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WATER SUPPLY AND DEMAND FOR NEW MEXICO

1985-2030-RESOURCE DATA BASE

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WATER SUPPLY AND DEMAND FOR NEW MEXICO 1985-2030–RESOURCE DATA BASE

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NEW MEXICO STATE UNIVERSITY

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Table of Contents

LIST OF TABLES

Table		Page

Table | Page

LIST OF FIGURES

Figure		Page

INTRODUCTION

CHAPTER I

A report titled, "Water: Lifeblood of New Mexico" (Creel, et al., 1988) was prepared by the New Mexico Water Resources Research Institute for New Mexico First to serve as a briefing document for the second Town Hall seminar to be sponsored by New Mexico First. The Town Hall discussion is to center on New Mexico's water resources and will be held May 15-18, 1988. The goal of the briefing document was to present generalized information on the availability, use, and management issues relative to the state's water supply in a readable format so the participants in the forum will be able to use the information in formulating opinions in developing recommendations for policies and actions that would affect the availability and future use of New Mexico's water resources. The purpose of this report is to provide supplemental data on our water supply and future water-use that was developed in the process of writing the First New Mexico briefing report. Much of the detailed information developed was not included in the briefing report because of the need to produce a document that could and would be read.

The data for this supplement report and for the briefing document (Creel, et al., 1988) came primarily from available published information and, in many cases, assumptions have been made to facilitate and promote understanding of complex issues. In instances where basic information was not available, the team relied on a combination of available information, appropriate scientific techniques, and its best estimates based on experience. Both reports contain long-range projections that are, for obvious reasons, conjectural in nature and constitute no more than an "outline" of different water futures that New Mexico might face. This was particularly true in projecting future water-demands as it is extremely difficult to incorporate all of the variables that define New Mexico's future water supply/demand profile.

Chapter II provides a review of the variability in New Mexico's water supply, particularly the surface supply. It also contains a basin-by-basin analysis of the available water supply. The data in Chapter II of this report is intended to supplement the information in the First New Mexico document.

In Chapter III, current uses of water in New Mexico, as well as potential New Mexico future demands, are presented. Chapter III is organized as follows. Section 2 provides estimates of current water use for the State, for each river basin, and for each county in New Mexico. Water use is defined as depletions (the consumptive use of water) and use are condensed into five categories in Section 2. The water use figures in Section 2 were taken from a 1986 State Engineer Office report (Wilson, 1986). In this section, the state is broken into nine river basins--Upper Colorado. Lower Colorado, Southwest Closed, Upper Rio Grande, Lower Rio Grande, Central Closed, Pecos River, Arkansas-Red-White, and Texas Gulf basins (figure I-1).

Three alternative future population projections (to the year 2030) are set-out in Section 3. Two scenarios were developed because of the recent experiences with different levels of economic activities in the basic high-water using sectors--agriculture, energy and minerals, and reservoir evaporation. In the early to mid-1980s, mineral and energy production and agriculture were in an economic slump and as a result, their consumptive use of water was below previous years in recent history. Scenario A represents the trends in depletions expected with sluggish economic activity. The late 1970s and early 1980s represented an era of strong economic growth in New Mexico and water depletions were at their height. Scenario B is a projection of depletions that would have resulted from a high-growth economy similar to that which prevailed during the late 1970s and early 1980s if it were to continue into the future.

In Section 4, these estimates of future water-demands are converted into river basin demands for the two scenarios (and the population growth projected) starting from the 1985 per capita depletions for each water-use category. Water-use projections by water use category were projected at five year increments to the year 2030 for each population projection and economic scenario.

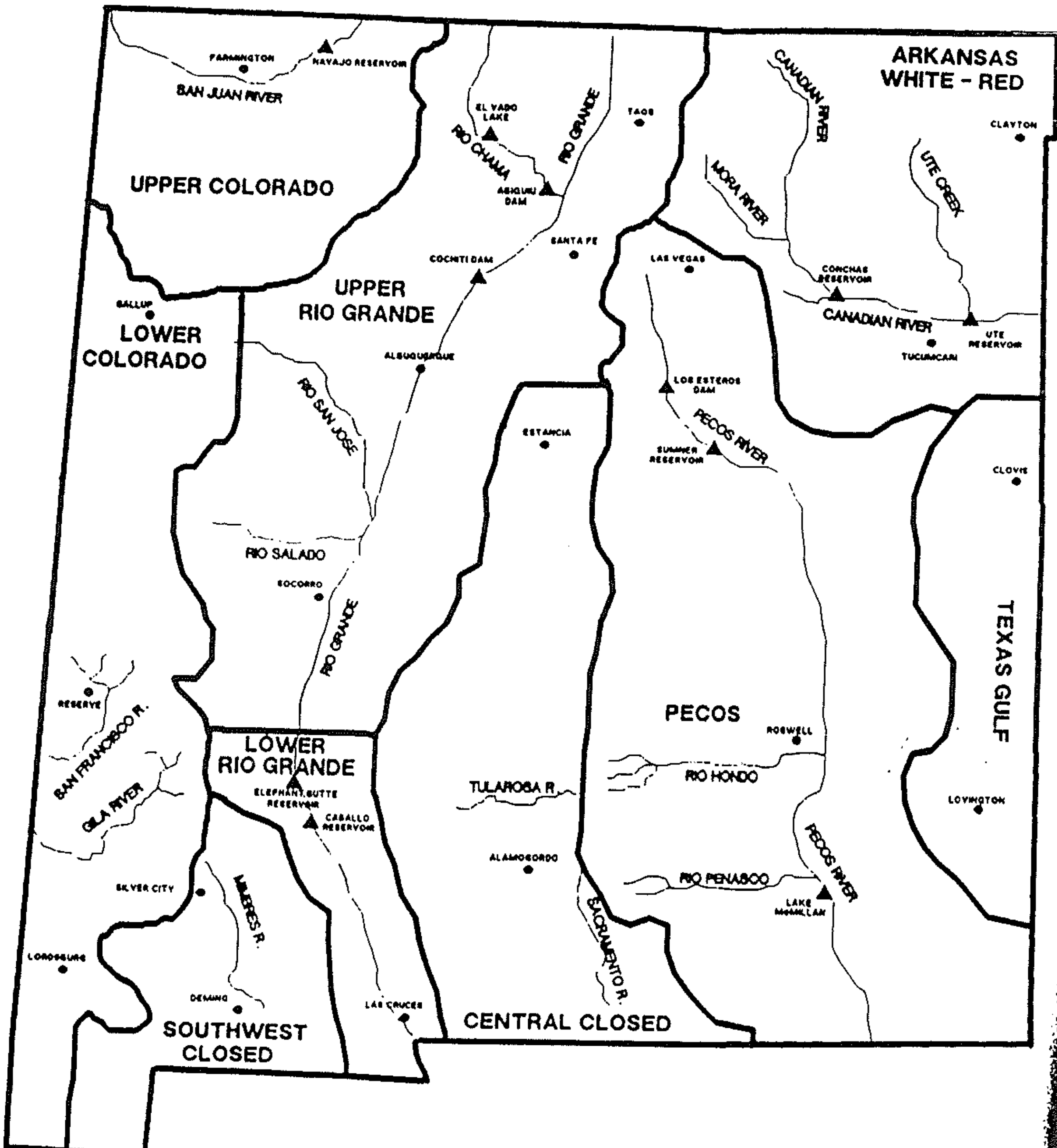


FIGURE 1-1. NEW MEXICO'S RIVER BASINS

DATA RELATED TO THE WATER SUPPLY AVAILABLE FOR FUTURE USE

CHAPTER II

GENERAL

The total water resources of New Mexico far exceed the supply that is actually available for consumptive use. One reason is that most of the precipitation that falls each year, quickly returns to the atmosphere by transpiration from vegetation and by evaporation from soils and plant surfaces.

Many factors combine to limit the supply that may be used for beneficial purposes within New Mexico. Some of these factors are legal constraints such as international treaties, interstate compacts and interstate commerce consideration. Some are directly associated with use such as river channel and canal transportation-losses, reservoir evaporation, and losses to non-beneficial uses. Other factors are related to the variability of the resource both in geographic distribution and in time. The sections that follow contain examples of some of these factors and the extent to which they diminish the available supply. Estimates of both the surface and ground water resources, available for consumptive use annually in New Mexico in the various river basins, are also provided.

FACTORS THAT LIMIT THE AVAILABLE SUPPLY

VARIABILITY IN THE RAINFALL-RUNOFF RELATIONSHIP

Surface water-flow, and to some extent ground water recharge, is dependent on the relationship between precipitation and runoff. There are few good rules of thumb that can be used in New Mexico to estimate the percent of precipitation that appears as stream flow. The relationship between ground water recharge and precipitation is even more difficult to predict and subject to even greater variability across the state.

What is available are the results from studies on portions of various drainage basins and generalized composite-maps that demonstrate the variability in the water supply and the reasons for the observed variations. Figure 2-1 is an example of a composite map taken from a U.S. Geological Survey publication on flood-flows in the Southwest (USGS WSP 1580-0, 1964). The lines on Figure 2-1 are for equal runoff-precipitation ratios in the central section of New Mexico. These equi-potential lines vary in magnitude from 0.01 to 0.2, a 20-fold factor in the ratio of runoff to rainfall.

Figure 2-2 is a map of the average annual precipitation in New Mexico taken from a New Mexico State Engineer report (Hale, Reiland, and Beverage, 1968). Figure 2-3 is a map of the average annual temperature distribution in New Mexico. A brief review of the second of these two maps shows that there are significant geographical variations in the average annual precipitation. The two dominate factors in the differences found across the state are elevation and latitude. Significantly higher annual precipitation is found at higher elevations. While not universally true, it can also be noted that precipitation is likely to be higher in the northern parts of New Mexico than in the southern sections. This same tendency occurs in the runoff/precipitation ratio (see figure 2-1). Evaporation rates are also greater in southern New Mexico as a result of the higher annual temperature that prevail (see figure 2-3). The net effect of these factors is to make the amount, and the frequency of surface flows (and ground water recharge, too) quite variable in time and in aerial extent, far more variable than is precipitation.

In general, good stream-yields are obtained in the northern mountainous parts of New Mexico in terms of acre-feet of water discharged

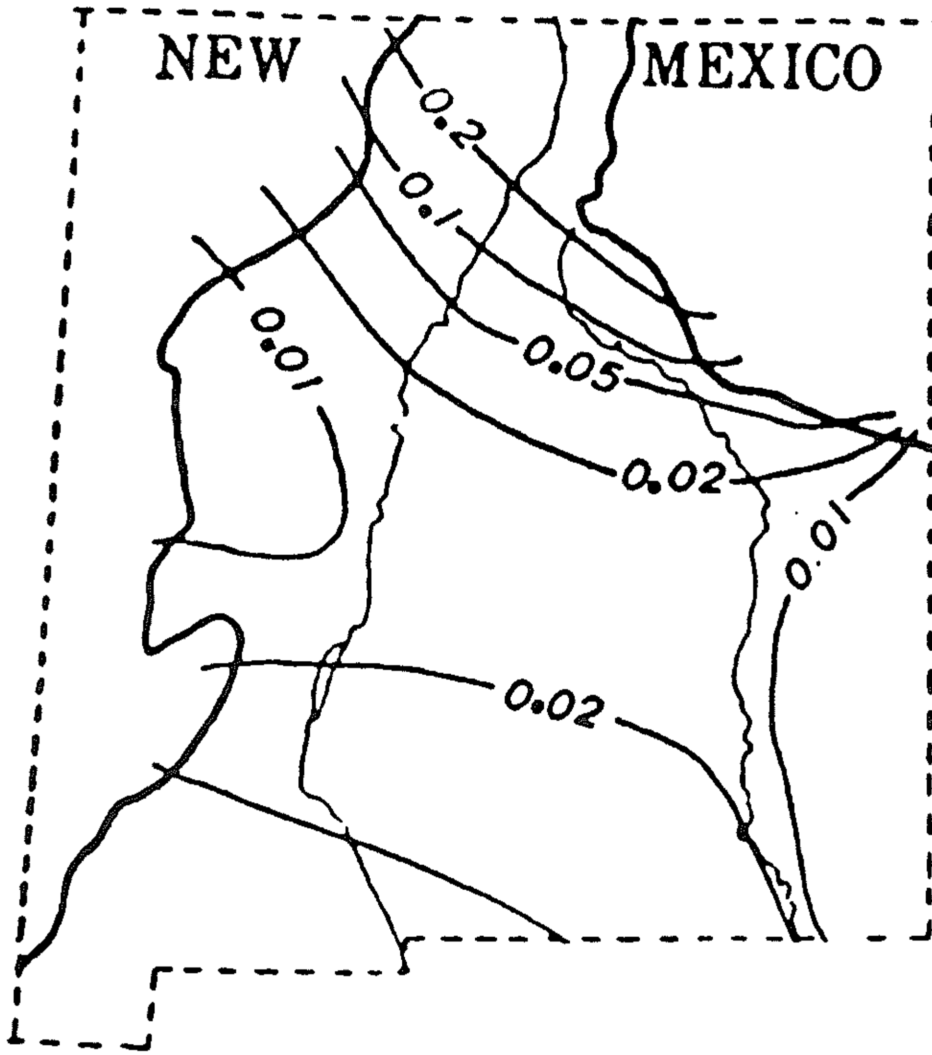
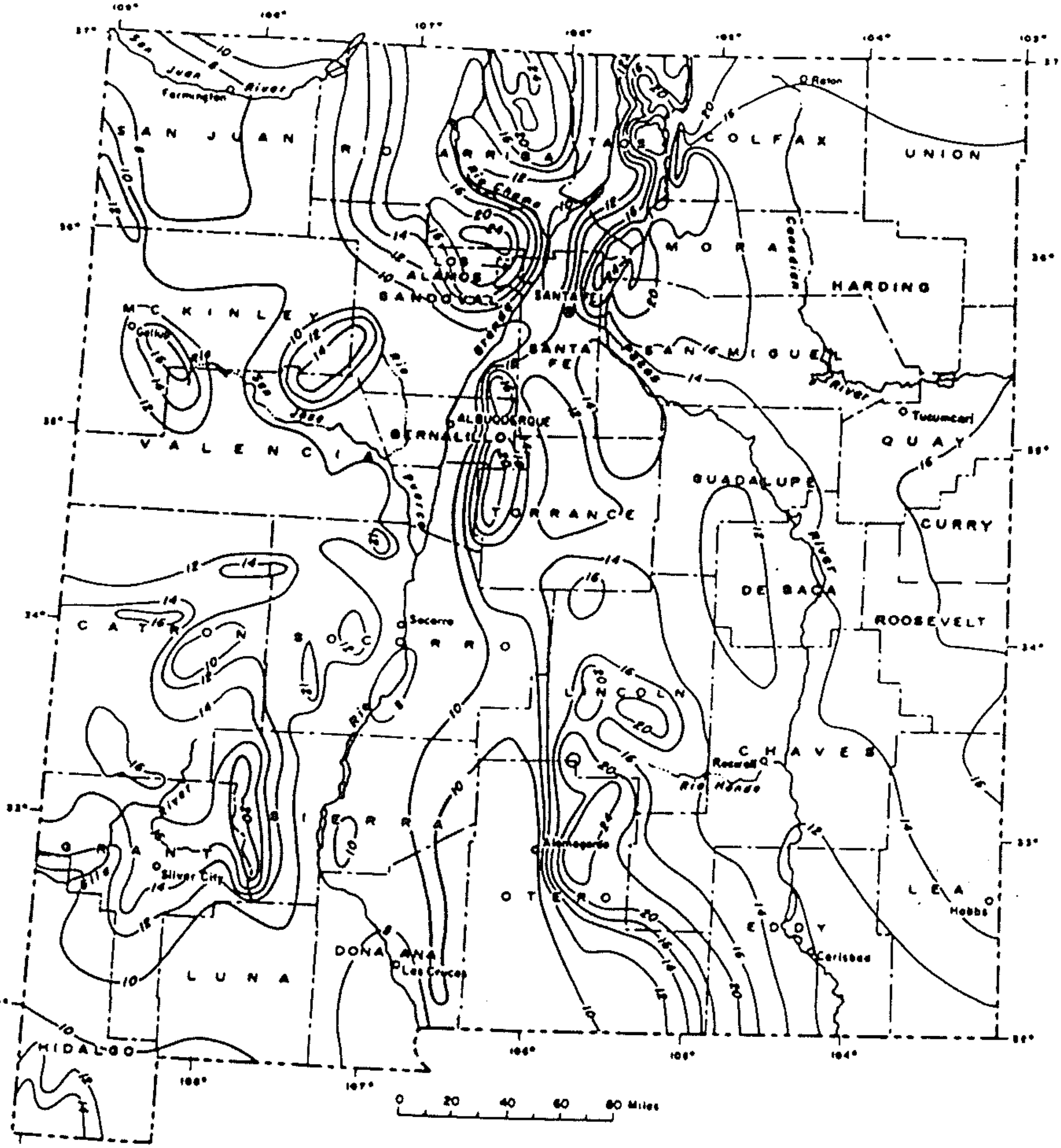


FIGURE 2-1. LINES OF EQUAL ANNUAL SURFACE RUNOFF AS A PERCENT OF PRECIPITATION IN NEW MEXICO.

SOURCE: USGS WSP 1580-0, 1964.



EXPLANATION

12

Contour showing equal annual precipitation, in inches, variable contour interval

FIGURE 2-2. MEAN ANNUAL PRECIPITATION IN INCHES, IN NEW MEXICO, 1931 - 52.

SOURCE: NEW MEXICO SEO REPORT NUMBER 31.

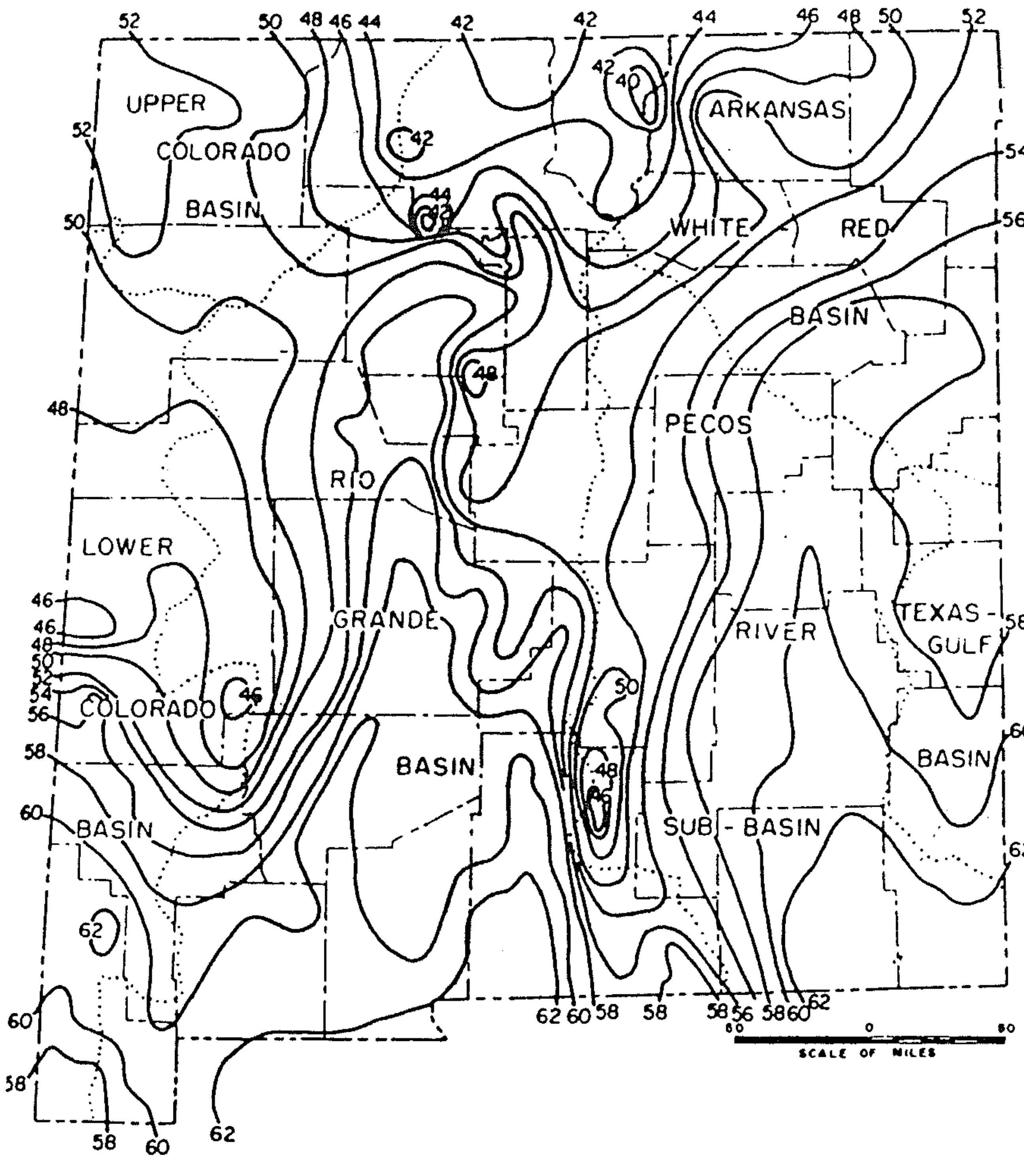


FIGURE 2-3. AVERAGE ANNUAL TEMPERATURE (F), NEW MEXICO.

annually per square mile of drainage basin. It is also true that runoff rates from some of the mountain areas in southern New Mexico are on the same order of magnitude as those from northern watersheds (see table 2-1). This table does demonstrate the importance of snow melt as a part of the annual discharge in New Mexico's perennial streams.

Table 2-1 provides a comparison of stream flow per square mile from northern New Mexico watersheds versus watershed yields for the major river systems at a few points in southern New Mexico. There are many factors that effect the stream yields at the selected gaging stations in southern New Mexico such as stream channel characteristics (these impact on losses into the ground water system), stream channel vegetation, and the number of acres irrigated above the point of measurement. For example, there are approximately 770,000 acres of irrigated lands above Elephant Butte Reservoir on the Rio Grande (620,000 of which is in Colorado). With the exception of the mountain areas in the southern part of the state, average annual stream flow per square mile is lower from southern watersheds than that from most northern New Mexico watersheds. At lower elevations, and to the west of the Rio Grande and to the east of the Pecos River, runoff is only one or two percent of the rainfall (see figure 2-1). As noted previously, precipitation is also less in these regions than at higher elevations (see figure 2-2) and evaporation is greater.

Clearly, only major rivers will have perennial flows in the southern part of New Mexico and greater variations in the quantity of water can be expected from year to year from southern watersheds than from northern New Mexico. In southern New Mexico, with a few exceptions, periods of high runoff are related to major thunderstorm events and not to snowmelt. Rainfalls of high intensity and of long return-frequency can produce large stream-flows, but only for relatively short periods of time. The greater the availability of the resource, the smaller the percentage of the water supply that can be used for beneficial purposes.

THE EFFECT OF RESERVOIR EVAPORATION ON SUPPLY

Reservoir evaporation is one of the major beneficial uses of water in the state. It is considered to be beneficial in that much of New Mexico's steam flow could not be used if reservoirs providing over-year storage were not available. Figure 2-4 shows the change in frequency distribution that can be obtained in annual flows through storage in large surface reservoirs. For example, the plot of the distribution of annual stream flows on the Gila River at Redrock, New Mexico shows annual flows to be less than 100,000 acre-feet over 50 percent of the time. However, there are many years (about 20 percent of the time) when the annual flow is in excess of 250,000 acre-feet. If the excess flows during these years could be trapped and held in storage for more than one year, then more of the water legally available to New Mexico could be utilized. It should be noted that there are no major reservoirs on the Gila River in New Mexico for this purpose.

Similarly, on the Pecos River near Puerto de Luna (above Lake Ft. Sumner), Figure 2-4 shows a plot of the frequency distribution where annual flows are less than 150,000 acre-feet per year over 75 percent of the time. However, occasionally (about 5 percent of the time) flows greater than 300,000 acre-feet per year occur. Reservoirs are now located on the Pecos (at Santa Rosa, Ft. Sumner, and Artesia) to hold these very large, but highly variable annual flows.

Figure 2-4 also shows the change in frequency distribution of annual flows that can be obtained by employing large reservoirs. Note that the plot of the distribution of annual flows below Elephant Butte and Caballo reservoirs has shifted to the left, so that the most likely annual flow is in the largest class shown, not in the lowest flow-classes as with the Pecos and Gila distributions. Some of New Mexico's water uses would not be possible if these flood flows are not stored for use in future years.

Reservoir evaporation does constitute a major source of depletion of the surface water supply (over 20 percent in most years). A north-south difference in water losses is evident in reservoir evaporation. Annual losses from major northern New Mexico lakes (El Vado, Heron, Abiquiu, Bluewater, and Costilla)

Table 2-1. Stream Flow Yields at Selected Gaging Stations in New Mexico.*

Gaging Station	Average Annual Flow	Drainage Area	Yield Streamflow
	(000s of acre feet)	(000s of sq. miles)	(ac-ft per sq. mile of drainage area)
		NORTHERN NEW MEXICO	
Pecos River Near Pecos, NM	72	0.2	360
Vermejo River near Dawson, NM	13.3	0.3	44
Mora River at Shoemaker	40.7	1.0	41
San Juan River Carracos, CO	458	1.2	381
Animas River near Cedar Hill, NM	667	1.1	606
		SOUTHERN NEW MEXICO	
Tularosa Creek near Bent, NM	7.8	0.1	78
Gila River near Gila, NM	107	1.9	56
Rio Grande near Bernardo, NM (north of Socorro)	900	120	8
Rio Grande at San Marcial (Above Elephant Butte)	793	150	5
Pecos River near Artesia, NM	173	15	12

*All values are approximate.

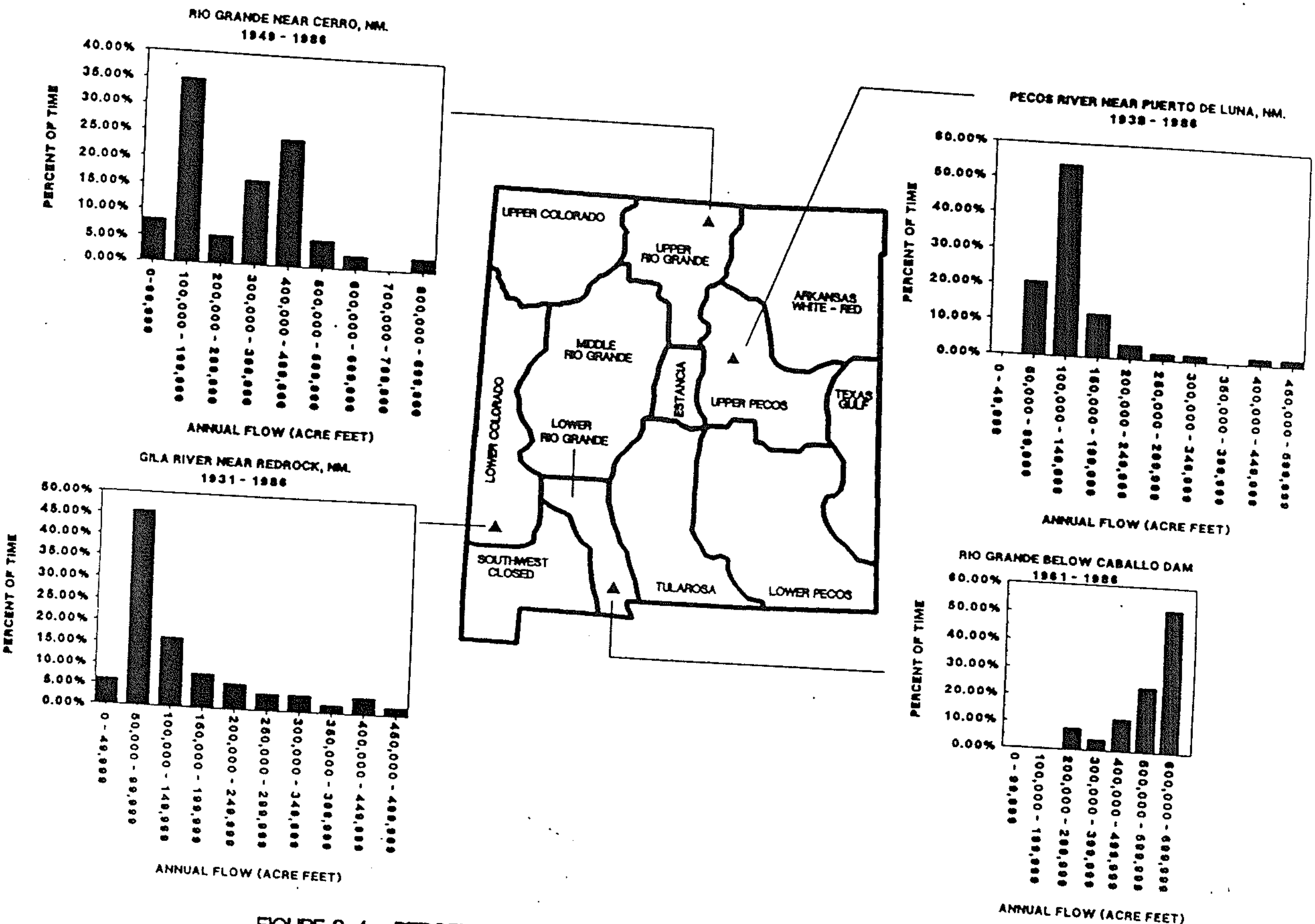


FIGURE 2-4. PERCENTAGE OF TIME ANNUAL STREAM FLOW OCCURRED IN EACH DISCHARGE RANGE FOR PERIOD OF RECORD.

averages between 3 and 4 acre-feet per surface acre per year. Evaporation from southern New Mexico lakes (Caballo and *Elephant Butte) is on the order of 6 acre-feet per acre of water surface per year.

EFFECTS OF SOILS AND VEGETATION ON SUPPLY

Other factors affecting the available water supply are vegetation, soil moisture, soil permeability, land-slope and topography, watershed orientation, stream channel materials, and the degree of definition of the drainage system. Man's management of these factors may also tend to change ground water recharge patterns in one way or another. For example, the extent to which soil conservation practices have been employed in a drainage basin can markedly reduce surface flow and may increase ground water recharge. Successful application of conservation techniques can significantly alter runoff to the point that expected stream flows (are not obtained where the estimates were based on the historic data. In some watersheds in the arid Southwest, conservation practices have been so widely implemented, and have been so effective, that previous runoff-rainfall relationships have been changed over the past 30 years.

Of these factors listed above, vegetation and soil permeability play major roles in determining the available surface supply. Vegetation can affect the quantity of water available because of differences in density and because of the differences in plant consumptive-uses. For example, cacti typically use very little water and willow trees can use large amounts. The depth to which plant roots penetrate to obtain their supply and the aerial extent of the leaf surfaces of plants are quite variable. In many cases, vegetation also helps to protect soils from erosion; it can act as a barrier between raindrops and the soil-surface, and it can also act as an anchor for soils. Often the vegetation type will also effect soil chemistry and this may determine infiltration and runoff rates.

Vegetation is one of the principal factors over which man has more control. Phreatophytes such as tamarisk, or salt cedar, take their supply from the ground water through their deep root-system. Salt cedar have very high rates of growth and a single plant can bear hundreds of thousands of seeds per year. Tamarisk is an imported plant, and not a native of New Mexico. Since its arrival in the last half of the nineteenth century, vast growths of tamarisk have developed in New Mexico's river valleys using hundreds of thousands of acre-feet of water per year. In 1970, Kirby and Jetton estimated the water consumption by phreatophytes on the Rio Grande above El Paso to be over one-half million acre-feet per year (Kirby and Jetton, 1970).

Many techniques for controlling phreatophytes have been tried, not all successfully. Grubbing, or removing the entire plant, root and all, has been attempted, but phreatophytes have very long roots, and unless the entire tree is taken, the plant will regrow. It may be possible to control phreatophytes chemically, but environmental considerations mitigate against this approach. Phreatophytes can be controlled by prolonged flooding, but the maintenance of an adequate water depth is almost impossible over large areas. Burning is not effective as phreatophytes will regrow. The most successful method of controlling these plants has been to continually mow or cut the plants to ground level. Water salvage projects have been undertaken in the Rio Grande and Pecos drainage basins with reduction in water use obtained on the order of an acre-foot per acre of land treated.

ANALYSIS OF THE AVAILABLE DATA

New Mexico has long practiced responsible stewardship of its water resources by participating with various federal agencies in data- collection programs related to stream flow, water quality, groundwater levels, and climate (precipitation, pan evaporation, temperature, etc.). Figure 2-5 provides an example of the flow data available for over 150 stream gaging stations in New Mexico. Very long-term records (over 50 years) are available for a number of stations and these are particularly useful in demonstrating changes in river regime over time. One of the problems with the interpretation of these records are the many man-made changes in upstream water-use and storage that have taken place over the years. There is a continuing need for hydrologic review and study of the data, be-

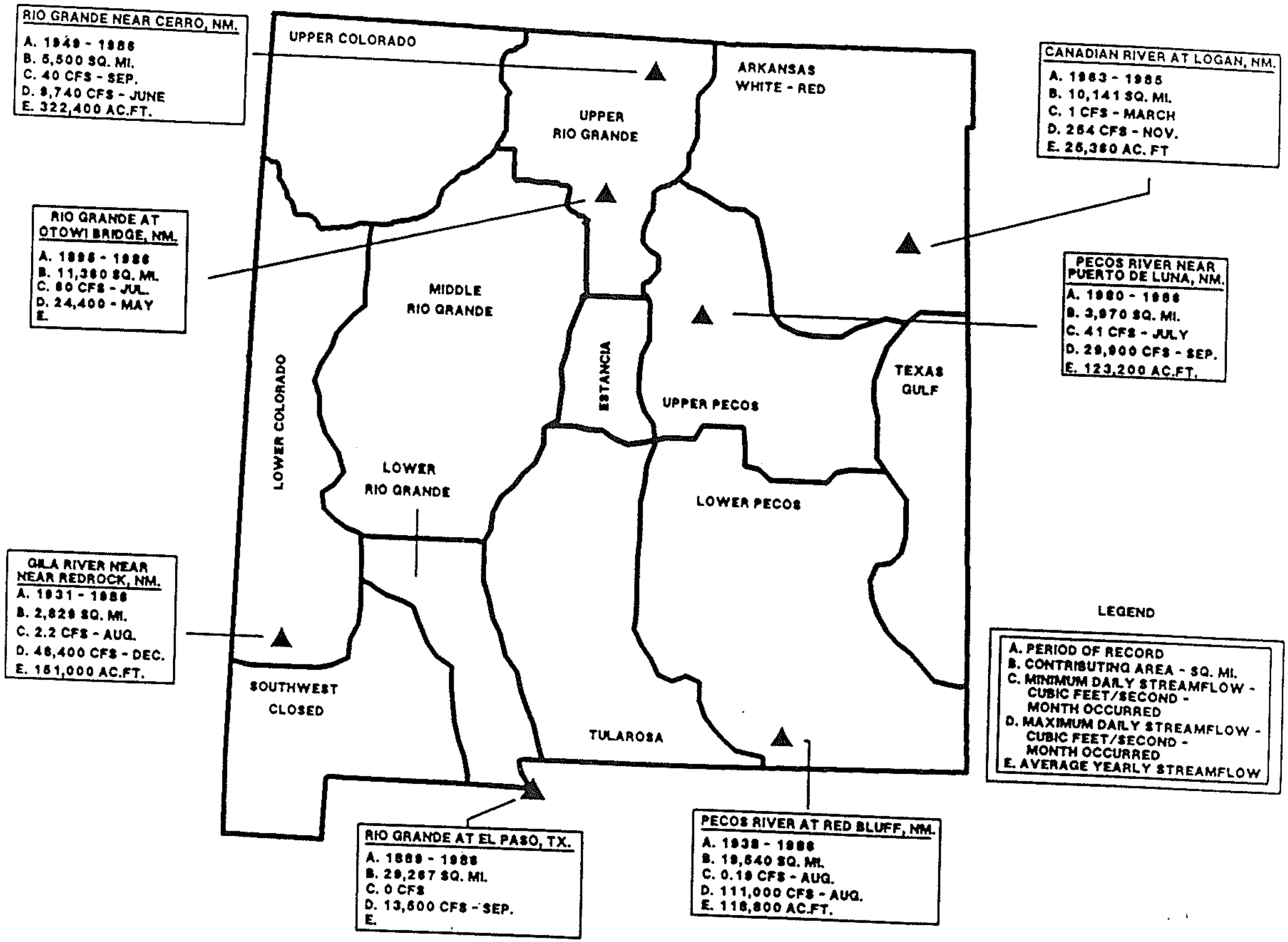


FIGURE 2-5. DISCHARGE STATISTICS AT SELECTED GAGING STATIONS ON NEW MEXICO RIVERS

cause of the complex interrelations that tend to alter stream flow.

Analysis of flow records can be used to note changes in ground water discharge into a gaining reach of stream over time and to evaluate stream channel losses. Figures 2-6 and 2-7 provide bar graphs for each month for the average daily flow at two gaging stations that are about 50 miles apart. The differences in flow between the upper and lower station during the winter months is probably attributable to Albuquerque's municipal wastewater flow which enters between the two. By making corrections for this discharge and for the irrigation withdrawals made between the two stations during the spring and summer, long-term groundwater gains and losses from the river, relative to ground water levels, can be studied.

Figure 2-8 is an example of a probability analysis for annual flows at Redrock, New Mexico on the Gila River. The distribution of the historic annual discharge at this station is skewed to the left toward lower annual flows (see figure 2-4) with 50 percent of the annual yields being below 100,000 acre-feet (this is equal to a stream-flow of about 138 cfs at all times). A log-probability plot (see Figure 2-8) produces an approximate straight line so that estimates of the likelihood of any particular annual flow can be determined. For example, if a minimum flow of 55,000 acre-feet per year (about 77 cfs) is needed for a water project, Figure 2-7 can be used to determine the probability of the flow occurring in any one year (on the average). From this graph, for a flow of 77 cfs, the probability that the stated flow (77 cfs) will be equaled to or exceeded is 0.84 or there is a 16 percent chance that in any one year, that the desired flow will not be obtained. This type of analysis can also be used to predict the probability of peak flood-flows and, similarly, prolonged low-flow durations. In general, New Mexico's historic stream-flow data is adequate for the needs for standard hydrologic analysis.

SURFACE WATER SUPPLY AVAILABLE FOR USE IN NEW MEXICO

The surface water supply of the state is essentially fully committed to use, either to consumptive use in New Mexico by water right holders, or to delivery to a downstream state under an interstate compact. As has been shown in various examples earlier in this chapter, most of the factors that tend to effect the flows in New Mexico's rivers (precipitation, evaporation, transpiration by vegetation, channel losses, soil infiltration, etc.) are quite variable both geographically and over-time. The results of the complex interplay of these elements is to make the flow in streams, without surface-storage, very erratic and unpredictable. Even when there are a number of reservoirs on a stream system, it is difficult to insure a specific annual supply.

Some examples of the change in flow in the downstream direction and over-time are in Tables 2-2, 2-3, 2-4 and 2-5. Table 2-2 is a summary of the major storage reservoirs on streams in the Arkansas-White-Red Basin and Table 2-3 provides the average annual stream flows at various stations along this river system. The drainage area and amount of irrigation (in acres) above each station is given. Were it not for the storage capacity at Eagle Nest and Conchas lakes, much of the irrigated agriculture shown in Table 2-3 would not be possible.

Table 2-4 provides the average annual flows at various points along the Pecos River in New Mexico. Depletions by surface water-supplied irrigated lands on the Pecos River does not account for the losses in stream flow between the various stations shown in this table. The Pecos is a very complex system of inter-related ground water and surface water, of losses to reservoir evaporation, stream channel losses, and losses to non-beneficial uses such as phreatophytes. Table 2-5, for the Rio Grande, portrays similar losses in stream flow between stations without a comparable increase in the irrigated land area, but with substantial increases in the area drained within the river basin.

Table 2-6 shows that variability still exists in stream flow below a set of major storage reservoirs that have sufficient capacity to trap virtually all of the runoff in the stream system. This table shows the releases from Caballo Reservoir, a short distance downstream from Elephant Butte for the period 1951 to 1978. In 18 of the 28 years of records provided, the releases were not sufficient to provide a "full" supply to the downstream users (60,000 acre-feet for Mexico under treaty and an irrigation supply, sufficient for about 150,000 acres in Texas and New

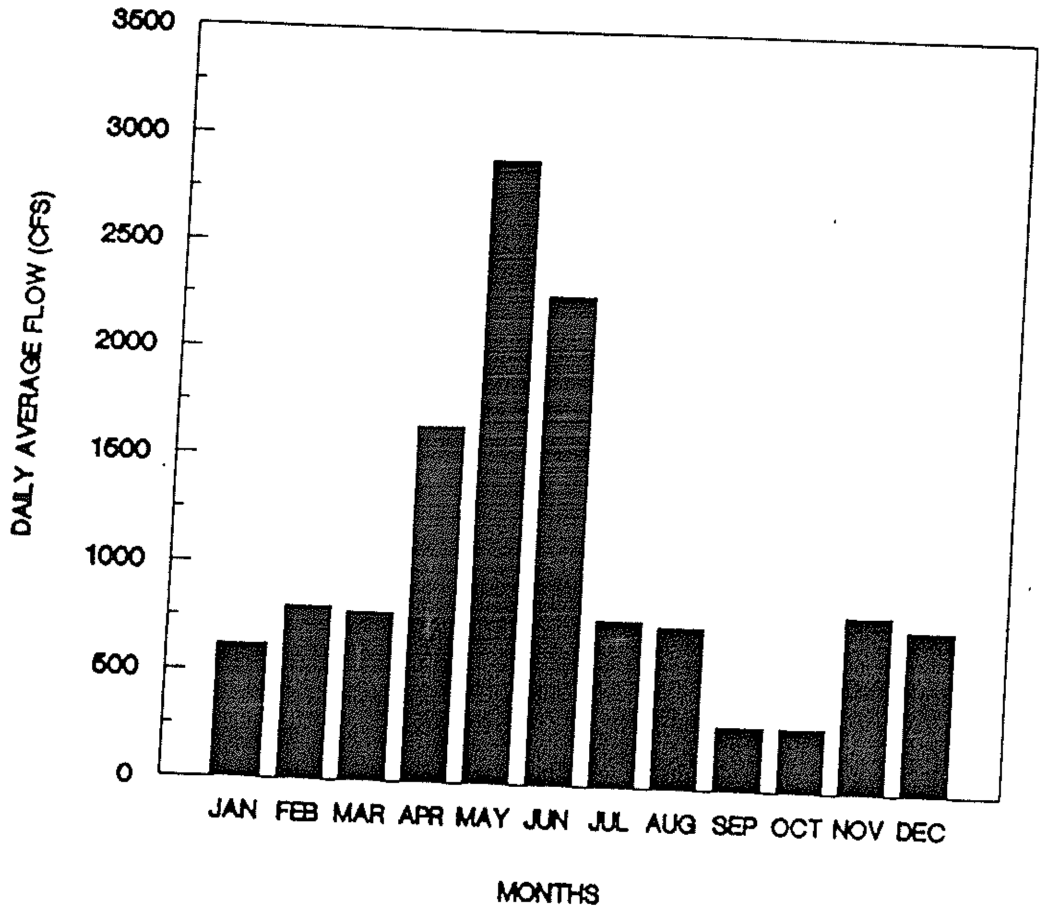


FIGURE 2-6. DAILY AVERAGE FLOW OF THE RIO GRANDE NEAR BERNALILLO, NM.

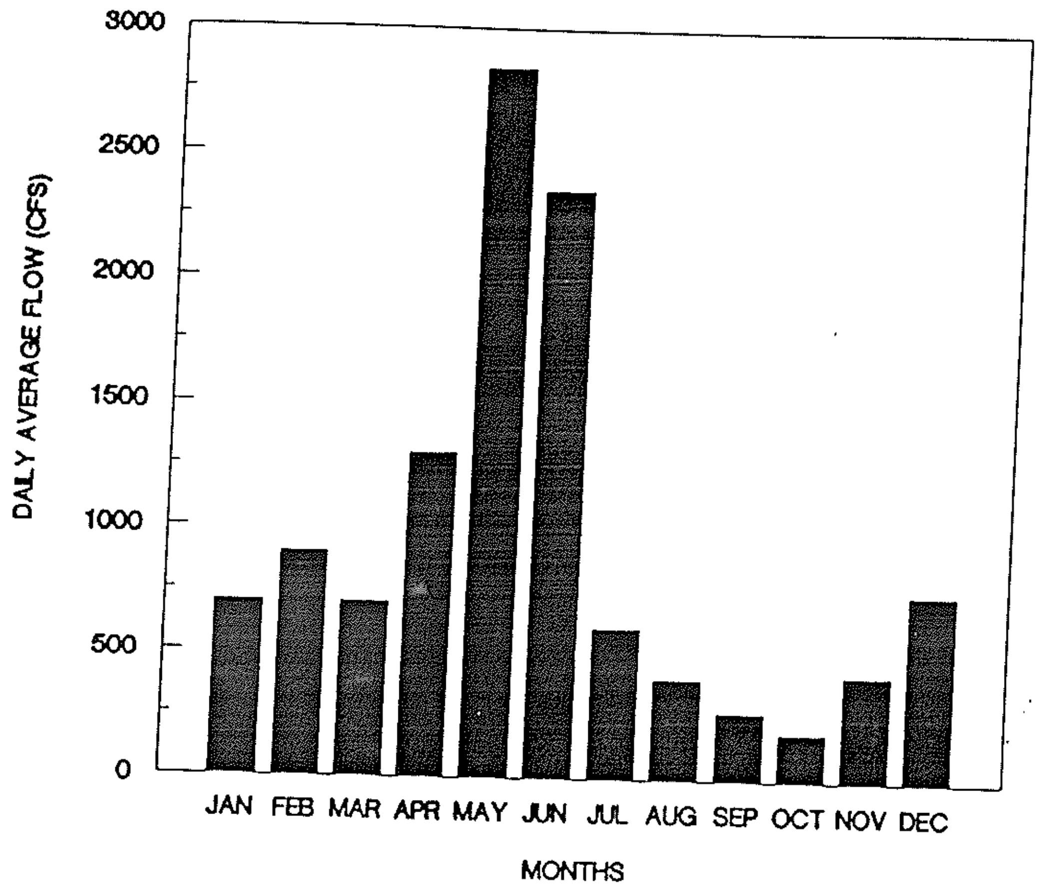


FIGURE 2-7. DAILY AVERAGE FLOW OF THE RIO GRANDE NEAR BELEN, NM.

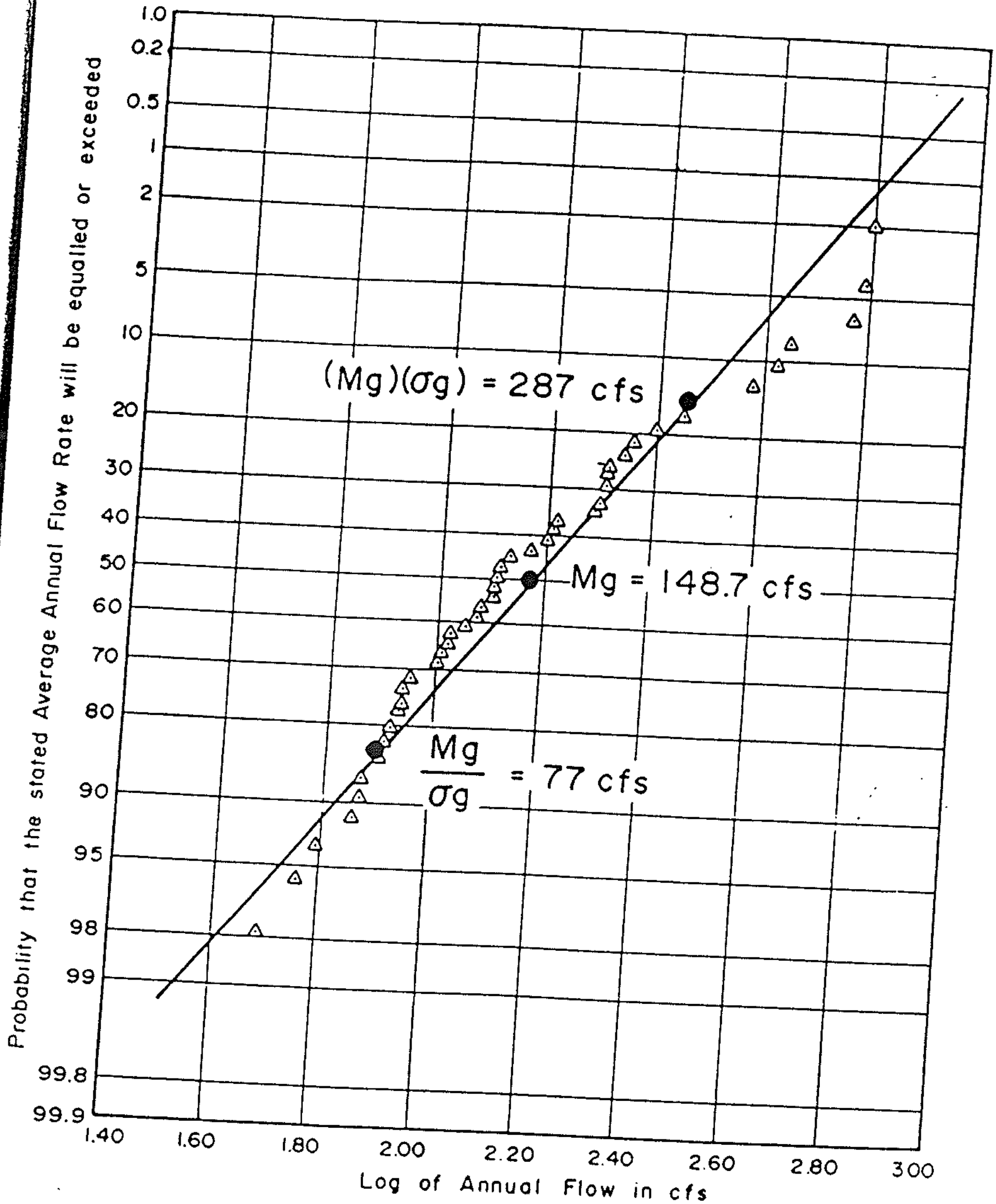


FIGURE 2-8. LOG PROBABILITY PLOT FOR AVERAGE ANNUAL FLOWS OF THE GILA RIVER

Table 2-2. Arkansas-White-Red Reservoirs (all values are approximate).

Reservoir and Stream System	Storage Capacity Acre-feet	Elevation Feet Above Sea level	Annual Evaporation Acre-feet	Present Use
Eagle Nest on the Cimarron River	79,500	8,000	3,400	Recreation and irrigation storage
Conchas Reservoir on the Canadian River	330,000	4,000	34,000	flood control, irrigation storage and recreation
Ute Dam on the Canadian	246,000	3,700	14,000	flood control, fish and wildlife, recreational, municipal & industrial supply
Clayton Dam	1,500	3,500	500	recreation and fish and wildlife

Source: USGS, 1986

Table 2-3 Streamflows of Interest in the Arkansas-White-Red Basin (all values are approximate).

Station and River	Drainage Area	Average Annual Flow	Potential Area Irrigated Above Above the Station
	(Sq. Miles)	(000s of AcFt)	(acres)
Vermejo River Near Dawson	300	13.5	a small amount
Cimarron River near Cimarron	300	15.1	3,500
Cimarron River near Springer	1,000	12.5	23,000
Canadian River near Taylor Spring	2,800	56	30,000
Mora River at Shoemaker	1,000	40	26,000
Canadian River 30 miles above Conchas Reservoir	6,000	133	56,000
Canadian River at Logan	10,000	185 (1939-1962)	90,000

Source: USGS, 1986

Table 2-4. Stream flow records at selected mainstream stations on the Pecos River in New Mexico.

Station	Contributing Drainage Area	Period of Record	Approximate Average Annual Discharge
	(Square Miles)		(Acre-feet Per Year)
Pecos River Above Santa Rosa Lake	2,340	1976-86	73,000
Pecos River Below Santa Rosa Lake	2,430	1980-86	58,540
Pecos River Below Ft. Sumner Dam	4,390	1937-1986	144,200
Pecos River Near Artesia	15,300	1937-86	173,200
Pecos River Below McMillan Dam	16,990	1948-86	(After releases to the Carlsbad Irrigation District)
Pecos River Near Carlsbad	18,080	1951-1986	24,560
Pecos River At Red Bluff on the NM-TX line	19,540	1937-86	118,800

Table 2-5. Average Annual Flows at Selected Upper Rio Grande Gaging Stations*

Gaging Station Location	Period Record	Approximate Average Annual Discharge	Approximate Irrigated Area Above the Station	Approximate Contributing Drainage Area
Rio Grande Near Cerro, NM in Taos Co.	1948-84	296	About 7,000 acres in New Mexico; 620,000 acres in Colorado	5,500
Rio Chama near Chamita just above junction with the Rio Grande	1974-84	391 includes San Juan-Chama Water	27,600 acres on the Chama and tributaries; flow is regulated by Heron, El Vado, and Abiquiu	3,000 on the Chama River
Rio Grande at San Juan just about junction with the Rio Chama	1963-84	538	42,000 acres; no flow regulation on the Rio Grande above this station in NM	7,600
Rio Grande at Albuquerque	1974-84	917	100,000 acres; flows regulated by Cochiti Reservoir	14,500
Rio Grande near Bernardo, north of Socorro	1974-84	900 includes both conveyance channel and floodway flows	120,000 acres	16,300
Rio Grande at San Marcial above Elephant Butte	1974-84	793	150,000 acres	25,800

* Note. Tabular information was taken from USGS, 1984, for the most part, and modified by personal knowledge and experience.

Table 2-6. Annual Flow in Lower Rio Grande Basin below Elephant Butte 1951-1978.

All Flows in Acre-feet

Year	Release from Storage in Caballo Res.	Diversions from the Rio Grande in New Mexico	Farm Deliveries New Mexico
1951	469,300	332,801	161,911
1952	544,700	354,683	178,349
1953	529,100	359,534	172,711
1954	244,100	205,122	60,336
1955	219,100	114,238	45,684
1956	246,100	125,036	40,236
1957	397,600	204,564	94,416
1958*	736,600	499,595	246,840
1959*	687,100	496,955	233,006
1960*	705,500	502,809	243,421
1961	561,700	408,889	188,621
1962*	651,900	484,832	252,887
1963	517,200	434,501	188,092
1964	206,100	162,359	35,286
1965	505,600	220,599	143,004
1966	610,300	396,488	191,551
1967	456,500	304,908	134,481
1968	505,700	366,853	162,809
1969*	667,700	467,100	227,754
1970*	661,200	488,272	249,679
1971	498,500	339,820	148,028
1972	200,700	163,428	69,954
1973*	617,300	407,250	223,964
1974*	641,000	426,178	229,565
1975*	580,700	420,762	225,607
1976*	679,700	508,265	247,809
1977	417,500	289,227	120,942
1978	356,200	188,782	64,184

* indicates those years when a "near" full-supply was obtained and when Mexico received its full-supply of 60,000 acre-feet.

Mexico). In just 10 of the 28 years, there was enough water to give Mexico its "full" supply and to provide a "near full" supply for irrigated agriculture. A "full" supply to the 90,000 acres irrigated in New Mexico would require farm deliveries of about 250,000 acre-feet per year. This failure to fully meet demands 70 percent of the time, could lead to the conclusion that the surface supply below Elephant Butte is over appropriated.

Based on published reports of the available surface supply and on a review of the streamflow records for the state (see examples in table 2-2 through 2-6), estimates of the average annual supply available for depletion in New Mexico can be developed. Table 2-7 provides an estimate of this nature.

WATER QUALITY DATA

Chemical quality at a number of key stations on New Mexico's interstate streams has been evaluated for over 40 years. In more recent years, biological parameters have been added to the more conventional chemical constituents in water. The U.S. Geological Survey, in cooperation with State agencies, now maintain 64 surface water quality stations and 168 wells that are monitored periodically for quality. The combined data set has met most of New Mexico's needs for water quality information in the past, but as national concerns shifts to toxic and hazardous synthetic organics, more and varied analysis will be required. For example, it may be necessary to do bio-monitoring (the use of live aquatic species in testing) below the discharge points for municipal wastewaters.

The current record has been used to set the water quality standards for the state's interstate streams and to monitor compliance. An example of the use of chemical data in this process is depicted in Figure 2-9. This figure shows a relationship between stream flow (in cubic feet per second) and the concentration of dissolved ions (as represented by the total dissolved solids content in mg/l) that are typical of many of New Mexico's rivers after a stream leaves the upper reaches of its watersheds. At low flows, the concentration of dissolved salts is often very high, but at high flows (when the bulk of the annual discharge occurs) water quality is quite good. The relationship between flow and quality permits the generation of a statistically significant straight line with the resulting exponential equation shown in Figure 2-9. Equations similar to the one in Figure 2-9 were used in setting the water quality standards for dissolved solids at a number of stations on New Mexico rivers when the stream standards were initially set in 1967.

There has been a great deal of monitoring of the chemical quality of ground water in New Mexico, but it has been a spotty, non-rigorous process. Most of the water sampling and analysis has been for specific purposes. The two principal agencies collecting groundwater quality data have been the U.S. Geological Survey and the State Environmental Improvement Division. The best information available is for municipal supplies taken from various ground water sources. The data available is adequate for most water-use decision-making, but is not sufficient for some industrial water supply needs.

GROUNDWATER RESOURCES

AVAILABLE DATA

The State Engineer Office, the U.S. Geological Survey, and the State Bureau of Mines have done extensive work in evaluating the ground water resources of New Mexico. Most of the reports produced have been in the context of studies of a particular aquifer in a geographic area. In general, the results have been excellent and useful to meet existing needs at the time of the study. However, detailed studies are expensive and time-consuming, and as a result, some of the more important groundwater studies done in the past are now more than 20 years old. Another problem is that some studies have not been formally published, but remain in office files with limited distribution.

It should be noted that the groundwater data base has been kept current in many areas by annual measurement of ground water levels. With the advent of computer modeling of very complex groundwater systems, the type of data needed has changed to some degree. Mathematical models can be developed that can be used to predict water level declines and changes in water quality for different water-use scenarios. However, these models must be calibrated and verified. The quantity and type of

Table 2-7. Surface Water Available Annually for Depletion by Basin, New Mexico

River Basin	Surface Water Available
	(approximate values in acre-feet)
Arkansas-Red-White	312,000
Texas Gulf	2,000
Pecos	200,000
Central Closed	10,000
Upper Rio Grande	300,000
Lower Rio Grande	340,000
Upper Colorado	670,000
Lower Colorado	95,000
Southwest Closed	11,000

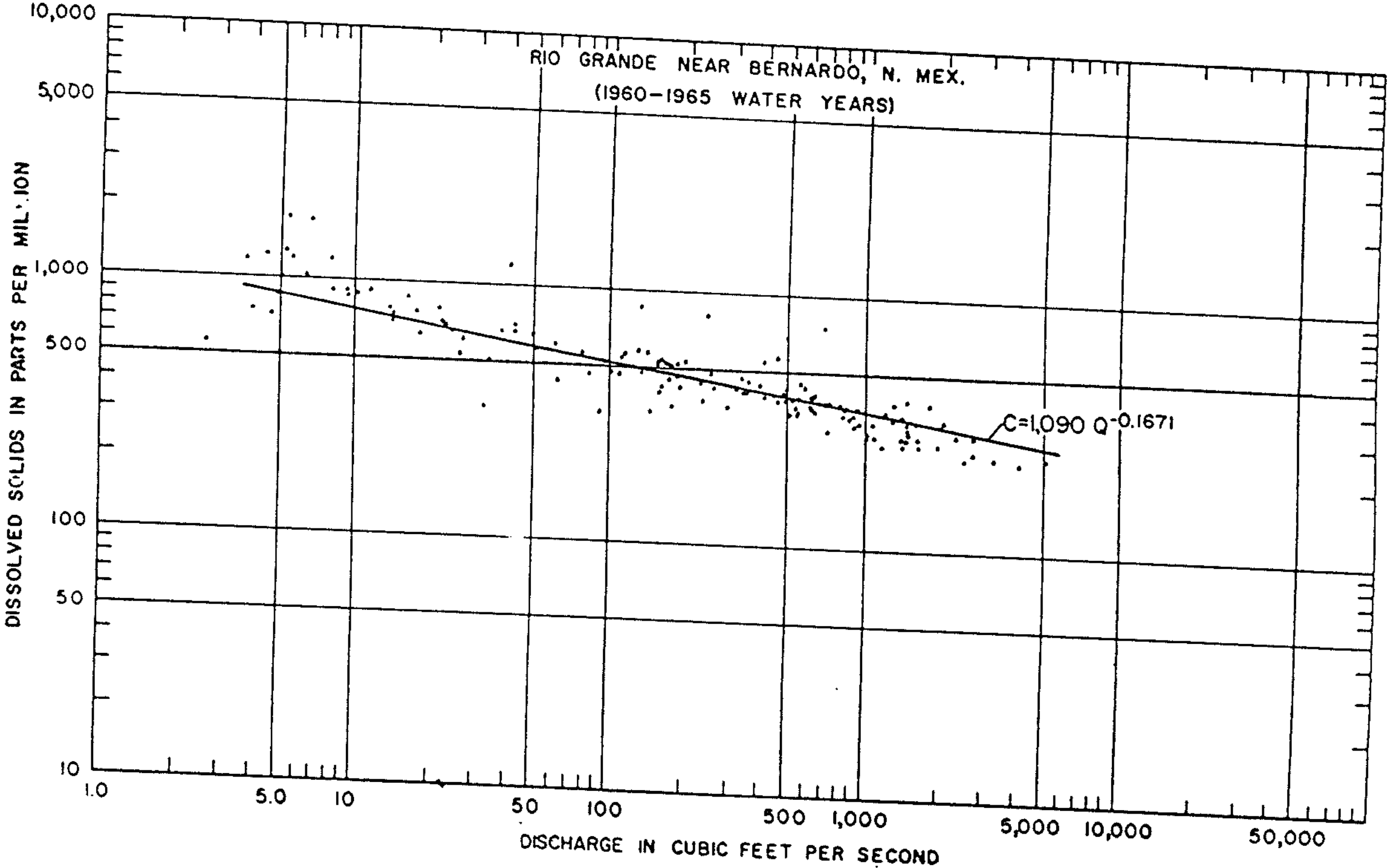


FIGURE 2-9. WATER QUALITY AS A FUNCTION OF FLOW FOR THE RIO GRANDE NEAR BERNARDO, NM.

data needed to perform these two tasks goes beyond the routine water-level measurements that have traditionally been made. Comprehensive aquifer pumping tests, using nests of wells completed at different depths, are often needed in modeling complex systems. It would be highly desirable to develop computer models for all of New Mexico's ground water basins so that questions regarding the effects of changing ground water withdrawals can be readily answered.

The data available has been sufficient to prepare generalized maps of the ground water resources of the state such as those shown in Figures 2-10 and 2-11. As a rule of thumb, a useful production-well for agricultural or for municipal use should yield at least 250 to 300 gallons-per-minute. Figure 2-10 shows areas in the state where to locate wells to obtain good quality water (less than 1,000 mg/l total dissolved solids) where wells are likely to yield 300 gallons-per-minute, or more. A quick review of Figure 2-10 will indicate that this is not possible throughout much of New Mexico. Figure 2-11 is a comparison map that shows those sections in New Mexico where ground water is not considered to be "fresh," as the total dissolved solids content in the shallow aquifer exceeds 1,000 mg/l. Above this concentration of salts in water, tastes become noticeable and disagreeable.

AVAILABLE GROUND WATER RESOURCES

There are two basic types of aquifers in New Mexico; those that are directly connected to a major stream (a river valley system), and those groundwater basins that are recharged from general regional sources (this could include some stream channels recharge).

The ground waters that are in some hydrological balance with a flowing stream are of the greatest interest. There are a number of major stream- system aquifers in New Mexico; examples are the mainstream of the river in the upper and lower Rio Grande basins, the Pecos River below Acme, the Gila River below Gila, and the San Juan River. The surface water resources of the state are essentially totally committed to existing water uses, or to compact and treaty uses in other states. With a few exceptions, all of the surface supply is virtually fully assigned to current water-right owners under New Mexico doctrine of prior appropriation, or must be delivered to downstream states. When a ground water system is closely linked to a surface supply, the drilling of new wells and the development of new withdrawals can adversely affect these existing water rights by depleting the surface flow. The New Mexico State Engineer has taken steps to control new withdrawals from stream-connected aquifers and to require the retirement of surface rights as the effects of the pumping of new wells begin to impact on the flow in the river system.

The second type of ground water basin is one where the aquifer receives recharge from a broad area of one or more drainage systems. Examples are the Southwest Closed, Tularosa, Estancia, and Texas Gulf basins. This type of basin is usually a "mined" groundwater system in that the annual withdrawals already exceed recharge. The State Engineer Office has declared most of the important basins in the state of this type. No new or additional groundwater appropriation can be made without application to the State Engineer and public notice. If a new, proposed withdrawal is protested, the State Engineer will hold hearings to determine the legal and hydrologic aspects of the new application. He will then make a decision based on the applicable law and on the information presented at the hearings. Should there be no protests, the State Engineer will approve, in whole or in part, the proposed new withdrawals to the extent that it meets certain criteria. An example of one of the conditions that might be considered in an approval decision would be to insure that the present withdrawals, plus the new taking, will not result in a total depletion of the ground water resource of the basin over a 40-year period. Another criteria might be to place limits on the maximum allowable annual decline in the ground water levels within some appropriate radius of a new well.

The long-term annual yields from both types of ground water aquifers is limited. The surface connected aquifer system should not be developed beyond the point of equilibrium with downstream surface water commitments. The basin-type aquifer should not be "mined" at a greater rate than can be maintained over a 40-year period. There are estimates of the safe yield

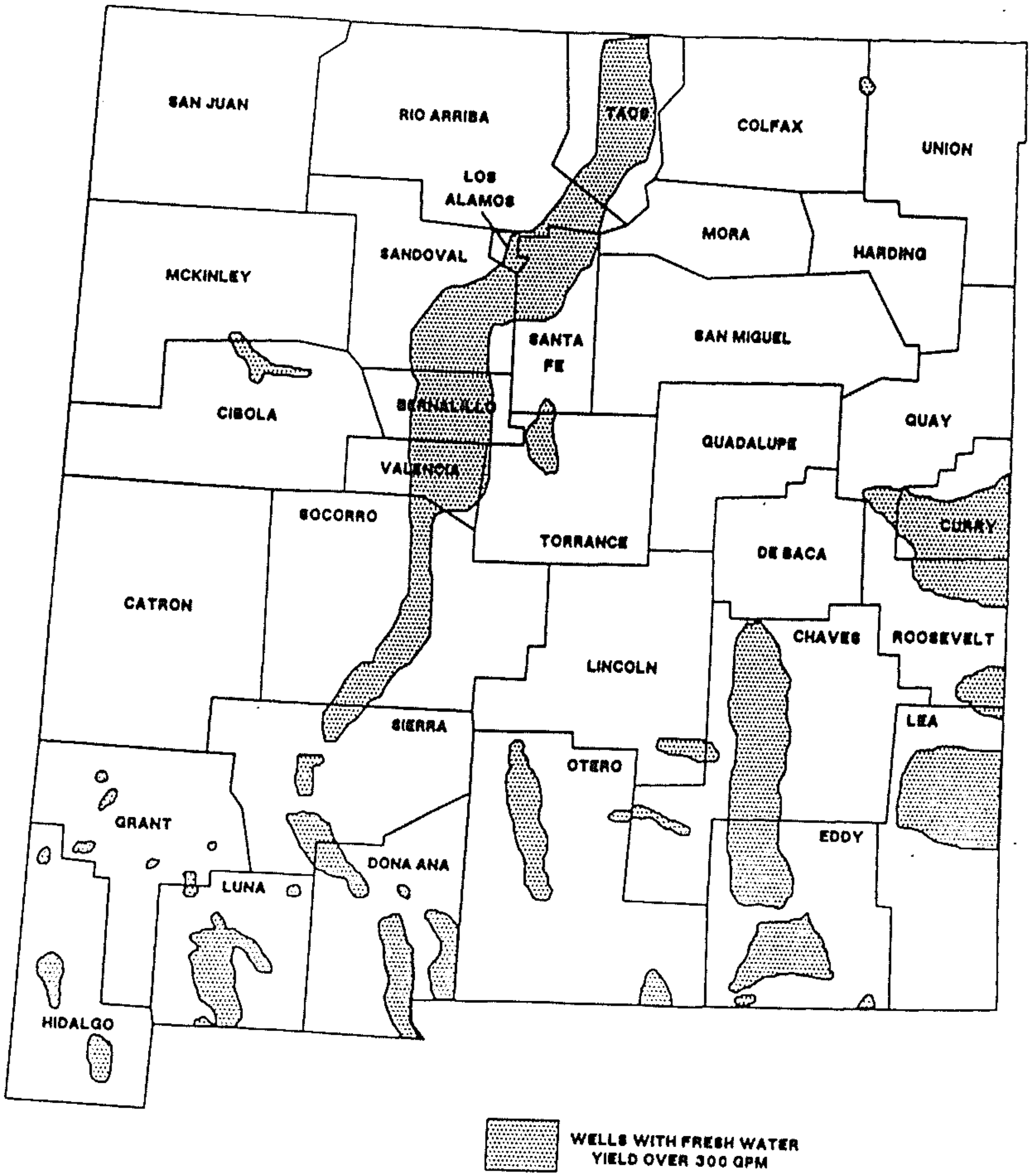


FIGURE 2-10. LOCATIONS OF FRESH GROUND WATER IN NEW MEXICO: AREAS WITH WELLS THAT YIELD OVER 300 GPM

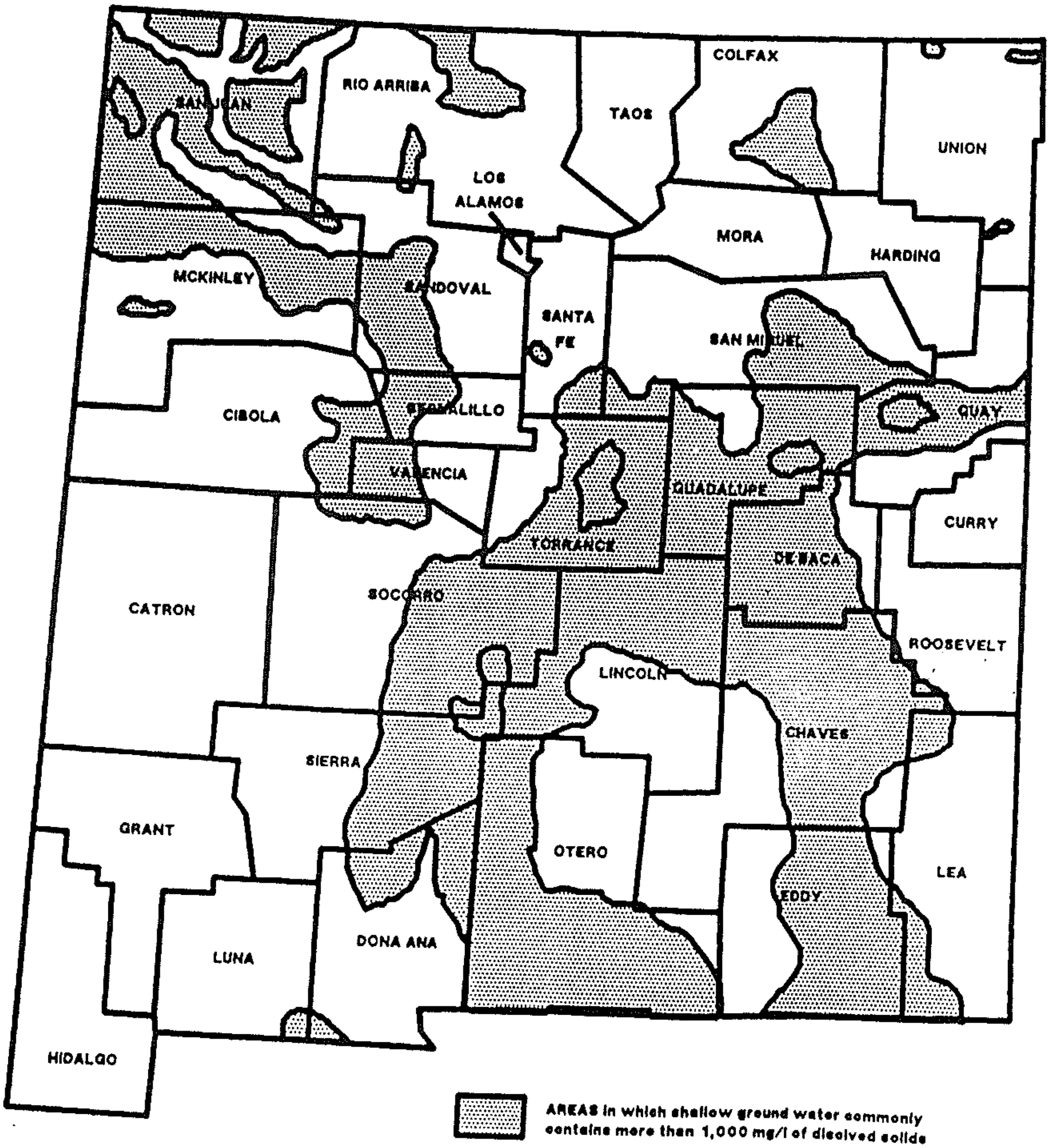


FIGURE 2-11. GENERAL QUALITY OF SHALLOW GROUND WATER IN NEW MEXICO

Table 2-8. Groundwater Supply Available Annually for Depletion by Basin for New Mexico.

River Basin	Surface Water Available
	(approximate values in acre-feet)
Arkansas-Red-White	112,000
Texas Gulf*	340,000
Pecos	235,000
Central Closed	205,000
Upper Rio Grande	95,000
Lower Rio Grande	80,000
Upper Colorado	4,000
Lower Colorado	62,000
Southwest Closed	176,000

*This rate cannot be maintained over a 40-year period.

from various ground water basins in the literature. Where authoritative estimates have not been printed, a figure for the available annual supply can be arrived at by following the guidelines above. Table 2-8 is a summary estimate of the ground water available for consumptive-use (depletion) beginning in 1985 for each of the basins in New Mexico. Note that the rate of depletion given for the Texas Gulf Basin can not be maintained over a 40-year period.

WATER DEMANDS IN NEW MEXICO

CHAPTER III

INTRODUCTION

In this chapter, current uses of water in New Mexico, as well as potential future demands, will be estimated. This will be done by developing estimates for current and future water demand in each county by river basin in New Mexico. These long-range projections will, for obvious reasons, be conjectural in nature and constitute no more than an "outline" of different water futures that New Mexico might face. Later in this chapter, these demand estimates will be brought together with existing supply figures to project possible times of future water scarcity in New Mexico.

Water depletion is the foundation for any discussion of water use. Depletion is a term meaning water withdrawn that is no longer available for use because it has been evaporated, transpired, incorporated into products or crops, consumed by man or livestock, or otherwise removed. Water use is also measured as a withdrawal, or the amount that is diverted from its source. The distinction between the two terms is important because some water uses may divert a great deal of water, but actually may consume or deplete only a small amount. The water use figures developed here will refer to depletions; that is, water no longer available for other uses.

Current (1985) water use figures for each New Mexico county and river basin will be obtained from a 1986 report by the State Engineer Office (SEO) (Wilson, 1986). This report presents withdrawals and depletions of both surface water and groundwater.

CATEGORIES OF DEPLETIONS

Thirteen separate categories of water use are presented in the State Engineer report (Wilson, 1986). These are:

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

To simplify the presentation of present and future water demands, the thirteen water use categories are combined into five categories as follows:

1. Agriculture
   - Irrigated Agriculture
   - Livestock
   - Stockpond Evaporation
2. Municipal
   - Urban
   - Rural
3. Industrial
   - Commercial
   - Industrial
   - Military
4. Minerals and Power
5. Evaporation
   - Reservoir
   - Fish and Wildlife
   - Recreation

The 1986 Wilson Report presented estimates of depletions by county and by river basin. The river basins used by the SEO study will be slightly different from those used in this report. Where differences in river basin boundaries exist, the depletions by river basin will be estimated by sub-dividing relevant counties into their respective sub-basins using A priori information. The SEO report had six river basins--Arkansas-White-Red, Pecos, Rio Grande (including the Central Closed and Southwest Closed basins), Texas Gulf, Lower Colorado, and Upper Colorado.

POPULATION PROJECTIONS

To determine alternative future water depletions, three population projections will be developed: 1) Conservative Growth; 2) Potential Growth; and 3) Optimistic Growth. The conservative growth population projection will be adopted from a recent publication by the Bureau of Business and Economic Research (BBER) of the University of New Mexico. The BBER report projected population to the year 2010.

For purposes of this report, population estimates for 2020 and 2030 will be trended forward from 2010. The data in the BBER report provided population estimates on a county level. The county data will be estimated by subdividing relevant counties into their respective basins similar to the way depletions will be handled.

The potential population projections will be adapted from a recent New Mexico State University report by Peach and Williams (1987). Peach and Williams presented population estimates by county for every five years from 1980 to 2020. Peach and Williams used a different methodology than BBER which resulted in higher population estimates than those presented by BBER. The population data will be trended forward by a straightline method to derive the 2030 population estimate. The county level data will be aggregated into river basins by the same technique used for the BBER projection.

The optimistic population projection will be derived by taking the BBER projections and increasing them 20 percent beginning in the year 2000.

The rationale for the 20 percent increase was arrived at after discussions with BBER personnel and personal judgment.

WATER DEPLETION PROJECTIONS

Water depletions will be estimated for each of the three population projections based on the 1985 depletions. Depletions per person will remain at the 1985 levels for the municipal, industrial, minerals and power, recreation, and fish and wildlife sectors. The per capita depletion coefficients will be used in conjunction with the population projection to estimate future water depletions by water use category. Reservoir evaporation will be held to the average of the past 20 years. The mid-1980s were very wet years and most of the reservoirs were at or near capacity which produced a very high evaporation estimate for 1985. Therefore, on typical years, evaporation would be grossly overestimated.

Two scenarios will be presented for the population projections. The first scenario (A) will hold agricultural depletions constant at the 1985 level over time. The second scenario (B) will permit agricultural depletions to increase at the same rate as the other economic sectors. The second scenario could be representative of the conditions and projections of a high-growth economy that prevailed during the late 1970s and early 1980s. During this period, water depletions were much higher than in 1985. The agricultural, mineral and power sectors were growing at a fast rate. If these sectors were to recover to growth levels experienced earlier, then Scenario B projections might be more valid.

For each scenario, an estimate of the impact of a 10 percent reduction in depletions will be estimated for each of the population projections and for each of the depletion categories except reservoir evaporation. Research has shown that attempting to reduce reservoir evaporation is almost an impossible task because of the joint-use nature of reservoirs, i.e, water-based recreation and storage for irrigation.

CURRENT WATER DEPLETIONS

Estimates of current water depletions will be presented by the five water-use categories for the state followed by estimates by river basin and county.

STATE

Water depletions in New Mexico from 1970 to 1985 reflected the state's economic health during that period. From 1970 through 1980, there was an increase in water depletions. However, from 1980 to 1985, there was a significant decrease (400,000 acre-feet) in the statewide depletions (figure 3-1). The late 1970s and early 1980s represented the greatest era of economic activity in the history of New Mexico. As indicated by depletions, the agricultural, and mineral and power sectors were at the height of economic activity. Since the early to mid-1980s, these sectors have been in an economic slump and therefore, their depletions were down. Figure 3-2 presents the statewide depletions by the five water use categories. In 1985, agriculture accounted for about 68 percent (1.5 million acre-feet) of the total depletions of 2.2 million acre-feet in New Mexico. Evaporation accounted for an additional 21 percent (451,300 acre-feet), municipal, 6 percent (138,000 acre-feet), mineral and power, 4 percent (87,900 acre-feet), and self-supplied industrial, the remaining one percent (12,000 acre-feet).

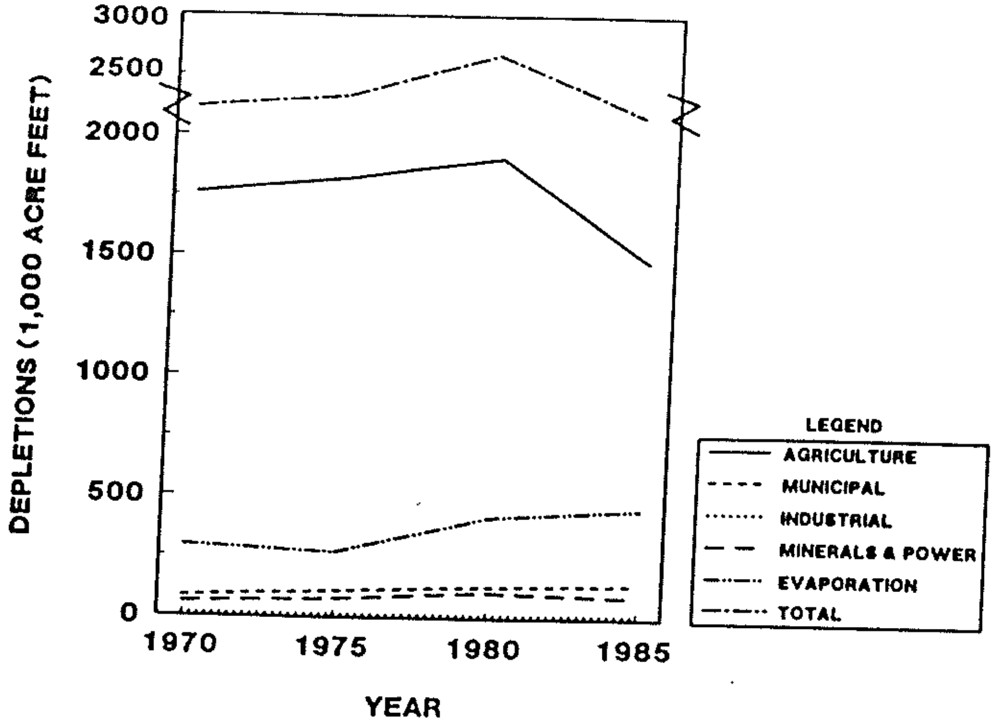


Figure 3 - 1. Water Depletion in New Mexico by Category, 1970 - 1985

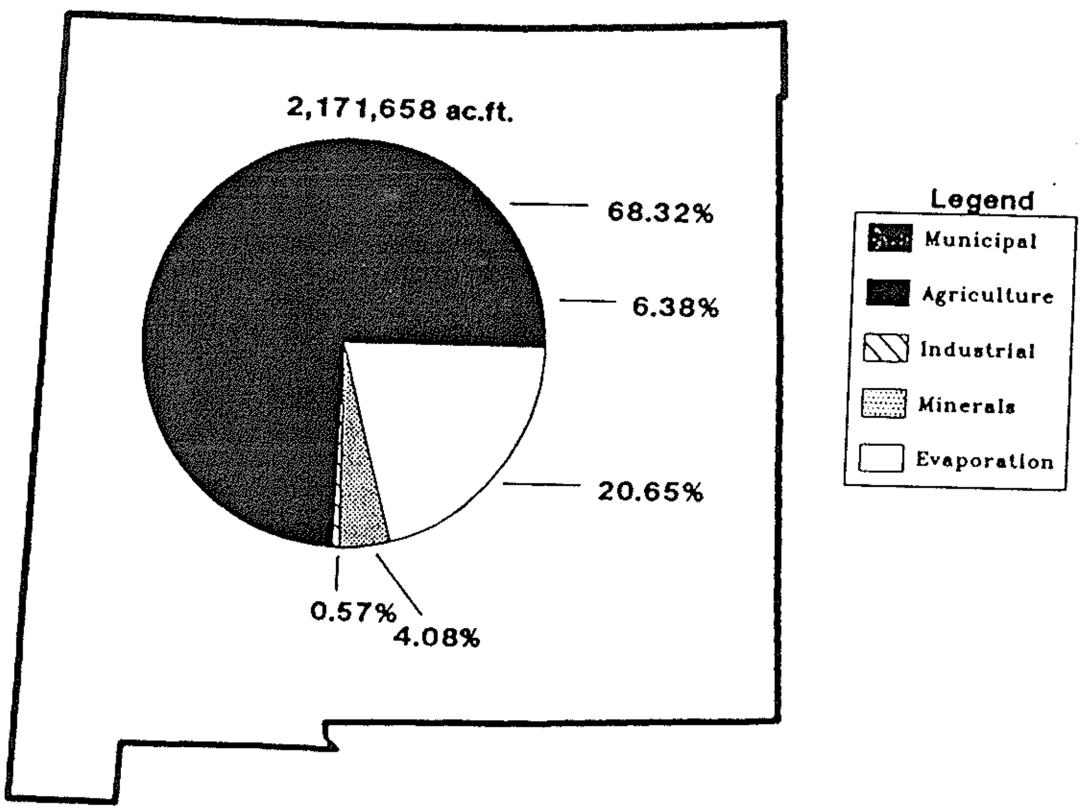


Figure 3 - 2. Summary of Water Depletions in New Mexico, 1985

Agriculture

Water depletions by agriculture increased from 1.76 million acre-feet in 1970 to 1.9 million acre-feet in 1980 and then decreased to 1.5 acre-feet in 1985. The primary reason for this decrease of about 430,000 acre-feet was due to the reduced acreage that was irrigated between 1980 and 1985.

The acreage of crops irrigated decreased by nearly 90,000 acres between 1980 and 1985. The reduction of acreage actually being irrigated in 1985 was due primarily to the state agricultural economy. Farming has not been profitable during the 1980s. Also, the crop mix changed with a higher percentage of low water-using crops being grown in 1985 than 1980, thereby reducing depletions.

Municipal

Municipal water depletions steadily increased from about 85,000 acre-feet in 1970 to almost 138,000 acre-feet in 1985 (table 3-1). These increases in water depletions were almost entirely due to population growth. In 1985, the annual per capita depletions of water for municipal (urban and rural) was estimated to be about 31,000 gallons.

Industrial

Industrial water depletions were estimated at almost 13,000 acre-feet in 1970 (Bureau of Reclamation, 1976) and slipped slightly to 12,100 acre-feet in 1975 and then remained steady at 12,000 acre-feet in 1980 and 1985. The reason for the reduced estimates in 1975, 1980, and 1985 was most likely due to the change in the method of estimating industrial water use. Most likely, the 1970 and 1975 water depletions were over estimated. In 1980, a new methodology was adopted that more nearly obtains the actual water used by the industrial sector and it was applied to both the 1980 and 1985 estimates.

Mineral and Power

Water depletions for the mineral and power sectors increased steadily from 1970 through 1980 and then decreased sharply from 1980 to 1985 (table 3-1). The reasons for those trends were the state of economy in minerals, including oil and gas, in the 1970s. There was rapid development in these sectors especially in oil, gas, and uranium in the mid-1970s and early 1980s. However, during the 1980s, these sectors fell on bad economic times. The demand, and therefore the production of primary minerals (including oil and gas), has been significantly reduced. Nearly all of the uranium mines and processing facilities have closed down and the oil and gas exploration and development has almost ceased. Many low-volume producing oil and gas wells have been abandoned. Even production has been reduced. In addition, the water depletions for the power sector were decreased by about 10 percent between 1980 and 1985. This was due to reduced economic activity in 1985 and some obsolete power plants in New Mexico being phased out and the electricity being supplied from generating plants outside of New Mexico.

Evaporation

Evaporation increased from 295,800 acre-feet in 1970 to 451,300 acre-feet in 1985 (table 3-1). This is a reflection of the above average precipitation the state has enjoyed during the 1980s. Most of the reservoirs in the state were at capacity or near capacity during the mid-1980s. As the surface area of the reservoirs increased, the evaporation increased proportionately.

RIVER BASINS

There are nine river basins presented in the following sections (figure 3-3). They are presented in the following order: Upper Colorado River Basin, Lower Colorado River Basin, Southwest Closed Basin, Upper Rio Grande Basin, Lower Rio Grande Basin, Central Closed Basin, Pecos River Basin, Arkansas-Red-White Basin, and the Texas Gulf Basin.

Upper Colorado River Basin

The Upper Colorado River Basin lies in northwestern New Mexico and encompasses parts of four counties--all of San Juan, and small portions of Rio Arriba, Sandoval, and McKinley counties (figure 3-3). The water depletions for 1985 were estimated to be almost 300,000 acre-feet (table 3-2). Nearly 99 percent of the depletions for 1985 were from surface water sources in the Upper Colorado River Basin (Wilson, 1986).

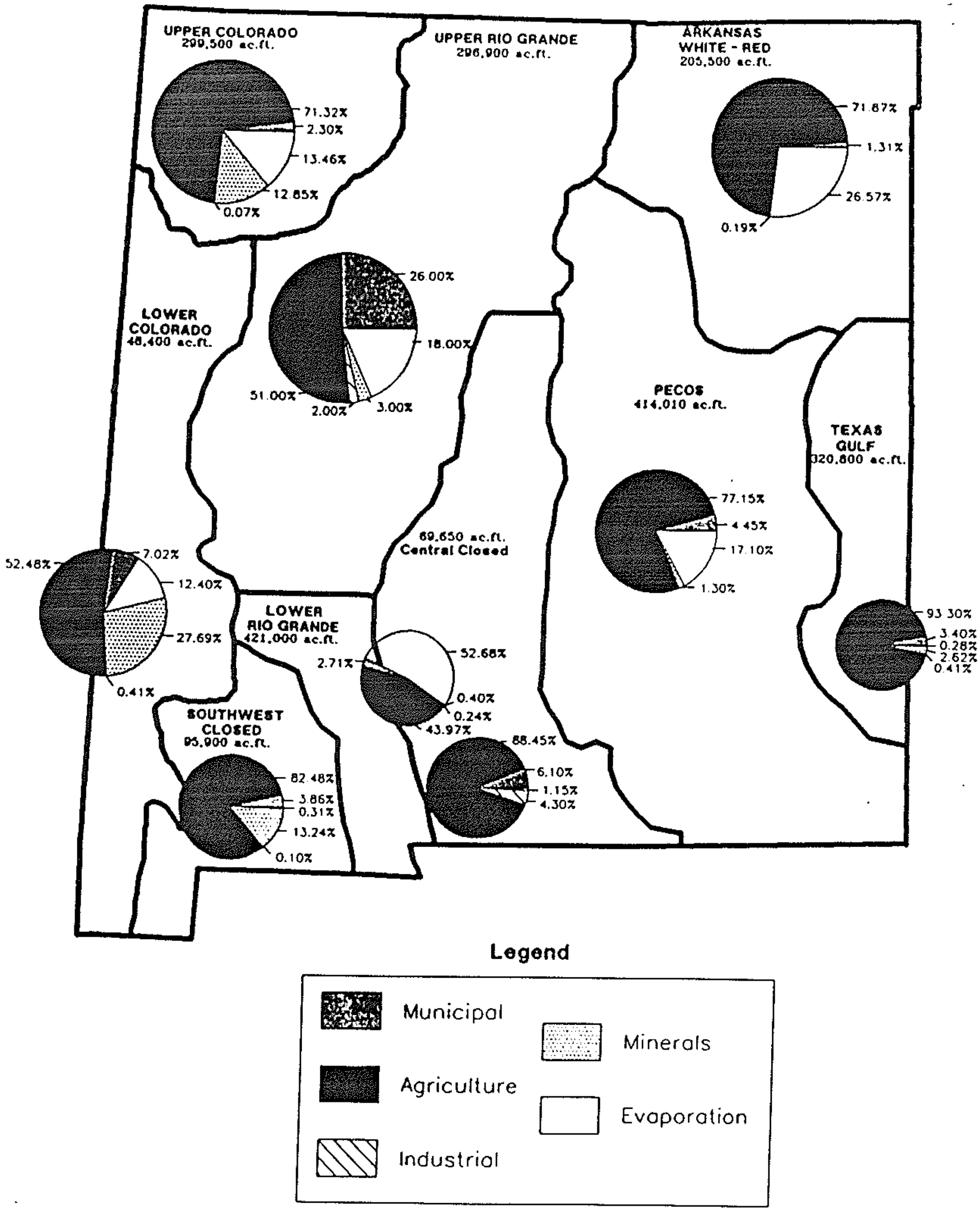


Figure 3-3. Water Depletions in New Mexico by River Basins, 1985

Table 3-1. Water Depletion in New Mexico by Category, 1970-1985.

Water Use Category	1970*	1975**	1980#	1985##
-(000 acre-feet)-				
Agriculture	1,760.5	1,820.1	1,910.4	1,482.7
Municipa	184.9	107.5	129.9	137.9
Industrial	12.9	12.1	12.0	12.0
Minerals and Power	61.3	77.0	105.6	87.9
Evaporation	295.8	270.2	416.0	451.3
Total	2,215.4	2,286.9	2,573.0	2,171.8

*Source: Bureau of Reclamation (1976)
**Source: Sorensen (1977)
#Source: Sorensen (1982)
##Source: Wilson (1986)

There were small quantities of groundwater used for rural, domestic, livestock, minerals, and recreation purposes.

The primary water use categories in the Upper Colorado River Basin are presented in Figure 3-3. They were agriculture, accounting for about 70 percent (213,600 acre-feet) of depletions, evaporation at 13 percent (40,300 acre-feet), mineral and power at 13 percent (38,500 acre-feet), municipal at 2 percent (6,900 acre-feet), and self-supplied industrial depletions at less than one percent (200 acre-feet).

Agriculture

With the recent development of the Navajo Indian Irrigation Project (NIIP) in San Juan County, this basin has become one of the important irrigated regions in the state. During 1976, water was delivered for the first 9,200 acres on the project. Since then, water has been delivered to an additional 37,400 acres. The NIIP Project is planned for 110,000 irrigated acres when fully implemented. Depletions for agriculture are exceeded in only the Pecos River and the Texas Gulf basins.

The principal crops grown in the Upper Colorado River Basin were alfalfa, corn, pasture, wheat, dry beans, and potatoes.

Municipal

Urban and rural water depletions were estimated at 6,900 acre-feet in 1985 (table 3-2). The basin ranked fifth out of the nine river basins in terms of municipal depletions, only exceeding the Lower Colorado, Southwest Closed, Central Closed, and Arkansas-Red-White river basins. The Upper Colorado River Basin encompassed about 4.3 percent of the state population in 1985. The annual per capita depletions were estimated to be 36,250 gallons which is well above the state average of 31,000 gallons.

Industrial

Self-supplied industrial and commercial depletions were very small at 200 acre-feet in 1985 (table 3-2). One of the primary reasons for the small self-supplied industrial depletions is very small quantities of groundwater in the region. Nearly all of the depletions were from surface water sources (Wilson, 1986).

Minerals and Power

Miineral and power water depletions were estimated at 38,500 acre-feet for 1985 in the San Juan Basin (table 3-2). This is down about 6,000 acre-feet from 1980. The Upper Colorado has two large major coal-fired electricity generating

Table 3-2. Water Depletions by Water Use Category, Upper Colorado River Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	213,600
Municipal	6,900
Industrial	200
Minerals	38,500
Evaportion	40,300
Total	299,500

Table 3-3. Water Depletions by Water Use Category, Lower Colorado River Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	25,400
Municipal	3,400
Industrial	200
Minerals	13,400
Evaportion	6,000
Total	48,400

Table 3-4. Water Depletions by Water Use Category, Southwest Closed Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	79,100
Municipal	3,700
Industrial	100
Minerals	12,700
Evaportion	300
Total	95,900

plants along the San Juan River in San Juan County west of Farmington. In fact, power accounts for approximately 95 percent of the total water depletions in this category.

Evaporation

Evaporation ranked second in terms of water depletions in the Upper Colorado River Basin accounting for over 13 percent of total depletions. This basin ranks fourth in terms of evaporation among the nine river basins in New Mexico. Navajo Reservoir, located on the San Juan River, is the largest reservoir in New Mexico which accounts for the large evaporation depletions.

Lower Colorado River Basin

The Lower Colorado River Basin lies in western New Mexico stretching north of Gallup to the New Mexico/Mexico/Arizona boundary in the south (figure 3-3). The basin encompasses parts of six counties--McKinley, Cibola, Catron, Grant, Sierra, and Hidalgo. Much of the lower portion of the basin (Gila and San Francisco river basins) are under a federal adjudication decree. In these basins, surface and conjunctive groundwater use is monitored closely by the State Engineer Office. The water depletions for 1985 were estimated to be about 48,400 acre-feet (table 3-3). This basin has the lowest depletions of all the basins in New Mexico.

The primary water use categories in the Lower Colorado River Basin are presented in Figure 3-3. They were agriculture, accounting for over 52 percent (25,400 acre-feet) of depletions, followed by mineral and power at 28 percent (13,400 acre-feet), evaporation at 12 percent (6,000 acre-feet), municipal at 7 percent (3,400 acre-feet), and self-supplied industrial depletions at less than one percent (200 acre-feet).

Agriculture

Agriculture and minerals were the most important sectors of the Lower Colorado economy. Nearly all of the irrigated croplands were located in the southern portion of the basin (Catron and Hidalgo counties). Groundwater was the most important source of water for irrigation accounting for 72 percent of the irrigation depletions. Nearly all of the groundwater depletions were in Hidalgo County. The principal crops grown in the basin were typically relatively low-value crops--cotton, grain sorghum, and corn.

Municipal

Urban and rural water depletions were estimated at only 3,400 acre-feet in 1985 (table 3-3). The Lower Colorado River Basin is sparsely populated and contained less than 5 percent of the state population in 1985. The basin ranked last in terms of municipal depletions and was well below the state average in the annual per capita depletions at 22,570 gallons.

Industrial

Self-supplied industrial and commercial depletions were very small at 200 acre-feet in 1985 (table 3-3). One of the primary reasons for the small self-supplied industrial depletions are the lack of urban areas. All of the industrial depletions were in the commercial sector and from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 13,400 acre-feet for 1985 in the Lower Colorado River Basin (table 3-3). This was down about 1,000 acre-feet from 1980. In 1980, 700 acre-feet of water was depleted for power in the Lower Colorado while none was depleted for this purpose in 1985. In 1985, minerals accounted for all of the depletions in this category. The large copper mines in the southern portion of the basin accounted for nearly all of the mineral depletions.

Evaporation

Evaporation was the second largest use category for water in the Lower Colorado River Basin accounting for slightly under 13 percent of total depletions. There are no major reservoirs in this basin. The evaporation was from small lakes, rivers, and streams (80 percent), recreation (3 percent), and fish and wildlife (16 percent).

Southwest Closed Basin

The Southwest Closed Basin lies in southwestern New Mexico. The basin encompasses parts of five counties--Luna, Grant, Sierra, Hidalgo, and Dona Ana. The water depletions for 1985 were estimated to be about 96,000 acre-feet (table 3-4). About 80 percent of the depletions were from groundwater sources (Wilson, 1986). All of the surface water depletions were for agricultural purposes.

The primary water use categories are presented in Figure 3-3. They were agriculture, accounting for about 82 percent (79,100 acre-feet) of depletions, followed by mineral and power at 13 percent (12,700 acre-feet), municipal at 4 percent (3,700 acre-feet), evaporation and self-supplied industrial depletions at less than one percent each (300 and 100 acre-feet respectively).

Agriculture

Agriculture was one of the primary economic sectors in this region. The principal crops produced were cotton, grain sorghum, and in recent years, high value crops such as chile, lettuce, onions, and grapes. There were 10,000 acres of native pasture in the Mimbres Basin in Luna County that were irrigated with surface water from the Mimbres River.

Municipal

Urban and rural water depletions were estimated at 3,700 acre-feet in 1985 (table 3-4). The Southwest Closed Basin encompassed about 3.3 percent of the state population in 1985, but only 2.8 percent of the state's municipal depletions. The basin ranked third from last in terms of municipal depletions, only exceeding the Lower Colorado and Arkansas-Red-White river basins.

Industrial

Self-supplied industrial and commercial depletions were very small at 100 acre-feet in 1985 with nearly all associated with the commercial sector (table 3-4). Nearly all of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were the second most important use of water in the Southwest Closed Basin. Depletions were estimated at 12,700 acre-feet (13 percent of total) for 1985 (table 3-4). This was basically unchanged from 1980. Minerals accounted for all of the total water depletions in this category, primarily from the large copper mines and smelters in the basin.

Evaporation

Evaporation, including recreation depletions, were estimated at 300 acre-feet. There are no major reservoirs in this basin. The majority of evaporation depletions were associated with the recreational sector.

Upper Rio Grande Basin

The Upper Rio Grande Basin lies in central New Mexico stretching from the New Mexico/Colorado state line north of Taos and Chama to the Socorro/Sierra county line in the south (figure 3-3). The basin encompasses all or parts of 12 counties--Rio Arriba, Taos, Los Alamos, Santa Fe, Sandoval, Bernalillo, McKinley, Cibola, Valencia, Torrance, Socorro, and Catron. For the purposes of presenting current depletions, the basin has been divided into two sub-basins--upper and middle. The Upper Rio Grande Sub-basin includes Rio Arriba, Taos, Los Alamos, and Santa Fe. The Middle Rio Grande Sub-basin includes the eight remaining counties--Sandoval, Bernalillo, McKinley, Cibola, Valencia, Torrance, Socorro, and Catron. The water depletions for 1985 were estimated to be about 296,900 acre-feet with 107,000 in the Upper Rio Grande Sub-basin and 189,900 in the Middle Rio Grande (table 3-5). This basin had the fifth highest depletions of all the basins in New Mexico.

The primary water use categories were agriculture, accounting for 51 percent (151,800) acre-feet) of depletions, followed by municipal at 26 percent (77,000 acre-feet), evaporation at 18 percent (54,000 acre-feet), minerals at 3 percent (8,500 acre-feet), and self-supplied industrial depletions at less than one percent (5,600 acre-feet).

The Upper Rio Grande Basin had the largest municipal depletions of all the basins because of the Albuquerque Metropolitan area. In fact, this basin accounted for about 56 percent of the total municipal depletions in the state. The population of the basin accounted for about 49 percent of the total state population, therefore, the annual municipal depletion per person was well above the state average at 0.11 acre-feet (35,490 gallons).

Upper Rio Grande Sub-basin

The Upper Rio Grande Sub-basin includes the Rio Chama and the Rio Grande from the Colorado/New Mexico state line to the Otawi Bridge (Santa Fe/Sandoval county line).

The primary water use categories were agriculture, accounting for about 70 percent (75,400 acre-feet) of depletions, followed by evaporation at 20 percent (20,900 acre-feet), municipal at 8.5 percent (9,100 acre-feet), mineral and power at one percent (1,300 acre-feet), and self-supplied industrial depletions at less than one percent (300 acre-feet).

Agriculture

The irrigated cropland was located primarily along the Rio Chama in Rio Arriba County and along or adjacent to the Rio Grande in Taos, Rio Arriba, and Santa Fe counties. Surface water was nearly the only source of water for irrigation accounting for over 90 percent of the irrigation depletions. The lack of supplemental groundwater presented a major problem during periods of low flows in the rivers. The cropping plan reflected this problem primarily producing low-value crops such as pasture, native pastures, alfalfa, and small grains.

Municipal

Urban and rural water depletions were estimated at only 9,100 acre- feet in 1985 (table 3-5). The Upper Rio Grande Sub-basin contained about 10 percent (146,650) of the state population in 1985. The annual per capita depletions were estimated at 20,200 gallons, which was below the state average of 31,000 gallons per day.

Industrial

Self-supplied industrial and commercial depletions were very small at 300 acre-feet in 1985 (table 3-5). Nearly all (92 percent) of the industrial depletions were in the commercial sector. Santa Fe County accounted for about 46 percent of these depletions and Rio Arriba accounted for an additional 39 percent. All of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 1,300 acre-feet for 1985 in the sub-basin (table 3-5). In 1985, minerals accounted for all of the depletions in this category. Taos County accounted for 83 percent

of the depletions. This was primarily associated with molybdenum. About two-thirds of the depletions were from groundwater sources and one-third from surface water sources in the sub-basin.

Evaporation

There are three major reservoirs (Abiquiu, Herron, and El Vado) in this sub-basin, all on the Rio Chama. Most of the Rio Grande in this sub-basin has been designated as a wild and scenic river. Evaporation accounted for about 20 percent of total sub-basin depletions.

Middle Rio Grande Sub-basin

The Middle Rio Grande Sub-basin lies in central New Mexico. The basin encompasses all or parts of eight counties--Sandoval, Bernalillo, McKinley, Cibola, Valencia, Torrance, Socorro, and Catron. The water depletions for 1985 were estimated to be about 189,900 acre-feet (table 3-5).

The primary water use categories were agriculture, accounting for slightly over 40 percent (76,400 acre-feet) of depletions, followed by municipal at 36 percent (67,800 acre-feet), evaporation at 17 percent (33,100 acre-feet), minerals at 4 percent (7,200 acre-feet), and self-supplied industrial depletions at 3 percent (5,400 acre-feet).

Agriculture

The irrigated cropland was located primarily along the Rio Grande in Sandoval, Bernalillo, Valencia, and Socorro counties; the Jemez and Rio Puerco in Sandoval County, and the Rio San Jose in McKinley and Cibola counties. Surface water was the primary source of water for irrigation accounting for about 85 percent of the irrigation depletions. The lack of supplemental groundwater presented a major problem during periods of low flows in the rivers. The cropping plan reflected this problem primarily producing low-value crops such as pasture, alfalfa, native

Table 3-5. Water Depletions by Water Use Category, Upper Rio Grande Basin, 1985.

Water Use Category	1985 Depletions Upper	1985 Depletions Middle	Total
	(acre-feet)		
Agricultural	75,400	76,400	151,800
Municipal	9,100	67,800	76,900
Industrial	300	5,400	5,700
Minerals	1,300	7,200	8,500
Evaportion	20,900	33,100	54,000
Total	107,000	189,900	296,900

Table 3-6. Water Depletions by Water Use Category, Lower Rio Grande Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	185,100
Municipal	11,400
Industrial	1,000
Minerals	1,700
Evaportion	221,800
Total	421,000

Table 3-7. Water Depletions by Water Use Category, Central Closed Basin, 1985.

Water Use Category	1985 Depletions Estancia	1985 Depletions Tularosa	Total
	(acre-feet)		
Agricultural	45,300	16,300	61,600
Municipal	600	3,900	4,500
Industrial	0	3,000	3,000
Minerals	0	20	20
Evaportion	30	500	530
Total	45,930	23,720	69,650

pastures, corn, and small grains. However, there were some high-value crops being produced in Bernalillo and Valencia counties.

Municipal

Urban and rural water depletions were estimated at 67,800 acre-feet in 1985 (table 3-5). The Middle Rio Grande Sub-basin contained about 39 percent (560,000) of the state population in 1985. The annual per capita depletions were estimated at 39,500 gallons which was well above the state average of 31,000 gallons per capita per year.

Industrial

Self-supplied industrial and commercial depletions were estimated to be 5,400 acre-feet in 1985 (table 3-5). This accounted for 45 percent of the state's industrial depletions. Nearly all (85 to 90 percent) of the industrial depletions were in the commercial sector. Bernalillo County accounted for about 30 percent of these depletions and Valencia accounted for an additional 26 percent. All of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 7,200 acre-feet for 1985 in the sub-basin (table 3-5). In 1985, power accounted for about 75 percent of the depletions in this category. Cibola County accounted for 60 percent of the depletions and Bernalillo County for nearly all of the remaining 40 percent. The Cibola County depletions were primarily associated with a relatively new large electrical generating plant west of Grants. Nearly all (over 95 percent) of the depletions were from groundwater sources.

Evaporation

There are two major reservoirs--Cochiti on the Rio Grande in Sandoval County and Bluewater on the Rio San Jose in McKinley and Cibola counties. Evaporation was estimated at 33,100 acre-feet. Reservoir evaporation accounted for about 70 percent of the total sub-basin evaporation depletions, fish and wildlife about 25 percent because of the game refuges in Socorro County, and recreation, the remaining 5 percent.

Lower Rio Grande Basin

The Lower Rio Grande Basin lies in south-central New Mexico and encompasses parts of two--Dona Ana and Sierra (figure 3-3). The water depletions for 1985 were estimated to be 421,000 acre-feet (table 3-6). About 88 percent of the depletions for 1985 were from surface water sources in the Lower Rio Grande Basin (Wilson, 1986). Agriculture and municipal were large users of groundwater. Small quantities of groundwater were used for industrial, minerals, and recreation purposes.

The primary water use categories were evaporation, accounting for about 53 percent (221,800 acre-feet), followed by agriculture, accounting for about 44 percent (185,100 acre-feet) of depletions, municipal at 3 percent (11,400 acre-feet), mineral and power (1,700 acre-feet), and self-supplied industrial depletions at less than one percent (1,000 acre-feet) respectively.

Agriculture

The Lower Rio Grande Basin was an important agricultural region in New Mexico producing about 70 percent of the high-value crops in New Mexico. The important irrigated crops in the basin in 1985 were alfalfa, pecans, cotton, chile, lettuce, onions, and wheat.

Municipal

Urban and rural water depletions were estimated at 11,400 acre-feet in 1985 (table 3-6). The basin ranked third out of the nine river basins in terms of municipal depletions with only the Upper Rio Grande and Pecos River basins exceeding it in municipal depletions. The Lower Rio Grande Basin accounted for about 8.7 percent of the state population in 1985. The annual per capita depletions were slightly under the state average at 29,300 gallons per person.

Industrial

Self-supplied industrial and commercial depletions were the third largest of any basin at 1,000 acre-feet in 1985 (table 3-6). Nearly all (97 percent) of the depletions were for the commercial sector. All of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 1,700 acre-feet for 1985 in the Lower Rio Grande Basin (table 3-6). The basin has a gas-fired electricity generating plant along the Rio Grande in southern Dona Ana County. Power accounted for about 94 percent of the total water depletions in this category.

Evaporation

Evaporation was the largest use of water in the Lower Rio Grande Basin accounting for about 53 percent of total depletions. This basin ranked first in terms of evaporation among the nine river basins in New Mexico. Elephant Butte and Caballo reservoirs are located on the Rio Grande in Sierra County. Elephant Butte is the second largest and southern most major reservoir in New Mexico which accounts for the large evaporation depletions.

Central Closed Basin

The Central Closed Basin lies in central New Mexico stretching from eastern Santa Fe County on the north to the New Mexico/Texas state line on the south (figure 3-3). The basin encompasses parts of 9 counties--Santa Fe, Torrance, Bernalillo, Socorro, Lincoln, Sierra, Dona Ana, Chaves, and Otero. For the purpose of presenting current depletions, the basin has been divided into two sub-basins--Estancia and Tularosa. The Estancia Sub-basin includes Santa Fe, Torrance and Bernalillo. The Tularosa Sub-basin includes the six remaining counties. The water depletions for 1985 were estimated to be about 69,600 acre-feet with 45,900 in the Estancia Sub-basin and 23,700 in the Tularosa Sub-basin (table 3-7). This basin had the second lowest depletions of all the basins in New Mexico.

The primary water use categories are presented in Figure 3-3. They were agriculture, accounting for 88 percent (61,600 acre-feet) of depletions, followed by municipal at 6 percent (4,500 acre-feet), minerals at 4 percent (3,000 acre-feet), evaporation at less than one percent (500 acre-feet), and self-supplied industrial depletions at less than one percent (20 acre-feet).

The Central Closed Basin was divided into two sub-basins because of the large potential supply of groundwater in both sub-basins. The Estancia Sub-basin is close to Albuquerque and future water use may be influenced by the metropolitan area. The Tularosa Sub-basin lies much further south and is adjacent to Las Cruces and El Paso, Texas. The development of the Tularosa Sub-basin is also likely to be influenced by El Paso and Las Cruces. The Tularosa Basin also is the home for White Sands Missile Range.

Estancia Sub-basin

The Estancia Sub-basin does not include any rivers or major streams. The major economic activity was primarily in southern Santa Fe County and northern Torrance County around the towns of Moriarty and Estancia.

The primary water use categories were agriculture, accounting for over 98 percent (45,300 acre-feet) of depletions, followed by municipal at one percent (600 acre-feet), and evaporation depletions at less than one tenth of one percent (30 acre-feet). Industrial and mineral depletions were less than 5 acre-feet each.

Agriculture

The irrigated cropland was located in an area about 5 miles north of Moriarty in Santa Fe County to an area about 15 miles south of Estancia in Torrance County. For all practical purposes, groundwater was the only source for irrigation. There were small quantities of surface water available near the Manzano and Sandia mountains. The cropping pattern consisted primarily of corn, wheat, alfalfa, pastures, small grains, and potatoes.

Municipal

There are no urban centers in the basin. Therefore, municipal depletions were all rural depletions and were estimated at only 600 acre-feet in 1985 (table 3-7). The basin contained less than one percent (10,500) of the state population in 1985. The annual per capita municipal water depletions were well below the state average at 18,600 gallons.

Industrial

Self-supplied industrial and commercial depletions were non-existent in 1985 (table 3-7).

Minerals and Power

Minerals and power depletions were non-existent in 1985 (table 3-7).

Evaporation

Evaporation water depletions were estimated at 30 acre-feet in 1985. The depletions were fairly well split between recreation and evaporation. Playa Lakes east of Estancia account for most of the evaporation occurred.

Tularosa Sub-basin

The Tularosa Sub-basin includes several small rivers and major streams that feed the groundwater basin. The major economic activity was primarily located in Otero County and southeastern Dona Ana County around the cities of Alamogordo, Las Cruces, and El Paso, Texas.

The primary water use categories were agriculture, accounting for about 69 percent (16,300 acre-feet) of depletions, followed by municipal at 16 percent (3,900 acre-feet), minerals at 13 percent (3,000 acre-feet), evaporation depletions at two percent (500 acre-feet), and industrial at about 0.1 percent (20 acre-feet).

Agriculture

The majority of irrigated cropland was located in eastern Otero County from 20 miles north of Tularosa to Alamogordo. Nearly all of the cropland was on the alluvial fans close to the mountains or in valleys in the mountains. Groundwater was the principal source for irrigation accounting for about two-thirds of the depletions. There are small quantities of surface water available in and near the Sacramento Mountains. The cropping pattern consisted primarily of alfalfa, pastures, orchards, and small grains.

Municipal

The only urban center is Alamogordo in the basin. Municipal depletions were estimated at only 3,900 acre-feet in 1985 (table 3-7). The basin contained about 3 percent (49,300) of the state population in 1985. The annual per capita municipal water depletions were well below the state average at 25,800 gallons.

Industrial

Self-supplied industrial, commercial, and military depletions accounted for 3,000 acre-feet of depletions in 1985 (table 3-7). Military depletions accounted for over 99 percent of these depletions.

Minerals and Power

Minerals and power depletions were almost non-existent at 20 acre-feet in 1985 (table 3-7).

Evaporation

Evaporation water depletions were estimated at 500 acre-feet in 1985. The depletions were primarily recreation related.

Pecos River Basin

The Pecos River Basin lies in southeast central New Mexico stretching from San Miguel and Santa Fe counties northwest of Las Vegas to the New Mexico/Texas line on the south (figure 3-3). The basin encompasses all or parts of 13 counties--Santa Fe, San Miguel, Torrance, Guadalupe, Quay, Lincoln, Chaves, DeBaca, Roosevelt, Curry, Otero, Eddy and Lea. For the purposes of presenting current depletions, the basin has been divided into two sub-basins--Upper and Lower Pecos. The Upper Pecos Sub-basin includes Santa Fe, San Miguel, Torrance, Guadalupe, DeBaca, Quay, Curry, and Roosevelt counties. The Lower Pecos Sub-basin includes the five remaining counties--Lincoln, Chaves, Otero, Eddy, and Lea. The water depletions for 1985 were estimated to be about 414,000 acre-feet with 83,700 in the Upper Sub-basin and 330,300 in the Lower Pecos (table 3-8). This basin had the second highest depletions in the state, surpassed only by the Lower Rio Grande.

The primary water use categories were agriculture, accounting for 77 percent (320,200 acre-feet) of depletions, followed by evaporation at 17 percent (70,200 acre-feet), municipal at 4 percent (18,000 acre-feet), minerals at one percent (4,800 acre-feet), and self-supplied in-

Table 3-8. Water Depletions by Water Use Category, Pecos River Basin, 1985.

Water Use Category	1985 Depletions Upper	Lower	Total
	(acre-feet)		
Agricultural	49,200	271,000	320,200
Municipal	2,200	15,800	18,000
Industrial	100	700	800
Minerals	10	4,800	4,810
Evaportion	32,200	38,000	70,200
Total	83,710	330,300	414,010

Table 3-9. Water Depletions by Water Use Category, Arkansas, Red, White River Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	147,700
Municipal	2,700
Industrial	100
Minerals	400
Evaportion	54,600
Total	205,500

Table 3-10. Water Depletions by Water Use Category, Texas Gulf Basin, 1985.

Water Use Category	1985 Depletions
	(acre-feet)
Agricultural	299,300
Municipal	10,900
Industrial	1,300
Minerals	8,400
Evaportion	900
Total	320,800

dustrial depletions at less than one percent (800 acre-feet) (table 3-8).

The Pecos River Basin had the largest agricultural depletions of all the basins. This basin accounted for about 22 percent of the total agricultural depletions in the state. The irrigated cropland of the basin accounted for less than 20 percent of the total state irrigated cropland, therefore, the agricultural depletions per acre was well above the state average.

Upper Pecos River Sub-basin

The Upper Pecos River Sub-basin includes the Pecos River above the Chaves County line and includes two large reservoirs--Los Esteros north of Santa Rosa, and Sumner near Ft. Sumner. This is a relatively rural region with agricultural being the predominant industry.

The primary water use categories were agriculture, accounting for about 59 percent (49,200 acre-feet) of depletions, followed by evaporation at 38 percent (32,200 acre-feet), municipal at 3 percent (2,200 acre-feet), mineral and power, and self-supplied industrial depletions at less than one percent (100 and 10 acre-feet, respectively).

Agriculture

The irrigated cropland is located primarily along or adjacent to the Pecos River and its tributaries in San Miguel County and along the Pecos River in Guadalupe and DeBaca counties. Surface water was the primary source of water for irrigation accounting for about 75 percent of the irrigation depletions. The lack of supplemental groundwater presented a major problem during periods of low flows in the rivers in San Miguel and Guadalupe counties. The cropping plan reflected this problem primarily producing low-value crops such as pasture, native pastures, alfalfa, and small grains.

Municipal

Urban and rural water depletions were estimated at only 2,200 acre-feet in 1985 (table 3-8). The Upper Pecos Sub-basin contained about six percent (93,850) of the state population in 1985. The annual per capita depletions were estimated at 7,650 gallons which was well below the state average.

Industrial

Self-supplied industrial and commercial depletions were almost non-existent at 100 acre-feet in 1985 (table 3-8). Nearly all (95 percent) of the industrial depletions were in the commercial sector. San Miguel County accounted for about 46 percent of these depletions. All of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at only 10 acre-feet for 1985 in the sub-basin (table 3-8). In 1985, minerals accounted for all of the depletions in this category.

Evaporation

There are two major reservoirs (Los Esteros and Sumner) in this sub-basin, all on the Pecos River. Evaporation accounted for about 38 percent of total sub-basin depletions.

Lower Pecos River Sub-basin

The Lower Pecos River Sub-basin lies in southeast central New Mexico (figure 3-3). The basin encompasses all or parts of five counties--Lincoln, Chaves, Otero, Eddy, and Lea. The water depletions for 1985 were estimated to be about 330,300 acre-feet (table 3-8).

The primary water use categories are presented in Figure 3-3. They were agriculture, accounting for slightly over 82 percent (271,000 acre-feet) of depletions, followed by evaporation at 12 percent (38,000 acre-feet), municipal at 5 percent (15,800 acre-feet), minerals at one percent (4,800 acre-feet), and self-supplied industrial depletions at less than one percent (700 acre-feet).

Agriculture

The irrigated cropland was located primarily along the Pecos River in Chaves and Eddy counties; the Rio Hondo and Rio Penasco in Lincoln, Chaves, Otero, and Eddy counties. Groundwater was the primary source of water for irrigation accounting for about 85 percent of the irrigation depletions. The lack of supplemental groundwater presented a major problem during periods of low flows in the Rio Hondo and Rio Penasco rivers. The cropping plan consisted of alfalfa, cotton, corn, small grains, and irrigated pasture.

Municipal

Urban and rural water depletions were estimated at 15,800 acre-feet in 1985 (table 3-8). The Lower Pecos Sub-basin contained about 9 percent (131,800) of the state population in 1985. The annual per capita depletions were estimated at 39,100 gallons which was well above the state average of 31,000 gallons per capita per year.

Industrial

Self-supplied industrial and commercial depletions were estimated to be 700 acre-feet in 1985 (table 3-8). This accounted for 7 percent of the state's industrial depletions. Nearly all (85 percent) of the industrial depletions were in the industrial sector. Eddy County accounted for over half of these depletions and Chaves and Lea counties accounted for an additional 10 to 15 percent. About 85 percent of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 4,800 acre-feet for 1985 in the sub-basin (table 3-8). In 1985, minerals accounted for nearly all of the depletions in this category. Eddy and Lea counties accounted for nearly all of the depletions in the potash mining sector. Nearly all of the depletions were from groundwater sources.

Evaporation

There are two major reservoirs--McMillan and Avalon on the Pecos River in Eddy County. Evaporation was estimated at 38,000 acre-feet. Reservoir evaporation accounted for about 84 percent of evaporation depletions, fish and wildlife about 14 percent because of the game refuge in the sub-basin, and recreation, the remaining 2 percent. Eddy County accounted for over 80 percent of the evaporation depletions in the county.

Arkansas-Red-White Basin

The Arkansas-Red-White (ARW) Basin lies in northeastern New Mexico and encompasses all or parts of seven counties--Colfax, Union, Mora, Harding, San Miguel, Quay, and Curry (figure 3-3). The water depletions for 1985 were estimated to be 205,500 acre-feet (table 3-9). About 56 percent of the depletions for 1985 were from surface water sources in the ARW (Wilson, 1986). Agriculture was the largest user of groundwater, accounting for almost 98 percent of the total groundwater depletions. Small quantities of groundwater were used for municipal and recreation purposes.

The primary water use categories are presented in Figure 3-3. They were agriculture accounting for about 72 percent (147,700 acre-feet), followed by evaporation, accounting for about 27 percent (54,600 acre-feet) of depletions, municipal at one percent (2,700 acre-feet), mineral and power (400 acre-feet), and self-supplied industrial depletions at less than one percent (100 acre-feet) respectively (table 3-9).

Agriculture

The ARW was an important agricultural region in New Mexico accounting for about 10 percent of the total agricultural depletions. The important irrigated crops in the basin in 1985 were corn, grain sorghum, and wheat.

Municipal

Urban and rural water depletions were estimated at 2,700 acre-feet in 1985 (table 3-9). The basin ranked last out of the nine river basins in terms of municipal depletions and populations. The ARW Basin accounted for about 3 percent of the state population in 1985. The annual per capita depletions were well under the state average at 20,500 gallons per person.

Industrial

Self-supplied industrial and commercial depletions were among the lowest of any basin at 100 acre-feet in 1985 (table 3-9). Nearly all (97 percent) of the depletions were for the commercial sector. All of the depletions were from groundwater sources.

Minerals and Power

Minerals and power water depletions were estimated at 400 acre-feet for 1985 in the Lower Rio Grande Basin (table 3-9). The basin had an oil-fired electricity generating plant at Clayton in

Union County. Power accounted for about 100 acre-feet of the water depletions.

Evaporation

Evaporation was the second largest user of water in the ARW Basin accounting for about 27 percent of total depletions. This basin ranked third in terms of evaporation among the nine river basins in New Mexico. Conchas and Ute reservoirs we located on the Canadian River in Quay County.

Texas Gulf Basin

The Texas Gulf Basin lies in southeastern New Mexico and encompasses all or parts of five counties--Quay, Curry, Roosevelt, Chaves, and Lea (figure 3-3). The water depletions for 1985 were estimated to be 320,800 acre-feet (table 3-10). Over 99 percent of the depletions for 1985 were from groundwater sources in the Texas Gulf Basin (Wilson, 1986). There are no rivers or major streams in the Texas Gulf Basin. Agriculture and municipal were large users of water in the basin. Small quantities of groundwater were used for industrial, minerals, and recreation purposes.

The primary water use categories are presented in Figure 3-3. They were agriculture, accounting for about 93 percent (299,300 acre-feet), followed by municipal at 3 percent (10,900 acre-feet), mineral and power at 3 percent (8,400 acre-feet), and self-supplied industrial and evaporation depletions at less than one percent (1,300 and 900 acre-feet respectively).

Agriculture

The Texas Gulf Basin was an important agricultural region accounting for about 20 percent of the total agricultural depletions in New Mexico. The important irrigated crops in the basin were corn, grain sorghum, wheat, and cotton.

Municipal

Urban and rural water depletions were estimated at 10,900 acre-feet in 1985 (table 3-10). The basin ranked fourth out of the nine river basins in terms of municipal depletions with only the Upper Rio Grande, Lower Rio Grande and Pecos River basins exceeding it in municipal depletions. The Texas Gulf Basin accounted for about 8 percent of the state population in 1985. The annual per capita depletions were slightly under the state average at 30,800 gallons per person.

Industrial

Self-supplied industrial and commercial depletions were the second largest of any basin at 1,300 acre-feet in 1985 (table 3-10). About 62 percent (800 acre-feet) of the depletions were for the military sector and the remainder for the commercial sector. All of the depletions were from groundwater sources (Wilson, 1986).

Minerals and Power

Mineral and power water depletions were estimated at 8,400 acre-feet for 1985 in the Texas Gulf Basin (table 3-10). The basin has several gas-fired electricity generating plants which accounted for 5,700 acre-feet of the depletions.

Evaporation

Evaporation has the least use of water in the Texas Gulf Basin, accounting for less than one percent of total depletions. This basin ranks last in terms of evaporation among the nine river basins in New Mexico since there are no rivers, streams or reservoirs in the basin. All of the depletions were for recreational purposes.

COUNTIES

Depletions by the water use categories for each New Mexico county are presented in four regional graphs--Northwest (figure 3-4), Northeast (figure 3-5), Southwest (figure 3-6), and Southeast (figure 3-7). Tables detailing depletions by water use category are presented in the appendix.

San Juan County in the northwest region had the highest depletions at 296,200 acre-feet followed by Sierra County at 237,200 acre-feet, Dona Ana County at 190,700 acre-feet, Chaves at 161,700 acre-feet, and Roosevelt with 134,300 acre-feet. The above counties typically had large reservoirs (San Juan and Sierra) and/or among the largest agricultural depletions. Sierra County had the highest evaporation at 219,000 acre-feet followed by San Juan at 39,700 acre-feet, Eddy at 31,400 acre-feet, and San Miguel at 28,900 acre-feet. The highest agricultural depletions were San Juan with 211,500 acre-feet, Dona

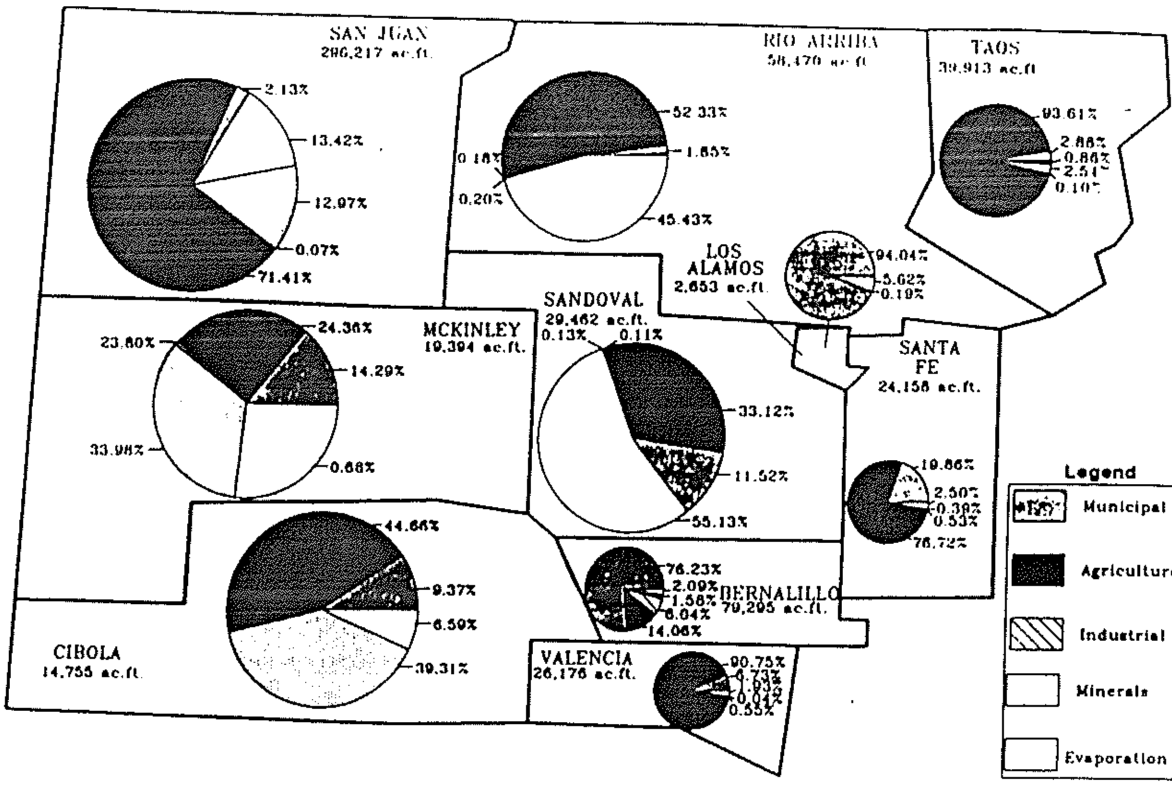


Figure 3–4. Water Depletions by County in Northwest Region, 1985.

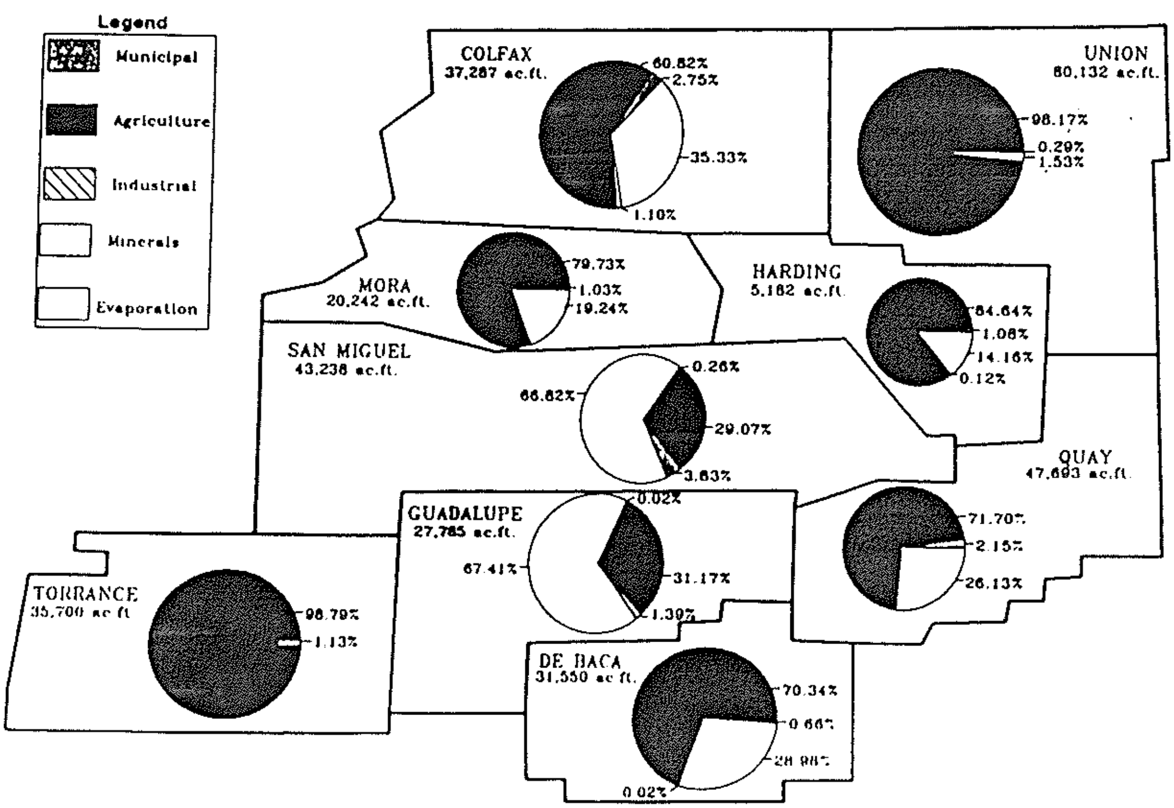


Figure 3–5. Water Depletions by County in Northeast Region, 1985.

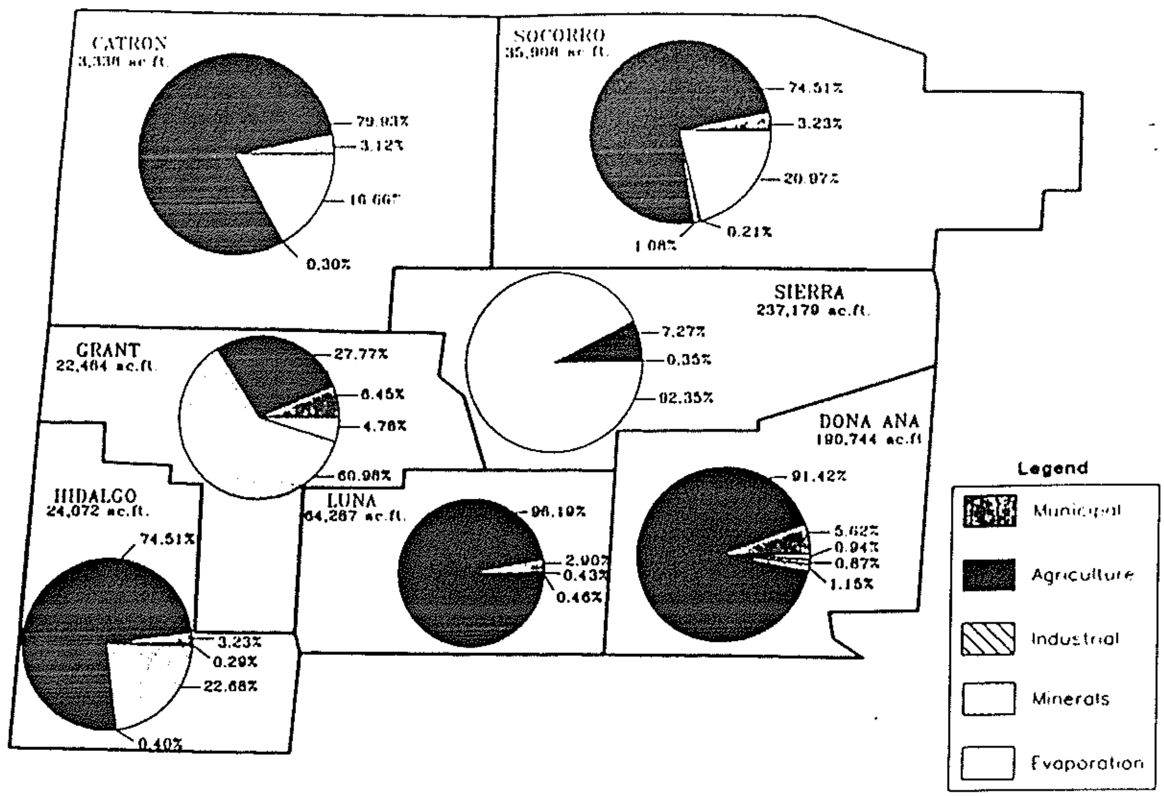


Figure 3-6. Water Depletions by County in Southwest Region, 1985.

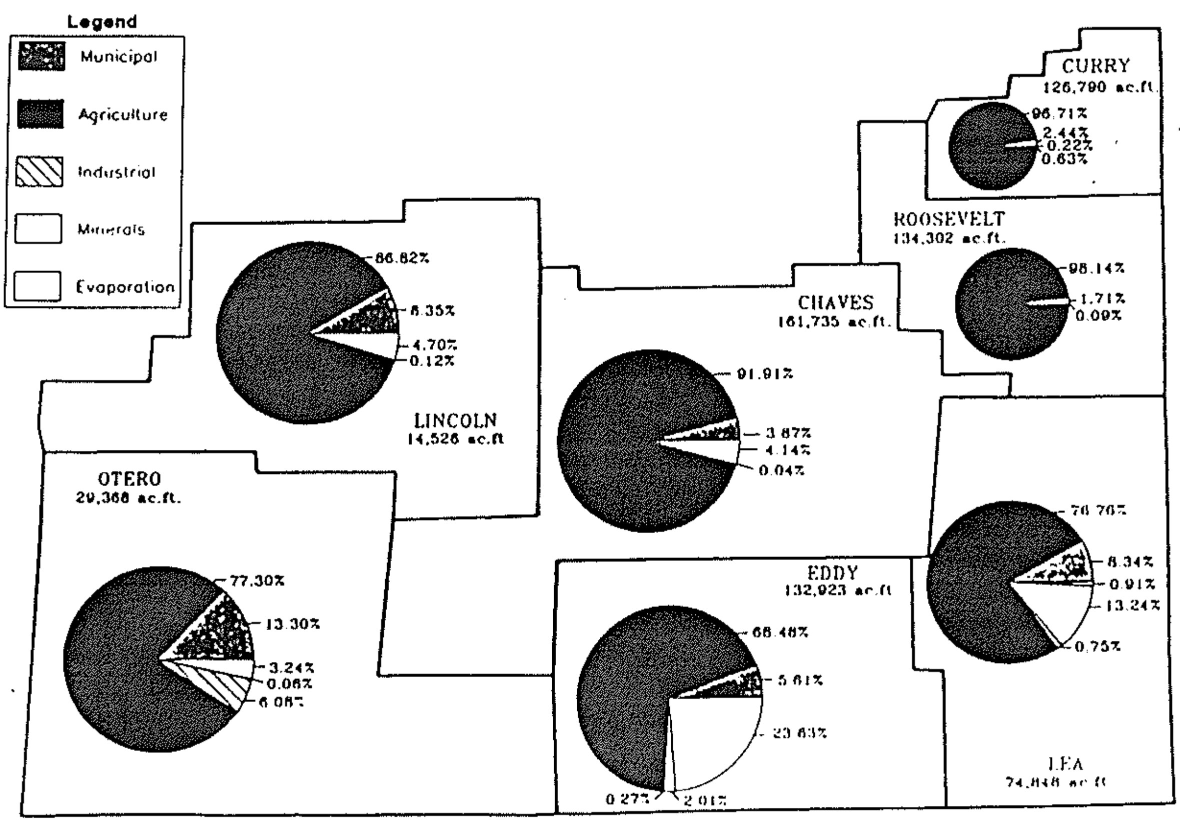


Figure 3-7. Water Depletions by County in Southeast Region, 1985.

Ana with 174,400 acre-feet, Chaves with 148,600 acre-feet, Roosevelt with 131,800 acre-feet, and Curry with 122,600 acre-feet.

The five counties with the least depletions were Los Alamos (2,650 acre-feet), Harding (5,200 acre-feet), Lincoln (14,500 acre-feet), McKinley (19,400 acre-feet), and Mora (20,200 acre-feet). The above counties typically were among the counties with the below average population, lack of reservoirs, and low agricultural depletions.

POPULATION PROJECTIONS

Three population projection scenarios were developed to determine alternative future water depletions: 1) Conservative Growth; 2) Potential Growth; and 3) Optimistic Growth.

The population projections for each of the scenarios are presented graphically in Figure 3-8.

CONSERVATIVE POPULATION PROJECTION

The conservative population projection was based on a recent publication from the BBER of University of New Mexico. The State of New Mexico's population is expected to increase over 81 percent between 1985 and 2030 under this scenario (table 3-11). The Upper Rio Grande Basin is expected to remain the most important basin in terms of population in 2030 accounting for about 46 percent of the state's population compared to 49 percent in 1985. Pecos Basin is expected to maintain its second place in 2030 accounting for about 15 percent of the state's population followed by the Lower Rio Grande at 11 percent and Upper Colorado Basin at 6.5 percent.

The population in the Upper Colorado River Basin is expected to almost triple by 2030; about double in the Lower Colorado River Basin; increase about 70 percent in the Upper Rio Grande; more than double (138 percent increase) in the Lower Rio Grande; and almost double in the Central Closed and Pecos basins. The Southwest Closed, Arkansas-Red-White, and Texas Gulf basins are expected to have the lowest population growth rates: about 55 percent for the Southwest Closed Basin, about 47 percent in the Texas Gulf, and about 30 percent in the Arkansas-Red-White Basin.

POTENTIAL POPULATION PROJECTION

The potential population projection was based on a report by Peach and Williams (1987) at New Mexico State University. The State of New Mexico's population is expected to increase about 90 percent between 1985 and 2030 under the potential scenario (table 3-12). The population, in 2030, under the potential scenario, is expected to be about 5 percent higher than under the conservative projection. As in the conservative projection, the Upper Rio Grande is expected to have about 46 percent of the state's population in 2030. The Pecos Basin maintains its second place with 17 percent of the state's population followed by the Lower Rio Grande with 11 percent, but Texas Gulf edges out the Upper Colorado for fourth place.

The population under the conservative population projection is expected to be higher for the Upper Colorado, Lower Colorado, and Central Closed basins than under the potential population projections in 2030. However, the highly populated Upper Rio Grande, Pecos, and Lower Rio Grande are expected to have higher populations in 2030 under the potential scenario. Thus the 5 percent increase in population.

OPTIMISTIC POPULATION PROJECTION

The optimistic projection is a 20 percent increase over the conservative population projection. The estimated state population is 3.16 million by 2030 under this scenario (table 3-13). The same relationship between and within river basins for the conservative projection would hold for this population projection. The state's population under this projection would be about 14 percent above the potential scenario.

PROJECTED WATER DEPLETIONS BY POPULATION PROJECTION

The projected water depletions will be presented first by the conservative population projection. This will be followed by an analysis of the impact of a 10 percent reduction in depletion by conservation. The potential population projections will be presented second, along with impacts resulting from conservation. The optimistic population projections will be presented last and will include a description of the impact of conservation.

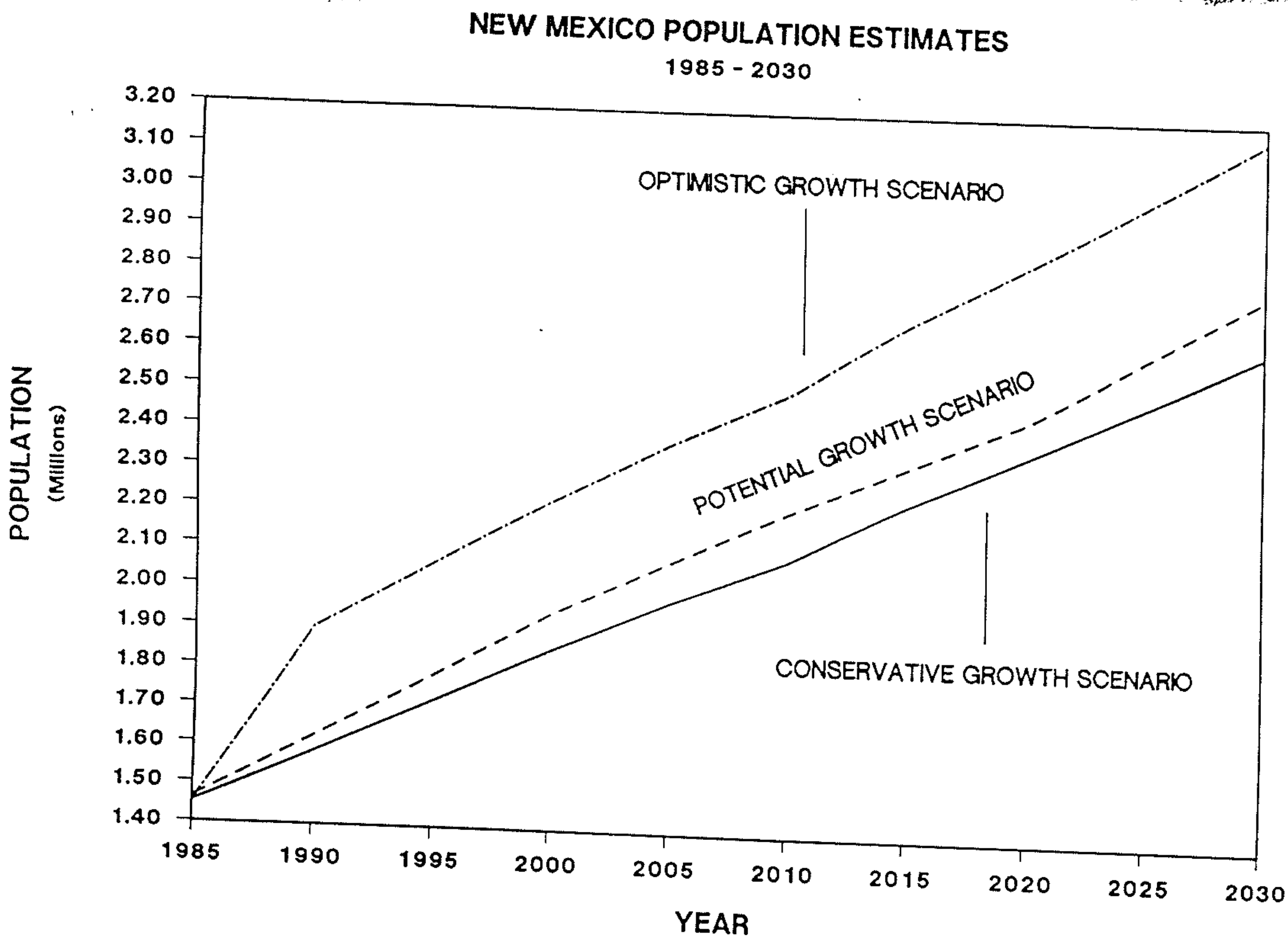


Figure3-8. New Mexico Population Projections by Growth Scenarios

Table 3-11. New Mexico Population Projections, Conservative Growth Scenario, 1985-2030

Basin	1985	2000	2010	2020	2030
Upper Colorado	62,028	100,295	121,501	148,337	173,053
Lower Colorado	64,870	89,987	108,363	123,828	140,469
Southwest Closed	47,980	56,807	63,035	68,748	74,672
Upper Rio Grande	706,052	881,119	972,162	1,093,211	1,203,207
Lower Rio Grande	126,803	189,283	219,478	263,490	302,085
Central Closed	59,824	77,191	87,503	99,512	110,846
Pecos	225,667	282,101	326,407	364,536	405,250
Arkansas-Red-White	42,907	46,608	49,558	52,499	55,430
Texas Gulf	115,170	130,709	145,093	156,417	168,781
Total	1,451,300	1,854,100	2,093,100	2,370,579	2,633,793

Source: Bureau of Business and Economic Research. 1987.

Table 3-12. New Mexico Population Projections, Potential Growth Scenario, 1985-2030

Basin	1985	2000	2010	2020	2030
Upper Colorado	59,005	91,985	115,181	139,505	161,399
Lower Colorado	65,201	86,378	102,234	120,423	134,082
Southwest Closed	49,359	62,361	70,265	78,312	86,882
Upper Rio Grande	721,175	940,529	1,043,331	1,118,540	1,266,756
Lower Rio Grande	124,091	193,882	236,564	271,712	318,464
Central Closed	57,978	71,789	79,668	87,384	96,548
Pecos	230,534	315,309	367,139	420,753	476,212
Arkansas-Red-White	42,760	50,452	54,840	59,285	64,319
Texas Gulf	112,202	131,967	145,307	160,342	173,208
Total	1,462,303	1,944,652	2,214,529	2,456,256	2,777,870

Source: Peach, J.T. and J.D. Williams. 1987.

Table 3-13. New Mexico Population Projections, Optimistic Growth Scenario, 1985-2030

Basin	1985	2000	2010	2020	2030
Upper Colorado	62,028	120,354	145,801	178,004	207,663
Lower Colorado	64,870	107,985	130,035	148,593	168,562
Southwest Closed	47,980	68,168	75,643	82,498	89,607
Upper Rio Grande	706,052	1,057,343	1,166,595	1,311,854	1,443,848
Lower Rio Grande	126,803	227,140	263,374	316,188	362,502
Central Closed	59,824	92,629	105,003	119,414	133,015
Pecos	225,667	338,521	391,688	437,444	486,300
Arkansas-Red-White	42,907	55,929	59,470	62,999	66,517
Texas Gulf	115,170	156,851	174,112	187,701	202,538
Total	1,451,300	2,224,920	2,511,720	2,844,694	3,160,551

Source: adapted from Bureau of Business and Economic Research. 1987.

Two caveats will be presented for each population projection. The primary caveat will hold agricultural depletions constant at the 1985 level over time. The second caveat will present 10 percent reduction in depletions in water use through conservation. Two scenarios will be presented for each caveat.

CONSERVATIVE POPULATION PROJECTION

State

Scenario A

The state depletions were estimated at 2.2 million acre-feet in 1985. Under this scenario, they were estimated to increase to 2.3 million acre-feet in 2030 (table 3-14). The total supply of water for depletions was estimated to be 3.2 million acre-feet in 1985 (see Chapter II for details). It is expected to decrease slowly to 3.1 million in 2030 because of groundwater mining in the Texas Gulf Basin. Based on the projection of depletions, it appears that the state's water depletions will not exceed supply by 2030.

An overall state water surplus can be misleading, since it is equally important as to where these surpluses occur in the state. For example, 300,000 acre-feet of surplus water are located in the Upper Colorado River Basin, 109,000 acre-feet in the Lower Colorado River Basin, 82,000 acre-feet in the Southwest Closed, 138,000 acre-feet in the Central Closed and 226,000 acre-feet in the Arkansas-Red-White basins with low economic potential and population projections.

In 1985, agriculture accounted for 68 percent (1.5 million acre-feet) of the total depletions and is expected to decrease to 64 percent of the state's depletions by 2030.

Evaporation accounted for the second largest depletion in the state in 1985 at about 448,500 acre-feet (21 percent). They are expected to decrease over time and only account for about 16 percent (361,000 acre-feet) of total depletions in 2030 (table 3-14).

In 1985 municipal depletions accounted for 6 percent (138,600 acre-feet). They are expected to increase to about 11 percent (247,400 acre-feet) of the total state depletions in 2030 (table 3-14). The expected increase in depletions is expected to be about 80 percent over the 45-year period. These increased depletions are due to the increased population over the period 1985-2030.

Mineral and power were a distant fourth place in terms of depletions in 1985 accounting for about 4 percent (88,500 acre-feet). They are expected to increase to almost 8 percent of the total state depetions by 2030 (195,000 acre-feet). This is an increase of 120 percent over the 45-year period. Self-supplied industries accounted for less than one percent (12,400 acre-feet) of the statewide depletions in 1985. They are expected to increase to about one percent (22,100 acre-feet) by 2030.

Scenario A with Conservation

The state depletions were estimated at 2.2 million acre-feet in 1985. Under this scenario, they were estimated to decrease to 2.1 million acre-feet in 2030 (table 3-14). This is a savings of approximately 231,000 acre-feet. As in the case of the primary caveat, the state's water depletions will not exceed supply by 2030. The water surplus in 2030 is nearly 1.0 million acre-feet.

Scenario B

If agricultural depletions had been permitted to grow at the same rate of other economic activity, then depletions would exceed supply between 2010 and 2020. The estimated depletions in 2030 under this caveat was 3.6 million acre-feet (table 3-14).

Scenario B with Conservation

If agricultural depletions had been permitted to grow at the same rate as other economic activity, depletions would be about equal to supply, in 2030, under this caveat. The estimated depletions in 2030 are 3.2 million acre-feet (table 3-14), while supply was estimated at 3.2 million acre-feet.

River Basins

Upper Colorado River Basin

Scenario A

The depletions in the Upper Colorado River Basin were estimated at about 300,000

Table 3-14. Water Depletions by Water Use Category, New Mexico, Conservative Population Projection, 1985 - 2030.

Water Use Category	Depletions				
	1985	2000	2010	2020	2030
	- - - - - - - -(thousands of acre-feet)- - - - - -				
			Scenario A		
Agricultural	1,483.8	1,483.8	1,483.8	1,483.8	1,483.8
Municipal	138.6	175.8	197.2	223.2	247.4
Industrial	12.4	15.7	17.6	19.9	22.1
Minerals	88.5	124.6	146.4	171.3	195.0
Evaporation	448.5	348.1	352.1	356.6	360.9
Total	2,171.7	2,148.1	2,197.2	2,254.8	2,309.2
			Scenario A +10% Conservation		
Agricultural	1,483.8	1,335.4	1,335.4	1,335.4	1,335.4
Municipal	138.6	158.3	177.5	200.9	222.7
Industrial	12.4	14.1	15.9	17.9	19.9
Minerals	88.5	112.2	131.8	154.1	175.5
Evaportion	448.5	313.3	316.9	321.0	324.8
Total	2,171.7	1,933.3	1,977.4	2,029.3	2,078.3
			Scenario B		
Agricultural	1,483.8	1,898.7	2,160.1	2,453.3	2,734.0
Municipal	138.6	175.8	197.2	223.2	247.4
Industrial	12.4	15.7	17.6	19.9	22.1
Minerals	88.5	124.6	146.4	171.3	195.0
Evaporation	448.5	348.1	352.1	356.6	360.9
Total	2,171.7	2,563.0	2,873.5	3,224.3	3,559.5
			Scenario B +10% Conservation		
Agricultural	1,483.8	1,708.8	1,944.1	2,208.0	2,460.6
Municipal	138.6	158.3	177.5	200.9	222.7
Industrial	12.4	14.1	15.9	17.9	19.9
Minerals	88.5	112.2	131.8	154.1	175.5
Evaporation	448.5	313.3	316.9	321.0	324.8
Total	2,171.7	2,306.7	2,586.2	2,901.9	3,203.5

acre-feet in 1985 (table 3-15) and are expected to increase to 373,500 acre-feet in 2030 (figure 3-9).

The total supply of water available for depletions in the Upper Colorado River Basin was estimated to be 674,000 acre-feet in 1985. Based on the projected depletions, it appears that the Upper Colorado River Basin depletions will not exceed supply until the year 2185. In 2030, the water supply exceeded depletions by 300,500 acre-feet. Annual depletions in 2030 are expected to account for only a little over half of the available water supply.

In 1985, agriculture accounted for about 70 percent (213,600 acre-feet) of the total water depletions and is expected to remain the dominant sector through 2030 (figure 3-9).

Evaporation (40,300 acre-feet) and minerals and power (38,500 acre-feet) ranked second and third, respectively, in water depletions during 1985. Evaporation is expected to drop to 32,600 acre-feet in 2030, while minerals and power are expected to increase 180 percent to 107,500 acre-feet in 2030.

In 1985, municipal depletions ranked fourth in terms of total depletions, accounting for about 2 percent. They are expected to rank fourth in terms of total depletions in 2030. Self-supplied industries depletions were relatively minor in 1985. They are expected to remain minor (600 acre-feet by 2030).

Scenario A with Conservation

The depletions in the Upper Colorado River Basin were estimated at about 300,000 acre-feet in 1985 (table 3-15) and are expected to increase to 336,200 acre-feet in 2030 (figure 3-9). Based on the projected depletions, it appears that the Upper Colorado River Basin water supply will exceed depletions, in 2030, by 337,800 acre-feet. Annual depletions in 2030 are expected to account for about 50 percent of available water supply. As in the case of the state estimates, the same relationships hold for this caveat as for the primary caveat. However, there is a net savings in depletions of 37,300 acre-feet.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, then shortly after the year 2025, depletions will exceed supplies (figure 3-9). Total depletions in 2020 were estimated to be 652,100 acre-feet and are expected to increase to 755,800 acre-feet in 2030 (table 3-15). This may be the more likely caveat if the Navajo Indian Irrigation Project is fully developed during the 45-year period of this analysis. Approximately 50,000 acres of irrigated cropland has been developed on NIIP, with approximately 60,000 acres yet to be developed.

Scenario B with Conservation

Depletions under this caveat will exceed supplies in 2030. Total depletions in 2020 were estimated to be 587,000 acre-feet and increase to 680,200 acre-feet in 2030 (table 3-15). Under this caveat, the break-even point between depletions and supplies is moved about 10 years into the future, from 2020 to 2030 due to conservation (figure 3-9).

Lower Colorado River Basin

Scenario A

The depletions in the Lower Colorado River Basin were estimated at about 48,400 acre-feet in 1985 (table 3-16). They are expected to increase to 68,300 acre-feet in 2030 (figure 3-9). The total supply of water available for depletions in the Lower Colorado River Basin was estimated to be 157,000 acre-feet in 1985. Based on the projection of depletions, it appears that the Lower Colorado River Basin will have a water surplus of 108,600 acre-feet in 2030. Annual depletions in 2030 are expected to account for only about 44 percent of the available water supply. This surplus should continue until 2200, when depletions should equal supply.

In 1985, agriculture was ranked first in terms of basin depletions, accounting for about 52 percent (25,400 acre-feet) of the total water depletions, but is expected to drop to second place by 2030. Minerals are expected to replace agriculture as the sector with the largest depletions by 2030 (figure 3-9). Minerals are expected to increase 116 percent to 29,000 acre-feet in 2030.

Evaporation (6,000 acre-feet) ranked second in water depletions during 1985. Evaporation is expected to increase slightly to

Table 3-15. Water Depletions by Water Use Category, Upper Colorado River Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	213.6	213.6	192.2	595.8	536.2
Municipal	6.9	19.3	17.4	19.3	17.4
Industrial	0.2	0.6	0.5	0.6	0.5
Minerals	38.5	107.5	96.7	107.5	96.7
Evaporation	40.3	32.6	29.3	32.6	29.3
Total	299.6	373.5	336.2	755.8	680.2

Table 3-16. Water Depletions by Water Use Category, Lower Colorado River Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	25.4	25.4	22.9	55.0	49.5
Municipal	3.4	7.3	6.6	7.3	6.6
Industrial	0.2	0.5	0.5	0.5	0.5
Minerals	13.4	29.0	26.1	29.0	26.1
Evaporation	6.0	6.1	5.5	6.1	5.5
Total	48.4	68.3	61.5	97.9	88.1

Table 3-17. Water Depletions by Water Use Category, Southwest Closed Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	79.1	79.1	71.2	123.1	110.8
Municipal	3.7	5.7	5.2	5.7	5.2
Industrial	0.1	0.2	0.2	0.2	0.2
Minerals	12.7	19.8	17.8	19.8	17.8
Evaporation	0.3	0.4	0.4	0.4	0.4
Total	95.9	105.2	94.7	149.2	134.3

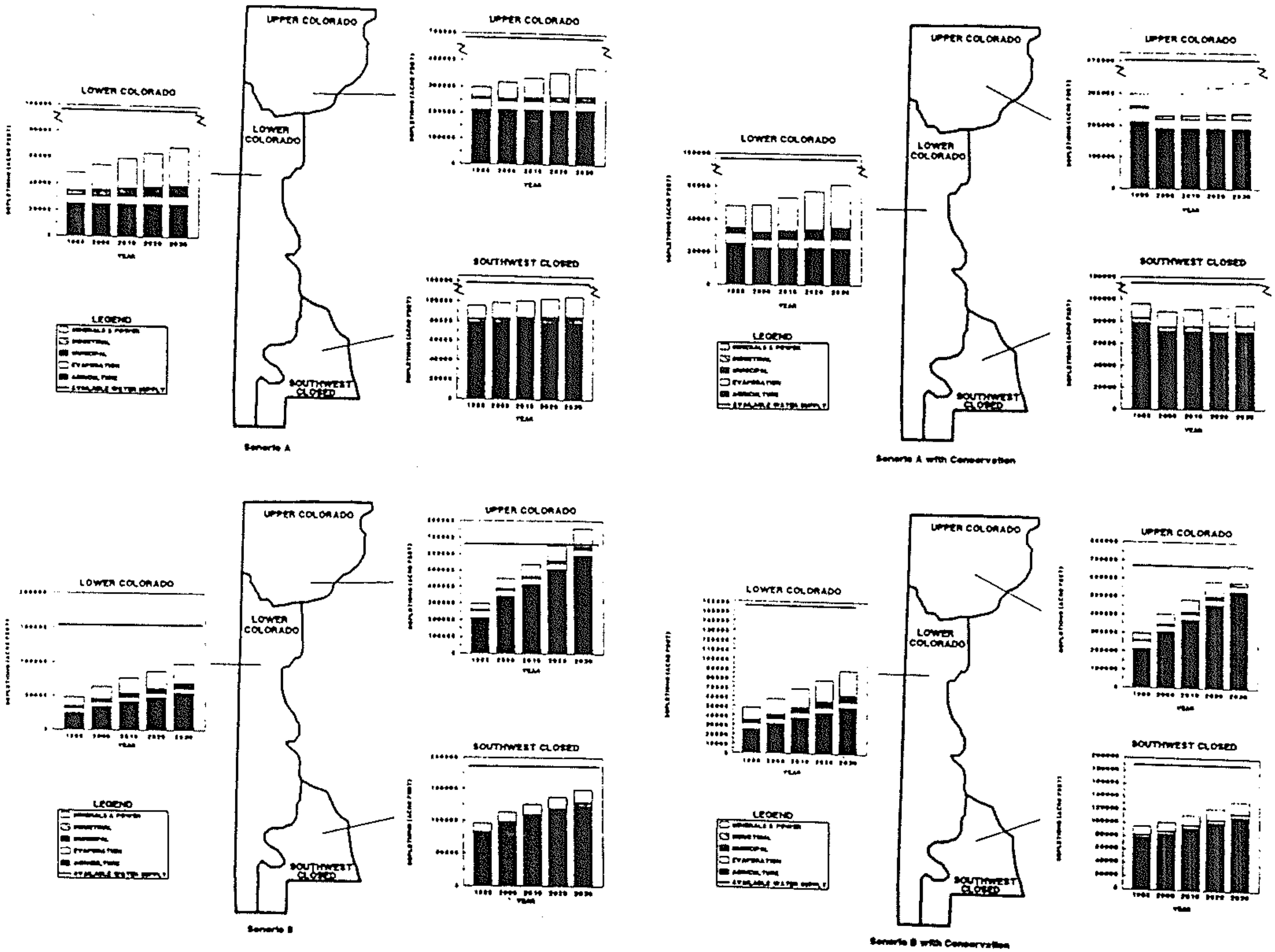


Figure 3 - 9. Water Depletion Projections by Senerio for Upper Colorado, Lower Colorado and Southwest Closed Basins, Conservative Population Projection

6,100 acre-feet in 2030. In 1985, municipal depletions ranked fourth in terms of total depletions, accounting for about 7 percent. They are expected to more than double (115 percent) over the 45-year period and still rank fourth in terms of total depletions. Self-supplied industries depletions were relatively minor in 1985. They are expected to remain minor (500 acre-feet) by 2030.

Scenario A with Conservation

The depletions in the Lower Colorado River Basin are expected to increase to 61,500 acre-feet in 2030 (figure 3-9). Based on the projected depletions, it appears that the Lower Colorado River Basin water supply will exceed depletions, in 2030, by 95,500 acre-feet. The annual depletions in 2030 are expected to account for only about 40 percent of the available water supply. There is a savings in annual depletions of 6,800 acre-feet.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population in the Lower Colorado River Basin, depletions will only account for about 62 percent (97,900 acre-feet) of the total water supplies in 2030 (table 3-16). This water surplus should continue until the year 2080.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 88,100 acre-feet, which is about 56 percent of the available water supply (figure 3-9).

Southwest Closed Basin

Scenario A

The depletions in the Southwest Closed Basin were estimated at about 95,900 acre-feet in 1985 (table 3-17). They are expected to increase to 105,200 acre-feet in 2030 (figure 3-9).

The total supply of water available for depletions in the Southwest Closed Basin was estimated to be 187,000 acre-feet in 1985. Based on the projected depletions, it appears that the Southwest Closed Basin depletions will have a water surplus, in 2030, of 81,800 acre-feet. Annual depletions in 2030 are expected to account for about 56 percent of the available water supply. This water surplus should continue beyond the year 2200.

In 1985, agriculture accounted for about 82 percent (79,100 acre-feet) of the total water depletions and is expected to remain the dominant sector through 2030 (figure 3-9).

Mineral and power was the second most important industry accounting for nearly 13 percent of the basins water depletions (12,700 acre-feet). Depletions in this category are expected to increase 19,800 acre-feet in 2030. This is an increase of 55 percent over the 45-year period.

In 1985, municipal depletions accounted for about 4 percent of the basin total. They are expected to increase to 5,700 acre-feet in 2030 and account for about 5 percent of the total depletions.

Self-supplied industries accounted for less than one percent (100 acre-feet) of the basin depletions in 1985. They are expected to increase to 200 acre-feet by 2030 (table 3-17).

Evaporation accounted for less than one percent (300 acre-feet) of the total basin depletions in 1985. They are expected to account for approximately 400 acre-feet in 2030.

Scenario A with Conservation

The depletions in the Southwest Closed were estimated at about 95,900 acre-feet in 1985 (table 3-17) and are expected to decrease to 94,700 acre-feet in 2030 (figure 3-9). Based on the projected depletions, it appears that the Southwest Close Basin depletions will have a water surplus, in 2030, by 92,300 acre-feet. Annual depletions in 2030 are expected to account for about half of the available water supply (figure 3-9). There is a net savings in annual depletions of 10,500 acre-feet.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, total annual depletions in 2030 would be 149,200 acre-feet (table 3-17). Shortly after 2060, total annual depletions would exceed the annual available water supply (figure 3-9).

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 134,300 acre-feet, or about 72 percent of the total water supply available (table 3-17).

Upper Rio Grande Basin

Scenario A

The depletions in the Upper Rio Grande Basin were estimated at about 296,800 acre-feet in 1985 (table 3-18). Total depletions are expected to increase to 364,000 acre-feet in 2030 (figure 3-10).

The total supply of water available for depletions in the Upper Rio Grande Basin was estimated to be 395,000 acre-feet in 1985. Based on the projected depletions, it appears that the Upper Rio Grande Basin depletions will not exceed supply in 2030 by only 31,000 acre-feet. Annual depletions in 2030 are expected to account for 92 percent of the available water supply. Depletions should not exceed supply until the year 2050.

In 1985, agriculture accounted for about 51 percent (151,800 acre-feet) of the total water depletions and is expected to remain the dominant sector through 2030 accounting for about 42 percent of the total depletions (figure 3-10).

In 1985, municipal depletions ranked second in terms of total depletions, accounting for about 26 percent. They are expected to increase about 70 percent over the 45-year period and still rank second in terms of total depletions.

Evaporation (54,000 acre-feet) and minerals and power (8,500 acre-feet) ranked third and fourth, respectively, in water depletions during 1985. Evaporation is expected to increase to 56,800 acre-feet in 2030, while minerals and power are expected to increase 69 percent to 14,400 acre-feet in 2030. Self-supplied industries depletions ranked last in terms of depletions at 5,600 acre-feet in 1985. They are expected to increase about 70 percent to 9,600 acre-feet in 2030.

Scenario A with Conservation

The Upper Rio Grande depletions were estimated at 296,800 acre-feet in 1985. Under this scenario, they were estimated to decrease to 327,600 acre-feet due to conservation in 2030 (table 3-18). This is a savings of approximately 36,400 acre-feet. As in the case of the primary caveat, the water depletions will not exceed supply by 2040 (figure 3-10).

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, then shortly after the year 2010, depletions will exceed supplies. Total depletions in 2010 were estimated to be 387,400 acre-feet, increase to 430,500 acre-feet in 2020, and increase to 469,800 acre-feet in 2030 (table 3-18).

Scenario B with Conservation

Under this scenario, the depletions were estimated to decrease by 47,000 acre-feet due to conservation in 2030 (table 3-18). Under this scenario, they were estimated to decrease to 422,800 acre-feet due to conservation in 2030). As in the case of the primary caveat, the depletions will exceed supply by 2030. Under this caveat, the break-even point between depletions is moved about 10 years into the future, from 2010 to 200 due to depletions (figure 3-10).

Lower Rio Grande Basin

Scenario A

The depletions in the Lower Rio Grande Basin were estimated at about 421,000 acre-feet in 1985 (table 3-19) and are expected to decrease to 373,200 acre-feet in 2030 (figure 3-10). The total supply of water available for depletions in the Lower Rio Grande Basin was estimated to be 420,000 acre-feet in 1985. The Lower Rio Grande Basin is one of the two basins expected to have lower total depletions in 2030 than in 1985. The reason for this is large reservoir evaporation (221,800 acre-feet) in 1985 as compared to 154,400 acre-feet in 2030. Based on the projected depletions, it appears that the Lower Rio Grande Basin depletions will not exceed supply in 2030 by 46,500 acre-feet, or about 90 percent of the available annual water supply.

Table 3-18. Water Depletions by Water Use Category, Upper Rio Grande Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	151.8	151.8	136.6	257.6	231.8
Municipal	77.0	131.4	118.2	131.4	118.2
Industrial	5.6	9.6	8.7	9.6	8.7
Minerals	8.5	14.4	13.0	14.4	13.0
Evaporation	54.0	56.8	51.1	56.8	51.1
Total	296.8	364.0	327.6	469.8	422.8

Table 3-19. Water Depletions by Water Use Category, Lower Rio Grande Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	185.1	185.1	166.6	441.0	396.9
Municipal	11.4	27.3	24.5	27.3	24.5
Industrial	1.0	2.3	2.1	2.3	2.1
Minerals	1.7	4.1	3.7	4.1	3.7
Evaporation	221.8	154.4	139.0	154.4	139.0
Total	421.0	373.2	335.9	629.1	566.2

Table 3-20. Water Depletions by Water Use Category, Central Closed Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	61.6	61.6	55.4	116.0	104.4
Municipal	4.5	8.3	7.5	8.3	7.5
Industrial	3.0	5.6	5.0	5.6	5.0
Minerals	0.0	0.0	0.0	0.0	0.0
Evaporation	0.5	0.9	0.8	0.9	0.8
Total	69.6	76.4	68.8	130.8	117.7

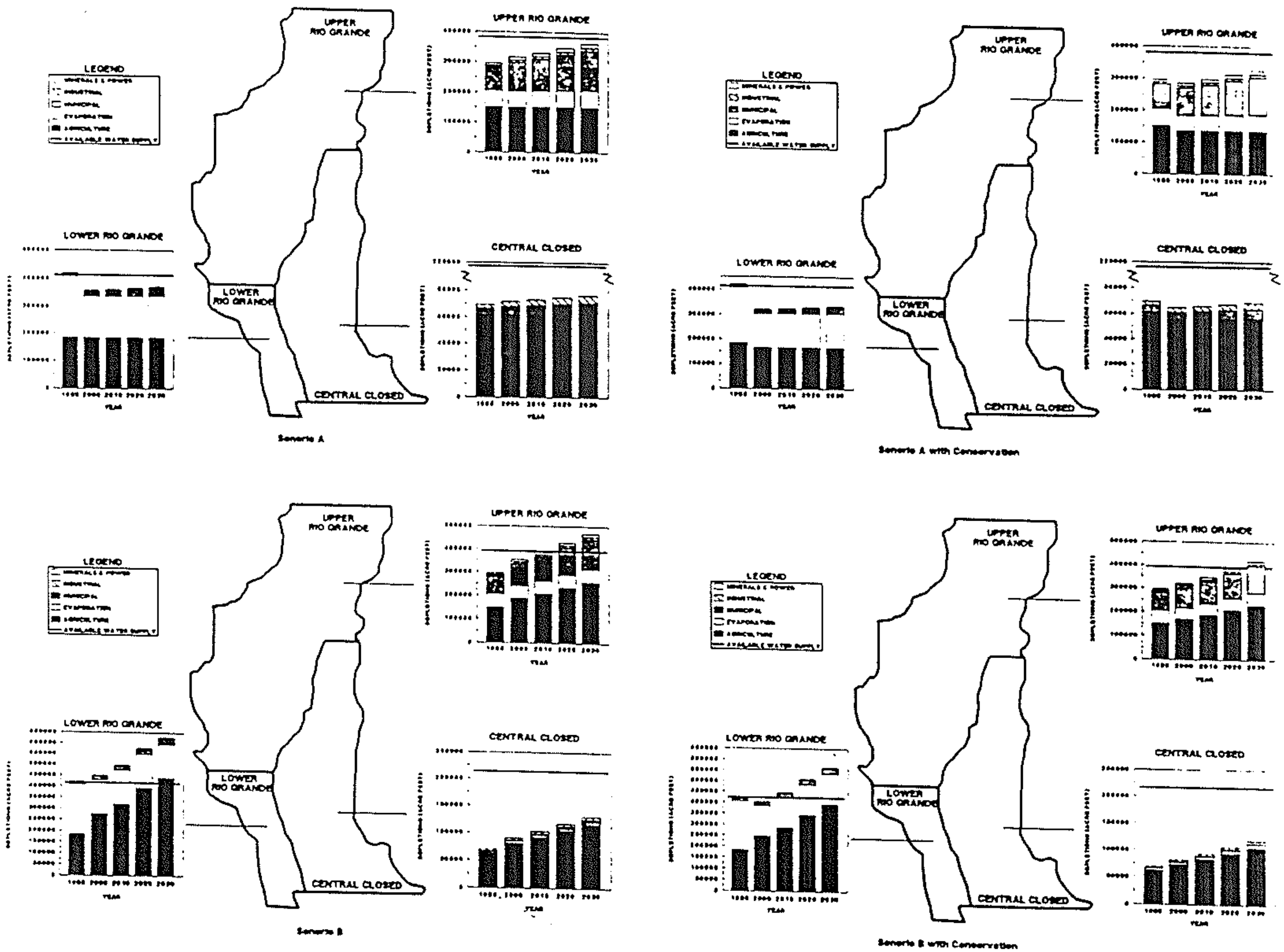


Figure 3 - 10. Water Depletion Projections by Senerio for Lower Rio Grande, Upper Rio Grande, and Central Closed Basins, Conservative Population Projection

This surplus should continue until approximately 2100.

In 1985, agriculture accounted for about 44 percent (185,100 acre-feet) of the total water depletions which was second behind evaporation at 53 percent (221,800 acre-feet). Agriculture is expected to become the dominant sector after 1985, accounting for about 50 percent of the total depletions (figure 3-10). Evaporation is expected to rank second in water depletions after 1985. Evaporation is expected to drop to 154,400 acre-feet after 1985.

In 1985, municipal depletions ranked third in terms of total depletions, accounting for about 3 percent. They are expected to increase about 139 percent over the 45-year period and still rank third in terms of total depletions. Mineral and power were ranked fourth in 1985 and are expected to increase 141 percent to 4,100 acre-feet in 2030. Self-supplied industries depletions were relatively minor at 1,000 acre-feet in 1985. They are expected to increase to 2,300 acre-feet by 2030.

Scenario A with Conservation

The Lower Rio Grande depletions were estimated at 421,000 acre-feet in 1985. Under this scenario, they were estimated to decrease to 335,900 acre-feet due to conservation in 2030 (table 3-19). This is a savings of approximately 37,300 acre-feet. As in the case of the primary caveat, the water depletions will not exceed supply by 84,100 in 2030 (figure 3-10).

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, then shortly before the year 2000, depletions will exceed supplies (figure 3-10). Total depletions in 2000 were estimated to be 450,200 acre-feet, increase to 498,100 acre-feet in 2010, and increase to 629,100 acre-feet in 2030 (table 3-19).

Scenario B with Conservation

Depletions under this caveat will exceed supplies in 2010. Total depletions were estimated to be 405,200 acre-feet in 2020, 448,300 acre-feet in 2010, and increase to 566,200 acre-feet in 2030 (table 3-19). Under this caveat, the break-even point between depletions and supplies is moved about 10 years in the future, from 2000 to 2010, due to conservation (figure 3-10).

Central Closed Basin

Scenario A

The depletions in the Central Closed Basin were estimated at about 69,600 acre-feet in 1985 (table 3-20) and are expected to increase to 76,400 acre-feet in 2030 (figure 3-10).

The total supply of water available for depletions in the Central Closed Basin was estimated to be 215,000 acre-feet in 1985. Based on the projected depletions, it appears that the Central Closed Basin depletions will not exceed supply in 2030 by 138,600 acre-feet. Annual depletions in 2030 will account for about 35 percent of the available water supply. This surplus should continue well beyond the year 2200.

In 1985, agriculture accounted for about 88 percent (61,600 acre-feet) of the total water depletions and is expected to remain the dominant sector, accounting for 81 percent of total depletions in 2030 (figure 3-10). In 1985, municipal depletions ranked second in terms of total depletions, accounting for about 6 percent. They are expected to increase about 84 percent over the 45-year period and still rank second in terms of total depletions. Self-supplied industries depletions ranked third at 3,000 acre-feet in 1985. They are expected to remain in third place (5,600 acre-feet) in 2030.

Evaporation and minerals ranked fourth and fifth, respectively, in water depletions during 1985. Evaporation is expected to increase to 900 acre-feet in 2030, while minerals and power are expected to be less than 100 acre-feet in 2030.

Scenario A with Conservation

The depletions in the Central Closed Basin were estimated at about 69,600 acre-feet in 1985 (table 3-20) and are expected to decrease slightly to 68,800 acre-feet in 2030 (figure 3-10). Based on the projection of depletions, it appears that the Central Closed Basin water supply will exceed depletions, in 2030 by 146,200 acre-feet. Annual depletions in 2030 are expected to account for only about one-third of the available water supply. There is a net savings in annual depletions of 7,600 acre-feet.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, total depletions in 2030 were estimated to be 130,800 acre-feet which is only about 60 percent of the available supply of water (table 3-20). Water supply should continue to exceed depletions until 2095.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 117,700 acre-feet (table 3-20). This is 54 percent of the total annual water supply in 2030 (figure 3-10).

Pecos River Basin

Scenario A

The depletions in the Pecos River Basin were estimated at about 414,000 acre-feet in 1985 (table 3-21) and are expected to increase to 420,100 acre-feet in 2030 (figure 3-11). The total supply of water available for depletions in the Pecos River Basin was estimated to be 435,000 acre-feet in 1985. Based on the projected depletions, it appears that the Pecos River Basin depletions will exceed the supply of water in 2030. This surplus should continue until the year 2070.

In 1985, agriculture accounted for about 77 percent (320,100 acre-feet) of the total water depletions and is expected to remain the dominant sector through 2030 (figure 3-11). Evaporation (70,200 acre-feet) ranked second in water depletions during 1985. Evaporation is expected to drop to 62,700 acre-feet in 2030.

In 1985, municipal depletions ranked third in terms of total depletions, accounting for about 4 percent. Municipal depletions are expected to increase 59 percent over the 45-year period and still rank third in terms of total depletions. Mineral and power were ranked fourth in total depletions at 4,800 acre-feet and are expected to increase 52 percent to 7,300 acre-feet in 2030.

Scenario A with Conservation

The depletions in the Pecos Basin are expected to decrease to 378,100 acre-feet in 2030 due to conservation (figure 3-11). Based on the projected depletions, it appears that the Pecos Basin water supply will exceed depletions, in 2030, by 56,900 acre-feet. Annual depletions in 2030 are expected to only account for 87 percent of the available water supply. However, there is a net savings in annual depletions of 42,000 acre-feet.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, then shortly before the year 2000, depletions will exceed supplies (figure 3-11). Total depletions in 2000 were estimated to be 466,600 acre-feet, increase to 566,700 acre-feet in 2020, and 616,100 acre-feet in 2030 (table 3-21).

Scenario B with Conservation

Depletions under this caveat will exceed supplies by 2010 (figure 3-11). Total depletions in the year 2000 were estimated to be 420,000 acre-feet, 467,700 in 2010, and increase to 554,500 acre-feet in 2030 (table 3-21). Under this caveat, the break-even point between depletions and supplies is moved about 10 years into the future, from 2000 to 2010, due to conservation.

Arkansas-Red-White River Basin

Scenario A

The depletions in the ARW River Basin were estimated at 205,500 acre-feet in 1985 (table 3-22) and are expected to decrease to 197,600 acre-feet in 2030 (figure 3-11). The ARW Basin is the second basin expected to have reduced depletions in 2030 because of reservoir evaporation. The total supply of water available for depletions in the ARW River Basin was estimated to be 424,000 acre-feet in 1985. Based on the projected depletions, it appears that the ARW River Basin depletions will not exceed supply by 2030 by 226,400 acre-feet. Annual depletions in 2030 are expected to account for only 47 percent of the available annual water supply (figure 3-11). The available water supply should continue exceeding depletions beyond the year 2200.

In 1985, agriculture accounted for about 72 percent (147,700 acre-feet) of the total water

Table 3-21. Water Depletions by Water Use Category, Pecos River Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	320.1	320.1	288.1	516.1	464.5
Municipal	18.0	28.7	25.8	28.7	25.8
Industrial	0.8	1.3	1.2	1.3	1.2
Minerals	4.8	7.3	6.6	7.3	6.6
Evaporation	70.2	62.7	56.4	62.7	56.4
Total	414.0	420.1	378.1	616.1	554.5

Table 3-22. Water Depletions by Water Use Category, Arkansas-Red-White River Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	147.7	147.7	133.0	190.9	171.8
Municipal	2.7	3.5	3.2	3.5	3.2
Industrial	0.0	0.0	0.0	0.0	0.0
Minerals	0.4	0.6	0.5	0.6	0.5
Evaporation	54.6	45.7	41.2	45.7	41.2
Total	205.5	197.6	177.9	240.8	216.7

Table 3-23. Water Depletions by Water Use Category, Texas Gulf Basin, Conservative Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	299.3	299.3	269.4	438.6	394.8
Municipal	10.9	16.0	14.4	16.0	14.4
Industrial	1.3	1.9	1.7	1.9	1.7
Minerals	8.4	12.3	11.1	12.3	11.1
Evaporation	0.9	1.3	1.2	1.3	1.2
Total	320.8	330.8	297.7	470.1	423.1

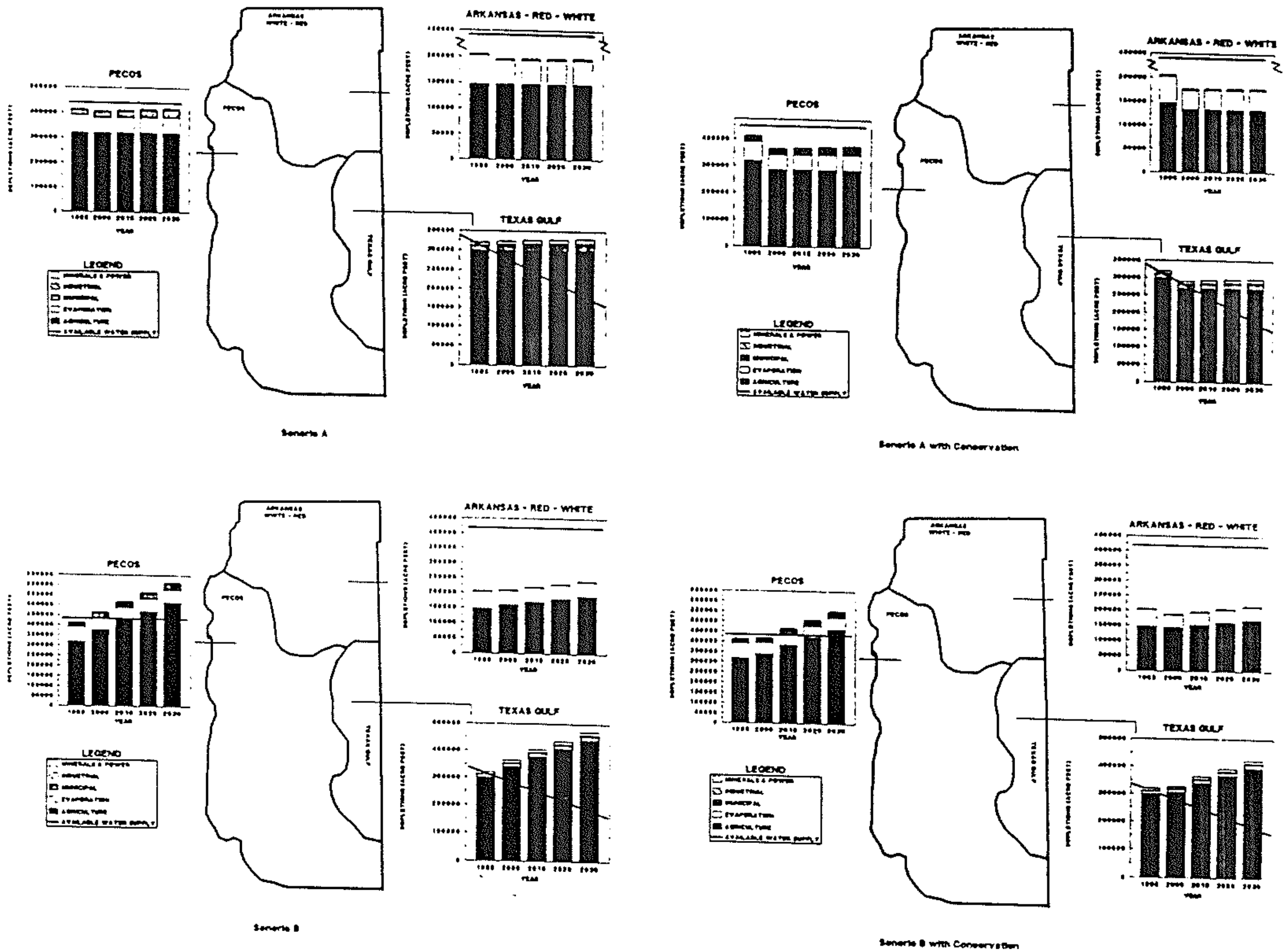


Figure 3 - 11. Water Depletion Projections by Senerio for Pecos, Texas Gulf, and Arkansas-Red-White Basin. Conservative Population Projection

depletions and is expected to remain the dominant sector through 2030 (figure 3-11).

Evaporation (54,600 acre-feet) was ranked second in water depletions during 1985. Evaporation is expected to drop to 45,700 acre-feet in 2030.

In 1985, municipal depletions ranked third in terms of total depletions, accounting for about one percent. They are expected to increase about 30 percent over the 45-year period and still rank third in terms of total depletions. Mineral and power were relatively minor in 1985 and are expected to remain that way (600 acre-feet) in 2030. Self-supplied industries depletions were non-existent in 1985 and are expected to remain the same in 2030.

Scenario A with Conservation

The depletions in the ARW River Basin are expected to decrease to 177,900 acre-feet in 2030 (figure 3-11). Based on the projected depletions, it appears that the ARW River Basin water supply will exceed depletions, in 2030, by 246,100 acre-feet. However, there is a net savings in annual depletions of 19,700 acre-feet. Annual depletions in 2030 are expected to account for only about 42 percent of the available water supply.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, total depletions in 2030 will amount to 240,800 acre-feet, which is about 57 percent of the available supply of water (figure 3-11).

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions were 216,700 acre-feet in 2030 (table 3-22). Annual depletions in 2030 account for about half of the total annual water supplies.

Texas Gulf Basin

Scenario A

The depletions in the Texas Gulf Basin were estimated at about 320,800 acre-feet in 1985 (table 3-23) and are expected to increase to 330,800 acre-feet in 2030 (figure 3-11). The total supply of water available for depletions in the Texas Gulf Basin was estimated to be 342,000 acre-feet in 1985, decrease to 328,000 acre-feet in 2000, 217,000 acre-feet in 2020, and 152,000 acre-feet in 2030. Based on the projected depletions, it appears that the Texas Gulf Basin depletions will exceed supply by 1990.

In 1985, agriculture accounted for about 93 percent (299,300 acre-feet) of the total water depletions and is expected to remain the dominant sector through 2030 (figure 3-11). In 1985, municipal depletions ranked second in terms of total depletions, accounting for about 3 percent. Municipal depletions are expected to increase about 47 percent over the 45-year period and still rank second in terms of total depletions.

Minerals (8,400 acre-feet) and industrial (1,300 acre-feet) ranked third and fourth, respectively, in water depletions during 1985. Mineral water use is expected to increase to 12,300 acre-feet in 2030, while industrial are expected to increase 46 percent to 1,900 acre-feet in 2030. Evaporation depletions were relatively minor in 1985. They are expected to remain minor (1,300 acre-feet) by 2030.

Scenario A with Conservation

The depletions in the Texas Gulf Basin are expected to decrease to 297,700 acre-feet in 2030 due to conservation (figure 3-11). There is a net savings in depletions of 33,100 acre-feet.Based on the projected depletions, it appears that the Texas Gulf Basin depletions will exceed supply shortly after 1985.

Scenario B

If agricultural depletions are permitted to grow at the same rate as population, the water deficit will grow more rapidly. Total depletions in 2000 were estimated to be 328,000 acre-feet, increase to 435,700 acre-feet in 2020, and 470,100 acre-feet in 2030 (table 3-23).

Scenario B with Conservation

Depletions under this caveat will exceed supplies shortly after 1985. Total depletions in 2000 were estimated to be 327,600 acre-feet, increase to 392,100 acre-feet in 2020 and 423,100 acre-feet in 2030 (table 3-23).

POTENTIAL ECONOMIC GROWTH SCENARIO

This growth scenario is based on the population projection developed by Peach and Williams at New Mexico State University. The growth in population is faster under this scenario than for the Conservative Population Projection, therefore, the projected depletions are expected to be higher.

State

Scenario A

The state depletions were estimated at 2.2 million acre-feet in 1985. Under this scenario, they were estimated to increase to 2.3 million acre-feet in 2030 (table 3-24). This is an increase in depletions of approximately 156,800 acre-feet or about 11 percent over the Conservative Economic Growth Scenario. The total supply of water for depletions was estimated to be 3.2 million acre-feet in 1985 and is expected to decrease slowly to 3.1 million in 2030 due to groundwater mining in the Texas Gulf Basin. As in the case of the Conservative Economic Growth Scenario, the state's water depletions will not exceed supply by 2030. At the rate that depletions are increasing, the state has enough total water supplies to last for an additional 40 to 50 years. However, this large surplus is somewhat misleading because much of this surplus will be located in basins with low economic potential and population projections.

The relationship between water-use categories remain the same as for the Conservative Population Projection Scenarios--agriculture accounting for about 64 percent of the state's depletions in 2030, evaporation second at about 16 percent of the state's depletions, municipal, third at 11 percent, minerals at 8 percent, and industrial at about one percent (table 3-34).

Scenario A with Conservation

Depletions are estimated to decrease to 2.1 million acre-feet in 2030 due to conservation (table 3-24). This is a savings of approximately 232,800 acre-feet over the primary caveat. As in the case of the primary caveat, the state's water supply will exceed depletions in 2030 by about 1.0 million acre-feet. However, this large surplus is somewhat misleading since much of this surplus will be located in basins with low projected economic potential and population projections. For example, 300,000 acre-feet of water surplus are located in the Upper Colorado River Basin, 109,000 acre-feet in the Lower Colorado River Basin, 82,000 acre-feet in the Southwest Closed, 138,000 acre-feet in the Central Closed and 226,000 acre-feet in the Arkansas-Red-White.

The relationship between water-use categories remain the same as for the Potential Economic Growth Scenario--agriculture accounting for about 64 percent of the state's depletion in 2030, evaporation second at about 16 percent of the state's depletions, municipal, third at 11 percent, minerals at 8 percent, and industrial at about one percent (table 3-24). These depletions by water-use categories would be about 10 percent less, due to conservation, than the primary caveat.

Scenario B

If agricultural depletions had been permitted to grow at the same rate as other economic activity, then depletions would be about equal to supply between 2010 and 2020, under this caveat (table 3-24). The water depletions in 2010 were estimated at 3.0 million acre-feet and 3.4 million acre-feet in 2020 while supply was estimated at 3.2 million acre-feet.

Scenario B with Conservation

Conservation would add about 10 years to the point where depletions equal supply. Depletions in 2020 were estimated at 3.1 million acre-feet and 3.4 million acre-feet in 2030 (table 3-24).

River Basins

Upper Colorado River Basin

Scenario A

The depletions in the Upper Colorado River Basin were estimated at about 300,000 acre-feet in 1985 (table 3-25) and are expected to increase to 371,000 acre-feet in 2030 (figure 3-12). The depletions in 2030 are about 2,500 acre-feet below the Conservative Scenario. The population projection under this scenario is ex-

Table 3-24. Water Depletions by Water Use Category, New Mexico, Potential Population Projection, 1985-2030.

Water Use Category	Depletions				
	1985	2000	2010	2020	2030
	(thousands of acre-feet)				
	Scenario A				
Agricultural	1,483.8	1,483.8	1,483.8	1,483.8	1,483.8
Municipal	138.6	183.6	208.4	229.9	260.1
Industrial	12.4	16.0	17.9	19.6	22.0
Minerals	88.5	124.3	148.5	173.6	197.3
Evaporation	448.5	350.3	355.2	359.7	365.4
Total	2,171.7	2,158.0	2,213.7	2,266.6	2,328.5
	Scenario A +10% Conservation				
Agricultural	1,483.8	1,335.4	1,335.4	1,335.4	1,335.4
Municipal	138.6	165.3	187.6	206.9	234.1
Industrial	12.4	14.4	16.1	17.7	19.8
Minerals	88.5	111.9	133.6	156.3	177.6
Evaportion	448.5	315.3	319.7	323.7	328.8
Total	2,171.7	1,942.2	1,992.4	2,039.9	2,095.7
	Scenario B				
Agricultural	1,483.8	1,985.7	2,301.5	2,615.0	2,947.2
Municipal	138.6	183.6	208.4	229.9	260.1
Industrial	12.4	16.0	17.9	19.6	22.0
Minerals	88.5	124.3	148.5	173.6	197.3
Evaporation	448.5	350.3	355.2	359.7	365.4
Total	2,171.7	2,659.9	3,031.5	3,397.9	3,791.9
	Scenario B +10% Conservation				
Agricultural	1,483.8	1,787.1	2,071.4	2,353.5	2,652.4
Municipal	138.6	165.3	187.6	206.9	234.1
Industrial	12.4	14.4	16.1	17.7	19.8
Minerals	88.5	111.9	133.6	156.3	177.6
Evaporation	448.5	315.3	319.7	323.7	328.8
Total	2,171.7	2,393.9	2,728.4	3,058.1	3,412.7

pected to be about 11,600 persons less than under the Conservative Scenario (tables 3-11 and 3-12). Peach and Williams (1986) expected the population to grow at a slower rate than did the BBER (1987). The BBER recently revised the population projection upward for Northwestern New Mexico because of the potential for a faster than expected recovery in the minerals and power sector of the economy.

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 58 percent of the total annual depletions, minerals about 28 percent, evaporation about 9 percent, municipal about 5 percent and industrial less than one percent of the total annual depletions (table 3-25).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 674,000 acre-feet over the period of this analysis (figure 3-12). Based on the projected depletions, it appears that the Upper Colorado River Basin depletions will not exceed supply, in 2030, by 303,000 acre-feet. Depletions in 2030 account for 55 percent of the available supply. This surplus should continue beyond the year 2200.

Scenario A with Conservation

The depletions in the Upper Colorado River Basin are expected to increase to 355,300 acre-feet in 2030 under this caveat (table 3-25). However, there is a net savings in depletions of 15,700 acre-feet over the primary caveat. Based on the projected depletions, it appears that the Upper Colorado River Basin depletions will not exceed supply in 2030 by 318,700 acre-feet (figure 3-12). Annual depletions in 2030 are expected to account for about 53 percent of available water supply.

Scenario B

Depletions under this caveat will exceed supplies before 2030. Total depletions in 2020 were estimated to be 645,100 acre-feet and increase to 741,600 acre-feet in 2030 (table 3-25). Under this scenario, the break-even point between depletions and supplies is moved about 10 years in the future, from 2020 to 2030, when compared to the Conservative Scenario (figure 3-12).

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 667,400 acre-feet (table 3-25). Under this caveat, the break-even point between depletions and supplies is shortly after 2030 since annual water supplies exceed annual depletions by only 6,600 acre-feet (figure 3-12).

Lower Colorado River Basin

Scenario A

The depletions in the Lower Colorado River Basin were estimated at about 48,400 acre-feet in 1985 (table 3-26) and are expected to increase to 66,400 acre-feet in 2030 (figure 3-12). The depletions in 2030 are about 1,900 acre-feet below the Conservative Scenario. The population projection under this scenario is expected to be about 6,400 persons less than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Minerals in 2030 is expected to account for about 42 percent of the total annual depletions, agriculture about 38 percent, municipal about 10 percent, evaporation about 9 percent and industrial less than one percent of the total annual depletions (table 3-26).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 157,000 acre-feet over the period of this analysis. Based on the projected depletions, it appears that the Lower Colorado River Basin water supply will exceed depletions in 2030 by 303,000 acre-feet (figure 3-12), with this surplus continuing through the year 2200. Depletions in 2030 account for about 42 percent of the available water supply.

Scenario A with Conservation

The depletions in the Lower Colorado River Basin are expected to increase to 59,700 acre-feet in 2030 (table 3-26). However, there is a savings in annual depletions of 6,700 acre-feet due to conservation. Based on the projected depletions, it appears that the Lower Colorado River Basin water supply will exceed depletions,

Table 3-25. Water Depletions by Water Use Category, Upper Colorado River Basin, Potential Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	213.6	213.6	213.6	584.2	525.7
Municipal	6.9	18.9	17.0	18.9	17.0
Industrial	0.2	0.6	0.5	0.6	0.5
Minerals	38.5	105.4	94.8	105.4	94.8
Evaporation	40.3	32.5	29.3	32.5	29.3
Total	299.6	371.0	355.3	741.6	667.4

Table 3-26. Water Depletions by Water Use Category, Lower Colorado River Basin, Potential Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	25.4	25.4	22.9	52.2	47.0
Municipal	3.4	6.9	6.2	6.9	6.2
Industrial	0.2	0.5	0.4	0.5	0.4
Minerals	13.4	27.6	24.8	27.6	24.8
Evaporation	6.0	6.0	5.4	6.0	5.4
Total	48.4	66.4	59.7	93.2	83.9

Table 3-27. Water Depletions by Water Use Category, Southwest Closed Basin, Potential Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	79.1	79.1	71.2	139.2	125.3
Municipal	3.7	6.5	5.8	6.5	5.8
Industrial	0.1	0.2	0.2	0.2	0.2
Minerals	12.7	22.4	20.2	22.4	20.2
Evaporation	0.3	0.5	0.4	0.5	0.4
Total	95.9	108.6	97.8	168.7	151.9

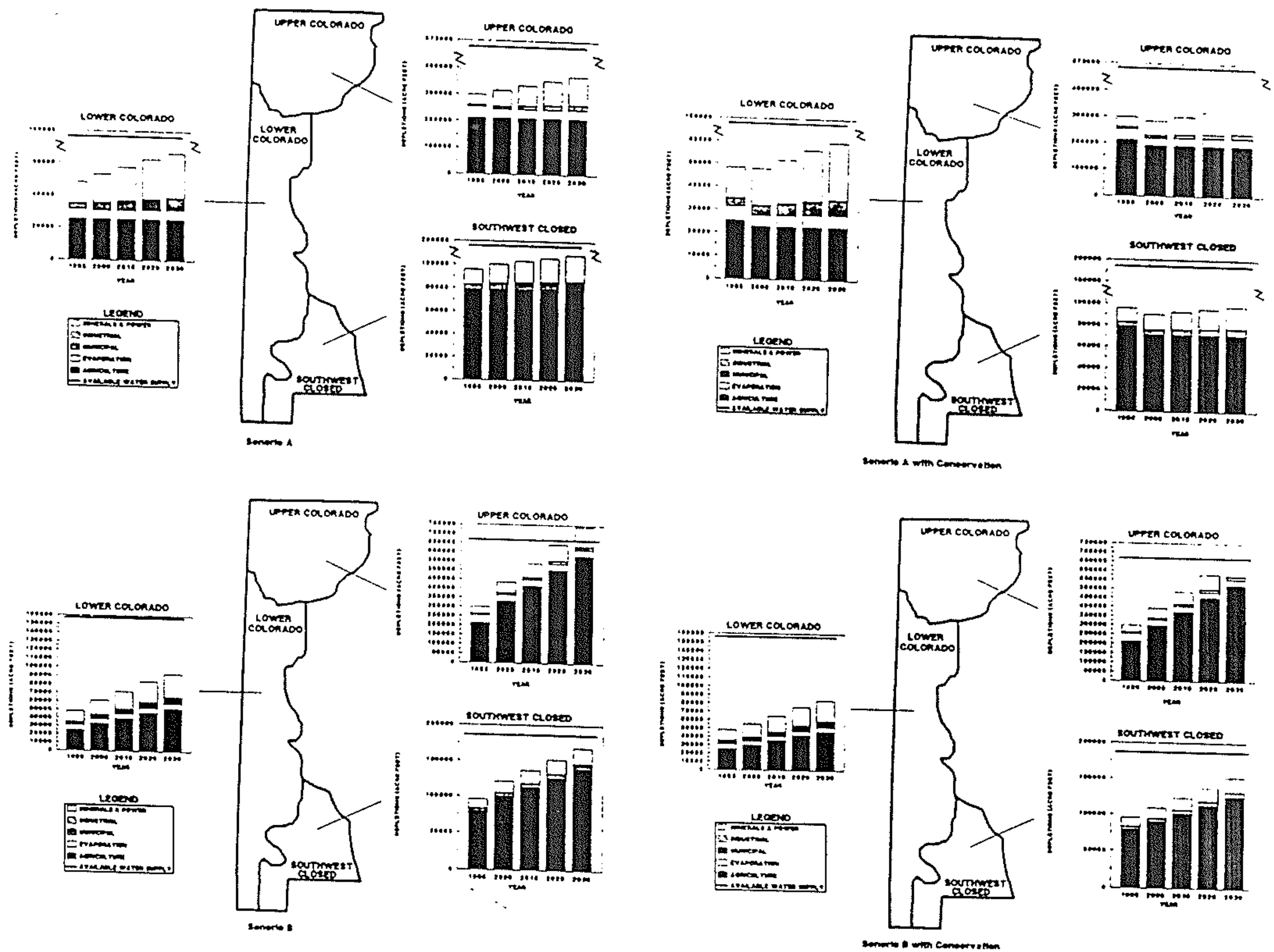


Figure 3 -12. Water Depletion Projections by Senerio for Upper Colorado, Lower Colorado and Southwest Closed Basins, Potential Population Projection in 2030, by 97,300 acre-feet (figure 3-12). The annual depletions in 2030 are expected to account for only about 38 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 93,200 acre-feet (table 3-26). Depletions under this scenario are about 4,700 acre-feet below the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is near the year 2100.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 83,900 acre-feet (table 3-26) which is about 53 percent of the available water supply. The break-even point between depletions and supplies will extend well towards the 22nd century.

Southwest Closed Basin

Scenario A

The depletions in the Southwest Closed Basin were estimated at about 95,900 acre-feet in 1985 (table 3-27) and are expected to increase to 108,600 acre-feet in 2030 (figure 3-12). The depletions in 2030 are about 3,400 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 12,200 persons more than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 73 percent of the total annual depletions, minerals about 20 percent, municipal about 6 percent, evaporation and industrial less than one percent each of the total annual depletions (table 3-27).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 187,000 acre-feet over the period of this analysis (figure 3-12). Based on the projected depletions, it appears that the Southwest Closed Basin depletions will not exceed supply, in 2030, by 303,000 acre-feet. Depletions in 2030 account for about 58 percent of the available supply. This surplus should continue through 2200.

Scenario A with Conservation

The depletions in the Southwest Closed are expected to increase to 97,800 acre-feet in 2030 (table 3-27). However, there is a net savings in annual depletions of 10,800 acre-feet due to conservation. Based on the projected depletions, it appears that the Southwest Closed Basin depletions will not exceed supply in 2030 by 89,200 acre-feet (figure 3-12). Annual depletions in 2030 are expected to account for about 52 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 168,700 acre-feet (table 3-27). Depletions under this scenario are about 19,500 acre-feet above the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is between 2040 and 2050.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 151,900 acre-feet or about 81 percent of the total water supply available (table 3-27). The break-even point between depletions and supplies is expected to occur before 2040.

Upper Rio Grande Basin

Scenario A

The depletions in the Upper Rio Grande Basin were estimated at about 296,800 acre-feet in 1985 (table 3-28) and are expected to increase to 369,200 acre-feet in 2030 (figure 3-13). The depletions in 2030 are about 5,200 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 63,500 persons more than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in

2030 is expected to account for about 41 percent of the total annual depletions, municipal about 37 percent, evaporation about 16 percent, minerals about 4 percent and industrial about 3 percent of the total annual depletions (table 3-28).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 395,000 acre-feet over the period of this analysis (figure 3-13). Based on the projected depletions, it appears that the Upper Rio Grande Basin depletions will not exceed supply, in 2030, by 25,800 acre-feet. However, the basin's depletions will exceed supplies very shortly after 2040.

Scenario A with Conservation

The depletions in the Upper Rio Grande Basin are expected to increase to 332,300 acre-feet in 2030 (figure 3-13). However, there is a net savings in annual depletions of 36,900 acre-feet. Based on the projected depletions, it appears that the Upper Rio Grande Basin water supply will exceed depletions, in 2030, by 62,700 acre-feet. Annual depletions in 2030 are expected to only account for 84 percent of the available water supply.

Sceario B

Depletions under this caveat will exceed supplies in 2030 (figure 3-13). Total depletions in 2010 were estimated to be 404,600 acre-feet, 431,900 acre-feet in 2020, and increase to 483,200 acre-feet in 2030 (table 3-28). Under this scenario, the break-even point between depletions and supplies is moved from 2020 to 2010 when compared to the Conservative Scenario.

Scenario B with Conservation

Depletions under this caveat will exceed supplies by 2030 (figure 3-13). Total depletions in 2020 were estimated to be 388,700 acre-feet and increase to 434,800 acre-feet in 2030 (table 3-28). Under this caveat, the break-even point between depletions and supplies is moved about 10 years in the future, from 2010 to 2020, due to conservation.

Lower Rio Grande Basin

Scenario A

The depletions in the Lower Rio Grande Basin were estimated at about 421,000 acre-feet in 1985 (table 3-29) and are expected to decrease to 376,100 acre-feet in 2030 (figure 3-13). The decrease in depletions are due to the 67,100 acre-feet reduction in evaporation. The depletions in 2030 are about 3,100 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 16,300 persons more than under the Conservative Scenario (tables 3-11 and 3-12). As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 49 percent of the total annual depletions, evaporation about 41 percent, municipal about 8 percent, minerals about 1 percent, and industrial less than one percent of the total annual depletions (table 3-29).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 420,000 acre-feet over the period of this analysis (figure 3-13). Based on the projected depletions, it appears that the Lower Rio Grande Basin water supply will exceed depletions in 2030 by 44,000 acre-feet. However, the basin's depletions will exceed supplies very shortly after 2100.

Scenario A with Conservation

The depletions in the Lower Rio Grande Basin are expected to decrease to 338,500 acre-feet in 2030 (table 3-29). However, there is a net savings in annual depletions of 37,600 acre-feet. Based on the projected depletions, it appears that the Lower Rio Grande Basin depletions will not exceed supply in 2030 by 81,500 acre-feet (figure 3-13). Annual depletions in 2030 are expected to only account for 81 percent of the available water supply.

Scenario B

Depletions under this caveat will exceed supplies in 2030 (figure 3-13). Total depletions in 2030 were estimated to be 666,100 acre-feet (table 3-29), which is 246,100 acre-feet above available supplies. Depletions under this

Table 3-28. Water Depletions by Water Use Category, Upper Rio Grande Basin, Potential Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	151.8	151.8	136.6	265.8	239.2
Municipal	77.0	135.3	121.8	135.3	121.8
Industrial	5.6	9.9	8.9	9.9	8.9
Minerals	8.5	14.9	13.4	14.9	13.4
Evaporation	54.0	57.3	51.6	57.3	51.6
Total	296.8	369.2	332.3	483.2	434.8

Table 3-29. Water Depletions by Water Use Category, Lower Rio Grande Basin, Potential Population Projection, 1985-2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	185.1	185.1	166.6	475.1	427.6
Municipal	11.4	29.4	26.4	29.4	26.4
Industrial	1.0	2.5	2.3	2.5	2.3
Minerals	1.7	4.4	3.9	4.4	3.9
Evaporation	221.8	154.7	139.3	154.7	139.3
Total	421.0	376.1	338.5	666.1	599.5

Table 3-30. Water Depletions by Water Use Category, Central Closed Basin, Potential Population Projection, 1985-2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	61.6	61.6	55.8	124.4	112.0
Municipal	4.5	7.3	6.6	7.3	6.6
Industrial	3.0	4.7	4.2	4.7	4.2
Minerals	0.0	0.0	0.0	0.0	0.0
Evaporation	0.5	0.8	0.7	0.8	0.7
Total	69.6	74.4	67.3	137.2	123.5

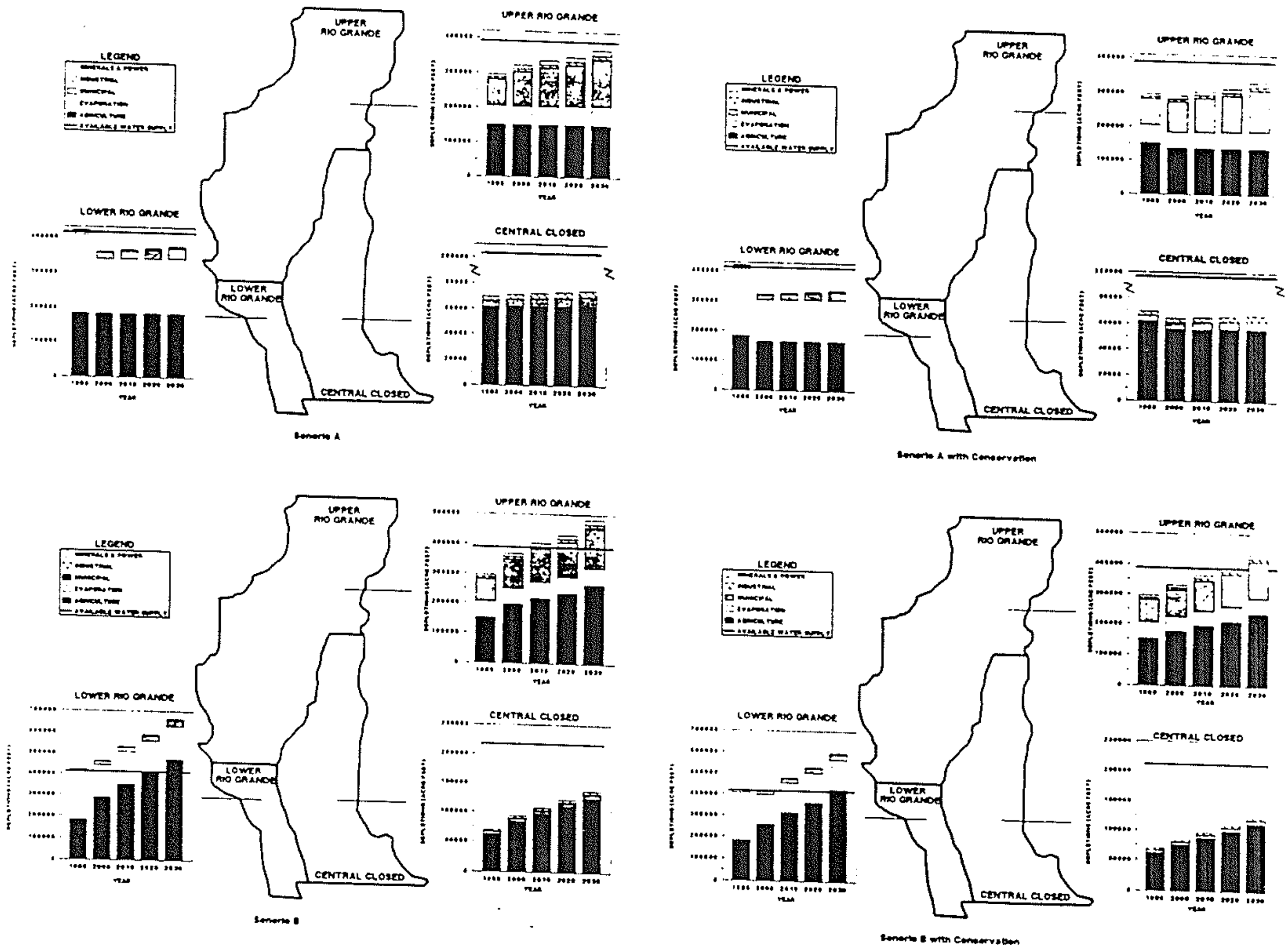


Figure 3 - 13. Water Depletion Projections by Senerio for Lower Rio Grande, Upper Rio Grande, and Central Closed Basins, Potential Population Projection

scenario are about 37,000 acre-feet above the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is about 1995.

Scenario B with Conservation

Depletions under this caveat will exceed supplies by 2010 (figure 3-13). Total depletions in the year 2000 were estimated to be 417,800 acre-feet, 480,000 acre-feet in 2010, and increase to 599,500 acre-feet in 2030 (table 3-29). Under this caveat, the break-even point between depletions and supplies is moved about 10 years in the future, from just under the year 2000, to over the year 2000, due to conservation.

Central Closed Basin

Scenario A

The depletions in the Central Closed Basin were estimated at about 69,600 acre-feet in 1985 (table 3-30) and are expected to increase to 74,400 acre-feet in 2030 (figure 3-13). The depletions in 2030 are about 2,000 acre-feet below the Conservative Scenario. The population projection under this scenario is expected to be about 14,300 persons less than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 83 percent of the total annual depletions, municipal about 10 percent, industrial about 6 percent, evaporation and minerals less than one percent each of the total annual depletions (table 3-30).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 215,000 acre-feet over the period of this analysis (figure 3-13). Based on the projected depletions, it appears that the Central Closed Basin depletions will not exceed supply in 2030 by 140,600 acre-feet. Depletions in 2030 account for only about one-third of the available supply. This surplus should continue through the year 2200.

Scenario A with Conservation

The depletions in the Central Closed Basin are expected to decrease slightly to 67,300 acre-feet in 2030 (table 3-30). However, there is a net savings in annual depletions of 7,100 acre-feet (figure 3-13). Based on the projected depletions, it appears that the Central Closed Basin water supply will exceed depletion in 2030 by 147,700 acre-feet. Annual depletions in 2030 are expected to account for only about 31 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030 (figure 3-13). Total depletions in 2030 were estimated to be 137,200 acre-feet (table 3-30). Depletions under this scenario are about 6,400 acre-feet above the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is more than 50 years beyond 2030.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030 (figure 3-13). Total depletions in 2030 were estimated to be 123,500 acre-feet (table 3-30). This is only 57 percent of the total annual water supply in 2030. The break-even point will be beyond the year 2080.

Pecos River Basin

Scenario A

The depletions in the Pecos River Basin were estimated at about 414,000 acre-feet in 1985 (table 3-31) and are expected to increase to 431,100 acre-feet in 2030 (figure 3-14). The depletions in 2030 are about 11,000 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 71,000 persons more than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 74 percent of the total annual depletions, evaporation about 15 percent, municipal about 8 percent, minerals about 2 percent, and industrial less than one percent of the total annual depletions (table 3-31).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 435,000

Table 3-31. Water Depletions by Water Use Category, Pecos River Basin, Potential Population Projection, 1985-2030.

Water Use Category	Base Year 1985	Scenario - 2030 A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	320.1	320.1	288.1	622.0	559.8
Municipal	18.0	34.8	31.3	34.8	31.3
Industrial	0.8	1.6	1.4	1.6	1.4
Minerals	4.8	9.1	8.2	9.1	8.2
Evaporation	70.2	65.5	58.6	65.5	58.6
Total	414.0	431.1	387.6	733.0	659.3

Table 3-32. Water Depletions by Water Use Category, Arkansas-Red-White River Basin, Potential Population Projection, 1985-2030.

Water Use Category	Base Year 1985	Scenario - 2030 A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	147.7	147.7	133.0	222.2	200.0
Municipal	2.7	4.1	3.7	4.1	3.7
Industrial	0.0	0.0	0.0	0.0	0.0
Minerals	0.4	0.6	0.6	0.6	0.6
Evaporation	54.6	46.7	42.1	46.7	42.1
Total	205.5	199.2	179.4	273.7	246.4

Table 3-33. Water Depletions by Water Use Category, Texas Gulf Basin, Potential Population Projection, 1985-2030.

Water Use Category	Base Year 1985	Scenario - 2030 A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	299.3	299.3	269.4	462.0	415.8
Municipal	10.9	16.8	15.1	16.8	15.1
Industrial	1.3	2.0	1.8	2.0	1.8
Minerals	8.4	13.0	11.7	13.0	11.7
Evaporation	0.9	1.4	1.2	1.4	1.2
Total	320.8	332.5	299.2	495.2	445.7

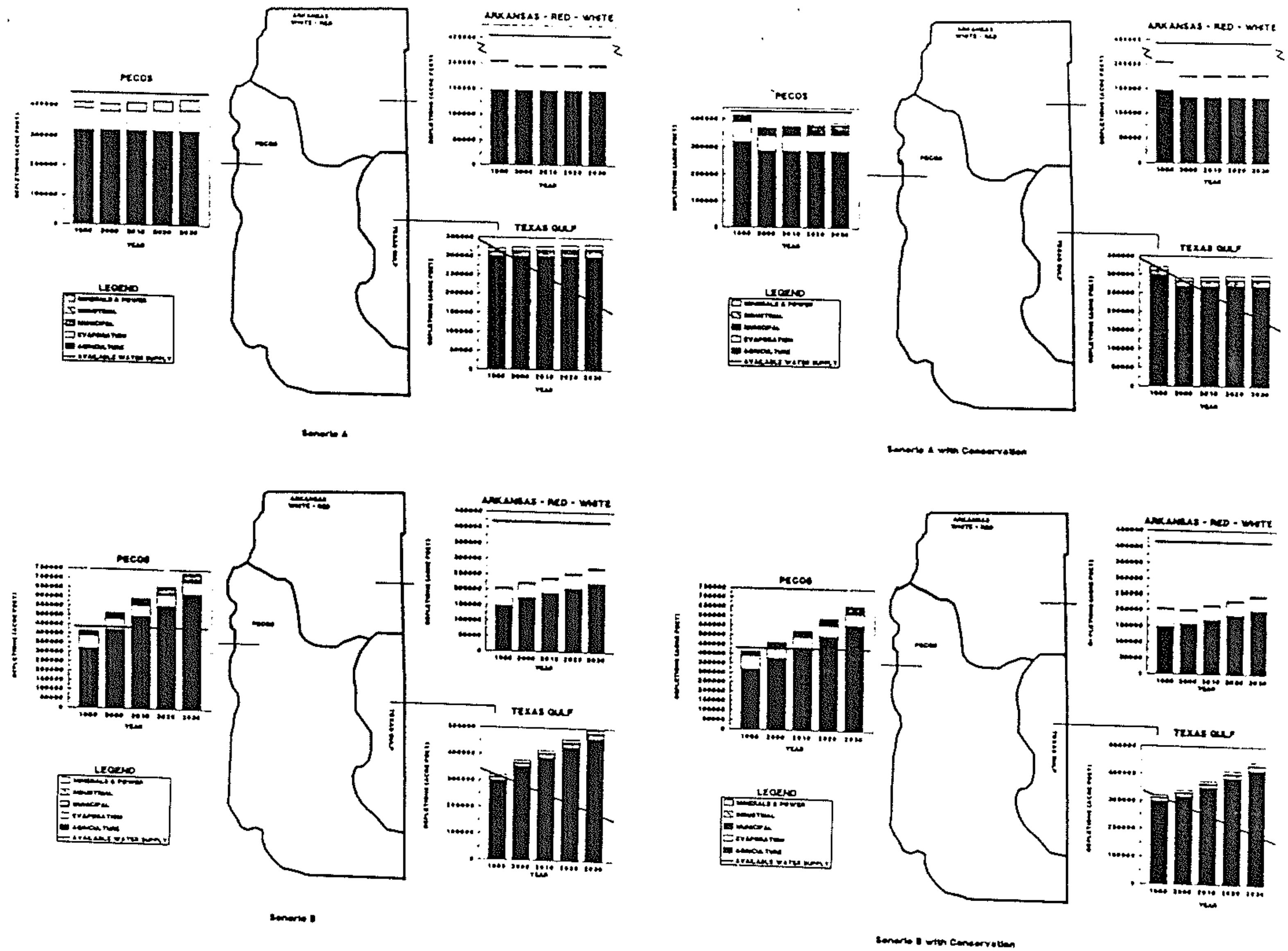


Figure 3 - 14. Water Depletion Projections by Senerio for Pecos, Texas Gulf, and Arkansas-Red-White Basin, Potential Population Projection

acre-feet over the period of this analysis (figure 3-14). Based on the projected depletions, it appears that the Pecos River Basin depletions will not exceed supply in 2030 by 3,900 acre-feet. However, the basin's depletions will exceed supplies by 2040.

Scenario A with Conservation

The annual depletions in the Pecos River Basin are expected to decrease to 387,600 acre-feet in 2030 (table 3-31). However, there is a net savings in annual depletions of 43,500 acre-feet. Based on the projected depletions, it appears that the Pecos River Basin depletions will not exceed supply in 2030 by 47,400 acre-feet (figure 3-14). Annual depletions in 2030 are expected to account for 89 percent of the available water supply. The break-even point under this caveat will be near the year 2040.

Scenario B

Depletions under this caveat will exceed supplies in 2030 (figure 3-14). Total depletions in 2030 were estimated to be 733,000 acre-feet (table 3-31), which is 298,000 acre-feet above supplies. Depletions under this scenario are about 117,000 acre-feet above the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is between 1990 and 1995.

Scenario B with Conservation

Depletions under this caveat will exceed supplies by the year 2000 (figure 3-14). Total depletions in the year 2000 were estimated to be 463,600 acre-feet and increase to 659,300 acre-feet in 2030 (table 3-31). Under this caveat, the break-even point between depletions and supplies is moved about 10 years in the future, from 1990 to 2000, due to conservation.

Arkansas-Red-White River Basin

Scenario A

The depletions in the ARW Basin were estimated at about 205,500 acre-feet in 1985 (table 3-32) and are expected to decrease to 199,200 acre-feet in 2030 (figure 3-14). The depletions in 2030 are about 1,600 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 8,900 persons more than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 74 percent of the total annual depletions, evaporation about 23 percent, municipal about 2 percent, industrial and minerals less than one percent each of the total annual depletions (table 3-32).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 424,000 acre-feet over the period of this analysis (figure 3-14). Based on the projected depletions, it appears that the ARW River Basin water supply will exceed depletions in 2030 by 224,800 acre-feet. Depletions account for about 47 percent of the available supply. This surplus should continue beyond the year 2200.

Scenario A with Conservation

The depletions in the ARW River Basin are expected to decrease to 179,400 acre-feet in 2030 (figure 3-14). However, there is a net savings in annual depletions of 19,800 acre-feet. Based on the projected depletions, it appears that the ARW River Basin depletions will not exceed supply, in 2030, by 244,600 acre-feet. Annual depletions in 2030 are expected to account for only about 42 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 273,700 acre-feet (table 3-32). Depletions under this scenario are about 32,900 acre-feet above the Conservative Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is estimated to be nearly 2110.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions were 246,400 acre-feet in 2030 (table 3-32). Annual depletions in 2030 account for about 58 percent of the total annual water supplies.

Texas Gulf Basin

Scenario A

The depletions in the Texas Gulf Basin were estimated at about 320,800 acre-feet in 1985 (table 3-33) and are expected to decrease to 332,500 acre-feet in 2030 (figure 3-14). The depletions in 2030 are about 1,700 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 4,400 persons more than under the Conservative Scenario (tables 3-11 and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 90 percent of the total annual depletions, municipal about 5 percent, minerals about 4 percent, industrial and evaporation less than one percent each of the total annual depletions (table 3-33).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 342,000 acre-feet in 1985, 328,000 in 2000, 217,000 in 2020 and 152,000 in 2030 (figure 3-14). Based on the projected depletions, it appears that the Texas Gulf Basin depletions will exceed supply prior to the turn of this century.

Scenario A with Conservation

The depletions in the Texas Gulf Basin are expected to decrease to 299,200 acre-feet in 2030 (table 3-33). However, there is a net savings in depletions of 33,300 acre-feet. Based on the projected depletions, it appears that the Texas Gulf Basin depletions will exceed supply shortly after 1985 (figure 3-14).

Scenario B

Depletions under this caveat will exceed supplies well before the turn of the century. Total depletions in the year 2000 were estimated to be 377,300 acre-feet (table 3-33) which is about 49,300 acre-feet above supplies. Depletions under this scenario are about 25,100 acre-feet above the Conservative Scenario in 2030.

Scenario B with Conservation

Depletions under this caveat will exceed supplies shortly after 1985. The water deficit grows more rapidly under this caveat than by holding agricultural depletions constant. Total depletions in the year 2000 were estimated to be 339,600 acre-feet, increase to 412,600 acre-feet, in 2020, and 445,700 acre-feet in 2030 (table 3-33).

OPTIMISTIC POPULATION PROJECTION

Twenty percent was added to BBER population projections for the conservative population projection. Therefore, the population growth is faster under this projection than for the Conservative or Potential Population Projections. The projected depletions are expected to be higher and would be considered as the upper boundary in depletion projections.

State

Scenario A

The state depletions were estimated at 2.2 million acre-feet in 1985. Under this scenario, they were estimated to increase to 2.4 million acre-feet in 2030 (table 3-34). This is an increase in depletions of approximately 102,300 acre-feet or about 4 percent over the Conservative Economic Growth Scenario and about 83,000 acre-feet or about 3.5 percent over the Potential Economic Growth Scenario. The total supply of water for depletions was estimated to be 3.2 million acre-feet in 1985 and is expected to decrease slowly to 3.1 million in 2030 because of groundwater mining in the Texas Gulf Basin. Under this scenario, the state's water depletions will barely exceed supply in 2030.

The relationship between water-use categories remain about the same as for the other scenarios (table 3-34).

Scenario A with Conservation

The state depletions were estimated to decrease slightly below 2.2 million acre-feet in 2030 (table 3-34). As in the case of the previous scenarios, the state's water depletions will not exceed supply by 2030 by about 1.0 million acre-feet.

Scenario B

If agricultural depletions had been permitted to grow at the same rate as other economic activity, then depletions would exceed

Table 3-34. Water Depletions by Water Use Category, New Mexico, Optimistic Population Projection, 1985 - 2030.

Water Use Category	Depletions				
	1985	2000	2010	2020	2030
	(thousands of acre-feet)				
Scenario A					
Agricultural	1,483.8	1,483.8	1,483.8	1,483.8	1,483.8
Municipal	138.6	211.0	236.7	267.8	296.9
Industrial	12.4	18.8	21.1	23.9	26.5
Minerals	88.5	149.6	175.7	205.5	234.0
Evaporation	448.5	355.0	359.7	365.2	370.3
Total	2,171.7	2,218.1	2,277.0	2,346.2	2,411.5
Scenario A +10% Conservation					
Agricultural	1,483.8	1,335.4	1,335.4	1,335.4	1,335.4
Municipal	138.6	189.9	213.0	241.0	267.2
Industrial	12.4	17.0	19.0	21.5	23.9
Minerals	88.5	134.6	158.2	185.0	210.6
Evaporation	448.5	319.5	323.8	328.6	333.3
Total	2,171.7	1,996.3	2,049.3	2,111.6	2,170.3
Scenario B					
Agricultural	1,483.8	2,278.5	2,592.2	2,944.0	3,280.8
Municipal	138.6	211.0	236.7	267.8	296.9
Industrial	12.4	18.8	21.1	23.9	26.5
Minerals	88.5	149.6	175.7	205.5	234.0
Evaporation	448.5	355.0	359.7	365.2	370.3
Total	2,171.7	3,012.8	3,385.4	3,806.4	4,208.6
Scenario B +10% Conservation					
Agricultural	1,483.8	2,050.6	2,332.9	2,649.6	2,952.8
Municipal	138.6	189.9	213.0	241.0	267.2
Industrial	12.4	17.0	19.0	21.5	23.9
Minerals	88.5	134.6	158.2	185.0	210.6
Evaporation	448.5	319.5	323.8	328.6	333.3
Total	2,171.7	2,711.6	3,046.9	3,425.7	3,787.7

supply, in 2030, by about 1.0 million acre-feet under this caveat. The estimated depletions in 2030 were 4.2 million acre-feet, while supply was estimated at 3.2 million acre-feet. In fact, depletions would exceed supply in about 2010 when annual depletions were estimated at 3.4 million acre-feet (table 3-34).

Scenario B with Conservation

If agricultural depletions had been permitted to grow at the same rate as other economic activity, depletions would exceed supply between 2010 and 2020, under this caveat. The estimated depletions in 2030, under this caveat, are 3.8 million acre-feet (table 3-34) while supply was estimated at 3.2 million acre-feet.

River Basins

Upper Colorado River Basin

Scenario A

The depletions in the Upper Colorado River Basin were estimated at about 300,000 acre-feet in 1985 (table 3-35) and are expected to increase to 399,500 acre-feet in 2030 (figure 3-15). The depletions in 2030 are about 26,000 acre-feet above the Conservative Scenario and 28,500 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 34,600 persons more than under the Conservative Scenario and 46,300 more than under the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the previous scenarios, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to account for about 53 percent of the total annual depletions, minerals about 32 percent, evaporation about 8 percent, municipal about 6 percent, and industrial less than one percent of the total annual depletions (table 3-35).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 674,000 acre-feet over the period of this analysis (figure 3-15). Based on projected depletions, it appears that in the Upper Colorado River Basin, the depletions will not exceed supply in 2030 by 274,500 acre-feet. Depletions in 2030 account for 60 percent of the available supply. Water supply, in the Upper Colorado Basin, should continue to exceed depletions up through the year 2150.

Scenario A with Conservation

The depletions in the Upper Colorado River Basin are expected to increase to 359,600 acre-feet in 2030 (figure 3-15). However, there is a net savings in depletions of 39,900 acre-feet. The Upper Colorado River Basin water supply will exceed depletions in 2030 by 314,400 acre-feet. Annual depletions in 2030 are expected to account for about 53 percent of available water supply.

Scenario B

Depletions under this caveat will exceed supplies by 2015. Total depletions in 2010 were estimated to be 691,500 acre-feet, 766,600 acre-feet in 2020, and increase to 901,000 acre-feet in 2030 (table 3-35).

Scenario B with Conservation

Depletions under this caveat will exceed supplies by 2020. Total depletions in 2020 were estimated to be 698,900 acre-feet and increase to 810,900 acre-feet in 2030 (table 3-35).

Lower Colorado River Basin

Scenario A

The depletions in the Lower Colorado River Basin were estimated at about 48,400 acre-feet in 1985 (table 3-36) and are expected to increase to 76,100 acre-feet in 2030 (figure 3-15). The depletions in 2030 are about 7,800 acre-feet above the Conservative Scenario and 9,700 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 28,100 persons more than under the Conservative Scenario and about 34,500 above the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the previous scenarios, the same relationships between water use categories hold for this scenario. Minerals in 2030 is expected to be the dominant sector in terms of depletions followed by agriculture, municipal,

Table 3-35. Water Depletions by Water Use Category, Upper Colorado River Basin, Optimistic Population Projection, 1985 and 2030.

Water Use Category	Base Year 1985	Scenario - 2030			
		A	A+Conserv	B	B+Conserv
	- - - -(depletions in thousands of acre-feet)- - - - -				
Agricultural	213.6	213.6	192.2	715.0	643.5
Municipal	6.9	23.2	20.9	23.2	20.9
Industrial	0.2	0.7	0.7	0.7	0.7
Minerals	38.5	129.0	116.1	129.0	116.1
Evaporation	40.3	33.1	29.8	33.1	29.8
Total	299.6	399.5	359.6	901.0	810.9

Table 3-36. Water Depletions by Water Use Category, Lower Colorado River Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030			
		Scenario A	Scenario A +10% Cons.	Scenario B	Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	25.4	25.4	22.9	66.0	59.4
Municipal	3.4	8.8	7.9	8.8	7.9
Industrial	0.2	0.6	0.6	0.6	0.6
Minerals	13.4	34.8	31.3	34.8	31.3
Evaporation	6.0	6.5	5.9	6.5	5.9
Total	48.4	76.1	68.5	116.7	105.1

Table 3-37. Water Depletions by Water Use Category, Southwest Closed Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030			
		Scenario A	Scenario A +10% Cons.	Scenario B	Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	79.1	79.1	71.2	147.7	133.0
Municipal	3.7	6.9	6.2	6.9	6.2
Industrial	0.1	0.2	0.2	0.2	0.2
Minerals	12.7	23.8	21.4	23.8	21.4
Evaporation	0.3	0.5	0.5	0.5	0.5
Total	95.9	110.4	99.4	179.1	161.2

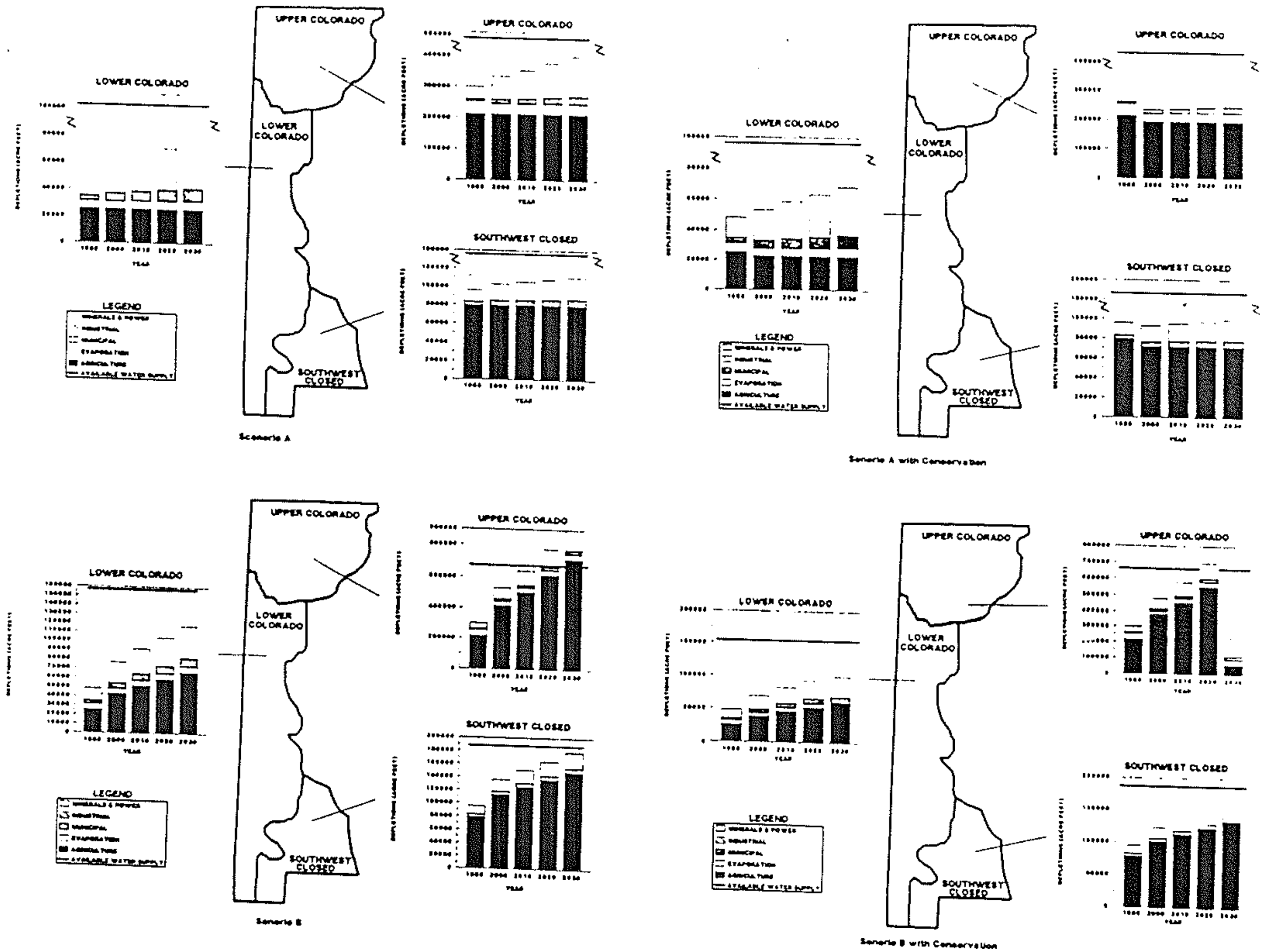


Figure 3 -15. Water Depletion Projections by Senerio for Upper Colorado, Lower Colorado and Southwest Closed Basins, Optimistic Population Projection evaporation, and industrial depletions (table 3-36).

The total supply of water available for depletions in the basin was the same as the previous scenarios--about 157,000 acre-feet (figure 3-15). Based on the projected depletions, it appears that the Lower Colorado River Basin depletions will not exceed supply in 2030 by 80,900 acre-feet. Depletions in 2030 account for about 48 percent of the available water supply. This surplus should continue beyond the year 2100.

Scenario A with Conservation

The depletions in the Lower Colorado River Basin are expected to increase to 59,700 acre-feet in 2030 (figure 3-15). However, there is a savings in annual depletions of 7,600 acre-feet. The Lower Colorado River Basin water supply will exceed depletions in 2030 by 88,500 acre-feet. The annual depletions in 2030 are expected to account for only about 44 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 116,700 acre-feet (table 3-36). Under this scenario, the break-even point between depletions and supplies would be the year 2060.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030 (figure 3-15). Total depletions in 2030 were estimated to be 105,100 acre-feet which is about 67 percent of the available water supply. The break-even point between depletions and supplies will extend towards the 21st century.

Southwest Closed Basin

Scenario A

The depletions in the Southwest Closed Basin were estimated at about 95,900 acre-feet in 1985 (table 3-37) and are expected to increase to 110,400 acre-feet in 2030 (figure 3-15). The depletions in 2030 are about 5,200 acre-feet above the Conservative Scenario and 1,800 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 14,900 persons above the Conservative Scenario and 2,700 above the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture in 2030 is expected to be the most important in terms of water depletions followed by minerals, municipal, evaporation, and industrial (table 3-37).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 187,000 acre-feet over the period of this analysis (figure 3-15). Based on the projected depletions, it appears that the Southwest Closed Basin water supply will exceed depletions in 2030 by 76,600 acre-feet. Depletions in 2030 account for about 59 percent of the available supply. Under this scenario, this water surplus should continue well beyond 2200.

Scenario A with Conservation

The depletions in the Southwest Closed are expected to increase to 99,400 acre-feet in 2030 (figure 3-15). However, there is a net savings in annual depletions of 11,000 acre-feet. The Southwest Closed Basin depletions will not exceed supply in 2030 by 87,600 acre-feet. Annual depletions in 2030 are expected to account for about 53 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030 (figure 3-15). Total depletions in 2030 were estimated to be 179,100 acre-feet (table 3-37). Under this scenario, the break-even point between depletions and supplies is 2040.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions in 2030 were estimated to be 161,200 acre-feet, or about 86 percent of the total water supply available (table 3-37). The break-even point between depletions and supplies is expected to occur before 2040.

Upper Rio Grande Basin

Scenario A

The depletions in the Upper Rio Grande Basin were estimated at about 296,800 acre-feet in 1985 and are expected to increase to 318,400 acre-feet in 2030 (table 3-38). The depletions in 2030 are about 34,400 acre-feet above the Conservative Scenario and 29,200 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 240,600 persons more than under the Conservative Scenario and 177,100 above the Potential Scenario (tables 3-11, 3-12, and 3-13).

Municipal replaces agriculture as the predominant water-use category, followed by agriculture, evaporation, minerals, and industrial (table 3-38).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 395,000 acre-feet over the period of this analysis (figure 3-16). Based on the projected depletions, it appears that the Upper Rio Grande Basin depletions will slightly exceed supply in 2030 by 3,400 acre-feet.

Scenario A with Conservation

The depletions in the Upper Rio Grande Basin are expected to increase to 358,600 acre-feet in 2030 (figure 3-16). However, there is a net savings in annual depletions of 39,800 acre-feet. The Upper Rio Grande Basin water supply will exceed depletions in 2030 by 36,400 acre-feet. Annual depletions in 2030 are expected to account for 91 percent of the available water supply.

Scenario B

Depletions under this caveat will exceed supplies by the year 2000 (figure 3-16). Total depletions in 2000 were estimated to be 417,700 acre-feet, 456,800 acre-feet in 2010, 508,600 acre-feet in 2020, and increase to 555,700 acre-feet in 2030 (table 3-38).

Scenario B with Conservation

Depletions under this caveat will exceed supplies shortly after the year 2000 (figure 3-16). Total depletions in 2000 were estimated to be 375,900 acre-feet, increase to 411,200 acre-feet in 2010, and to 500,100 acre-feet in 2030 (table 3-38).

Lower Rio Grande Basin

Scenario A

The depletions in the Lower Rio Grande Basin were estimated at about 421,000 acre-feet in 1985 and are expected to decrease to 380,800 acre-feet in 2030 (table 3-39). The decrease in depletions are due to the 66,500 acre-feet reduction in evaporation. The depletions in 2030 are about 7,600 acre-feet above the Conservative Scenario and 4,700 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 60,400 persons more than under the Conservative Scenario and 44,000 above the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture is dominant in total annual depletions, followed by evaporation, municipal, minerals, and industrial (table 3-39).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 420,000 acre-feet over the period of this analysis (figure 3-16). Based on the projected depletions, it appears that the Lower Rio Grande Basin water supply will exceed depletions in 2030 by 39,200 acre-feet. However, the basin's depletions will exceed supplies before 2100.

Scenario A with Conservation

The depletions in the Lower Rio Grande Basin are expected to decrease to 342,700 acre-feet in 2030 under this caveat (figure 3-16). However, there is a net savings in annual depletions of 38,100 acre-feet. Based on the projected depletions, it appears that the Upper Rio Grande Basin depletions will not exceed supply in 2030 by 77,300 acre-feet. Annual depletions in 2030 are expected to only account for 82 percent of the available water supply.

Table 3-38. Water Depletions by Water Use Category, Upper Rio Grande Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	151.8	151.8	136.6	309.1	278.2
Municipal	77.0	157.6	141.9	157.6	141.9
Industrial	5.6	11.5	10.4	11.5	10.4
Minerals	8.5	17.3	15.6	17.3	15.6
Evaporation	54.0	60.1	54.1	60.1	54.1
Total	296.8	398.4	358.6	555.7	500.1

Table 3-39. Water Depletions by Water Use Category, Lower Rio Grande Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	185.1	185.1	166.6	529.2	476.3
Municipal	11.4	32.7	29.4	32.7	29.4
Industrial	1.0	2.8	2.5	2.8	2.5
Minerals	1.7	4.9	4.4	4.9	4.4
Evaporation	221.8	155.3	139.8	155.3	139.8
Total	421.0	380.8	342.7	724.9	652.4

Table 3-40. Water Depletions by Water Use Category, Central Closed Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	61.6	61.6	55.4	139.2	125.2
Municipal	4.5	10.0	9.0	10.0	9.0
Industrial	3.0	6.7	6.0	6.7	6.0
Minerals	0.0	0.1	0.0	0.1	0.0
Evaporation	0.5	1.1	1.0	1.1	1.0
Total	69.6	79.4	71.5	156.9	141.3

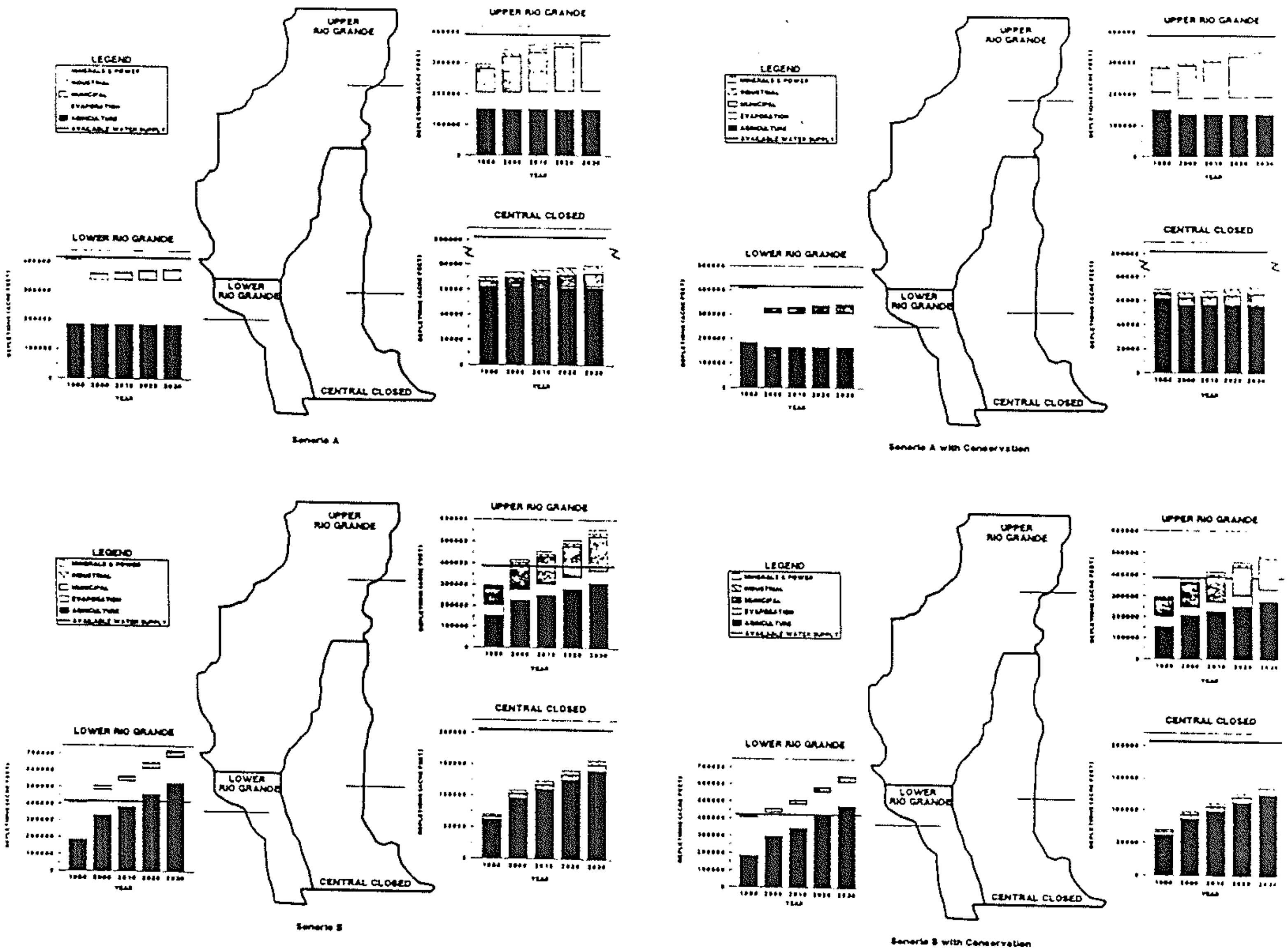


Figure 3 - 16. Water Depletion Projections by Senerio for Lower Rio Grande, Upper Rio Grande, and Central Closed Basins, Optimistic Population Projection

Scenario B

Depletions under this caveat will exceed supplies by 1990 (figure 3-16). Total depletions in 2000 were estimated to be 488,000 acre-feet and are expected to increase to 724,900 acre-feet in 2030.

Scenario B with Conservation

Depletions under this caveat will exceed supplies by the year 2000. Total depletions in the year 1990 were estimated to be 395,100 acre-feet, 459,200 acre-feet in 2000, and increase to 652,400 acre-feet in 2030 (figure 3-16).

Central Closed Basin

Scenario A

The depletions in the Central Closed Basin were estimated at about 69,600 acre-feet in 1985 and are expected to increase to 79,400 acre-feet in 2030 (table 3-40). The depletions in 2030 are about 3,000 acre-feet below the Conservative Scenario and 5,000 acre-feet below the Potential Scenario. The population projection under this scenario is expected to be about 22,200 persons more than under the Conservative Scenario and 36,500 more than under the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture, in 2030, is expected to be the predominant water-use category followed by municipal, industrial, evaporation, and minerals (table 3-40).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 215,000 acre-feet over the period of this analysis (figure 3-16). The Central Closed Basin depletions will not exceed supply in 2030 by 135,600 acre-feet. Depletions in 2030 account for only about 37 percent of the available supply. This surplus should continue well beyond the year 2100.

Scenario A with Conservation

The depletions in the Central Closed Basin are expected to increase slightly to 71,500 acre-feet in 2030 (figure 3-16). However, there is a net savings in annual depletions of 7,900 acre-feet. The Central Closed Basin water supply will exceed depletions in 2030 by 143,500 acre-feet. Annual depletions in 2030 are expected to account for only about 33 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030 (figure 3-16). Total depletions in 2030 were estimated to be 156,900 acre-feet (table 3-40). Depletions under this scenario are about 26,100 acre-feet above the Conservative Scenario in 2030 and 19,700 acre-feet above the Potential Scenario. Under this scenario, the break-even point between depletions and supplies would be around 2070.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030 (figure 3-16). Total depletions in 2030 were estimated to be 141,300 acre-feet (table 3-40). This is only 66 percent of the total annual water supply in 2030. The break-even point will be beyond the year 2080.

Pecos River Basin

Scenario A

The depletions in the Pecos River Basin were estimated at about 414,000 acre-feet in 1985 and are expected to increase to 430,100 acre-feet in 2030 (table 3-41). The depletions in 2030 are about 10,000 acre-feet above the Conservative Scenario. The population projection under this scenario is expected to be about 81,000 persons more than under the Conservative Scenario and 10,000 above the Potential Scenario (tables 3-11, 3-12, and 3-12).

As in the case of the Conservative Scenario, the same relationships between water use categories hold for this scenario. Agriculture is the predominant water-use category followed by evaporation, municipal, minerals, and industrial (table 3-41).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 435,000 acre-feet over this period of analysis (figure 3-17). Based on the projected depletions, it appears that the Pecos River Basin depletions will not exceed supply in 2030 by 4,900 acre-feet.

However, the basin's depletions will exceed supplies by the year 2040.

Scenario A with Conservation

The annual depletions in the Pecos River Basin are expected to decrease to 387,100 acre-feet in 2030 (figure 3-17). However, there is a net savings in annual depletions of 43,000 acre-feet. The Pecos River Basin depletions will not exceed supply in 2030 by 47,900 acre-feet. Annual depletions in 2030 are expected to account for 89 percent of the available water supply. The break-even point under this caveat will be about 2040.

Scenario B

Depletions under this caveat will exceed supplies in 2030 (figure 3-17). Total depletions in 2030 were estimated to be 729,300 acre-feet (table 3-41), which is 294,300 acre-feet above supplies. Under this scenario, the break-even point between depletions and supplies is between 1985 and 1990.

Scenario B with Conservation

Depletions under this caveat will exceed supplies by 1990. Total depletions in the year 1990 were estimated to be 437,300 acre-feet and increase to 676,300 acre-feet in 2030 (table 3-41).

Arkansas-Red-White River Basin

Scenario A

The depletions in the ARW Basin were estimated at about 205,500 acre-feet in 1985 and are expected to decrease to 199,600 acre-feet in 2030 (table 3-42). The depletions in 2030 are about 2,000 acre-feet above the Conservative Scenario and 400 acre-feet above the Potential Scenario. The population projection under this scenario is expected to be about 11,100 persons more than under the Conservative Scenario and about 2,200 more than the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the previous scenarios, the same relationships between water use categories hold for this scenario. Agriculture was ranked first, evaporation second, municipal third, minerals fourth, and industrial last (table 3-42).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 424,000 acre-feet over this period of analysis (figure 3-17). Based on the projected depletions, it appears that the ARW Basin water supply will exceed supply in 2030 by 224,400 acre-feet. Depletions account for only about 47 percent of the available supply. The break-even point would be well beyond the year 2200.

Scenario A with Conservation

The depletions in the ARW River Basin are expected to decrease to 179,600 acre-feet in 2030 (table 3-42). However, there is a net savings in annual depletions of 20,000 acre-feet. The ARW River Basin water supply will exceed depletions in 2030 by 244,400 acre-feet (figure 3-17). Annual depletions in 2030 are expected to account for only about 42 percent of the available water supply.

Scenario B

Depletions under this caveat will not exceed supplies in 2030 (figure 3-17). Total depletions in 2030 were estimated to be 280,900 acre-feet (table 3-42). Depletions under this scenario are about 40,100 acre-feet above the Conservative Scenario and 7,200 acre-feet above the Potential Scenario in 2030. Under this scenario, the break-even point between depletions and supplies is estimated to be around the year 2140.

Scenario B with Conservation

Depletions under this caveat will not exceed supplies in 2030. Total depletions were 252,800 acre-feet in 2030 (table 3-42). Annual depletions in 2030 account for about 60 percent of the total annual water supplies.

Texas Gulf Basin

Scenario A

The depletions in the Texas Gulf Basin were estimated at about 320,800 acre-feet in 1985 and are expected to increase to 337,100 acre-feet in 2030 (table 3-43). The depletions in 2030 are about 6,300 acre-feet above the Conservative Scenario and 4,600 acre-feet above the Potential Scenario. The population projection under this

Table 3-41. Water Depletions by Water Use Category, Pecos River Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	320.1	320.1	288.1	619.3	577.4
Municipal	18.0	34.4	30.9	34.4	30.9
Industrial	0.8	1.6	1.4	1.6	1.4
Minerals	4.8	8.8	7.9	8.8	7.9
Evaporation	70.2	65.2	58.7	65.2	58.7
Total	414.0	430.1	387.1	729.3	676.3

Table 3-42. Water Depletions by Water Use Category, Arkansas-Red-White River Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	147.7	147.7	133.0	229.0	206.1
Municipal	2.7	4.3	3.8	4.3	3.8
Industrial	0.0	0.0	0.0	0.0	0.0
Minerals	0.4	0.7	0.6	0.7	0.6
Evaporation	54.6	46.9	42.2	46.9	42.2
Total	205.5	199.6	179.6	280.9	252.8

Table 3-43. Water Depletions by Water Use Category, Texas Gulf Basin, Optimistic Population Projection, 1985 and 2030.

Category	1985	2030 Scenario A	2030 Scenario A +10% Cons.	2030 Scenario B	2030 Scenario B +10% Cons.
	(thousands of acre-feet)				
Agricultural	299.3	299.3	269.4	526.4	473.7
Municipal	10.9	19.2	17.2	19.2	17.2
Industrial	1.3	2.3	2.1	2.3	2.1
Minerals	8.4	14.8	13.3	14.8	13.3
Evaporation	0.9	1.6	1.4	1.6	1.4
Total	320.8	337.1	303.4	564.1	507.7

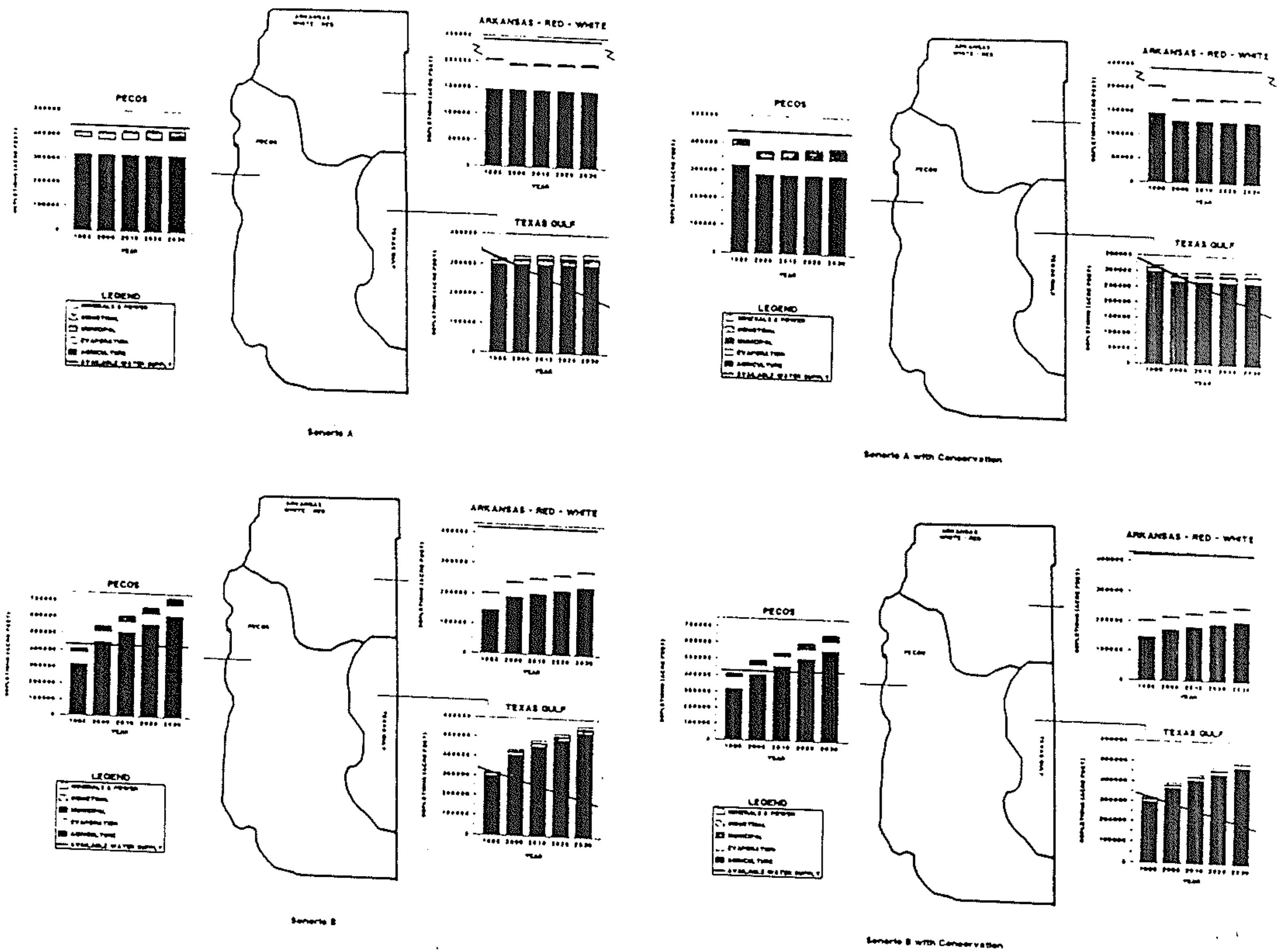


Figure 3 - 17. Water Depletion Projections by Senerio for Pecos, Texas Gulf, and Arkansas-Red-White Basin, Optimistic Population Projection

scenario is expected to be about 33,800 persons more than under the Conservative Scenario and 29,300 above the Potential Scenario (tables 3-11, 3-12, and 3-13).

As in the case of the previous scenarios, the same relationships between water use categories hold for this scenario. Agriculture was ranked first, municipal second, minerals third, industrial fourth, and evaporation ranked last in terms of annual depletions (table 3-43).

The total supply of water available for depletions in the basin was the same as the previous scenarios. It was estimated to be 342,000 acre-feet in 1985, 328,000 acre-feet in 2000, 217,000 in 2020 and 152,000 acre-feet in 2030 (figure 3-17). Based on the projected depletions, the Texas Gulf Basin depletions will exceed supply by the turn of the century.

Scenario A with Conservation

The depletions in the Texas Gulf Basin are expected to decrease to 303,400 acre-feet in 2030 (table 3-43). However, there is a net savings in depletions of 33,700 acre-feet. Depletions in the Texas Gulf Basin will exceed supply shortly after 1985 (figure 3-17).

Scenario B

Depletions under this caveat will exceed supplies well before the turn of the century. Total depletions in 2000 were estimated to be 436,900 acre-feet which is about 108,900 acre-feet above supplies. Depletions under this scenario are about 94,000 acre-feet above the Conservative Scenario and 68,900 above the Potential Scenario in 2030 (figure 3-17).

Scenario B with Conservations

Depletions under this caveat will exceed supplies shortly after 1985. The water deficit grows more rapidly under this caveat than by holding agricultural depletions constant. Total depletions in the year 2000 were estimated to be 393,200 acre-feet, increase to 470,500 acre-feet in 2020, and 507,700 acre-feet in 2030 (table 3-43).

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