

WATER USE IN NEW MEXICO, 1985

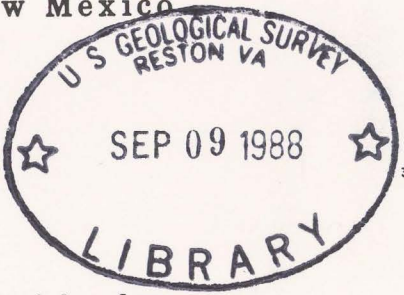
by  
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U.S. GEOLOGICAL SURVEY  
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INTRODUCTION

Water-use data are essential for managing the State's limited water resources. The New Mexico State Engineer Office (NMSEO) and the U.S. Geological Survey collect and publish data on water use at 5-year intervals. These data are used by Federal and State agencies, city and county planners, private industry, and irrigation districts.

This report graphically summarizes water-use data by county in New Mexico in 1985. The primary source of data was the NMSEO Technical Report 46 (Wilson, 1986), which contains detailed water-use information. The data presented here are in the same format (categories of use and units) as the technical report. The Survey's national data-collection format differs from the NMSEO format in some category definitions, quantity of data reported, and units.

The State Engineer Office defines a withdrawal as the amount of water removed from a surface- or ground-water source. A depletion is that part of a withdrawal consumed by man or livestock, included in crops or products, evaporated or transpired, or otherwise removed. In the figures and text referring to specific data, water "use" is synonymous with "withdrawals," not consumptive use.

DATA COLLECTION

The Survey has published reports on national water use since 1950. Similarly, the NMSEO has collected and reported water-use data at 5-year intervals since 1965; these reports are the primary sources of data on New Mexico water use for the Survey reports. In 1978, the Survey started a cooperative program with the NMSEO to collect and store water-use data. The Survey national water-use data program was created to provide a consistent, accurate, timely, and accessible source of water-use data for every State.

The NMSEO collects water-use data for 13 categories: urban, rural, irrigated agriculture, livestock, stock-pond evaporation, minerals, industrial, commercial, fish and wildlife, recreation, reservoir evaporation, military, and power. For each category, the NMSEO compiles the data using measured withdrawals, such as surface-water diversions or ground-water pumpage, supplemented by estimated data. Measured withdrawals were 51 percent of the total withdrawals reported by the NMSEO in 1985 (Wilson, 1986, p. 5). Except for urban and rural water use, the categories represent water that is self-supplied.

The Survey collects data for each State on the amount of water delivered by public-supply systems for domestic, commercial, industrial, and municipal uses. These data are presented in the report "Estimated use of water in the United States in 1985" by Solley, Merk, and Pierce (1988).

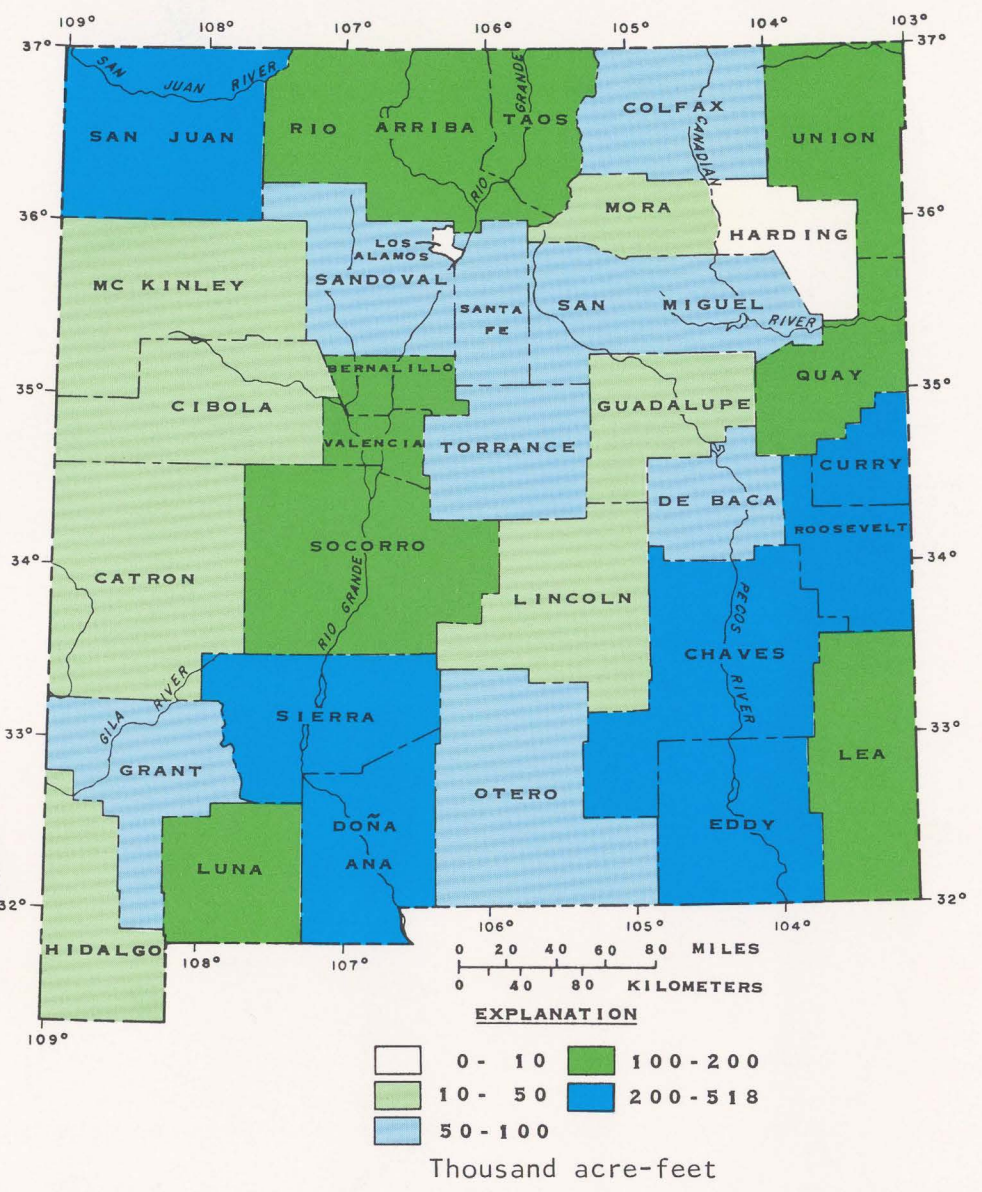


Figure 1.--Total water use by county in New Mexico, 1985.

WATER SUPPLY

New Mexico's average annual precipitation is about 13 inches, ranging from 8 inches in desert areas to about 30 inches in the mountains (Tuan and others, 1973, p. 18). Snowmelt runoff results in peak streamflow during the spring, and reservoirs throughout the State retain this water for use later in the year. Precipitation during 1985 was much greater than normal throughout the State. Snowpack was two to five times greater than average, resulting in high runoff (Denis and others, 1986, p. 2).

Only a small portion (3 million acre-feet) of the average annual precipitation (85 million acre-feet) becomes streamflow. The remainder returns to the atmosphere by evapotranspiration or percolates into the ground to recharge aquifers (New Mexico State Engineer Office, 1967). The Rio Grande, San Juan River, and Pecos River are the sources for most of the surface water used in New Mexico.

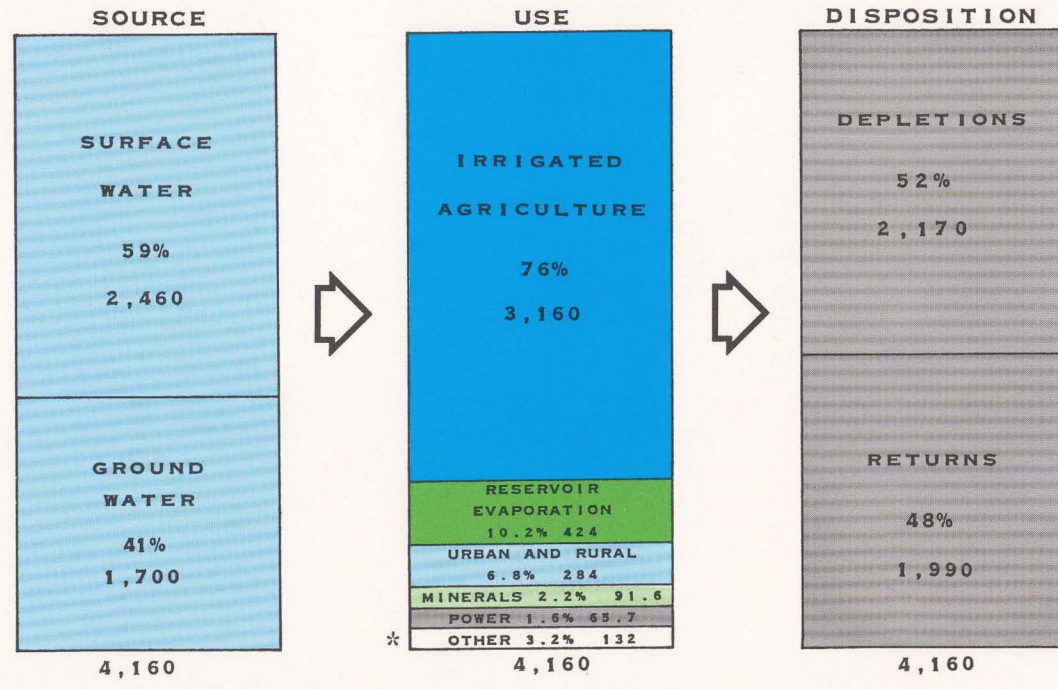
Ground water in New Mexico is locally abundant and is important in supplementing

the variable surface-water supply. The amount of ground water in storage is estimated to be 20 billion acre-feet, but only about one-quarter of this amount is considered to be fresh or slightly brackish water and not all of it is extractable (Hale and others, 1965, p. 4).

TOTAL WATER USE

Freshwater withdrawals for all uses in 1985 amounted to 4,160,000 acre-feet. Fifty-two percent, or 2,170,000 acre-feet, was depleted, and the remainder was returned to surface- or ground-water sources. Total withdrawals were about 5 percent less in 1985 than in 1980. Total water use by county in 1985 is shown in figure 1.

The source, use, and disposition of the 4,160,000 acre-feet of freshwater withdrawn in 1985 are shown in figure 2. A comparison of withdrawals and depletions by the major categories of use clearly shows the dominant role of irrigation in New Mexico's water use (figs. 3 and 4).



\* The "OTHER" category (3.2%, 132) includes fish and wildlife (1.0%, 43.3), stock-pond evaporation (0.9%, 35.7), livestock (0.5%, 20.5), recreation (0.3%, 12.1), military (0.3%, 11.7), commercial (0.2%, 8.2), and industrial (<0.1%, 0.8)

NOTE: Data are in thousands of acre-feet and are rounded to three significant figures

Figure 2.--Source, use, and disposition of freshwater.

Surface-water withdrawals totaled 2,460,000 acre-feet in 1985 and accounted for 59 percent of total withdrawals in the State. San Juan County used the most surface water (511,000 acre-feet), followed by Doña Ana and Sierra Counties (fig. 5). Surface-water withdrawals were only 1 percent less in 1985 than in 1980.

Ground-water withdrawals in 1985 totaled 1,700,000 acre-feet, or 41 percent of total withdrawals. The largest use occurred in the eastern counties (fig. 6) where irrigation is extensive. Ground water was used more than surface water for domestic, livestock, commercial, minerals, military, rural, urban, and recreational purposes. Ground-water withdrawals in 1985 were 10 percent less than in 1980.

IRRIGATED AGRICULTURE

New Mexico's semiarid climate requires most cropland to be irrigated extensively. In 1985, irrigation withdrawals (3,160,000 acre-feet) amounted to 76 percent of the total withdrawals (fig. 3); depletions (1,430,000 acre-feet) were 65.7 percent of total depletions (fig. 4). San Juan, Doña Ana, Chaves, and Roosevelt Counties used the most water for irrigation (fig. 7A). Los Alamos was the only county that did not have any irrigation water use. Irrigation withdrawals in 1985 decreased about 8 percent from 1980 withdrawals.

Surface water was the source for about 58 percent of irrigation withdrawals and amounted to 1,850,000 acre-feet; 36 percent of this amount was depleted. San Juan and Doña Ana Counties were the largest surface-water users (fig. 7B), diverting water from the San Juan River and the Rio Grande, respectively. San Juan and McKinley Counties used only surface water for irrigation in 1985. Seven irrigation districts, five conservancy districts, two ditch associations, and 721 acequia or ditch associations help manage and maintain diversion systems throughout the State (Saavedra, 1987).

Ground-water withdrawals for irrigation totaled 1,310,000 acre-feet, and 58 percent was depleted. Counties in eastern and southern New Mexico primarily used ground water (fig. 7C). Ground water is used in eastern New Mexico because surface water is scarce and aquifers yield substantial amounts of freshwater. However, extensive withdrawals have resulted in declining ground-water levels in areas that contain a high density of irrigation wells, such as Curry, Chaves, Lea, and Roosevelt Counties (U.S. Geological Survey, 1985).

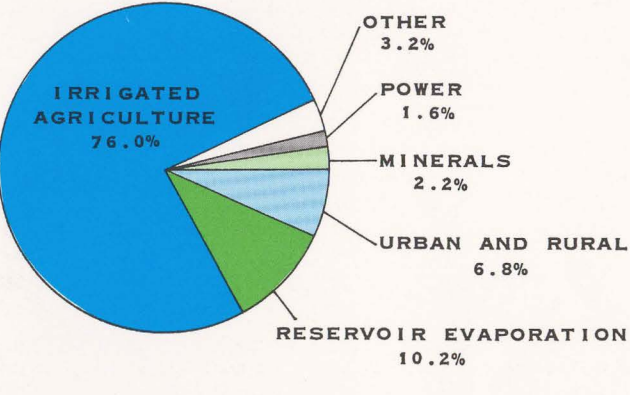


Figure 3.--Total withdrawals by category, in percent.

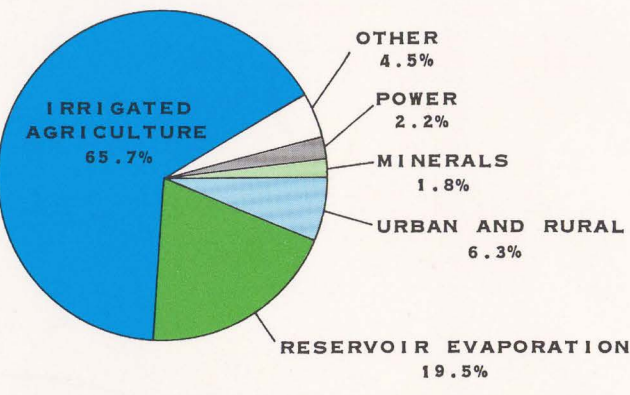


Figure 4.--Total depletions by category, in percent.

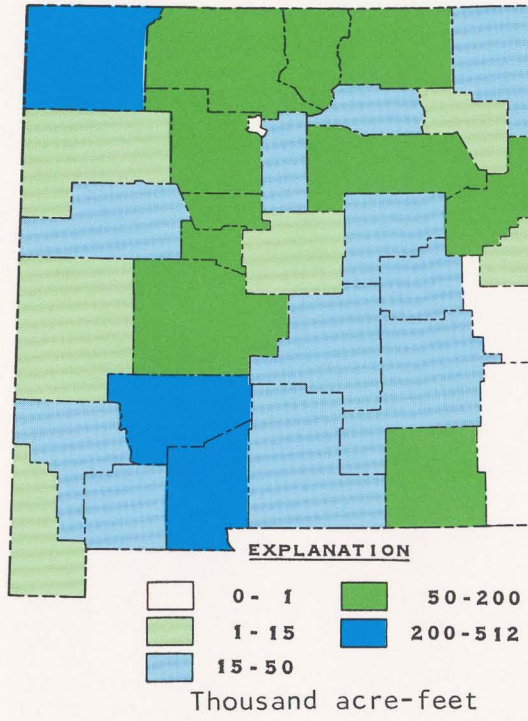


Figure 5.--Surface-water use.

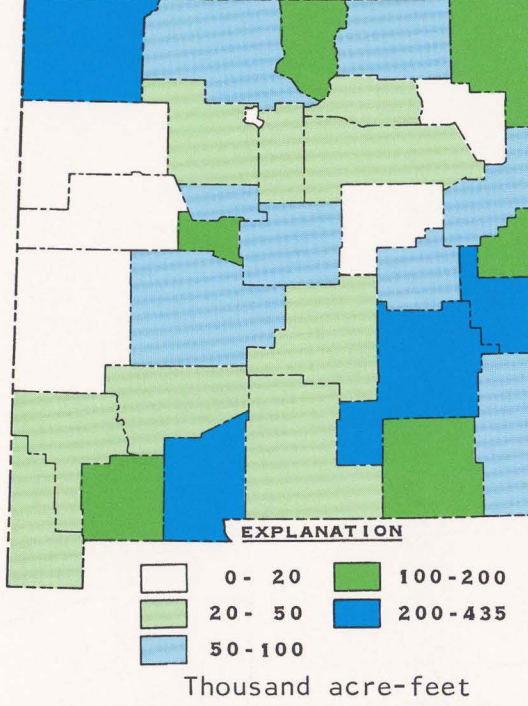


Figure 7A.--Irrigated agriculture water use.

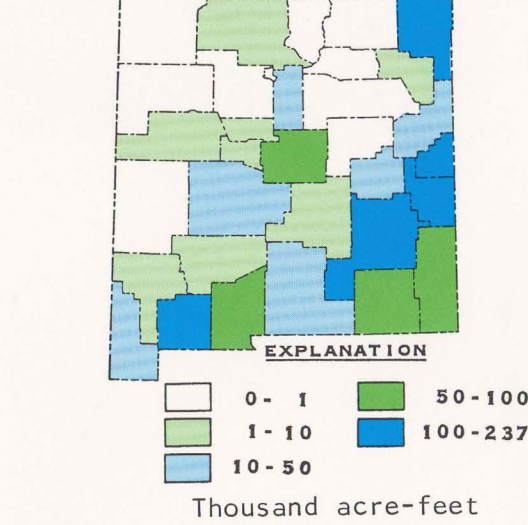


Figure 7C.--Ground-water irrigated agriculture water use.

Total irrigated cropland in 1985 was almost 946,000 acres (Wilson, 1986, p. 6), or about 1.2 percent of the area of New Mexico. Of the irrigated acreage, 27 percent was irrigated with surface water, 60 percent was irrigated with ground water, and 13 percent was irrigated with a combination of the two (Lansford and others, 1986, p. 2). The principal crops were alfalfa, wheat, planted and native pasture, grain sorghum, corn, and cotton. About 13 percent less acreage was irrigated in 1985 than in 1980.

RESERVOIR EVAPORATION

There are 23 reservoirs in the State that have storage capacities greater than 5,000 acre-feet. The combined storage of the 12 largest reservoirs was 5,187,000 acre-feet at the end of the 1985 water year (September 30, 1985), an increase of 1,070,000 acre-feet from 1984 (Denis and others, 1986, p. 2). However, evaporation losses are large in New Mexico. During 1985, evaporation from reservoirs was almost 424,000 acre-feet, or 19.5 percent of all water depleted (figs. 2 and 4).

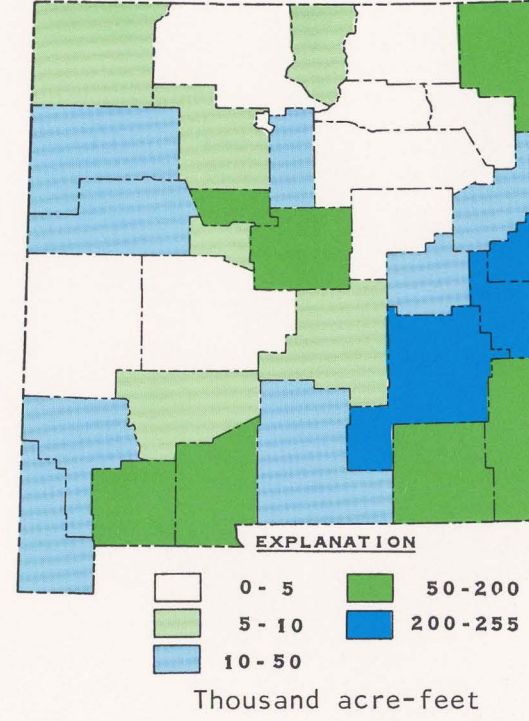


Figure 6.--Ground-water use.

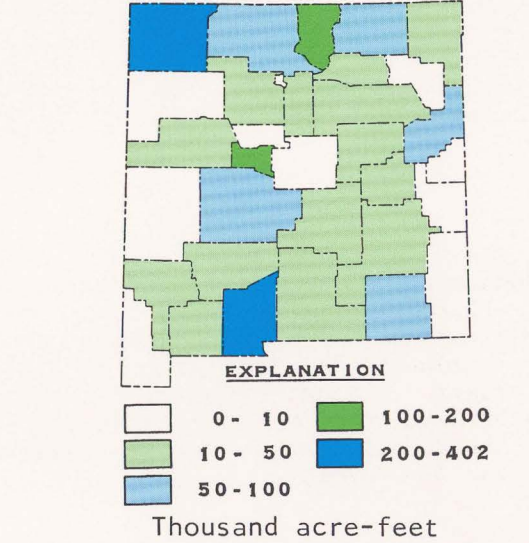


Figure 7B.--Surface-water irrigated agriculture water use.

URBAN AND RURAL USE

Urban and rural water use includes water that was self-supplied and water that was delivered by public suppliers. Although most water from public suppliers was for domestic use, a small fraction was for commercial and industrial use in urban areas. Urban areas are defined as having a population of more than 2,500 residents (Wilson, 1986, p. 2).

Ground water was the source for 90 percent of the total amount withdrawn (284,000 acre-feet) for urban and rural use. Withdrawals for urban use were 246,000 acre-feet, of which 89 percent was from ground water. Withdrawals for rural use were 37,800 acre-feet, 96 percent of which was from ground water. Almost one-third of the State's population, or about 464,000 people, live in Bernalillo County (Wilson, 1986, p. 56), which contains the State's largest city, Albuquerque. Consequently, Bernalillo County had the largest urban and rural use (fig. 8).

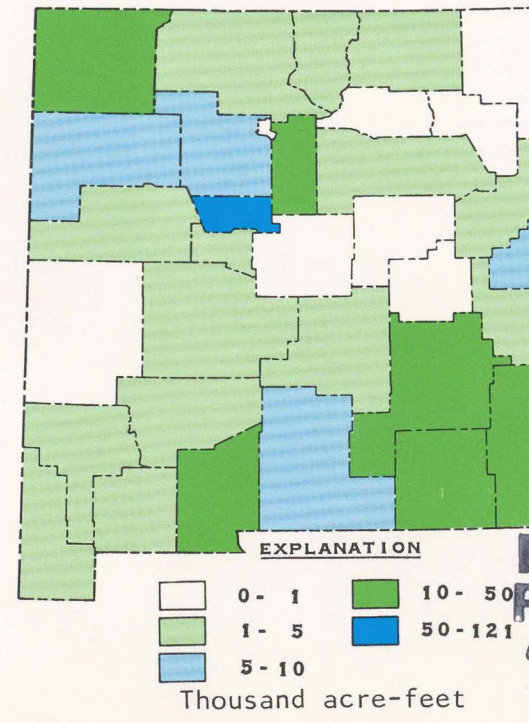


Figure 8.--Urban and rural use.

The estimated State population in 1985 was 1,417,790, an increase of 8.8 percent from the population in 1980 (Wilson, 1986, p. 5). Growth was concentrated in the larger cities, such as Albuquerque, Las Cruces, and Santa Fe, located in Bernalillo, Doña Ana, and Santa Fe Counties, respectively. Urban use in 1985 increased by 15,200 acre-feet from 1980, and rural use increased by 6,100 acre-feet.

MINERALS

New Mexico is rich in fuel and mineral resources, such as oil, gas, coal, uranium, copper, molybdenum, silver, and lead. Because of the decrease in mining activity in 1985, there was about 16 percent less water used than in 1980. Total withdrawals for minerals production were 91,600 acre-feet; 40,000 acre-feet was depleted.

The areas having the largest water use for minerals production in 1985 were the northwest (San Juan, McKinley, and Cibola Counties), the southeast (Lea and Eddy Counties), the southwest (Grant and Hidalgo Counties), and Taos County in north-central New Mexico. Ground water was the source for 85 percent of the withdrawals. Only 3 of New Mexico's 33 counties did not use any water for minerals production in 1985 (Wilson, 1986). Withdrawals for minerals production accounted for 2.2 percent of total withdrawals (fig. 3).

POWER USE

New Mexico's 18 fossil-fueled thermoelectric power plants withdrew a total of 65,700 acre-feet of water in 1985, a decrease of 9 percent from 1980. All the power plants use towers or ponds for cooling purposes. Eighty-two percent of the withdrawals were from surface water, largely by the Four Corners and San Juan Power Plants in San Juan County.

OTHER USES

The remaining categories of water use include fish and wildlife, stock-pond evaporation, livestock, recreation, military, commercial, and industrial. Withdrawals for each of these categories amounted to 1 percent or less of the State's total withdrawals during 1985 (fig. 2).

REFERENCES CITED

Denis, L.P., Beal, L.V., and Allen, H.R., 1986, Water resources data for New Mexico, water year 1985: U.S. Geological Survey Water-Data Report NM-85-1, 482 p.

Hale, W.E., Reiland, L.J., and Beverage, J.P., 1965, Characteristics of the water supply in New Mexico: New Mexico State Engineer Office Technical Report 31, 131 p.

Lansford, R.R., Creel, B.J., Mapel, C.L., and others, 1986, Sources of irrigation and dry cropland acreages in New Mexico, by county, 1980-85: Las Cruces, New Mexico State University, Agricultural Experiment Station Research Report 596, 48 p.

New Mexico State Engineer Office, 1967, Water resources of New Mexico--Occurrence, development, and use: Santa Fe, New Mexico State Planning Office, 321 p.

Saavedra, Paul, 1987, Surface water organizations in New Mexico: New Mexico State Engineer Office Report TDDC-87-2, 152 p.

Solley, W.B., Merk, C.F., and Pierce, R.R., 1988, Estimated use of water in the United States in 1985: U.S. Geological Survey Circular 1004, 80 p.

Tuan, Yi-Fu, Everard, C.E., Widdison, J.G., and Bennett, Iven, 1973, The climate of New Mexico: Santa Fe, New Mexico State Planning Office, 197 p.

U.S. Geological Survey, 1985, National Water Summary 1984--Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.

Wilson, Brian, 1986, Water use in New Mexico in 1985: New Mexico State Engineer Office Technical Report 46, 84 p.



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