WATER USE IN NEW MEXICO, 1990

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INTRODUCTION

Water-use data are essential for managing the limited water resources of the State of New Mexico. The New Mexico State Engineer Office (NMSEO) and the U.S. Geological Survey (USGS) collect and publish data on water use at 5-year intervals. The NMSEO has collected and reported water-use data at 5-year intervals since 1965; these reports are now the primary source of data on New Mexico water use for the USGS reports. The USGS has published reports on national water use since 1950. In 1978, the USGS started a cooperative program with the NMSEO to collect and store water-use data. The USGS's National Water-Use Information Program was created to provide a consistent, accurate, timely, and accessible source of water-use data. These data are used by Federal and State agencies, city and county planners, private industry, and the public.

This report graphically summarizes water-use data by county and river basin in New Mexico in 1990. The primary source of data was NMSEO Technical Report 47 (Wilson, 1992), which contains tables of water-use data by county and river basin. The data presented here are in the same format (categories of use and units) as the NMSEO report. Percentages were calculated from data in that report. The USGS national data-collection format differs from the NMSEO format in some category definitions, quantity of data reported, and units.

The NMSEO 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 humans or livestock, incorporated into crops or products, evaporated or transpired, or otherwise removed. Data in the text have been rounded to three significant figures. References to 1985 data are based on data from reports published by the NMSEO (Wilson, 1986) and the USGS (Garrabrant, 1988).

DATA COLLECTION

The NMSEO collects water-use data for nine categories: irrigated agriculture, reservoir evaporation, public water supply, mining, power, domestic, livestock, commercial, and industrial. All categories except public water supply represent water that is self supplied. Some of the categories used in 1985 have been changed for 1990: "urban and rural" has been divided into "public water supply" and "domestic" (self supplied), "recreation" is now under "public water supply" or "commercial," "military" is now under "public water supply," "fish and wildlife" is now under "commercial" or "irrigated agriculture," stock-pond evaporation" is no longer reported, and "reservoir evaporation" includes evaporation only from reservoirs that have more than 5,000 acre-feet of capacity. The NMSEO compiles the data for each category using measured withdrawals (surface-water diversions or ground-water pumpage) and/or estimated data.

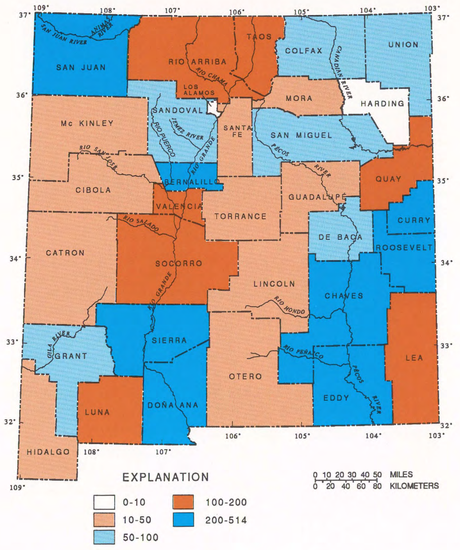
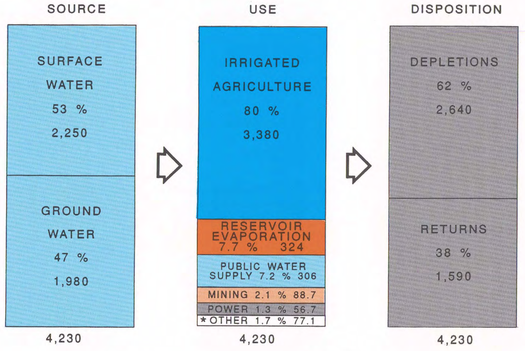


Figure 1.--Total freshwater withdrawals by county in New Mexico, 1990.

The USGS compiles water-use data in every State for 12 categories: irrigation, reservoir evaporation, public supply, mining, fossil-fuel power, nuclear power, hydroelectric power, domestic, livestock, commercial, industrial, and sewage treatment. The USGS collects public-supply data, such as the amount of water delivered by public-supply systems for domestic, commercial, industrial, and municipal uses. These data for New Mexico for 1990 are presented in the report "Estimated use of water in the United States in 1990" by Solley and others (1992).

WATER SUPPLY

Average annual precipitation in New Mexico 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. At stations in most parts of the State precipitation during 1990 was 10 to 40 percent above normal; the exception was in the southeastern part of the State where precipitation at several stations was 5 to 50 percent below normal (U.S. Department of Commerce, 1991).



* The "OTHER" category of use (1.7%, 77.1) includes domestic (0.6%, 26.6), livestock (0.6%, 24.2), commercial (0.4%, 19.3), and industrial (0.1%, 6.99)

NOTE: Data are in thousands of acre-feet and are independently rounded to three significant figures. Percentages were calculated from unrounded data and are rounded to two significant figures

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

Only a small part (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 (see fig. 1) and their tributaries 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. About 4.4 billion acre-feet of recoverable fresh (less than 1,000 milligrams per liter (mg/L)) and slightly saline (1,000 to 3,000 mg/L) water is estimated to be present in underground storage. About 3 billion acre-feet of this water in storage is fresh and may be used for many purposes without treatment (U.S. Bureau of Reclamation, 1976, p. 62-64).

TOTAL WATER USE

Freshwater withdrawals in New Mexico for all uses in 1990 amounted to 4,230,000 acre-feet. Total withdrawals by county in 1990 are shown in figure 1. Doña Ana County withdrew the most water (514,000 acre-feet) and Harding County withdrew the least (4,380 acre-feet). Total withdrawals were 2 percent greater in 1990 than in 1985.

The source, use, and disposition of the 4,230,000 acre-feet of water withdrawn in 1990 are shown in figure 2. Sixty-two percent, or 2,640,000 acre-feet, was depleted, and the remainder was returned to surface- or ground-water sources. A comparison of withdrawals and depletions by the major categories of use clearly shows the significant effect of irrigated agriculture on water use in New Mexico (figs. 3 and 4).

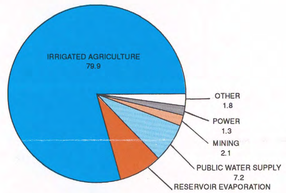


Figure 3.--Total freshwater withdrawals by category, in percent.

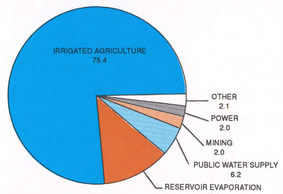


Figure 4.--Total freshwater depletions by category, in percent.

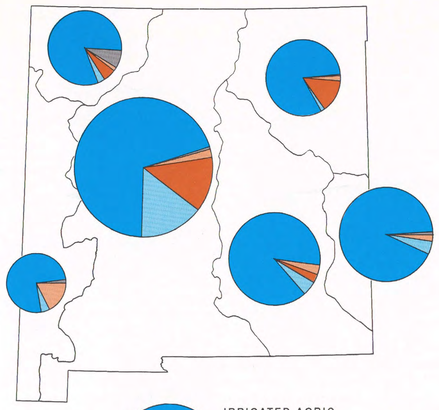


Figure 5.--Total water use by river basin.

The NMSEO reports water-use data for these six major river basins: Rio Grande, Pecos, Texas Gulf, Upper Colorado, Arkansas-White-Red, and the Lower Colorado. The Rio Grande Basin had the largest withdrawals (1,830,000 acre-feet) and the Lower Colorado Basin had the smallest withdrawals (98,400 acre-feet) (fig. 5). Irrigated agriculture is by far the largest water use in all the river basins.

Surface-water withdrawals totaled 2,250,000 acre-feet in 1990 and accounted for 53 percent of total withdrawals in the State. San Juan and Doña Ana Counties used the most surface water (fig. 6). Surface-water withdrawals were 8 percent less in 1990 than in 1985.

Ground-water withdrawals totaled 1,980,000 acre-feet in 1990, or 47 percent of total withdrawals. The largest use was in the eastern counties (fig. 7) where irrigation is extensive. Ground water was used more than surface water for public water supply, domestic, livestock, commercial, industrial, and mining purposes. Ground-water withdrawals in 1990 were 16 percent larger than in 1985.

IRRIGATED AGRICULTURE

Most croplands in New Mexico's semiarid climate require irrigation to sustain high yields. In 1990, irrigated-agriculture withdrawals (3,380,000 acre-feet) amounted to 80.0 percent of total withdrawals (fig. 3); irrigation depletions (1,990,000 acre-feet) were 75.4 percent of total depletions (fig. 4). Doña Ana, San Juan, Curry, Chaves, Roosevelt, and Eddy Counties withdrew the most water for irrigation, respectively (fig. 8). Los Alamos was the only county that had no withdrawals for irrigation. Irrigation withdrawals in 1990 increased 7 percent from 1985.

Surface water was the source for 54 percent of irrigation withdrawals and amounted to 1,840,000 acre-feet; 44 percent of this amount was depleted. San Juan and Doña Ana Counties were the largest surface-water users, diverting water from the San Juan River and Rio Grande, respectively. San Juan and McKinley Counties had only surface-water withdrawals for irrigation in 1990.

Ground-water withdrawals for irrigation totaled 1,540,000 acre-feet, and 77 percent was depleted. Ground water is the primary source of water for irrigation in the eastern counties of New Mexico.

Total irrigated cropland in 1990 was about 984,000 acres. Of the irrigated acreage, 31 percent was irrigated only with surface water, 54 percent was irrigated only with ground water, and 15 percent was irrigated with a combination of the two (Wilson, 1992, p. 134). In 1990, 57.3 percent of the total acreage was irrigated by use of flood-irrigation systems, 42.2 percent with sprinkler systems, and 0.5 percent with drip systems (Wilson, 1992, p. 135). The following crops accounted for 84 percent of the total acres irrigated in 1990: alfalfa, wheat, planted and native pasture, cotton, grain, sorghum, and corn (Lansford and others, 1991, p. 9). About 4 percent more acreage was irrigated in 1990 than in 1985.

RESERVOIR EVAPORATION

The NMSEO estimated evaporation for 28 reservoirs having storage capacities of about 5,000 acre-feet or more. During 1990 net evaporation from reservoirs was 324,000 acre-feet, or 12.3 percent of all water depleted (fig. 4).

PUBLIC WATER SUPPLY

Public water supply is water that is withdrawn by public or private suppliers such as utility companies, cities, or community systems and sold for domestic, commercial, or industrial use. It also includes water used by municipalities for watering grass in parks and for firefighting. Withdrawals for public water supply in 1990 were 306,000 acre-feet or 7.2 percent of the total withdrawals (fig. 3). Ground-water withdrawals were 88 percent of that total, or 270,000 acre-feet. Surface-water withdrawals were 12 percent, or 35,800 acre-feet. Bernalillo County had the largest public-supply withdrawals (125,000 acre-feet) (fig. 9), and 94 percent of the population was publicly supplied (Wilson, 1992). Los Alamos is the only county where the population is all publicly supplied. The more rural counties where less than half of the population is publicly supplied are Catron, McKinley, Rio Arriba, Taos, Torrance, and Valencia.

The total population of New Mexico in 1990 was 1,515,069 (U.S. Bureau of the Census, 1991). According to the public suppliers that reported water-use data to the NMSEO, 79 percent of the total population in the State is publicly supplied.

MINING

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 1990, 3 percent less water was used in 1990 than in 1985. The total withdrawal for mining in 1990 was 88,700 acre-feet; 53,100 acre-feet was depleted.

The areas using the most water for mining in 1990 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 97 percent of the total withdrawals. Only 4 of 33 counties in the State had no withdrawals for mining production in 1990 (Wilson, 1992). Withdrawals for mining accounted for 2.1 percent of total withdrawals in 1990 (fig. 3).

POWER

A total of 56,700 acre-feet of water was withdrawn for power generation purposes in 1990, a decrease of 14 percent from 1985. All the fossil-fueled power plants use towers or ponds for cooling purposes. Seventy-nine percent of the withdrawals were from surface water. The Four Corners and San Juan Power Plants in San Juan County accounted for most of the surface-water withdrawals. Withdrawals for power production were 1.3 percent of the total withdrawals in 1990 (fig. 3).

OTHER USES

The remaining categories of self-supplied water use and amounts of water withdrawn in 1990 were: domestic (26,600 acre-feet), livestock (24,200 acre-feet), commercial (19,300 acre-feet), and industrial (6,990 acre-feet) (fig. 2). These uses accounted for 1.7 percent of the total withdrawals (fig. 3).

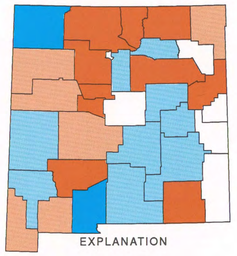


Figure 6.--Surface-water withdrawals by county.

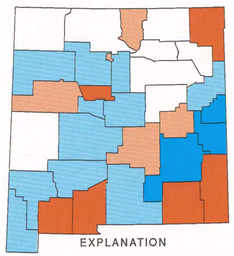


Figure 7.--Ground-water withdrawals by county.

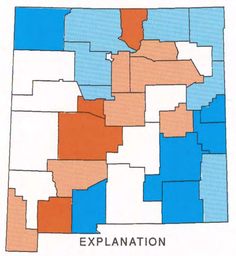


Figure 8.--Irrigated-agriculture withdrawals by county.

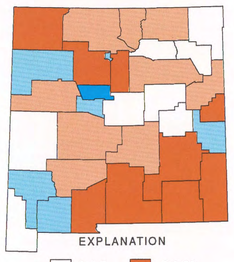


Figure 9.--Public water supply withdrawals by county.

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