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Report

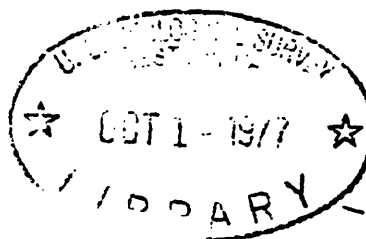
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WATER TABLE IN THE SURFICIAL AQUIFER
AND POTENTIOMETRIC SURFACE OF THE FLORIDAN AQUIFER
IN SELECTED WELL FIELDS, WEST-CENTRAL FLORIDA, SEPTEMBER 1976
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Open-File Report 77-551



Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
and LOCAL AGENCIES

Tallahassee, Florida

1977

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CONVERSION FACTORS

The English units used in this report can be converted to equivalent metric units as follows:

<u>English</u>	<u>Multiply by</u>	<u>Metric</u>
in (inches)	2.54×10	mm (millimeters)
ft (feet)	3.05×10^{-1}	m (meters)
mi ² (square miles)	2.59	km ² (square kilometers)
Mgal/d (million gallons per day)	4.38×10^{-2}	m ³ /s (cubic meters per second)
Mgal (million gallons)	3.785×10^{-3}	Mm ³ (million cubic meters)

ABSTRACT

The water table in the surficial aquifer and the potentiometric surface of the Floridan aquifer in a 1200 square-mile area in west-central Florida are mapped semiannually by the U. S. Geological Survey. Maps are prepared on the basis of water levels measured in wells each May to coincide with seasonal low levels, and in September, when levels are high. The mapped area contains nine producing well fields which supplied 67.2 million gallons on September 8, 1976, to municipalities along the Gulf Coast. The water is from the Floridan aquifer, the major aquifer in Florida. The effect of localized withdrawal of ground water is shown on the maps as cones of depression in both the potentiometric and water-table surfaces. The September 1976 maps show the seasonal rise in water levels from the low levels of the previous May.

INTRODUCTION

The accompanying maps show the configuration of the water table (surficial aquifer) and potentiometric surface (Floridan aquifer) in a part of west-central Florida where water levels are affected by pumping for public supply. They are prepared semiannually by the U. S. Geological Survey, in cooperation with the Southwest Florida Water Management District, State, and local agencies.

The maps encompass a land area of about 1200 mi², and include parts of Hillsborough, northeast Pinellas, and west Pasco Counties. The area is underlain by unconsolidated fine-grained sediments as much as 80 ft thick, which constitute the surficial aquifer. In most of the mapped area the surficial aquifer is underlain by clay that forms a leaky confining layer separating the surficial aquifer from the underlying limestone of the Floridan aquifer. In southern Hillsborough County, confining beds separate the Floridan aquifer into upper and lower units.

Included in the mapped area are nine well fields that contain active public-supply wells. The nine are East Lake, Starkey, Cypress Creek, Sun City, Riverview, Pasco County, Eldridge-Wilde, Cosme, and Section 21. One proposed well field (Morris Bridge) also is included in the mapped area but in which no wells have been pumped as of September 1976. Wells in the nine fields supply water to the urban and suburban areas of New Port Richey, St. Petersburg, Pinellas County, and southern Hillsborough County. Depressions in the potentiometric and water-table surfaces are the result of ground-water withdrawals. Pumpage is usually highest from April to June, the peak months for lawn irrigation.

This report contains four maps, one table, and one figure, as follows:

Sheet 1, Potentiometric surface of Floridan aquifer, west-central Florida, September 1976

Sheet 2, Water table in surficial aquifer, west-central Florida, September 1976

Sheet 3, Potentiometric surface of Floridan aquifer in selected well fields, west-central Florida, September 1976

Sheet 4, Water table in surficial aquifer in selected well fields, west-central Florida, September 1976

Table 1, Monthly rainfall totals, June-September 1976, and monthly normals, 1941-70, at seven stations in west-central Florida

Figure 1, Hydrographs of selected wells tapping surficial and Floridan aquifers

The following summary is based on conditions portrayed by the illustrations and table.

SUMMARY OF CONDITIONS

Monthly totals and deviations from long-term normal rainfall from June 1976 to September 1976 are shown in table 1. In September, water levels in observation wells in the surficial aquifer and the Floridan aquifer were above those measured in May 1976 reflecting the usual regional seasonal recovery of water levels.

On September 8, the week that water levels were measured, the total pumpage from the producing wells in all fields was 67.2 Mgal, 25.6 Mgal less than the 92.8 Mgal total recorded on May 12. The decrease in pumpage in September resulted largely from a decrease in lawn irrigation.

Seasonal and year-to-year fluctuations of level in the surficial aquifer and the Floridan aquifer, and the head relations of the two at each well field are shown by hydrographs in figure 1. Water levels generally are lowest in May and highest in September. The extent to which the water table will respond to the lowering of the potentiometric surface when wells tapping the Floridan aquifer are pumped generally depends, of course, on the amount of hydraulic connection between the surficial and Floridan aquifers where the wells are being pumped.

Table 1. -- Monthly rainfall totals, June-September 1976, and monthly normals, 1941-70, at seven stations in west-central Florida.

STATION	AGENCY	JUNE 1976	NORMAL 1941-70	JULY 1976	NORMAL 1941-70	AUGUST 1976	NORMAL 1941-70	SEPTEMBER 1976	NORMAL 1941-70
RUSKIN	NWS ^{1/}	7.22	6.49	4.58	8.43	7.02	8.00	6.04	6.35
ST. LEO	NWS	6.27	8.02	9.35	8.68	4.03	8.55	3.04	7.03
SECTION 21	USGS ^{2/}	12.46	--	4.88	--	8.40	--	5.15	--
ELDRIDGE-WILDE	USGS	5.06	--	6.74	--	7.70	--	7.01	--
CYPRESS CREEK	USGS	4.41	--	10.37	--	5.66	--	3.12	--
ODESSA	USGS	8.76	--	4.19	--	9.42	--	3.70	--
COSME	ST. PETERS- BURG								
		5.88	6.66	6.81	9.95	10.53	9.73	6.91	6.54
PASCO COUNTY	USGS	11.62	--	3.49	--	6.68	--	5.43	--

^{1/} National Weather Service

^{2/} U. S. Geological Survey

ALTITUDE OF POTENTIOMETRIC SURFACE AND WATER TABLE, IN FEET ABOVE AND BELOW MEAN SEA LEVEL

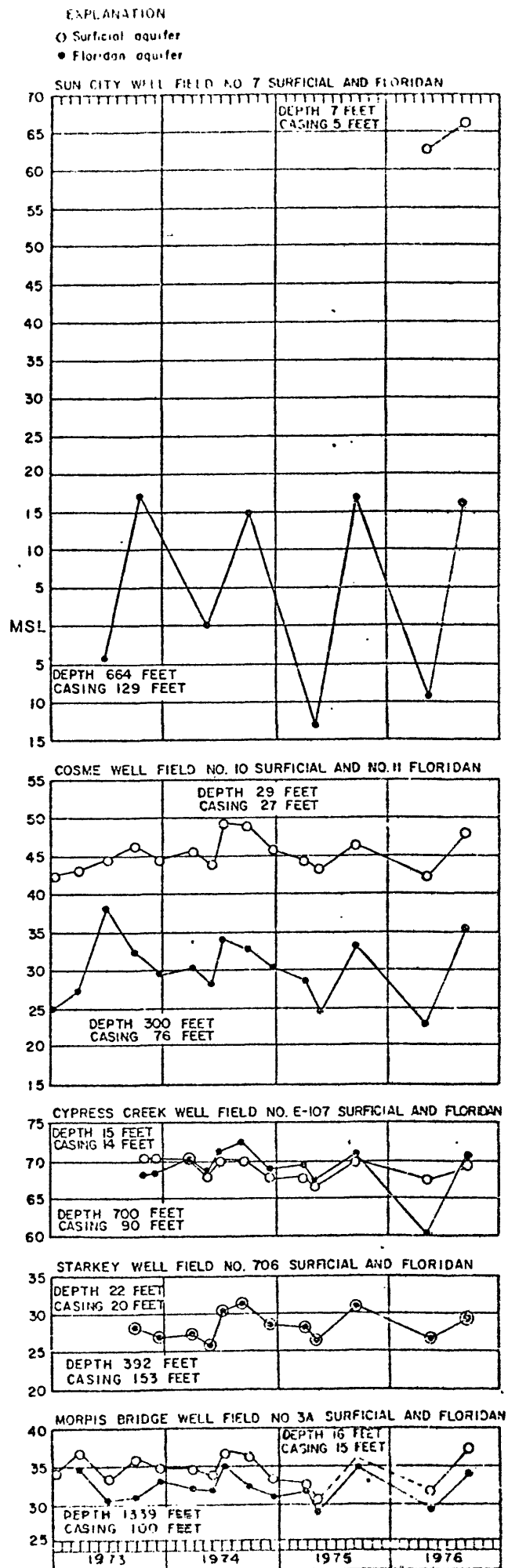
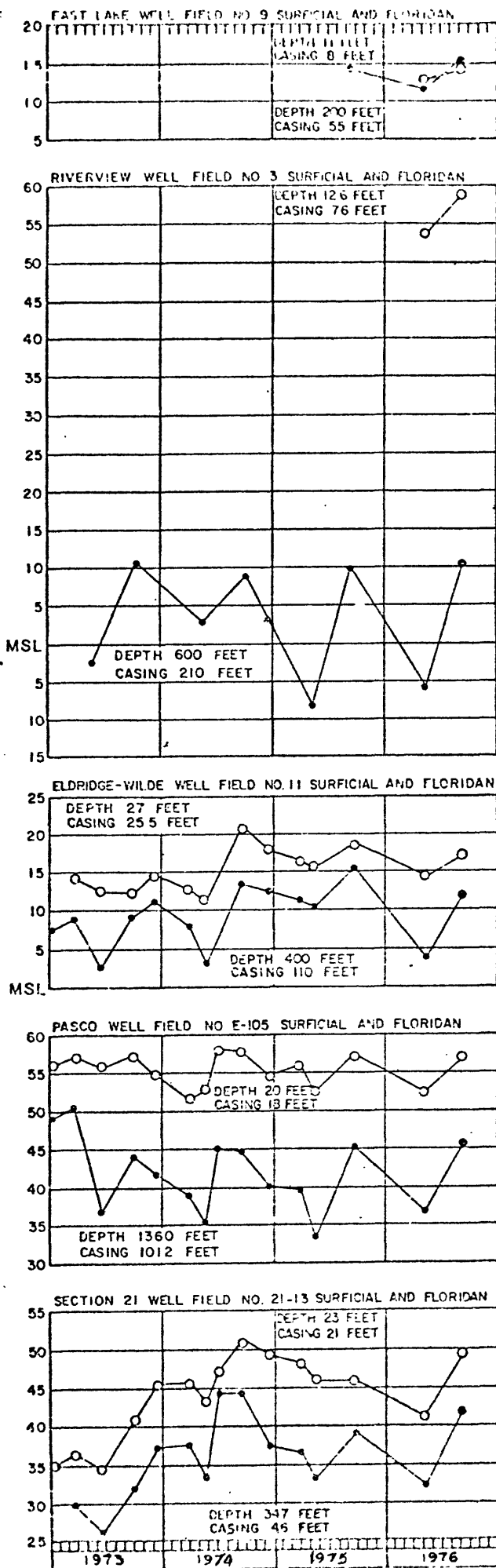


Figure 1. Hydrographs of selected wells tapping the Surficial and Floridan aquifers

Pasco County Well Field. -- The Pasco County well field contains 8 wells. The first of these began production in March 1973. Operation of these provides a relief for the wells in the Cosme and Section 21 well fields, which had been heavily pumped. The potentiometric surface in well E-105, near the center of the cone of depression in the Floridan aquifer at the Section 21 well field, was about 46 ft above msl (mean sea level) in September, which represents a 9-ft recovery since May.

The water table in the surficial aquifer rose about 6 ft since May. The difference in head between the water table and the potentiometric surface was about 10 ft for September, at the center of the well field. The water-table contours on the regional map indicate that the surficial aquifer is discharging water westward to the South Branch of the Anclote River.

Section 21 Well Field. -- The Section 21 well field contains 6 active wells. The first of these began production in February 1963. In September the daily yield of the active wells was the same as in May, and the 8 ft recovery in the Floridan potentiometric surface since May reflects the regional water-level recovery. On September 8, water levels in wells 21-13 and 26A were about 9 ft above regulatory levels set by the Southwest Florida Water Management District.

The water table rose about 6 ft since the previous May, about the same as the water-level recovery in the Floridan. The head difference between the water table and the potentiometric surface at well 21-13, was 7.4 ft on September 8, at the center of the well field.

Eldridge-Wilde Well Field. -- In September, the potentiometric surface of the Floridan aquifer in the well field was about 8 ft higher than in May. On September 8, the well yield of 32.6 Mgal was 4.3 Mgal less than on May 12. The water level in the U. S. Geological Survey recorder well, north of production well 5, was 9.6 ft above mean sea level. The water levels in wells 2 South, 113A, N2, and 139G were above regulatory levels on September 8.

The water table recovered about 4 ft since May. The difference in head between the water table and the potentiometric surface at well 11 was 5.3 ft on September 8. The water-table mound near the western edge of the well field overlies a thick layer of clay between 14 and 30 ft below land surface.

Cosme Well Field. -- The potentiometric surface of the Floridan aquifer rose about 10 ft from May to September. Pumpage at the time of the September measurements was 8 Mgal/d, 7.8 Mgal/d less than at the time of the May 1976 water-level measurements. The 10-ft recovery in level of the potentiometric surface probably reflects the regional water-level recovery. The levels in wells E-100, 11, and 33A ranged from 7 ft to 12 ft above regulatory levels set by the Southwest Florida Water Management District.

The water table rose 2 ft since May. The stages of several lakes also recovered from seasonal lows observed earlier in the year.

Morris Bridge Well Field. -- Although the wells have been drilled in the Morris Bridge well field, none have been pumped. Therefore, the water table and potentiometric surfaces in the well field reflect natural conditions. The water table in the surficial aquifer and the potentiometric surface indicate ground-water discharge to the Hillsborough River.

Starkey Well Field. -- The Starkey well field is in the planning and testing stage. Four production wells are operating, supplying the city of New Port Richey with about 2.5 Mgal/d. The altitude of the potentiometric surface and water table generally coincide. The water table in the surficial aquifer rose about 2 ft since May, and the potentiometric surface of the Floridan aquifer rose about 4 ft.

Cypress Creek Well Field. -- The Cypress Creek well field is in the testing stage. Wells C1, C2, and C3 were put into production in April 1976. Pumping rates were varied from zero to over 10 Mgal/d from April 12 through the end of August 1976, in order to obtain data for hydrologic evaluation of the well-field area.

All wells in the well field were shut off during the September water-level measurements in preparation for an aquifer test. The potentiometric surface of the Floridan aquifer rose about 4 ft from May to September 1976, while the water table rose 2 ft.

East Lake Well Field. -- Wells in the East Lake well field began production in September 1974 to supplement the yield from the wells in the Eldrige-Wilde field. On September 8, the pumping rate was 1.2 Mgal/d. No cone of depression developed in the potentiometric surface at that time.

The water table slopes toward Brooker Creek, which indicates that the creek is receiving water from the surficial aquifer. The head difference between the water table and the potentiometric surface averaged less than 1 ft on September 8.

Riverview Well Field. -- Production from wells in the Riverview well field began in 1969. On September 8, 1976, 2.2 Mgal was obtained from the wells. The potentiometric surface rose 17 ft between May and September 1976.

The water-table gradient in the surficial aquifer is southeast to northwest, toward Bullfrog Creek. On September 8, the average head difference between the water table in the surficial aquifer and the potentiometric surface was 50 ft.

Sun City Well Field. -- In 1961, the first well in the Sun City well field began production, and on September 8, 1976, 6 wells supplied the Sun City Center area with about 1.0 Mgal. The potentiometric surface rose 26 ft from May to September, 1976.

Since May 1976, the water level in a shallow well near the center of the well field rose 1.8 ft. On September 8, the difference in head between the water table in the surficial aquifer and the potentiometric surface of the Floridan aquifer was 40 ft.

REFERENCES

- Mills, L. R., and Hutchinson, C. B., 1976, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1975: U. S. Geol. Survey, Open-File Rept. FL-76004, 13 p.
- National Oceanic and Atmospheric Administration, October 1975 - May 1976, Climatological data, Florida: vol. 79, nos. 10-12, vol. 80, nos. 1-5.