

HYDROGRAPHS OF THE WATER LEVEL IN SELECTED WELLS IN THE SALT RIVER VALLEY AND LOWER SANTA CRUZ BASIN

EXPLANATION

3/16 ESTIMATED GROUND-WATER PUMPAGE, IN THOUSANDS OF ACRE-FEET

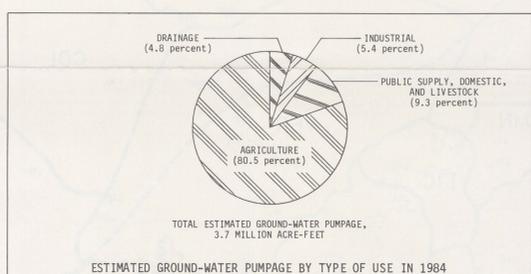
N PUMPAGE OF 500 ACRE-FEET OR LESS

--- AREA BOUNDARY

--- WATER-PROVINCE BOUNDARY

A WELL FOR WHICH A HYDROGRAPH IS SHOWN IN CENTER FIGURE

NOTE: In areas where no data are shown, the pumpage is mostly from domestic and stock wells, and the amount is unknown. The total pumpage in these areas is estimated to be about 10,000 acre-feet for 1984 (see table).



EXPLANATION

■ AREA FOR WHICH A REPORT HAS BEEN RELEASED

▨ AREA FOR WHICH A REPORT HAS BEEN RELEASED AND AN UPDATE IS IN PROGRESS

▩ AREA FOR WHICH AN UPDATE OF PREVIOUS REPORT HAS BEEN PUBLISHED

--- AREA BOUNDARY

--- WATER-PROVINCE BOUNDARY

8 NUMBER OF ACTIVE OBSERVATION WELLS—As of Spring 1985

ESTIMATED GROUND-WATER PUMPAGE IN ARIZONA IN 1984

STATUS OF GROUND-WATER INVENTORY AND OBSERVATION-WELL PROGRAM

ESTIMATED ANNUAL GROUND-WATER PUMPAGE, IN THOUSANDS OF ACRE-FEET, IN ARIZONA, BY AREA [NUMBERS ROUNDED TO NEAREST THOUSAND ACRE-FEET. AREA: AVR, SEE MAPS FOR LOCATION]

YEAR	ADP	ALT	ARA	AVR	ESC	SII	BLM	BOO	BOT	SMH	COI	CHV	CHN	CDP	CHI	COO	DOU	DUN	GIL	GRD	GRV	STJ	STN	STU	TUB	USP	USV	VER	VEG	WAT	WIL	WLD	WMA	WNB	WNT	WST	TOTAL	YEAR																										
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TOTAL	276	3	135	3949	468	177	628	8	438	1066	308	8	278	8	830	422	2826	965	7239	1837	1551	5411	8	8	5608	219	2200	28	-5	92	8	168	504	9342	88	2702	8	166	8	198	554	102	4544	82954	1	318	57	2775	336	-8	108	8990	9188	608	630	5359	348	8678	-6	70	6812	84822	197964	TOTAL

EXPLANATION OF SYMBOLS

A: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THIS TOTAL IS FOR 1966-84 ONLY. ESTIMATED PUMPAGE BEFORE 1966 IS INCLUDED IN "OTHERS."

B: VETERINARY PESTS FOR DRAINAGE PURPOSES.

C: PUMPAGE FOR THESE AREAS WAS NOT ESTIMATED PRIOR TO 1974. THIS TOTAL IS FOR 1974-84 ONLY. ESTIMATED PUMPAGE BEFORE 1974 IS INCLUDED IN "OTHERS."

D: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THIS TOTAL IS FOR 1966-84 ONLY. ESTIMATED PUMPAGE BEFORE 1966 IS INCLUDED IN "OTHERS."

E: YUM AREA INCLUDES SOUTH ELIA VALLEY, YUM WASH, AND YUM WELLS. BEGINNING IN 1949 TO YUM VALLEY, IN 1961 IN SOUTH ELIA VALLEY, AND IN 1970 IN YUM WASH. PART OF THE PUMPAGE WAS FOR DRAINAGE OF WATERLOGGED LANDS.

F: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THIS TOTAL IS FOR 1966-84 ONLY. ESTIMATED PUMPAGE BEFORE 1966 IS INCLUDED IN "OTHERS."

G: PUMPAGE FOR AEF, ABA, BMM, H-C, COV, TON, AND WHO AREAS WAS NOT ESTIMATED PRIOR TO 1979. THIS TOTAL IS FOR 1979-84 ONLY. ESTIMATED PUMPAGE BEFORE 1979 IS INCLUDED IN "OTHERS."

H: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THIS TOTAL IS FOR 1966-84 ONLY. ESTIMATED PUMPAGE BEFORE 1966 IS INCLUDED IN "OTHERS."

I: PUMPAGE FOR AEF, ABA, BMM, H-C, COV, TON, AND WHO AREAS WAS NOT ESTIMATED PRIOR TO 1979. THIS TOTAL IS FOR 1979-84 ONLY. ESTIMATED PUMPAGE BEFORE 1979 IS INCLUDED IN "OTHERS."

J: "OTHERS" INCLUDES: BLACK BEVER BASIN, UPPER SALT BEVER BASIN, AND WHITE BEVER BASIN. PUMPAGE IN THESE AREAS IS MOSTLY FROM DOMESTIC AND STOCK WELLS, AND THE AMOUNT IS UNKNOWN. TOTAL ANNUAL PUMPAGE FOR THESE AREAS IS APPROXIMATED.

K: PREVIOUSLY PUBLISHED FIGURES REVISED.

Introduction

In arid and semiarid regions such as Arizona, the availability of adequate water supplies has a significant influence on the type and extent of economic development. About two-thirds of the water used in the State is ground water. The nature and extent of the ground-water reservoirs must be known for proper management of this valuable resource.

The U.S. Geological Survey, in cooperation with the State of Arizona, which is represented by the Arizona Department of Water Resources, has conducted a program of ground-water studies in Arizona since 1939. The primary purposes of these studies are to define the amount, location, and quality of the ground-water resources of Arizona and to monitor the effects of large-scale development on these resources. The program includes the collection, compilation, and analysis of the geologic and hydrologic data necessary to evaluate the ground-water resources of the State. The hydrologic data, results of areal studies, and research findings are presented in publications of the U.S. Geological Survey and the Arizona Department of Water Resources and in technical journals and other publications. (See section entitled "Recent Publications.") The basic hydrologic data are in computer storage and are available to the public. Since 1974, a major thrust of the program has been to inventory the ground-water conditions in the 68 ground-water areas of the State. Several selected ground-water areas are studied each year; water levels are measured annually in a statewide observation-well network; many ground-water samples are collected and analyzed; and the ground-water pumpage is computed for most of the areas. (See small maps at top of sheet 1.) As of July 1985, reports had been published for 56 of the 68 ground-water areas. Data collected in the ground-water areas include information on selected wells, water-level measurements, and water samples for chemical analysis. The data for each of the selected ground-water areas are analyzed, and the results are published in map form. Typically, the maps show depth to water; change in water levels; altitude of the water level; and quality-of-water data, such as specific conductance, dissolved solids, and fluoride.

Conversion Factors

For readers who prefer to use the International System of Units (SI) rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

Multiply	By	To obtain
foot (ft)	0.3048	meter (m)
gallon per minute (gal/min)	0.06309	liter per second (l/s)
acre-foot (acre-ft)	0.001223	cubic hectometer (hm ³)

Availability and Use of Water

In Arizona the availability of adequate and potable water supplies has as great an influence on the location of cities and cropland as any other factor. Agriculture is dependent almost entirely on irrigation and sedimentary rocks in the mountains bound the basins. In some areas, surface water is available in a few areas, but the amount is not sufficient to meet the continually increasing demand. For many years, nearly two-thirds of Arizona's water supply has been withdrawn from the ground-water reservoirs. The use of ground water for the irrigation of crops, although municipal and industrial uses are increasing steadily.

In 1984 the withdrawal of ground water was about 3.7 million acre-ft. This amount is about 0.85 million acre-ft more than the amount withdrawn in 1983, but is nearly 0.5 million acre-ft less than in 1982, 1.7 million acre-ft less than in 1981, and 0.9 million acre-ft less than in 1980. The withdrawal in 1984, although more than the small amount withdrawn in 1983, is still less than the 4.5 to 5.5 million acre-ft of water withdrawn throughout the 1950's to 1970's. Most of the differences in annual pumpage are in the amounts of ground water used for irrigation in the Basin and Range lowlands province. Slightly more than 2.9 million acre-ft of ground water or 80.5 percent of the total withdrawal was used for the irrigation of crops in 1984. The rest was used for public-supply, industrial, domestic, and livestock uses, and some ground water was pumped for drainage of waterlogged lands. Through 1984, nearly 200 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in Arizona. The amount of water pumped in 1984 is given on the map showing estimated ground-water pumpage; the annual and accumulated pumpage since the beginning of record are shown in the table, and in addition to the ground water pumped, about 2.9 million acre-ft of surface water was diverted for use in the State in 1984; about 2.1 million acre-ft of the surface water was conservatively used, and the rest was returned to the Colorado River through drains and spillways. All the surface water diverted is used in the Basin and Range lowlands province. Potential well production, depth to water in selected wells in spring 1985, and change in water level in selected wells from 1980 to 1985 are shown on the map on sheet 2. The use of ground water and the effects of this use on the ground-water reservoirs in each of the three water provinces (see map showing water provinces, sheet 2) are discussed separately in the following sections.

Basin and Range lowlands province.--The Basin and Range lowlands province is the most highly developed of the three water provinces. The province is characterized by rugged mountain ranges separated by broad elongated alluvium-filled basins. The ground-water reservoirs are mainly alluvial deposits in the basins, but small supplies of water can be obtained locally from the crystalline and sedimentary rocks in the mountains that bound the basins. In 1984, about 3.54 million acre-ft of ground water was withdrawn in the province, of which about 2.9 million acre-ft was used for the irrigation of crops. Through 1984, more than 195 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in the province. The amount of ground water withdrawn in 1984 is about 0.85 million acre-ft more than that withdrawn in 1983 but is less than that in any other year except 1983 since pumpage has been

calculated separately for the water provinces (1974). Precipitation in the province in 1984 averaged nearly 6 in. above the long-term average. (See U.S. Environmental Data Service, 1984, Climatological data--annual summary--Arizona: National Oceanic and Atmospheric Administration, v. 88, no. 13, 27 p.)

The annual reports from the Arizona Crop and Livestock Reporting Service show that 194,700 acres more were harvested in 1984 than in 1983 but acres harvested in 1984 were less by about 91,000, 299,000, and 272,000 acres, respectively, than in 1982, 1981, and 1980. (See Arizona Crop and Livestock Reporting Service, 1980-1984, Arizona Agricultural Statistics: Statistical Reporting Service, U.S. Department of Agriculture and University of Arizona, College of Agriculture.) The lesser amount of acreage harvested than in the early 1980's probably reflects a depressed agricultural economy, which along with the unusually wet year can easily account for the drop in acreage harvested in 1984. The amount of ground water used for irrigation in 1984 was about 2.9 million acre-ft more than in 1983. Municipal and domestic use increased about 41,000 acre-ft. Ground water for drainage purposes amounted to more than 100,000 acre-ft less in 1984 than in 1983 and was only 4.8 percent of the total withdrawal whereas it was 10.0 percent