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PUMPAGE AND GROUND-WATER LEVELS IN
ARIZONA IN 1951

L.C. Halpenny & R.L. Cushman
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Pumpage and ground-water levels in Arizona in 1951

By

L. C. Halpenny and R. L. Cushman

Prepared in cooperation with
Arizona State Land Department
W. W. Lane, Commissioner

Tucson, Arizona

ARIZONA

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Scope of Water-Level Program

The observation-well program in Arizona was continued in 1951 principally in cooperation with the State Land Department. During 1951, water-level measurements were made in more than 1,500 wells. The measurements made in a few representative wells are tabulated in this report to show typical fluctuations in stage of the water tables in the ground-water basins of the State. In comparing this report with the 1950 water-level report, it will be apparent that many wells for which water-level measurements were previously reported do not appear in this report. Some wells have been reclassified to project wells, and water-level measurements in them will be released with project reports. Those who wish to obtain water-level measurements from observation wells not included in this report, can obtain them by consulting the open files of the offices of the U. S. Geological Survey, Ground Water Branch, at Tucson and Phoenix. The water-level measurement program is most intensive in the irrigated areas of central and southern Arizona, where the seasonal water-level fluctuations are large and, in general, of more concern to the people of Arizona. The inventory of wells includes more than 4,000 used irrigation wells. The rate of discharge in gallons per minute was measured in more than 500 of these wells. The library of samples of drill cuttings from deep wells was added to greatly during 1951. Permeability tests were made on selected samples of these drill cuttings, but for the most part only a mechanical analysis and a mineral identification of each sample were made. Cuts from these samples are being stored for future reference in cooperation with the State Land Department, the University of Arizona, and the Museum of Northern Arizona. Geophysical and hydrologic studies of the aquifers in the Salt River Valley were continued in 1951, with special reference to the water-bearing character of deep aquifers. Similar work was done near Chiu Chuischu, on the Papago Indian Reservation, for the Bureau of Indian Affairs and in the Picacho-Redrock area for the Arizona Power Commission. A program of investigation of the springs along the Mogollon Rim was started. The springs were sampled for quality, temperatures were recorded, discharge measurements were made, and the geology of the individual spring sites was studied. The ground-water resources and related geology of the Navajo and Hopi Indian Reservations have been under study since 1948 at the request of the Bureau of Indian Affairs.

The following reports on ground-water resources of Arizona were prepared and released by the Geological Survey in 1951:

Geology and ground-water resources of the Ranegras Plain area, Yuma County, by D. G. Metzger.

Pumpage and ground-water levels in Arizona, 1950, by S. F. Turner and R. L. Cushman.

Preliminary report on the ground-water resources of the Navajo and Hopi Indian Reservations, by L. C. Halpenny.

Water supply of the central Arizona area, answers to 24 questions from J. R. Queen of the staff of the House Committee on Interior and Insular Affairs.

Jurassic stratigraphy of the Navajo country, by J. W. Harshbarger, C. A. Repenning, and R. L. Jackson.

A geologic and geophysical reconnaissance of the Doney Park-Black Bill Park area, Ariz., with reference to ground water, by J. H. Feth and C. B. Yost Jr.

Pumpage

Pumpage of ground water for irrigation in 1951 exceeded the previous record high of 1950 by more than 300,000 acre-feet. The following table contains records of pumpage for the 7-year period 1945-51. A change has been made in the table by no longer including records of pumpage for the New Mexico portion of the Duncan-Virden Valley. This change slightly reduces the previously reported totals for the years 1946-50. The table indicates that about 3,680,000 acre-feet of ground water was pumped from the principal ground-water basins in the State in 1951. However, ground-water pumpage was not included in the following areas: San Simon Valley, Upper San Pedro Valley, Lower San Pedro Valley, Aravaipa area, Cactus Flat area, St. Johns area, Snowflake-Taylor area, Hunt area, Woodruff area, Joseph City area, Chino Valley and Long Valley, Skull Valley and Peeples Valley, Date Creek area, Big Sandy Valley and Valentine area, Bouse area, and Parker area. It is estimated that pumpage for irrigation in these areas was 75,000 acre-feet in 1951. The total pumpage in the State during 1951 was approximately 3,750,000 acre-feet.

Interpretation of Water-Level Fluctuations

Apache County.--Water levels in wells generally showed a slight decline during 1951, although a few rises were observed. Precipitation at Springerville during the year amounted to 8.07 inches, approximately 63 percent of normal.

Cochise County.--Artesian pressures in the deep wells of the Pomereene-Benson-St. David area in the San Pedro valley showed in general little or no net change in 1951. The water level in well (D-17-20)10ccc graphed in figure 3 showed a rise in pressure during the latter part of the year. However, it is believed that this rise is the result of less pumping in this vicinity and not a regional gain in ground-water storage. Net changes in water levels in wells tapping the shallow nonartesian system showed local rises and declines but nothing to indicate a regional trend. The graph of well (D-16-20)34acd shows a decline in the vicinity of this well probably caused by increased pumping from nearby irrigation wells. (See fig. 3.) Water levels in wells in the Fort Huachuca-Charleston area, upstream along the San Pedro River indicated that little or no net change occurred in 1951. This area is one in which the principal draft on ground water is for domestic and stock use. Hydrographs shown in figure 3 for wells (D-20-20)32cdb and (D-21-21)11aad are typical for the area. Fluctuations of water levels in the deep wells of the San Simon and Bowie areas of the San Simon Basin showed a continued lowering of pressure in the artesian aquifers during 1951. The net average decline of the pressure

Pumpage, in acre-feet, from wells in principal ground-water areas of Arizona

	1945	1946	1947	1948	1949	1950	1951
Cochise County:							
San Simon Basin	(a)	5,800	(a)	(a)	(a)	(a)	(a)
Willcox Basin	9,000	15,500	20,000	23,000	28,000	35,000	38,000
Douglas Basin	8,000	12,500	17,000	22,000	30,000	35,000	38,000
Graham County:							
Cactus Flat-Artesia area	(a)	5,600	(a)	(a)	(a)	(a)	(a)
Safford Valley	35,000	115,000	100,000	110,000	40,000	90,000	125,000
Greenlee County:							
Duncan Valley ^{b/}	6,500	17,000	21,000	21,000	11,000	23,000	33,000
Maricopa County:							
Salt River Valley area ^{c/}	1,143,000	1,360,000	1,406,000	1,670,000	1,644,000	1,852,000	1,910,000
Gila Bend area	(a)	33,300	40,500	60,800	67,000	59,000	(110,000
Dendora area	(a)	6,700	6,700	1,900	5,000	6,000	(
Pima County:							
Part of Santa Cruz River Basin	111,000	108,000	145,000	145,000	150,000	180,000	240,000
Pinal County:							
Part of Santa Cruz and Gila River basin	610,000	660,000	700,000	950,000	1,100,000	1,000,000	1,030,000
Santa Cruz County:							
Part of Santa Cruz River basin	18,500	24,000	25,000	28,000	31,000	21,000	30,000
Yuma County:							
Dateland area	4,000	4,000	4,000	5,000	8,000	9,000	15,000
Wellton-Mohawk area	35,000	38,000	43,000	50,000	45,000	46,000	50,000
South Gila Valley	22,000	32,000	35,000	54,000	56,000	56,000	62,000
Total		2,437,000	2,563,200	3,140,000	3,215,000	3,412,000	3,681,000

a Not determined; b Does not include Virden Valley, N. Mex.; c Includes Queen Creek area, Maricopa and Pinal Counties.

in 1951 was about $1\frac{1}{2}$ feet near the town of San Simon, and less than a quarter of a foot in wells in the vicinity of Bowie. The decline in water level near Bowie shown in figure 3 for well (D-13-29)6ccc represents a local condition caused by increased pumping of the well for irrigation. The well formerly was equipped with a windmill and supplied water for stock. Several deep wells were drilled in the Bowie area in 1951 to irrigate large tracts of newly cleared land. It is reported that several thousand acres probably will be cleared and cultivated within the next year or two in the Bowie area. The hydrograph for well (D-13-31)30cdc shows water-level fluctuations that are typical of the water-table wells near the town of San Simon. (See fig. 3.) In recent years several water-table wells were drilled for irrigation in this area, and pumping of these wells is slowly lowering the water table in their vicinity. The hydrograph for well (D-14-31)3bca shows the pressure changes in the artesian system in the more heavily pumped area of the San Simon Basin in the vicinity of the town of San Simon. (See fig. 3.) Ground-water levels in the Willcox Basin continued to decline, owing to pumping of wells for irrigation. In the irrigated area northwest of Willcox, the declines ranged from a fraction of a foot in the southern and northern parts to a maximum of $4\frac{1}{2}$ feet in the center of the area. The average decline was about $1\frac{1}{4}$ feet. In the vicinity of the Willcox Playa the water table was lowered about half a foot. In the Kansas Settlement area, east of the playa, water levels in artesian wells declined about half a foot in 1951. Water-level fluctuations in two wells (D-14-23)36baa and (D-14-25)6cac are shown graphically in figure 4. The first well is on the west side of the playa and the second well is near the town of Willcox. Pumpage in the Willcox Basin in 1951 reached a record high of 38,000 acre-feet. There were approximately 170 irrigation wells operated during 1951. Water levels in wells in the irrigated area of the Douglas Basin reached a record low in 1951, with an average net decline of about 2 feet. In local areas of concentrated pumping, near Elfrida, McNeal, and Double Adobe, net water-level declines in wells were as much as $5\frac{1}{2}$ feet in 1951. In the general area of heavy pumping, the average net decline was about 3 feet. Near Douglas, along the International Boundary, the net decline averaged about 1 foot. Pumping for municipal, industrial, and agricultural uses caused this decline. Pumpage in the Douglas Basin in 1951 amounted to about 38,000 acre-feet from approximately 270 irrigation wells. Precipitation at Willcox was 13.57 inches in 1951, or 1.73 inches above normal. Monthly amounts of precipitation at Willcox are shown graphically in figure 4 for the years 1942-51.

Coconino County.—Water levels rose during 1951 in most of the wells that were measured, the gains ranging from a few hundredths to as much as 8 feet. Slight declines of water levels in three wells also were recorded. The U. S. Weather Bureau at Flagstaff reported a total of 25.79 inches of precipitation during the year, considerably above normal and more than twice as much as occurred in 1950.

Gila County.—Water levels in shallow wells along Pinal Creek fluctuated with no pronounced trend until near the end of the year. At that time the water levels rose sharply in response to recharge occurring as a result of seepage from flows in Pinal Creek. Precipitation at Globe was 18.62 inches in 1951, 3.49 inches above normal. In the month of August 5.28 inches of rain fell, or 2.70 inches more than normal for the month. Water levels in deeper aquifers upstream along Pinal Creek from Globe showed little or no net change in ground-water storage.

Graham County.—An average net water-level decline of $4\frac{1}{2}$ feet was measured in wells in the cultivated portion of Safford Valley in 1951. In general, the water table was depressed to the lowest level in the period of record 1940-51. The net declines in individual wells ranged from a quarter of a foot to 16 feet. The average net decline of the water table by areas was: San Jose-Safford area, 8 feet; Safford-Pima area, 6 feet; Pime-Cork area, 4 feet; Cork-Geronimo area, 1 foot; and Pima-Eden area, 3 feet. The stage of the underflow of the Gila River into Safford Valley is indicated by the decline of water level in well (D-6-28)31aac, shown graphically in figure 5. The water level in this well had a net decline of about 7 feet in 1951, and at the end of the year was at the lowest level during the period of record shown on the graph. The decline in water level in well (D-7-26)22bac, graphed in figure 5, indicates that a 10-foot thickness of the aquifer was dewatered in the vicinity of that well in 1951. The 4-foot decline in water level in 1951 in well (D-6-24)5aac was representative of the declines in the Pima-Cork area. The average stage of the water level in this well for the year 1951 was lower than the average for any previous year of record. The stage of the underflow of the Gila River leaving the cultivated portion of the valley is indicated by the water level in well (D-4-22)13acc, shown graphically in figure 5. Precipitation in the vicinity of Safford amounted to 9.26 inches in 1951, or approximately normal for the area. The decline in ground-water levels in the Safford Valley in 1951 can be attributed principally to a reduced rate of recharge and to large-scale pumping. Pumpage in Safford Valley reached a record high of 125,000 acre-feet in 1951. The supply of surface water available for irrigation was the smallest in the period 1940-51, and this deficiency was made up by pumping from wells. The following table is a summary of the quantities used from ground-and surface-water sources. The information on surface water was taken from annual reports of the Gila Water Commissioner.

Year	Ground Water (acre-feet)	Surface Water (acre-feet)	Total (acre-feet)
1940	24,600	99,693	124,293
1941	8,685	151,300	159,985
1942	18,900	172,005	190,905
1943	35,000	121,569	156,569
1944	52,000	128,027	180,027
1945	35,000	148,675	183,675
1946	115,000	69,909	184,909
1947	100,000	51,978	151,978
1948	110,000	39,848	149,848
1949	40,000	167,790	207,790
1950	90,000	68,504	158,504
1951	125,000	26,389	151,389

Greenlee County.—Water levels in wells in Duncan Valley between the Arizona-New Mexico line and Sheldon lowered a net average of $1\frac{1}{4}$ feet in 1951. (See fig. 6.). The maximum lowering was $2\frac{1}{2}$ feet in wells near the State line. Water-level declines decreased from the State line downstream to Sheldon. From Sheldon downstream to the narrows below York, water levels in wells rose a net average of 1 foot. The rise in water level increased from about zero near Sheldon to a maximum of $1\frac{1}{2}$ feet downstream from York.

Precipitation at Duncan amounted to 9.21 inches in 1951. In 1951, approximately 33,000 acre-feet of water was pumped from wells for irrigation in the Duncan Valley, not including Virden Valley, New Mexico. This is a record high for the valley. The amount of pumpage was larger because of the small amount of surface water available for irrigation. Less surface water was available for irrigation in the valley in 1951 than in any other year in the period 1940-51. There were about 70 irrigation wells in use in the valley during 1951.

Maricopa County.--As may be seen from the graphs in figure 7, water levels throughout most of the Salt River Valley continued to decline during 1951. In the Queen Creek-Higley-Gilbert area the downward trend of water levels continued at about the same rate as in the several preceding years, the average decline amounting to about 9 feet. The total average decline since 1940 has been approximately 52 feet, of which more than 40 feet has occurred since 1946. In the Tempe-Mesa-Chandler area the average water-level decline during 1951 was more than 7 feet, making a total decline of about 43 feet since 1940. The rate of decline during 1951 was approximately the same as in the immediately preceding years. There was a continued decline in water levels in the Phoenix-Glendale-Tolleson area, although the rate of decline was not quite so rapid as it had been in previous years. Total average decline for 1951 was slightly less than 3 feet and the total decline in this area since 1940 has amounted to approximately 34 feet. Of this amount, more than 27 feet has occurred since 1946. In the Litchfield-Beardsley-Marinette area, average water levels showed a very slight rise, the first reversal of the downward trend since 1938. Heavy rains in late August and early September resulted in floods along the Agua Fria River and New River, both of which traverse this area, and the slight rise of the water table may have resulted both abnormal recharge along the stream courses and from decreased pumping for irrigation. In the Liberty-Buckeye-Hassayampa area there was practically no change in average water levels from the previous year, the decline amounting to less than a tenth of a foot. The water table in this area is now slightly lower than it had been at any time since 1930 and is approximately 12 feet below the high peak that was reached during 1945. Cumulative net changes of average water level in the entire Salt River Valley area since 1930 are shown graphically in figure 8. A graph also shows the amount of water pumped for irrigation each year since 1933. The water levels continued to decline at about the same rate as in the previous year, even though the amount of water pumped for irrigation, 1,910,000 acre-feet, exceeded any prior year's withdrawal. This pumpage was greater than in 1950, when the previous high mark was established. The increase in pumpage is attributed to continued expansion of cultivation. Rainfall at Phoenix during 1951 amounted to 12.82 inches, about 5 inches above normal. The above-normal rainfall probably prevented an acceleration in the rate of decline of water levels throughout most of the area because less irrigation water per acre was needed than during previous years.

Mohave County.--Water-level fluctuations in wells in the Big Sandy Valley near Wikieup were largely seasonal during 1951, but there were indications that the downward trend of previous years was being slowed or reversed. In the vicinity of Kingman, ground-water levels continued to decline about 1 foot a year, a trend that has been evident through the period of record, 1944-51. Precipitation at Kingman amounted to 14.24

inches, or 4.15 inches above normal. Much of the precipitation was recorded during the last 5 months of the year. In areas of shallow depth to water, such as along the Big Sandy River, recharge resulting from the above-normal rainfall had reached the water table by the end of the year.

Navajo County.—Fluctuations of water levels during 1951 were slight in the well measured in Navajo County. The number of slight declines considerably exceeded the number of gains, but there was not enough change to indicate any definite trend. Weather records show that precipitation during the year was not far below normal.

Pima County.—The water table beneath most of the irrigated areas of Pima County was depressed to a record low in 1951 as a result of continued large-scale pumping of ground water, primarily for irrigation. The net decline amounted to about 4 feet in 1951 in the Tucson-Cortaro area of the Santa Cruz River valley. The hydrograph for well (D-12-12)16bad shown in figure 9 is typical of the maximum water-level fluctuation in wells in this area. In the Avra-Marana irrigated area the net average lowering of the water table was about 2 feet in 1951. In the northern part of that area the net lowering in some wells was as much as 4 feet, where as in the southern part, where less pumping occurred, the net lowering was less than 1 foot. Well (D-15-10)35aaa, the water-level fluctuation of which are graphed in figure 9, reflects ground-water conditions in the relatively undeveloped section in the extreme southern end of the Avra-Marana area. Water levels in wells in the irrigated areas along Rillito Creek and Pantano Wash lowered between $1\frac{1}{2}$ and 4 feet during the year. Water-level declines in the Tucson-Continental area ranged from $3\frac{1}{2}$ to $5\frac{1}{2}$ feet, with an average decline of about $3\frac{3}{4}$ feet. The largest declines were near the southern end of the area. Well (D-17-14)18cab, the water-level fluctuations of which are graphed in figure 9, is about in the center of the Tucson-Continental area. Well (D-15-13)2cca, also in this area, represents fluctuations in the Tucson city well field south of Tucson. Pumpage in Pima County increased about 60,000 acre-feet in 1951 to a record high of 240,000 acre-feet. Approximately 35,000 acre-feet of this amount was withdrawn for industrial and domestic use in the Tucson metropolitan area. Water needed for newly cultivated land and for more intensive cultivation of the older irrigated areas accounted for most of the increased pumpage in 1951.

Pinal County.—The average net decline amounted to $7\frac{1}{4}$ feet in 1951 in the irrigated area of the Santa Cruz and Gila River valleys of Pinal County. The water table declined to the lowest stage on record. Declines averaged about 6 feet in the Casa Grande-Florence area, with net declines of as much as 10 feet southwest of Coolidge. Net declines averaged about 2 feet on the Gila Indian Reservation near Sacaton. Water-level declines averaged $8\frac{1}{2}$ feet in the Maricopa-Stanfield area in 1951. Declines of more than 15 feet were not uncommon in the southern and western parts of this area. Water-level declines averaged about $7\frac{1}{2}$ feet in the Eloy area with local depressions of as much as 12 feet in the central and southern part of the area. (See fig. 10.) The least and greatest depth to water, respectively, in the irrigated portions of these areas at the end of 1951 were: Casa Grande-Florence area, 30 feet, just downstream from Ashurst-Hayden Dam, and 140 feet, about 7 miles south of Coolidge; Maricopa-Stanfield area, 35 feet, about 2 miles northwest of Maricopa, and 300 feet, about 5 miles southwest of Stanfield; and Eloy area, 75 feet, about 12 miles west of Eloy, and 240 feet, about 5 miles south of Eloy. Pumpage in 1951 in the

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Santa Cruz and Gila River valley of Pinal County amounted to 1,030,000 acre-feet, a new record high. Pumpage in that part of the Queen Creek area within Pinal County amounted to about 100,00 acre-feet, but this pumpage is included in the total for the Salt River Valley. The San Carlos Project, made up in part by the Casa Grande-Florence area and in part by lands on the Gila Indian Reservation, had less surface water available for use than in any other year of the 12-year period 1940-51. The low ground-water levels reduced the pump discharges greatly in the project area, thereby causing the quantity available to be less than the total required. The lack of surface water, and the inability to supplement the supply by pumping from wells, resulted in some lands in the project not receiving enough water to mature the crops.

Santa Cruz County.—Ground-water levels in the Santa Cruz River valley of Santa Cruz County were lowered in 1951 by continued large-scale pumping of wells for irrigation. Local depressions in the water table as much as 6 feet were measured in centers of concentrated ground-water withdrawal. In areas of less pumping, the declines were as small as half a foot. Figure 11 shows graphs of water-level fluctuations in wells (D-22-13)35dcd and (D-23-14)27baa. The first well is in an area more heavily pumped than the second well, and the large water-level fluctuations caused by the heavier pumping can be readily seen in comparing the two graphs. Precipitation at Nogales amounted to 18.88 inches, or 2.97 inches above normal. Rains coming at opportune times reduced the over-all requirement of ground water for irrigation. Pumpage in Santa Cruz County amounted to about 30,000 acre-feet in 1951.

Yavapai County.—During 1951 there was a substantial recovery of water levels in many of the wells measured in this county. Rises of 3 feet or more were numerous, and in some cases the water stood at higher levels than at any time since 1948. Recoveries were particularly noticeable in Peeples Valley and Skull Valley. The wells in Chino Valley showed less fluctuation than those in other parts of the county.

Yuma County.—There were no large fluctuations in water levels in wells measured in the Ranegras Plain area of northern Yuma County in 1951, nor was there a consistent trend in water levels. In general, in the majority of the wells measured, the water-level trend was downward, owing in part to the previous years of drought. The magnitude of the average decline in 1951 was about a tenth of a foot. Fluctuations in water level in well (B-5-16)10ddd, shown graphically in figure 12, are typical of water-table fluctuations in northern Yuma County. Water levels in wells in the Gila River valley of southern Yuma County generally declined during 1951. The net decline of the water level in most wells measured in the Wellton-Mohawk area of the Gila valley was about half a foot. Water levels in a few wells west of the town of Wellton rose slightly because of recharge that was not offset by pumpage from wells for irrigation. Pumpage in the Wellton-Mohawk valley is least west of Wellton. Total pumpage for the Wellton-Mohawk valley amounted to about 50,000 acre-feet in 1951. In the South Gila Valley and in the Yuma-Mesa area, ground-water levels continued to rise in response to added recharge from heavy applications of water for irrigation. Fluctuations in water levels in well (C-9-22)17ddd, shown in figure 12, are typical for the area. Pumpage from wells in Yuma County amounted to 127,000 acre-feet in 1951.

Acknowledgments

Many irrigation districts, power companies, and individuals cooperated in furnishing the information contained in this report. The following organizations were particularly helpful in furnishing data on which the figures for pumpage were based: Arizona Edison Electric Company, Citizens Utilities Company, city of Tucson, Duncan Utilities Company, Eloy Light and Power Company, Gila Water Commissioner, Goodyear Farms, Maricopa County Municipal Water Conservation District, Mohawk Municipal Water Conservation District, Rural Electrification Administration, Roosevelt Irrigation District, Roosevelt Water Conservation District, Salt River Valley Water Users' Association, Central Arizona Light and Power Company, San Carlos Irrigation District, Tucson Gas and Electric Company, U. S. Bureau of Indian Affairs, and U. S. Bureau of Reclamation.

Well-Numbering System

Wells are numbered in accordance with the Bureau of Land Management system of land subdivision. The first digit of a well number indicates the township, the second the range, and the third the section in which the well is situated. The lower-case letters--a, b, c, and d--following the section number indicate the well location within the section; the first letter denotes the quarter section (160 acre tract), the second the quarter-quarter section (40-acre tract), and the third the quarter-quarter-quarter section (10-acre tract). The letters are assigned in a counterclockwise direction, beginning in the northeast quarter. If the location is known within a 10-acre tract, three lower-case letters are shown in the well number. When there is more than one well in the smallest significant tract, consecutive numbers beginning with 1 are added as suffixes. The land survey of Arizona is based on the Gila and Salt River Base Line and Meridian, which divide the State into four quadrants. These quadrants are designated by the capital letters A, B, C, and D. All lands north and east of the base point are in A quadrant; those north and west are in the B quadrant, and so on through C and D quadrants. (See fig. 2.) For example, well number (D-4-5)19 designates the well as being in sec. 19, T. 4S., R. 5E., in the southeast quadrant.

WELL DESCRIPTIONS AND WATER-LEVEL MEASUREMENTS

APACHE COUNTY

(A-13-28)29ca. Formerly 6716. Mr. E. L. Johns. Drilled domestic water-table well in gravel, diameter 12 inches, depth 50 feet. Highest water level 8.43, Aug. 7, 1950; lowest 24.35, June 11, 1947. Records available 1944-51. Water level below land-surface datum, 1951: Feb. 26, 11.44; Aug. 7, 12.69.

COCHISE COUNTY

(D-13-29)6ccc. Formerly 4200. A. R. Spikes. Drilled stock and irrigation artesian well in sand and gravel, diameter 6 inches, reported depth 835 feet. Land-surface datum is about 3,675 feet above msl. Highest water level 9.49, May 2, 1941; lowest 18.70, Mar. 8, 1951. Records available: 1941-42, 1944, 1946-47, 1949-51. Water level below land-surface datum, 1951: Mar. 8, 18.70; Oct. 18, 17.85.

(D-13-31)30cdc. Formerly 4366. Elmer Franklin. Drilled domestic water-table well in sand and gravel, diameter 4 inches, depth 72 feet. Land surface datum is about 3,610 feet above msl. Highest water level 58.70, Nov. 2, 1949; lowest 63.20, Oct. 18, 1951. Records available: 1940-42, 1944, 1946-51. Water level below land-surface datum, 1951: Mar. 8, 62.67; May 26, 62.63; Oct. 18, 63.20.

(D-14-23)36baa. Formerly 1700. Fay Proctor. Drilled domestic and stock water-table well in sand and gravel, diameter 6 inches, depth 50 feet. Land-surface datum is about 4,210 feet above msl. Highest water level 36.05, May 13, 1942; lowest 42.93, June 11, 1947. Records available: 1942, 1944-51. Water level below land-surface datum, 1951: Mar. 30, 40.70; May 28, 40.57; Aug. 1, 41.59; Oct. 16, 41.92.

(D-14-25)6cac. Formerly 1776. E. T. Dunlap. Formerly Dunlap Auto Court. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 34 feet. Land-surface datum is about 4,166 feet above msl. Highest water level 12.00, May 14, 1942; lowest 16.34, Mar. 7, 1950. Records available: 1942, 1944-51. Water level below land-surface datum, 1951: Feb. 19, 15.77; May 28, 15.91; July 24, 16.21; Oct. 4, 16.33.

(D-14-31)3bca. Formerly 4600. Paul Barnes. Drilled unused artesian well in sand and clay, diameter 5 inches, depth 626 feet. Highest water level 40.40, Apr. 30, 1941; lowest 15.39, Aug. 28, 1951. Records available: 1941-42, 1946-51. Water level below land-surface datum, 1951: Mar. 8, 6.79; May 26, 12.90; Aug. 28, 15.39; Oct. 17, 11.07.

(D-16-20)34acd. Formerly 305. L. A. Scott. Drilled domestic and stock water-table well in sand and gravel, diameter 6 inches, depth 98 feet. Highest water level 70.42, June 12, 1941; lowest 82.09, Dec. 19, 1951. Records available: 1941-42, 1944-51. Water level below land-surface datum, 1951: Apr. 11, c 79.98; Dec. 19, 82.09.

(D-16-25)16add. Formerly 1956. W. D. Wear. Formerly State of Arizona. Drilled stock water-table well in sand and gravel, diameter 6 inches, depth 65 feet. Land-surface datum is about 4,190 feet above msl. Highest water level

33.99, June 7, 1944; lowest 45.23, June 12, 1947. Records available: 1942, 1944-51. Water level below land-surface datum, 1951: Feb. 20, a 36.68; May 30, 36.28; July 31, a 38.76; Oct. 15, 37.64.

(D-17-20)10ccc. Formerly 477. City of Benson. Drilled unused artesian well in sand and gravel, diameter 4 inches; reported depth 700 feet. Highest water level 6.17, Dec. 28, 1951; lowest 19.75, June 18, 1950. Records available: 1944-51. Water level below land-surface datum, 1951:

Daily noon water level, 1951
(From recording gage)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.11	8.22	9.41	9.13	8.90	12.97	16.03	10.75	8.40	9.06		7.31
2	8.13	8.45	9.38	9.79	8.45	13.49	16.23	9.81	9.27	8.81	7.70	7.45
3	8.63	8.42		9.77	8.36	13.83	16.19	9.78	9.89	8.93	7.57	7.32
4	8.58	8.84		9.72	8.95	13.28	16.20	9.73	9.99	8.99	7.26	7.18
5	8.28	8.79		9.49	9.07	13.54	15.75	9.64	9.67	9.71	7.82	7.06
6	8.25	8.39		8.98	10.18	13.54	14.45	9.44	10.55	9.90	7.81	7.09
7	8.55	8.76		8.58	10.41	13.50	14.35	9.46	10.99	9.57	7.55	6.94
8	8.52	8.07		8.50	10.10	13.16	15.39	10.58	10.65	9.86	7.58	6.81
9	8.37	9.05		8.50	10.55	13.93	15.77	10.70	11.04	10.56	7.56	6.45
10	8.31	9.00	9.55	9.35	11.00	13.86	16.05	10.73	11.37	10.16	7.65	7.05
11	8.06	9.63	9.04	9.00	11.37	13.66	16.05	12.04	10.97	10.29	7.33	6.70
12	8.06	9.17	9.26	8.92	10.92	13.61	15.66	12.38	10.42	10.40	7.06	6.76
13	8.20	9.10	8.96	9.84	11.43	14.56	15.55	12.72	11.30	10.75	7.63	6.92
14	8.32	9.34	8.63	11.00	10.48	13.85	14.52		10.75	10.87	7.35	6.78
15	8.44	9.37	9.20	9.75	10.15	14.19	13.11	12.11	11.25	10.60	6.71	6.53
16	8.17	9.25	10.10	9.87	10.36	14.84		11.12	11.18	10.21	6.92	6.78
17	8.08	9.24	9.65	10.37	10.03	14.57		11.33	11.55	10.58	6.90	6.79
18	8.04	9.25	9.88	9.76	10.86	14.16		11.76	10.90	9.81	6.77	6.59
19	7.96	9.51	10.34	10.45	11.37	14.38		11.92	11.36	10.35	6.70	6.46
20	8.06	9.20	9.79	9.61	11.93	15.15	11.80	11.09	12.01	9.91	6.75	6.51
21	8.25	9.23	10.44	9.25	11.55	15.49	11.67	11.01	11.41	10.15	6.52	6.41
22	8.22	9.19	10.12	8.93	12.20	15.65	12.35	10.41	11.84	9.75	6.50	6.21
23	8.43	10.06	9.65	9.16	11.74	16.04	11.83	10.30	11.61	9.50	6.74	6.92
24	8.53	9.38	10.32	8.98	11.75	16.06	11.05	10.04	12.40	9.90	7.09	6.58
25	8.30	9.18	10.39	9.65	11.87	15.16	10.12	10.00	12.25	9.36	6.84	6.25
26	8.17	9.13	10.00	9.80	12.40	15.32	9.81	9.23	11.66	9.17	7.05	6.22
27	8.34	8.94	9.35	9.56	13.35	15.88	9.73	9.02	11.33	8.87	7.11	6.54
28	7.94	9.11	8.78	9.95	13.22	15.85	9.85	8.43	10.75	8.55	7.02	6.17
29	8.33		8.65	9.80	13.41	16.12	10.60	8.46	10.85	8.59	6.95	6.30
30	8.03		8.92	9.06	12.72	16.08	10.77	8.21	9.80	8.21	7.42	6.22
31	8.20		8.71		13.30		10.72	8.21		8.03		6.30

(D-17-21)32bad. Formerly 599. Boquillas Cattle Co. Drilled domestic and stock artesian well in sand and gravel, diameter 6 inches, reported depth 520 feet, cased to 500. Highest water level 16.92, Dec. 9, 1946; lowest 21.51, Apr. 6, 1950. Records available 1944-51. Water level below land-surface datum, 1951: Apr. 11, 21.19.

(D-18-21)6aab. Formerly 745. Walter Haymore. Drilled domestic water-table well in sand and gravel, diameter 4 inches, depth 60 feet. Highest water level 27.42, June 8, 1945; lowest 35.80, Sept. 22, 1947. Records available 1944-51. Water level below land-surface datum, 1951: Apr. 11, 31.87.

(D-18-26)28aaa. Formerly 2375. Frank Geers. Formerly Frank Jeans. Drilled stock water-table well in sand and gravel, diameter 6 inches, depth 140 feet. Land-surface datum is 4,267.8 feet above msl. Highest water level 70.65, Dec. 21, 1949; lowest 75.05, Sept. 7, 1950. Records available 1946-51.

Water level below land-surface datum, 1946-51

Date	Water Level	Date	Water Level	Date	Water Level
Jan. 31, 1946	70.77	Sept. 23, 1947	71.13	Dec. 21, 1949	70.65
Mar. 27,	71.41	Oct. 23,	71.17	Feb. 9, 1950	72.04
May. 2,	71.77	Mar. 27, 1948	71.30	Feb. 28,	72.12
June 13,	70.80	Oct. 13,	71.51	Sept. 7,	a75.05
July 25,	70.82	Feb. 9, 1949	b71.94	Dec. 13,	72.40
Oct. 15,	a73.30	July 8,	71.86	Feb. 21, 1951	72.81
Dec. 11,	70.92	Aug. 2,	71.81	Oct. 15,	72.73
Aug. 27, 1947	71.11	Oct. 12,	70.94		

(D-20-20)32cdb. Formerly 950. Lon Hunt. Drilled unused water-table well in sand and gravel, diameter 6 inches, depth 125 feet. Highest water level 86.17, Apr. 2, 1941; lowest 91.99, Dec. 19, 1950. Records available 1941-43, 1945-51. Water level below land-surface datum, 1951: Apr. 12, 91.98.

(D-20-26)33add. Formerly 2709. Frank Sproul. Formerly F. O. Mackey. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 64 feet, perforations 24-64. Land-surface datum is 4,124.2 feet above msl. Highest water level 22.46, May 27, 1942; lowest 40.69, July 24, 1951. Records available 1942, 1944-51. Water level below land-surface datum, 1951: Feb. 26, 35.64; May 29, 37.12; July 24, 40.69; Oct. 12, 39.48.

(D-21-21)11aad. Formerly 1074. J. L. Parker. Dug unused water-table well in sand and gravel, diameter 48 inches, depth 36 feet. Highest water level 26.90, Dec. 9, 1949; lowest 30.69, Apr. 9, 1941. Records available 1941, 1944-51. Water level below land-surface datum, 1951: Apr. 12, 27.28.

(D-21-26)24baa. Formerly 3001. McNeal Cemetery. Drilled domestic water-table well in sand and gravel. Land surface datum is 4195.8 ft. above msl. Highest water level 112.00, Jan. 31, 1946; lowest 121.90, June 24, 1949. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 27, 117.74; May 30, 118.54; July 25, 118.64; Oct. 15, 119.14.

(D-22-26)28bab2. Formerly 3388. J. E. Brophy. Drilled irrigation water-table well in sand and gravel, diameter 8 inches, depth 90 feet. Highest water level 26.42, July 25, 1946; lowest 35.55, Oct. 15, 1951. Records available 1946-47, 1949-51. Water level below land-surface datum, 1951: Feb. 27, 31.92; Oct. 15, 35.55.

(D-24-27)5bdb. Formerly 3804. Fred Price. Formerly L. E. Harris. Dug stock water-table well in sand and gravel, diameter 96 inches, depth 82 feet. Land-surface datum is about 3,996 ft. above msl. Highest water level 54.30, May 26, 1942; lowest 60.48, Oct. 11, 1949. Records available 1942, 1944-51. Water level below land-surface datum, 1951: Feb. 27, 58.44; Oct. 16, 59.04.

Gila County

(A-1-15)9aad. Formerly 51. Kenneth Hoopes. Drilled unused water-table well in sand and gravel, diameter 12 inches, depth 160 feet. Highest water level 62.63, May 25, 1945-51; lowest 90.40, October 3, 1950. Records available 1945-51.

Water level below land-surface datum, 1951

Date	Water level	Date	Water level	Date	Water level
Jan. 10, 1951	87.17	May 8, 1951	88.10	Sept. 5, 1951	82.93
Feb. 21,	87.84	July 2,	88.72	Nov. 13,	83.65
Apr. 19,	88.50				

(A-1-15)13bad. Formerly 52. Schniffen. Drilled unused water-table well in sand and gravel, diameter 6 inches, depth 105 feet. Highest water level 3.50, May 5, 1949; lowest 45.40, June 21, 1947. Records available 1946-51.

Water level below land-surface datum, 1951

Date	Water level	Date	Water level	Date	Water level
Jan. 10, 1951	35.06	May 8, 1951	34.96	Sept. 5, 1951	35.34
Mar. 6,	36.90	July 2,	28.86	Nov. 13,	28.97
Apr. 11,	38.87				

Coconino County

(A-22-6)26aaa. Formerly 2602. City of Flagstaff. Drilled unused water-table well in Coconino sandstone, diameter 16 inches, reported depth 1,021 feet. Highest water level 129.63, Sept. 28, 1945; lowest 130.99, Aug. 5, 1951. Records available 1944-51. Water level below land-surface datum, 1951: Feb. 25, 130.70; Aug. 5, 130.99.

(A-21-7)9ddc. Formerly 2401. Pinewood Dairy. Dug stock water-table well in gravel, diameter 48 inches, depth 25 feet. Highest water level 11.93, June 5, 1945; lowest 19.34, Oct. 15, 1948. Records available 1944-51. Water level below land-surface datum, 1951: Feb. 25, 15.88; Aug. 5, 17.06.

Graham County

(D-4-22)13acc. Formerly 51. Aubrey Rabb. Formerly Bert Hinton. Drilled irrigation water-table well in sand and gravel, diameter 10 inches, depth 76 feet. Land-surface datum is 2,641.0 feet above msl. Highest water level 14.31, Mar. 18, 1941; lowest 27.63, July 30, 1951. Records available 1939-51.

Water level below land-surface datum, 1951

Date									
Jan. 29	21.85	Apr. 30	22.75	July 30	27.63	Oct. 29	23.36		
Feb. 26	21.59	May 28	21.63	Sept. 3	24.86	Nov. 26	23.08		
Mar. 26	21.40	June 25	24.78	Oct. 1	23.77	Dec. 24	22.64		

(D-4-22)35ddd. Formerly 60. Pat Hinton. Drilled stock water-table well in sand and gravel, diameter 6 inches, depth 75 feet. Land-surface datum is 2,859.5 feet above msl. Highest water level 17.08, Feb. 11, 1943; lowest 39.65, Oct. 25,

149. Records available 1939-44, 1946-51. Water level below land-surface datum, 1951: Mar. 6, 29.85; May 22, 30.65.

(D-4-23)29adc. Formerly 91. Ben Montierth. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 83 feet, cased to 83, perforations 53-73. Land-surface datum is 2,705.7 feet above msl. Highest water level 46.10, Mar. 18, 1941; lowest 63.23, Feb. 15, 1948. Records available 1940-51. Water level below land-surface datum, 1951: Mar. 6, 60.88.

(D-6-24)5acc. Formerly 273. Eldon Palmer. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 64 feet. Land-surface datum is 2,779.6 feet above msl. Highest water level 38.93, May 29, 1941; lowest 51.38, July 30, 1951. Records available 1940-51.

Water level below land-surface datum, 1951

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	47.30	June 25	50.96	Oct. 1	50.84	Dec. 24	50.61
Feb. 26	47.00	July 30	51.38	Oct. 29	51.04		
May 28	50.58	Sept. 3	51.25	Nov. 26	50.84		

(D-6-24)13cbb. Formerly 289. W. J. Preston. Drilled domestic water-table well in sand and gravel, diameter 5 inches, depth 48 feet. Land-surface datum is 2,828.8 feet above msl. Highest water level 29.15, May 28, 1942; lowest 44.43, Apr. 30, 1948. Records available 1939-40, 1942-51. Water level below land-surface datum, 1951: Mar. 5, 42.55; May 22, 43.92.

(D-6-25)17ddd. Formerly 320. Vance Marshall. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 46 feet. Land-surface datum is 2,821.6 feet above msl. Highest water level 10.77, May 26, 1941; lowest 18.27, Oct. 11, 1950. Records available 1939-46, 1948-50. Water level below land-surface datum, 1951: No meas. made.

(D-6-28)31aac. Formerly 454. J. W. Earven. Formerly Brown Canal Co. Drilled irrigation water-table well in sand and gravel, diameter 16 inches. Depth 57 feet. Highest water level 17.14, Apr. 16, 1941; lowest 32.81, May 23, 1951. Records available 1940-51. Water level below land-surface datum, 1951: Mar. 6, 29.56; May 23, 32.81.

(D-7-26)13dcd. Formerly 592. E. M. Claridge. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 80 feet, cased to 80, perforations 35-70. Land-surface datum is about 2,962 feet above msl. Highest water level 11.73, May 25, 1942; lowest 51.02, Apr. 28, 1948. Records available 1940-51. Water level below land-surface datum, 1951: Mar. 6, c37.10.

(D-7-26)22bac. Formerly 623. Lee Johns. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 90 feet, cased to 90. Land-surface datum is 2,950.3 feet above msl. Highest water level 20.27, May 25, 1942; lowest 58.23, Apr. 28, 1948. Records available 1940-51. Water level below land-surface datum, 1951: Mar. 6, 38.27.

(D-7-27)4dad. Formerly 674. Zelma Clonts. Formerly O. H. Clonts. Drilled irrigation water-table well in sand and gravel, diameter 16 inches depth 81 feet, cased to 81, perforations 10-60. Land-surface datum is about 3,012 feet above msl.

Highest water level 9.32, Apr. 16, 1941; lowest 29.74, July 22, 1947. Records available 1940-51. Water level below land-surface datum, 1951: No meas. made.

Greenlee County

(D-7-31)4bcc. Formerly 31. Barney and Frazier. Formerly J. C. Merritt. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 75 feet. Land-surface datum is 3,544.4 feet above msl. Highest water level 24.25, May 5, 1941; lowest 33.31, Dec. 28, 1950. Records available 1939-1943, 1945-51. Water level below land-surface datum, 1951: Mar. 7, 33.16; May 24, 32.58; Nov. 5, 33.14.

(D-6-31)7bdd. Formerly 5. Warner Foote. Driven observation water-table well in sand and gravel, diameter 1 inch, depth 15 feet. Land-surface datum is 3,452.2 feet above msl. Highest water level 4.78, Mar. 1, 1949; lowest 9.03, July 23, 1947. Records available 1941-51. Water level below land-surface datum, 1951: Mar. 7, 6.67.

(D-8-32)34cdd. Formerly 133. Floyd McDaniels. Drilled irrigation water-table well in sand and gravel, diameter 18 inches, depth 70 feet. Land-surface datum is about 3,687 feet above msl. Highest water level 6.60, Mar. 1, 1949; lowest 29.55, Nov. 5, 1951. Records available 1939-1943, 1945-51. Water level below land-surface datum, 1951: Mar. 7, 17.36; Nov. 5, 29.55.

(D-8-32)32cda. Formerly 122. Lavar Merrill. Formerly O. Christensen. Drilled domestic water-table well in sand and gravel, diameter 4 inches, depth 110 feet. Land-surface datum is 3,716.0 feet above msl. Highest water level 22.68, Mar. 15, 1945; lowest 38.56, Aug. 27, 1951. Records available 1939-51. Water level below land-surface datum, 1951: Mar. 7, 31.80; May 24, 36.08; Aug. 27, 38.56; Nov. 5, 36.19.

Maricopa County

(A-1-1)4aaa. Formerly 3053. Isabell-Hartner Ranches. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 158 feet. Land-surface datum is about 1,025 feet above msl. Highest water level 54.93, Jan. 14, 1946; lowest 98.32, Nov. 5, 1951. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 14, 86.48; Nov. 5, 98.32.

(A-1-4)11bcb. Formerly 1502. J. B. House. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 201 feet, deepened from 165. Highest water level 36.75, Feb. 21, 1946; lowest 68.32, Nov. 7, 1951. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 7, 62.30; Nov. 7, 68.32.

(A-1-6)23daa. Formerly 851. Logan Stillwell. Drilled domestic water-table well in sand and gravel, diameter 10 inches, depth 328 feet, deepened from 288, perforations 308 to 328. Land-surface datum is 1,375.7 feet above msl. Highest water level 229.20, Mar. 19, 1946; lowest 300.83, Nov. 21, 1951. Records available 1946, 1948-51. Water level below land-surface datum, 1951: Feb. 8, 284.02; Nov. 21, 300.83.

(A-3-1)35baa. Formerly 2856. Otis Cook. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 217 feet. Highest water level 54.47,

Mar. 20, 1946; lowest 94.50, Nov. 5, 1951. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 15, 37.39; Nov. 5, 94.50.

(A-3-2)12caa. Formerly 2582. John M. Jacobs. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 417 feet, perforations 179-390. Land-surface datum is 1,309.7 feet above msl. Highest water level 253.96, Feb. 21, 1949; lowest 290.50, Dec. 12, 1950. Records available 1948-51. Water level below land-surface datum, 1951: Feb. 15, 286.47.

(A-3-4)15ddd. Formerly 1711. David & Leona Gooze. Drilled unused water-table well in sand and gravel, diameter 6 inches, depth 193 feet, uncased. Highest water level 165.82, Mar. 24, 1946; lowest 170.22, Nov. 13, 1951. Records available 1946-51. Water level below land-surface datum, 1951: Jan. 25, 166.95; Nov. 13, 170.22.

(B-1-2)13acd. Formerly 4100. Measurements prior to 1948 were made by Roosevelt Irrigation District. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 155 feet, perforations 40-130. Land-surface datum is 958.9 feet above msl. Highest water level 39.0, Apr. 30, 1928; lowest 73.25, Mar. 27, 1950. Records available 1928-31, 1934-41, 1944-45, 1947-51. Water level below land-surface datum, 1951: Feb. 1, 66.54; Nov. 8, 65.40.

(B-1-3)34bbb. Formerly 4401. Roosevelt Irrigation District. All measurements prior to 1946 were made by Roosevelt Irrigation District. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 200 feet, perforations 74-186. Land-surface datum is 916.7 feet above msl. Highest water level 55.24, Feb. 13, 1947; lowest 66.86, Dec. 15, 1950. Records available 1928-51. Water level below land-surface datum, 1951: Feb. 1, 60.44.

(B-2-1)13cba. Formerly 3489. R. E. McMurchy. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 143 feet. Highest water level 58.56, June 27, 1946; lowest 108.22, Dec. 21, 1950. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 13, 102.12; Nov. 15, 104.66.

(B-2-2)4dcb. Formerly 4002. Measurements prior to 1946 were made by Maricopa Co. Water Conservation District. Maricopa County Municipal Water Conservation District No. 1. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 500 feet, perforations 204-484. Highest water level 183.7, May 17, 1940; lowest 238.10, Nov. 15, 1951. Records available 1940-42, 1946-51. Water level below land-surface datum, 1951: Feb. 14, 226.16; Nov. 15, 238.10.

(B-4-1)8daa. Formerly 3686. All measurements prior to 1946 were made by Maricopa Co. Municipal Water Conservation District. Maricopa County Municipal Water Conservation District No. 1. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 500 feet, perforations 182-484. Land-surface datum is about 1,335 feet above msl. Highest water level 180.0, Nov. 28, 1938; lowest 227.27, Nov. 14, 1951. Records available 1938, 1940-42, 1944, 1946-51. Water level below land-surface datum, 1951: Feb. 13, 223.63; Nov. 14, 227.27.

(C-1-5)1aabb. Formerly 5506. Charles Yokum. Drilled stock water-table well in sand and gravel, diameter 6 inches, depth 185 feet. Highest water level 62.77, Oct. 25, 1946; lowest 78.69, June 16, 1949. Records available 1946-51. Water level below land-surface datum, 1951: Feb. 2, 72.12; Nov. 8, 76.83.

(C-1-7)15bbb. Formerly 6564. Lee C. Underdown. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 650 feet, perforations 164-254. Highest water level 178.22, Mar. 4, 1949; lowest 179.69, Jan. 26, 1951. Records available 1949-51. Water level below land-surface datum, 1951: Jan. 26, 179.69.

(D-1-5)1bbb. Formerly 1208. Measurements prior to 1946 were made by Salt River Valley Water Users' Association. Salt River Valley Users' Association. Drilled domestic water-table well, in sand and gravel, diameter 16 inches, depth 180 feet. Land-surface datum is 1222.2 feet above msl. Highest water level 67.20, Feb. 18, 1946; lowest 140.78, Nov. 6, 1951. Records available 1945-51. Water level below land-surface datum, 1951: Feb. 6, 120.25; Nov. 6, 140.78.

(D-1-6)25aaa. Formerly 136. Roosevelt Water Conservation District. Drilled domestic water-table well in sand and gravel. Diameter 18 inches, depth 223 feet. Land-surface datum is 1324.1 feet above msl. Highest water level 92.76, May 26, 1941; lowest 134.24, Nov. 23, 1951. Records available 1939-51. Water level below land-surface datum, 1951: Feb. 8, 128.14; Nov. 23, 134.24.

(D-2-5)15bbb. Formerly 1310. All measurements prior to 1949 were made by Salt River Valley Water Users' Association. L. S. Breckler. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 200 feet. Land-surface datum is 1,214.0 feet above msl. Highest water level 40.2, Mar. 23, 1945; lowest 85.87, Nov. 7, 1951. Records available 1945-51. Water level below land-surface datum, 1951: Feb. 6, 77.58; Nov. 7, 85.87.

(D-2-7)12ddd. Formerly 701. L. M. Mecham. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 600 feet, perforations 250-585. Highest water level 177.00, Feb. 28, 1948; lowest 214.47, Nov. 21, 1951. Records available 1948-51. Water level below land-surface datum, 1951: Feb. 9, 200.90; Nov. 21, 214.47.

Mohave County

(B-16-13)34dd. Formerly 904. Dr. A. E. Carter. Dug domestic and stock water-table well in sand and gravel, diameter 4 feet, depth 20 feet. Highest water level 13.76, Oct. 1, 1945; lowest 18.50, Aug. 3, 1951. Records available 1945-51. Water level below land-surface datum, 1951: Feb. 24, 16.58; Aug. 3, 18.50.

(B-21-17)24cd. Formerly 1302. E. A. Kier. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 120 feet. Highest water level 101.46, Aug. 14, 1944; lowest 109.75, Aug. 2, 1951. Records available 1944-51. Water level below land-surface datum, 1951: Feb. 24, 108.16; Aug. 2, 109.75.

Navajo County

(A-17-21)7bb. Formerly 7653. Arizona State Highway Department. Drilled unused water-table well in Coconino sandstone, diameter 10 inches, depth 110 feet. Land-surface datum is 5,110.5 feet above msl. Highest water level 39.51, June 3, 1948; lowest 40.59, Aug. 5, 1950. Records available 1944-51. Water level below land-surface datum, 1951: Feb. 26, 40.21; Aug. 6, 40.58.

Pima County

(D-11-10)22add. Formerly 457. Tom Greenfield. Formerly T. J. Smith. Drilled domestic and irrigation water-table well in sand and gravel, diameter 20 inches,

reported depth 600 feet, cased to 600, perforations 145-582. Highest water level 140.66, Feb. 28, 1940; lowest 163.68, Sept. 26, 1950. Records available 1940, 1942, 1945-48, 1950-51. Water level below land-surface datum, 1951: Dec. 28, 162.24.

(D-12-10)20ddc. Formerly 1505. B. Wong. Drilled domestic water-table well in sand and gravel, diameter 7 inches, depth 222 feet. Highest water level 184.79, Apr. 15, 1940; lowest 194.39, July 16, 1951. Records available 1940, 1942, 1944-51. Water level below land-surface datum, 1951: Feb. 28, 188.50; July 16, 194.39.

(D-12-11)18ddd. Formerly 1430. J. E. Glover. Drilled domestic and stock water-table well in sand and gravel, diameter 10 inches, depth 218 feet. Highest water level 189.37, June 13, 1941; lowest 204.62, Sept. 26, 1950. Records available 1940-42, 1944-47, 1949-51. Water level below land-surface datum, 1951: July 16, 204.34; Dec. 27, 201.84.

(D-12-12)16bad. Formerly 1337. Cortaro Water Users' Association. Formerly Cortaro Farms. Drilled unused water-table well in sand and gravel, diameter 24 inches to 18 inches. Reported depth 300 feet, cased to 292, perforations 75-285. Highest water level 74.71, Feb. 20, 1940; lowest 123.33, Aug. 25, 1948. Records available 1939-51. Water level below land-surface datum, 1951: Feb. 28, 94.29; Dec. 17, 117.22.

(D-15-10)35aaa. Formerly 6410. State of Arizona. Formerly C. W. Van Camp. Drilled unused water-table well in sand and gravel, diameter 6 inches, depth 295 feet. Highest water level 212.17, Oct. 7, 1948; lowest 214.84, Dec. 26, 1951. Records available 1940-1942, 1944, 1946-51. Water level below land-surface datum, 1951: May 14, 214.52; July 12, 214.73; Dec. 26, 214.84.

(D-15-13)2cca. Formerly 6612. City of Tucson. Dug and drilled unused water-table well in sand and gravel, diameter 12 inches, dug portion of well filled after 12-inch casing installed, depth 104 feet. Highest water level 31.70, July 29, 1942; lowest 60.51, Oct. 25, 1951. Records available 1942-51.

Water level below land-surface datum, 1951

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Jan. 29	51.56	Apr. 25	53.29	July 27	57.56	Oct. 25	60.51
Feb. 27	51.18	May 25	54.85	Aug. 27	58.55	Nov. 28	57.88
Mar. 26	51.77	June 25	57.28	Sept. 25	58.88	Dec. 21	56.90

(D-17-14)18cab. Formerly 8686. Arizona State Highway Department. Dug unused water-table well in sand and gravel, diameter 36 inches, depth 67 feet. Highest water level 52.16, Jan. 2, 1940; lowest 67.36, July 27, 1949. Records available 1939-51. Water level below land-surface datum, 1951: Jan. 18, 61.36; May 24, 65.36; Dec. 18, 65.91.

(D-19-13)3baa. Formerly 10477. Owner's No. W1. Farmers Investment Co. Formerly Intercontinental Ranch Co. Dug and drilled irrigation water-table well in sand and gravel, diameter 96 to 10 inches, depth 246 feet, cased to 246, perforations 42-224. Highest water level 47.44, Oct. 3, 1939; lowest 75.13, Jan. 18, 1951. Records available 1939-51. Water level below land-surface datum, 1951: Jan. 18, 75.13.

Pinal County

(D-2-10)8cc. Formerly 35. E. M. Little. Drilled unused water-table well in sand and gravel, diameter 8 inches, depth 436.7 feet. Highest water level 396.83, Jan. 28, 1947; lowest 411.72, Feb. 28, 1941. Records available 1939-51. Water level below land-surface datum, 1951: Feb. 8, 400.48; Nov. 21, 401.25.

(D-3-9)20aaa. Formerly 69. Elmer C. Von Glahn. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 600 feet, perforations 285-585. Highest water level 222.70, Feb. 17, 1949; lowest 254.20, Nov. 21, 1951. Records available 1942, 1948-51. Water level below land-surface datum, 1951: Feb. 9, 244.64; Nov. 21, 254.20.

(D-4-8)2cc. Formerly 278. Arizona Ranches. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 237 feet. Land-surface datum is 1,530.5 feet above msl. Highest water level 157.96, June 12, 1941; lowest 190.14, Nov. 21, 1951. Records available 1941-51. Water level below land-surface datum, 1951: Feb. 9, 182.70; Nov. 21, 190.14.

(D-4-11)7cca. Formerly 341. Owner's No. 7. U. S. Indian Service. Drilled unused water-table well in sand and gravel, diameter 20 inches, reported depth 162 feet, cased to 80. Land-surface datum is 1,560.4 feet above msl. Highest water level 15.30, June 29, 1943; lowest 44.14, Nov. 24, 1948. Records available 1942-51. Water level below land-surface datum, 1951: Feb. 6, 30.60; June 21, 35.94; Sept. 7, 35.73; Dec. 28, 36.19.

(D-5-4)30cbb. Formerly 618. Harrison and Harris. Formerly - Yagua. Drilled domestic water-table well in sand and gravel, diameter 14 inches, depth 188 feet. Land-surface datum is 1,242.7 feet above msl. Highest water level 81.05, Mar. 13, 1942; lowest 129.79, Dec. 28, 1951. Records available 1942-51. Water level below land-surface datum, 1951: Feb. 2, 125.82; Dec. 28, 129.79.

(D-5-9)29ada. Formerly 437. Owner's No. 76. U. S. Indian Service. Drilled unused water-table well, diameter 16 inches, reported depth 616 feet, perforations 134-440. Land-surface datum is 1,520.0 feet above msl. Highest water level 114.2 Feb. 6, 1944; lowest 164.30, Sept. 7, 1951. Records available 1942-51. Water level below land-surface datum, 1951: Feb. 6, 153.10; June 21, 161.68; Sept. 7, 164.30.

(D-6-6)25ddd. Formerly 991. H. L. Early. Formerly Mrs. Emma Pennington. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, formerly 12 inches, well deepened and recased, depth 171 feet. Land-surface datum is 1,438.3 feet above msl. Highest water level 39.00, Apr. 18, 1940; lowest 85.22, Sept. 14, 1951. Records available 1940-51. Water level below land-surface datum, 1951: Feb. 5, 80.60; Sept. 14, 85.22.

(D-7-6)30add. Formerly 1489. A. R. Chapman. Formerly Albert Steinfeld. Dug and drilled unused water-table well in sand and gravel, diameter 20 inches, formerly 42 x 72 inches, depth 100 feet. Land-surface datum is 1,443.6 feet above msl. Highest water level 52.64, Mar. 12, 1942; lowest 87.80, Sept. 11, 1951. Records available 1942-51. Water level below land-surface datum, 1951: Feb. 13, 82.23; June 26, 86.33; Sept. 11, 87.80.

(D-7-7)11cdd. Formerly 1405. E. C. Grasty. Formerly S. C. McFarland.

Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 460 feet, perforations 100-430. Land-surface datum is 1,498.2 feet above msl. Highest water level 85.93, Mar. 11, 1942; lowest 164.07, July 27, 1949. Records available 1942-51. Water level below land-surface datum, 1951: Feb. 5, 146.25.

(D-8-6)29acc. Formerly 1716. Leon Zagouies. Formerly Smith-Thornburg Co. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 282 feet, perforations 75-208. Land-surface datum is 1,501.2 feet above msl. Highest water level 63.89, Sept. 12, 1941; lowest 105.35, Sept. 12, 1951. Records available 1941-51. Water level below land-surface datum, 1951: Feb. 13, 88.44; June 26, 100.03; Sept. 12, 105.35; Dec. 27, 94.15.

(D-8-7)25ddd. Formerly 1795. R. E. Hamilton. Formerly Jack Pretzer, Jr. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 997 feet, formerly 938 feet. Land-surface datum is 1,614.8 feet above msl. Highest water level 124.47, Mar. 24, 1941; lowest 217.44, Aug. 25, 1948. Records available 1940-51. Water level below land-surface datum, 1951: Feb. 16, 207.22.

(D-10-9)10dba. Formerly 2354. H. H. Cake. Drilled domestic water-table well in sand and gravel, diameter 8 inches, depth 188 feet. Land-surface datum is about 1,798 feet above msl. Highest water level 143.36, July 3, 1941; lowest 168.85, Sept. 10, 1951. Records available 1941-51. Water level below land-surface datum, 1951: Feb. 15, 164.83; Sept. 10, 168.85.

Santa Cruz County

(D-22-13)35dcd. Formerly 915. T. T. Pendleton. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 88 feet, reported depth 100 feet published in previous Water-Supply Papers. Highest water level 16.01, Oct. 25, 1939; lowest 53.04, May 7, 1946. Records available 1939-51. Water level below land-surface datum, 1951: Jan. 18, 37.44; Apr. 25, 41.20; Dec. 10, 44.41.

(D-23-14)27 baa. Formerly 1513. Ramon Michelena. Formerly Dines Nelson. Dug, unused water-table well in sand and gravel, diameter 62 inches, depth 36 feet, concrete casing to 9, open hole 9-36. Highest water level 16.78, Mar. 26, 1941; lowest 21.80, July 28, 1948. Records available 1939-51. Water level below land-surface datum, 1951: Jan. 18, 18.30; Mar. 1, 18.44; Dec. 18, 19.44.

Yavapai County

(B-11-5)25dab. Formerly 27. Mr. Towne. Drilled unused water-table well in sand and gravel, diameter 8 inches, depth 212 feet. Highest water level 26.35, July 2, 1946; lowest 40.80, Aug. 4, 1951. Records available 1946, 1948-49, 1951. Water level below land-surface datum, 1951: Mar. 5, 37.85; Aug. 4, 40.80.

(B-13-6)9dd. Formerly 466. J. S. Reagan. Dug irrigation water-table well in sand and gravel, diameter 72 inches, depth 22 feet. Highest water level 13.98, Jan. 17, 1945; lowest 17.97, Aug. 4, 1951. Records available 1945-49, 1951. Water level below land-surface datum, 1951: Mar. 5, 14.28; Aug. 4, 17.97.

(B-14-4)33ab. Formerly 634. Mr. Sine. Formerly M. A. Wiser. Drilled unused water-table well in sand and gravel, diameter 16 inches, depth 73 feet. Highest water level 11.03, Apr. 14, 1945; lowest 17.64, Aug. 4, 1951. Records available 1944-49, 1951. Water level below land-surface datum, 1951: Mar. 5, 14.44; Aug. 4, 17.64.

Yuma County

(B-5-16)10ddd. Formerly 632. Crowder Cattle Co. Drilled unused water-table well in sand and gravel, diameter 16 inches, depth 164 feet. Highest water level 112.60, Feb. 21, 1946; lowest 112.91, July 31, 1951. Records available 1946; 1948-51. Water level below land-surface datum, 1951: Feb. 23, 112.85; July 31, 112.91.

(C-7-16)33aaa. Formerly 680. Mohawk Municipal Water Conservation District. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 83 feet. Highest water level 28.30, May 3, 1945; lowest 35.28, Feb. 21, 1951. Records available 1945-51. Water level below land-surface datum, 1951: Feb. 21, 35.28.

(C-9-22)17ddd. Formerly 1520. Archie J. Griffin. Drilled unused water-table well in sand and gravel, diameter 16 inches, depth 195 feet. Land-surface datum is 210.5 feet above msl. Highest water level 83.32, Feb. 21, 1951; lowest 97.63, Sept. 5, 1946. Records available 1945-51. Water level below land-surface datum, 1951: Feb. 21, 83.32.

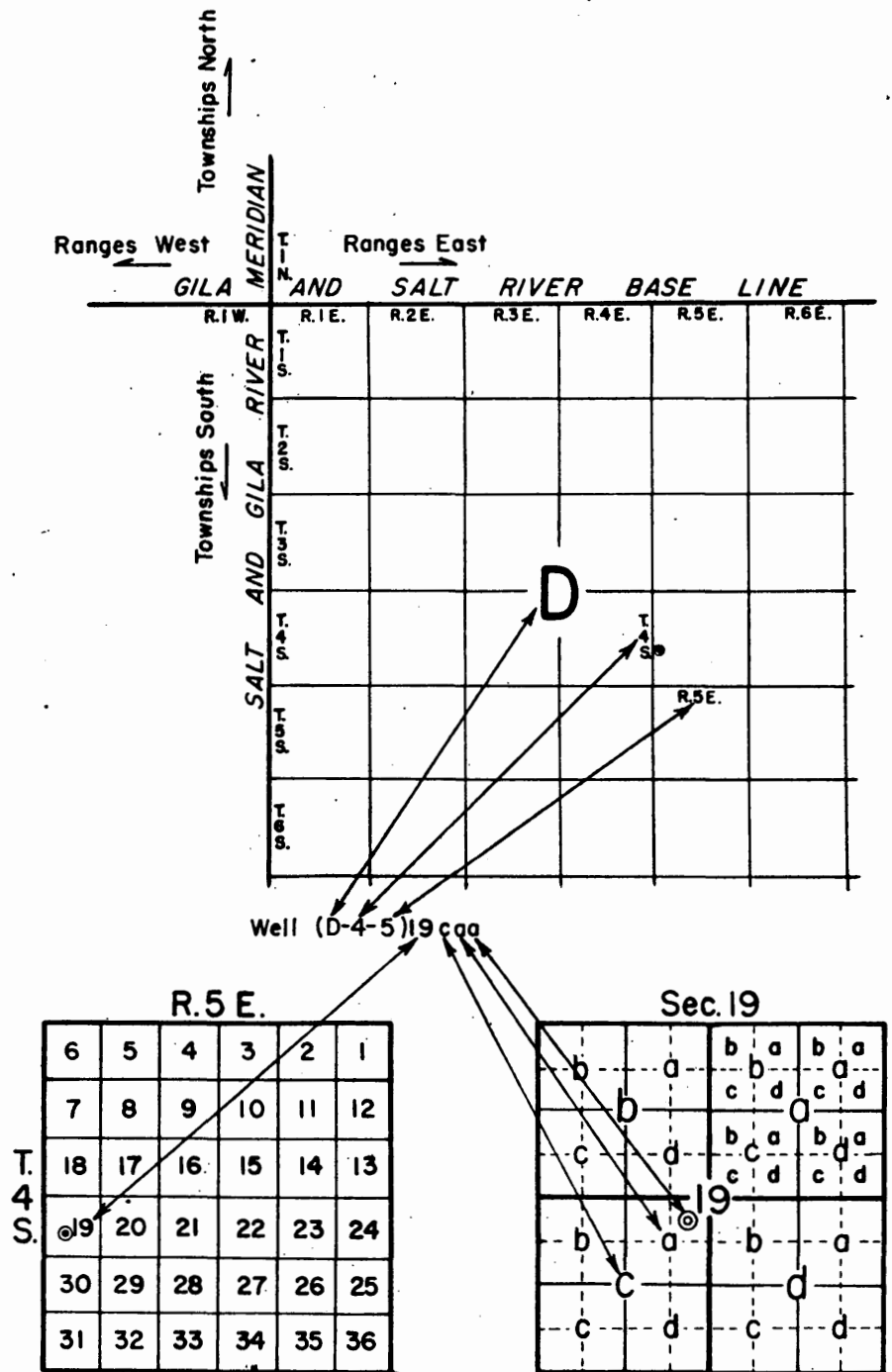


Figure 2 . --Sketch showing well-numbering system in Arizona.

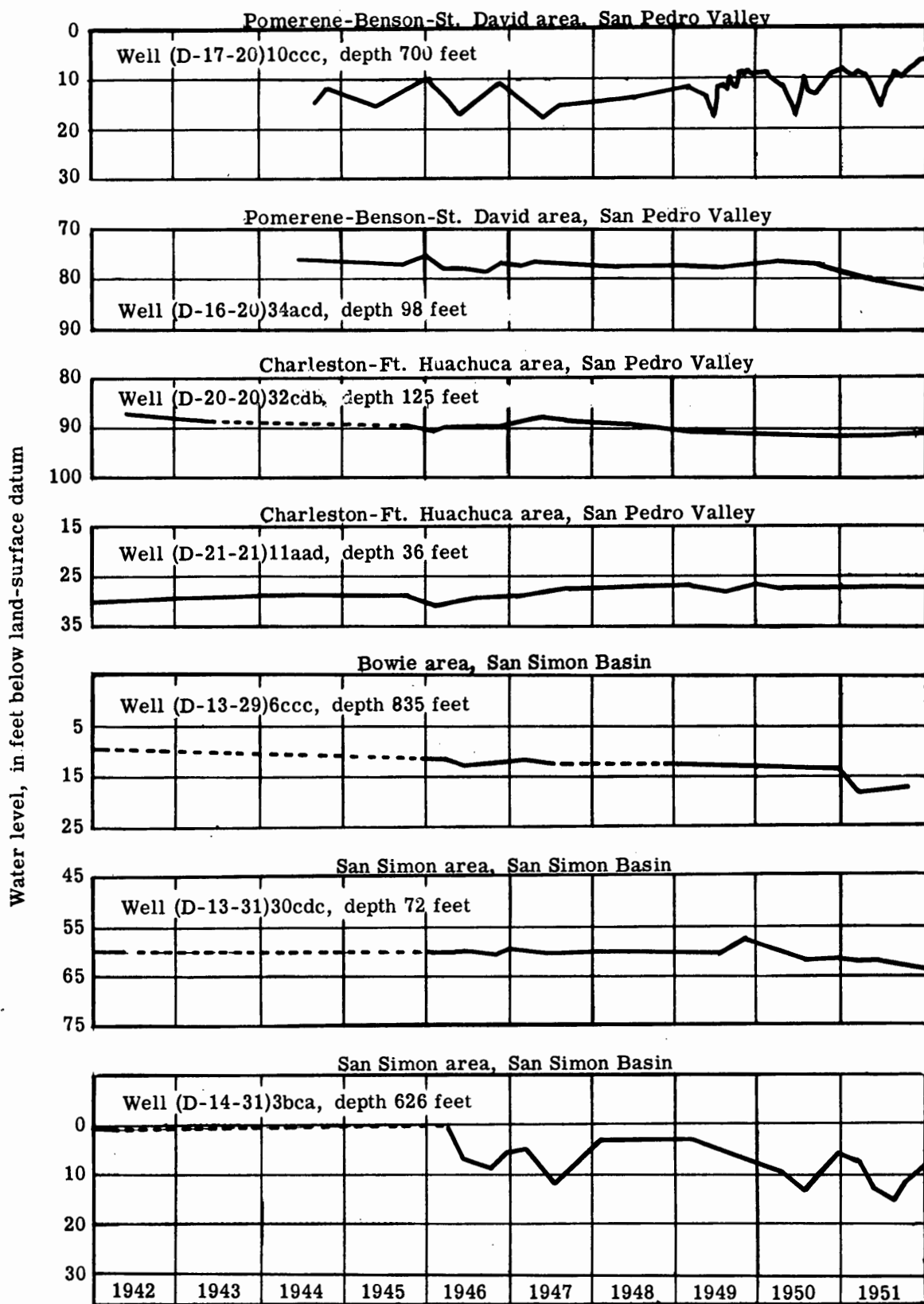


Figure 3. --Water levels in wells in San Pedro Valley and San Simon Basin, Cochise County.

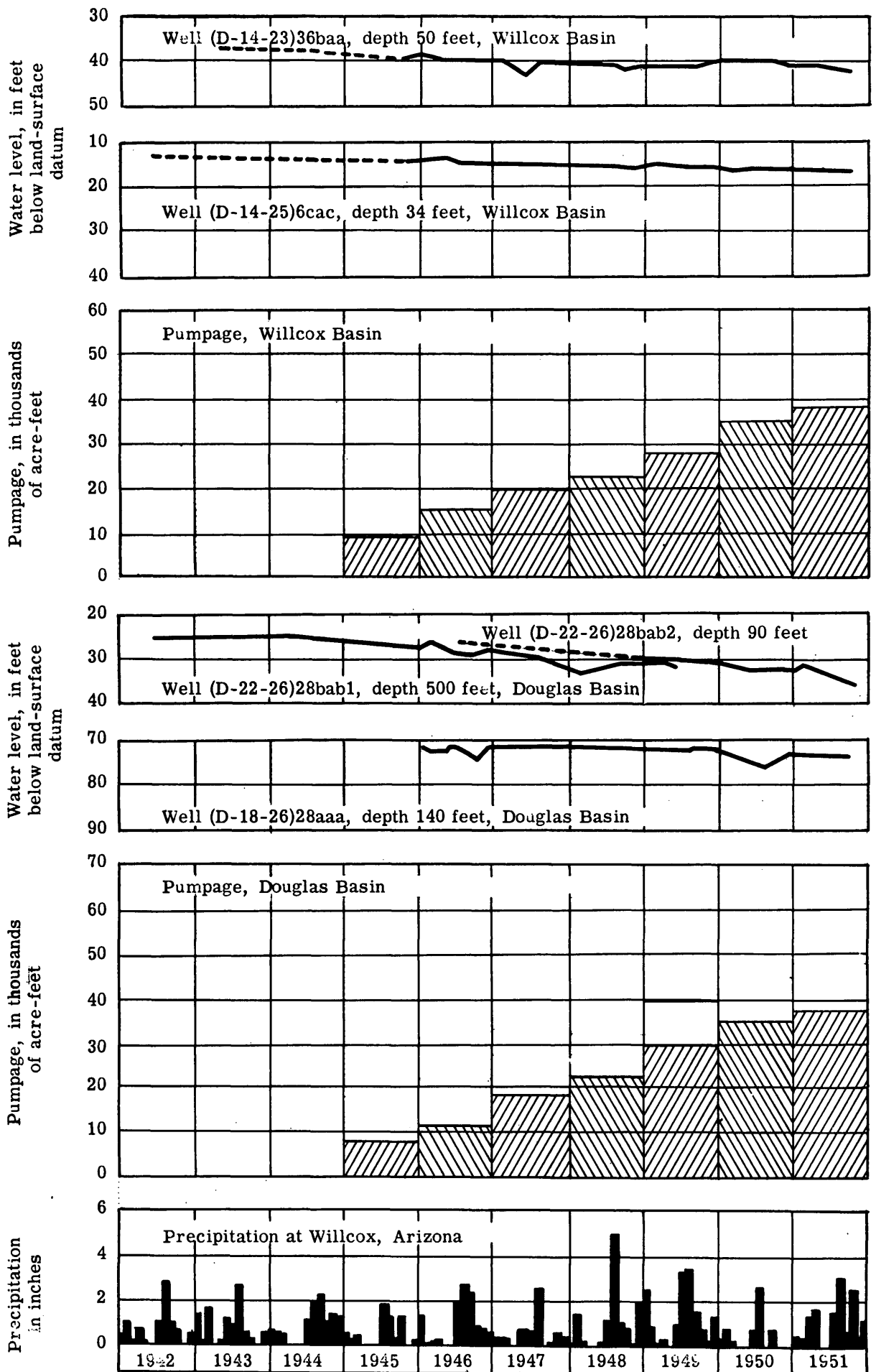


Figure 4. --Water levels in wells and pumpage in Willcox and Douglas Basins, and precipitation at Willcox, Cochise County, 1942-51.

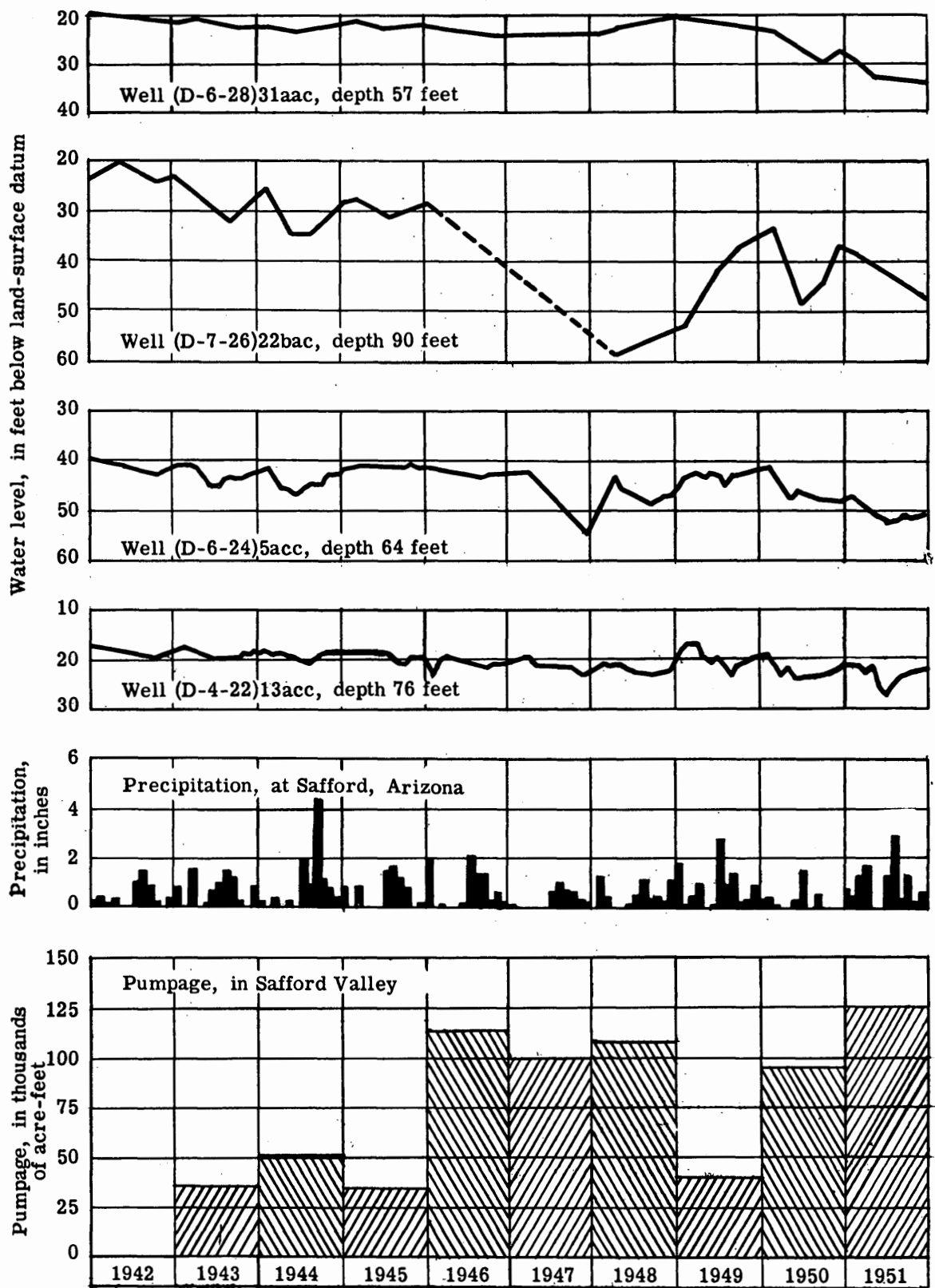


Figure 5. --Water levels in wells, precipitation at Safford, and pumpage in Safford Valley, Graham County.

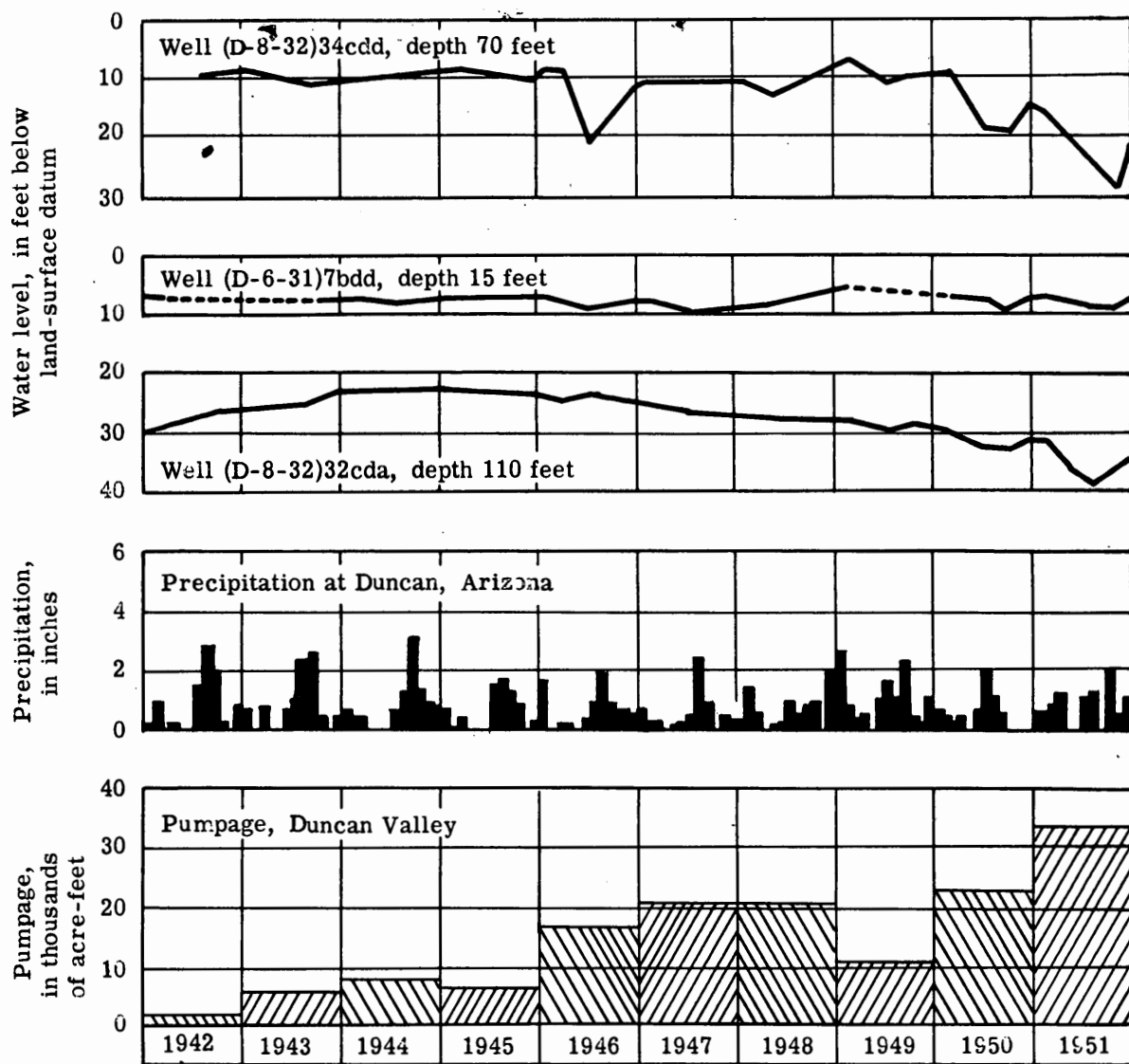


Figure 6. --Water levels in wells, precipitation at Duncan, and pumpage in Duncan Valley, Greenlee County.

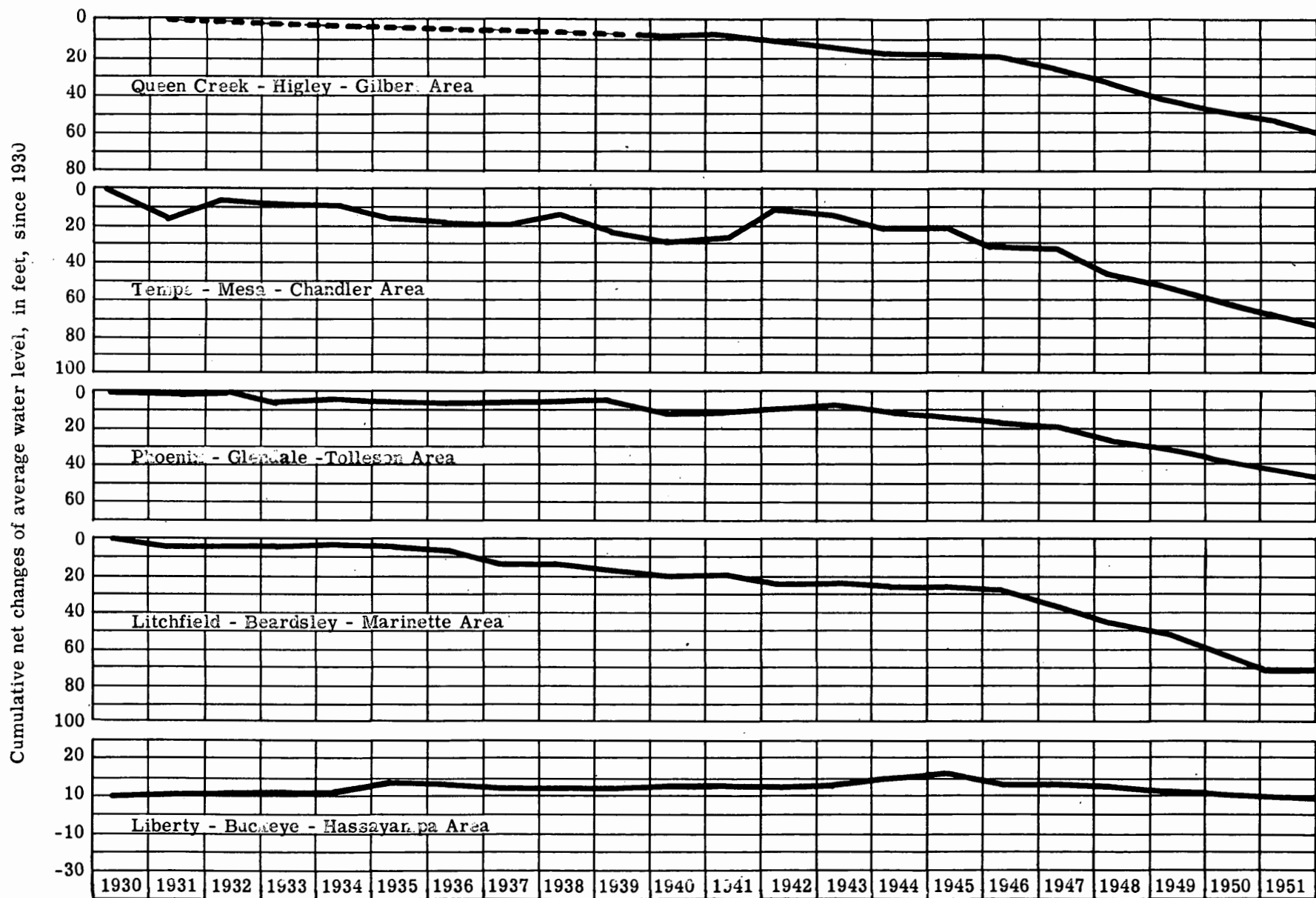


Figure 7. --Cumulative net changes of average water level in various parts of Salt River Valley, Maricopa County.

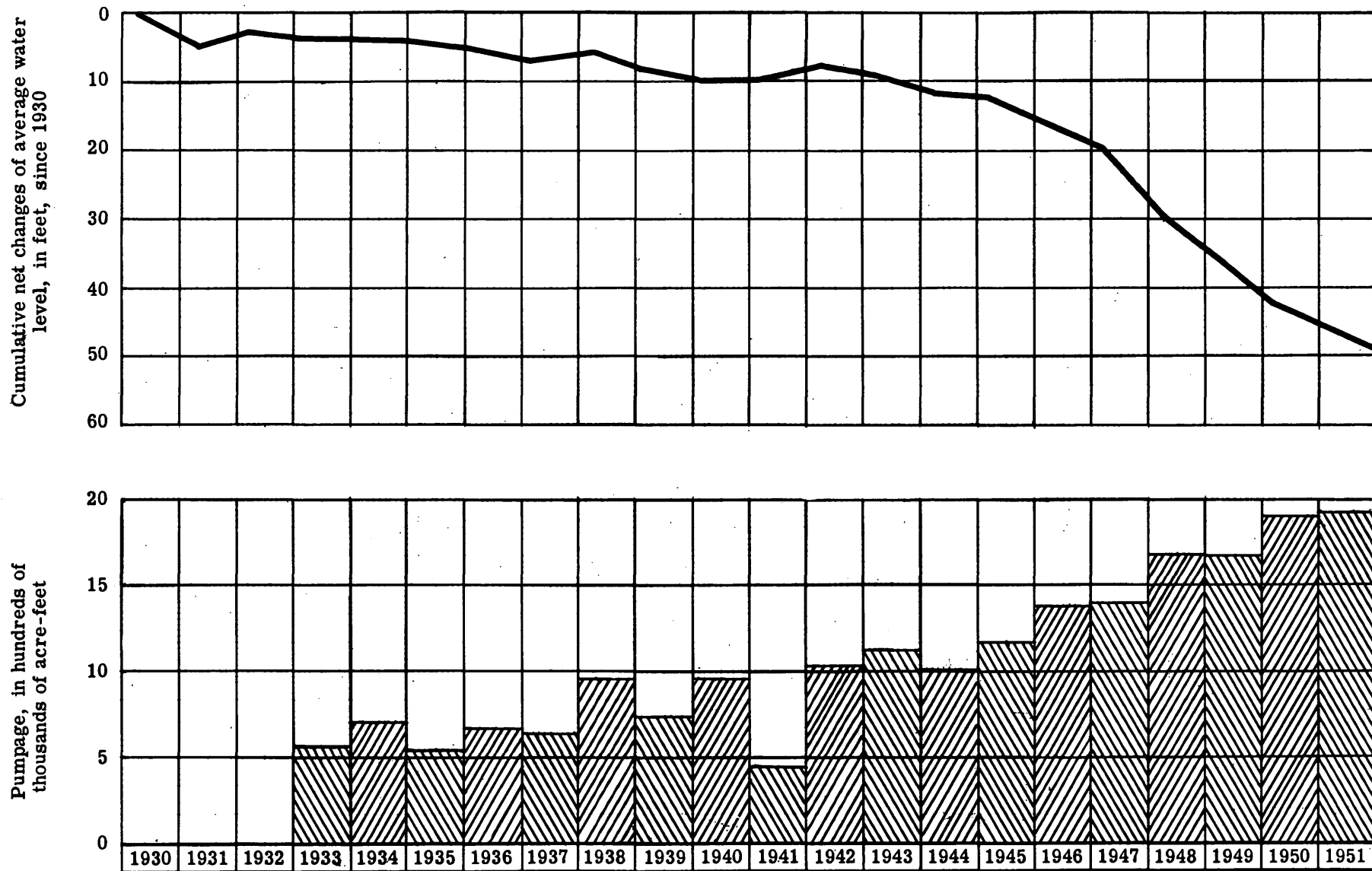


Figure 8. --Cumulative net changes of average water level and pumpage for irrigation in Salt River Valley, Maricopa County.

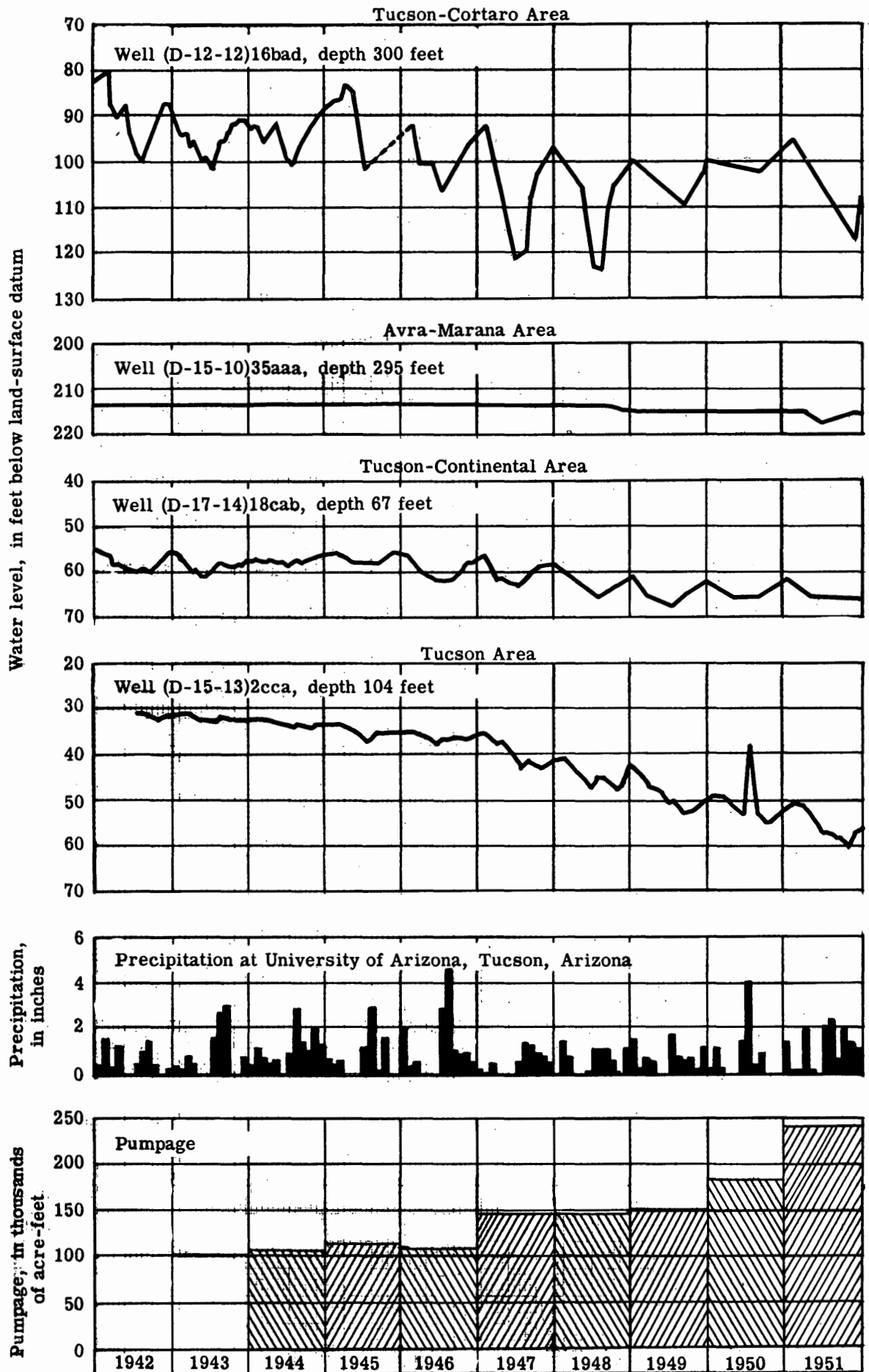


Figure 9. --Water levels in wells in the Tucson-Cortaro, Avra-Marana, and Tucson-Continental areas, precipitation at Tucson, and pumpage, Pima County.

Cumulative net changes of average water level, in feet, since 1939

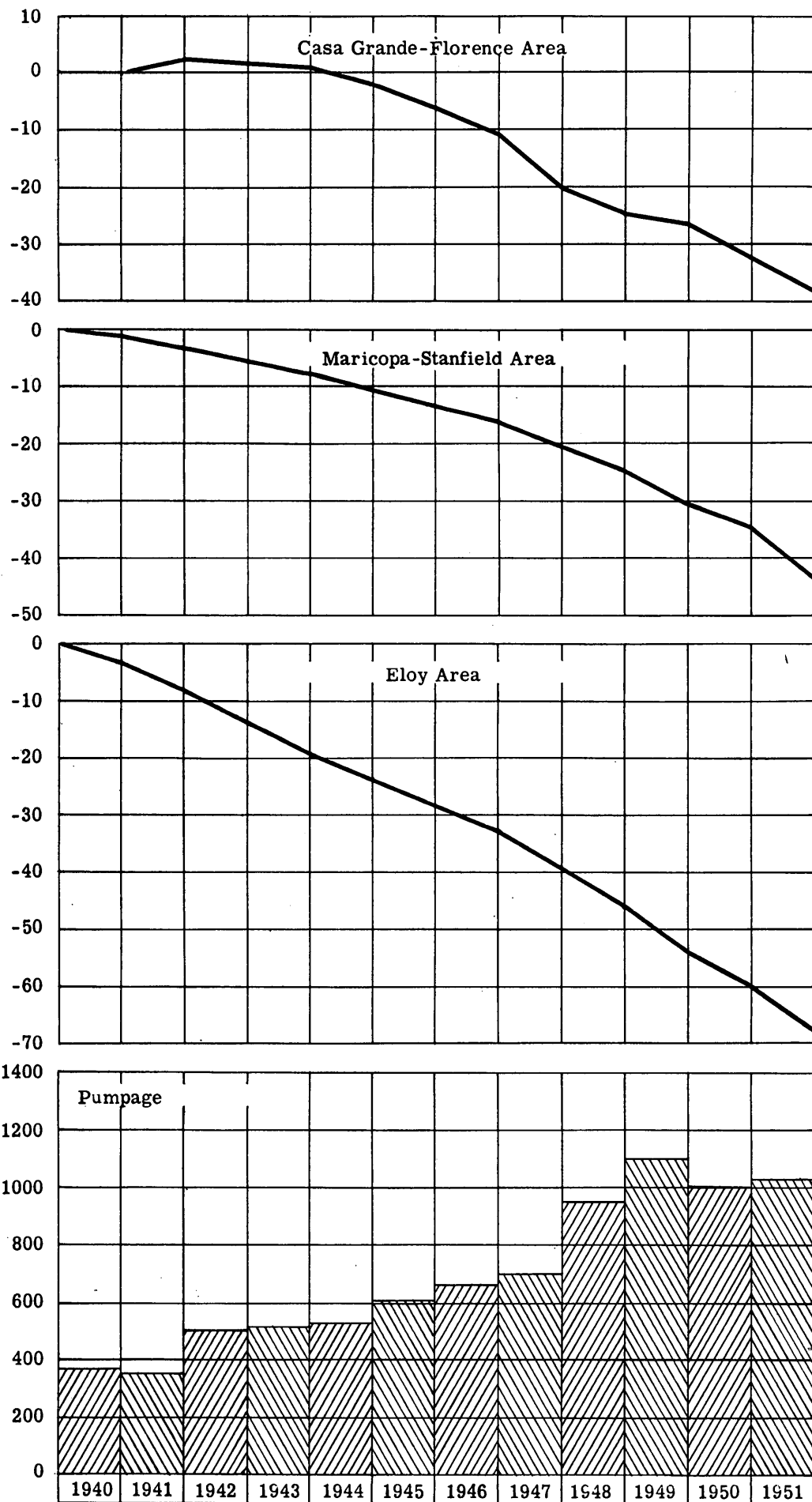


Figure 10. --Cumulative net changes of average water level and pumpage in portions of the Santa Cruz Basin within Pinal County.

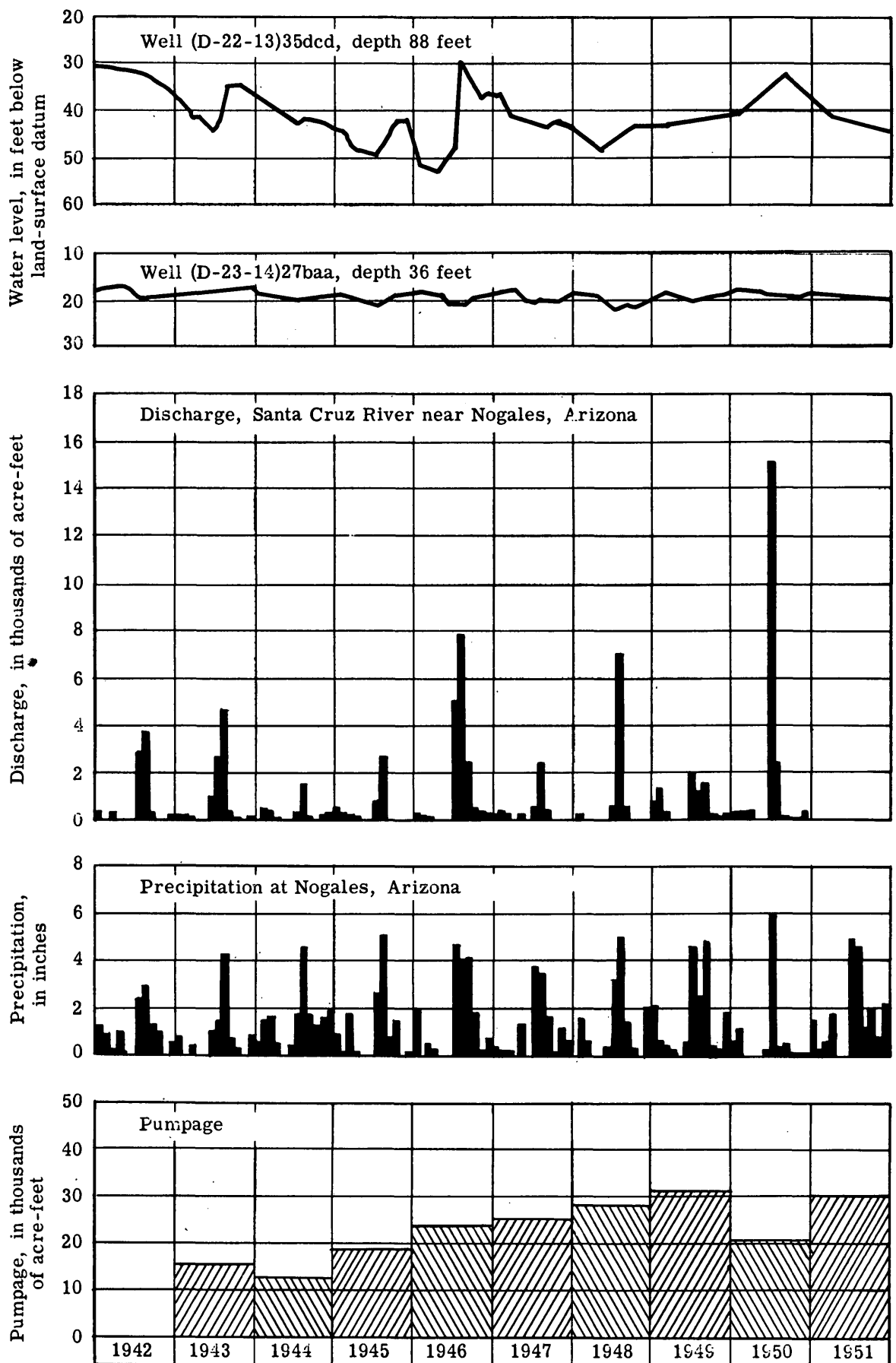


Figure 11. --Water levels in wells in the Santa Cruz Valley, discharge of Santa Cruz near Nogales, precipitation at Nogales, and pumpage in Santa Cruz County.

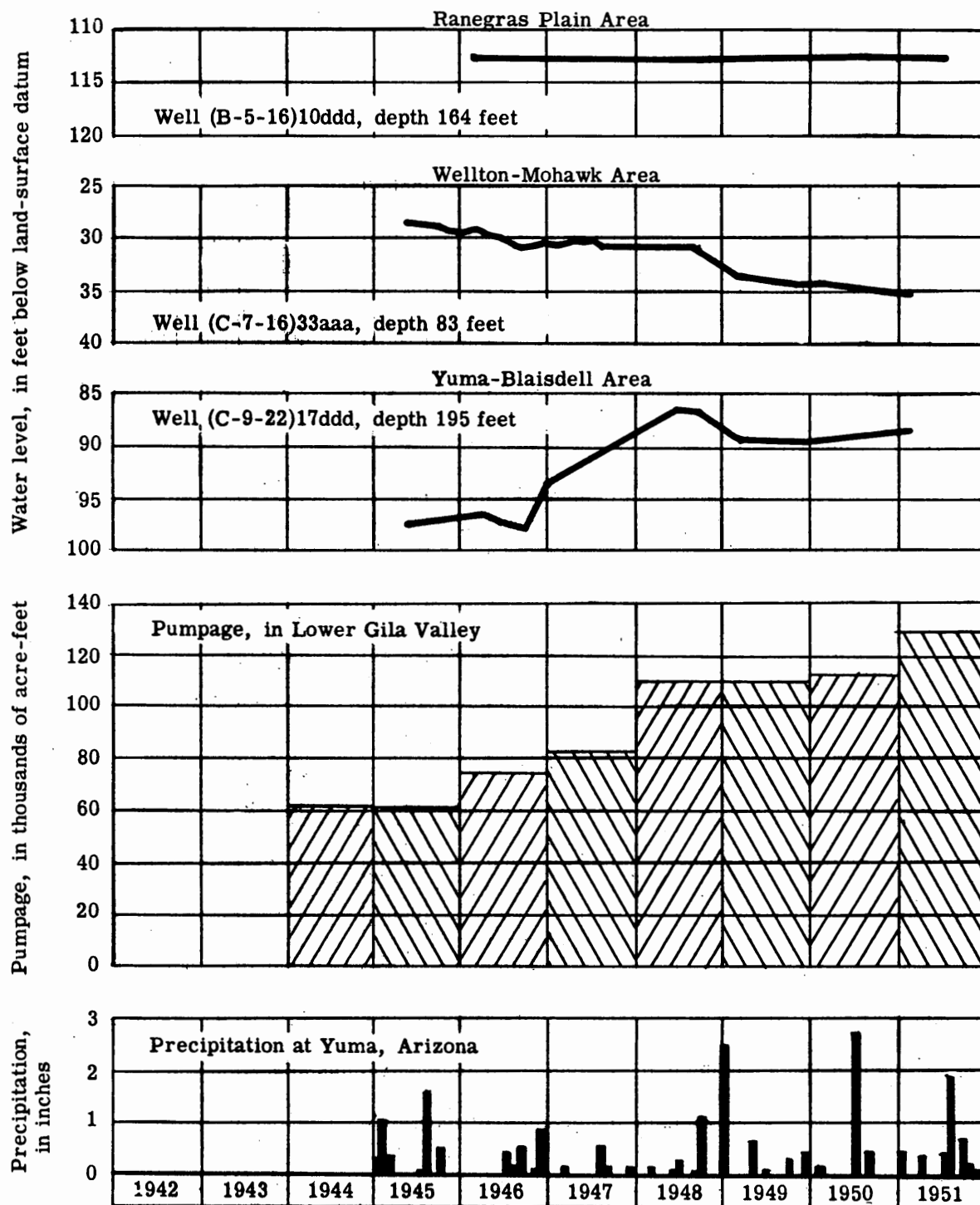


Figure 12. --Water levels in wells in Ranegras Plain, Wellton-Mohawk, and Yuma-Blaisdell areas, pumpage in Lower Gila Valley, and precipitation at Yuma, Yuma County.