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Johnson, P.W.

PUMPAGE AND GROUND-  
WATER LEVELS IN  
ARIZONA IN 1954

By

P.W. Johnson, N.D. White, and H.N. Wolcott

Prepared in cooperation with the  
Arizona State Land Department  
Roger Ernst, Commissioner

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Tucson, Arizona  
July 1955

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## ARIZONA

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### Scope of Water-Level Program

The collection of water-level and discharge measurements at wells and springs constitutes an integral part of ground-water investigations in Arizona. A substantial part of the financial cooperation with the Arizona State Land Department is for the collection of these basic data. The State cooperative program also includes continued investigations of the geology and ground-water resources in specific areas, such as those presently being conducted in the Palomas Plain and Harquahala Plains. The program of cataloging and analyzing drill cuttings from deep wells was continued in 1954 in cooperation with the State Land Department, the University of Arizona, and the Museum of Northern Arizona. A preliminary report on the investigation of springs along the Mogollon Rim was completed as part of a long-range project of evaluating the water resources in central Arizona. Work on the Navajo, Hopi, and Papago Indian Reservations was continued in financial cooperation with the Bureau of Indian Affairs. The program of periodic resampling of water from selected wells was continued during 1954 for the purpose of maintaining a record of the changes in the quality of ground water in the State.

During 1954, 15 wells in Arizona were measured monthly in connection with the nationwide Federal observation-well program. Water-level measurements were made in approximately 1,850 wells during the year, recording gages were maintained on 9 wells, and the rate of discharge in gallons per minute was measured in about 560 wells. Approximately 6,000 irrigation wells were in use in the State during 1954. This estimate does not include wells equipped with pumps rated 5 horsepower or less.

This report includes tabulations of water-level measurements from a few selected wells to show typical fluctuations in the stage of the water table in the ground-water basins of the State in 1954. Graphs are included to show representative 1954 water-level fluctuations in relationship to those of previous years. Water-level measurements not included in this report are available in the open files in the offices of the Geological Survey, Ground Water Branch, at Tucson and Phoenix.

The following reports on the ground-water resources of Arizona were prepared and released to the open file by the Geological Survey in 1954:

Preliminary report of investigations of springs in the Mogollon Rim region, Arizona, by J. H. Feth, with sections on base flow of streams by N. D. White and quality of water by J. D. Hem, mimeographed, 77 p., 5 pl., 24 figs.

Ground-water field trip, Tucson to Nogales, Ariz., by D. R. Coates and L. C. Halpenny, mimeographed, 20 p., 1 pl.

Pumpage and ground-water levels in Arizona in 1953, by L. C. Halpenny and others, mimeographed, 27 p., 11 figs.

Bidahochi formation of Arizona and New Mexico, by C. A. Repenning and J. H. Irwin: Am. Assoc. Petroleum Geologists Bull., v. 38, No. 8, p. 1821-1826.

Water resources of the Chuska Mountains area, Navajo Indian Reservation, Ariz. and N. Mex., by J. W. Harshbarger and C. A. Repenning: U. S. Geol. Survey Circ. 308, 16 p., 1 pl., 1 fig., 6 tables.

Geology and ground-water supplies of the Fort Wingate Indian School area, McKinley County, N. Mex., by J. T. Callahan and R. L. Cushman: U. S. Geol. Survey Circ. 360, 12 p.

Memorandum on ground-water investigations in the Sells area, Papago Indian Reservation, Pima County, Ariz., by D. R. Coates, mimeographed, 6 p., 1 pl.

Geologic and ground-water reconnaissance of the Patagonia area, Arizona, by J. H. Feth, typed, 12 p., 1 fig.

Memorandum on ground-water conditions in parts of Tps. 10 and 11 S., Rs. 23 and 24 W., Yuma County, Ariz., by P. W. Johnson, typed, 5 p.

Piping and earthcracks - a discussion, by L. A. Heindl and J. H. Feth: Am. Geophys. Union Trans., v. 35, No. 2, p. 258-262.

Geology and ground-water resources of the Douglas basin, Arizona, by D. R. Coates and R. L. Cushman: U. S. Geol. Survey Water-Supply Paper 1354 (in course of publication).

A report on the geology and ground-water resources of the Gila Bend and Dendora areas has been drafted.

#### Precipitation

The following, written by R. A. Dightman, is quoted from the Annual Summary, 1954, Climatological Data, U. S. Weather Bureau:

"The year [1954] in Arizona as a whole averaged warmer and drier than normal. Although the summer monthly averages were not far from normal, unusually mild months in January, February, April, October, and November combined to produce a mild year in general. While precipitation averaged a little less than normal statewide, some areas did much better than usual, while some of the normally dry sections were even much drier than usual. A few stations had heavy amounts, while those in the southwest corner were extremely dry. There were a number of severe storms, some of which caused widespread damage.

. . . . "As is usual in the mountainous western states, precipitation varied widely between stations and divisions throughout the year. The State annual average was 11.98 inches, 0.57 inch below normal. By divisions, however, the pattern varied from an average total 19.36 inches, +0.68 inch in East Central to 2.78 inches, -1.75, in the Southwest. The largest divisional average excess was +0.85 inch in the Southeast, where the average total was 14.02 inches. In the normally dry Southwest Division, 1954 precipitation was only 61 percent of the normal average 4.53 inches, but the East Central Division, normally the wettest area of the State, received 104 percent of the period mean total. In the Northeast Division the 13.45-inch average total was 1.50 inches short of normal. In Northwest, North Central, and South Central Divisions average totals were not far from normal.

"The driest single station was Yuma WB Airport, where the yearly total, 0.61 inch, was 2.78 inches below normal, and only 18 percent of the normal 3.39 inches. The Yuma City exposure measured a total of 0.90 inch for the year. Nearly all of the very dry stations for the year were in the Southwest Division, but that is not particularly unusual. Two stations with normals received over five inches less than the normal amounts: Aguila, 4.46 inches, -5.09, and Bright Angel Ranger Station, 19.34 inches, -5.91. The largest total was 40.17 inches at Mount Lemmon. The stations with highest totals were mostly in a general area beginning near Nogales on the Mexico Boundary to East Central and North Central Divisions. In this area lay all three stations where totals exceeded normal by more than five inches: San Carlos Reservoir, 18.87, +6.15; Oracle 4 SE, 24.44, +5.74, and Patagonia, 22.08, +5.11 inches. In general it can be noted that 1954 precipitation was at least adequate over most of the State, with the important local exceptions noted above.

. . . "Damaging storms during 1954 were mainly in the wind, hail, or heavy rain categories -- often accompanied by thunder and lightning. Flooding resulted in a few cases. As a class, hail damage was probably most widespread, but rain-caused floods resulted in concentrated severe damage in a few cases.

. . . "While as a whole the year was generally favorable for agriculture, there were some important local exceptions in addition to the storms described above. In the Salt River Valley there was some freeze damage to citrus fruits early in January. Heavy frost around and in Oak Creek Canyon caused considerable blossom damage on March 13. Some crops in the Yuma area suffered about 50 percent loss from frost March 13-14, and on the same dates fruits were damaged by freezing in the Nogales area. Late season warmth, and first frosts in growing areas being delayed until December, permitted completion of fall harvests with a minimum of frost damage.

"While ranges early in the year were mostly too dry in Northeast and Southeast Divisions, and stock water was short in some places, by April most grazing land had improved to fair or good condition except in the Southeast, where improvement was delayed until during the generous rains of July, August, and September. Ranges were dry again in May and June, but by September ranges were generally very good. By the end of the year, however, a need for moisture had developed. Cattle and sheep generally were in good condition throughout the year. In spite of some severe storms, frosts, floods, and dry spells, it was a favorable year for agriculture."

Total annual runoff figures for 1954 as measured by the Geological Survey include: Salt River near Roosevelt, 351,500 acre-feet; Tonto Creek near Roosevelt, 39,750 acre-feet; and Verde River above Horseshoe Dam, 294,500 acre-feet.

#### Pumpage

The following table contains records of pumpage in the major areas of ground-water development in the State for the 5-year period, 1950-54. Areas in which pumpage records were not collected include: Upper San Pedro

Valley, Lower San Pedro Valley, Cactus Flat-Artesia area, St. Johns area, Snowflake - Taylor area, Hunt area, Woodruff area, Joseph City area, Chino Valley, Williamson Valley, Skull Valley, Peeples Valley, Date Creek area, Big Sandy Valley, Valentine area, and Parker area. Pumpage for irrigation in these areas, based on partial data, is estimated to be less than 100,000 acre-feet in 1954. By adding this figure to those in the last column of the table, a total of about 4,500,000 acre-feet is obtained as the amount of water pumped in 1954 from the ground-water reservoirs in the State. This quantity is about 300,000 acre-feet less than the amount of ground water pumped in 1953, and about twice the amount of water diverted from surface-water in 1954.

According to data provided by G. W. Barr of the University of Arizona, approximately 1,250,000 acres was in cultivation in the State in 1954. This represents a decrease in farmed land of about 50,000 acres from 1953. Dr. Barr's data also indicate that cash income from crops and livestock in Arizona amounted to about 380 million dollars during 1954, an increase of about 10 million dollars over 1953.

As the chief use of ground water in Arizona is for irrigation, the decrease in pumpage is believed to be due to the following factors: (1) In areas where ground water is pumped as a supplement to surface water, increased amounts of surface water were available in 1954; (2) there was less acreage in cultivation in 1954; and (3) heavier precipitation supplied water in some areas that otherwise would have been supplied by pumping of ground water.

#### Interpretation of Water-Level Fluctuations

The discussions that follow include statements about water-level fluctuations in each of the 14 counties of Arizona, listed alphabetically. The detail provided in each discussion is determined by the complexity of the water-level changes and by the number of ground-water areas into which each county is divided.

Apache County. -- Water levels in Apache County showed variable changes in 1954, ranging from a rise of about 3 feet in a well in the Petrified Forest National Park to a decline of about 5 feet in a well near St. Johns. As most of the water levels in this area are comparatively shallow, they are affected by local climatic variations and thus far have shown no discernible trend either upward or downward. Precipitation at Springerville was 11.89 inches in 1954, about 92 percent of normal.

Cochise County. -- Water-level fluctuations in the four main areas of development in Cochise County are discussed separately, as follows: (1) the Upper San Pedro Valley, (2) the San Simon basin, (3) the Willcox basin, and (4) the Douglas basin.

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

	1950	1951	1952	1953	1954
<b>Cochise County:</b>					
San Simon Basin <u>a/</u>	(b)	(b)	15,000	25,000	32,000
Willcox Basin	35,000	38,000	39,000	75,000	70,000
Douglas Basin	35,000	38,000	42,000	45,000	42,000
<b>Graham County:</b>					
Safford Valley	90,000	125,000	70,000	120,000	90,000
<b>Greenlee County:</b>					
Duncan Valley <u>c/</u>	23,000	33,000	17,000	30,000	27,000
<b>Maricopa County:</b>					
Salt River valley area <u>d/</u>	1,852,000	1,910,000	2,000,000	2,300,000	2,300,000
Waterman Wash area	(e)	(e)	(e)	28,000	30,000
Harquahala Plains area	(e)	(e)	(e)	20,000	33,000
Gila Bend area	59,000	110,000	120,000	145,000	139,000
Dendora area	6,000		6,000	5,000	7,000
<b>Pima County:</b>					
Part of Santa Cruz Basin	180,000	240,000	250,000	380,000	300,000
<b>Pinal County:</b>					
Part of Santa Cruz Basin and Gila River basin	1,000,000	1,030,000	950,000	1,400,000	1,200,000
<b>Santa Cruz County:</b>					
Part of Santa Cruz Basin	21,000	30,000	27,000	27,000	20,000
<b>Yuma County:</b>					
Palomas Plain area	9,000	15,000	26,000	47,000	30,000
Wellton-Mohawk area	46,000	50,000	40,000	16,000	9,000
South Gila Valley	56,000	62,000	60,000	60,000	60,000
Northern Yuma County <u>f/</u>	(b)	(b)	(b)	28,000	26,000

a/ Includes Bowie area.

b/ Not determined.

c/ Does not include Virden Valley, N. Mex.

d/ Includes Queen Creek area, Maricopa and Pinal Counties.

e/ For 1950-52, inclusive, was included in Salt River Valley area.

f/ Ranegras Plain and McMullen Valley.



Generally, water levels in wells in the Upper San Pedro Valley showed a slight rise. Wells (D-21-21)11aad and (D-20-20)32cdb (fig. 3), representative of the Charleston-Fort Huachuca area, showed a slight rise in water level during the year. Water levels in wells (D-16-20)34acd and (D-17-21)32bad (fig. 3), in the Pomerene-Benson-St. David area, showed about a foot of decline. Precipitation at Fairbank amounted to 11.97 inches, slightly greater than normal.

Pumpage of ground water in the San Simon basin in 1954 amounted to about 32,000 acre-feet, an increase of about 7,000 acre-feet over 1953. Development in the basin centers around the towns of San Simon and Bowie. In the San Simon area, most of the wells are under artesian pressure, but only a few wells flow. All have to be pumped to provide sufficient water for irrigation. Declines in water level of as much as 3 feet were measured in the center of the cultivated area, as shown in the hydrograph of well (D-14-31)3ddd (fig. 3). Pressure heads ranged from slightly above the surface to about 70 feet below the surface. Precipitation at San Simon was 10.93 inches in 1954, about 26 percent greater than normal. In the Bowie area, water levels declined from 6 to 20 feet in and near the cultivated area. Well (D-13-29)6ccc (fig. 3), representative of the area, showed a decline in water level of 17 feet. Depths to water ranged from about 40 feet on the eastern edge of the cultivated area to approximately 280 feet on the western edge. Precipitation at Bowie was 10.73 inches in 1954, about 16 percent greater than normal.

The two main areas of development in the Willcox basin are the Stewart area, northwest of Willcox, and the Kansas Settlement area, southeast of Willcox. In the Willcox basin, about 70,000 acre-feet of water was pumped in 1954, a slight decrease from the amount pumped in 1953. In the Stewart area, the average decline in water level amounted to about 3 feet, the maximum declines being as much as 6 feet. Depths to water in the area ranged from about 20 to more than 100 feet. In the Kansas Settlement area, water levels declined an average of 4 feet. In the center of the cultivated area, maximum declines of 7 and 8 feet were measured. Depths to the water table ranged from about 30 to about 200 feet. The water levels in wells (D-14-23)36baa and (D-14-25)6cac (fig. 4) are representative of wells outside the cultivated area in the Willcox basin. Neither showed any appreciable decline during 1954. Precipitation at Willcox amounted to 11.57 inches in 1954, about 98 percent of normal.

Pumpage in the Douglas basin amounted to about 42,000 acre-feet in 1954, a decrease of about 3,000 acre-feet from the amount pumped in 1953. Changes in water levels during the year ranged from a rise of about 1 foot in wells outside the cultivated area to a decline of about 5 feet south of McNeal in the center of the cultivated area. The average decline for the basin as a whole was slightly more than 2 feet (fig. 4). The range in depth to water was from about 35 to more than 100 feet. Precipitation at Douglas was 11.76 inches in 1954, about 96 percent of normal.

Coconino County. --In Coconino County, changes in water levels in both the shallow and the deep wells were, for the most part, less than a foot, indicating little change in the ground-water storage during 1954. Precipitation at Flagstaff in 1954 amounted to 19.55 inches, about 6 percent above normal. The excess was largely due to storms that occurred in March, July, and September.

Gila County. --In the upper Pinal Creek area of Gila County, water levels fluctuated widely, owing to withdrawals of ground water and to recharge from greater-than-normal amounts of runoff in Pinal Creek. During 1954, some wells showed rises in water level of as much as 5 feet; others showed declines of as much as 3 feet. Precipitation at Globe was 18.37 inches, 21 percent greater than normal.

Graham County. -- Generally, the water levels in the Safford Valley of Graham County showed a slight rise during 1954. Water levels in the San Jose-Safford, Safford-Pima, and Pima-Cork areas showed a rise of about 1 foot. In the Cork-Geronimo and Pima-Eden areas, the water levels declined approximately 2 feet. The hydrograph for well (D-6-28)31aac (fig. 5), east of the San Jose-Safford area, shows that the water level dropped slightly more than a foot during 1954. The water levels in wells (D-7-26)22bac and (D-6-24)5acc (fig. 5), in the San Jose-Safford and Pima-Cork areas, respectively, rose about 1 foot during 1954. Pumpage of ground water in 1954 was about 90,000 acre-feet, 30,000 acre-feet less than in 1953. This decrease can be attributed partially to the increased amount of surface water available for irrigation in 1954, about 80,000 acre-feet, or about twice as much as in 1953. Precipitation at Safford amounted to 8.82 inches in 1954, slightly greater than normal. In Aravaipa Valley of Graham County, fluctuations in water levels ranged from little or no decline to small local rises.

Greenlee County. --In the Duncan Valley of Greenlee County, both rises and declines in water levels were measured during 1954. In the area between the Arizona-New Mexico State line and Sheldon, the water table rose approximately 1 foot during the year. In the area from Sheldon to York, water levels showed a decline of about half a foot. Figure 6 shows hydrographs of three wells typical of the area. About 27,000 acre-feet of ground water was pumped during 1954. Surface water diverted for irrigation during 1954 amounted to about 13,000 acre-feet, or about 5,500 acre-feet more than in 1953. Precipitation at Duncan was 8.77 inches in 1954, about 90 percent of normal.

Maricopa County. --Water levels in Maricopa County continued to decline during 1954. Figure 7 shows the cumulative net changes of average water levels in various parts of the Salt River valley. In figure 8, the cumulative changes of the average water level of the entire Salt River valley are shown, in addition to the irrigation pumpage by years since 1933.

The average decline in the Queen Creek-Higley-Gilbert area in 1954 amounted to almost 6 feet. Although the eastern end of the Queen Creek area lies in Pinal County, it is an integral part of the Queen Creek-Higley-Gilbert area and is, therefore, included in this section of the report. The greater declines occurred in wells in the parts of the area where surface water was not available for supplemental use. Declines of as little as 2 feet occurred in wells in areas where surface water was available.

In the Tempe-Mesa-Chandler area, water-level declines averaged about 5 feet for 1954. This downward trend of the water level has continued at about the same rate since 1947.

The average decline in the Phoenix-Glendale-Tolleson area amounted to about 6 feet. The Deer Valley part of the area continued to show the largest declines.

In the Litchfield-Beardsley-Marinette area, the average decline was 8 feet--slightly less than in 1953, but still at a rate about the same as the annual average since 1946.

Average water-table declines in the Liberty-Buckeye-Hassayampa area amounted to about 1 foot. This average decline is smaller than in other parts of the Salt River valley because the water levels in this area are affected by recharge from irrigation water applied in upstream areas.

Pumpage in the Salt River valley during 1954 amounted to about 2,300,000 acre-feet (fig. 8). This figure includes the Queen Creek area but does not include pumpage in Waterman Wash or the Harquahala Plains. The pumpage in those two areas was about 30,000 acre-feet and about 33,000 acre-feet, respectively, an increase over 1953. Rainfall at Phoenix during 1954 amounted to 4.31 inches, about 60 percent of normal.

In the Gila Bend area, average water-table declines ranged from about 2 feet northwest and west of Gila Bend to about 8 feet north of Gila Bend in the Rainbow Valley area. Water from some of the wells in the vicinity of Rainbow Valley was pumped into canals and transported on the surface to irrigate land west of Gila Bend. Pumpage in the Gila Bend area in 1954 amounted to about 139,000 acre-feet, a decrease of about 6,000 acre-feet from 1953. Rainfall at Gila Bend was 3.75 inches in 1954, about 68 percent of normal.

In the Dendora area, the average water-table decline was less than 1 foot. Pumpage amounted to about 7,000 acre-feet, an increase of about 2,000 acre-feet over 1953.

Mohave County .--There was little change in ground-water storage along the Big Sandy River near Wikieup during 1954. Water levels in some of the wells along the Big Sandy River were slightly higher than in 1953; others showed small declines. The overall average was a rise of less than half a foot. Precipitation at Wikieup amounted to 10.87 inches, about 5 percent greater than normal.

In the Kingman area, no definite trend was observed and the average change in water levels amounted to a rise of less than half a foot. Precipitation at Kingman during 1954 was 10.97 inches, almost 9 percent above normal.

Navajo County .--Water levels in wells in Navajo County generally were slightly higher in 1954 than in 1953, but no consistent long-term trend has thus far been observed. Most of the wells measured in this county derive water from the Coconino sandstone and from shallow alluvium along the Little Colorado River. Precipitation at Holbrook in 1954 was 11.27 inches, almost 40 percent greater than normal.

Pima County .--Water-level fluctuations in Pima County are discussed by areas as follows: (1) Avra-Marana area, (2) Tucson-Cortaro area, (3) Tucson area, (4) Tucson-Continental area, and (5) Rillito-Tanque Verde-Pantano area.

In the Avra-Marana area, water levels in wells showed an average decline of nearly 6 feet during 1954 and maximum declines of as much as 10 feet were measured in areas of heavy pumping. In the downstream part of the area, near the Pima-Pinal County line, the average decline was approximately 5 feet. Well (D-15-10)35aaa (fig. 9), typical of the extreme southern part of the area, showed a slight rise in water level during the year. The range in depth to water in the area was from 170 to more than 300 feet.

Fluctuations in water levels in the Tucson-Cortaro area varied considerably during 1954. Over the whole area maximum changes in water levels ranged from a rise of about 5 feet to a decline of approximately 5 feet. Water levels in wells along the Santa Cruz River, from the Rillito Narrows to the mouth of Rillito Creek, showed an average rise of about 1 foot. Well (D-12-12)16bad (fig. 9), representative of the area along the river near Cortaro, showed a rise of 3 feet during the year. In the area just north of Tucson, the average decline in water levels amounted to about 3 feet. The range in depth to water in the area was from 70 to 100 feet.

In the Tucson area, the amount of decline in water levels varied greatly during 1954. Water levels in the city of Tucson "Southside" well field showed an average decline of about 1 foot during 1954. Well (D-15-13)2cca (fig. 9) showed a net rise of approximately 1 foot. In the municipal well field in northeast Tucson, the average decline was nearly 4 feet. These averages were obtained from water-level data supplied by the city of Tucson. Depth to water in the area ranged from about 45 feet in wells near the Santa Cruz River to about 160 feet east of the city limits.

In the Tucson-Continental area, the change in water levels in wells during 1954 ranged from a decline of 5 feet to a rise of about 8 feet. Well (D-17-14)18cab (fig. 9), midway between Tucson and Continental, showed little or no decline during 1954. In the area from Continental to the Pima-Santa Cruz County line, changes in water levels ranged from a local decline of 5 feet just south of Continental to a general rise of 4 feet near the county line. Depth to water in the Tucson-Continental area ranged from about 40 feet in wells near the river south of Tucson to more than 100 feet in wells near Continental.

Fluctuations of water levels in wells along Rillito Creek ranged from a decline of about 2 feet to a rise of about 8 feet. Along Tanque Verde Creek, changes in water levels ranged from a decline of about 1 foot to a rise of about 5 feet. Wells along Pantano Wash showed changes in water levels ranging from a decline of about 5 feet to a rise of about 6 feet. Depths to water in wells in this area range from less than 20 feet along Rillito and Tanque Verde Creeks to over 250 feet near the mountains.

Ground water pumped in Pima County during 1954 amounted to about 300,000 acre-feet, or about 80,000 acre-feet less than the amount pumped in 1953. Precipitation at the University of Arizona, Tucson, was 11.31 inches in 1954, 9 percent greater than normal.

Pinal County .--For the most part, water levels in the lower Santa Cruz area of Pinal County showed less decline in 1954 than in 1953. Pumpage in Pinal County in 1954 was approximately 1,200,000 acre-feet, about 200,000 acre-feet less than in 1953. The cumulative net declines shown graphically in figure 10 for the three major irrigated areas in Pinal County are based on water-level measurements in several hundred wells. Water-level fluctuations in these three areas are discussed separately as follows: (1) the Casa Grande-Florence area, (2) the Maricopa-Stanfield area, and (3) the Eloy area.

In the Casa Grande-Florence area, the average decline in the water levels in 1954 was about 6 feet. Declines of more than 15 feet were measured in the heavily pumped sections. In the area between Casa Grande and Coolidge, declines in water levels ranged from 5 to 15 feet. Between

Coolidge and Florence, the average decline in water level amounted to about 5 feet. From Florence to the Ashurst-Hayden Dam, water levels generally declined less than 5 feet. In the vicinity of Sacaton on the Gila River Indian Reservation, water levels dropped an average of about 5 feet. The decline of the water table indicates that most of the water was withdrawn from storage. The volume of sediments unwatered during 1954 is estimated to be about 1,100,000 acre-feet. The depth to water in the Casa Grande-Florence area ranged from about 25 feet near the Ashurst-Hayden Dam to about 165 feet south of Coolidge near the canal boundary. Pumpage of ground water in the area amounted to approximately 380,000 acre-feet during 1954. Precipitation at Casa Grande was 6.74 inches, about 86 percent of normal.

In the Maricopa-Stanfield area, the average decline in water level was about 11 feet in 1954. South of State Highway 84, water levels declined as much as 20 feet in the heavily pumped areas. From State Highway 84 to the southern boundary of the Maricopa Indian Reservation, the decline in water level ranged from 10 to 15 feet during the year. West of the Maricopa Indian Reservation boundary and north of State Highway 84, net declines of more than 30 feet were measured. In the vicinity of the town of Maricopa, the average decline was slightly less than 5 feet. The volume of sediments dewatered during 1954 is estimated to be about 2,300,000 acre-feet. The amount of water pumped during the year in the Maricopa-Stanfield area was about 420,000 acre-feet. The depth to water in the area ranged from 50 feet north of the town of Maricopa to more than 350 feet in the southwestern part of the area.

The average lowering of the water table in the Eloy area in 1954 was slightly less than 7 feet. Between the town of Eloy and the Florence-Casa Grande Canal, declines ranging from 5 to 12 feet were measured. The amount of ground water pumped in the Eloy area during 1954 was about 400,000 acre-feet, and the total volume of sediments unwatered was approximately 1,500,000 acre-feet. The depth to water in the area ranged from about 100 feet in the northwestern part of the area to about 250 feet south of the town of Eloy. Precipitation at Eloy amounted to 9.77 inches in 1954.

Santa Cruz County. --Ground-water levels in the Santa Cruz River valley of Santa Cruz County generally showed rises during 1954. This is attributed to greater-than-normal precipitation providing water that otherwise would have been supplied by pumping of ground water, and to the greater-than-normal flow in the Santa Cruz River that increased recharge to the ground-water reservoir. The total discharge of the Santa Cruz River at the gaging station near Nogales for the month of August 1954 was the greatest for any month since 1940. Monthly discharges at this gaging station since 1945 are shown on a graph in figure 11.

In the area from the Pima-Santa Cruz County line to Tubac, the change in water level was from zero to a rise of about 6 feet. In the heavily pumped area between Tubac and Calabasas, water-level fluctuations ranged from zero

to a rise of about 15 feet, well (D-22-13)35dcd (fig. 11). Between Calabasas and the International Boundary, rises in the water level ranged from less than 1 foot to more than 15 feet, well (D-23-14)27baa (fig. 11). The average depth to water was between 25 and 30 feet along the river. Pumpage of ground water in Santa Cruz County in 1954 amounted to about 20,000 acre-feet. Precipitation at Nogales was 18.35 inches in 1954, 15 percent greater than normal.

Yavapai County. --Water-level measurements in wells in Yavapai County generally showed slight declines in 1954. The average decline in Peeples Valley was about 1 foot, and that in Chino Valley was approximately 2 feet. In a few wells, slight rises were observed, but these probably were due to local conditions of a seasonal nature. In Skull Valley, the average decline from 1953 levels amounted to about 1 foot. Precipitation at Prescott in 1954 amounted to 16.91 inches, about 85 percent of normal.

Yuma County. --Northern Yuma County includes two major agricultural areas, the Ranegras Plain and McMullen Valley. Water levels in most wells in both areas showed very little change in 1954; the average decline amounted to less than half a foot. Well (B-5-16)10ddd (fig. 12) showed little or no decline. A decline of more than 20 feet was measured near Nordis ranch, in the narrows about 6 miles south of Salome, where the water is pumped into a canal and transported several miles southward to irrigate land in the northwest end of Harquahala Plains. Pumpage in northern Yuma County during 1954 amounted to about 26,000 acre-feet. Precipitation at Salome in 1954 was 5.71 inches, approximately 74 percent of normal.

In the Wellton-Mohawk area of southern Yuma County, the water table continued to rise as a result of the use of surface water from the Colorado River. In well (C-8-16)28bda (fig. 12), the rise in 1954 amounted to 2 feet, about average for the area. As more surface water became available during the year, pumpage for irrigation decreased. About 9,000 acre-feet of water was pumped in 1954 as compared with about 16,000 acre-feet pumped in 1953 and about 40,000 acre-feet pumped in 1952. The effects of recharge from irrigation with surface water are reflected in the rising level of the water table in the area. Precipitation at Wellton in 1954 was 1.67 inches, less than 38 percent of normal.

Water levels in wells in the south Gila Valley and Yuma Mesa areas showed a continuing rise in 1954. The average rise amounted to about 3 feet, as shown in well (C-9-22)17ddd (fig. 12). Pumpage in this area in 1954 amounted to approximately 60,000 acre-feet, about the same as in 1953, although more surface water was available for irrigation. Precipitation at Yuma in 1954 was 0.90 inch, slightly less than 25 percent of normal.

Water levels in the Palomas Plain area showed an average decline of slightly more than 1 foot during 1954. Part of this area lies within Maricopa County, but most of the developed acreage is in Yuma County. Pumpage in the

Palomas Plain area in 1954 was about 30,000 acre-feet. There is no weather station in this area, however, it is probable that the precipitation was somewhat less than the 3.75 inches recorded at Gila Bend, approximately 40 miles east.

### 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 figures for pumpage were based: Arizona Public Service Co.; Buckeye Irrigation District; Bu-Gas Distributors; Citizens Utility Co.; City of Douglas; City of Nogales; City of Tucson; Cortaro Farms; Duncan Utilities Co.; Eloy Light and Power Co.; Gila Water Commissioner; Goodyear Farms; Magma Natural Gas Co.; Maricopa County Municipal Water Conservation District; Mohawk Municipal Water Conservation District; Natural Gas Service Co.; Roosevelt Irrigation District; Roosevelt Water Conservation District; Rural Electrification Administration; Safford Municipal Utilities; Salt River Valley Water Users' Association; San Carlos Irrigation District; Trico Electric Cooperative; Tucson Gas Electric Light and Power Co.; 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 lowercase letters--a, b, c, and d--following the section number indicate the well location within the section: the first letter denotes the 160-acre tract, the second the 40-acre tract, and the third the 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 lowercase letters are shown in the well number. Where 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 B quadrant, and so on through C and D quadrants. For example, well number (D-4-5)19 designates the well as being in sec. 19, T. 4 S., R. 5 E., in the southeast quadrant (fig. 2).



## WELL DESCRIPTIONS AND WATER-LEVEL MEASUREMENTS

(Water levels are in feet below land-surface datum unless otherwise indicated.)

### Apache County

(A-13-28)29ca. 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 1944-54. Water level, 1954: Oct. 11, 21.80.

### Cochise County

(D-13-29)6ccc. 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 87.36, Aug. 18, 1954. Records available 1941-42, 1944, 1946-47, 1949-52, 1954. Water level, 1954: Jan. 28, 40.67; Aug. 18, 87.36.

(D-13-31)30cdc. 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 66.82, Dec. 16, 1953. Records available 1940-42, 1944, 1946-54. Water level, 1954: Jan. 28, 64.06; Mar. 29, 64.10; Apr. 30, 64.24; Aug. 18, 64.60.

(D-14-23)36baa. 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, 1944-54. Water level, 1954: Jan. 26, 41.36; Mar. 29, 40.92; May 25, 41.07; Aug. 9, 41.98; Nov. 3, 42.20.

(D-14-25)6cac. E. T. Dunlap. 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 17.94, Nov. 3, 1954. Records available 1942, 1944-54. Water level, 1954: Jan. 26, 17.50; Mar. 29, 17.48; May 25, 17.58; Aug. 9, 17.76; Nov. 3, 17.94.

(D-14-31)3ddd. A. G. Pierce. Drilled unused artesian well in sand and clay, diameter 8 inches, reported depth 400 feet. Land-surface datum is about 3,690 feet above msl. Highest water level 17.20, Apr. 24, 1942; lowest 55.58, July 22, 1954. Records available 1941-42, 1946-54.

Daily noon water level, 1954  
(From recording gage)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1							52.90	-	-	-	-	47.91
2							52.98	-	-	-	-	47.83
3						50.62	53.09	-	-	-	-	47.74
4						50.55	53.20	-	-	-	50.21	47.68
5						50.69	53.35	-	-	-	50.12	47.60
6						50.82	53.49	-	-	-	50.02	47.51
7						50.91	-	-	-	-	49.93	47.44
8						51.01	-	-	-	-	49.85	47.39
9						51.18	-	-	-	-	49.75	47.30
10						51.36	-	-	-	-	49.68	47.21
11						51.54	-	-	-	-	49.62	47.18
12						51.67	-	-	-	53.04	49.51	47.11
13						51.78	-	-	-	52.92	49.44	47.01
14						51.90	-	-	-	52.85	49.37	46.94
15						52.03	-	-	-	-	49.30	46.88
16						52.13	-	-	-	-	49.23	46.86
17						52.22	-	-	55.45	-	49.18	46.81
18						52.30	-	-	55.46	-	49.07	46.77
19						52.34	-	54.45	-	-	48.97	46.71
20						52.38	-	54.45	-	-	48.87	46.63
21						52.45	-	54.49	-	51.78	48.79	46.54
22						52.53	55.58	54.53	-	51.62	48.71	46.46
23						52.65	-	-	-	-	48.61	46.40
24						52.66	-	-	-	-	48.51	46.32
25						52.72	-	-	-	-	48.41	46.25
26						52.75	-	-	-	-	48.32	46.19
27						52.77	-	-	-	-	48.21	46.14
28	42.04					52.80	-	-	-	-	48.12	46.09
29			41.94			52.82	-	-	-	-	48.03	46.00
30				46.79		52.86	-	-	-	-	47.99	45.95
31							-	-	-	-		45.89

(D-16-20)34acd. 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 85.57, May 28, 1954. Records available 1941-42, 1944-54. Water level, 1954: Feb. 23, 83.58; May 28, 85.57; Aug. 25, 85.15; Nov. 19, 84.20.

(D-16-25)16add. W. D. Wear. 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 42.27, Jan. 19, 1953. Records available 1942, 1944-54. Water level, 1954: Jan. 29, 39.15; Apr. 1, 37.39; May 26, 37.86; Aug. 10, 39.54; Nov. 3, 39.77, pumping.

(D-17-21)32bad. 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 1944-54. Water level, 1954: Feb. 24, 19.93; May 28, 20.14; Aug. 26, 20.55; Nov. 22, 19.80.

(D-18-21)6aab. Walter Haymore, Drilled domestic water-table well in sand and gravel, diameter 4 inches, depth 60 feet. Highest water level 25.62, Mar. 30, 1946; lowest 39.68, May 28, 1954. Records available 1944-54. Water level, 1954: Feb. 24, 35.25; May 28, 39.68; Aug. 26, 34.20; Nov. 22, 35.24.

(D-18-26)28aaa. Frank Geers. 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 77.71, Nov. 4, 1954. Records available 1946-54. Water level, 1954: Jan. 22, 75.23; Apr. 1, 78.87, pumping; May 25, 75.84; Aug. 12, 76.40; Nov. 4, 77.71.

(D-20-20)32cdb. 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 96.60, May 24, 1954. Records available 1941-43, 1945-54. Water level, 1954: Feb. 24, 93.42; May 24, 96.60; Aug. 26, 93.27; Nov. 22, 93.70.

(D-20-26)33add. Frank Sproul. 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 56.46, Jan. 19, 1954. Records available 1942, 1944-54. Water level, 1954: Jan. 19, 56.46.

(D-21-21)11aad. J. L. Parker, Dug unused water-table well in sand and gravel, diameter 4 feet, depth 36 feet. Highest water level 25.24, Aug. 26, 1954; lowest 30.69, Apr. 9, 1941. Records available 1941, 1944-54. Water level, 1954: Feb. 24, 27.58; May 24, 28.09; Aug. 26, 25.24; Nov. 22, 26.17.

(D-21-26)24baa. McNeal Cemetery. Drilled domestic water-table well in sand and gravel, diameter 8 inches, depth 196 feet. Land-surface datum is 4, 195.8 feet above msl. Highest water level 112.0, Jan. 31, 1946; lowest 127.04, Aug. 17, 1954. Records available 1946-54. Water level, 1954: Jan. 18, 125.10; Apr. 1, 125.42, pumping; May 25, 129.82, pumping, Aug. 17, 127.04; Nov. 3, 129.48, pumping.

(D-22-26)28bab2. 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 39.45, Nov. 3, 1954. Records available 1946-47, 1949-51, 1953-54. Water level, 1954: Jan. 22, 38.44; Aug. 17, 39.44; Nov. 3, 39.45.

(D-24-27)5bdb. Fred Price. Dug stock water-table well in sand and gravel, diameter 8 feet, depth 82 feet. Land-surface datum is about 3,996 feet above msl. Highest water level 54.30, May 26, 1942; lowest 62.29, Nov. 3, 1954. Records available 1942, 1944-54. Water level, 1954: Jan. 18, 61.76, Aug. 17, 61.55; Nov. 3, 62.29.

#### Coconino County

(A-21-7)9ddc. Pinewood Dairy. Dug stock water-table well in gravel, diameter 4 feet, depth 25 feet. Highest water level 11.93, June 5, 1945; lowest 19.34, Oct. 15, 1948. Records available 1944-51, 1953-54. Water level, 1954: Oct. 8, 13.95.

(A-22-6)26aaa. City of Flagstaff. Drilled unused water-table well in Coconino sandstone, diameter 16 inches, reported depth 1,021 feet. Highest water level 129.68, Sept. 28, 1945; lowest 131.13, July 5, 1952. Records available 1944-54. Water level, 1954: Oct. 8, 131.00.

#### Gila County

(A-1-15)9aad. Kenneth Hoopes. Drilled industrial water-table well in sand and gravel, diameter 12 inches, depth 160 feet. Highest water level 99.25, Apr. 9, 1952; lowest 90.40, Oct. 3, 1950. Records available 1945-54. Water level, 1954: Mar. 8, 74.48; May 11, 68.20, nearby well pumped recently.

(D-1-15)13bad. -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 38.87, Apr. 11, 1951. Records available 1946-54. Water level, 1954: Mar. 8, 36.47; May 11, 7.03; Aug. 18, 14.44; Dec. 8, 17.65.

#### Graham County

(D-4-22)13acc. Aubrey Rabb. 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 1939-52. Water level, 1954: Measurements discontinued.

(D-4-22)13bda. Aubrey Rabb. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, reported depth 100 feet. Highest water level 19.08, Mar. 2, 1953; lowest 28.98, Aug. 31, 1953. Records available 1953-54.

Water level, 1953-54

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Feb. 2, 1953	19.24	Sept. 29, 1953	23.39	Feb. 2, 1954	22.45	Sept. 28, 1954	20.55
Mar. 2	19.08	Nov. 3	22.38	Mar. 2	21.98	Oct. 26	20.46
30	22.42	Dec. 1	21.96	30	21.48	Nov. 30	19.71
May 4	20.26	29	21.83	July 27	24.83	Dec. 28	19.70
Aug. 31	28.98						

(D-4-22)35ddd. 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 39.36, Mar. 29, 1940. Records available 1939-44, 1946-54. Water level, 1954: Feb. 9, 37.62, pumped recently; Apr. 13, 39.40, pumped recently; July 6, 36.80, pumped recently; Oct. 12, 33.95.

(D-4-23)29adc. Silas Jarvis. 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 1940-54.

Water level, 1954

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Feb. 2	56.78	June 29	61.03	Sept. 28	57.90	Dec. 28	55.54
Mar. 2	56.39	July 27	61.37	Oct. 26	57.07		
30	56.00	Aug. 31	59.12	Nov. 30	55.50		

(D-6-24)5acc. 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 54.67, Dec. 28, 1947. Records available 1940-54.

Feb. 2	50.15	May 4	50.42	July 27	51.75	Oct. 26	50.02
Mar. 2	50.25	25	50.44	Aug. 31	50.90	Nov. 30	49.74
30	49.66	June 29	51.20	Sept. 28	50.52	Dec. 28	49.68

(D-6-24)13cbb. 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 45.79, Jan. 22, 1952. Records available 1939-40, 1942-54.

Water level, 1954

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Feb. 2	43.76	May 4	42.77	July 27	43.30	Oct. 26	42.72
Mar. 2	43.68	25	42.52	Aug. 31	42.98	Nov. 30	41.87
30	43.40	June 29	42.65	Sept. 28	43.01	Dec. 28	41.71

(D-6-25)17ddd. 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 22.24, July 27, 1954. Records available 1939-46, 1948-50, 1952-54.

Feb. 1	20.24	May 4	20.35	Sept. 28	20.20	Dec. 28	20.46
Mar. 2	21.18	July 27	22.24	Oct. 26	20.01		
30	22.22	Aug. 31	20.22	Nov. 30	20.53		

(D-6-28)31aac. J. W. Earven. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 57 feet. Highest water level 17.14, Apr. 16, 1941; lowest 49.16, Nov. 2, 1953. Records available 1940-54.

Feb. 1	46.39	May 3	42.98	July 26	47.80	Dec. 27	48.60
Mar. 1	44.55	24	43.30	Aug. 30	48.42		
29	44.54	June 28	45.22	Sept. 27	48.85		

(D-7-26)13dcd. 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 58.62, June 28, 1954. Records available 1940-54.

Feb. 1	38.84	May 3	47.86	Aug. 30	52.04	Nov. 29	40.35
Mar. 1	43.38	24	51.87	Sept. 27	48.70	Well destroyed	
29	46.28	June 28	58.62	Oct. 25	44.16		

(D-7-26)22bac. 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 66.36, June 28, 1954. Records available 1940-54. Water level, 1954: Feb. 1, 51.68; May 24, 63.08; June 28, 66.36; July 26, 65.40; Sept. 27, 57.36; Oct. 25, 53.91; Nov. 29, 50.82; Dec. 27, 49.42.

(D-7-27)4dad. Zelma 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 37.95, Sept. 27, 1954. Records available 1940-50, 1952-54. Water level, 1954: Feb. 1, 30.20; May 3, 32.59; Aug. 30, 37.40; Sept. 27, 37.95; Oct. 25, 33.80; Nov. 29, 31.70; Dec. 27, 32.64.

#### Greenlee County

(D-6-31)19dad. D. W. Rapier. Drilled domestic water-table well in sand and gravel, diameter 12 inches, depth 70 feet. Highest water level 30.76, May 5, 1941; lowest 40.66, Aug. 27, 1951. Records available 1939-54.

#### Water level, 1939-54

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Dec. 6, 1939	33.92	May 5, 1941	30.76	July 4, 1946	37.30	Mar. 7, 1951	36.72
Jan. 31, 1940	33.62	June 2	31.18	Dec. 30	37.72	Aug. 27	40.66
Mar. 1,	32.60	July 10	32.70	Mar. 12, 1947	38.98	Nov. 5	39.00
June 4	33.21	Mar. 11, 1942	32.33	July 23	39.67	Jan. 23, 1952	35.14
July 1	33.40	Nov. 11	34.78	Feb. 13, 1948	31.00	May 6	b32.10
Aug. 8	34.20	Sept. 29, 1943	35.56	May 19	39.00	Aug. 27	36.33
Sept. 5	34.89	Dec. 27	35.00	Mar. 1, 1949	33.03	Dec. 2	35.82
30	34.57	Mar. 13, 1944	35.02	July 14	c33.86	Jan. 27, 1953	35.49
Oct. 29	34.18	Feb. 1, 1945	35.83	Oct. 27	33.15	May 7	36.26
Dec. 2	34.33	Mar. 15	35.36	Mar. 16, 1950	32.39	Nov. 12	37.60
Jan. 8, 1941	32.85	Aug. 8	36.12	July 16	33.44	Mar. 10, 1954	38.22
31	32.08	Nov. 5	36.10	Oct. 10	36.50	May 19	39.50
Feb. 27	31.48	Jan. 20, 1946	35.82	Dec. 28	36.47	Nov. 9	38.59
Apr. 15	31.18						

b. Pumped recently.

c. Pumping nearby.

(D-7-31)4bcc. Barney & Frazier. 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 38.85, Aug. 11, 1954. Records available 1939-43, 1945-54. Water level, 1954: Mar. 10, 30.59; May 19, 34.90; Aug. 11, 38.85; Nov. 9, 32.74.

(D-8-32)32cda. Lavar Merrill. 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 1939-54. Water level, 1954: Mar. 10, 34.39; May 19, 34.63; Aug. 11, 34.14; Nov. 9, 33.84.

(D-8-32)34cdd. 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 28.18, Nov. 12, 1953. Records available 1939-43, 1945-53. Water level, 1954: Well destroyed.

#### Maricopa County

(A-1-1)4aaa. 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 1946-52. Water level, 1954: Measurements discontinued.

(A-1-1)4aaa2. Isabell-Hartner Ranches. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 514 feet, cased to 365 feet, perforations 150-355. Highest water level 111.12, Feb. 2, 1953; lowest 131.14, Nov. 18, 1954. Records available 1953-54.

#### Water level, 1953-54

Date	Water Level	Date	Water Level	Date	Water Level
Feb. 2, 1953	111.12	Feb. 19, 1954	113.89	Aug. 4, 1954	c182.68
Oct. 28	118.68	May 12	c181.10	Nov. 18	131.14
c. Pumping nearby					

(A-1-4)11bcb. J. B. House. Drilled domestic water-table well in sand and gravel, diameter 6 inches, depth 201 feet. Highest water level 36.75, Feb. 21, 1946; lowest 107.55, Nov. 17, 1954. Records available 1946-54. Water level, 1954: Feb. 25, 92.48; May 12, 104.85; Nov. 17, 107.55.

(A-1-6)23daa. Logan Stillwell. Drilled domestic water-table well in sand and gravel, diameter 10 inches, depth 408 feet. Land-surface datum is 1,375.7 feet above msl. Highest water level 229.20, Mar. 19, 1946; lowest 349.65, Nov. 17, 1954. Records available 1946, 1948-54. Water level, 1954: Feb. 24, 328.55; May 11, 338.95; Nov. 17, 349.65.

(A-3-1)35baa. 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 122.93, Aug. 4, 1954. Records available 1946-54. Water level, 1954: Feb. 19, 114.30; May 13, 116.38; Aug. 4, 122.93; Nov. 18, 118.71.

(A-3-2)12caa. John M. Jacobs. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 417 feet, deepened to 809, perforations 179-390. Land-surface datum is 1,309.7 feet above msl. Highest water level 253.96, Feb. 21, 1949; lowest 339.26, Nov. 18, 1954. Records available 1948-54. Water level, 1954: Feb. 16, 321.02; May 13, 331.87; Nov. 18, 339.26.



(A-3-4)15ddd. David and 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 171.46, Oct. 21, 1952. Records available 1946-54. Water level, 1954: Feb. 2, 168.24; May 14, 168.50; Nov. 17, 168.74.

(B-1-2)13acd. 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, 1947-54. Water level, 1954: Feb. 16, 71.94; May 13, 71.59; Aug. 4, 73.19; Nov. 18, 71.67.

(B-1-3)34bbb. Roosevelt Irrigation District. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 200 feet, perforations 74-176. Land-surface datum is 916.7 feet above msl. Highest water level 54.2, June 1, 1944; lowest 76.32, Nov. 3, 1952. Records available 1928-54. Water level, 1954: Feb. 16, 68.20; May 13, 71.11; Aug. 4, 72.15; Nov. 18, 68.66.

(B-2-1)13cba2. R. E. McMurchy. Drilled unused water-table well in sand and gravel, diameter 20 inches, depth 135 feet. Highest water level 104.87, Feb. 25, 1953; lowest 113.68, May 13, 1954. Records available 1952-54. Water level, 1954: Jan. 27, 111.80; May 13, 113.68; Nov. 4, well destroyed.

(B-2-2)4dcb. 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 248.43, Feb. 5, 1954. Records available 1940-42, 1946-54. Water level, 1954: Feb. 5, 248.43.

(B-4-1)8daa. 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 245.77, Aug. 4, 1954. Records available 1938, 1940-42, 1944, 1946-54. Water level, 1954: Feb. 4, 239.19; May 13, 242.74; Aug. 4, 245.77; Nov. 18, 245.64.

(C-1-5)1aab. 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 82.34, May 13, 1954. Records available 1946-54. Water level, 1954: Feb. 16, 78.24; May 13, 82.34; Aug. 4, 82.11; Nov. 18, 77.60

(C-1-7)15bbb. 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 184.38, Nov. 18, 1954. Records available 1949-54. Water level, 1954: Mar. 29, 181.84; Nov. 18, 184.38.

(D-1-5)1bbb. Salt River Valley Water Users' Association. Drilled domestic water-table well in sand and gravel, diameter 16 inches, depth 180 feet. Land-surface datum is 1,222.2 feet above msl. Highest water level 67.20, Dec. 10, 1945; lowest 158.50, Nov. 17, 1954. Records available 1945-54. Water level, 1954: Feb. 24, 139.40; May 12, 147.96; Aug. 8, 149.51; Nov. 17, 158.50.

(D-1-6)25aaa. Roosevelt Water Conservation District. Drilled domestic water-table well in sand and gravel, diameter 18 inches, depth 223 feet. Land-surface datum is 1,324.1 feet above msl. Highest water level 92.76, May 26, 1941; lowest 147.12, Nov. 17, 1954. Records available 1939-54. Water level, 1954: Jan. 27, 141.90; May 12, 145.25; Aug. 9, 146.86; Nov. 17, 147.12.

(D-2-5)15bbb. 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 105.30, Nov. 17, 1954. Records available 1945-54. Water level, 1954: Jan. 29, 100.25; May 12, 109.10, pumping nearby; Aug. 11, 107.62, pumping nearby; Nov. 17, 105.30.

(D-2-7)12ddd. 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 247.10, Nov. 17, 1954. Records available 1948-54. Water level, 1954: Feb. 2, 243.00; Nov. 17, 247.10.

#### Mohave County

(B-16-13)34dd. Dr. A. E. Carter. Dug domestic and stock water-table well in sand and gravel, diameter 4 feet, depth 20 feet. Highest water level 13.04, Oct. 4, 1954; lowest 18.50, Aug. 3, 1951. Records available 1945-54. Water level, 1954: Oct. 4, 13.04.

(B-21-17)24cd. 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 112.49, Sept. 19, 1952. Records available 1944-54. Water level, 1954: Oct. 5, 109.75.

#### Navajo County

(A-17-21)7bb. 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 44.13, July 2, 1952. Records available 1944-54. Water level, 1954: Oct. 9, 40.45.

# Pima County

(D-11-10)22add. Tom Greenfield. Drilled domestic and irrigation water-table well in sand and gravel, diameter 20 inches, reported depth 600 feet, cased to 600, perforations 145-582. Land-surface datum is 1,914.6 feet above msl. Highest water level 140.66, Feb. 28, 1940; lowest 186.44, May 6, 1954. Records available 1940, 1942, 1945-48, 1950-54. Water level, 1954: May 6, 186.44; Nov. 3, 182.80.

(D-12-10)20ddc. B. Wong. Drilled domestic water-table well in sand and gravel, diameter 7 inches, depth 222 feet. Land-surface datum is 2,021.4 feet above msl. Highest water level 184.79, Apr. 15, 1940; lowest 222.87, Aug. 26, 1954. Records available 1940, 1942, 1944-54. Water level, 1954: Feb. 11, 204.79; May 6, 222.00; Aug. 26, 222.87.

(D-12-11)18ddd. 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 214.92, May 6, 1954. Records available 1940-42, 1944-47, 1949-54. Water level, 1954: Feb. 10, 213.24; May 6, 214.92; Aug. 26, 214.70.

(D-12-12)16bad. Cortaro Water Users' Association. Drilled unused water-table well in sand and gravel, diameter 24 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 1939-54. Water level, 1954: Feb. 10, 105.61; May 5, 111.08; Aug. 26, 110.63.

(D-15-10)35aaa. State of Arizona. Drilled unused water-table well in sand and gravel, diameter 6 inches, depth 295 feet. Highest water level 212.17, Oct. 7, 1948; lowest 219.24, Feb. 10, 1954. Records available 1940-42, 1944, 1946-54. Water level, 1954: Feb. 10, 219.24; May 7, 216.80; Aug. 3, 217.09; Nov. 23, 217.40.

(D-15-13)2cca. City of Tucson. Dug and drilled unused water-table well in sand and gravel, diameter 12 inches, depth 104 feet. Highest water level 31.70, July 29, 1942; lowest 64.97, June 22, 1954. Records available 1942-54.

Water level, 1954

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Jan. 25	60.08	Apr. 26	61.67	July 28	47.90	Oct. 25	60.97
Feb. 2	60.24	May 25	62.88	29	50.52	Nov. 23	60.64
23	59.86	June 22	64.97	Aug. 26	52.41	Dec. 23	59.51
Mar. 25	60.30	July 27	44.47	Sept. 27	55.54		

(D-17-14)18cab. Arizona State Highway Department. Dug observation water-table well in sand and gravel, diameter 36 to 12 inches, depth 124 feet. Highest water level 52.16, Jan. 2, 1940; lowest 76.30, Sept. 17, 1954. Records available 1939-54.

Daily noon water level, 1954  
(From recording gage)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	71.74	-	73.36	74.34	76.03	74.92	-	-	-	75.68	74.28	73.04
2	71.59	-	73.44	74.40	75.91	74.60	-	-	-	75.64	74.24	72.97
3	71.68	72.58	73.49	74.50	75.72	75.04	-	-	-	75.59	74.21	72.90
4	71.60	72.57	73.53	74.60	75.62	-	-	-	-	75.53	74.15	72.92
5	71.59	72.57	73.57	74.67	75.50	-	-	-	-	75.48	74.10	72.85
6	71.63	72.58	73.50	74.73	75.38	-	-	-	-	75.44	74.05	72.80
7	71.63	72.59	73.51	74.82	75.30	-	-	-	-	75.41	74.03	72.78
8	71.66	72.58	73.45	74.92	75.27	-	-	-	-	75.35	73.98	72.74
9	71.74	72.57	73.41	75.01	75.23	-	-	-	-	75.29	73.91	72.68
10	71.77	72.62	73.35	75.13	75.19	-	-	-	-	75.25	73.90	72.63
11	71.85	72.64	73.33	75.20	75.14	-	-	-	-	75.23	73.86	72.67
12	71.99	72.63	73.32	75.25	75.10	-	-	-	-	75.17	73.77	72.59
13	72.18	72.64	73.28	75.32	75.06	-	-	-	-	75.13	73.76	72.52
14	72.26	72.67	73.26	75.41	75.03	-	-	-	-	75.09	73.71	72.50
15	72.34	72.77	73.29	75.52	75.00	-	-	-	-	75.04	73.67	72.46
16	72.29	72.71	73.44	75.54	74.97	-	-	-	-	74.98	73.64	72.48
17	72.30	72.75	73.56	75.57	74.90	-	-	-	76.30	74.95	73.62	72.42
18	72.29	72.78	73.59	75.64	74.80	-	-	-	-	74.90	73.53	72.36
19	72.31	72.81	73.59	75.71	74.73	-	-	-	-	74.83	73.48	72.33
20	72.36	72.80	73.64	75.75	74.66	-	-	75.59	-	74.82	73.45	72.27
21	72.33	72.83	73.63	75.80	74.65	-	-	-	76.15	74.75	73.44	72.24
22	72.31	72.89	73.65	75.81	74.65	-	-	-	-	74.70	73.39	72.19
23	72.35	72.99	73.72	75.94	74.65	75.97	76.12	-	-	74.64	73.35	72.16
24	72.36	73.05	73.82	76.00	74.64	-	-	-	75.97	74.63	73.31	72.10
25	72.33	73.16	73.82	76.07	74.68	-	-	-	75.44	74.58	73.25	72.06
26	72.36	73.21	73.89	76.12	74.70	-	-	-	75.89	74.54	73.22	72.03
27	72.37	73.33	73.88	76.11	74.73	-	-	-	75.84	74.50	73.16	72.05
28	-	73.27	73.93	76.14	74.74	-	-	-	75.80	74.45	73.13	71.98
29	-	-	74.00	76.05	74.80	-	-	-	75.77	74.41	73.08	71.89
30	-	-	74.12	75.94	74.86	-	-	-	75.72	74.36	73.11	71.93
31	-	-	74.22	-	74.88	-	-	-	-	74.29	-	71.83

(D-19-13)3baa. Owner's No. W1. Framers Investment 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 83.02, Oct. 25, 1954. Records available 1939-54. Water level, 1954: July 23, 74.75; Oct. 25, 83.02; Nov. 8, 69.20.

## Pinal County

(D-2-10)8ccc. E. M. Little. Drilled unused water-table well in sand and gravel, diameter 8 inches, depth 437 feet. Highest water level 396.82, Jan. 22, 1946; lowest 411.72, Feb. 28, 1941. Records available 1939-54. Water level, 1954: Feb. 10, 403.91; May 11, 404.12; Aug. 6, 404.92; Nov. 17, 405.25.

(D-3-9)20aaa. Elmer C. VonGlahn. 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 268.30, Nov. 12, 1952. Records available 1942, 1948-52. Water level, 1954: No measurements made.

(D-4-8)2ccc. Arizona Ranches, Inc. 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 224.33, Nov. 17, 1954. Records available 1941-54. Water level, 1954: Feb. 26, 218.00; May 11, 219.92; Aug. 9, 221.97; Nov. 17, 224.33.

(D-4-11)7cca. Bureau of Indian Affairs, well 7. 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 1942-54. Water level, 1954: Feb. 17, 34.92; May 4, 29.93; Aug. 19, 26.70; Nov. 16, 26.10.

(D-5-4)30cbb. Harrison & Harris. 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 169.20, May 5, 1954. Records available 1942-54. Water level, 1954: Feb. 18, 163.87; May 5, 169.20; measurements discontinued.

(D-5-9)29ada. Bureau of Indian Affairs well 76. Drilled unused water-table well in sand and gravel, diameter 16 inches, reported depth 616 feet, perforations 134-440. Land-surface datum is 1,520.0 feet above msl. Highest water level 114.24, Feb. 16, 1944; lowest 178.71, Aug. 19, 1954. Records available 1942-54. Water level, 1954: Feb. 17, 172.66; Aug. 19, 178.71; Nov. 16, 165.92.

(D-6-6)25ddd. H. L. Early. Drilled irrigation water-table well in sand and gravel, diameter 16 inches, depth 171 feet. Land-surface datum is 1,438.3 feet above msl. Highest water level 39.00, Apr. 18, 1940; lowest 110.06, Feb. 15, 1954. Records available 1940-52, 1954. Water level, 1954: Feb. 15, 110.06

(D-7-6)30add. A. R. Chapman. Dug and drilled unused water-table well in sand and gravel, diameter 20 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 1942-52. Water level, 1954: Measurements discontinued.

(D-7-7)11cdd. E. C. Grasty. 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 178.69, Feb. 15, 1954. Records available 1942-54. Water level, 1954: Feb. 15, 178.69.

(D-8-6)29acc. Leon Zagouies. 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 121.40, Sept. 1, 1953. Records available 1941-53. Water level, 1954: Measurements discontinued.

(D-8-6)30dad. Chiu Chuischu Ranch. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 296 feet, perforations 69-200. Highest water level 108.59, July 28, 1948; lowest 158.70, May 6, 1954. Records available 1948-52, 1954.

Water level, 1954

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
July 28, 1948	108.59	Feb. 10, 1950	110.82	Feb. 14, 1952	118.03	May 6, 1954	158.70
Feb. 8, 1949	109.89	Feb. 21, 1951	108.79	1953	No meas. made	Nov. 18	151.40

(D-8-7)25ddd. R. E. Hamilton. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 997 feet. Land-surface datum is 1,614.8 feet above msl. Highest water level 124.47, Mar. 24, 1941; lowest 281.10, Aug. 4, 1954. Records available 1940-52, 1954. Water level, 1954: Aug. 4, 281.10.

(D-10-9)10dba. 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 170.28, Feb. 21, 1952. Records available 1941-52. Water level, 1954: Measurements discontinued.

(D-10-9)36ddd1. King Investment Co. Drilled domestic water-table well in sand and gravel, depth 230 feet, diameter 8 inches. Highest water level 134.40, Oct. 12, 1939; lowest 164.30, Feb. 8, 1954. Records available 1939, 1941-44, 1949-54.

Water level, 1939, 1941-44, 1949-54

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Oct. 12, 1939	134.40	July 18, 1944	138.00	Feb. 7, 1950	c143.77	Feb. 2, 1953	152.76
1940	No meas. made	1945	No meas. made	Sept. 26	146.32	Apr. 22	158.30
Dec. 1, 1941	134.76	1946	No meas. made	Feb. 28, 1951	144.44	July 22	158.97
Mar. 5, 1942	134.87	1947	No meas. made	Dec. 28	150.72	Oct. 21	161.24
Aug. 24	134.50	1948	No meas. made	Feb. 20, 1952	149.25	Feb. 8, 1954	164.30
Dec. 21	135.88	Mar. 24, 1949	147.00	May 14	152.04	May 6	c164.66
Nov. 4, 1943	138.40	Aug. 31	144.62	Sept. 10	156.34	Nov. 3	c171.87
Jan. 15, 1944	136.83	Nov. 17	143.45	Dec. 9	153.12		
c. Pumping nearby							

Santa Cruz County

(D-22-13)35dcd. T. T. Pendleton. Drilled irrigation water-table well in sand and gravel, diameter 20 inches, depth 88 feet. Highest water level 16.01, Oct. 25, 1939; lowest 53.71, Feb. 9, 1954. Records available 1939-54. Water level, 1954: Jan. 6, 48.38; Feb. 9, 53.71; Mar. 3, 50.41; Mar. 30, 52.96; Sept. 17, 29.12; Oct. 25, 29.48; Nov. 8, 27.10.

(D-23-14)27baa. Ramon Michelena. Dug unused water-table well in sand and gravel, diameter 5 feet, 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 1939-54.

Water level, 1954

Date	Water Level	Date	Water Level	Date	Water Level	Date	Water Level
Jan. 6	19.87	Apr. 27	18.50	July 23	21.30	Oct. 25	17.99
Feb. 8	19.90	May 17	18.99	Aug. 25	18.25	Nov. 8	18.00
Mar. 3	19.28	June 23	21.06	Sept. 17	18.24		

Yavapai County

(B-11-15)25dab. Mr. Towne. Drilled unused water-table well in sand and gravel, diameter 8 inches, depth 212 feet. Highest water level 23.60, July 16, 1952; lowest 40.80, Aug. 4, 1951. Records available 1946, 1948-49, 1951-54. Water level, 1954: Oct. 6, 29.04.

(B-13-6)9dd. J. W. Ropeter. Dug irrigation water-table well in sand and gravel, diameter 6 feet, depth 22 feet. Well deepened. Highest water level 13.98, Jan. 17, 1945; lowest 17.97, Aug. 4, 1951. Records available 1945-49, 1951-54. Water level, 1954: Oct. 6, 23.45, pumping.

(B-14-4)33ab. C. C. McLain. Drilled unused water-table well in sand and gravel, diameter 16 inches, depth 73 feet. Well deepened to 85 feet. Highest water level 11.03, Apr. 14, 1945; lowest 18.20, Oct. 6, 1954. Records available 1944-49, 1951-54. Water level, 1954: Oct. 6, 18.20.

Yuma County

(B-5-16)10ddd. 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 113.70, Feb. 8, 1954. Records available 1946, 1948-54. Water level, 1954: Feb. 8, 113.70.

(C-8-16)28bda. Bob Anderson. Drilled domestic well in sand and gravel, diameter 16 inches, depth 419 feet. Highest water level 82.62, Dec. 19, 1945; lowest 86.98, Mar. 3, 1954. Records available 1945-47, 1949-54. Water level, 1954: Mar. 3, 86.98.

(C-9-22)17ddd. 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 74.05, Mar. 3, 1954; lowest 97.63, Sept. 5, 1946. Records available 1945-54. Water level, 1954: Mar. 3, 74.05.



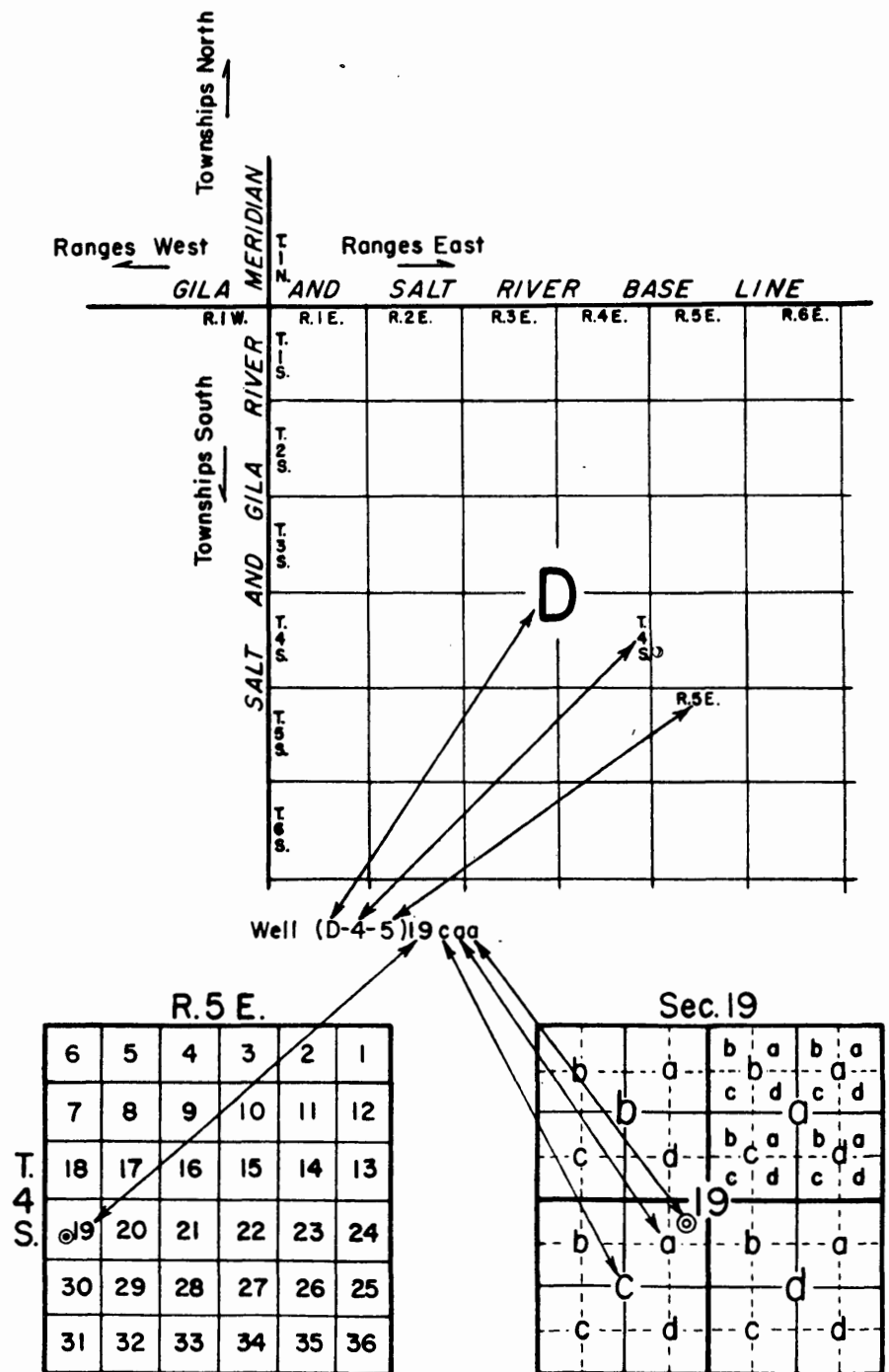


Figure 2 . --Sketch showing well-numbering system in Arizona.

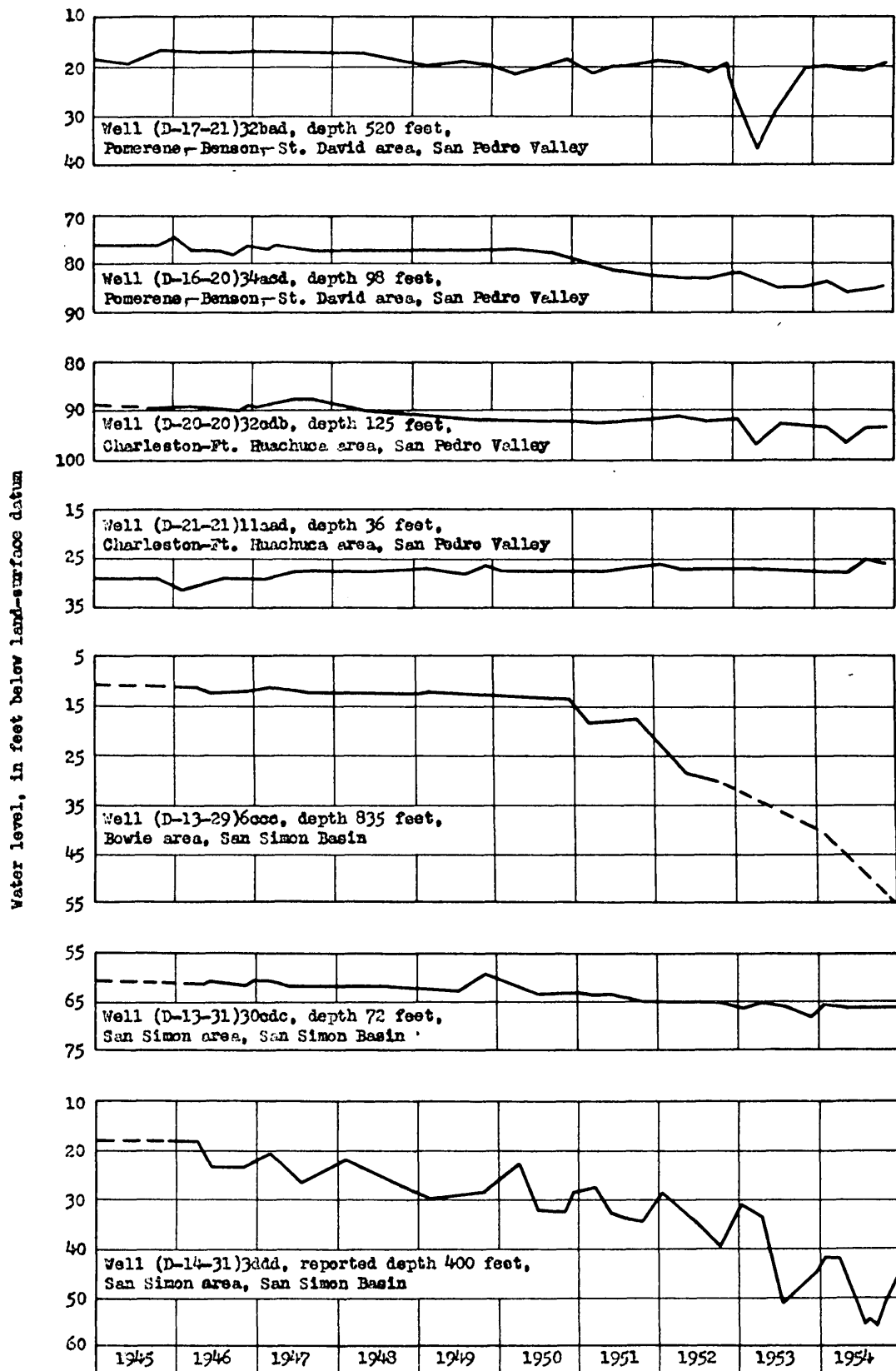


Figure 3.—Water levels in wells in San Pedro Valley and San Simon Basin, Cochise County.

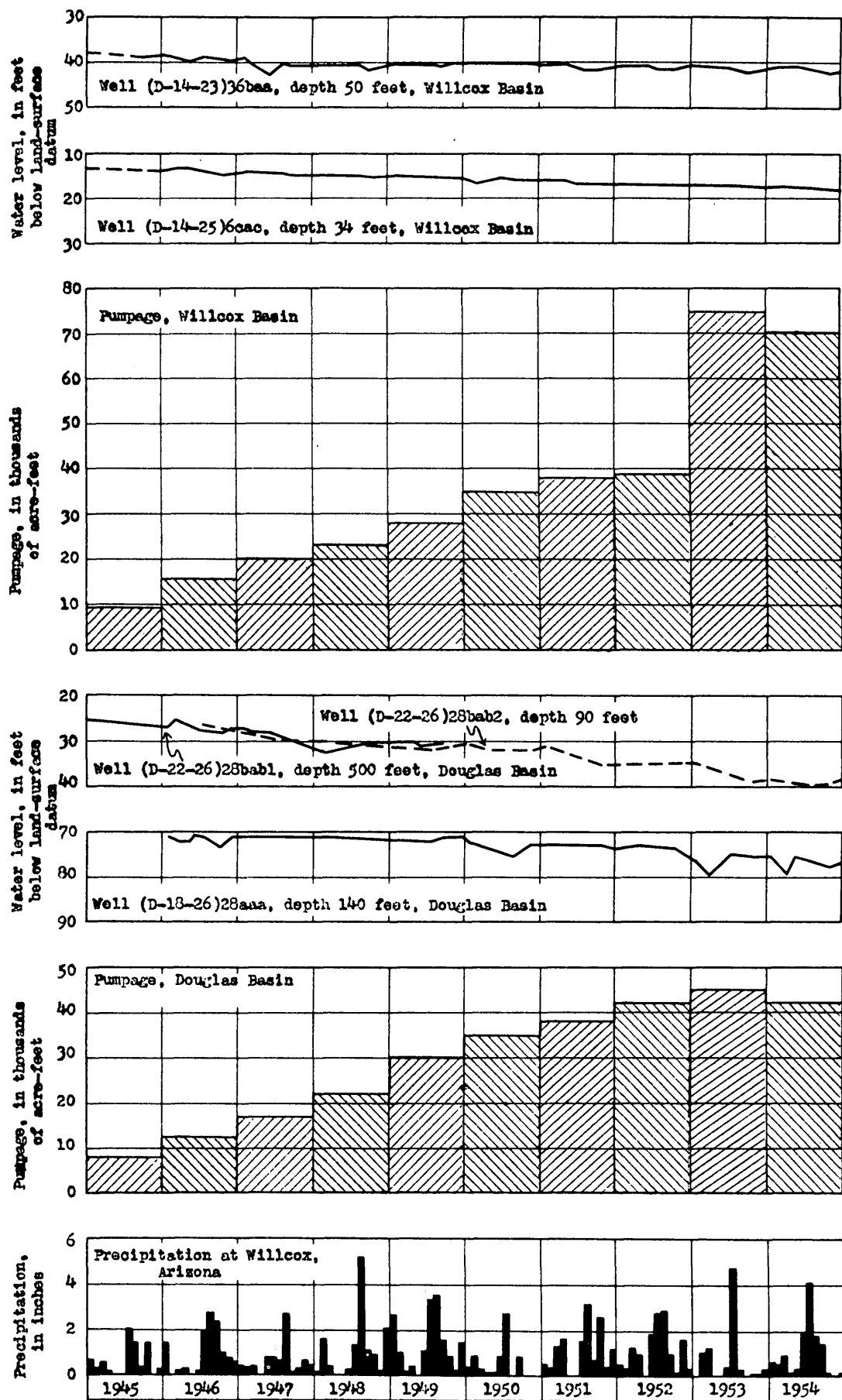


Figure 4.—Water levels in wells and pumpage in Willcox and Douglas Basins, and precipitation at Willcox, Cochise County.

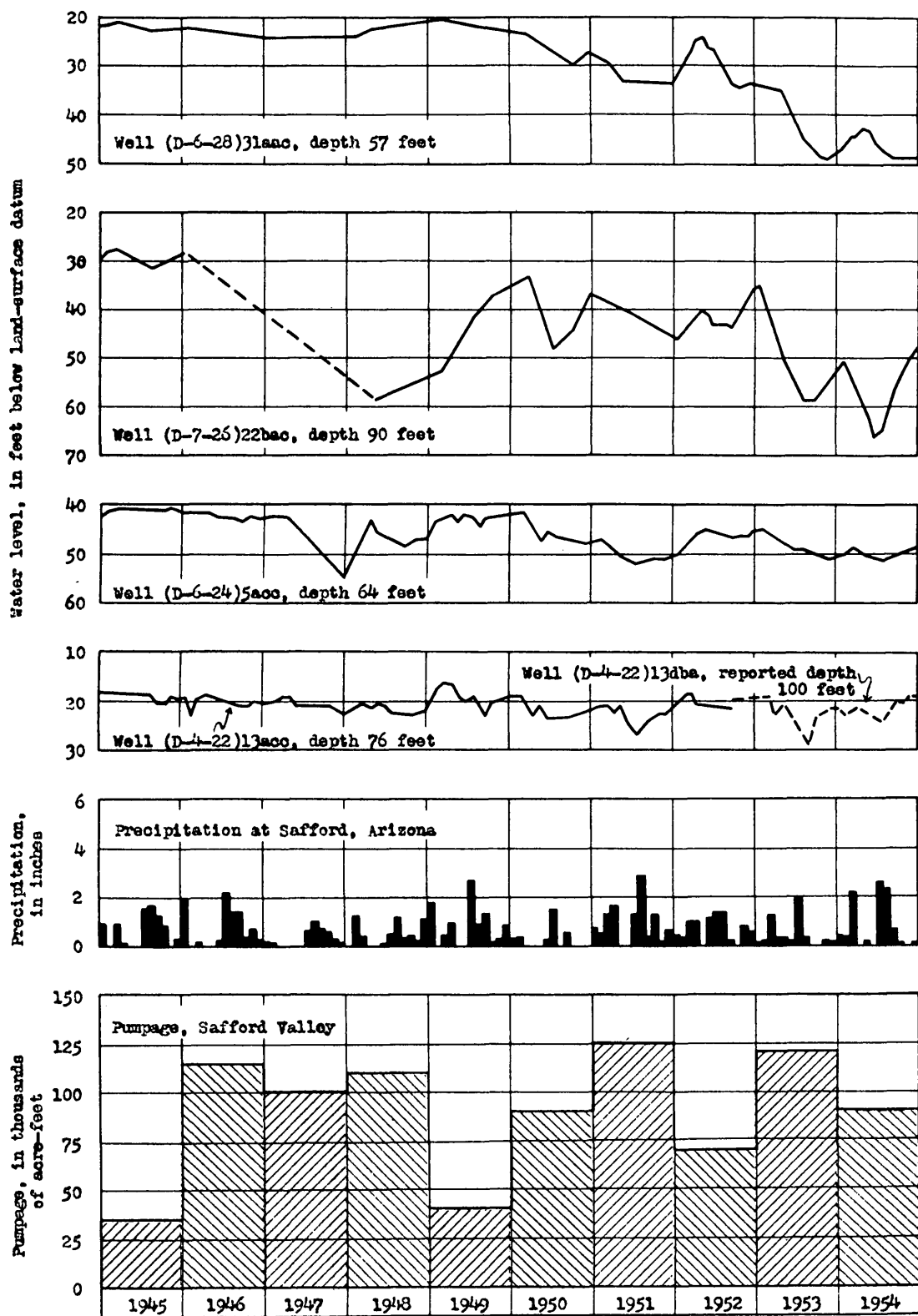


Figure 5.--Water levels in wells, precipitation at Safford, and pumpage in Safford Valley, Graham County.

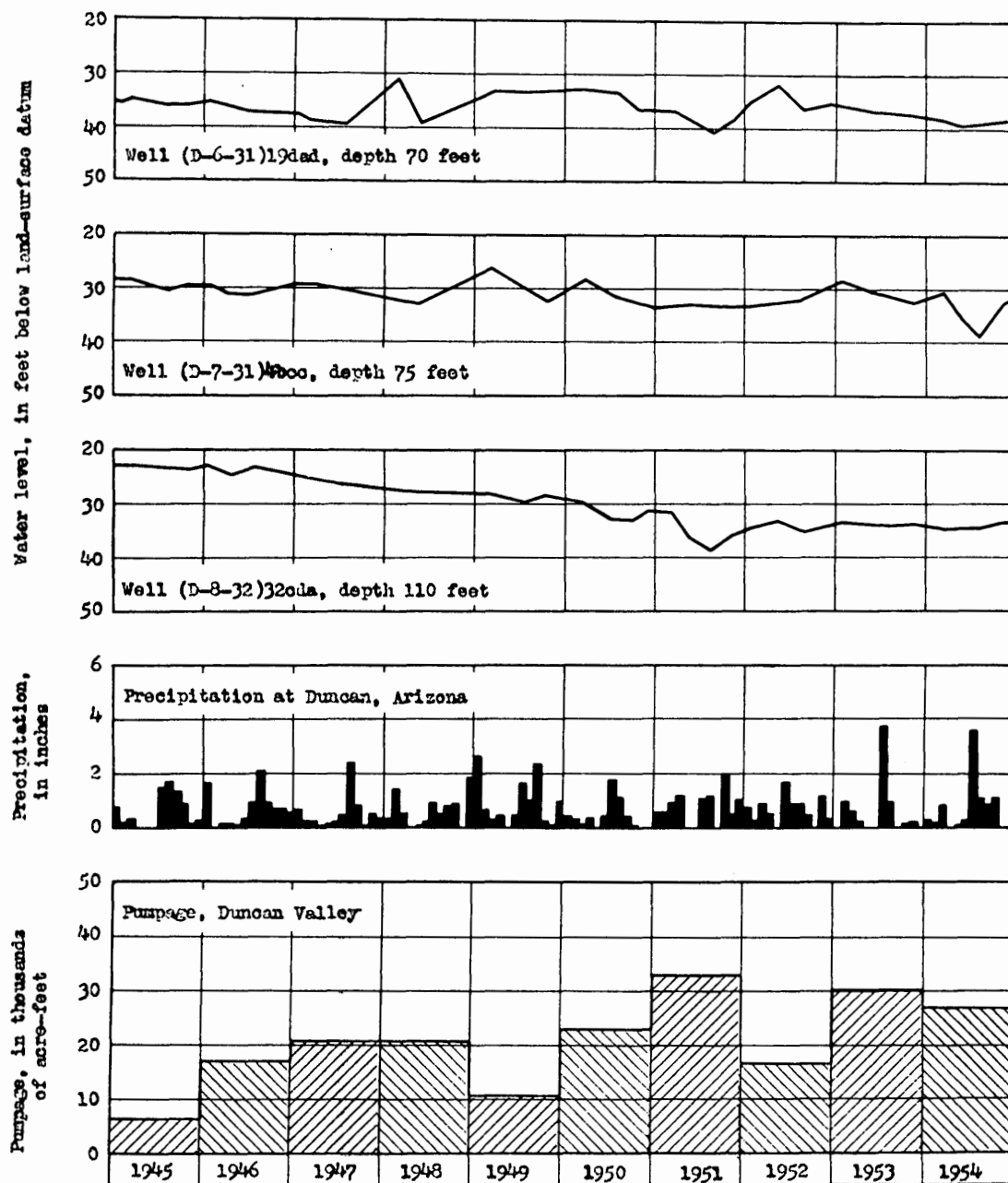


Figure 6.—Water levels in wells, precipitation at Duncan, and pumpage in Duncan Valley, Greenlee County.

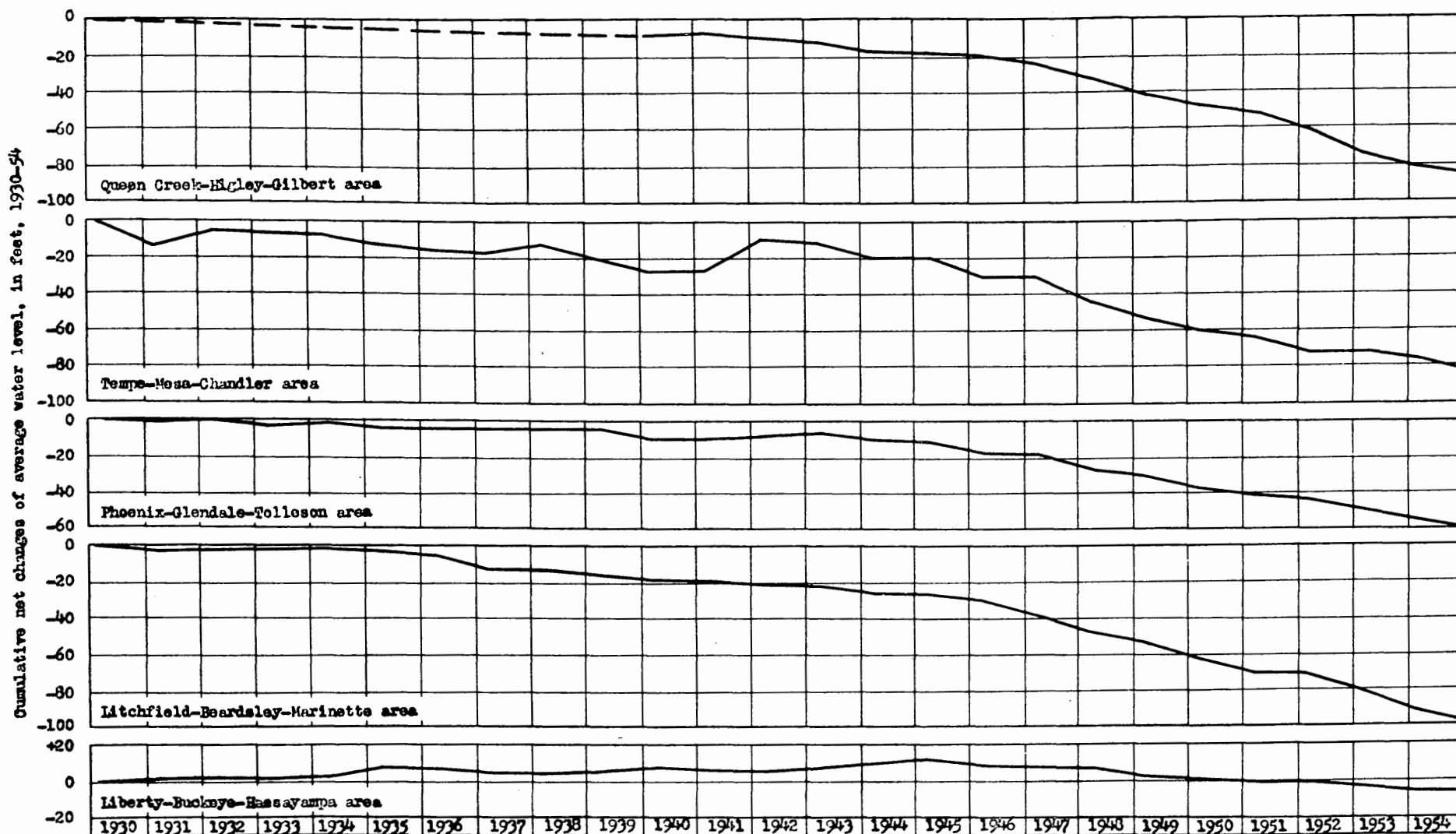


Figure 7.—Cumulative net changes of average water level in various parts of Salt River Valley, Maricopa County.

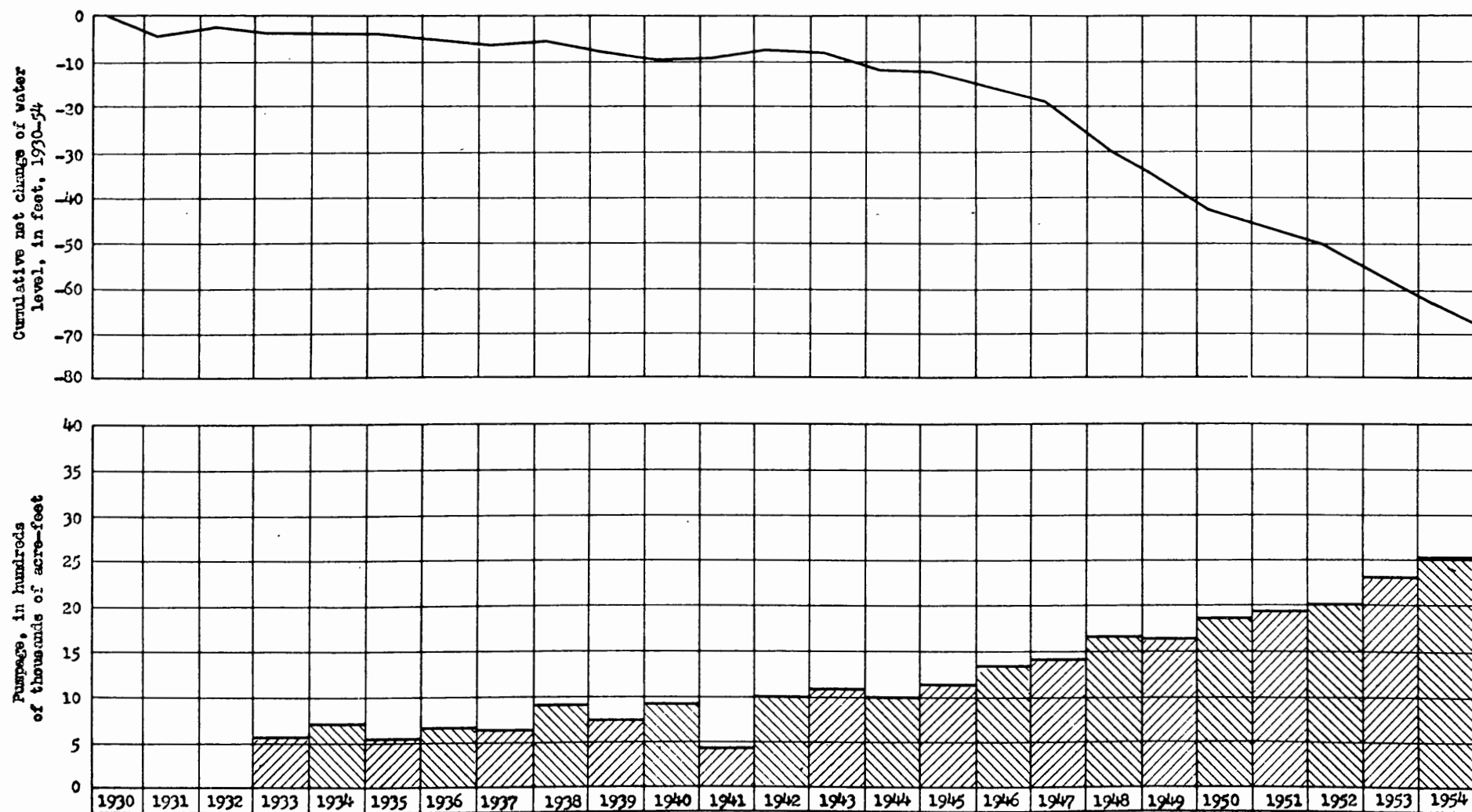


Figure 8.—Cumulative net change in water level and water pumped for irrigation in the Salt River Valley area, Maricopa County, Arizona.

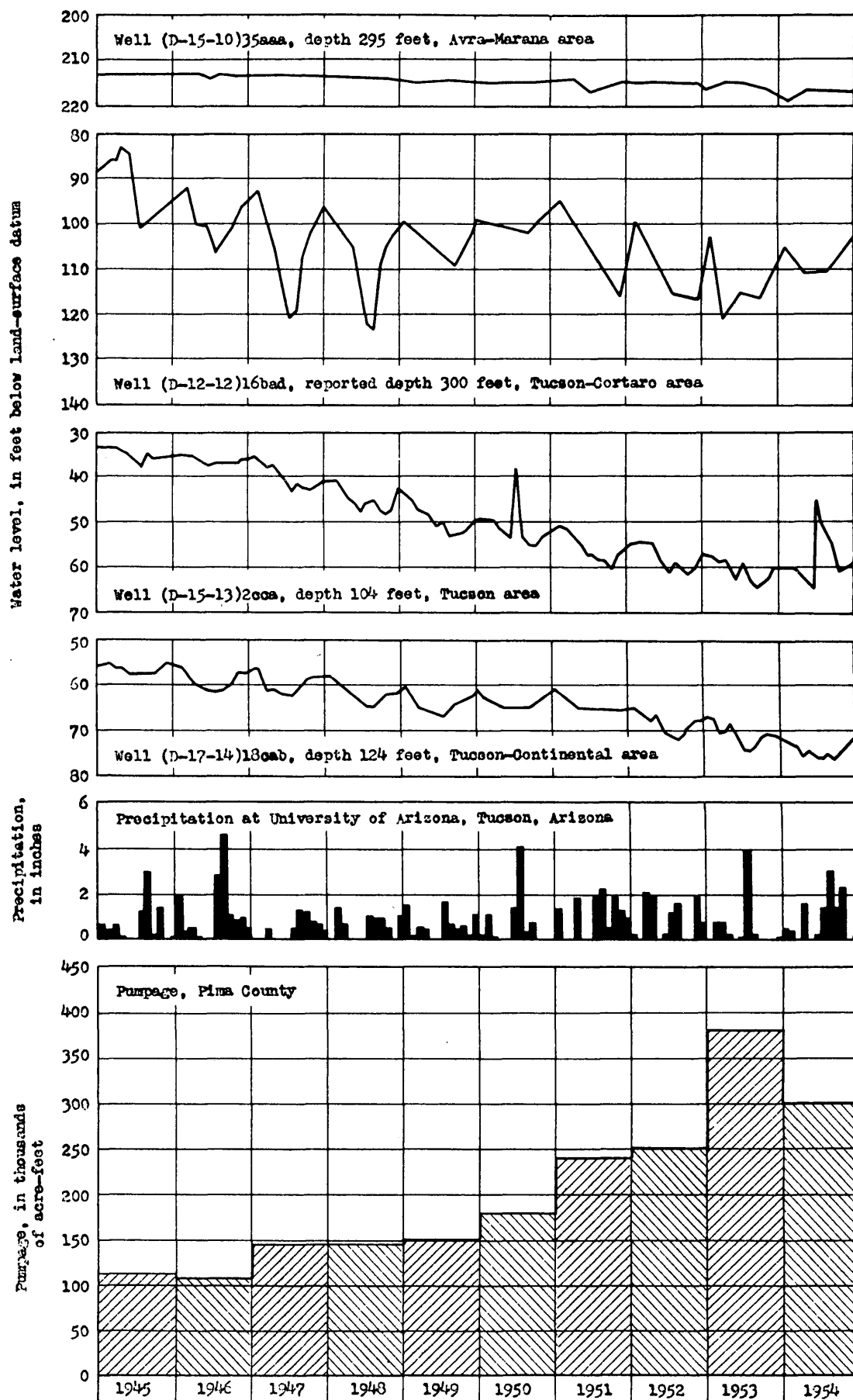


Figure 9.—Water levels in wells in the Avra-Marana, Tucson-Cortaro, Tucson, and Tucson-Continental areas, precipitation at Tucson, and pumpage, Pima County.



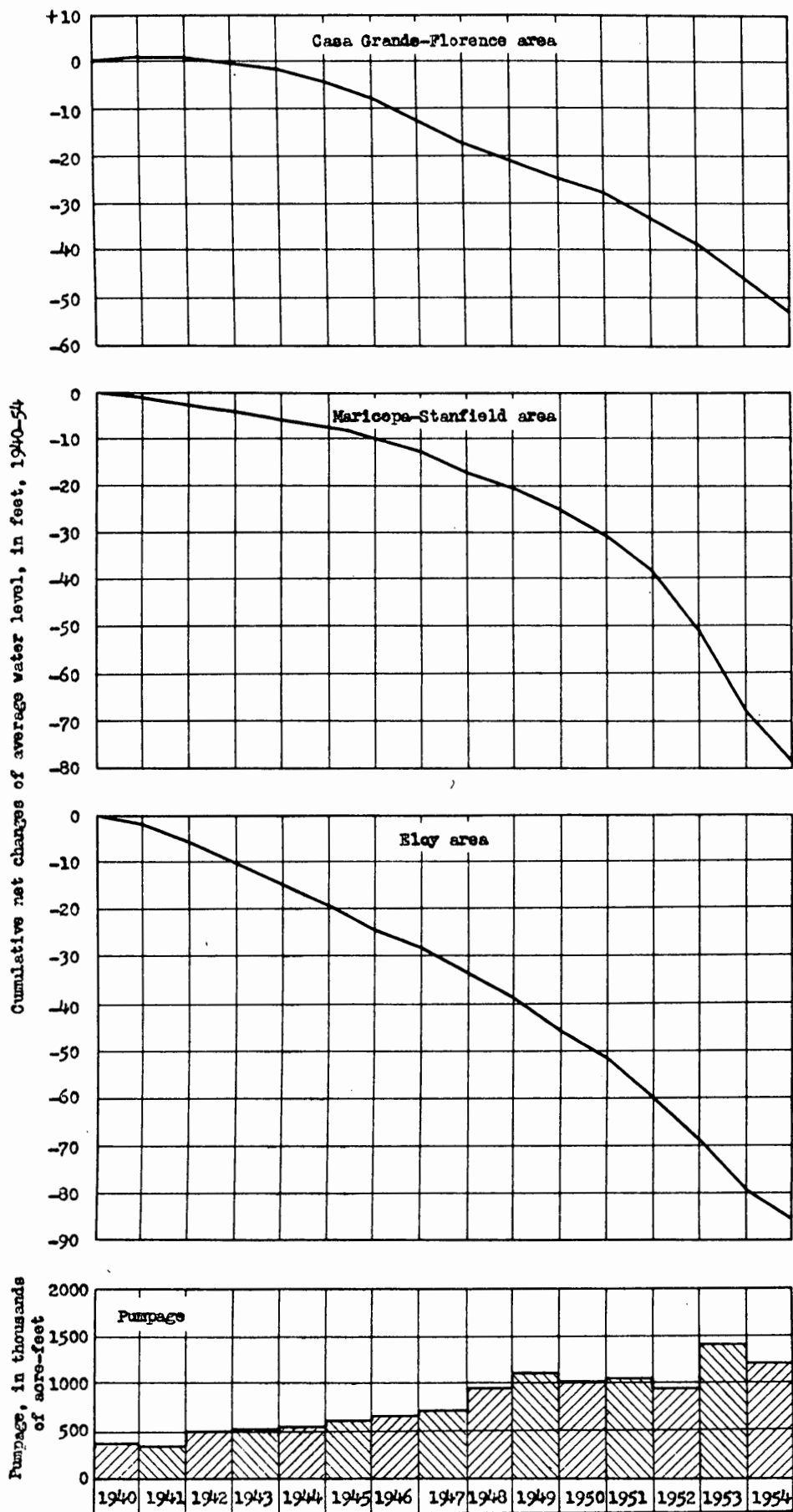


Figure 10.—Cumulative net changes of average water level and pumpage in portions of the Santa Cruz Basin within Pinal County.

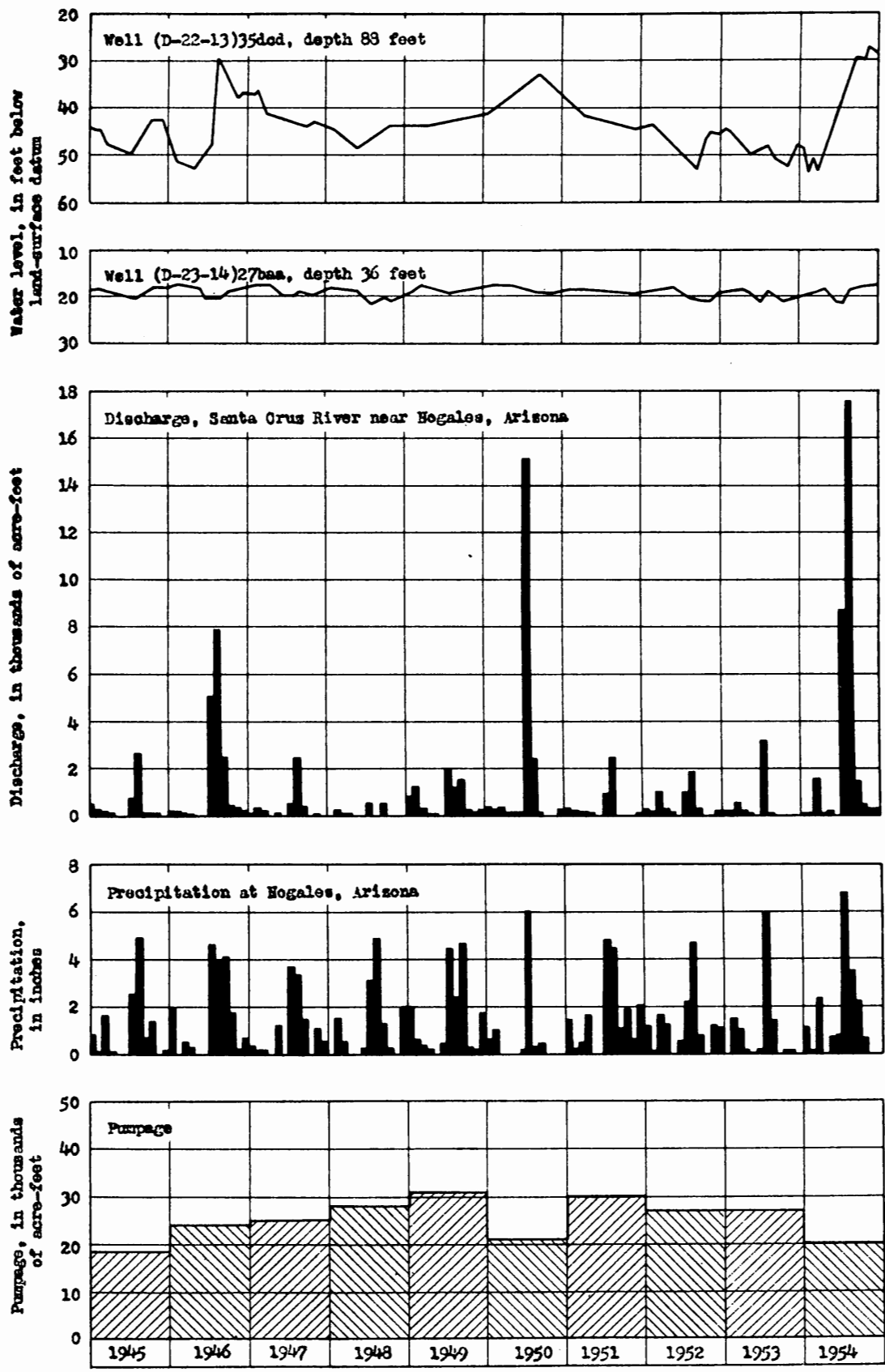


Figure 11.—Water levels in wells in the Santa Cruz Valley, discharge of Santa Cruz near Nogales, precipitation at Nogales, and pumpage in Santa Cruz County.

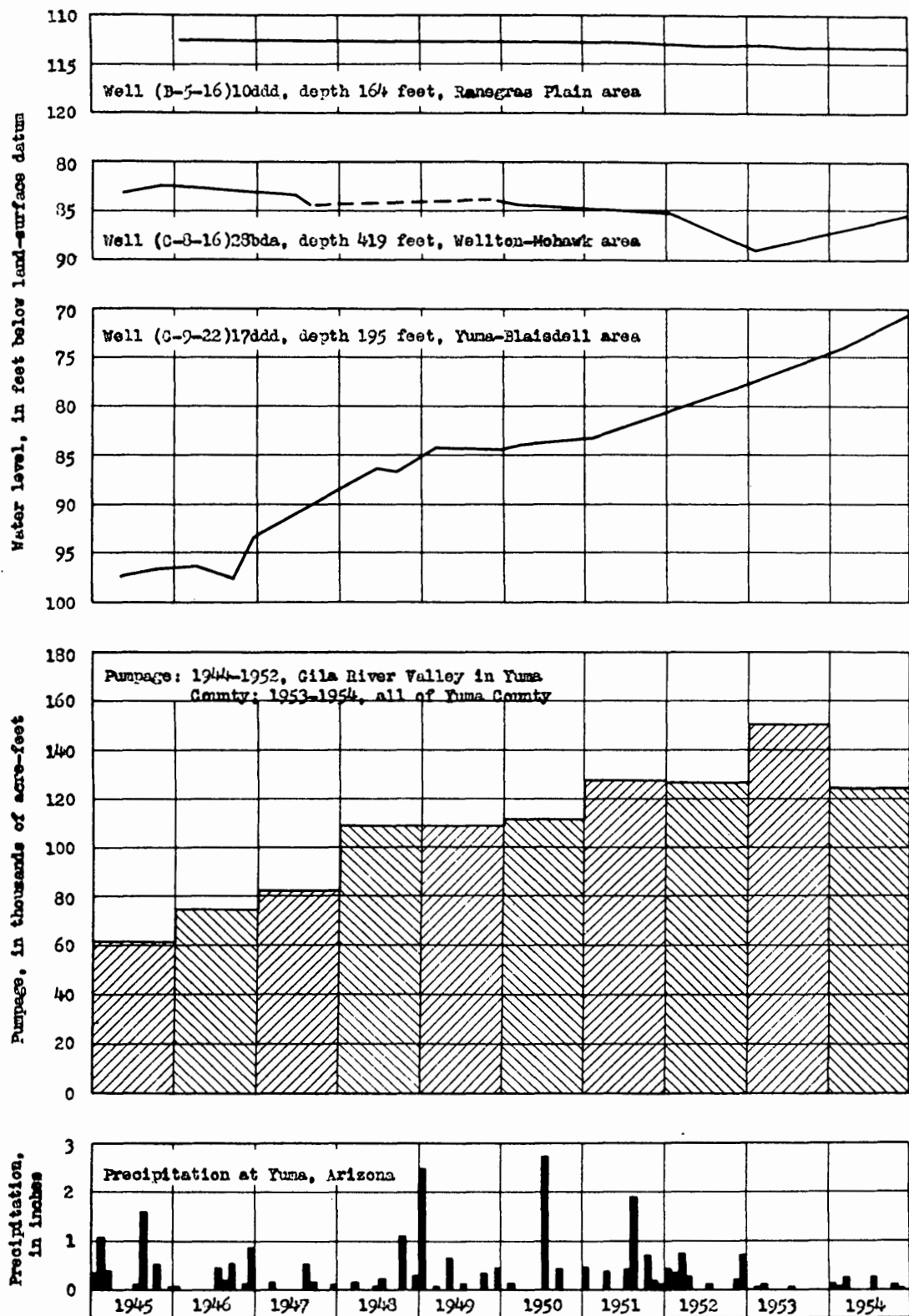


Figure 12.—Water levels in wells in Ranogras Plain, Wellton-Mohawk, and Yuma-Blaisdell areas, pumpage in Lower Gila Valley, and precipitation at Yuma, Yuma County.