groundwater mining for water needs. Due to the wealth of minerals in that region, the available groundwater supplies are of minimal quality with excessive mineral concentrations. These naturally occurring water quality problems may have been exacerbated by mine dewatering and other activities of the mineral industry. Contamination of potable water supplies is always a possibility and has occurred because of leakage from uranium tailings ponds.

The Bureau of Reclamation has been studying a proposal to pipe San Juan River water to this region to bring domestic users better quality water. It is far from clear that this project will ever be completed without funding from some outside source. (See discussion of project costs in Chapter 8.)

III. CITY OF ALBUQUERQUE SERVICE AREA

In the area served by the City of Albuquerque, there are very few problems directly related to water scarcity because the city acquired rights to San Juan/Chama water years ago, which they can use to offset the impact of their municipal wells on the river. However, the city is purchasing surface water rights from farmers and leasing those rights back to them until such time as the city may need to retire those rights to offset the impact of its pumping on the river.

A hydrologic question that no one really understands at this point is, What will happen in future water-short years when, rather than flowing downstream, river water fills the cones of depression created by the city's wells? Even though our system of treaties and compacts requires that certain quantities of surface water flow downstream below Albuquerque, in water-short years, gravity, not laws, will control the river. The results of this historic pumping are not really understood. If the water table drops beneath the roots of existing vegetation, the bosque could become a very different region indeed.

A second issue in the Albuquerque area, specifically in the South Valley, is water pollution. There have been problems with leakage from underground gasoline storage tanks, and many of the residents have septic tanks and drain field systems that circulate effluent in the same areas as some of the groundwater wells.

This, coupled with the existence of areas that once contained landfills and feedlots, makes consumption of the shallow groundwater hazardous in some areas.

The smaller municipalities north and south of Albuquerque have different kinds of problems. One concern is the fear that they cannot compete with the city of Albuquerque for the surface water rights they will need to retire in order to continue pumping from their groundwater wells. Even if they require the subdivision developer to acquire surface rights for retirement, as Los Lunas does, there may not be rights available to be retired. If they are within the Middle Rio Grande Conservancy District, there is a problem. The district is taking the position that it, not the private farmer, is the real owner of the rights and that these rights are not for sale. The possibility of lawsuits has been raised concerning this issue, but as yet no major litigation has been filed.

Finally, the area east of the Sandias is growing rapidly since it provides a very attractive area for homesites and rural living. It is an area with very little water. Most supplies are from shallow, undefined, mineable aquifers that are subject to pollution from septic tanks. A reliable potable supply cannot be guaranteed. As new developers move into the area, their wells will impact existing wells and all this will lead to actions before the State Engineer and the courts. Proposals have been commissioned by some of the governing agencies, and water transfer projects from Albuquerque and Estancia have been considered. As in most areas that anticipate growth but do not yet have the capital return from that growth, the water transfer projects appear very costly.

IV. RIO GRANDE BELOW ELEPHANT BUTTE

Along the Rio Grande below Elephant Butte, we found total uncertainty and confusion concerning the water supply. The El Paso case has triggered a myriad of applications for water in the Mesilla Bolson that, if added up, far exceeds the available water supply under the most liberal estimates. These applications vary from those of purely private investors, to wild water slides, to the state land office. One article described the area as one where water is simply legally unavailable.

Some people who attended the two public meetings held in the area were concerned that the City of Las Cruces could not acquire rights within the Elephant Butte Irrigation District and, as a consequence, it could not grow. The representatives of the District expressed concern that the estimates of available groundwater may be incorrect and that if new uses and wells were granted they might not have enough water from their wells.

Some expressed the hope that perhaps the concept of State Appropriation was, in some way, a specific solution to the El Paso case. The citizens were informed that the study was not aimed at solving the El Paso "problems." It was explained that the state is simply contemplating an active role in interstate water and that the hearings and litigation in El Paso would proceed whether or not the state appropriated water in other areas of the state.

V. EASTERN HIGH PLAINS

The Eastern High Plains area, which is mostly outside any declared underground water basin, is acutely aware of its water problems. This massive land area includes Union, Harding, Quay, Guadalupe, De Baca, Curry and Roosevelt counties. Indeed, the Eastern Plains Council of Governments and the El Llano Estacado Resources Conservation and Development Area recently issued an excellent report, entitled Water Issues Statement for Northeastern New Mexico. They describe the issue in general terms as follows:

> The high plains of northeastern New Mexico is almost ideally suited for agricultural endeavors, being generally flat, four to six thousand feet elevation, fertile, of good climate, and having (limited) water resources for irrigation, the sole means of obtaining consistent and maximized crop production. Consequently, the area is the state's leading producer of corn, wheat, grain sorghum, and peanuts. Table I presents acreage figures for northeastern New Mexico and the State, from which it may be determined that while the area comprises barely 15 percent of the State, it currently has 34.5 percent of the irrigable land. However, in 1983, only 58.3 percent of that was actually irrigated, which is attributed principally to the insufficiency of water supply.
>
> Table II presents population data for the area in recent decades, which shows a steady overall rate of increase, but that many of the communities actually lost residents. Since the area overall is still agriculturally oriented, these results are also seen as being largely tied to the lack of water.
>
> Increasing domestic and municipal water needs, a recently developed and expanding industrial base in several communities, continued irrigation demand, lack of public awareness, and sometimes related but conflicting federal programs, all contribute to the general water supply deficiency.
>
> Water quality has also become a concern in several of the area's major localities, and serious flooding problems exist in portions of the area. Institution of community-wide awareness and concerted corrective

action is necessary, with appropriate State involvement being indicated for any effective solutions.

All of the foregoing illustrates that the entire area suffers from a real and worsening water shortage that is severely impeding further agricultural and community development, alleviation of which would permit a major additional contribution to the economics of the area, state and nation. In direct regard to this, recent estimates indicate that to satisfy national and international requirements, the production of American food and fiber must increase 70 percent to 100 percent by the year 2020. In contrast, high crop production in northeastern New Mexico thru irrigation farming will be virtually ended by 2020 without augmentation of the water supply. A directly related problem is that New Mexico presently has less than 500,000 acres of prime farmland remaining, and will have 0 such acres by 2020 unless action is taken now thru law to protect and reserve this land for agricultural use only.

Northeastern New Mexico would not be the first area ever to run out of water, as there are many historical examples, some even in this country, that could be cited, with their disastrous results on the land and its inhabitants. A national news magazine recently highlighted the country's present and potentially dangerous future water shortages, including that of the States overlying the Ogallala Aquifer, and indicating the need for water conservation and planning now. The water presently available for irrigation farming, the largest "consumer" by far, must be utilized in the most efficient manner possible to allow time for determination of applicable research results and development of other remedial measures.

The study proposes various solutions, including conservation. It also contains the following recommendations for legislative actions, among others:

1. (I.) Authorize a new comprehensive "Study" of all New Mexico water resources, uses and potentials based upon the presentations of Sections III, and IV. A. thru H. above, to update and otherwise revise the resource study of 1976 noted in the Bibliography, preferably by independent contractor, with action recommendations and provision for periodic review and modification, to be completed within one year of date of award of contract.

2. (IV.) Authorize establishment and maintenance by the State Department of Natural Resources (DNR) of a revised State Water Management Program Plan based on

and periodically amended in accordance with the study and reviews of paragraph 1. just above, and incorporating provisions of or similar to those of the Texas plan delineated in subsection IV.G., to be completed within six months of completion of the study of subparagraph 1.

A principal concern in the area is that the local region, and not the state, should be responsible for determining its water future. In the meetings, all were in agreement that water importation was the long-term solution to the area's problems and that such a plan could eventually be made cost-effective. However, in the short term, they were willing to conserve and manage their water resources wisely.

VI. TAOS REGION

All people in the area viewed water supply as a limiting factor in the growth of the area and perhaps the most important issue facing their communities. As a result, a number of cultural and economic development concerns surfaced in the meeting. A principal concern among those who use the acequias is that water transfers to other economic uses, such as ski areas, should be prohibited. It is obvious, however, that some users desire to sell their rights to these new users because conflicts and litigation have arisen over precisely these circumstances.

People were also concerned that they did not fully understand their water rights and the rules governing them. They were likewise concerned about the Indian water rights litigation that is taking place throughout the state and about the potential impact of the litigation on their water uses.

People expressed a desire for help in making the acequia systems more efficient, but were also concerned that many people did not understand the reasons for some of their irrigation practices. There were discussions of the need to create something in the nature of localized trusts for the allocation of water to ensure that historic uses are maintained and some mistrust of the concept of state appropriation if it, somehow, foreclosed local options.

In general, the major concern appears to be about transfers rather than any new appropriations because the surface streams in this region are fully appropriated by the acequia users. Finally, there is concern about the use of the river in the Rio Grande Box. Local residents are concerned about the congestion and general encroachment on private property by the commercial rafters. Others are concerned about the impact on the river itself, while the commercial outfitters feel that they generate revenue for the area. People were also concerned about the impact of mining operations in the area on the quality of the river.

CHAPTER 11

ACTIVITIES OF OTHER STATES

I. INTRODUCTION

A not so quiet revolution is taking place in states' attitudes toward water resources. States surrounding the Great Lakes, along with their Canadian counterparts, have issued a charter, vowing to prevent large-scale diversions to maintain the integrity of the Lakes. Many states have engaged in intensive water resources planning. Montana, Texas and Colorado have gone a step further and have actively acquired proprietary interests in water resources, while maintaining their authority to plan for and manage use.

This storm of activity is the result of a combination of factors. Arid states are beginning to realize that dependence on groundwater stocks is potentially disastrous if aquifers are not protected from contamination or overdraft. In some states, officials readily admitted that they do not have a sufficient water supply for moderate future development.

Before 1983, officials of most states believed they had an absolute right to some portion of the interstate streams flowing through their state. Groundwater was assumed to be the subject of exclusive state control because its use was seen as a matter of local concern, just as land use is still primarily a local matter. Even when states compacted to apportion surface water rights, there was little or no mention of groundwater because it was not viewed as a shared resource. By projecting future in-state demand and relating that to in-state supply, states could manage water resources and be assured with some certainty of their water future.

Then, in 1982, the Supreme Court fundamentally altered the traditional relationship between states and groundwater resources within their boundaries. As discussed in previous chapters, in Sporhase v. Nebraska, the Court held that privately held groundwater rights were commodities in interstate commerce. Absent some federal action acknowledging an exclusive right, privately held water rights may, in some instances, be transferred across state lines. This was extended to unappropriated groundwater in New Mexico by the federal district court in the El Paso litigation.[1]

Matching in-state demand to known supply no longer results in relative certainty of supply for future needs. Rather, the demand is regional. This fact has encouraged state planning but, at the same time, has made it more difficult because the potential demand is not as clear and is usually larger than it has been in the past.

In reaction to these events, states are increasing water planning efforts on a dramatic scale and are attempting to cope with the existence of the interstate water market. Some have enacted legislation attempting to regulate the interstate water market while others are actively participating in the regional water market to acquire an assured supply. El Paso has used the interstate market to appropriate water in New Mexico. Colorado and Texas assert proprietary interests in groundwater located under state-held lands. Montana is actively appropriating water and has arrangements in place to market it, as does Texas and Colorado. Texas and other states are also relying on investment of state revenues to develop water supplies, thereby creating proprietary rights in water resources. This trend is not limited to the so-called western prior appropriation states. Riparian states are purchasing well fields for the same purpose. This chapter describes the regulatory and proprietary mechanisms other states have adopted in an attempt to ensure an adequate water supply for future generations.

II. ACTIONS OF OTHER STATES REGULATING THE USE OF WATER

A. The Public Trust Doctrine

Where a state's authority to regulate water use is based upon the public trust doctrine, there is a heightened regulatory interest, or police power.[2] According to the El Paso (II) decision, this allows New Mexico to regulate the interstate water market by preferring primarily non-economic "public welfare" uses over out-of-state uses in certain circumstances.[3] The exercise of this regulatory function, however, does not give states much certainty of supply.[4]

The public trust doctrine and its effect on water resources regulation is discussed in Chapter 3. As noted in that chapter, the state of California has held that the public trust doctrine may create publicly held water rights by prescription for public welfare uses.[5] Other states, such as North Dakota, view the public trust doctrine as the basis of their authority to plan for future use.[6] However, the interstate market for water controls unless water is actually being put to some "public trust" use or there are specific plans to put the water to some use.

B. The Police Power

Absent any assertion of a public trust, states still have authority to regulate use of water resources based upon the traditional duty to protect public health and safety. The most commonplace example of this power is land use planning and regulation. States and their political subdivisions have actively regulated land uses for a number of years. Today many states are engaged in various forms of water use planning. A spectrum of such activities is described below.

1. Wyoming

The Wyoming Water Development Commission[7] (the Commission) formulates water and related land resource plans for the entire state, major regions and river basins. The plans may be reviewed and revised from time to time. The state is divided into four water divisions, each having two members on the Commission.

To the extent possible, plans should:

(i) Identify, describe and inventory the occurrence, amounts, availability and quality of water resources, current uses of water, activities that affect the quality of water and uses of water;

(ii) Identify and describe prospective needs and demands for water and opportunities for water development, control, withdrawal, storage, conservation, supply, distribution, drainage and disposal;

(iii) Identify and specify for each plan appropriate state, regional and local goals and objectives for management of water resources, including the obtaining of economic efficiency and a desirable distribution of income, the protection of the health, safety and welfare of the people, the protection and encouragement of particular industries and activities, the protection and enhancement of the environment and recreation; and

(iv) Evaluate and compare prospective and anticipated uses and projects, including combinations and coordinations thereof, uses of alternative sources of water and alternative use of water, in terms of goals....[8]

Although the Commission "may" consult with regional groups, there is no requirement that these interests be considered when plans are formulated.[9]

The Commission does not have authority to regulate use through the planning process, but it can make recommendations for legislation to implement its plans. The plans are published as they are formulated and adopted, and are disseminated to people, industries and governmental departments and agencies.

In addition to the Commission's planning process, Wyoming has created a hierarchy of preferred uses.[10] Existing unpreferred uses may be condemned to supply preferred uses.

2. Arizona

After decades of serious groundwater overdraft and an absence of regulation, the state of Arizona adopted one of the most comprehensive groundwater management codes in the United States.[11] Unlike Wyoming, where planning is not directly tied to water use regulation, in Arizona the planning process is intimately related to regulatory activities. The new code is premised on the ability of the state to force changes in use through a series of plans to achieve specific conservation goals in at least four areas of the state.[12] There are three basic components of the Code: (1) Well registration, (2) identification of critical areas requiring intensive management, and (3) annual reporting of use.

Although well registration and annual use reports are important tools to monitor present uses, the heart of the Code is intensive management of critical areas. It is the explicit policy of the state not to allow any new agricultural uses in these areas. In these generally urban "Active Management Areas" (AMA), the management goal is to regulate aquifer use on a "safe-yield" basis by 2025.[13] This means that by the year 2025, water taken out will equal recharge into the aquifer. In the primarily rural Pinal AMA the management goal is to preserve future water supplies for non-irrigation uses while "maintaining existing agricultural economies for as long as feasible."[14]

In order to reach these goals, a series of five management plans will be prepared for each critical area. Preparation of the plans is the responsibility of the State Water Resources Department, but local or regional participation is important. There is an advisory board in each critical area; members are appointed by the Governor. All the critical areas are now in the first management period. At this time, conservation programs must be developed for each type of groundwater use. The policy behind these programs is that users must employ the latest commercially available conservation technology consistent with a reasonable economic return."[15] Municipal and domestic uses are to be reduced to 140 gallons per capita per day gradually over the next forty-five years. In each succeeding planning period, users will be subject to more stringent conservation requirements. During the second period, augmentation programs will be considered, and, if necessary, the purchase and retirement of pre-existing agricultural rights may take place during the third period.

A major achievement of the new Code is the demise of the "reasonable use" rule in critical areas. Prior to the Code, groundwater use in Arizona was governed by this doctrine. The only limitation on the amount of water a landowner could pump was that water could not be used in an unreasonable manner. Drying up other users' supplies was not unreasonable. Now, in critical areas this has been replaced with a permit system and special provisions for pre-existing uses.[16]

Uses in existence when the Code was enacted fall into two broad categories: service area rights and all others. Service area rights include those held by municipalities, private water companies, water delivery systems and irrigation districts. These entities can now withdraw as much groundwater from within the service area as needed to provide water to the population of the service area.[17]

Other pre-existing uses have been converted to "grandfathered rights" (GFR). There now exist (1) Irrigation GFRs, (2) Type 1 Non-irrigation GFRs, and (3) Type 2 Non-irrigation GFRs. Irrigation GFRs constitute a right to irrigate a number of acres, not a specific quantity of water. Type 1 GFRs are rights held by virtue of the purchase of agricultural lands and retirement of those lands so that the waters can be applied to specific, future non-irrigation uses. Type 2 GFRs cover all other pre-existing uses. Unlike other GFRs, these are severable from the land. These rights can be transported for use in other areas.[18] New users have at least five options as to how to obtain water: (1) lease or purchase lands with irrigation GFRs and transform by retirement to Type 1 GFRs; (2) lease or purchase Type 2 GFRs; (3) lease or purchase Central Arizona Project Waters; (4) lease or purchase effluent, if appropriate; and, as a last resort, (5) apply for a permit if the planned use is not for irrigation purposes.

Rather than regulating users directly, the Code regulates types of uses in the same manner as comprehensive land use or zoning. Implicit within the act are a variety of mechanisms that are used by other states. The Code sets minimum aquifer levels,[19] expresses a preference for some uses over others,[20] and institutes a permit process for groundwater use.[21]

The Code, then, is a state water plan. Future uses are to be met by the demise of the state's agricultural economic sector. It is not clear that new economies will emerge to take the place of agriculture; that is the risk Arizona is taking.

3. Texas

For the past five years, Texas has been engaged in a massive water planning process that culminated in the adoption of a state water planning procedure and extensive statutory revisions by referendum in 1985. Unlike Arizona and Wyoming, which concentrated planning efforts at the statewide level, Texas has adopted a regional planning approach.

Prior to the 1985 Referendum, use of groundwater was controlled, if at all, by voluntary conservation districts. Special provisions now allow for the creation of underground water conservation districts in critical areas as defined by the legislature.[22]

Districts can be proposed by the public or by the Texas Department of Water Resources. The Department monitors the groundwater situation in the state and makes its information available to districts. It also has a duty to identify potential critical areas. Critical areas include areas "that are expected to experience, based on the information available to the department, within the immediately following 20-year period critical underground water problems, including shortages of surface or underground water, subsidence resulting from underground water withdrawal, and contamination of underground water supplies."[23]

If creation of a district is recommended, then a long, involved process of public hearings and agency reporting is pursued. Both the Department and the Commission may receive evidence and testimony regarding the potential economic, political, geological, and hydrological impact of the creation of a district. The Commission must consider "whether the land and property within the boundaries of the proposed district will benefit from the creation of the district; ... whether there is a public need for the district; ... and whether the creation of the district would further the public welfare."[24] The final step in the creation of a district is approval by popular vote of those living in the proposed district.

Once created, Districts may: "make and enforce rules to provide for conserving, preserving, protecting, recharging, controlling subsidence, and preventing waste of the underground of an underground water reservoir or its subdivisions and to carry out the powers and duties provided by this chapter."[25] Districts may not issue permits for use, but they can regulate any aspect of drilling. Permits to drill a well may be issued subject to terms and provisions necessary to "conserve the underground water, prevent waste, minimize as far as practicable the drawdown of the water table or the reduction of artesian pressure, lessen interference between wells, or control and prevent subsidence."[26]

Districts must also develop comprehensive plans "for the most efficient use of underground water" and for controlling and preventing "waste" and "subsidence." Both "waste" and "use for a beneficial purpose" are legislatively defined.[27] Districts may publish their plans.

Although Texas has placed planning in the hands of regional decision-makers, taken together, this creates a statewide plan that is comprehensive and diverse. In-stream flow requirements protect sensitive marine environments in coastal regions.[28] Conservation practices are encouraged in the high plains overlying the Ogallala and other regions. Local water conservation plans are a prerequisite to state financial assistance for local water projects.[29]

Texas also supports continuing research on the "proper conservation and development of the state's water resources." The Texas Water Development Board manages the Research and Planning Fund for this purpose. The Board may contract with any person for research into "any matter relating to" water conservation and development.[30]

4. Montana

Montana has developed an innovative state reservation system that allows state agencies, political subdivisions, and the federal government to reserve water now for uses in the future. The program exists within the context of a relatively active state natural resources policy environment that provides a strong constitutional and statutory basis for the conservation of natural resources. In the water policy area, for example, the legislature has mandated a statewide system for stream adjudication and development of a comprehensive water plan. A Reserved Water Rights Commission has been created to help resolve Indian and federal reserved water rights claims.

The state reservation program is administered by the Board of Natural Resources and Conservation, an advisory body whose members are appointed by the Governor. The Board must grant or deny permits to reserve water based on need, purpose (beneficial or not), the amount of water necessary, and whether the reservation is in the public interest. Successful applicants are allowed to reserve waters for existing or future beneficial uses or maintain a minimum flow or quantity of water.[31]

To prevent speculative claims, reservations for future uses must be reviewed by the Board every ten years to ensure that the water will be needed. These reserved rights can also be reallocated on a temporary basis, but only once every five years.

To date, the reservation system has been applied in only one basin of the state, the Yellowstone. However, a brief summary of the necessary implementation steps is instructive. The legislature first adopted a moratorium on all large applications for water. During the moratorium, the Department of Natural Resources and Conservation was directed to conduct extensive studies, including an Environmental Impact Statement on proposed appropriations. For the following four years, the Board conducted an extensive hearing and review process that resulted in allocation of water to four preferred uses: instream flow, future irrigation, municipal, and offstream storage. Agencies that wished to reserve water were directed to submit a detailed plan within three years which included projects to be developed, accomplishments to date, and a detailed plan of action. The Board reviews the plans and can approve, deny, or modify each plan according to a long list of criteria including the availability of water, adequacy of proposed diversion, the non-speculative nature of the plan, compatibility with local/regional planning efforts, and compliance with the public interest and water conservation efficiency. The reservation process has been both time-consuming and costly. In fact, the DNRC has resisted attempts at further implementation.[32] However, the system does allow for protection and careful management of a state's water resources.

5. Washington

Washington river basin water resource planning began in 1971 under laws that established basic state policies and authorized the Department of Ecology (the Department) to develop a comprehensive water resources program. Among the primary objectives of the plan were: (1) a definition of beneficial uses,[33] (2) allocation of water to "maximize net benefits" of the people of the State, and (3) protection of instream flows to protect the dependent marine resources of the state.

The Department develops and implements water resource management programs under a rule-making procedure. The Department has established 62 Water Resource Inventory Areas (WRIAs) in the state. Generally, these are river basins, not political units as in Montana. The WRIAs allow the Department to plan incrementally. Water resource management programs, or basin plans, were developed and implemented between 1975 and 1979. Minimum flows were established, total water supply in the basin was evaluated, and currently available water was determined and allocated to specific beneficial use categories.

Washington has encountered at least two noteworthy problems in its planning and implementation activities. The Wenatchee River basin plan was needed due to conflicts arising from increased demand for irrigation water, the proposed redevelopment of hydropower at two existing dam sites, and the fishing interests because it is one of the few streams in the area that could still support substantial salmon runs. The Department and the fishing interests disagreed over the meaning of the term "base flow" and how it should be calculated. The Department has construed the term to mean something akin to "minimum" flow and not greater than "50% exceedence level."[34] Although it is unlikely that any plan could please both diversionary and non-diversionary users, the administrative agency could make a determination as to what offers the best protection possible for all users.

Other problems have emerged, primarily due to the regional planning approach. The Okanogan River Basin Plan established beneficial use priorities in the following order: existing rights, domestic uses, instream flows, irrigation uses, and other consumptive uses. The plan closed certain streams and lakes to further consumptive appropriation for other than domestic and stock watering uses. It established water resources administration procedures and allocated water to four "stream management units," subject to beneficial use priorities. Because water required in the lower reach was greater than that required in the middle reach, the existence of four separate management units led to conflicts involving the first-in-time rule and enforcement difficulties.[35]

Groundwater use is managed in a manner somewhat like that employed by New Mexico. Before a permit to appropriate groundwater may be issued, the Department must find that the proposed appropriation will not cause a depletion of the aquifer below a sustained yield or reasonable or feasible pump lift. Presumably groundwater uses must not conflict with regional water plans.

Washington also has a system for reserving water for future uses. The Department may reserve water for future beneficial use and withdraw waters from appropriation until sufficient data is available to make a sound decision regarding the need for a reservation for future use.[36]

The Department reserves waters for future uses by a rule adopted after a public hearing in each county in which water rights affected by the new rule exist.[37] There are special provisions where a reservation is sought for future public water supplies.[38] The applicant must have a coordinated water system plan approved by the Secretary of the Department of Social and Health Services, unless exempted.[39] A coordinated water system plan is a plan adopted by utilities, covering one or more public water supply systems, which identifies present and future needs of participating water systems and sets forth means for meeting those needs in the most efficient manner possible.[40]

Regulations also provide for interim use of reserved waters for beneficial uses other than those for which the reservation was made.[41] Where a given area will require significant quantities of water for other than community and domestic uses, reservations may identify separate quantities for each use.[42] Reservations are reviewed and modified regularly as part of the state water planning process.[43] Water resource programs and coordinated water system plans are also reviewed and changed as necessary, but at least once every ten years.[44]

6. California

California has attempted to create a statewide water plan for a number of years. Regional differences have prevented planning, but not specific projects; thus the results have not been very satisfactory. Without adequate planning to determine the future needs of each region, there has been heated controversy over interbasin transfer projects. California enacted area-of-origin protection legislation that conditions public and private water appropriations both in and out of the state.[45] For example, the California Watershed Protection Act requires that state water projects shall not directly or indirectly deprive the watershed where water originates, or immediately adjacent areas, of the prior right to all water reasonably required.[46] With no mandated planning, however, areas of origin generally have not established their current or future "reasonable requirements" for water and some highly controversial water transfer projects have been implemented.

7. South Dakota and Utah

These two states do not engage in any integrated state water planning. Utah's approach to water use planning was described in the following manner:

> We don't perceive a state water plan to be an entity in and of itself. This plan does need to fit into an overall economic plan of the state, and within the goals and objectives that are articulated therein. It's a broad responsibility to enhance the general welfare. The state has the more specific obligation to plan for and encourage the use of its resources in a manner that will best serve the physical, economic and social needs of the people of Utah.[47]

This results in planning specific projects to meet present needs. The same is true for South Dakota. The legislature has described the State water plan as follows:

"It is the purpose of this chapter to provide the means for planning, funding and construction of a state water plan. This plan is comprised of the state water resources management system and the state water facilities plan."[48] Since planning is only in relation to projects to be developed by the state, these are essentially proprietary in nature.

III. ACTIVITIES OF OTHER STATES CREATING PROPRIETARY INTERESTS IN WATER

This section describes the activities of some states that go beyond water planning by simple calculation of a water inventory. These states take the next step, implementing their plans by expenditure of state funds. The states, in effect, create proprietary rights in water resources within regional water markets.

For some states, the ownership of land is sufficient to create a property interest in water resources by virtue of state law. In states like New Mexico, however, that apply the doctrine of prior appropriation, or like Texas that apply the rule of capture, ownership of land is not sufficient to create a proprietary interest in water resources.

A. States Where Proprietary Interests in Groundwater Are Automatically Derived from Ownership of Overlying Lands

1. Arizona

The rule of reasonable use still applies to groundwater located outside critical areas in Arizona. Therefore, where the state is the owner of land, it has the right to all the groundwater that it can put to reasonable use on overlying lands in owns.

2. California

The correlative rights doctrine governs groundwater use in this state. This rule gives the overlying landowner the right to a reasonable share of the water in the groundwater basin for use on their overlying lands. This right exists whether or not the overlying landowner has used water in the past. Any surplus can be transferred to other users; therefore, as with Arizona, California has proprietary interests in groundwater based on land ownership. In contrast to groundwater, use of surface waters in California is governed by both riparian and prior appropriation principles. Proprietary interests in surface waters are discussed in Section B below.

3. Colorado

Colorado amended its groundwater laws this past year to allow the state to claim proprietary interests in groundwater underlying state-owned lands.[49] The state also imposed an export fee on interstate transfers of water. The Attorney General of Colorado has already issued an opinion finding this fee to be unconstitutional.[50]

B. States Actively Creating Proprietary Interests in Water Resources

Proprietary rights are being created by states in a variety of ways. States are appropriating water just as any private individual and states are investing state monies to develop waters. Montana has asserted proprietary interests in water by legislative mandate.

In addition to acquiring proprietary interests, some states are preparing to market water, especially Montana, Texas, and perhaps Colorado.

1. California

In 1927, the California state legislature enacted a law that provided for the filing by the state itself of applications to appropriate water "required in the development and completion ... of a general or coordinated plan looking toward the development, utilization, or conservation of the water resources of the state.[51] State appropriations are exempt from diligence requirements and remain dormant, i.e. reserved, until development occurs. The California Department of Water Resources controls allocation of a significant proportion of state appropriated water as operator of the State Water Project. The California Water Resources Control Board is an independent quasi-judicial body whose regulatory authority includes jurisdiction over the State Water Project and all other appropriators. Board members are appointed by the Governor and must be confirmed by the State Senate.

Although most of these appropriations are held for specific governmental purposes, some are held by the state because the state funded the projects that made the waters available for use. The water, once available, is in the interstate market, but like any other seller, a state can be flexible as to when and how much it wants to sell.

2. Montana

Montana's laws[52] tightly centralize state control over water resources. The Department of Natural Resources (the Department) has full control over all waters in the state not under the exclusive control of the federal government or vested in private ownership. The Department has a duty to appropriate and conserve water for "the use of the people.[53] Its authority extends to "rights to the natural flows of the waters of th[e] state which it may acquire by condemnation, purchase, exchange, appropriation or agreement."[54] The Department's authority is co-extensive with the purposes of the chapter. Its decisions are subject to approval by the Board of Natural Resources and Conservation.

The state of Montana only allows the state to appropriate amounts greater than 4,000 acre-feet per year and 5.5 cubic feet per second for any consumptive use.[55] Appropriations for such quantities are made by the state in its own name and then leased to users under the State Water Leasing Program.[56] The state may acquire water rights for its leasing program through agreement with, or purchase from, other water right owners, as well as by appropriation.[57] Water from the state leasing program must be obtained from specified sources,[58] and no more than a total of 50,000 acre feet may be leased.[59] Lease terms may be no longer than 50 years but may be extended for additional terms.[60] Water may be leased for any beneficial use.[61] Special provisions apply to appropriations for large quantities if the water is to be transferred for use out of state.[62]

3. Texas

Provisions for state appropriation of Texas water rights have appeared in a number of fairly recent legislative initiatives. In 1977, the Texas Department of Water Resources (TDWR) was established. The TDWR is supervised by the Texas Water Development Board (the Board), an advisory body whose members are appointed by the Governor. The Board administers financial assistance to political subdivisions for water development projects that conform to the state water plan. Interestingly, recent legislation allows the TWDB to sell any unappropriated public water of the state and other water acquired by the state.[63]

The State of Texas funds water conservation and development through an elaborate system of funds, bonds accounts and a state bond insurance program. Since state funding that results in developed water may create proprietary rights in the state, these funds are important to an understanding of the full scope of Texas' activities in the water market. The Texas Water Assistance Fund (the fund) was created because the legislature found that

> it is in the public interest and to the benefit of the general public ... to encourage and to assist in the planning and construction of projects to develop and conserve the storm water and floodwater as well as the ordinary flows of the rivers and streams ..., to maintain and enhance the quality of the water ..., to provide protection to the state's citizens from ... floodwater ..., and other purposes ....[64]

Political subdivisions submit applications to the Board to fund project construction.[65] The fund consists of revenues both accumulated under specific provisions of the constitution and appropriated directly by the legislature. The new legislation allows revenues from the sale or lease of state waters to be deposited in the fund. The Board may also transfer monies in this fund to three other funds: the Water Loan Assistance Fund, the Storage Acquisition Fund and the Research and Planning Fund. The latter has been discussed in Section II and will not be treated here.

The Water Loan Assistance Fund provides loans for:

> the construction, acquisition, improvement, or enlargement of projects involving water conservation, water development, or water quality enhancement, providing

> nonstructural and structural flood control, drainage, protect recreation lands and revenue-generating recreational improvements, or subsidence control within any watershed, or providing recharge, chloride control, or desalinization ....[66]

In passing on an application for a loan from the fund, the Board must consider, but is not limited to considering:

> (1) the needs of the area to be served by the project and the benefit of the project to the area in relation to the needs of other areas requiring state assistance in any manner and the benefits of those projects to the other areas;
>
> (2) the availability of revenue to the political subdivision from all sources for the ultimate repayment of the cost of the project, including all interest;
>
> (3) the relationship of the project to overall statewide needs; and
>
> (4) the ability of the applicant to finance the project without state assistance.[67]

The Board may make loans available to successful applicants "in any manner it considers economically feasible."[68]

The Board also administers the State's storage acquisition fund. The Board may use the fund for design, acquisition, lease, construction, reconstruction, development, or enlargement, in whole or part, of any existing or proposed water storage project.

It must obtain permits from the Texas Water Commission for storage, transportation, and application to beneficial use of water in reservoirs and associated works constructed by the board. Reservoirs acquired, leased, constructed, developed, or enlarged" may be used by the Board to store "unappropriated state water and other water acquired by the state. It should be noted that Texas treats aquifers as groundwater reservoirs. Before the Board acquires storage facilities it must find that:

(1) it is reasonable to expect that the state will recover its investment in the facilities;

(2) the cost of the facilities exceeds the current financing capabilities of the area involved, and the facilities cannot be reasonably financed by local interests without state participation;

(3) the public interest will be served by acquisition of the facilities; and

(4) the facilities to be constructed or reconstructed contemplate the optimum development of the site which is reasonably reserved under all existing circumstances of the site.[69]

In order to promote regional water development, the Board may not acquire any facility to the extent that it finds that a political subdivision is "(1) willing and reasonably able to finance the acquisition of the facility; (2) has qualified by obtaining the necessary permit; and (3) has proposals that are consistent with the objectives of the state water plan."[70] The Board may also "sell, transfer, or lease, to the extent of its ownership," any project developed with money from the Storage Acquisition Fund.[71] Any such transfer must meet certain criteria, including the requirement that the transaction serve the public interest.[72] The money from a sale, transfer or lease of facilities is put into either the water assistance fund or the general revenue fund, depending on specific circumstances.

Under the wording in the act, the state may even be able to treat aquifers as storage facilities and lease or sell storage space in the aquifer. How this might work in practicality is not clear. Other provisions allow the Board to charge for "standby service": "holding water and conservation storage space for use and for actual delivery of water."[73]

As noted above, the Board may also "sell any unappropriated public waters of the state and other water acquired by the state that is stored by or for it."[74] The Board, however, may not compete with any political subdivision in the sale of water if the competition jeopardizes the ability of the political subdivision to meet obligations incurred to finance its own water supply projects. Political subdivisions also have a preferential, but not an exclusive, right to purchase, acquire or lease facilities and water from facilities. Finally, the statute provides that "[t]he board and the commission shall coordinate their efforts to meet these objectives and to assure that the public water, which is held in trust for the use and benefit of the public, will be conserved, developed, and utilized in the greatest practicable measure for the public welfare.[75]

The Board, by resolution, may issue negotiable bonds in an aggregate amount not to exceed $400 million and additional negotiable bonds not to exceed $200 million, not to exceed $980 million altogether. All money received by the Board is deposited in the State treasury and credited to specified funds and accounts. Proceeds from the sale of water development bonds and sales, refundings or prepayments of related political subdivision bonds are deposited in the "Water Development Account." The Water Development Account may be used for any project and in any manner consistent with the state constitution, except retail distribution or for transporting water solely to retail purchasers. The account may be used to provide financial assistance to political subdivisions for the construction, acquisition, or improvement of projects."

The statutes provide for a number of other funds, including a water development clearance fund, an interest and sinking fund, an administrative fund, a combined facilities operation and a maintenance fund, and creditors to clearance fund.

4. Kansas

The state of Kansas has established water districts for management of groundwater in the state. Water districts are empowered to purchase or otherwise acquire, control and operate water supply and distribution systems. The Kansas scheme is illustrative of devices which effectively localize control over state water supplies. In this sense, it is reminiscent of, though much simpler than, the Texas program.

5. Wyoming

Wyoming has a water development program administered by the same commission that formulates water resource plans. Under that program, the Commission must provide: "procedures and policies for the planning, selection, financing, construction, acquisition and operation of projects and facilities for the conservation, storage, distribution and use of water necessary in the public interest to develop and preserve Wyoming's water and related resources.[76] The program is intended to "encourage development of water facilities for irrigation, for reduction of flood damage, for abatement of pollution, for preservation and development of fish and wildlife resources and for protection and improvement of public lands."[77] The water development program is also intended to make state waters available for all beneficial uses, including protecting the "health, safety and general welfare of the people of the state of Wyoming."[78]

On the basis of the state water plan or as otherwise directed by the legislature, the Commission identifies and selects potential projects for inclusion in the water development program. The selection process involves a detailed schedule of events. Each step terminates with recommendations to the legislature as to whether a project should be studied further or discarded. The first stage requires that "reconnaissance studies"[79] be made. The second stage requires "feasibility studies."[80] The studies do not address economic feasibility, but whether a project is socially desirable and, if so, what obstacles might be faced if it were attempted. The third stage requires development plans,[81] which include an analysis of economic feasibility along with other factors. At this stage, the Commission holds a public hearing within the affected water division. After the hearing, the Commission makes a report of its findings regarding whether the project is in the public interest. In the report, the Commission must stipulate whether "the proposed project functions and services can be served by any person, association or corporation engaged in private enterprise, or if private enterprise has refused to provide the functions and services identified as being required by the proposed projects."[82] If a project is found to be in the public interest and private enterprise does not want to build or operate the project, construction and operating plans proceed as authorized and approval by the legislature under the direction and control of the Department of Economic Planning and Development. In addition to new projects, the program provides for rehabilitation of existing water projects.

In Wyoming, the Department of Economic Planning and Development, Division of Water Development, may, at the direction of the governor, file applications in the name of the state for permits to appropriate water, to construct dams and other works and to take steps necessary to acquire, maintain or preserve the priority of any right essential to any project which is or may become a project of the state water development program.[83] The Wyoming statutes provide explicitly that the state agency has no power to acquire water rights through eminent domain and must comply with all laws of the state relating to appropriation and use of water.

6. South Dakota

As noted in the planning section, South Dakota's management of water resources consists of project planning. The state constitutes the geographical bounds of the South Dakota Conservancy District. The District is defined as a public corporate entity. The District is divided into subdistricts. In 1984, the State legislature approved a measure to replace the old state conservancy subdistricts with water development districts formed around specific water projects. Project planning begins in the subdistricts.

Subdistricts are responsible for contacting local units of government within their boundaries to obtain project applications. Potential water development and supply projects are initially reviewed and prioritized by the subdistricts. Regional water project priority lists and supporting data are developed and submitted to the State Department of Water and Natural Resources. Projects are reviewed by the Department and then submitted to the State Board of Water and Natural Resources with further recommendations and supporting data. The Board compiles final recommendations, which are then submitted to the Governor and state legislature for approval.[84]

The Board of Water and Natural Resources (the Board) administers seven water development financing programs. Those programs include: four categorical programs for rural water supply projects, lake protection and rehabilitation projects, community water systems, and water pollution control facilities; the state water facilities construction fund; a discretionary bonding authority for interim financing; and a small issues bonding programs.[85]

Local communities have a duty to help finance projects, and the Department compiles annual financial capability assessments of each community to determine its ability to contribute to project funding through its taxing authority. The Department will neither force a community to increase taxes nor provide funds to a community that is unwilling but able to meet reasonable matching requirements.[86]

In the past, South Dakota has relied in part on "up-front federal funding and subsidies" to construct the major components of its water management system program.[87] Despite its past success with federal funding, the state acknowledges that it cannot presume that future activities will be accomplished with federal monies. South Dakota is now exploring other means to finance water development; one possibility is increased use of State bonding authority.

CHAPTER 11 ENDNOTES

1. Traditional equitable rights to surface flows may also have been dealt a severe blow that year in Colorado v. New Mexico (I), 459 U.S. 176 (1982). That suit was brought by Colorado to apportion the Vermejo River. In one sentence, the Court rejected the notion that a state had some inchoate right to surface waters flowing through its territory. State authority over water is dependent on use. While this gives firm protection for present uses, water for future uses will only be apportioned where there are concrete plans for future use.

2. Sporhase v. Nebraska, 458 U.S. 941 (1982).

3. City of El Paso v. Reynolds, 597 F. Supp. 694 (D.N.M. 1984).

4. Even the Supreme Court has admitted that "public welfare" may be a term incapable of precise definition. Berman v. Parker, 348 U.S. 26 (1954).

5. National Audubon Soc'y v. Superior Court, 658 P.2d 709 (Cal.), cert. denied, 104 S. Ct. 413 (1983).

6. United Plainsmen Ass'n v. North Dakota State Water Conservation Comm'n, 247 N.W.2d 457 (N.D. 1976).

7. The Commission consists of nine members, one of which is a member at large. All nine are voting members, and a Commission majority consists of five. At least one person on the Commission must have an adjudicated water right. The Commission is appointed by the Governor after consultation with the superintendent of each water division and approval by the Senate. The state engineer or his designee, the administrator of the Water Division of the Department of Economic Planning and Development, and "a person with interest, training and expertise in water resource matters from the University of Wyoming or the Wyoming Water Resources Research Institute" serve as non-voting consultants to the Commission.

8. Wyo. Stat. § 41-2-109 (Cum. Supp. 1985).

9. In formulating the plans, the Commission may consult with "persons, local groups and organizations representing water users, special interests, industries and the public interest." It may acquire data from and coordinate its plans with other governmental agencies and departments. The Commission may undertake studies, investigations, surveys and research necessary to formulate the plans, and can ar-

range to have those services undertaken by any "governmental agency, department or person, firm, university, institution or state or national organization." The Commission may also perform "other related activities or functions as are relevant and appropriate to the formulation of water resource plans."

10. Preferred uses are described and ranked as follows:

    (i) Water for drinking purposes for both man and beast;

    (ii) Water for municipal purposes;

    (iii) Water for the use of steam engines and for general railway use, water for culinary, laundry, bathing, refrigerating (including the manufacture of ice), for steam and hot water heating plants, and steam power plants; and

    (iv) Industrial purposes.

11. Ariz. Groundwater Management Act, 45 A.R.S. § 101 et seq. (1980). Although the Code's provisions have never been challenged under the commerce clause, and it is beyond the scope of this paper to address that issue, major portions have withstood other constitutionally based challenges. Domestic wells and those used to irrigate less than two acres are exempted from the Code's provisions.

12. A.R.S. § 45-469 (1980).

13. Safe yield is defined to be "the attainment and maintenance of a long-term balance between the amount of groundwater withdrawn annually and the annual amount of natural and artificial recharge." The feasibility of achieving this goal in an arid region where natural recharge is minimal is extremely debatable.

14. This is similar to the system used in New Mexico for managing non-tributary aquifers. See Mathers v. Texaco, 77 N.M. 239, 421 P.2d 771 (1966).

15. For agricultural users the state adopted the following standard minimum conservation practices during the first management period: lined ditches, pump-back systems, land levelling and efficient application practices.

16. A permit system, in and of itself, is not new. New Mexico has had a permit system in declared basins for half a century.

17. This is analogous to New Mexico's treatment of these types of uses.

18. This can be misleading. Irrigation GFRs can be retired, thereby becoming Type 1 GFRs. Type 1 GFRs are generally held by municipalities or other water service providers. As long as used within the "service area" they would not be considered severed from the overlying land.

19. This is done in Washington, Indiana and New Mexico by state agencies.

20. See Wyoming: Wyo. Stat. § 41-3-102 (1977); Montana: Mont. Code Ann. § 85-1-602 (storage of water for existing and future beneficial uses given highest priority); H.B. 680, "Statement of Intent," 49th Legislature, Senate Natural Resources Committee (preference for agricultural use); California: Cal. Water Code § 1-6999 (West 1985); Washington: Wash. Rev. Code § 90.22.010 (Cum. Supp. 1986).

21. See Wyoming: Wyo. Stat. § 41-3-905 (1977); New Mexico: N.M. Stat. Ann. § 72-12-1 (1985); Montana: Mont. Code Ann. § 85-2-302 (1985).

22. Tex. Water Code Ann. § 52.051 (Vernon Cum. Supp. 1986).

23. Id. Once an area is identified by the Department, it prepares a report that must:

    (1) provide a technical assessment of information available on underground water resources in the area to be covered by the plan;

    (2) evaluate the significance of groundwater problems within the area including problems with water quality;

    (3) assess the efficiency of existing institutions regulating underground water use;

    (4) assess the administrative feasibility and economic impact of restricting withdrawals of underground water;

    (5) assess potential methods of increasing aquifer recharge;

    (6) assess the potential for additional underground water development;

    (7) assess the potential and need for conjunctive use of underground water and surface water;

(8) evaluate and recommend potential control strategies for protecting underground water supplies on a regional basis;

(9) make recommendations as to whether an underground water conservation district would be a benefit to the area and if so what the boundaries of the district should be; and

(10) assess the alternative methods of financing the district.

24. Id.

25. The legislative purpose is described as follows:

> To assure the availability of a clean and adequate supply of underground water and to adequately control land subsidence problems and waste of underground water, it is the purpose of the legislature to establish a procedure through which the department can monitor and study on a continuing basis the underground water situation within the state and work within critical areas to solve existing or potential problems.

The legislature emphasized that it is also the purpose of the legislature to assure that the local areas will determine the best methods for handling underground water problems either through the creation of underground water conservation districts or through other means available to each individual and local governmental entity.

26. Tex. Water Code Ann. § 52.151 (Vernon Cum. Supp. 1986). A brief resume of each rule must be published. The district may enforce relevant provisions of law and its rules by injunction, mandatory injunction, or other appropriate remedy in a court of competent jurisdiction. Rules must be reasonable, and a person may appeal the reasonableness and validity of a rule. Tex. Water Code Ann. § 52.166 (Vernon Cum. Supp. 1986). Even those wells exempted from permit requirements:

> shall be equipped and maintained so as to conform to the district's rules requiring installation of casing, pipe, and fittings to prevent the escape of underground water from an underground water reservoir to any reservoir not containing underground water and to prevent the pollution or harmful alteration of the character of water in any underground reservoir.

Court proceedings are de novo, but the burden of proof is on the petitioner, and the rule, order or act is deemed prima facie valid. Rules, orders and acts of the Commission, other than orders creating critical areas after popular elections, are subject to the same scope of review.

27. Tex. Water Code Ann. § 52.001 (Vernon Cum. Supp. 1986).

"Waste" means:

(A) withdrawal of underground water from an underground water reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes;

(B) the flowing or producing of wells from an underground water reservoir if the water produced is not used for a beneficial purpose;

(C) escape of underground water from an underground water reservoir to any other reservoir that does not contain underground water;

(D) pollution or harmful alteration of underground water in an underground water reservoir by salt, water, other deleterious matter admitted from another stratum or from the surface of the ground; or

(E) wilfully or negligently causing, suffering, or permitting underground water to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well.

"Use for a beneficial purpose" means use for:

(A) agricultural, gardening, domestic, stock raising, municipal, mining; manufacturing, industrial, commercial, recreational, or pleasure purposes;

(B) exploring for, producing, handling, or treating oil, gas, sulphur, or other minerals; or

(C) any other purpose that is useful and beneficial to the user.

28. Under the Texas plan the Parks and Recreation Department is given five percent of the annual yield of water in any reservoir and associated works constructed with state financial participation within 200 river miles from the coast, for use to make releases to bays and estuaries and for instream

uses. In addition, the Texas Water Commission must assess the effects, if any, of issuance of a permit to store, take, or divert water on bays and estuaries, existing instream uses, the water quality of the stream or river to which the application applies, and fish and wildlife habitats.

29. Water conservation programs may include, but are not limited to, the following:

    (1) restrictions on discretionary water uses, such as lawn watering;

    (2) plumbing code standards for water conservation in new building construction;

    (3) retrofit programs to improve water-use efficiency in existing buildings;

    (4) educational programs;

    (5) universal metering;

    (6) conservation-oriented water rate structures;

    (7) drought contingency plans; and

    (8) distribution system leak detection and repair.

30. Tex. Water Code Ann. § 15.404 (Vernon Cum. Supp. 1986).

31. Mont. Code Ann. § 85-2-316(1) (1985).

32. <u>Report of the Select Committee on Water Marketing</u>, 49th Legislature, State of Montana, Jan. 1985, at V-46.

33. Wash. Rev. Code § 90.14.031 (Cum. Supp. 1986). "'Beneficial use'" shall include, but not be limited to, use for domestic water, irrigation, fish, shellfish, game and other aquatic life, municipal, recreation, industrial water, generation of electric power and navigation."

34. Marsha Beery, "Overview of Washington State's River Basin Planning Program," paper presented at Western States Water Council, 1st Symposium (Beery), at 206. The fisheries interests would prefer that the term be defined to mean something like the quantity and quality necessary to allow salmon to run without undue hardship or losses.

35. <u>Id</u>.

36. Wash. Rev. Code § 90.54.050(2) (Cum. Supp. 1986). Reservations may be made for agricultural, hydroelectric energy, municipal, industrial and other beneficial uses.

37. _Id._

38. Wash. Admin. Code Rev. § 173-590-020 (1976). A "public water supply" is "any water supply intended or used for human consumption and community uses for more than one person."

39. Wash. Admin. Code Rev. § 173-590-060 (1976).

40. _Id._ § 173-590-050(8). Among other information, a petition for this type of reservation must include present and projected in 10, 25, and 50 years population; the amount of water to be used for domestic, community and attendant commercial, industrial and irrigation, and other uses "as specified"; a summary of ongoing and planned conservation programs; information justifying the requested reservation quantity in the form of official state population estimates; regional plans or engineering reports; and "other data as may be required by the director." The director must give public notice of the filing of the petition and an opportunity for public comment before adopting a regulation establishing the reservation. The amount of the reservation is determined by the director and may be for more or less water than that requested in the petition.

41. _Id._ § 173-590-040(4).

42. _Id._ § 173-590-130.

43. _Id._ § 173-590-140.

44. _Id._

45. _See Final Report to the President and Congress of the United States by the National Water Commission, in Water Policies for the Future_ 37-333 (1973).

46. Cal. Water Code § 11460 _et seq._ (West 1971).

47. Summers, "Utah State Water Planning Activities," paper presented at Western States Water Council, 1st Symposium (Summers), at 11.

48. S.D. Codified Laws Ann. § 46-A-1-2 (1983).

49. "Colorado rejects use it or lose it," U.S. Water News, July 1985, at 6.

50. Application of House Bill 1070 § 6 (May 23, 1985), ON/R8504066/AON Op. Att'y Gen. (Sept. 10, 1985).

> My conclusion is that the above fee cannot be assessed on any water exported from Colorado because (1) Colorado is not entitled to impose a fee on any export that is authorized by an interstate

> compact or judicial decree or is credited as a delivery by Colorado to another state pursuant to a compact or decree; and (2) in any event, such an export fee violates the Commerce Clause, art. I, sec. 8, cl. 3 of the United States Constitution.

_Id_. at 2.

> I conclude that, since federal common law precludes Colorado from charging for the delivery of another state's equitable share of the waters of an interstate stream, Colorado may not impose a fee on water exported from the state which is authorized by an interstate compact or judicial decree or is credited as a delivery by Colorado to another state pursuant to a compact or decree. Consequently, section 37-81-104(1) cannot lawfully be applied to such compacted or decreed waters.

_Id_. at 5.

> The imposition of a fee on exports, on the other hand, is not narrowly tailored to these equitable apportionment and conservation purposes and is certainly not the least discriminatory means to achieve them. _See Hughes v. California_, 441 U.S. at 337. When section 37-81-104 is superimposed on the other limitations contained in sections 37-81-101(3) and 37-81-103, it does not appear that the imposition of an export fee adds anything to those provisions that "significantly advances the state's legitimate conservation and preservation interest ...." _Sporhase v. Nebraska_, 458 U.S. at 958. The statute also suffers from the same defect that was condemned in _Philadelphia v. New Jersey_, 437 U.S. at 628—it imposes the full burden of conserving the scarce natural resource on out-of-state interests. Finally, it is unclear, in light of _Commonwealth Edison Company v. Montana_, 453 U.S. 609, and the _Complete Auto Transit_ test applied therein, that any fee that on its face discriminates against interstate commerce, no matter what its justification, can withstand constitutional scrutiny.

_Id_. at 11.

51. Cal. Water Code §§ 10500-10507 (West 1971).

52. Mont. Code Ann. § 85-2-204 (1985).

53. _Id_.

54. _Id_.

55. *Id.* § 85-2-301(2)(a)(ii).

56. *Id.* § 85-2-141(2(b).

57. *Id.* § 85-2-141(2).

58. *Id.* § 85-2-141(3).

59. *Id.* § 85-2-141(4).

60. *Id.* § 85-2-141(5).

61. *Id.* § 85-2-141(4). Section 85-2-102 defines beneficial use as follows:

    (a) a use of water for the benefit of the appropriator, other persons, or the public, including but not limited to agricultural (including stock water), domestic, fish and wildlife, industrial, irrigation, mining, municipal, power, and recreational uses; and

    (b) a use of water appropriated by the department for the state water leasing program under 85-2-141 and of water leased under a valid lease issued by the department under 85-2-141.

62. Mont. Code Ann. § 85-2-402(5)(b)(i) (1985).

63. Tex. Water Code Ann. § 15.323(a) (Vernon Cum. Supp. 1986).

64. Tex. Water Code Ann. § 15.002(a) (Vernon Cum. Supp. 1986). The Board may define the legislative purpose in greater detail.

65. "Political subdivisions" include "any city, county, district or authority" created under relevant Texas law, "any other political subdivision of the state, or any interstate compact commission to which the state is a party." When a project's effects extend beyond the jurisdiction of the applicant, it must submit a written "memorandum of understanding" relating to the management of the watershed and approved by the governing bodies of all political subdivisions located in the watershed.

66. Tex. Water Code Ann. § 15.102 (Vernon Cum. Supp. 198_). An application proposing surface water development must show that it has "the necessary water right authorizing it to appropriate and use the water that the project will provide." An applicant proposing underground water development must show that it has "the right to use the water that the project will provide."

67. Tex. Water Code Ann. § 15.002 (Vernon Cum. Supp. 198_).

68. Tex. Water Code Ann. § 15.302(a) (Vernon Cum. Supp. 1986). For instance, it may contract with a political subdivision for payment of the principal, interest or both on bonds or other obligations issued or to be issued by the political subdivision. Contracts may cover all or any part of the debt service requirements. It may contract with a political subdivision to provide the subdivision's share of any cost-sharing required as a participant or local sponsor of a federal project. It may also purchase the bonds or other obligations of a political subdivision to completely or partially finance the project.

69. Id. § 15.306.

70. Id. § 15.307.

71. Id. § 15.313 sets out a method of computing the sale or transfer price of a state facility.

72. In addition, the Board must find that the applicant has a permit from the Commission; and that the consideration is just and reasonable and in full compliance with the law. Consideration may be either money or revenue bonds.

73. Tex. Water Code Ann. § 15.324(a) (Vernon Cum. Supp. 1986).

74. Id. at § 15.323(a). The price is determined by the Board. Money received is put into the general revenue fund or the water assistance fund, depending on specific circumstances. Consideration and other provisions must be "fair, reasonable and nondiscriminatory."

75. Tex. Water Code Ann. § 15.326 (Vernon Cum. Supp. 1986).

76. Wyo. Stat. § 41-2-112(a) (Cum. Supp. 1985).

77. Id.

78. Id.

79. Reconnaissance studies must, to the extent possible:

    (A) Describe the project;

    (B) Identify the need for the project including supplies and demands for water;

    (C) In cooperation with the state engineer, assess the status of water rights, including existing conflicts and recommendations for resolution of the conflicts and other potential obstacles;

(D) Assess and describe federal permits required for construction;

(E) Assess environmental considerations and constraints, including recreational use of the water in storage;

(F) Identify legal constraints to development;

(G) Identify alternate sources of supply, including both surface water and groundwater; [and]

(H) Summarize public testimony received at meetings held by the Commission in the basin or origin; ...

80. Feasibility studies must, to the extent possible:

(A) Include a detailed analysis of factors relevant to development, operation and maintenance;

(B) Identify major problems and opportunities concerning development and the environmental, recreational, social and economic effects of development;

(C) Identify the desired sequence of events, including commencement of state and federal permitting activities and acquisition of land;

(D) Summarize testimony received at public meetings held by the commission in the basin of origin;

(E) Include test drilling for groundwater projects;

....

(G) Include draft enabling legislation.

81. These plans should include: final design and cost estimates, the project financing plan, "identification of the interests in land and water rights to be acquired and the means and costs of acquisition. An 'interest in land' may include the fee simple title or any other interest in land less than a fee simple, and draft legislation describing in detail the construction, operation and financing of the proposed project. This includes reimbursement of predevelopment costs by the beneficiaries of the project.

82. Wyo. Stat. § 41-2-115(a) (Cum. Supp. 1985). If the Commission finds that a project is in the public interest and that "some other governmental agency, public district, or private corporation or association" wants, and is able, to construct, operate and maintain the project, then the Commission, with the approval of the Governor and legislature, may transfer or assign the project and any property or rights connected with it to another entity. Predevelopment costs, payments made for property and so forth are to be reimbursed.

83. Wyo. Stat. § 41-2-116 (Cum. Supp. 1985).

84. In 1984, 79 projects, at an estimated total cost of $70 million, had been selected for the water facilities plan; 18 projects, at an estimated cost of $3.5 billion, had been selected for the water resources management systems program.

85. In addition to these proprietary activities, the Board administers the federal EPA wastewater construction program and the HUD community development block grant program on behalf of the State. Funds from these sources have been combined with other public and private sources and used to initiate construction of 44 projects in 1983.

86. Matching requirements range from 20% to 40%. Loans usually carry interest at 6.125% over 30 years.

87. Edman, "The South Dakota State Water Plan—An Economic Development Blueprint," paper presented at Western States Water Council, 1st Symposium (Edman), at 154. In 1984, existing and potential federally supported projects in the State included:

    (1) a $92 million rural water supply system, under construction;

    (2) a $48 million irrigation rehabilitation project, authorized and made a part of the Pick-Sloan project;

    (3) a $140 million irrigation project, ready for authorization;

    (4) a $1.1 billion irrigation project, ready for authorization;

    (5) a $1.5 billion pumped storage hydro project, placed on high priority by Corps of Engineers; and

    (6) a $120 million extension project, receiving active support from the Department of Interior.

CHAPTER 12

SELECTING AN AGENCY TO APPROPRIATE WATER FOR VARIOUS REGIONS OF THE STATE

I. AGENCIES APPROPRIATING WATER IN OTHER STATES

Acquisition of water rights by a state or its political subdivisions is a fairly common and well established practice in many states. Chapter 11 examines state appropriation in other western states. This chapter examines possible institutions for state appropriation in New Mexico. The Interstate Streams Commission and its water market activities are given particular attention.

The state appropriation practices of the other states vary considerably but some common patterns emerge. In California, a state agency appropriates, and then controls, a significant proportion of the state's water resources by managing the water delivery system.

Texas suggests an alternate model. A statewide agency has been given the power to sell unappropriated waters from state lands even though it does not directly manage a physical system.

In Montana, no single statewide organization is designated as the state appropriator. Instead, a board is allowed to make what we have termed an "implicit appropriation" by reserving water for future use. Subsequent appropriations of reserved water are made by a multitude of state, local, and federal agencies who must successfully complete a considerable series of administrative hurdles prior to obtaining an appropriative right. As in the Texas case, the designated lead agency of the state is given considerable discretionary authority over allocation of water resources while escaping the responsibilities of project management through delegation to other state agencies or political subdivisions. Montana's system, with some modifications, might mesh nicely with state appropriation in New Mexico. A state agency or agencies would first appropriate unappropriated waters pursuant to a plan and then initiate a process whereby local agencies, with capital improvements, could put the water to beneficial use.

In the three reviewed states, a separate regulatory board or commission exists to ensure that all appropriations conform to constitutional and statutory requirements. This separation of functions provides a check on administrative discretion and is responsive to potential legal challenges based upon an alleged conflict of interest that may occur when a single agency both regulates and appropriates water resources.

In New Mexico, the regulation of water rights traditionally has been delegated to the Office of the State Engineer. The experience in the other states, while by no means conclusive, does suggest that the State Engineer should not be both a hearing officer on applications <u>and</u> the appropriator of water for the state.

A second attribute found in the three reviewed states is the presence of an active water planning process. While a state or its political subdivisions clearly have the right to appropriate water, as noted above, recent court decisions suggest that the water must be put to use as part of a plan for beneficial use. Planning is essential to a state appropriation system because any such appropriation must be based on data that shows the appropriation is reasonably necessary and adequate for future uses. In addition to conducting an inventory of water development needs and potentials, a planning process must provide a forum for input from interested agencies and parties. Each of the reviewed states, as well as New Mexico, have passed legislation that conditions appropriations and/or transfers of water rights on various criteria, such as public welfare, and conservation provisions. Regional water planning is one vehicle for insuring that these criteria govern state appropriations as well.

In sum, state appropriation institutions can be fashioned in a number of ways ranging from active project management to a more strictly defined process. In each reviewed state, however, two essential ingredients are evident: (1) separation of regulatory and proprietary functions into two or more organizations, and (2) commitment to regional planning processes prior to state appropriation of water.

II. AGENCY OPTIONS FOR NEW MEXICO STATE APPROPRIATION

A number of institutional options exist or could be created to allow state appropriation of unappropriated waters in New Mexico. Again, the review which follows evaluates a range of options rather than providing an exhaustive evaluation of all options. The section provides both a preliminary analysis of institutional options and an evaluative framework that could guide subsequent analyses. Three relatively different institutional options are evaluated:

A. Select an Existing Agency to Coordinate State Reservations of Water

The first option would be to allow any state agency or political subdivision the right to appropriate unappropriated water subject to final approval by the state engineer. The coordinating organization would not be expected to acquire and control unappropriated waters, but simply hold it for the state agency until needed. Due to the regulatory emphasis of this option, the Office of the State Engineer would be a logical candidate. This option most closely corresponds to the Montana reservation system discussed above. The study team is of the view that this option of simple reservation by declaration without plans to put water to beneficial use is not legally feasible in New Mexico and would be of questionable value.

B. Select an Existing Agency to Appropriate Water

Assuming that the State Engineer will continue to perform a primarily regulatory function, i.e., to review all water rights transactions according to constitutional and statutory criteria, to avoid potential conflict of interest challenges, this Office should not be the appropriating agency. However, another existing agency could be designated to appropriate, develop, and sell or lease unappropriated water. Leading candidates might be the Interstate Stream Commission and the Department of Natural Resources.

C. Create a New Agency to Appropriate Water

The state legislature could create a commission, statewide special purpose district, or not-for-profit corporation whose sole purpose would be to appropriate, develop, and lease or sell unappropriated water. South Dakota has recently created a statewide special district to market surplus waters. (See Chapter 11.)

III. EVALUATION OF INSTITUTIONAL OPTIONS

The three institutional options can be evaluated according to three general administrative considerations: (1) Suitability of the task to the basic purpose of the organization; (2) Accountability to the public and its representatives; (3) Feasibility from technical, political, legal and economic viewpoints. The relative advantages and disadvantages of each option are summarized in Table 1 and discussed more fully below.

TABLE 1: RELATIVE RATINGS OF SUITABILITY, ACCOUNTABILITY, FEASIBILITY OF INSTITUTIONAL OPTIONS FOR STATE APPROPRIATION OF WATER

INSTITUTIONAL OPTION*	SUITABILITY	ACCOUNTABILITY	FEASIBILITY			
			POLITICAL	ECONOMIC	TECHNICAL	LEGAL
OPTION 1: SELECT EXISTING AGENCY TO RESERVE WATER	MODERATE	MOD./HIGH	HIGH	HIGH	MODERATE	NOT POSSIBLE
OPTION 2: SELECT EXISTING AGENCY TO APPROPRIATE	MOD./HIGH	HIGH	MODERATE	HIGH	HIGH	HIGH
OPTION 3: CREATE NEW AGENCY TO APPROPRIATE	HIGH	HIGH	LOW	MODERATE	MODERATE	HIGH

*See text for full explanation of options and rating criteria.

A. <u>Suitability of task to basic purpose of organization conform</u>

As the governmental function evolves from merely regulating water use to more complex tasks such as ensuring an adequate supply of water for present and future uses, the basic mission of existing agencies may be changed. Consequently, enabling legislation may need to be amended. This, in turn, may disrupt established practices and procedures. This is especially problematic in established agencies where resources usually are fully committed and where personnel may resist adjustments needed to accomplish the new task.

Given these factors, forming a new administrative entity, Option 3, has significant advantages over the other two options because a charter or new enabling legislation can be specifically tailored to the task. For example, a not-for-profit corporation or statewide special purpose district could be designed to specifically meet the organizational needs of a state appropriation program. Generally, the enabling legislation for either type of entity is very flexible; the articles of incorporation, for example, could be structured to meet any peculiar or unique need of such a program provided that other laws or rights are not violated.

However, among existing state agencies, the enabling legislation of the Interstate Streams Commission (ISC) already conforms closely to the requirements of state appropriation. Specifically, the ISC is authorized by statute to "develop, conserve, and protect the waters and stream systems of the state, acquire, by purchase or otherwise, water rights, and sell or lease water rights for a wide variety of purposes." Therefore, if the ISC were the appropriating agency, it might not suffer the problems associated with giving new tasks to an existing agency. Therefore, option 2 has been assigned a moderate to high rating in terms of suitability, assuming that the Interstate Streams Commission is selected as the appropriation agency.

In contrast, the enabling legislation of the Office of the State Engineer is more narrowly prescribed. Therefore, adding appropriation to the duties of the office of the State Engineer under Option 1 would be the least viable. Furthermore, a generalized reservation system would not pass the legal requirements set out in the study. The strong working relationship between the Office of the State Engineer and the Interstate Streams Commission suggests that these entities could play complimentary roles in any state appropriation activity. As an <u>ex officio</u> member of the Commission, the State Engineer could perform the essential task of coordinating the tasks of the ISC with the activities of other state and local water agencies, but would be sufficiently separate from the ISC to resist allegations of conflict of interest.

B. <u>Accountability of appropriating agency</u>

The appropriation and subsequent distribution of water rights by a state entity must be monitored by executive, legislative, and judicial bodies. Political accountability can be accomplished through enabling legislation that provides for appointment or election of a governing board and requires conformance with clearly established operating criteria such as that embodied in strategic planning documents. Judicial accountability is accomplished through creation of appeal procedures which trigger review by a judicial or quasi-judicial body. Public accountability can be enhanced by specific provisions which mandate opportunities for regional public participation in forming, implementing, and evaluating the program. If public monies are used to support the appropriation of water resources, adequate records and documentation of activities are necessary to allow for periodic audits and evaluation of the program.

An important dimension of accountability concerns communications. Information about water availability and water needs should be made available to all interested parties. In addition, the appropriating entity should have a mutually constructive working relationship with existing water management and water service organizations.

Again, Option 3 rates highly because specific accountability provisions could be included in the enabling legislation. However, the other options also rate well because general provisions provide significant opportunities for legislative, executive, and judicial oversight. As noted, the close relationship that exists between the State Engineer and the Interstate Streams Commission suggests that communication patterns are well established and information is readily available.

One significant exception is that there are no provisions for public participation, such as environmental impact review procedures. Such provisions could, however, be provided in separate legislation if desired by the legislature. Another potential problem with either Option 1 or 2 concerns representation. The Interstate Streams Commission, unlike the Office of the State Engineer or the Department of Natural Resources, however, could be more accountable to each region of the state if legislation provided for regional representation.

C. Feasibility

Under this criterion, we examine four basic dimensions: political, economic, technical and legal. With reference to the three institutional options, if the needed capability, authority, operating freedom, and administrative infrastructure are available or readily adaptable (to enable state appropriation) within existing organizational arrangements, there would be little advantage in creating a new entity. Locating the state appropriation function within an existing organization or organizations generally will be more feasible politically, economically, technically and legally. However, a simple reservation system in the office of the State Engineer may not be legal. Further, the relative advantages of creating a new administrative entity also should be considered. It is often easier to write a new law then to amend an old one.

In terms of political feasibility, Option 1 clearly emerges as the top candidate because the appropriation function would be widely distributed to a multitude of agencies. Moreover, the Office of the State Engineer would be allowed to carry on business as usual, i.e., regulation, with only minor changes. However, as noted above, simple blanket reservations of water would probably not pass constitutional muster.

Designating the ISC seems to be the preferred alternative because this agency has an established record of successful appropriation coupled with a fairly broad statutory charter. Option 3 rates quite low in terms of political feasibility due to both the increasing reluctance of government to create new agencies and the existence of other agencies that might be able to accomplish the task. To create a new organization would require considerable political effort.

As to economic feasibility, it seems clear that water allocation and pricing institutions generally are more costly to administer than more simple regulatory bodies. These additional costs, which economists call transaction costs, increase with the complexity of the institutional arrangements. Costs likely to be associated with a state appropriation program include information costs to providers and recipients of goods and services, contract and agreement costs, capital costs, and other administrative costs. The goal is to identify the most cost-effective institutional mix which allows for full implementation of a state appropriation system.

Option 1 might involve initial high total costs. Montana's experiences with a similar system involved considerable time and expense to develop and review various plans and to reach agreement with water contractors. Furthermore, allowing a multitude of actors the opportunity to reserve water implies a need for some coordinating mechanism in order to prevent duplication of effort and competition between agencies who are using essentially the same revenue source, e.g., state revenues. However, in a pure reservation system, there would be no initial development costs. But, as listed above this would likely amount to a "legal fiction" and not be viewed as true state appropriation.

Option 3 would also entail considerable transaction costs. But in this case, significant startup costs would account for a significantly higher proportion of costs in comparison to either Option 1 or 2. Costs associated with coordination of efforts would be minimized with this Option and Option 2 because the agency probably would be given exclusive authority to appropriate unappropriated water. In the long run, economic feasibility of this option could be enhanced by revenue generation provisions, e.g. levy assessment powers, sale of bonds, and/or user fees such as revenues from leased water rights.

Giving the authority to the Interstate Streams Commission, Option 2, provides the best opportunity to minimize transaction costs in the provision of state appropriation functions. Further, because revenue sources, administrative infrastructure, and other features are already established, selecting an existing agency appears to be the most feasible alternative from an economic perspective. Coordination costs can be minimized by selection of the ISC due to the close relationship this agency has with the regulatory agency, the Office of the State Engineer.

Technical feasibility: The protection of third party interests in any water rights transaction is a central consideration in delegating administrative authority. The state appropriation entity must be staffed by individuals having technical expertise with reference to the hydrologic, legal, and economic externalities that accompany water rights transactions. A state appropriation system will also require significant management and administrative expertise including the conduct of regional planning and public review processes. Although a comprehensive review of technical capabilities has not been conducted, a few preliminary conclusions can be drawn.

Currently, the Office of the State Engineer possesses considerable expertise in the legal and hydrologic areas and, to a lesser extent, in economics. Other state agencies such as the ISC and Department of Natural Resources run a close second. The ISC's management of the Ute Dam Project gives it a decided advantage over other state agencies in terms of experience with state appropriation projects. None of the reviewed agencies boasts particular expertise in comprehensive planning or public participation processes largely because these areas have not been a high priority in water management. However, there is no reason to conclude that technical capacity is not available. Given financial resources, any state appropriation body could quickly develop expertise in needed areas. The existing activities of the ISC with respect to Ute Dam provide the best example of how an existing agency can and has exercised state appropriation functions.

IV. UTE DAM AND THE INTERSTATE STREAM COMMISSION: AN EXISTING EXAMPLE OF STATE APPROPRIATION

A. State Financing and Construction of Ute Dam

By 1955 the State Engineer was investigating dam sites below

Conchas Dam to take advantage of the state's storage rights under the Canadian River Compact.[1] Responsibility for the project fell to the Interstate Streams Commission (ISC). The commission "is delegated broad and general powers in the protection, conservation and development of the waters and stream systems of New Mexico, both inter and intra-state."[2] In 1957 the legislature authorized the ISC to issue special revenue bonds for the purpose of building, operating and maintaining storage facilities below Conchas Dam.[3] By 1962 the Ute Dam site had been selected and a contract was awarded for construction. In May 1963 the dam was dedicated.[4] No federal funds were used to develop this reservoir. Since 1963 the ISC has had exclusive responsibility for this storage structure. Thus, the waters that are stored in the reservoir could be considered a state-created good, in that they are only available for use because of state expenditures to exercise rights held under the compact.

B. <u>State Ownership of the Stored Waters</u>

As early as 1957 the ISC filed a Notice of Intention to Appropriate 200,000 acre-feet of the waters of the Canadian River to initiate a right for potential development.[5] Once the dam was completed in 1963, the ISC adopted a sales policy for the waters to be stored in the reservoir.[6] In 1965 the commission filed a Notice of Intention to Make Formal Application for a Permit to develop the unappropriated waters of the Canadian River and its tributaries between Ute Dam and the state line. This notice has been continually renewed. Thus, all the waters in the reservoir and between the reservoir and the state line have been indirectly controlled by the ISC since shortly after construction of Ute Dam. This state agency has acquired a proprietary interest in these waters by virtue of the permit process and by expending funds. These waters are not public waters that are open to appropriation by private individuals, but waters that have been appropriated in the same manner as all other private water rights in the state. Private individuals have access to these waters but they must negotiate with the ISC in the water market to use these waters. The history of this market participation follows.

C. Interstate Stream Commission Distribution of Canadian River Waters

The ISC has used three mechanisms to distribute waters it has appropriated: relinquishment, sale and lease. In-place distribution has also occurred. A major factor, practically speaking, that has limited distribution in the past and in the present is the Eastern New Mexico Water Supply Project of the U.S. Bureau of Reclamation. Ute Dam waters have always been considered a source of water for this project. Therefore, In distributing the waters of Ute Dam, the ISC has been an active participant in the water rights market for present uses and has worked with the Eastern New Mexico Water Supply Project to ensure that water is available in the future when and if the project is built.

1. Distribution for Present Use

a. Relinquishment

In a few instances the ISC has relinquished certain water rights in favor of various parties. This mechanism is similar to a gift transfer. By relinquishing its proprietary interest in favor of a named party, the named party can obtain a permit to appropriate the subject waters in accordance with state law.

After the ISC filed the original notice of intention to appropriate 200,000 acre-feet, the ISC relinquished up to 2,000 acre-feet in favor of a private individual, M.D. Smithson, to create a reservoir near Clayton.[7]

b. Sale

Shortly after dedication of the dam in 1963, the ISC instituted a policy regarding the sale of water from the project. A price of three cents/1000 gallons was established. Revenues from sales were deposited in the Ute Dam and Reservoir Construction Fund.[8] The Reports of the State Engineer from 1964 to the present show annual income from the sales for most years:

1964-65	$ 21.19
65-66	23.33
66-67	5.34
67-68	29.36
68-70	0.00
70-71	39.93
71-72	188.02
72-73	0.00
73-74	332.00
74-75	166.00
75-76	262.00
76-77	739.26
77-78	577.76
78-79	445.89
79-80	420.71
80-81	0.00
81-82	924.05
82-83	Unascertainable

c. Lease

The ISC has also entered into leases with individuals for water. In the 30th Biennial Report of the State Engineer (1970 and 1971) it was reported that the ISC entered into a 50-year lease agreement with Ray H. Davidson for 280 acre-feet of its conservation storage right.[9] Prior to this lease the ISC entered into an agreement with State Parks and Recreation that was a hybrid sale and lease. Parks and Recreation obtained the right to divert 50 acre feet annually with a ten year option to increase the diversion up to 300 acre feet annually.[10]

d. In-place Distribution

In order to control sediment, 49,900 acre-feet of water are held in Ute Dam.[11] Water for this use is specifically excepted from the conservation storage limitation by article II of the compact, but New Mexico recognizes secondary uses for this water that have defrayed the costs of operating the dam and reservoir. Prior to dedication of the Dam and Reservoir, a lease agreement was reached between the New Mexico Game and Fish Commission and the ISC whereby in consideration for not drawing the reservoir below a specified elevation, the Game Commission would contribute a set amount to the Ute Dam and Reservoir Operating Fund until the balance of the fund reached a certain amount.[12] In this lease transaction, then, certain waters are not available for distribution in consideration, in part, for agency contributions to operating funds.

2. Protection for Future Use

In late 1963, shortly after completion of Ute Dam, various municipalities in Eastern New Mexico formed the Ute Dam Municipal Water Association with the goal of developing a system to distribute the waters stored in Ute Dam to east-side municipalities in areas of the state with critical water needs due to groundwater overdraft and over appropriation of the Pecos River Basin.

Association representatives appeared before the ISC to request that if a pipeline was found to be feasible, that the ISC contract with the municipalities for the sale or lease of the total yield of the reservoir. The ISC refused to reserve all the stored waters for the municipalities, but it did agree to allow the association an opportunity to be heard before any water sale contract was signed.[13]

Since 1963 the Bureau of Reclamation has prepared a feasibility study. In 1976 further activities were suspended so that Hobbs, could analyze a report on the city's future supply needs. Since that time the bureau has updated its feasibility report but little else has been done. In recent months at least one city, Tucumcari, has stated a desire to activate the project.[14] The City of Clovis has entered into an option contract to purchase Ute Dam water.[15] The water for the project, though, is still available from Ute Dam, effectively withdrawn from appropriation by virtue of the ISC actions. Although not done as part of one overall plan, the effect of the ISC action has been to act as a market participant in appropriating water for future use by the interested communities.

CHAPTER 12 ENDNOTES

1. Office of the State Engineer, Biennial Report 1956-58, at 64. The Compact gives New Mexico a maximum amount of surface water in storage below Conchas Dam. _See_ article IV of the Compact, codified at N.M. Stat. Ann. § 72-15-2 (1978).

2. N.M. Stat. Ann. §§ 72-14-1 to 72-15-28 (1978 & Cum. Supp. 1984).

3. _See supra_ note 1.

4. Biennial Report, 1962-64, at 136.

5. _See supra_ note 1.

6. _See supra_ note 4.

7. Biennial Report, 1962-64.

8. _See supra_ note 4.

9. Biennial Report, 1970-72, at 77.

10. Correspondence with S.E. Reynolds, State Engineer (Aug. 27, 1985).

11. Telephone conference with New Mexico Game Fish Dept. personnel (Sept. 27, 1985). The Department has similar lease agreements to maintain minimum pools in other reservoirs, notably Eagle Nest Reservoir and Springer Lake.

12. Minutes of meeting of Canadian River Comm'n (Apr. 2, 1985).

13. _See generally_ Reports of State Engineer.

14. Minutes of NM Interstate Stream Comm'n meeting (Oct. 18-19, 1984).

15. Ute Reservoir Water Contract No. 8, dated Feb. 4, 1985, between the Interstate Stream Commission and the City of Clovis.