TRANSFERS OF WATER USE IN NEW MEXICO

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Abstract

This study was part of a comparative examination of the water transfer process and experience within six western states (Arizona, California, Colorado, New Mexico, Utah, and Wyoming). The results of the New Mexico portion of the study are presented here. For complete information on the results of the other five states and a comparative analysis of them, please see the final report of the overall project, *The Water Transfer Process as a Management Option for Meeting Changing Water Demands.*

In addition to a description of the water rights transfer process in New Mexico, the report presents numerical results of a Census of Water Right Transfers for the period from 1975 to 1987. This data was collected in a form which permitted disaggregation by basin region, size of transfer, frequency of protest, and other measures. In addition, some information was gathered on the cost of completing a transfer transaction and the sales price of the water right. Finally, the issue of the public welfare as it has arisen in the context of New Mexico water rights transfers is described and analyzed, and an institutional forum for addressing the issue is proposed.

Descriptors: Water Rights, Transfers, New Mexico, Public Welfare

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New Mexico applies the prior appropriation doctrine to both groundwater and surface water. In addition to appropriative water rights, there are federal reserved water rights held in Indian reservations and other federal lands.[1] Because these federally created water rights have been held nontransferable, they will not be considered in this discussion.

Public Ownership

The New Mexico legislature has declared that "all natural water flowing in streams and watercourses, whether such be perennial or torrential, within the limits of the state of New Mexico, belong to the public."[2] The state governs these resources as trustee for its citizens.[3] An individual may acquire a real property right to divert water, consistent with procedures under state law, up to the amount that can be put to a beneficial use.[4] Because water rights are property rights in New Mexico, they are transferable by deed from one person to another.[5] They can be forfeited if not put to beneficial use.[6]

Protection of instream flow in designated stretches of a watercourse is now common in most prior appropriation states, but has not been permitted in New Mexico. New Mexico has not authorized instream flows as beneficial uses of water.[7] Arguments based on ecological, recreational, and other grounds have been advanced in repeated efforts to secure legislative approval of instream rights, but no such efforts have been successful. These efforts have been defeated for several reasons, among them general concern that acceptance of this new use might severely limit transfer options. For example, instream flow opponents sometimes object, on principle, to the fact that transferring a surface right to instream use would protect a given stream stretch and that, consequently, surface rights downstream of the protected stretch could not be transferred to locations upstream of that stretch. [8] The New Mexico Constitution does not expressly foreclose instream flow rights.[9] It is conceivable, therefore, that a right to transfer water to instream use could be upheld under the constitution, where the transfer would provide economic benefit for a private party or recreational benefit for the state.[10]

Priority

New Mexico water law is based on "prior appropriation," a doctrine variously expressed in the several western states that have adopted it. In New Mexico the essence of prior appropriation is contained in two principles:

1) the first user (appropriator) in time has the better right to take and use water; and

2) that right continues as against subsequent users as long as the appropriator puts the water to beneficial use.[11]

Determining water rights by priority in time is a strict departure from the riparian approach followed in the eastern states.[12]

To establish a right to appropriate surface water anywhere in the state one must obtain a permit from the state engineer.[13] The same procedure is followed in establishing a right to appropriate groundwater, except where the groundwater is outside a declared basin. Declared basins are "water[s] of underground streams, channels, artesian basins, reservoirs or lakes, having reasonably ascertainable boundaries."[14] Outside a declared basin one can establish a right to appropriate groundwater simply by diverting water from the aquifer to beneficial use.[15]

Surface water established in an area prior to the state engineer's assertion of jurisdiction are also valid. New Mexico surface water came under the state engineer's jurisdiction in 1907. Thus, anyone who diverted surface water and put it to beneficial use before 1907 holds a valid water right regardless of whether the state engineer has since issued a corresponding permit.[16] Similarly, anyone who has pumped groundwater in a basin prior to state engineer jurisdiction has the right to continue his pumping.[17]

Beneficial Use

Under the New Mexico Constitution, "beneficial shall be the basis, the measure, and the limit of the right to use water."[18] The legislature has not statutorily defined what constitutes a "beneficial use" or assigned priorities as between particular uses. To date, however, as indicated above, the courts have recognized as beneficial uses only uses involving diversion of water from its source.[19]

Definition of Water Rights

A water right is defined not only by its priority date but by type of use, place of use, quantity, and point of diversion. A right's point of diversion, type, quantity, and place of use define the rightholder's choices in exercising the right.[20]

Use — Rights are designated as being for agricultural, municipal, industrial, or some other category of use. Some uses are exempt from traditional forfeiture rules.[21] Holders of municipal water rights, for example, are allowed forty years from the date of application to put water to beneficial use.[22] All other rights are limited to a maximum of four years of non-use subject to extensions of time.[23]

Quantity — The units of water utilized are described in definite ways. The right may be expressed in terms of land irrigated, or "acre feet per year," or as a rate of flow such as "cubic feet per second."[24] Water permits usually specify a total diversionary amount rather that the amount to be consumed by use. Because the total diversionary amount includes return flow, however, the relevant amount when the water is to be transferred to a new place or use is the consumptive use.[25]

The maximum quantity of water allocated to any given right is determined by the reasonable demands of the user and the desire "to prevent waste."[26] For agricultural rights, demand may be presumed to be the amount necessary to irrigate crops in the area as calculated by the Blaney-Criddle formula or some similar method adjusted for altitude, temperature, precipitation, and other relevant variables.[27] For municipal or industrial rights, the amount allowed per capita is determined by the reasonable water demands of these uses.[28]

Although the entire quantity of water associated with a right is generally designated for use within each calendar year, the time of year when a right must be used is not specified unless there is reason to do so. Surface rights are sometimes permitted on a seasonal basis when seasonal allocation makes more water available to others on the stream.[29]

Point of Diversion — The diversion point is the place where the appropriator constructs works for removing water from the stream or ground. The point of diversion and the source of water are extremely important in defining the scope of the right. Hydrologic differences

in underground aquifers illustrate this point. Rights to groundwater differ, depending on whether the water is in a stream-related aquifer, one recharged by surface streams, or a non-stream-related aquifer, one that is for practical purposes closed or nonrenewable.[30] New Mexico law conditions the extraction of water from a stream-related aquifer on the appropriator's retirement of surface rights on the stream sufficient to protect downstream users.[31] This requirement, known as the coordinated management rule, means that groundwater in storage can be taken only if a balance can be maintained between surface flow and groundwater pumping. Rights in non-stream-related aquifers, on the other hand, are absolute, but defined in time by the amount of water that can be pumped from the aquifer and the rate at which the water is withdrawn.[32]

Rights to surface water are also subject to restriction. Surface rights are divided into direct flow rights and storage rights. The point of diversion of a storage right is at the dams or outlet. The point of diversion of a diversionary flow right is on the stream at the irrigated land. Generally, direct flow rights are not convertible into storage rights unless the storage serves an accepted beneficial use. If storage is wasteful it will be ruled illegal.[33]

Place of Use — The place of use is the place, and only the place, where the water has been used historically, or for a permitted right, the place designated on the permit.[34]

Administration of Water Rights

Both the state engineer and the state judiciary have administrative roles with respect to water rights. The state engineer has at least three main administrative functions: maintaining records of all permitted water uses and uses declared antecedent to state engineer jurisdiction; granting permits for new uses; and supervising transfers of existing water rights with respect to point of diversion, place of use, and purpose of use. A water right can be sold without the state engineer's permission so long as the right's use, diversion point, and place of use remain unchanged. The state engineer does not directly supervise the use of water, except where metering is required, but he does bring legal actions to prevent waste,[35] and, if water rights have been forfeited for non-use, he may bring an action to enjoin further use of the right.[36] Statutory law also provides that the state engineer will assert responsibility to promote the adjudication of rights.[37]

In administering water rights, the state engineer is constrained by hydrology as well as by law. For example, although he does not give permits for a term of years, hydrologic factors sometimes require decisions having the same result. Extraction of water from mined basins is essentially a taking of nonrenewable resources. Since the resource is finite, a state engineer decision to permit diversions from these aquifers at a rate that exceeds recharge is a determination that all rights in the area will someday be terminated for lack of water supply. Accordingly, as indicated above, permits for water from these aquifers are permits for the number of years that make up the basin's useful life.[38]

Judicial administration of water rights occurs only with respect to quantifying them through a general stream adjudication. Very rarely a court will also issue an injunction against impairment of another's right. These actions involve all persons with water rights on a particular stream. The result of such adjudications is a judicial decree that establishes a point of diversion, priority date, place of use, purpose of use, and quantity for every water right owner on the stream.[39]

Transfer of Water Rights

General Considerations — The legal right to transfer a water right is generally the same whether the water is ground or surface, tributary or nontributary. The coordinated management obligation to maintain an equilibrium between ground and surface water in stream-related aquifers however may require additional conditions on groundwater withdrawal that affect surface rights.[40] Water can be conveyed for use from basin to basin.[41] Under these systems, the transferor must be certain that within-basin consumptive use after the transfer would not be greater than before the transfer. Simply put, an out-of-basin transfer cannot make the basin worse off than it was before.[42]

A water right priority date remains the same even though it is transferred. Imported water, on the other hand, does not carry a priority date in the basin of use, but is subject to state rules of forfeiture and beneficial use. New Mexico's water rights leasing statute allows temporary transfers,[43] but those transfers and transfers on a permanent basis always go through the State Engineer Office(SEO).[44] According to the State Engineer Office, the leasing statute is seldom used. Where a transfer is within irrigation or conservancy districts,

and is on lands served by the district works, the state engineer does not get involved[45] so long as downstream users are not affected.

Transfer Procedures — Persons seeking to transfer a water right must file a formal application with the State Engineer Office. The application indicates the point of diversion, the place of use, the quantity of the right, and, where they exist, the file number and license number of the right. After filing an application, the applicant publishes a notice of intent to change the right's use or place of use in a newspaper of general circulation where the right is located.[46]

Anyone objecting to a proposed transfer can file a formal protest with the state engineer. Protests must be based on a claim that the transfer will impair existing rights, will be contrary to the conservation of water, or will be detrimental to the public welfare. The standing rules for objecting on "public welfare" grounds are more specific than for protests based on impairment. The protestant must be specifically and substantially affected. Where no protest is filed and the state engineer finds the transfer compatible with state law, the transfer application will be approved. Where there is a protest, the state engineer holds a formal, due process hearing on the issues set out in the protest and decides the case.[47] If either party is dissatisfied with the state engineer's decision, he may appeal *de novo* to the district court. Although such appeals are *de novo*,[48] case law suggests that courts should defer to the state engineer's expertise.[49]

In transfer hearings the applicant bears the burden of proving nonimpairment, conservation of water, and consistency with the public welfare.[50] Technically, the applicant also must prove the use and amount of the transferred right. Practically, however, where the right has been adjudicated, the protestant bears the burden of disproving the right's use and amount. This is the case because adjudication of rights in a transfer proceeding is not allowed and an existing adjudication decree or declaration is accepted as *prima facie* evidence of the size and validity of the right.[51] Generally, in water right cases the burden of proof is by preponderance of the evidence. If the action filed is a forfeiture or abandonment claim, however, the standard of clear and convincing evidence applies.[52] The requirement that a transfer be consistent with the public welfare is a major issue in New

Mexico discussed more fully later in this report. First, however, the Census of Transfers and the Transaction Cost survey will be described and discussed.

SECTION 2: CENSUS OF TRANSFERS

Applications to Change Place or Purpose of Use

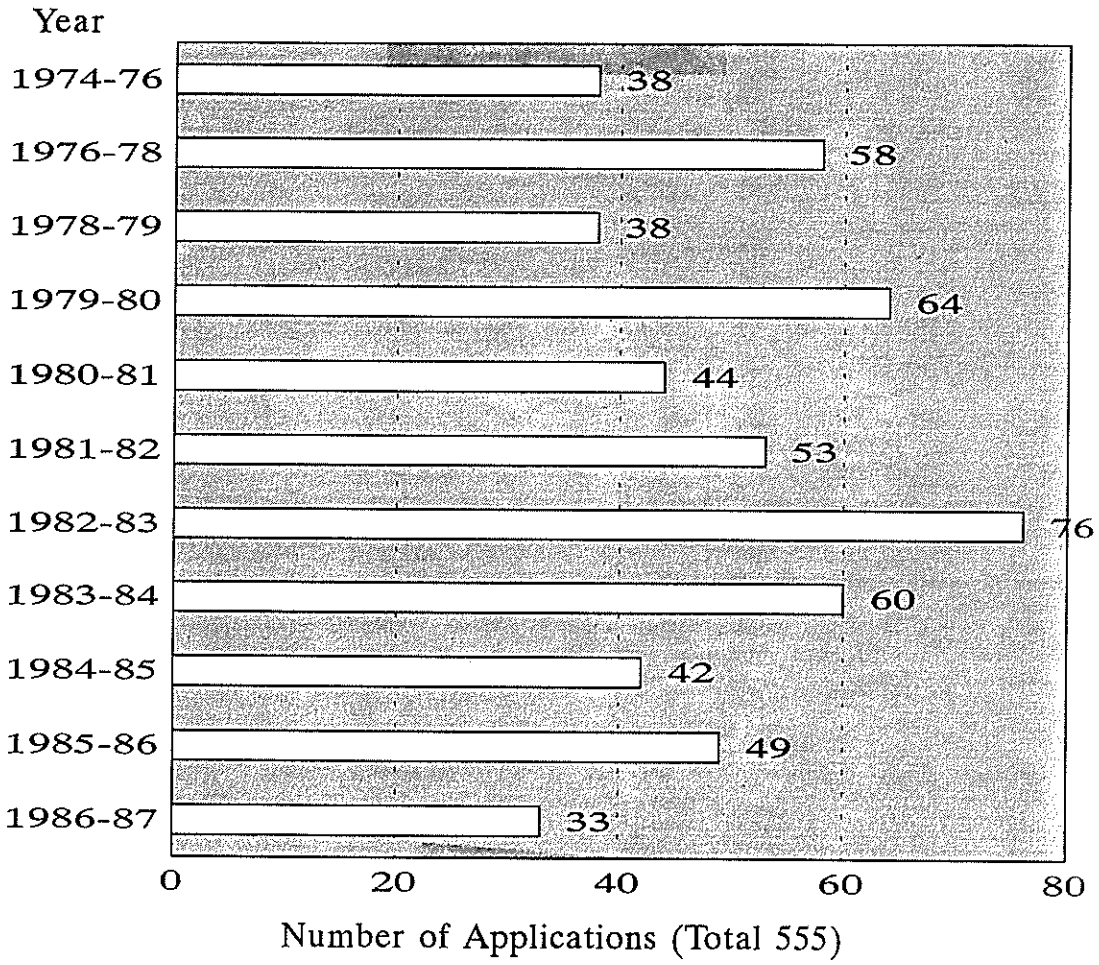
This study relied heavily on the development and use of an instrument for recording information on all identified transfers during 1975-1987. In New Mexico, as outlined previously, the principal means of moving water from one place and/or use to another is accomplished through the sale or lease of the water right itself.

All parties proposing changes in place or purpose of use of a water right, to both surface and groundwater, must file application with the State Engineer Office (SEO). These applications then follow administratively specified procedures in which they are scrutinized for conformity with the transfer restrictions also described earlier.[53] All transfer applications are contained within water rights files at one of four principal offices (or their branches) of the SEO in Santa Fe, Albuquerque, Roswell, or Deming. By statute the originals are kept in Santa Fe. Figure 1 reports the number of applications to change the place or purpose of use of surface water use during the study period. Table 1 and Figure 2 provide the number of applications to change the place or purpose of use of groundwater for the three SEO district offices.

Before discussing the procedures that were employed in gathering information on these transfer applications, two caveats are in order. First, a substantial number of these applications, particularly in the Roswell District but also in Deming, involved nothing more than a shift in the location of the groundwater well as farmers adopted center pivot irrigation techniques during this period. Because of this, the 2543 total applications are not indicative of the numbers of applications which involved a change in purpose of use or a significant shift in the place of use. This factor will be partially accounted for below.

On the other hand, there has developed a recent practice, particularly in the middle Rio Grande around Albuquerque, in which water rights are purchased from an irrigator and then leased back to him for a period of years into the future. In this way a municipality such as the city of Albuquerque, for example, obtains control over the water right even though it has no need of it currently. When the lease expires after a number of years, then presumably the municipality will have need of the right. In the meantime, however, no record of this transaction may enter the files of the SEO since the water remains in its

FIGURE 1
APPLICATIONS TO CHANGE THE PLACE OR PURPOSE OF SURFACE WATER USE



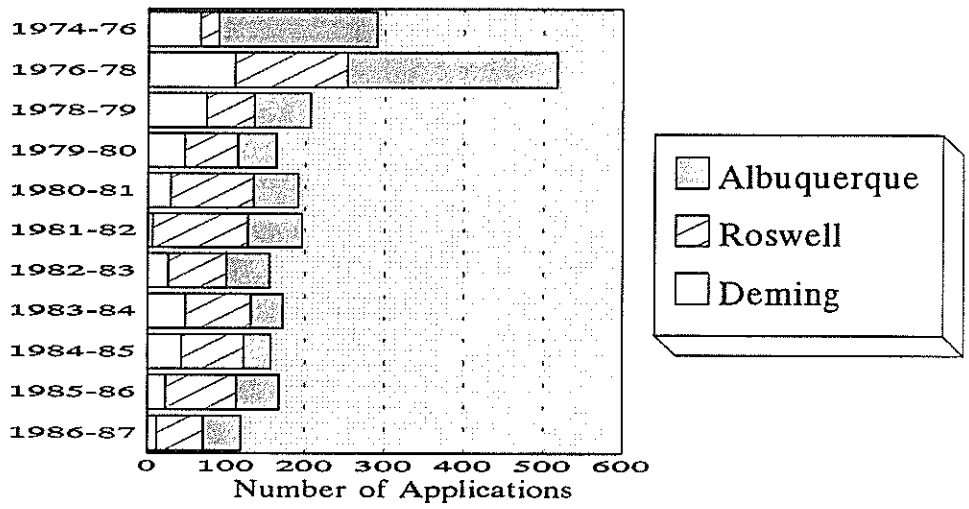
Source: Annual Reports of the State Engineer Office, Santa Fe, New Mexico

TABLE 1
APPLICATIONS TO CHANGE THE PLACE
OR PURPOSE OF USE OF GROUNDWATER

Year	Albuquerque District*	Roswell District	Deming District	Total
1974-76	66	23	201	499
1976-78	110	142	266	518
1978-79**	74	61	71	206
1979-80	47	67	49	163
1980-81	29	105	57	191
1981-82	6	121	69	196
1982-83	26	74	55	155
1983-84	48	83	41	172
1984-85	43	79	35	157
1985-86	23	90	54	167
1986-87	12	59	48	119
Totals	484	1113	946	2543

Source: Annual Reports of the State Engineer Office.
*For convenience, applications covering groundwater in the San Juan and Canadian basins are included in the Albuquerque totals, though administered through Santa Fe. Only eight such applications were recorded during the period of record.
**In FY78-79, the SEO changed from a biannual report to an annual basis.

FIGURE 2
APPLICATIONS TO CHANGE THE PLACE
OR PURPOSE OF USE OF GROUNDWATER



current use, and no change in place or purpose of use is contemplated until some time into the future.[54]

The net result of this lease-back arrangement for counting purposes in this report is some underestimation of the effective authority over the water right represented by ownership. In other words, the census survey recorded actual applications to change the place or purpose of use, and those numbers should not be considered as a measure of the degree of change in effective control over water. It is certain that more water rights have effectively moved into municipal or industrial ownership than the SEO records will reveal.

Recording Procedures

With the assistance of SEO personnel, research assistants spent many weeks conducting a manual search of all water rights files in the various offices of the state engineer. Appendix A is the form that was used to record information about the transfer applications discovered and documented. The 1309 applications thus recorded are termed the New Mexico Census of Water Rights Transfers.

Several aspects of the recording instrument deserve explanation and mention. First, there is a category of changes in water rights which the SEO terms Dedications and New Appropriations. Briefly, a party who wishes to put in a new groundwater well in an aquifer that is hydrologically connected to an already fully appropriated stream system may purchase an existing surface right to the stream and "dedicate" it to the state engineer in a legally binding manner.

By thereby giving the state engineer authority to require retirement and effectively extinguish the surface right, the party acquires the right to make a new appropriation from the stream related aquifer, a dispensation that would not otherwise be permitted due to the inevitable effect of groundwater pumping on the fully appropriated stream. The state engineer will exercise this retirement authority when, according to SEO calculations, the new groundwater pumping begins reducing the flow of the river system. For purposes of the census, this combination of Dedication and New Appropriation was treated like a transfer even though administratively the two functions of Dedication and New Appropriation are distinct.

The informational categories on the form are basically 1) the administrative description of the right involved in the transfer, 2) the legal description of the right's location, 3) the quantum of the right in diversion, consumptive use, or storage units, 4) the type of water user, 5) the use for which the right is exercised, 6) a chronological history of the transfer, and 7) a listing of the parties involved in the transfer to the extent that the records so provide. Items 2) through 5) record information both before and after a proposed transfer. Originally, the priority date of the right was an additional informational element of the census form. However, practically speaking, the file records are generally deficient in this regard as many, if not most, New Mexico streams have not been finally adjudicated in court. Thus priority dates are commonly only best guesses or assertions by the owner of the right, though declarations by owner are prima facia evidence in an adjudication case.

Completeness and Accuracy of Data

The benchmark numbers for comparing the completeness of the census are provided in Tables 1 and 2 taken from the annual reports of the SEO.[55] The total number of both surface and groundwater applications reported in those two tables is 3098. During the early years covered by the survey, however, the SEO prepared biennial reports. Consequently, the 1974-76 numbers in the two tables include applications from 1974 as well as 1975 and 1976 even though 1974 was outside the survey period. If the 1974-76 numbers are reduced by a fourth (135),[56] then for comparison purposes, the number of applications reported by the SEO during the survey period is reduced to 2963.

The difference between this figure and the 1309 applications which appear in the census database described below is 1654. Roughly 835 applications were seen by the census-takers but not recorded because they appeared to involve nothing more than a change in point of diversion. Another 89 recorded applications were nevertheless eliminated from the database for the same reasons. And approximately another 100 applications were recorded and tabulated on the same census form. These computations leave approximately 630 (slightly over twenty percent of the original 3098 SEO figure) unreported.

There are various possible explanations for this discrepancy. Some files containing applications were undoubtedly in use when the census-takers were at a particular SEO and were missed despite precautions. The numbers reported in the SEO reports themselves may contain some error. Certain state engineer offices cooperated by providing actual file lists which contained change applications, and conceivably some pertinent files were inadvertently left off those lists. All in all, it appears that the data drawn from the census records would tend to underestimate the extent of transfer activity rather than the reverse. Although some double counting may have occurred, it would have been unlikely due to the procedures employed and certainly isn't supported by the evidence.

No systematic methods were employed to determine the accuracy with which the information from individual applications was recorded onto the census forms. The census-takers were sensitive to the need for accuracy, and potential discrepancies that were identified during a review of all forms before coding were compared with the original application and corrected if necessary. Coded entries into the database were also proofread. In summary, the data set appears to be reasonably free of errors, but some may have been under counted.

Database for Census Information

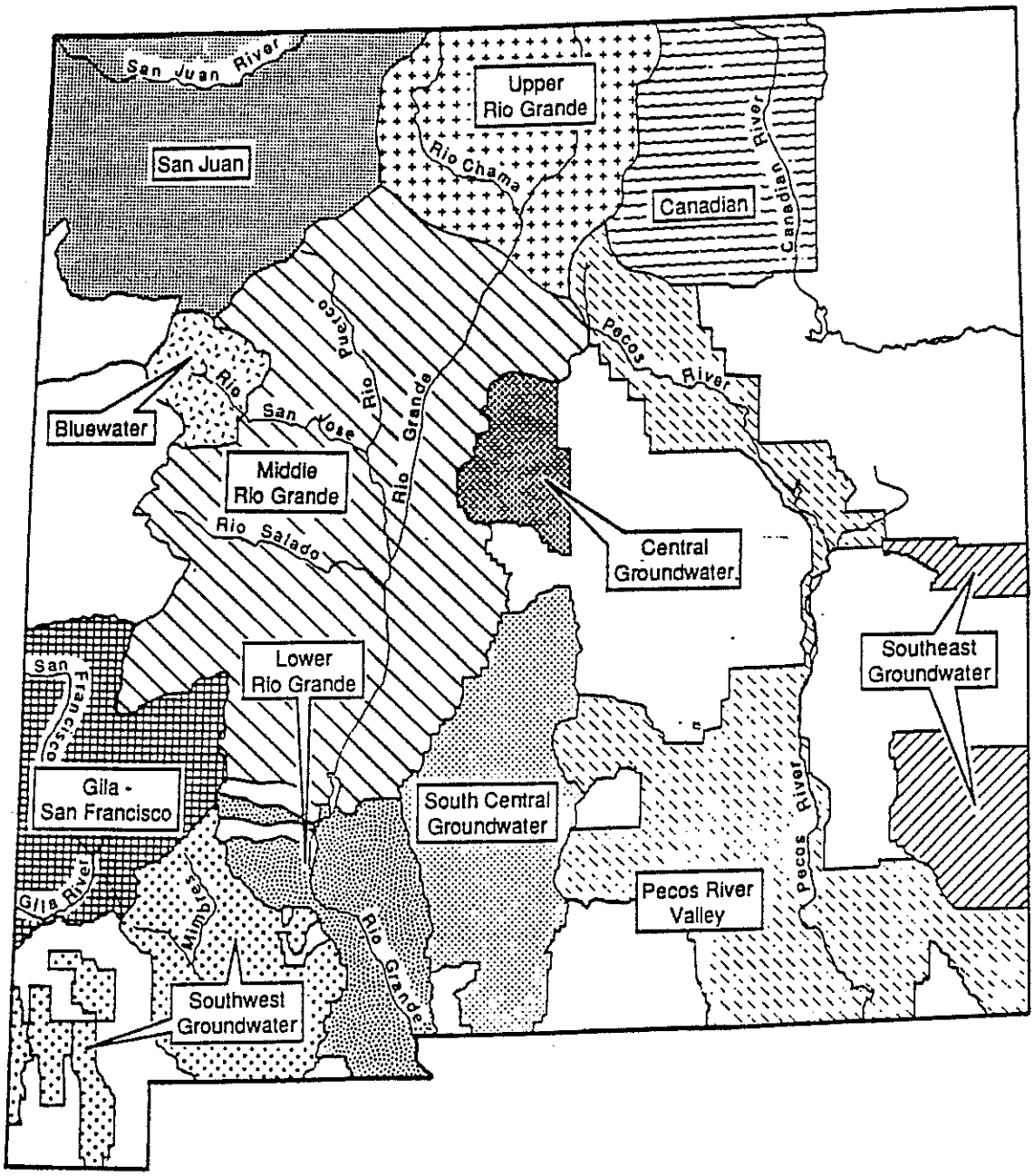
The data generated by the census are voluminous. All information other than the names and addresses of participants from the last page of the census form was transferred to an electronic database using Lotus 1-2-3 for ease of entry. Many Lotus files were created and the large volume of information produced was not easily managed nor necessary for most descriptive and analytical tasks. Consequently, a reduced database was constructed using a BASIC program.

Two features of this reduced database warrant mention. First, the SEO classifies each water right geographically into one of numerous surface and groundwater basins. For this study, these basins were aggregated into eight surface and surface-related groundwater units and into four enclosed groundwater basins. Table 2 lists the twelve geographic units and their constituent members, and Figure 3 depicts the twelve aggregate "basins."

TABLE 2
AGGREGATE SURFACE-RELATED
AND GROUNDWATER BASINS USED
IN THIS REPORT

Aggregate Basin	Constituent Basins
1. Bluewater	Rights in the Bluewater basin.
2. Canadian	Rights in the Canadian basin.
3. Gila/San Francisco	Rights in the Gila, the San Francisco, their tributaries, and all Gila/San Francisco groundwater rights.
4. Pecos River Valley	Surface and surface-related rights in the Pecos, the Rio Hondo, the Penasco, the Hagerman Canal, the Roswell Aquifer (artesian and shallow), Carlsbad, the Upper Pecos, and Ft. Sumner.
5. Lower Rio Grande	Rights in the Rio Grande below Elephant Butte Lake and Lower Rio Grande groundwater rights.
6. Middle Rio Grande	Surface and surface-related rights in the Rio Grande in and above Elephant Butte Lake and below Otowi Bridge and in tributaries to the Rio Grande which enter within the above boundaries.
7. Upper Rio Grande	Surface and surface-related rights in the Rio Grande above Otowi Bridge and in tributaries which enter the Rio Grande above the bridge.
8. San Juan	Surface and surface-related rights in the San Juan, the Animas, and their tributaries in the northwest portion of the state.
9. Central Groundwater	Estancia and Sandia groundwater basins.
10. Southeast Groundwater	Lea County, Portales, and Capitan.
11. Southwest Groundwater	Mimbres, Playas Valley, Lordsburg Valley, Nutt-Hockett, and Animas (southwest).
12. South Central Groundwater	Tularosa

FIGURE 3
MAP OF NEW MEXICO DEPICTING
AGGREGATE SURFACE AND GROUNDWATER BASINS



Historically, water rights in New Mexico and other western states have been measured in a variety of ways such as cubic feet per second, acres of land to be irrigated, or acre-feet of diversion, which generally relate to their agricultural origin. Increasingly, however, as rights are transferred into municipal or industrial uses, their measure is also being transformed into acre-feet of consumptive use, which in many ways is a more accurate and concise measure of the quantum of water entitled by the right.

File records in New Mexico still contain a mixture of these measures. With ample time and expertise, each of those rights still measured in units other than consumptive acre-feet could be converted into a consumptive use measure, at least in principle. For this study, however, less time consuming methods of standardization were required. In addition to the above complication, many files containing transfers did not have separate entries for both the water right quantum before and after completion of the transfer even though those values were potentially different.

To remedy these problems and standardize the water quantum information, two assumptions were made. First, if data were reported only for the "move-from" location or the "move-to" location, it was assumed that there was no change in the quantity of right being transferred. Second, if data were reported only in diversion units, it was assumed that consumptive use was the same fraction of diversion as the average of all consumptive use to diversion ratios for all transferred rights of that type (agriculture, industry, or municipality) which did report both consumptive use and diversion values. The pertinent coefficients used in converting diversion quantities into consumptive use are Agriculture (.534), Municipal (.459), and Industrial (.663). By use of this procedure, all transferred rights were converted into consumptive use measures for description and analysis.

SECTION 3: SUMMARY STATISTICS

Number of Applications

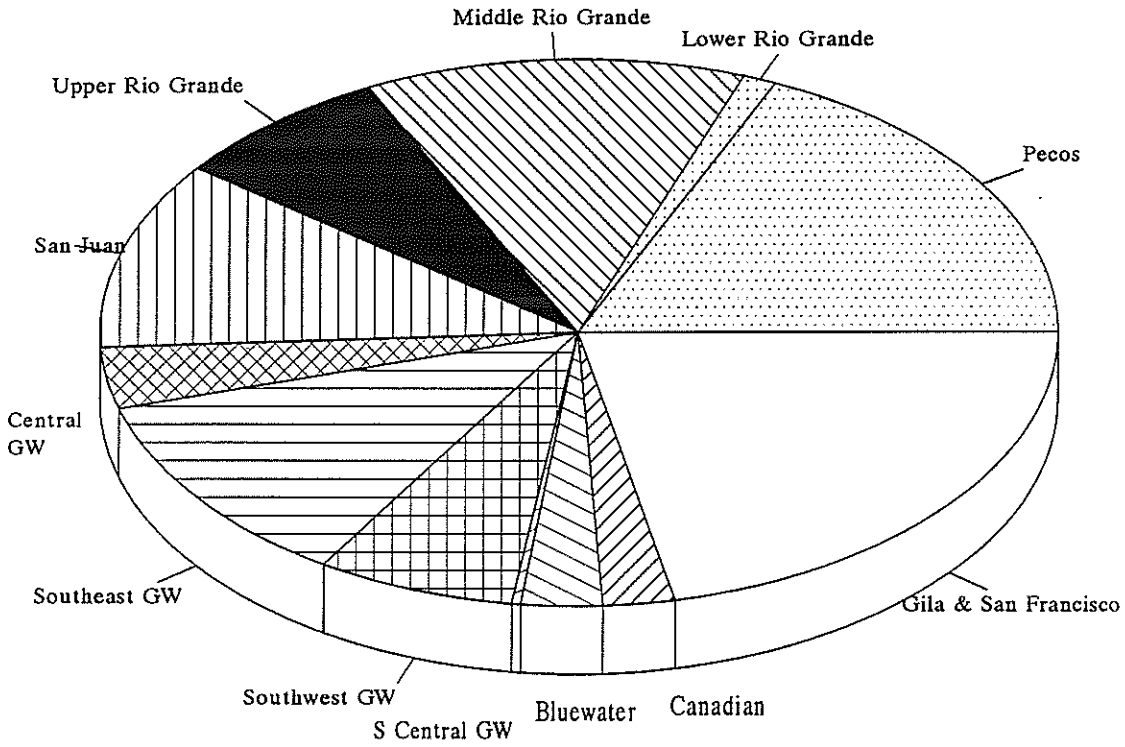
Table 3 and Figure 4 report the total number of all change applications by basin recorded by the census-takers which represented more than a nominal change in point of diversion, as for example, a move to center-pivot sprinkler irrigation.

Several aspects of this application data deserve mention. First, there is a general pattern of increased transfer activity, as measured by number of applications, from the early seventies which peaks around 1979 to 1983 and then declines for the remainder of the period of record. This pattern is most clear in the total reported for the entire state, but it is also apparent in the data for the Pecos, the Gila/San Francisco, the Middle Rio Grande, the Southeast Groundwater, and the San Juan basins.

TABLE 3
NUMBER OF APPLICATIONS TO CHANGE PLACE OR PURPOSE OF USE
(by year and basin)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Total
Basin														
Bluewater	-	2	2	-	1	2	2	4	17	5	1	-	-	36
Canadian	2	3	7	5	5	1	4	1	1	-	2	1	-	32
Gila & SF	15	5	13	25	43	23	46	17	16	26	23	18	14	284
Pecos	20	18	9	7	17	11	21	28	13	32	19	23	21	239
Lower RG	-	-	-	-	1	1	-	-	4	-	2	5	2	15
Middle RG	6	20	8	16	21	16	17	12	12	11	9	13	7	168
Upper RG	6	7	6	5	5	9	15	14	4	10	6	4	7	98
San Juan	-	2	5	5	29	6	7	27	41	6	6	11	1	146
Central GW	6	8	4	3	3	1	5	-	3	2	4	5	4	48
Southeast GW	16	5	9	8	13	26	25	13	15	8	7	5	1	151
Southwest GW	5	5	4	7	9	9	6	9	7	3	12	8	4	88
S Central GW	-	-	1	-	-	-	-	1	-	-	2	-	-	4
Total	76	75	68	81	147	105	148	126	133	103	93	93	61	1309
% of total	6	6	5	6	11	8	11	10	10	8	7	7	5	100

Figure 4
Applications to Change Place or Purpose of Use
(1975 - 1987 totals by basin)



Each basin has its own socioeconomic character and its own water supply situation, which provide the most likely determinants of the amount of transfer activity. For example, the Middle Rio Grande area contains the city of Albuquerque which has a standing offer to buy water rights in response to historical and projected growth in population. The San Juan and Southeast Groundwater basins are the locus for substantial oil and natural gas production and reserves and have experienced booms and busts after the 1973 oil embargo and subsequent energy price increases and declines.

The Gila/San Francisco is the location for copper mining and processing. It is also under added legal restrictions that do not apply to the rest of New Mexico. Namely, as a result of a decision by the U.S. Supreme Court[57], water rights must be purchased for domestic use outside the home even though the quantum may be very small. In most of the state, households are entitled to three acre-feet of diversion per annum without necessity of purchase even in fully appropriated basins. This singularity of the Gila/San Francisco accounts for much of the basin's applications.

Despite the differences among the various basins, as a general statement, they have all experienced slower demographic and economic growth in the eighties relative to the seventies that has been characteristic of New Mexico as a whole.[58] It is likely that this slower growth has been a major factor in the declining numbers of transfer applications since the peak years of the late seventies and the early eighties.

It is difficult to draw many comparative conclusions across basins from the number of change applications. Geographically, some of the twelve basins (for example, Bluewater and the Central Groundwater basins) are quite small relative to others (the three Rio Grande basin areas, for example). And, again, the socioeconomic and water supply characteristics of the twelve basins are substantially different. However, it is useful to point out reasons why some of the basins experience low numbers of applications.

The Lower Rio Grande, for example, may still contain substantial quantities of unappropriated groundwater which have not yet been put to beneficial use though there has been substantial litigation over these supplies. In the presence of appropriable supplies, less change of existing uses should be expected. The Upper Rio Grande, in contrast, is fully appropriated, but a combination of socioeconomic factors reduces the amount of transfer

activity in that basin. Namely, this region relative to the Lower Rio Grande experiences slower growth, and the cultural attitudes of many of its traditional Hispanic and Indian communities oppose the transfer of water from its historical association with agriculture.[59]

Consumptive Use Measures

Ultimately, however, the simple numbers of applications alone do not reveal as much about the nature and extent of transfer activity as when they are placed in the volumetric context of water associated with those applications. For this information consider first Table 4.

The pattern that was revealed in Table 3 in which application numbers rose to a peak in the late seventies and early eighties is not repeated in the volumetric series.[60] Instead, the annual totals for the state fluctuate from year to year around an annual average that is less than 10,000 acre-feet per year (Fig. 5). Individual basins exhibit even more variation (Fig. 6). Bluewater, for example, ranges from a low of zero to a high of 3769 acre-feet. Even the more active basins such as the Middle Rio Grande vary from a high of 10,486 acre-feet in 1986 to a low of 73 acre-feet in the following year.

Essentially, this characteristic reflects the lumpiness of the water right holdings themselves. Water rights are not held in homogeneous blocks for the convenience of transfer processes. Instead, they have emerged from their principally agricultural origin according to the configuration of land ownership itself. Then, too, the process by which rights are offered for sale, in response to a standing offer, for example, may be erratic in nature. Larger blocks may take varying degrees of time to negotiate and arrange, while small lots may arrive on the market almost unexpectedly. Any temporal patterns in this data, then, tend to be hidden by this erratic size of the individual transfers.

Comparing totals across basins, however, does reveal the relative size of those basins in terms of the volume for which application to change has been made. The Gila/San Francisco basin, which exhibited the largest number of transfer applications over the period of record, is seen to be much smaller in volume, again reflecting the large number of small transfers for single home domestic uses.

TABLE 4
TOTAL CONSUMPTIVE USE ASSOCIATED WITH APPLICATIONS TO CHANGE THE PLACE OR PURPOSE OF USE
(in acre-feet of rights by basin and year)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Total
Basin														
Bluewater	-	33	1193	-	89	377	15	1518	3769	1527	23	-	-	8543
Canadian	222	99	487	53	68	231	86	238	320	-	1	151	-	1956
Gila & SF	725	18	243	62	926	722	225	980	261	241	158	74	29	4665
Pecos	1368	1794	373	275	982	443	702	1230	940	1201	795	8693	3714	22510
Lower RG	-	-	-	-	99	92	-	-	181	-	34	79	15	501
Middle RG	100	9912	232	888	5879	520	278	292	170	4977	235	10486	73	34041
Upper RG	20	2301	55	31	16	2491	1593	323	127	454	56	35	25	7527
San Juan	-	5	154	53	349	175	30	648	928	89	195	527	4	3157
Central GW	386	508	310	364	767	2	60	-	255	89	201	82	114	3138
Southeast GW	6160	310	479	3789	1296	2711	4479	389	1329	200	426	380	124	22072
Southwest GW	4514	746	429	138	279	649	190	127	1351	350	195	371	65	9404
S Central GW	-	-	1328	-	-	-	-	24	-	-	17	-	-	1369
Total	13495	15728	5284	5653	10750	8412	7658	5769	9631	9127	2337	20878	4163	118884
Average	1125	1311	440	471	896	701	638	481	803	761	195	1740	347	9907

FIGURE 5
TOTAL CONSUMPTIVE USE ASSOCIATED WITH APPLICATIONS TO CHANGE THE PLACE OR PURPOSE OF USE
(in acre-feet of rights by year)

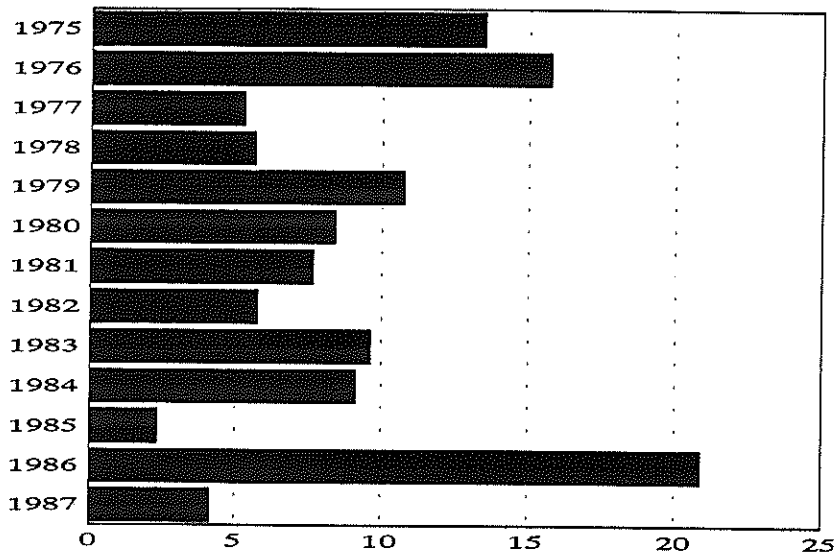
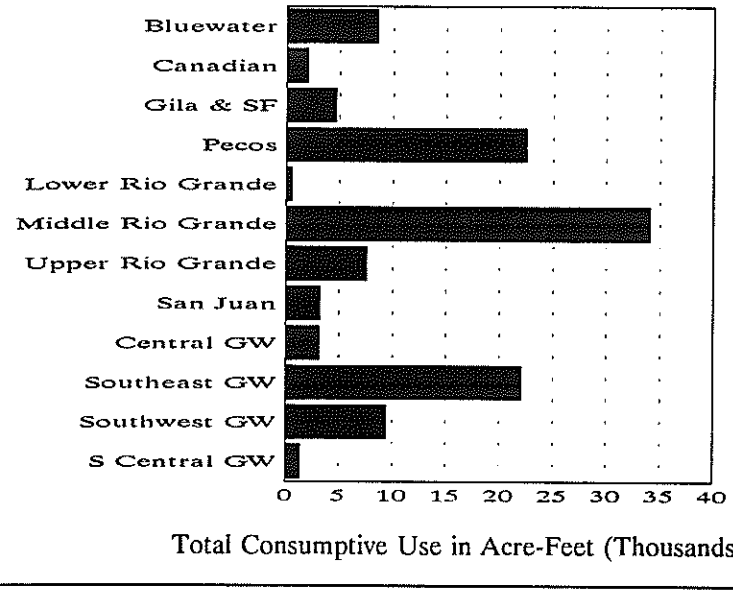


FIGURE 6
TOTAL CONSUMPTIVE USE ASSOCIATED WITH APPLICATIONS TO CHANGE THE PLACE OR PURPOSE OF USE
(in acre-feet of rights by basin)



Overall, the largest volume of water rights for which a change application has been made during the study period occurred in the Middle Rio Grande in which the city of Albuquerque is a dominant buyer. The next most active basins volumetrically are the Pecos and the Southeast Groundwater areas. To put these volumes into perspective, it is useful to compare them against a volumetric measure of the established quantity of water rights in each basin. Unfortunately, in the absence of adjudication decrees for most basins, such numbers are not available.

The best proxy that does exist is the estimated annual consumptive use of water prepared by the New Mexico State Engineer Office every five years.[61] The use of these numbers as a base must be qualified, however, in several ways. First, the depletion (consumptive use) quantities reported by the SEO are estimated by county and by river basin, but the river basins do not correspond in each case to the aggregations employed in this study. Only the Rio Grande (as a whole), the San Juan, the Gila/San Francisco, and the Pecos seem roughly comparable, and even in these cases, the match may not be exact.

Second, the depletions reported are unlikely to be precisely synonymous with long-term sustainable consumptive use due to some mining of groundwater in each basin. Consequently, for this reason the depletion numbers are not perfect proxies for the total quantity of consumptive use rights in a given basin; they are only the best comparative numbers available. With those caveats in mind, Table 5 compares the total quantity of rights for which application to transfer has been made in the above four basins with the estimated annual depletions in the same basin.

The Gila/San Francisco acquires prominence once again in that it has experienced the largest quantity of change applications as a percentage of the total depletion of the river basin system in New Mexico. One other caveat stated in the previous section should be repeated here. Namely, it is likely that legal control over additional water rights has already passed to municipalities such as the city of Albuquerque and other parties, but those transfers of control are not reflected in these numbers because the rights continue to be beneficially used in agriculture until needed by the new owner and prospective user. In this respect, it is likely that the Rio Grande percentage (and possibly the others as well) would be significantly higher than reported in Table 5 if these additional rights were included in the basin totals.

TABLE 5
COMPARISON OF TRANSFERRED RIGHTS
WITH BASIN DEPLETIONS
(in acre-feet of consumptive use per year)

Basin	Transfer Rights	Depletions	Transfer Rights as % of Depletions
Rio Grande	*42,069	883,300	4.8%
San Juan	3,157	299,500	1.1%
Pecos	22,510	414,300	5.4%
Gila/San Francisco	4,665	48,400	9.6%

*This number is the sum of the total volume of transferred rights for the Upper, Middle, and Lower Rio Grande basins in Table 4.

As one final measure of applications in consumptive use terms, consider Table 6. A number of interesting observations can be made from this data. First, although the volumetric fluctuations by basin and year first seen in Table 4 are still evident, the average sized application for the state as a whole is 91 acre-feet of consumptive use, and the averages for ten of the thirteen years in the study period are less than the overall average. Small applications of less than one hundred acre-feet are the norm, as will be demonstrated even more clearly in the following tables.

Second, individual basins again vary substantially from the low of sixteen acre-feet in the Gila/San Francisco previously explained to the 342 acre-feet for the South Central Groundwater basin (due exclusively to one large application in 1977). The Middle Rio Grande also exhibits significantly larger sized applications on average than occur in most basins, though even in this basin nine of the thirteen years exhibit averages of less than one hundred acre-feet. The averages in eight of those nine are less than thirty-five acre-feet. Finally, seven of the eleven basins have averages over the entire period that are less than a hundred acre-feet.

TABLE 6
AVERAGE CONSUMPTIVE USE OF CHANGE APPLICATIONS
(in acre-feet of consumptive use by basin and year)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Average
Basin														
Bluewater	-	17	597	-	89	188	7	380	222	305	23	-	-	237
Canadian	111	33	70	11	14	231	21	238	320	-	1	151	-	61
Gila & SF	48	4	19	2	22	31	5	58	16	9	7	4	2	16
Pecos	68	100	41	39	58	40	33	44	72	38	42	378	177	94
Lower RG	-	-	-	-	99	92	-	-	45	-	17	16	8	33
Middle RG	17	496	29	55	280	32	16	24	14	452	26	807	10	203
Upper RG	3	329	9	6	3	277	106	23	32	45	9	9	4	77
San Juan	-	2	31	11	12	29	4	24	23	15	33	48	4	22
Central GW	64	64	78	121	256	2	12	-	85	44	50	16	29	65
Southeast GW	385	62	53	474	100	104	179	30	89	25	61	76	124	146
Southwest GW	903	149	107	20	31	72	32	14	193	117	16	46	16	107
S Central GW	-	-	1328	-	-	-	-	24	-	-	8	-	-	342
Average	178	210	78	70	73	80	52	46	72	89	25	224	68	91

Size of Transfers

The size distribution can be seen even more clearly in Tables 7 and 8. These tables report approved applications (actual transfers) rather than simply those changes for which applications have been submitted. As such, they omit 80 applications, containing 12,029 acre-feet of consumptive use, which were either withdrawn, denied, or still pending in 1987.

TABLE 7
NUMBERS OF TRANSFERS BY DIFFERENT SIZE CATEGORIES
(in numbers per size category in acre-feet by basin)

	0-3	4-10	11-25	26-50	51-100	>100	Total
Basin							
Bluewater	-	4	5	5	3	11	28
Canadian	7	1	4	7	4	6	29
Gila & SF	200	30	21	9	13	6	279
Pecos	36	42	50	23	25	47	223
Lower RG	-	2	7	2	4	-	15
Middle RG	22	48	34	19	15	15	153
Upper RG	37	23	10	6	3	11	90
San Juan	39	30	29	31	6	5	140
Central GW	14	-	3	4	4	7	32
Southeast GW	6	34	33	17	15	44	149
Southwest GW	19	25	21	7	3	12	87
S Central GW	-	1	2	-	-	1	4
Total	380	240	219	130	95	165	1229
% of total	31	20	18	11	8	13	100

TABLE 8
VOLUME OF TRANSFERS BY DIFFERENT SIZE CATEGORIES
(in acre-feet transferred by size category by basin)

	0-3	4-10	11-25	26-50	51-100	>100	Total
Basin							
Bluewater	-	25	82	175	231	6262	6775
Canadian	9	3	49	248	280	1357	1946
Gila & SF	247	174	321	324	973	2566	4605
Pecos	58	241	808	817	1736	18265	21925
Lower RG	-	13	115	66	307	-	501
Middle RG	30	253	565	611	928	22742	25129
Upper RG	52	133	184	221	176	6716	7482
San Juan	50	164	494	1105	403	782	2997
Central GW	23	-	51	147	280	2300	2800
Southeast GW	12	209	535	612	978	19586	21932
Southwest GW	30	160	341	283	216	8364	9394
S Central GW	-	3	37	-	-	1328	1369
Total	511	1379	3581	4607	6509	90268	106855
% of total	-	1	3	4	6	84	100

Fully 87 percent of the 1229 approved transfers contained consumptive use quantities less than or equal to 100 acre-feet in magnitude. Yet, 84 percent of the total approved volume of 106,855 consumptive acre-feet were contained in applications greater than 100 acre-feet in magnitude. The bulk of the transfer numbers are of small size, while the bulk of the volume is contained in larger sized transfers.

Relevant here, though not reported in the two tables above, is the fact that the average sized transfer for those containing more than 100 acre-feet of consumptive use was 547 acre-feet. Also, the overall average transfer measured 87 acre-feet, not much different from the average 91 acre-feet per application reported above.

Protests

Tables 9, 10, and 11 and Figure 7 contain information about the protested applications. As noted in Table 9, only 59 applications over the entire 13-year study period were protested. This number is less than 5 percent of the total applications or, stated otherwise, only one of every twenty-two applications were protested.

TABLE 9
NUMBER OF PROTESTED APPLICATIONS
(by year and basin)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Total
Basin														
Bluewater	-	-	-	-	-	-	-	-	4	1	-	-	-	5
Canadian	2	1	3	-	2	-	-	-	-	-	-	-	-	8
Gila & SF	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Pecos	-	-	-	1	1	-	1	1	-	3	2	2	1	12
Lower RG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle RG	-	1	-	2	1	1	2	1	2	-	1	1	-	12
Upper RG	-	-	-	1	-	-	-	-	1	1	-	-	-	3
San Juan	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Central GW	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Southeast GW	9	-	-	-	1	-	-	-	-	-	-	-	-	10
Southwest GW	-	-	-	-	4	-	-	-	1	-	-	-	-	5
S Central GW	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Total	11	2	3	4	9	2	3	2	8	6	5	3	1	59
% of total	19	3	5	7	15	3	5	3	14	10	8	5	2	100

FIGURE 7
TOTAL NUMBER OF PROTESTED APPICATIONS
(by basin)

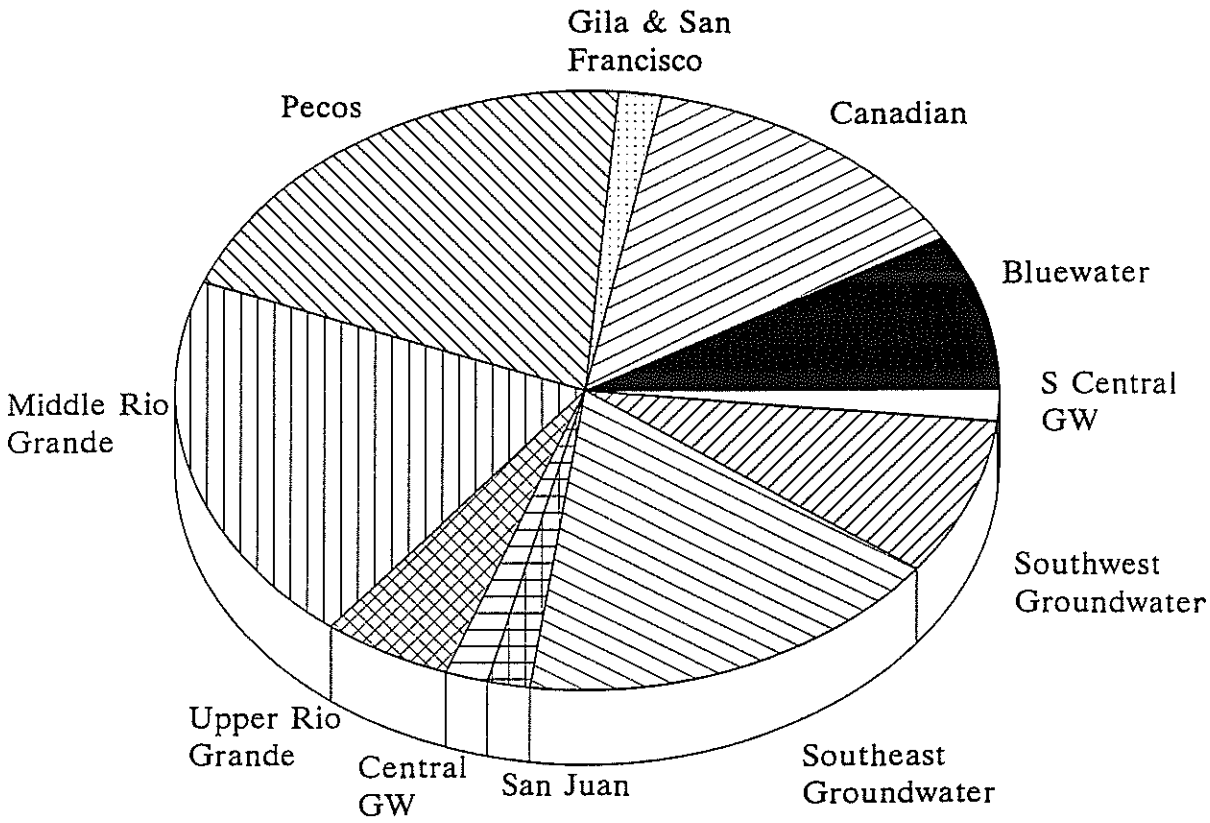


TABLE 10
CONSUMPTIVE USE CONTAINED IN PROTEST APPLICATIONS
(by year and basin)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Total
Basin														
Bluewater	-	-	-	-	-	-	-	-	582	1449	-	-	-	2031
Canadian	222	85	138	-	11	-	-	-	-	-	-	-	-	456
Gila & SF	-	-	-	-	-	38	-	-	-	-	-	-	-	38
Pecos	-	-	-	14	1	-	15	77	-	118	48	1086	479	1838
Lower RG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle RG	-	25	-	66	44	4	58	71	4	-	60	15	-	347
Upper RG	-	-	-	5	-	-	-	-	61	3	-	-	-	69
San Juan	-	-	-	-	-	-	-	-	-	-	50	-	-	50
Central GW	-	-	-	-	-	-	-	-	-	88	-	-	-	88
Southeast GW	6000	-	-	-	600	-	-	-	-	-	-	-	-	6600
Southwest GW	-	-	-	-	113	-	-	-	1249	-	-	-	-	1362
S Central GW	-	-	-	-	-	-	-	-	-	-	3	-	-	3
Total	6221	110	138	85	769	42	73	148	1896	1658	161	1101	479	12881
% of total	48	1	1	1	6	-	1	1	15	13	1	9	4	100

TABLE 11
AVERAGE CONSUMPTIVE USE PER PROTESTED APPLICATIONS
(by year and basin)

Year 19:	75	76	77	78	79	80	81	82	83	84	85	86	87	Total
Basin														
Bluewater	-	-	-	-	-	-	-	-	146	1449	-	-	-	406
Canadian	111	85	46	-	6	-	-	-	-	-	-	-	-	57
Gila & SF	-	-	-	-	-	38	-	-	-	-	-	-	-	38
Pecos	-	-	-	14	1	-	15	77	-	39	24	543	479	153
Lower RG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle RG	-	25	-	33	44	4	29	71	2	-	60	15	-	29
Upper RG	-	-	-	5	-	-	-	-	61	3	-	-	-	23
San Juan	-	-	-	-	-	-	-	-	-	-	50	-	-	50
Central GW	-	-	-	-	-	-	-	-	-	88	-	-	-	88
Southeast GW	667	-	-	-	600	-	-	-	-	-	-	-	-	660
Southwest GW	-	-	-	-	28	-	-	-	1249	-	-	-	-	272
S Central GW	-	-	-	-	-	-	-	-	-	-	3	-	-	3
All	566	55	46	21	85	21	24	74	237	276	32	367	479	218

Considered broadly over time and basins, there does not appear to be any significant pattern to the protests. For the most part, they are scattered fairly evenly. In a few basins, notably the Southeast Groundwater in 1975, the Southwest Groundwater in 1979, and Bluewater in 1983, there were single years in which protests were clumped together to some degree. Subsequently, in these basins there were very few additional protests; the problems seemed to have been resolved.

There is also a persistent pattern of a small number of protests in the Middle Rio Grande from 1978 through 1983, which may reflect objections of the Middle Rio Grande Conservancy district to proposed transfers which moved rights from inside the District boundaries to outside. Beyond those relatively isolated situations, there is very little to consider by way of numbers of protests. In fact, the rarity of protest is the most remarkable feature of Table 9.

A total of 12,881 acre-feet of consumptive use applications have been protested. This is approximately 11 percent of the total volume contained in the applications. Thus, larger applications appear to have some slightly higher frequency of protest (one of every nine acre-feet for which application is made is protested). This circumstance is also reflected in the average of 218 acre-feet contained in protested applications, as compared with the 91 acre-feet average of all applications.

The Bluewater and the Canadian basins have a higher frequency of protest than other basins whether measured by numbers or volume. The Southeast Groundwater basin has a substantially higher frequency of protests when the measure is volume. However, the number of cases in the first two basins is small and has not continued beyond an initial period of activity. The Southeast Groundwater protests, once again, were almost exclusively in a single year.

Only the Pecos seems to be experiencing an upswing in protest activity whether measured by numbers, total volume, or average size. This basin has recently been involved in an interstate dispute with the state of Texas which raised the specter that there would have to be actual curtailments in the exercise of water rights in New Mexico. Speculatively, this increased sensitivity may account in part for the increased frequency of protest in that basin.

Approval Times

It is useful to examine the transfer process in terms of the speed with which applications are handled. Tables 12, 13, and 14 report information on the number of months between the date of application and the date of approval.[62]

TABLE 12
APPROVAL TIMES FOR APPLICATIONS
(number of applications in monthly intervals)

Months	0-3	3-6	6-12	12-24	24-48	>48	Total
Basin							
Bluewater	9	11	4	4	-	-	28
Canadian	11	7	2	7	2	-	29
Gila & SF	172	72	25	6	1	-	276
Pecos	115	62	27	12	6	-	222
Lower RG	9	4	1	1	-	-	15
Middle RG	77	39	22	8	7	-	153
Upper RG	23	25	23	8	10	1	90
San Juan	35	39	36	17	5	8	140
Central GW	19	8	3	1	-	1	32
Southeast GW	13	16	7	4	-	9	149
Southwest GW	74	7	4	-	1	1	87
S Central GW	1	1	2	-	-	-	4
Total	658	291	156	68	32	20	1225
% of total	54	24	13	6	3	2	100

TABLE 13
APPROVED TIMES FOR APPLICATIONS
(volume in applications in monthly intervals)

Months	0-3	3-6	6-12	12-24	24-48	>48	Total
Basin							
Bluewater	3033	2720	756	267	-	-	6775
Canadian	498	295	406	736	11	-	1946
Gila & SF	2876	599	746	343	38	-	4601
Pecos	8080	9278	1110	3343	112	-	21923
Lower RG	346	124	15	16	-	-	501
Middle RG	9210	14718	943	129	128	-	25129
Upper RG	3118	275	1907	274	1847	61	7482
San Juan	632	564	1371	206	123	101	2997
Central GW	2398	261	91	49	-	2	2800
Southeast GW	12768	2320	692	153	-	6000	21932
Southwest GW	7857	103	113	-	1249	72	9394
S Central GW	1328	24	17	-	-	-	1369
Total	52142	31281	8166	5517	3508	6235	106848
% of total	49	29	8	5	3	6	100

TABLE 14
APPROVED TIMES FOR APPLICATIONS
(average consumptive use per application in monthly intervals)

Months	0-3	3-6	6-12	12-24	24-48	>48	Total
Basin							
Bluewater	337	247	189	67	-	-	242
Canadian	45	42	203	105	5	-	67
Gila & SF	17	8	30	57	38	-	17
Pecos	70	150	41	279	19	-	99
Lower RG	38	31	15	16	-	-	33
Middle RG	120	377	43	16	18	-	164
Upper RG	136	11	83	34	185	61	83
San Juan	18	14	38	12	25	13	21
Central GW	126	33	30	49	-	2	87
Southeast GW	113	145	99	38	-	667	147
Southwest GW	106	15	28	-	1249	72	108
S Central GW	1328	24	8	-	-	-	342
All	79	107	52	81	110	312	87

Fully 54 percent of the applications and 49 percent of the application volume are processed within three months. Seventy-eight (78) percent of both the applications and application volume are processed within six months, and 91 percent of the applications (86 percent of the application volume) are processed within one year. At the other end of the spectrum, only 20 applications took more than four years to approve. Nine of these totaling 6000 acre-feet of consumptive use were the 1975 protested applications in the Southeast Groundwater basin. If they are removed from the data, only 235 acre-feet of applications took as long as four years to approve.

At a basin level only the Canadian, the San Juan, and the Upper Rio Grande had approval speeds significantly slower than the state as a whole. The Canadian is most likely due to the higher percentage of protests, while the San Juan was slowed during one period by the necessity of developing a hydrological model linking groundwater withdrawals to reductions in streamflow.

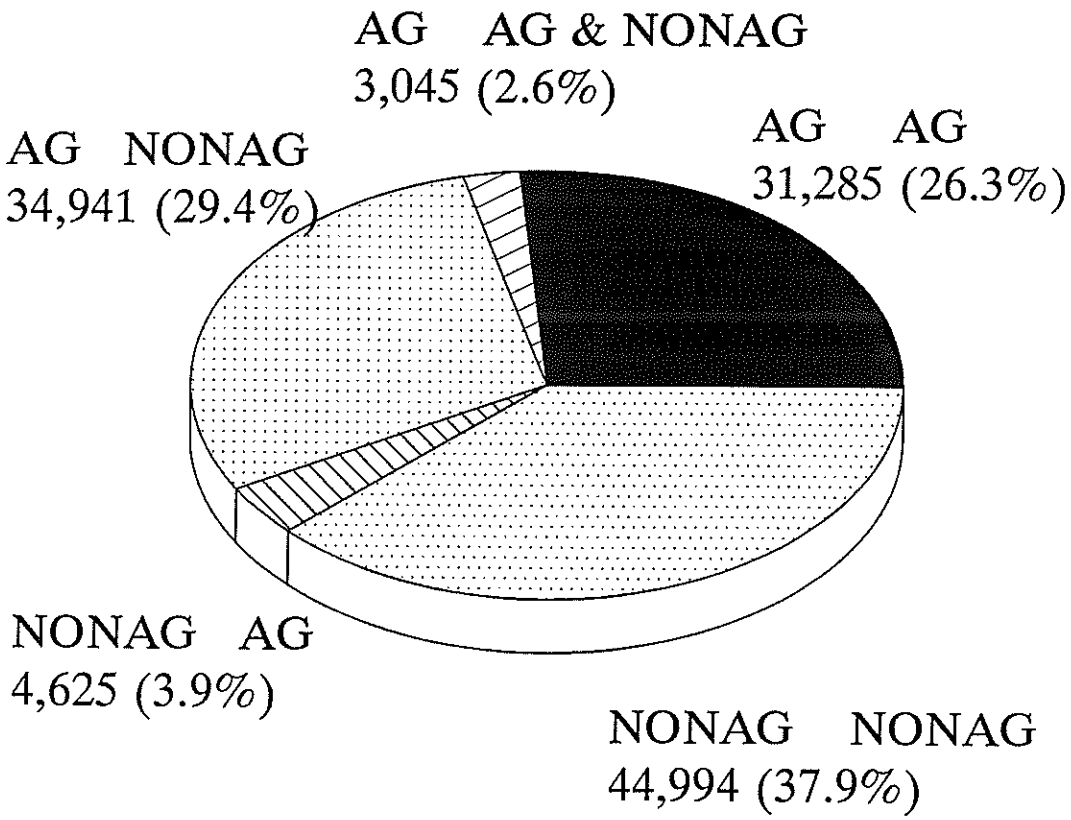
If the 6000 acre-feet of protested applications in the Southeast Groundwater basin are removed from Table 14, it becomes clear that the average size of the applications is not correlated with approval time. Protests and the development of hydrological modeling may slow the speed of approval, but little else appears to do so.

Direction of Change

Finally, in closing this review of the transfer data, consider Figure 8 which reports the direction of sector movement in the change applications from an agricultural perspective. All applications were categorized according to the "Use" **from** which the rights were to move and the "Use" **to** which they were moving.

One surprising statistic in Figure 8 is the large quantity and percentage moving within the agriculture sector. It is hoped that simple changes in point of diversion and use have been removed from these data. Consequently, this volume actually reflects situations in which water rights have been moved from one farming operation to another. A firm answer to that question is beyond the scope of this study.[63]

FIGURE 8
USE TO USE DIRECTION OF CHANGE
(acre-feet of consumptive use and percent)



SECTION 4: TRANSACTION COSTS AND PRICES

Data Gathering Procedures

The database containing 1309 applications identified through the Census of Transfers also provided the means for obtaining information on sale prices of water rights and the transaction costs associated with transfer applications. A sample of transfers was drawn from the census database, and survey forms (Appendix B) requesting price and cost data were mailed to the applicants. The database population was reduced to 730 applications to change the place or purpose of use before the sample was drawn. Those applications which only involved a shift within the agricultural sector or were from agricultural to domestic use were eliminated.[64] The remaining applications were then stratified into three time periods and individual hydrologic basins to insure a broad cross section of transfers within the sample.

Three time periods of 1975-79, 1980-83, and 1984-87 were employed containing 202, 318, and 210 files respectively. The number of basins ranged from 11 to 13 depending on which basins had actually experienced transfer applications during the particular time period. A total of 303 randomly selected files were then chosen with the distribution indicated in Table 15. Abbreviations used in Table 15 are Gila/San Francisco (GSF), Middle Rio Grande (MRG), Penasco (PN), Pecos River Valley (PRV), Southeast Groundwater (SEGW), San Juan (SJ), Southwest Groundwater (SWGW), Upper Rio Grande (URG), and the Lower Rio Grande (LRG). The first number reports the transfers recorded, while the second number (in parentheses) reports the size of the random sample selected from this basin and time period.

Following sampling, the sample applications were then separated into two categories by frequency of application. Those applicants having more than one application in the entire census population of 1309 were approached in person in order to reduce the possibility that there would be confusion between or among their separate applications. All applicants in the random sample were then provided a copy of the transaction cost survey form either by mail or in person. Those receiving the form by mail were subsequently called on the phone approximately two weeks later. This survey form and sampling procedure had

TABLE 15
DISTRIBUTION OF RANDOM SAMPLE
AMONG BASINS AND TIME PERIODS

1975-79	1980-83	1984-87
Bluewater 3* (2)**	Bluewater 18 (6)	Bluewater 4 (2)
Canadian 7 (4)	Canadian 1 (1)	Canadian 3 (1)
Estancia 3 (2)	Estancia 2 (1)	Estancia 4 (2)
GSF 29 (14)	GSF 30 (9)	GSF 26 (12)
MRG 59 (29)	LRG 5 (2)	LRG 1 (1)
PN 1 (1)	MRG 63 (20)	MRG 57 (27)
PRV 45 (22)	PN 2 (1)	PN 3 (1)
SEGW 13 (6)	PRV 52 (16)	PRV 52 (25)
SJ 14 (7)	SEGW 34 (11)	SEGW 12 (6)
SWGW 15 (7)	SJ 50 (16)	SJ 15 (7)
URG 13 (6)	SWGW 25 (8)	SWGW 17 (8)
	Tularosa 1 (1)	URG 16 (8)
	URG 35 (11)	
TOTAL 202 (100)	TOTAL 318 (103)	TOTAL 210 (100)

*total number of applications
**sample size

been finalized after a field test of a previous version in which exclusively mail responses were sought.

Of the 303 survey forms distributed in this manner, 121 (39.9 percent) usable responses were obtained at this writing, though not all contained transaction cost data. There are a total of 87 responses (again, at this writing) with usable transaction cost information that were obtained either through phoning or through personal interviews with applicants who had made more than one application. Thirty-four (34) of the 121 responses contained sales price information out of 63 which involved sales. An additional 14 have lease price information.

It was clear from conversations with respondents that many did not have good records, if any, of their expenses, the price paid or received, or personal time invested in the transfer process. Many of the dollar numbers provided, then, cannot be considered as anything more than an informed estimate by the respondent. Presumably, the longer the

application, the less accurate the estimates provided. The fact that sixty per cent of the sample did not respond is troubling, but there is little evidence of bias in the portion which did respond.

Results: Transaction Costs

To facilitate comparison, all transaction cost and price data were converted into constant (real) 1988 dollars using the Consumer Price Index (CPI). Bearing in mind this adjustment, Table 16 presents the real transaction cost, on average, per acre-foot of consumptive water right for the eight basins for which results can be disclosed.[65]

TABLE 16
AVERAGE TRANSACTIONS COST*
(in 1988 dollars per right to consumptive acre-foot)

Basin	Numbers of Responses	Average Transactions Cost
Southeast Groundwater	14	$ 1.66
Southwest Groundwater	5	4.92
Bluewater	11	2.25
Gila/San Francisco	12	151.16
Pecos River Valley	25	66.53
Middle Rio Grande	7	537.42
Upper Rio Grande	6	1383.58
San Juan	5	283.32
New Mexico Total	87**	$ 290.52

*The average values are weighted by the various strata size in the stratified random sample. They are not simple means for the respective basins.
**The column does not add to 87 reported for the state as a whole. See *supra* note 69.

For some of these basins, the range of values in the sample exhibits substantial variation, particularly if a protested application appeared in the sample. For example, in the Upper Rio Grande the transaction cost per consumptive acre-foot varied from a low of $17.78 to a high of $4997.26 within the set of six values. Given, however, that there are only sixty-four Upper Rio Grande transfers in the entire set of 730 from which the transfer sample was drawn, it is likely that a large variation (and large average value) would persist

in the population of sixty-four as a whole and for this particular sample of six. The average value, of course, would be expected to change with additional sampling.

Based on the numbers reported in Table 16, there appears to be substantial variation in transaction costs from one basin to another. However, there does not appear to be any discernible pattern to these average cost figures except possibly that it is less costly to transfer rights in ground water basins as contrasted with basins containing surface water. With the exception of the relatively low value for Bluewater, values for the two ground-water basins are substantially lower than all of the surface water basins.

The averages for the three periods are $18.75 (1975-79), $260.04 (1980-83), and $495.24 (1984-87). The estimated standard errors for these averages are respectively $4.83, $44.89, and $332.56. If 99 percent confidence intervals are constructed for the first two periods, they become ($6.29, $31.21) and ($144.20, $375.86) respectively, which do not overlap. Thus, it is very highly probable that average transaction costs (in constant dollars) have increased substantially from the first period to the second. Because of the large estimated standard error for the third period, it is less certain that the higher average reported for that period would be sustained in repeated sampling, though it is certainly more probable than not.

On a consumptive acre-foot basis, therefore, average transaction costs have increased from an almost nominal figure in the early years of the study period to well over $400 per AFCU in recent years. Again, this increase is over and above inflationary adjustments as reflected in the CPI. The explanation for this pattern is unclear, particularly since the frequency of protest has not increased from one period to the next.[66] The upward trend warrants further study due to the importance of transaction costs in the transfer process as a whole.

Despite the increase in the average transaction cost of applications, most changes still are processed inexpensively, whether measured by numbers of applications or the quantum of water contained within them, as seen in Table 17.

Alternatively, Table 18 depicts the average transaction cost by size category of acre-feet contained in the application. From these numbers it seems clear that there is an economy of scale in which the cost per unit of water transferred declines as the volume of water in the application increases.

TABLE 17
DISTRIBUTION OF AVERAGE TRANSACTION COST
(numbers of applications and volume by cost range)

Transaction Cost Ranges	Number of Applications	Percent of Total	Volume in Range	Percent of Total	Average in Range
< $10	52	59.1%	17,696 a-f	95.2%	$ 1.88
$10-$50	14	15.9%	319 a-f	1.7%	23.60
$50-$100	6	6.8%	325 a-f	1.8%	68.42
$100-$250	6	8.0%	185 a-f	1.0%	194.06
$250-$1000	5	5.7%	35 a-f	.2%	596.61
> $1000	4	4.6%	22 a-f	.1%	4997.26

TABLE 18
AVERAGE TRANSACTIONS COST BY SIZE OF APPLICATION

Size Group	Number of Applications	Ave. Trans. Cost
0-5 acre-feet	15	$ 473.70
5-10 acre-feet	7	343.82
10-20 acre-feet	14	395.40
20-50 acre-feet	15	60.23
50-150 acre-feet	16	36.25
> 150 acre-feet	20	3.82

Results: Prices

As noted above, there is less information in the survey results about prices paid or received from the sale of water rights. In fact, only slightly more than half of the transfers were actually sales. Nevertheless, it is useful to summarize the price information obtained from the survey to add to the general body of water right price information.

Tables 19 and 20 report average price information by time period and by basin respectively. For the second and third time periods, there are also sufficient data to report estimated standard errors for the averages provided. In those cases, 95 percent confidence intervals for the average price reported are ($1638, $2194) and ($2180, $4116) respectively. In other words, it is estimated that 95 percent of the samples selected would fall within

these intervals in repeated sampling. Because there is only a small overlap in the two confidence intervals, it is almost certain that the real price of water rights has risen substantially between the two periods.

TABLE 19
AVERAGE PRICE OF WATER RIGHTS PER TIME PERIOD*
(in 1988 dollars per consumptive acre-foot)

Period	Number of Sales	Average Price
1975-79	6	$ 1276
1980-83	13	1916
1984-87	15	3148

*These averages are weighted by the size of the respective strata in which the observations occur.

TABLE 20
AVERAGE PRICE OF WATER RIGHTS BY BASIN*
(in 1988 dollars per consumptive acre-foot)

Basin	Number of Sales	Average Price
Southeast Groundwater	2	$ 105
Southwest Groundwater	1	3316
Gila/San Francisco	3	4108
Pecos River Valley	14	2358
Middle Rio Grande	8	1450
Upper Rio Grande	1	2354
San Juan	4	2361
New Mexico	34**	2167

*Also weighted averages
**The number of sales column does not sum to 34 for reasons of confidentiality. However, all 34 reported prices are used in the calculation of the weighted sales price for the state as a whole.

These few values for sales prices are not sufficient to provide much basis for generalization, though the regional differences and the temporal increases are consistent with similar results reported elsewhere. In most basins water rights have become valuable property rights, and the evidence confirms a continuing increase in their value in constant dollars over and above increases due to general inflation. Transfer of these rights from one use and/or place to another may be expected to attract increasing scrutiny, as is perhaps

reflected in the increasing transactions cost associated with transfers. One policy issue associated with the transfer process is the nature and extent of public review to which these transfers should be subjected. This topic is examined in its New Mexico context in the following section.

SECTION 5: NEW MEXICO AND THE PUBLIC WELFARE

In 1985, New Mexico enacted legislation prohibiting the transfer of a water right from one use or place to another where the effect of the transfer would be "detrimental to the public welfare or contrary to the conservation of water."[67] New Mexico's statute, like similar statutes in other western states, simply adds public welfare and conservation impacts to other potential impacts that must be considered by the hearing officer or judge in ruling on a transfer application.[68] This section examines the concept of "public welfare" and the question of how it should be defined with respect to water use. Specifically, the discussion addresses the question of whether an appropriate determination of the public welfare can be made in the administrative or judicial arenas.

A Case in Point

The requirement that transfers be consistent with the public welfare became state law in 1985. Because few transfer applications have been challenged on this ground, the full ramifications of the requirement are not known. The likelihood the ramifications will be prolix is perhaps best illustrated by the case of Sleeper v. Ensenada Land and Water Association.[69] This case directly pitted the economic values associated with a new ski development against the cultural values of a northern New Mexico community.

Events leading up to the Sleeper suit date to the late 1970s, when Tierra Grande Corporation began developing a subdivision in conjunction with a large ski resort development[70] near Ensenada, New Mexico, a small farming community in the north central part of the state. While building roads for the new subdivision, Tierra Grande dug a gravel pit then, later, transformed the pit into a recreational lake by damming the Nutrias Creek.[71] The Nutrias, a tributary of the Rio Brazos, empties into the Ensenada irrigation ditch before it joins the Rio Brazos.[72] Fed mainly from snowmelt, the Nutrias runs heavily during the spring and is dry by late May or early June.[73] The Ensenada Land and Water Association uses the creek's waters, drawn off the Ensenada ditch, to fill irrigation reservoirs and "fertilize" the soil with its rich silt.[74] The association members use the Rio Brazos water when the Nutrias runs dry.

Tierra Grande's actions in damming the creek violated laws regarding the building of dams and the diversion of water.[75] When the state engineer discovered the lake, he ordered Tierra Grande to breach the dam.[76] After complying with the order, Tierra Grande contracted with two local property owners to purchase their lands and appurtenant water rights.[77] The parties conditioned the purchase upon the state engineer's approval of the property owners' application for change of place and purpose of use and point of diversion of their surface water rights.[78]

The applicants requested a one-time diversion of 61.32 acre-feet of water from Nutrias Creek to create the lake, and, thereafter, annual diversions of 13.32 acre-feet to compensate for evaporative loss.[79] These diversions necessarily would result in the retirement of irrigated land,[80] because when water rights used to irrigate land are transferred to a nonagricultural use, the previously irrigated land must be retired from agriculture. To offset loss of water from the creek, the Applicants proposed to temporarily retire 64.55 acres of irrigated land during the year the lake was filled, then, in the next year, permanently retire 14.02 acres of irrigated land.[81]

In 1982 the applicants applied for transfer of the surface water rights. The Ensenada association protested, alleging that the transfer would impair existing rights and would be contrary to the public interest. The hearing officer, relying upon hydrologic studies and his finding that the transfer would not impair existing rights, recommended that the state engineer approve the transfer application. When the state engineer accepted this recommendation, the Ensenada association appealed his decision, and the state district court reversed in a *de novo* hearing.

At the district court hearing, the Ensenada association argued that the transfer would be contrary to the public interest because it would result in the permanent loss of agricultural land and, inasmuch as ditch maintenance expenses after the transfer would be born by fewer people than before, would increase the financial obligations of individual association members.

Applicants contended that economic development resulting from the proposed resort project would be in the public interest because it would stimulate the local economy. The resort would generate construction jobs, such as the building of second homes, in the

Ensenada area. Eventually, the Applicants claimed, the tourist industry associated with the project would provide more local jobs, shifting the populace from an agricultural subsistence economy to an economy based on tourism.[82]

An expert for the Ensenada association countered that the development of tourism/recreational facilities would not improve the financial outlook of people currently residing in the area. The resort project would provide only menial jobs, such as those for waiters and maids. Overall, he said, most local residents would never realize any benefits from the resort economy.[83]

Presiding at the hearing, Judge Art Encinias addressed the conflict between economic and cultural values inherent in the dispute. Although Encinias used the term "public interest" rather than "public welfare," it is clear he considered the terms synonymous. "Northern New Mexicans possess a fierce pride over their history, traditions, and culture," he said, noting that the deeply rooted traditional ties of northern New Mexicans to the land and water are central to maintaining that culture.[84] He observed, further, that the living culture of northern New Mexico is recognized at the state and federal levels as possessing significant value that cannot be expressed in monetary terms. "[H]ere," he said, "it is simply assumed by the Applicants that greater economic benefits are more desirable than the preservation of a cultural identity."[85] In opposition to this view, Encinias mentioned that developments such as the resort community in question contribute step-by-step to the destruction of the local culture.[86] Reversing the state engineer, Encinias stated that "to transfer water rights, devoted for more than a century to agricultural purposes, in order to construct a playground for those who can pay is a poor trade, indeed."[87]

On appeal, the New Mexico Court of Appeals held that the statute in effect at the time of the application precluded the state engineer from considering broad public interest factors in the transfer of surface water rights. Because, in a strictly hydrological sense, the transfer did not harm existing rights, the court reversed.[88] While the people of the Ensenada ditch have had their day in court, the victories for them at the district court level and for their opposition at the appellate level have not instructed others as to the meaning of "public welfare."

Water Scarcity and Public Welfare

The conditions of water scarcity that gave rise to the prior appropriation system have been constant over time, but the demand for water has been expanding. In the last 70 years, New Mexico's population has more than tripled[89] and, where population once was dispersed widely in the state, it is now concentrated in urban areas.[90] Over the same period, the state's surface waters have been almost fully appropriated, and groundwater previously inaccessible due to inadequate drilling and pumping technology has become the major source of supply in several counties.[91] Furthermore, developments in hydrology now permit more precise measurement of underground reserves, better understanding of the relationship between underground and surface streams, and the possibility of reliably determining the state's water resource limits.

These demographic and technological changes have been accompanied by unprecedented, vastly increased demand for water in metropolitan, industrial, and recreational uses. Meanwhile, the concentration of senior water rights in agricultural uses is criticized by many as economically inefficient.[92] The closer the state approaches full appropriation, the greater is the pressure to move water to higher economically valued uses and to operate the allocation system on the market model.

Population increases have also been accompanied by increased production and disposal of municipal and industrial wastes, thus, in turn, by problems of water pollution. Point sources of pollution can be tracked to some extent, but the technology for correcting the effects of pollution, where it exists, is prohibitively expensive. Lastly, over all these other changes hangs the specter of global warming and its unknown consequences for the region. In short, the West is still experiencing population growth that is clarifying the finite nature of its water resources. Submitting proposed water rights transfers to the test that they not harm public welfare is an expression of growing uneasiness with growth based on a finite water future. What it says, in effect, is that some lawmakers, and, presumably, their constituents, are beginning to question the wisdom of allowing the marketplace exclusive control in determining who shall hold these rights and how they shall be used.

Ordinarily, mistrust of market effects does not extend to commerce in coal, copper, other minerals, and other energy fuels. Where these resources are concerned, society has

developed ways of mitigating the undesirable social and environmental consequences of allowing free trade to run its course. Depletion costs have been accepted in exchange for cash. When a mine or demand for its ore plays out, for example, the mining company is obliged to restore damaged lands and severance tax revenues are used to establish new tax bases for affected communities.

Where water is the resource and short supply a factor, however, results of a strict market economy are sometimes regarded as intolerable. Like air, water is perceived as distinguishable from other natural resources because it is essential to all forms of life. Because water has this characteristic, society seems unprepared to deal with the reality that giving the market exclusive control in western water trade might displace from competition those who could not bear the going rates.[93] In extremely arid areas people with fewer financial resources would be without water and forced to move. And, in the long term, given the strength of demand and the relative paucity of supply, water reserves would be exhausted. This result would mean destruction of the region's economic base and its habitability as well. The area would lose its capacity to support life, and this concept, on "Spaceship Earth," does not appear to be palatable for the current body politic.[94]

Conflicting Values Included in the Concept "Public Welfare"

Even though members of society are concerned about the "public welfare," there is never unanimity as to its meaning. Visualizing various values in water as located upon a continuum can help, perhaps, to clarify this subject. At one end of the continuum would lie values that are widely and strongly held. Water resources protected by law might be placed here. Through the Endangered Species Act,[95] for example, Congress has preserved the water habitats of certain birds, fish, and other kinds of wildlife. Similarly, as noted above, the federal government has asserted water rights in national parks, Indian reservations, and other areas it has set aside for specific purposes.

At the other end of the continuum would lie values that are so abstract or impractical they are unlikely ever to command a large constituency. Here, then, might be placed the sentiments of people who cherish the image of free running streams and, regardless of the impact, insist that no stream be impeded in its flow to the sea. Between these extremes

there are a number of other publicly held values in water.[96] Examples of these are set out below.

Environmental, Recreational, and Scenic Values — Almost all western states have recognized public benefit in preserving water flow in some stretches of perennial streams and rivers.[97] Protection of a certain level of streamflow is justified on several grounds. It maintains bacterial activity that cleanses the stream, dilutes municipal and industrial discharge into the stream, carries potentially clogging sediment downstream, ensures survival of fish and other aquatic life, and sustains vegetation in the bed and on the banks of the stream. This vegetation, in turn, serves as habitat for wildlife and waterfowl and acts as a filter by trapping polluting substances carried in return flow irrigation water and other runoff.

Other values in retaining water in streams and rivers are shown in the popularity of sport fishing, swimming, boating, rafting, and other purely recreational activities. In addition, there is clearly some value held in the enjoyment of the scenic quality of rivers, and of watersheds generally.[98]

Economic Values — In addition to sustaining physical life directly, water has other properties that, directly and indirectly, sustain economic life. It is among the most fundamental of the "means of production." As a source of buoyancy and momentum, channeled water can carry heavy objects from place to place, and can carry away and dilute the effluent of factories and businesses. Quantities of captured water, converted to steam or hydroelectric power, can serve multiple energy needs and at great distances from rivers and reservoirs.

In the end, the availability of water determines the feasibility of nearly all commercial enterprises. Some of these--in the West most notably large-scale irrigated agriculture, mining, and oil exploration--require large amounts of water.[99] Other businesses that do not themselves use great quantities of water depend on businesses that do. Manufacturers of farm implements, wholesalers and retailers of seed and fertilizer, trucking companies, packagers, advertisers, grocers and their customers all rely on farming products. Similar dependency networks radiate from the logging camps, mines, quarries, and oil fields of resource producing western states. Thus water underpins not only the tax base of towns built around highly water-consumptive industries, but, ultimately, the tax bases of remote, less water-consumptive cities.[100]

Historic and Cultural Values — For many people, water has significant cultural value apart from its importance as an economic commodity. In New Mexico, this value is evident in the traditions of historic communities. Among the many New Mexicans descended from aboriginal Indians and 16th century Spanish settlers, there are some who make their living by subsistence farming and livestock grazing in the tribal Pueblos or rural villages built by their ancestors.[101] In these enclaves of traditional cultures, community values in water are manifest in physical structures—the hand dug ditches through which water can flow to all parts of the villages—and in social structures—the respected practices of using and maintaining the ditches. Field crops are irrigated and stockponds filled by water diverted from nearby sources and carried through this network of ditches, or acequias.

Adherents to these traditional ways of life revere water as a sacred substance, the lifeblood of society. Reverence for the life-giving power of water extends to everything associated with water. The seasonal changes and corresponding changes in rainfall and river flow are observed by time-honored rituals, dances, and feasts. These events, along with the handicrafts, music, and other creative works the events inspire, are the basis of a substantial portion of the New Mexico's tourist trade, which is one of the state's primary industries.

Conservation Values — Where water is scarce, the tendency to prefer present over future uses is strong. And the duty to ensure usable water resources to future generations, while generally acknowledged in principle, often suffers in practice. Still, partly because the disastrous effects of improvident resource exploitation are now being felt worldwide, value in long-term management of water and other resources is today expressed more earnestly than in the past.[102]

Factors Constraining Decision Makers Evaluating Public Welfare

If water occurred in only one form, as a solid, divisible substance, it could be parceled and allocated in chunks. As a resource, however, water is not readily severable from all the institutions affected by decisions allocating it from one use to another. It is a changeable, mobile element in a natural system, the laws of which are imperfectly understood. Moreover, what is understood about hydrologic systems complicates rather than simplifies the task of allocating water with public welfare impacts in mind. We now know,

for example, that certain groundwater aquifers are connected to surface streams, that certain others are not, and that the decontamination of a polluted water system, whether surface or underground, is extremely expensive. All this information helps clarify the public welfare debate, but does not help resolve it.

Water Supply Issues

Renewable Water Resources — As noted above, some underground aquifers are hydrologically connected to surface streams.[103] Water, in the form of rainfall and snowmelt, percolates down through the soil to fill these aquifers, and, moving laterally underground, eventually enters streambeds as recharge. Over time, because water pumped from such an aquifer is lost to the surface-stream recharge process, withdrawals from the aquifer will not only drain it but also deplete the associated streams. Thus, where underground aquifers and surface streams are effectively the same water source, administration of them must recognize that fact. The difficulty comes in deciding when to balance accounts.

The rate at which groundwater pumping affects associated streams varies with the composition of the geologic zones separating the well from the stream. Usually, however, the rate is slow. One can take stream-related groundwater today and postpone reckoning with the impact until far into the future. If one were to place a well directly into the river, the drawdown effect would be immediate and evident. But the impact on the river of wells fifteen miles away from the river might not be felt for a hundred years. Thus, although the impact eventually will be felt, until it is felt, water pumped from the well can be considered as withdrawal from storage rather than withdrawal from the river.

These temporal and spatial considerations are of great practical importance to municipalities, for New Mexico municipalities rarely depend on surface water alone. In virtually every western city, groundwater in storage hydrologically connected to surface supplies is a supplemental, if not the major, water source. Accordingly, cities attempting to coordinate economic growth and water withdrawals have found it expedient to place wells as far from the river as possible and use the often high-quality groundwater to support domestic and industrial needs. Here, water from the city's wells is thought of as if it were

drawn from a source independent of the river when, in fact, it is an interest-free loan from the river. Once created, however, the debt to the river eventually must be paid.

New Mexico statutes allow municipalities to acquire water rights and refrain from fully using them for up to 40 years.[104] This law permits cities and towns to appropriate more water than they can use at present and, at the same time, build a hedge against increasing water prices in the future. For example, a city currently dependent on groundwater can buy agricultural rights in surface water at current market rates then lease the rights back to the individual farmers who sold them.[105] As long as the rights are used under lease by the farmers, the rights' type and place of use do not change, so no formal transfer must take place.[106] With the surface water rights in hand, the city can pump its wells secure in the knowledge that, when the time comes to repay the debt to the river built up by well pumping, the city can dry up the leased surface rights to offset the impact on the river.

The repayment issue becomes critical when and where a municipality has based its economic growth on a combination of surface and groundwater use greater than the actual supply. Consider a city of 500,000 people that needs 100,000 acre-feet a year to sustain it. For a time, the city can easily withdraw that amount from storage and the river. When the river ultimately can supply only 50,000 acre-feet a year, however, something will have to give. For purposes of public welfare analysis, then, decision makers must inquire into issues such as whether a city should be obliged to limit its growth on the basis of long-term supplies, or should be obliged to keep a certain amount of groundwater in reserve in case there is no snow melt and the upstream reservoirs are low.

Nonrenewable Water Resources — Where one is deciding the fate of a closed, or non-stream-related aquifer, the possible policy approaches are numerous. For example, speculating about future needs, one could conclude that these are of greater social value than present needs, and disallow any use greater than natural recharge. In this case, annual appropriations from an aquifer that contained 15,000,000 acre-feet of water but had a sustained yield of only 1,000 acre-feet a year could be limited to 1,000 acre-feet. At the other extreme, if policy makers believe that the economic value of the water in present uses

was higher than any foreseeable future use, they could make a decision to extract the water at rates dictated by present needs, leaving none for future generations.

One compromise between these positions would be to allocate quantities greater than natural recharge but strategically so. That is, using the best available technology, one could calculate the quantity of water in the basin as well as the supply of collateral resources needed to sustain economic development in the area. On the basis of these measurements, mining of water would be allowed but at a rate that ensured a certain quantity of water would remain to support the area's economy.

In making these decisions policies would have to present opportunities and obligations for water conservation. And the rate of drawdown might have to be regulated to prevent one user adversely affecting another by pumping too fast. Whatever the approach, a decision to mine and at a certain rate lies squarely within the concept of public welfare.[107]

Water Quality Issues — In evaluating the public welfare issues above, another crucial question is: To what degree are changes in water quality part of the public welfare equation? This question is more complex than it might at first appear. One starting point, as occurs in some legislation, would be the proposition that there should never be any degradation of water quality in either renewable or nonrenewable sources.[108]

"Efficiency" versus "Waste" — This argument proceeds from the notion that every drop of water taken from a nonrenewable source moves that source steadily toward extinction. Therefore, not one drop should be wasted or polluted. The difficulty in holding this position becomes apparent in the realization that pollution of water may not be "waste" of water. Indeed, in the process of polluting a water resource, a great deal of economic activity and employment may be generated for a large number of people.

If mining a nonrenewable source is allowed, it is inconsistent to argue the same source should never be polluted because the economic activity creating pollution is necessary to sustain employment. Suppose two individuals proposed to extract water from a non-renewable aquifer. The first agreed he would farm and by doing so dry up the aquifer. This use would generate 100 jobs over 45 years. Suppose the latter agreed he would utilize the water for a non-consumptive industrial purpose, thereby consuming none of it, and reinject

it into the ground after he was done. This use of the water would generate 4,500 jobs over 45 years. When reinjected into the aquifer, however, the water would be mildly toxic and, given current technology, unusable for other purposes. In which case is the public welfare best served? The debate over nondegradation versus measured rates of degradation continues, and every word of the debate invokes public welfare issues.[109]

Surface water pollution also presents public welfare ironies. Many clamor for more "efficiency" in water use by farmers, and ask that less water be consumed by the farming process. From a water quality standpoint, the problem may at times be just the opposite. Some modern farms may be too efficient.[110]

Throughout the West, where massive irrigation projects have been built and where water has become sufficiently expensive, cost may already be an incentive to the farmers to conserve water. This condition often results in the farmers using drain tiles to enhance return flow from their fields after the crops have been irrigated.[111] Although this process uses less water, it often reduces the quality of the water returning to the river. The water is lower in quality because it leaches the naturally occurring salts, and, at times, other elements such as boron and selenium, out of the soil and into the river to be presented as a "gift" to the next downstream user. Thus, consumption of the minimum use of water by one user can lower water quality for the next user and so on, until fisheries at the end of the watershed are severely damaged.[112]

Terms such as "efficiency" and "waste" and "conservation" are proper to the evaluation of the "public welfare," but people rarely mean the same thing when they use them. Consider three very distinct meanings for the term "waste" of water. An expert in the technology of on-farm uses of water might insist that, in farming, water is wasted in only three ways: by transpiration through the leaves of plants, by evaporation from open ditches, and by sufficiently deep percolation so that it cannot be reused economically or becomes blended with a nonusable aquifer. An economist, however, would suggest that even if one utilized the absolute minimum amount of water to grow crops, there would still be a waste of water if there were a more valuable use for the water outside of agriculture. Finally, consider a person who values rare birds. That person might strongly argue that water would be wasted in farming or industrial use when it could be used to save the last few members

of an indigenous duck species once plentiful in the area. The answer to the question of waste thus depends on whether waste is measured with a laser plane for leveling fields, a calculator with a discount rate function, or an ornithological guide and a hope that one's children will have an opportunity to observe the variety of species that can be seen today.

Prevention versus Cleanup — Water quality concerns include another significant factor that must be woven into the decision making process. This factor is the practical irreversibility of certain decisions. Weighing the costs of water pollution cleanup against the costs of prevention often results in substantial imbalance as illustrated by the Exxon oil spill in Valdez, Alaska. The cost of an alcoholic treatment program, or a testing program, or a failsafe radar system may be relatively minor in comparison with the cost of repairing the damage done by the oil slick. The same is commonly true with respect to the introduction of petrochemicals into a groundwater aquifer. The cost of removing such substances is frequently prohibitive by most benefit-cost calculations. That cleanup occurs at all is probably due to the general horror at having befouled one of life's most basic resources, its water supply. It remains to be seen, however, whether that horror will sustain the cleanup when they become so high that they compete with the costs of other basic programs like garbage collection or police service, for example. Because some pollution is virtually irreversible,[113] the public welfare is plainly implicated, not only for the individual actors in a water transaction, but for all the members of society who may have to live with the adverse consequences of the transaction.

Assuming the preceding discussion illustrates the difficult issues involved in the public welfare debate, other equally difficult questions also arise. Who should decide public welfare issues? How should those decisions be made? States may try to reinvent the wheel, as some states have done, or they may realize that others have worked long and hard at this question before. Indeed, such a planning analysis is commonplace throughout the world whenever new water development projects are proposed. Why should the analysis be any different when the issue is whether an existing water right should be transferred or whether a new appropriation should be permitted instead of whether a new water project should be constructed?

The Best Forum for Determining Public Welfare

If a public welfare analysis is considered mandatory, other issues become relevant. When and where should the analysis take place? Who is best qualified to do it? Actual practice under the transfer statutes of most western states, New Mexico included, elides these issues, and, therefore, resolves them by default. This oversight deserves scrutiny, for it obscures the fact that transfer procedures combine two questions that are not necessarily related: 1) Should this water right be transferred from use A to use B?, and 2) Would such a transfer be consistent with the public welfare?

The first question is properly joined with the issue of whether the transfer of the water right infringes upon or decreases the value of a third party's property right in water by reducing the quantity of the third party's water right.[114] This issue falls under the general heading of impairment. It is a hydrology question and submits readily to technical expertise. By contrast, the public welfare question concerns a broad range of variables and, perhaps, might be clearer if stated differently: Would allowing this transfer be inconsistent with society's goal of optimal utilization of precious and scarce water resources?[115]

The "impairment" question lends itself to an administrative or judicial forum because the ultimate facts are rarely in dispute and the legal issues are capable of clear statement and resolution. The adversary system of expert witnesses and cross examination is well suited to this task. The public welfare question is ill-suited to such a forum for the following reasons.

First, the issues are not clear-cut and capable of technical resolution. Second, expert testimony, if appropriate at all, would be largely subjective and value-loaded, and the decision making process would likely lead to a war of experts testifying on widely varied major premises. Third, resolution without error would be difficult because the traditional legal efficiency guidelines of relevancy and materiality would be useless, because virtually everything is relevant in a public welfare inquiry. Fourth, the inquiry would be so broad that the party with the most financial resources and staying power would prevail, solely because that party could amass more subjective testimony. Fifth, the typical decision makers in such a forum at least at the initial stage of the proceeding are commonly the state engineer and his staff. These persons, generally engineers or other technically trained

persons, are unlikely to be prepared by professional training or by temperament to handle sweeping nontechnical issues.

Sixth, assuming the issues were brought to the appellate courts for judicial clarification, there would be little chance of consistency in outcomes because any legal holding would contain little more than a general legal rule, as broad as public welfare itself, and each case would turn on its facts. Seventh, inasmuch as clear legal rules would not be forthcoming from the courts and the decision maker would not necessarily be trained to address these policy questions, the possibility of arbitrary and inconsistent results would be extremely high. Without some predictability of result few people would be inclined to invest money in transferring a water right.[116]

If one agreed with this analysis and wished to remove public welfare consideration from the province of administrative or judicial decision makers and limit the administrative and judicial transfer issues to questions of technical water right impairment, where should the power to decide public welfare issues be vested? One possibility would require the individual seeking a transfer to prepare the equivalent of an environmental impact statement and make it part of the record of decision to be considered by the administrative decision maker. This alternative, obviously patterned on the National Environmental Policy Act (NEPA),[117] probably would not go far enough. It does not go far enough because it would provide no decision rule: it is one thing to display impacts and quite another to decide that one or another impact justifies scrubbing a project.

A second choice would be to regionalize water development planning, as New Mexico has done, and allow the participants in that planning process to make fundamental choices about public welfare values in water use. The process would be involvement of citizens affected by water usage, defined procedural rules, and, following fair and adequate notice, a full public hearing on the issues.

Such a planning process would allow the public to have input into decisions regarding the use of regional water resources, subject to due process and to restrictions on unlawful takings of property without compensation.[118] The benefits of having a community rather than a judge define the public welfare values involved in water use include the following.

Once a regional water plan had been produced in this manner, it could serve as a guide, or, in some cases if subject to judicial review at adoption, a binding set of regulations for purposes of determining the public welfare impacts of proposed water rights transfers in the region.[119] Such a system would give clarity to transferors of water rights, would aid judicial decision makers in understanding how their communities view the public welfare values in water, and, having been developed outside the judicial arena, would be paid for by all concerned persons rather than particular litigants.[120]

SECTION 6: CONCLUSION

The preceding discussion is intended to demonstrate that with scarcity of surface and groundwater resources, comes inevitable political and philosophical debate as to the best method for allocating these resources among constituents of a democratic society. The authors endorse the marketplace as a starting point for allocating property rights in water and, thus far, have not seen a substitute that appears superior. At the same time, it is also clear that the value of water as an economic engine for production does not completely reflect the value of water to a society.

When cultural, environmental, and intergenerational values in water are articulated by the citizens of a society, there must be a forum in which these arguments can be heard. However, when these essentially nonquantifiable values are placed into a quasi judicial water rights transfer process through talismanic phrases such as the "public welfare," society is not necessarily served. The advocates of these values may not be served because the adjudicative process is not equipped to give the values a fair hearing, and the transferring parties are not served because they must submit to the costs and uncertainties of repetitive litigation. An alternative method may be found in allowing the "public welfare" to be defined in a regional planning process open to all interested parties.

SECTION 7: SUMMARY AND RECOMMENDATIONS

The water transfer process in New Mexico is active and in most respects free of contention. Over the study period,[121] there have been 1309 applications to change the place or purpose of water use. Of these, 1225 or 93.6 percent had been approved at this writing and 59 applications or 4.5 percent were protested during the entire period. An annual peak in applications was reached in 1981 followed by a gradual decline to the same levels that existed in the early years of the study period. Similar patterns exist for many of the individual water basins.[122]

All water rights in New Mexico are measured in acre-feet, and when rights are being transferred into municipal or industrial use, it is common practice to convert them from a diversionary base into a consumptive use quantum. For this study, simplifying assumptions were employed to convert **all** transfers into a consumptive use basis. By this volumetric method, the 1309 applications comprise 118,884 acre-feet of consumptive use. The approved transfers, similarly, carry rights to 106,855 acre-feet of consumptive use or 89.9 percent.

There is less pattern to the annual and basin volumetric totals for either applications or approved transfers which in large part reflects the lumpiness of water right holdings that come onto the market. It also is difficult to put the volume into perspective as to whether it constitutes a large or small quantity of water rights compared to the available supply. Most New Mexico basins have not been adjudicated, and a volumetric measure of the total stock of water rights in a given basin is unavailable. However, estimates of annual consumptive use within basins are prepared by the State Engineer Office (SEO) every five years, and these quantities can be used as proxies for the volume of water rights in the basin.

On this basis, the transferred rights in four basins (the Rio Grande, the San Juan, the Pecos, and the Gila/San Francisco) are respectively 4.8 percent, 1.1 percent, 5.4 percent, and 9.6 percent. It is likely that substantial, though unknown, additional quantities of water rights have also passed into the control of new owners such as municipalities and corporations but are not yet recorded at the SEO because they continue to be used in agriculture until they are needed for the new purposes for which they were purchased.

An application's average size is 91 acre-feet of consumptive use though 51 percent of transfers involve quantities that are less than 10 acre-feet in size. At the same time, 90,268 acre-feet of consumptive use transferred are contained in transfers that are larger than 100 acre-feet. Thus, the bulk of the transferred water occurs in only 13 percent of the approved transfers. Most transfers involve small amounts of water.

As noted, few applications are protested. The 59 protested contained 12,881 acre-feet of consumptive use or 10.8 percent of the total volume for which application was made. A protested application's average size was 218 acre-feet compared with the 91 acre-feet contained in the average application. Overall, there does not seem to a significant pattern to the protested applications. In a few basins there were single years with a large number of protests followed by very few additional protests in subsequent years. In other words, what problems existed appear to have been resolved.

Fifty-four (54) percent of all transfers were approved within three months, 78 percent within six months, and 95 percent within two years. Volumetrically, 78 percent were also approved within six months though 9 percent of the volume took longer than two years to approve. Looked at differently, the average volume of a transfer approved within three months was 79 acre-feet, and the average volume for those taking longer than four years was 312 acre-feet.

Thirty-two (32) percent of the volume transferred moved from agriculture into non-agricultural use or a mixture of both. Another 37.9 percent moved from non-agricultural use into other non-agricultural use. The surprising statistic, as yet unexplained, is the 26.3 percent of water rights being transferred and yet staying within the agricultural sector. Because effort was made to eliminate simple change of place of use by one owner, this statistic warrants further investigation since it is unlike the experience in other states.

The transaction cost associated with most small applications that are not protested is minimal, and as stated above, this is by far the largest group of transfers numerically. When a transfer is protested, the expense may become considerable, with evidence that average transactions costs are increasing significantly beyond the rate of inflation.

New Mexico's transfer process is well defined and routine in most instances. Although there is no explicit legislative or executive policy endorsing transfers as occurs in

California, the basic laws and practices of the state implicitly accept and even encourage transfers as a principal means of meeting new water demands in fully appropriated basins.

As is common to other western states, New Mexico disallows proposed transfers that may impair the water rights of others. Most recently, New Mexico adopted a statute which broadens the basis for protesting a transfer to include situations which are considered adverse to the public welfare or contrary to the conservation of water within the state. The experience with these new conditions has not been great as yet, and there remain significantly different opinions as to what these clauses may eventually come to mean. This report argues for a political process for determining the public welfare as contrasted with an administrative or judicial determination.

To summarize, the water rights system in New Mexico possesses considerable flexibility in terms of the transferability of water rights, and this flexibility is counted upon as the state experiences growth. There is circumstantial evidence that some consolidation and concentration of water rights holdings may be occurring, but these are only potential problems for the future. Most immediately, the principal issue remains the definition of public welfare[123] as it will operate within the transfer process.

ENDNOTES

1. United States v. Rio Grande Dam and Irrigation Co., 174 U.S. 690 (1899), Winters v. United States, 207 U.S. 564 (1908), United States v. New Mexico, 438 U.S. 696 (1978). For a good discussion of federal reserve water rights see Meyers et al. Water Resource Management (3rd ed. 1987) at 771-805.

2. **N.M. Stat. Ann.** § 72-1-1 (Repl. 1985).

3. Id.

4. DuMars, infra note 11, at 1047.

5. Id.

6. **N.M. Stat. Ann.** § 72-12-8 (Repl. 1985) § 72-5-28 (Repl. 1985).

7. State ex rel. Reynolds v. Miranda, 83 N.M. 442 (1972) and cases cited therein.

8. Anderson, Water Rights, infra note 81 at 249-282.

9. **N.M. Const.** Art. XVI § 3 (1974).

10. See State of Idaho, Department of Parks v. Idaho Department of Water Admn., 96 Idaho 440, 530 P.2d 224 (1924).

11. DuMars, New Mexico Water Law: An Overview and Discussion of Current Issues, 22 **Nat. Res. L. J.** 1045 (1982).

12. Id. at 1046. Under the riparian doctrine, owners of land bordering a river or other body of water enjoy instream rights, or rights to a continuous flow of water through their property, and privileges in use of the water not accorded owners of nearby non riparian land, however longstanding the latter's residence on that land. A good discussion of the riparian water law doctrine can be found in J. Sax and A. Abrams, Legal Control of Water Resources (1986) pp. 154-227 and in Mather, Water Resources: Distribution, Use, and Management 277-83 (1984).

13. DuMars, supra note 11 at 1047.

14. **N.M. Stat. Ann.** § 72-12-12 (Repl. 1985). When the state engineer finds that an underground reservoir fits the statutory definition, he simultaneously declares the basin as such and brings it within his jurisdiction.

15. **N.M. Stat. Ann.** s+ 72-12-2 (Repl. 1985).

16. **N.M. Const.** Art. XVI § 1 (1978) and **N.M. Stat. Ann.** §§ 72-1-2 and 72-1-3 (Repl. 1985).

17. **N.M. Stat. Ann.** § 72-12-4 (Repl. 1985); State ex rel. Reynolds v. Mendenhall, 68 N.M. 467, 362 P.2d; DuMars, supra note 11 at 1047. For a good discussion of this issue see State ex rel. Bliss v. Dority, 55 N.M. 12, 225 P.2d 1007 (1950) appeal dismissed 341 U.S. 924 (1951).

18. **N.M. Const.** Art. XIV § 3 (1978).

19. State ex rel. Reynolds v. Miranda, 83 N.M. 443, 493 P.2d 409 (1972). For a good discussion of the instream flow issue see State of Idaho, Department of Parks v. Idaho Department of Water Administration, 96 Idaho 440, 530, 530 P.2d 924 (1974). See text and accompanying note at pg. 3 infra.

20. For example, the water allocation statute for agricultural use is **N.M. Stat. Ann.** § 72-5-18 (Repl. 1985). The state engineer also exercises authority to require efficient use of water.

21. State ex rel. Reynolds v. Rio Rancho Estates, Inc., 95 N.M. 559, 624 P.2d 501 (1981).

22. **N.M. Stat. Ann.** § 72-1-9 (Repl. 1985).

23. **N.M. Stat. Ann.** § 72-12-8 (Repl. 1985).

24. **N.M. Stat. Ann.** 72-5-19 (Repl. 1985) ("The standard measurement of the flow of water shall be the cubic foot per second of time; the standard measurement of the volume of water shall be the acre-foot, being the amount of water upon an acre covered one foot deep, equivalent to forty-three thousand five hundred and sixty cubic feet.")

25. City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1962). For a discussion of the problem of consumptive use calculation in water right transfers see Dunning, The Physical Solution in Water Law 57 25. **U. of Colo. L. Rev.** 445 (1986).

26. **N.M. Stat. Ann.** § 72-5-18 (Repl. 1985) ("The amount shall be based upon beneficial use and in accordance with good agricultural practices and the amount allowed shall not exceed that amount. The State Engineer shall permit the amount allowed to be diverted at a rate consistent with good agricultural practice and which will result in the most effective use of available water in order to prevent waste.")

27. State ex rel. Reynolds v. Mears, 86 NM SW, 525 P.2d 870 (1974).

28. City of Roswell v. Berry, 80 N.M. 110, 452 P.2d 179 (1969).

29. Id. at note 26.

30. A nonrenewable aquifer is one that is not connected to a surface stream and that has been formed over thousands of years by rainfall gradually filling the alluvium with water. Once the water is taken out, for all practical purposes the aquifer will not be replenished.

31. City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1963). Conjunctive management issues are discussed in Meyers et al. note 4 supra at 608-623.

32. Mathers v. Texaco, 77 N.M. 239, 421 P.2d 771 (1967). See also Bagley, Water Rights and Public Policies Relating to Groundwater Mining in the Southwestern States, 4 **J. Law and Econ.** 144 (1961).

33. For a good discussion of direct flow versus storage rights, see Denver v. Northern Colorado Water Conservancy District, 130 Colo. 375, 276 P.2d. 992 (1954). State engineer jurisdiction over stored imported waters is discussed in Jicarilla Apache Tribe v. United States, 601 F.2d 1116 (10th Cir. 1978) cert. denied, 444 U.S. 995 (1979).

34. Id. at note 26

35. **N.M. Stat. Ann.** § 72-8-4 (Repl. 1985) (waste of water a misdemeanor).

36. **N.M. Stat. Ann.** § 72-5-39 (Repl. 1985) (State Engineer can get injunction against unauthorized use including forfeited rights).

37. The New Mexico statutes setting out the procedures for the adjudication are located at **N.M. Stat. Ann.** 72-4-1 to 72-4-20 (Repl. 1985).

38. Mathers v. Texaco, Inc., 77 N.M. 239, 421 P.2d 771 (1966).

39. **N.M. Stat. Ann.** § 72-4-19 (Repl. 1985) § 72-5-22 (Repl. 1985).

40. City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1963).

41. **N.M. Stat. Ann.** 72-5-26 (Repl. 1985). However, if an individual proposes to pump water out of state, the "Commerce Clause" of the U.S. Constitution and interstate compacts are often implicated.

42. Id.

43. **N.M. Stat. Ann.** § 72-6-3.

44. Id.

45. **N.M. Stat. Ann.** § 72-5-39 (Repl. 1985). Also, Ellis and DuMars, Two-Tiered Market in Western Water, 57 **Neb. L. Rev.** 333 (1978).

46. **N.M. Stat. Ann.** §§ 72-5-4, 72-5-5, and 72-5-51. (Repl. 1985).

47. **N.M. Stat. Ann.** § 72-12-3 (Repl. 1985).

48. **N.M. Const.** Art. XVI, § 5 (1978).

49. Stokes v. Morgan, 101 N.M. 195, 680 P.2d 335 (1978).

50. **N.M. Stat. Ann.** § 72-12-7A (Repl. 1985).

51. W.S. Ranch v. Kaiser Steel Corp., 79 N.M. 65, 439 P.2d 714 (1968).

52. State ex rel. Reynolds v. South Springs Co., 80 N.M. 144, 452 P.2d 478 (1969).

53. For a description of the administrative procedures for transferring a right in New Mexico see Water Transfers and Transactions Costs: Case Studies in Colorado, New Mexico, Utah, and Nevada, Bonnie G. Colby, Ken A. Rait, Todd Sargent, and Mark A. McGinnis, Department of Agricultural Economics, University of Arizona, Tucson, AZ 85721.

54. There is a change of ownership form that is also administered by the SEO, but these records are much too numerous to have been surveyed during the course of this research.

55. Steve Reynolds, State Engineer, raises the possibility that the number of applications stated in the annual reports of the State Engineer's Office may themselves contain inaccuracies. However, there was no other data source available for checking the completeness of the Census survey.

56. The reports are prepared are on a fiscal year basis. Therefore, the 1974-76 report covers the last half of 1974, all of 1975, and the first half of 1976. Of the four half-years, only the last half of 1974 (presumptively one-fourth of the applications) is outside the survey period.

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

58. Based on data reported in Tables 1-1 and 1-2 in Volume 1, the population growth rate for New Mexico fell from a compound annual rate of 2.51% in the seventies to 1.83% in the eighties. Employment growth rates fell precipitously from a seventies' rate of 4.2% to only 2.3% in the eighties.

59. F. Lee Brown and Helen M. Ingram, Water and Poverty in the Southwest, The University of Arizona Press, 1987.

60. Recall as a caveat that the volumetric numbers reported here are constructed estimates based on average coefficients rather than recorded, official values taken from each application. Even with this qualification, however, the series should adequately reflect relative magnitudes from year to year and basin to basin.

61. Water Use in New Mexico in 1985, Brian Wilson, New Mexico State Engineer Office Technical Report 46, November, 1986.

62. Four applications totaling seven acre-feet did not have sufficient information to determine the number of months to approval. Consequently, the total number of approved applications in Table 13 is only 1225 compared with 1229 in Table 8.

63. It is not uncommon for industrial or mining companies to use separate, seemingly unrelated subsidiaries to purchase water rights from farmers. One benefit of this practice is that rights can be accumulated more slowly

over time with less impact upon price. However, the same practice complicates the task of determining just what Use sector may have actual control over the rights.

64. This decision was for the purpose of focusing on the transfers of greatest interest in the study, namely the movement of rights out of agriculture into municipal and industrial uses. By this decision, a large number of agriculture to domestic applications in the Gila/San Francisco were eliminated which presumably had very small transactions costs because they were routinely and quickly processed.

Also, as subsequent information about the transfer process has been obtained, it has been discovered that at least some, and possibly many, of the agriculture to agriculture transfers are a first step procedure some applicants employ to establish a more secure quantum and record for their rights before proceeding to the second step of applying for a change from agricultural to non-agricultural uses.

65. One response was obtained for the Lower Rio Grande and one for the Estancia. Due to promised confidentiality of the information, these individual responses will not be disclosed separately. They are included, however, in other aggregate statistics reported in this section.

66. See Tables NM-4 and NM-10.

67. **N.M. Stat. Ann.** § 72-12-7 (Repl. 1985).

68. For a discussion of other comparable statutes, see Trelease and Gould, Cases and Materials on Water Law (4th ed. 1986) at 194-214.

69. No. RA 84-53(C), slip. op. (N.M. Dist. Ct. Apr. 16, 1985) (hereinafter known as Sleeper I), rev'd., 107 N.M. 494, 760 P.2d (Ct. App. 1988) (hereinafter known as Sleeper II), cert. quashed, 107 N.M. 413, 759 P.2d 200 (1988).

70. Id. Sleeper I, slip op. at 2. This case is complex. This description of the facts is taken from an excellent student comment by Ms. Shannon A. Parden. The comment is to be published in the **Natural Resources Journal** under the title "The Milagro Beanfield Revisited in Ensenada Land and Water Association v. Sleeper: Public Welfare Defies Transfer of Water Rights."

71. Id.

72. Id.

73. Id.

74. Id.

75. Id.

76. Id.

77. Id.

78. Id. at 2-3.

79. Sleeper II, 107 N.M. at 496, 760 P.2d at 789.

80. Sleeper I, slip op. at 3.

81. Sleeper II, 107 N.M. at 496, 760 P.2d at 789.

82. Sleeper I, slip op. at 5-6.

83. Id.

84. Id.

85. Id.

86. Id.

87. Id.

88. Sleeper II, 107 N.M. at 496, 500, 760 P.2d at 791-792, 793.

89. J. Williams [ed.] New Mexico in Maps (2nd ed.) (1986) at 150-157.

90. Id.

91. Letter from Steve Reynolds, State Engineer, to Charles DuMars, Chairman, Governor's Water Law Study Committee, March 12, 1984, on file in office of **Natural Resources Journal**, University of New Mexico School of Law.

92. See J. Sax and A. Abrams, Legal Control of Water Resources (1986) at 796.

93. Numerous authors have written on this topic. See, e.g., Grant, Public Interest Review of Water Allocation and Transfer in the West: Recognition of Public Values, 19 **Ariz. St. L. J.** 681 (1987). Getches, The Value of Water in the West, 8 **The Public Land L. Rev.** 1-32 (1987). Josephson, An Analysis of the Potential Conflict Between the Prior Appropriation and Public Trust Doctrines in Montana Water Law, 8 **The Public Land L. Rev.** 81-114 (1984). Littleworth, The Public Trust vs. The Public Interest, 19(4) **Pacific L. J.** 1201-1224 (1988). Trager, Emerging Forums for Groundwater Dispute Resolution in California: A Glimpse at the Second Generation of Groundwater Issues and How Agencies Work Towards Problem Resolution, 21(1) **Pacific L. J.** 31-74 (1988). Ingram, et al. Measuring the Public Welfare Value of Water (monograph), The Water and Public Welfare Project, Udall Center for Studies in Public Policy (University of Arizona) and the Natural Resources Center (University of New Mexico), 1988. Kneese and Brown, The Southwest Under Stress: National Resource Development Issues in a Regional Setting (Washington, D.C.: Resources for the Future, Inc., 1981). United National Department of Technical Co-operation for Development, Assessment of Multiple Objective Water Resources Projects: Approaches for Developing Countries (New York: United Nations, 1988).

94. For a directly contrary view see T. Anderson, Water Rights: Scarce Resource Allocation, Bureaucracy, and the Environment (1983).

95. **16 U.S.C.** § 1531, et seq.

96. See, e.g., Shokal v. Dunn, 109 Idaho 330, 707 P.2d 441 (1985), National Audubon Society v. Superior Court, 658 P.2d 709, 189 Cal. Rptr. 346 (1983), cert. denied sub non, L.A. Dept. of Water and Power v. National Audubon, 464 U.S. 977 (1983 (often referred to as the "Mono Lake" case), and Brown and Ingram, Water and Poverty in the Southwest: Conflict, Opportunity and Challenge (1987).

97. Tarlock, Appropriation for Instream Flow Maintenance: A Progress Report on New Public Western Water Rights, 1978 **Utah Law Rev.** 211 (1978) see footnote 37, infra. and case cited therein.

98. Stegner, The Sound of Mountain Water (1980) at 41-43.

99. See discussion of irrigation and industrial water demand in Ellis and DuMars, Two-Tiered Market in Western Water, 57 **Neb. L. Rev.** 333 (1978); T. Anderson, Water Rights: Scarce Resource Allocation, Bureaucracy and the Environment (1983) 223-248; and Zamora, Kneese, and Erickson, Pricing Urban Water: Theory and Practice in Three Southwestern Cities, 1 **S.W. L. Rev.** 89 (1981).

100. Brown and Ingram, Water and Poverty in the Southwest: Conflict, Opportunity, and Challenge (1987).

101. Id. See also Upper Rio Grande Working Group, The Course of Upper Rio Grande Waters; A Declaration of Concerns (1985) and Upper Rio Grande Waters: Strategies (proceedings from a conference on traditional water use, October 5-6, 1987) Both publications are available from the Southwest Hispanic Research Institute,

the Natural Resources Center, and the Native American Studies Center at the University of New Mexico, Albuquerque.

102. In Policies for Water Law: Property Rights, Economic Forces, and Public Regulation (5 **Nat. Res. L. J.** 1 (1965), the late Dean Frank Trelease concluded that:

> No system of water rights should result in a rigidity that will hamper future generations, nor impose upon those generations a water use pattern suitable only for a bygone age. A water use law should be flexible enough so that today's lack of omniscience or prescience will not prevent the correction of mistakes. It must grow with the times. The water rights it creates must be flexible enough to enable shifts from use to use. While it may be permissible to assume that the use to which water is first put is the most desirable and economic at the time, it is fallacious to presume that such a use would be best for all time. While we may wish to encourage water resource development today for its immediate benefits, getting the best use possible under present conditions, in years to come we may find that new or different uses promise greater benefits. (p. 30)

See also Wright, The Coming Water Famine (1966), and Engelbert, Water Scarcity: Impacts on Western Agriculture (1984).

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

104. **N.M. Stat. Ann.** § 72-1-9 (Repl. 1985).

105. Id. supra note 37.

106. For a discussion of how the City of Albuquerque has been required to retire surface rights, see Id. supra note 37.

107. The issue of groundwater mining is discussed in Anderson, supra note 33 at 223-249 and in Meyers et al. Water Resource Management (3rd ed. 1987), at 626-676. See also Mathers v. Texaco, 77 N.M. 239, 421 P. 2nd 771 (1967).

108. See generally Tripp & Jaffee, Preventing Groundwater Pollution: Toward a Coordinated Strategy to Protect Critical Recharge Zones, 3 **Harv. Envtl. L. Rev.** 1 (1979). See also the 1986 Safe Drinking Water Act amendments, 42 U.S.C.A. sections 300f-300j.

109. Water quality issues, of course, will arise under both federal and state law. See White, The Emerging Relationship Between Environmental Regulations and Colorado Water Law, 53 **U. Colo. Law Rev.** 597 (1982).

110. See generally Evaluation of Unlined Ditch and Reservoir Seepage Losses in Westlands Water District, Document prepared for San Joaquin Valley Drainage Program, U.S. Bureau of Reclamation contract No. 7-CS-20-05230 (Boyle Engineering Corporation, 1988). Anderson (supra note 33 at 283-322) suggests the possibility of allocation rights to pollute an aquifer as commodities in themselves.

111. See generally D. Swain et al., Technical Report: Formulating and Evaluating Drainage Management Plans for the San Joaquin Valley (1988).

112. Id.

113. Petrochemical and pesticide pollution in certain soil types is an example of this kind of pollution where clean up is not economically feasible. See generally, United States Environmental Protection Agency, 1986a, Pesticides in Ground Water: Background Document, Office of Ground Water Protection (Wh-550G).

114. See Trelease, New Water Legislation: Drafting for Development Efficient Allocation and Environmental Protection, **XII Land and Water Law Review** 385 (1977).

115. A good contrast of views can be found in Trelease, The Model Water Code, The Wise Administrator and the Goddam Bureaucrat 14 **Nat. R. J.** 207 (1974) and Dunning, Reflections on the Transfer of Water Rights 4 **J. Contemp. L.** 109 (1977).

116. Ellis and DuMars, supra note 33.

117. **42 U.S.C.** sections 4331-4335.

118. See, e.g., Orion Corporation v. Washington, 109 Wash. 2d 621, 747 P.2d 1062 (1987), cert. denied, 108 S. Ct. 1996 (1988) (Regulation restricting right to fill tide lands was not a taking as they were subject to public trust.)

119. The regional planning option is suggested under the theory that, in the case of any proposed transfer, those residing in the region where the transfer would occur would most likely be knowledgeable about, affected by, and concerned with water development in the area. Of course, there may be circumstances where the interests of the region would be overridden by the interests of the state as a whole. A procedure should be implemented to allow review of regional water plans on this basis and, where necessary, resolution of these conflicts.

120. The importance of integrating the planning process into the decision making process cannot be overstated. To fail to do so would be to create the worst of both worlds. If the interested parties were to engage in planning and have their plans brushed aside, they would be more likely to protest and further complicate the planning process. And, if there were no legal right to integrate the planning process into the decision, the decision maker might feel constrained to ignore the process out of the fear of appearing biased against the applicant. Thus, there must be some guidelines that indicate the weight to be given the plan in evaluating the propriety of a transfer. Armed with this information, the decision maker may still rule against the plan, but a reviewing court might well require clear and convincing evidence that the results of the planning process did not in fact reflect the public welfare concerns of the community.

121. The study period in New Mexico was expanded to include all years from 1975 to 1987 inclusively.

122. In particular, the Pecos, the Gila/San Francisco, the Middle Rio Grande, the Southeast Groundwater, and the San Juan basins exhibit a similar pattern.

123. In particular, in-stream uses have not been recognized as a beneficial use in New Mexico which gives rise to the possibility that proponents of in-stream values could seek to include these values under the public welfare clause.

1. Person Completing Form _____
2. Date completed _____

CENSUS OF NEW MEXICO WATER RIGHTS TRANSFERS
CHANGE IN PLACE AND/OR PURPOSE OF USE & DEDICATIONS/NEW APPROPRIATIONS
(1975-1987)

3. FILE # _____
4. SEO OFFICE _____
5. TRANSFER TYPE: A B C D E F G H I J (circle one)

6. APPLICANT: _____
7. ADDRESS: _____

		MOVE FROM or DEDICATE:		MOVE TO or NEW APPROPRIATION	
SOURCE	8.	_____		9. _____	
LEGAL DESCRIPTION	10.	1/4 1/4 1/4		11. 1/4 1/4 1/4	
Section	12.	_____		13. _____	
Township	14.	_____		15. _____	
Range	16.	_____		17. _____	

REQUESTED AMOUNT OF TRANSFER:

Diversion rights, af/y	18.	_____	19.	_____
Consumptive Use, af/y	20.	_____	21.	_____
Quantity stored, af	22.	_____	23.	_____

PRIORITY DATE OF APPROPRIATION:

Claimed	24.	_____	25.	_____
Adjudicated	26.	_____	27.	_____
Permitted	28.	_____	29.	_____

TYPE OF WATER USER:

a) Individual	30.	___	31.	___
b) Water District	32.	___	33.	___
c) Corporation	34.	___	35.	___
d) Municipality	36.	___	37.	___
e) Utility	38.	___	39.	___
f) Other _____	40.	___	41.	___

USE TYPES:	MOVE FROM (DED.)	MOVE TO (NEW AP.)	TYPE OF DIVERSION:	MOVE FROM (DED.)	MOVE TO (NEW AP.)
a) Irrigation	42. ___	43. ___	a) Ditch	44. ___	45. ___
b) Municipal	46. ___	47. ___	b) Well	48. ___	49. ___
c) Commercial	50. ___	51. ___	c) Reservoir	52. ___	53. ___
d) Industrial	54. ___	55. ___	d) Spring	56. ___	57. ___
e) Recreation	58. ___	59. ___	e) Seeps	60. ___	61. ___
f) Fishery	62. ___	63. ___	f) Mine	64. ___	65. ___
g) Fire	66. ___	67. ___	g) Pipeline	68. ___	69. ___
h) Domestic	70. ___	71. ___	h) Surface pump	72. ___	73. ___
i) Stock	74. ___	75. ___			
j) All	76. ___	77. ___			

78. SURFACE WATER SUBAREA: _____

HISTORY

79. Date the application was considered filed _____.

80. Was there a protest? yes ____ no ____.

81. Date of protest _____.

82. Was there a hearing? yes ____ no ____.

83. Date of hearing _____.

84. What was the ruling? approval ___ denial ___ pending ___ .

85. Date of the ruling? _____.

86. Was there an appeal to District Court? yes ____ no ____.

87. Has there been a decision on appeal? approval ___ denial ___ pending ___ .

88. Date of decision on appeal _____.

89. Was there a higher appeal? yes ____ no ____.

90. If so, to where? _____ .

91. Disposition of appeal? approval ___ denial ___ pending ___ .

92. Date of final disposition _____.

93. Were there hydrologic reports filed? yes ____ no ____.

94. If yes, by State Engineer's Office? yes ____ no ____.
95. By hydrologists hired by the parties? yes ____ no ____.

96. Is any price mentioned in files? yes ____ no ____.

97. If so, indicate dollar amount, quantity of water, and whether rights were to consumptive use or diversionary.

_____

98. Were rights moved into, out of, or within an irrigation or conservancy district? yes ____ no ____.

If yes, indicate the nature of the move below:

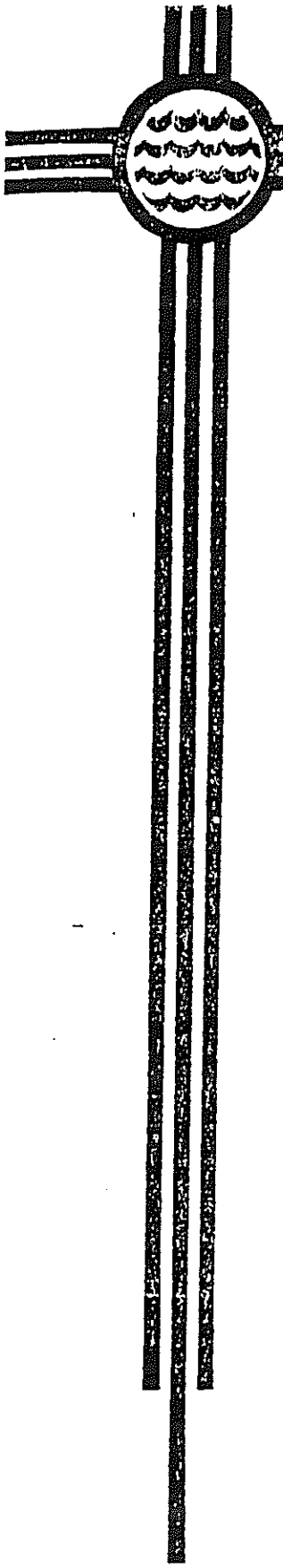
99. Place/purpose of use moved out of a district. yes ____ no ____.
100. Point of diversion moved out of a district. yes ____ no ____.
101. Place/purpose of use moved into a district. yes ____ no ____.
102. Point of diversion moved into a district. yes ____ no ____.
103. Place/purpose of use moved within a district. yes ____ no ____.
104. Point of diversion moved within a district. yes ____ no ____.
105. Other _____.

106. Name of Irrigation or Conservancy District _____
107. Address of District office, if in file: _____
_____
_____

PARTICIPANTS

(If additional space is needed, use back of sheet)

		BUYER	SELLER
PRIMARY PARTIES (Give names of representatives, if corporation or municipality)	NAME(S)		
	ADDRESSES:		
	PHONE:		
ATTORNEY FOR APPLICANT (Give names of representatives, if corporation or municipality)	NAME(S)		
	ADDRESSES:		
	PHONE:		
PROTESTANT(S)	NAME(S)		
	ADDRESSES:		
	PHONE:		
ATTORNEY FOR PROTESTANT	NAME(S)		
	ADDRESSES:		
	PHONE:		
HEARING EXAMINER	NAME(S)		
	ADDRESSES:		
	PHONE:		
SEO EXPERTS	NAME(S)		
	ADDRESSES:		
	PHONE:		
OTHER EXPERT WITNESSES	NAME(S)		
	ADDRESSES:		
	PHONE:		



NATURAL RESOURCES CENTER
An interdisciplinary component of The University of New Mexico School of Law

Dear Friend:

We are writing to ask for your help. The Natural Resources Center and the Department of Economics at the University of New Mexico are conducting a pair of studies of water administration in New Mexico. We hope to get a better understanding of what it costs a water-right owner to change the place or purpose of the water use, as well as what changes in water uses are occuring, and what water rights are worth. The results of these studies may assist the State in matching its administration system to the needs of New Mexicans.

The only source for this information is people like yourself, who have been involved in changes in water use. With the cooperation of the State Engineer's Office, we have made a complete census of applications to change the place or purpose of use of water rights in New Mexico since 1975. As you know, the State Engineer's records do not include cost information, so we are asking people who have made applications to help us with cost data. Included with this letter is a questionaire which gives the date, quantity, and file number of your application, and asks what what you spent on the application, the amount of your time involved, and what was paid for the water right. This information is the missing element in understanding how the water system is working, and your cooperation is the only way to fill this gap.

We are sensitive to the fact that cost information is private. The information we collect will be used in statistical analysis, and will be kept confidential; it won't be associated with your name or with the file number of your water right. However, the results should be extremely useful to New Mexico and to people making changes in their water uses in the future.

It would be helpful if you would look over the questionaire and check your records for the information requested. If another person handled the application, you may prefer to pass the questionaire on to them. Someone from our office will call you next week to arrange a time to take your responses over the phone. They will be able to answer any questions you have about the study. If you have any questions right now, please call the Natural Resources Center in Albuquerque at 277-6424.

We hope to make the data from this census available to the public through the Bureau of Business and Economic Research by next summer. Thank you very much for your cooperation. Your help will be an important contribution to New Mexico's ability to make good, informed water decisions.

Sincerely yours,

F. Lee Brown,
Co-Director,
Natural Resources Center

Susan Christopher Nunn,
Assistant Professor,
Department of Economics

Department of Economics, The University of New Mexico, Albuquerque, NM 87131, 505 277-6424

Census of Applications to Change Place and/or Purpose of Water Use

Applicant: _____ Quantity_____ Date of application _____ File No._____

1. Is the above information correct? If not, please correct:

Applicant: _____ Quantity_____ Date of application _____ File No._____

2. What was your role in the transfer? ____ applicant ____ protestant ____ other (explain) _____

Answer questions 3-7 only if the application involved a sale, and you were associated with either the buyer or the seller.

3. Did this transfer involve a sale of water rights? ☐ yes ☐ no

4. With which party to the sale were you associated? ☐ buyer ☐ seller ☐ other (explain) _____

5. Could you estimate the total dollar value paid for these rights?
$_____ to the seller

6. Was there a commission paid to a realator or broker, and if so, how much? $_____

7. Was there any additional compensation for the right other than price? ☐ yes ☐ no
If so please explain: _____

8. Could you estimate your total expenditures in the following catagories, associated with this application excluding purchase price or sales commission?

Filing and publication fees _$_____ Hydrologists or Engineers $_____
Title Search _$_____ Other (Please Explain) $_____
Attorneys _$_____ _____

9. Could you estimate the amount of uncompensated time in days or hours expended by you and your associates on this application. _____ days _____hours

10. On a scale of 1 to 5, with 5 the highest, would you indicate the intensity with which this application was protested? (Circle appropiate number.)

1	2	3	4	5
Routine, Uncontested		Moderately Protested		Strongly Protested

11. If protested, what were the reasons for protest, in order of importance?

1. _____
2. _____
3. _____

12. Was the original application modified or conditioned? ☐ yes ☐ no
If yes, how? _____

Thank you for your help!