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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



WATER TABLE IN THE SURFICIAL AQUIFER AND POTENTIOMETRIC
SURFACE OF THE FLORIDAN AQUIFER IN SELECTED WELL FIELDS,
WEST-CENTRAL FLORIDA, MAY 1978

Open-File Report 78-939

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



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By R. M. Wolansky, L. R. Mills, and W. M. Woodham

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Tallahassee, Florida

September 1978

CONVERSION FACTORS

The U.S. customary units used in this report can be converted to equivalent metric units as follows:

<u>U.S. customary units</u>	<u>Multiply by</u>	<u>Metric units</u>
in (inch)	2.54×10	mm (millimeter)
ft (foot)	3.05×10^{-1}	m (meter)
mi ² (square mile)	2.59	km ² (square kilometer)
Mgal/d (million gallons per day)	4.38×10^{-2}	m ³ /s (cubic meter per second)
Mgal (million gallons)	3.785×10^{-3}	Mm ³ (million cubic meters)

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ABSTRACT

The water table in the surficial aquifer and the potentiometric surface of the Floridan aquifer in a 1,200-square-mile area in west-central Florida are mapped semiannually by the U.S. Geological Survey. Maps are prepared showing water levels measured in wells each May to coincide with seasonal low levels, and each September to coincide with seasonal high levels.

The mapped area shows 11 well fields which supplied 144.0 million gallons to municipalities on May 16, 1978. The water is withdrawn from the Floridan aquifer, the major aquifer in Florida. The effect of localized withdrawal of ground water is shown on the maps as depressions in both the potentiometric and water-table surfaces.

Water levels were generally lower in May 1978 than in September 1977 because of seasonal rainfall. The maximum decrease determined was more than 17 feet at Sun City well field. Water levels in May 1978 were generally higher than in May 1977 because of heavy rainfall in early May. However, water levels in well fields with significant increases in pumpage were lower.

INTRODUCTION

The accompanying maps show the configuration of the water table in the surficial aquifer and the potentiometric surface of the Floridan aquifer in parts of west-central Florida where water levels are primarily affected by pumping for public supply. The maps are prepared semiannually by the U.S. Geological Survey, in cooperation with the Southwest Florida Water Management District and local agencies. Because of the seasonal nature of rainfall in Florida, water levels generally are lowest in May and highest in September. The change in water-table levels due to pumpage from the Floridan aquifer and subsequent lowering of the potentiometric surface is controlled, to a large extent, by the thickness and permeability of the confining bed separating the surficial and Floridan aquifers in the area the wells are being pumped.

The maps encompass land areas of about 1,200 mi², and include parts of Hillsborough, Pinellas, Pasco and Sarasota Counties. The surficial aquifer in the areas consist of unconsolidated fine-grained sediments as much as 80 ft thick. In most of the mapped areas, 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. The Floridan aquifer consists of limestone and dolomite beds about 1,000 ft thick. In southern Hillsborough County and Sarasota County, confining beds separate the Floridan aquifer into upper and lower units.

Eleven well fields were selected in the mapped areas to show the effects of pumping caused primarily by public water-supply systems. They are Cosme, Cypress Creek, East Lake, Eldridge-Wilde, Morris Bridge, Pasco, Riverview, Section 21, Starkey, Sun City, and Verna. Wells in the 11 fields supply water to the urban and suburban areas of New Port Richey, St. Petersburg, Tampa, and Sarasota, and Pinellas and southern Hillsborough Counties. Depressions in the potentiometric surface and the water table are the result of ground-water withdrawals. Pumpage is usually highest from April to June, the peak months for lawn and crop irrigation.

This report contains four maps, two tables, and two figures, as follows:

Map 1--Potentiometric surface of Floridan aquifer, west-central Florida,
May 1978.

Map 2--Potentiometric surface of Floridan aquifer in selected well fields,
west-central Florida, May 1978.

Map 3--Water table in surficial aquifer, west-central Florida, May 1978.

Map 4--Water table in surficial aquifer in selected well fields, west-
central Florida, May 1978.

Table 1--Pumpage and water-level data at eleven well fields in west-central
Florida.

Table 2--Monthly rainfall totals, October 1977-May 1978, and monthly nor-
mals, 1941-70, at selective stations in west-central Florida.

Figure 1--Hydrographs of selected wells tapping surficial and Floridan
aquifers.

Figure 2--Hydrographs of selected wells tapping surficial and Floridan
aquifers.

SUMMARY OF CONDITIONS

In May 1978, water levels in most observation wells in the surficial aquifer and the Floridan aquifer were lower than those measured in September 1977, reflecting the usual seasonal decline of water levels (table 1). Rainfall in vicinity of the well fields was less than normal in October 1977 and in March and April 1978, and greater than normal in November and December 1977 and in January, February, and May 1978 (table 2). Rainfall during the week prior to May 16, 1978, the day that water levels were measured in the well fields, made available large quantities of water for recharge to the surficial and Floridan aquifers. Thus, rainfall in May 1978 resulted in higher water levels than recorded in May 1977, and higher than September 1977 in some well fields where pumpage was minimal.

Seasonal and year-to-year fluctuations of water levels in the surficial and Floridan aquifers, and their relations at each well field, are shown by hydrographs in figures 1 and 2.

On May 16, 1978, the total pumpage from the producing wells was 144.0 Mgal, 62.0 Mgal more than that recorded on September 21, 1977, and 50.7 Mgal more than that recorded on May 11, 1977 (table 1). Six well fields pumped significantly more water on May 16 than the previous May and September; East Lake was not pumping; Pasco, Section 21, Starkey, and Sun City pumped about the same amount. The higher pumpage on May 16, 1978, than on the sampling days in May and September 1977 is largely related to increased residential development.

Table 1.--Pumpage and water-level data at eleven well fields in west-central Florida

Well field	Operating agency	Number of supply wells	Number of wells pumped on 5-16-78	Pumpage (Mgal)			Potentiometric surface (ft-MSL)			Water table (ft-MSL)			Number of feet water table is above potentiometric surface				
				5-11-77	9-21-77	5-16-78	Floridan well no.	5-11-77	9-21-77	5-16-78	Surficial well no.	5-11-77	9-21-77	5-16-78	5-11-77	9-21-77	5-16-78
Cosme	St. Petersburg	33	9	5.5	12.6	14.2	11	28.2	29.5	28.5	10	43.6	46.1	46.2	15.4	16.6	17.7
Cypress Creek	West Coast Regional Authority	10	9	15.8 16.8	8.0	27.1	E-107	57.3	62.6	51.0	E-107	65.3	69.6	67.0	8.5	7.0	16.0
East Lake	Pinellas County	8	0	4.3	1.3	0	9	14.9	11.8	14.3	9	74.9 14.9	77.8 11.8	74.4 14.4	0	0	0.1
Eldridge-Wilde	Pinellas County	58	48	23.0	26.5	44.8	11	11.6	12.0	5.7 6.7	11	14.5	16.3	16.1	2.9	4.3	9.4
Morris Bridge	Tampa	20	10	0	0	20.0	3A	28.9	32.7	23.2	3A	32.1	35.3	33.3	3.2	2.6	10.3
Pasco	St. Petersburg	8	4	19.5	14.9	11.9	E-105	35.6	41.8	45.6	E-105	53.4	56.4	57.4	17.8	14.6	11.8
Riverview	Hillsborough County	7	5	2.4	3.0	3.3	3	-3.2	7.8	-1.0	3	54.2	58.9	55.0	57.4	51.1	36.0
Section 21	St. Petersburg	6	3	10.8	7.0	9.3	21-13	31.6	35.0	39.4	21-13	44.7	44.3	49.2	13.1	12.7	9.8
Starkey	Pasco County	4	3	3.1	2.2	3.0	10	26.5	27.5	28.0	20	26.6	27.3	28.0	0.1	-0.2	0
Sun City	Hillsborough County	6	4	1.8	0.7	1.8	7	-8.2	16.8	-0.8	7	61.4	64.9	61.5*	69.6	48.1	62.3
Verna	Sarasota	39	25	6.1	5.8	8.6	10-08	-8.2	13.6	-1.1	11-04A	56.9	61.1	58.3	65.1	47.5	59.4
Total				93.3	82.0	144.0											

*Estimated.

Table 2.--Monthly rainfall totals, October 1977-May 1978, and monthly normals, 1941-70,
at selective stations in west-central Florida (monthly totals in inches).

Station	Agency	October 1977	Normal 1941-70	November 1977	Normal 1941-70	December 1977	Normal 1941-70	January 1978	Normal 1941-70	February 1978	Normal 1941-70	March 1978	Normal 1941-70	April 1978	Normal 1941-70	May 1978	Normal 1941-70
Cosme	St. Petersburg	0.64	3.15	0.82	2.42	3.81	1.91	2.53	2.30	6.40	2.79	4.22	4.17	0.96	2.20	6.39	2.68
Cypress Creek	USGS ^{1/}	0.58		1.64		3.61		3.60		5.27		3.07		1.07		7.37	
East Lake	Pinellas County	0.03		2.83		3.47		2.36		5.13		3.72		0.73		0.82	
Eldridge-Wilde	SWFWMD ^{2/}	0.81		4.29		2.70		2.67		4.98		2.84		0.80		5.39	
Morris Bridge	SWFWMD	1.18		2.81		1.85		3.87		5.52		1.44		1.34		1.17	
Pasco	SWFWMD	0.40		1.51		2.65		3.96		5.85		3.50		0.95		11.04	
Riverview	Hillsborough County	0.67		1.53		2.78		2.42		4.42		3.40		0.20		4.52	
Ruskin near Sun City	NOAA ^{3/}	0.42	2.54	1.89	1.79	3.40	2.19	2.82	2.33	5.17	2.86	2.44	3.89	0.94	2.10	4.87	1.41
St. Leo near San Antonio	NOAA	1.31	2.93	1.88	1.87	3.48	2.36	4.72	2.55	6.20	3.13	4.01	4.53	1.59	3.10	7.83	3.79
Section 21	SWFWMD	0.88		1.49		3.15		3.91		5.73		3.48		0.80		9.02	
Starkey	SWFWMD	1.45		2.27		2.31		3.92		5.70		2.96		1.90		4.10	
Verna	Sarasota	0.63		1.95		6.60		3.78		3.91		2.79		0.00		1.37	
Monthly average of stations		0.75	2.87	2.08	2.03	3.32	2.15	3.38	2.39	5.36	2.93	3.16	4.20	0.94	2.47	5.32	2.63

^{1/} U.S. Geological Survey.

^{2/} Southwest Florida Water Management District.

^{3/} National Oceanic and Atmospheric Administration.

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

EXPLANATION

- Surficial aquifer
- Floridan aquifer

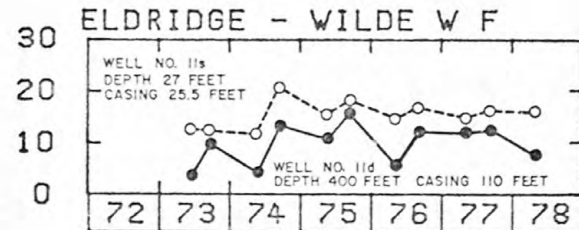
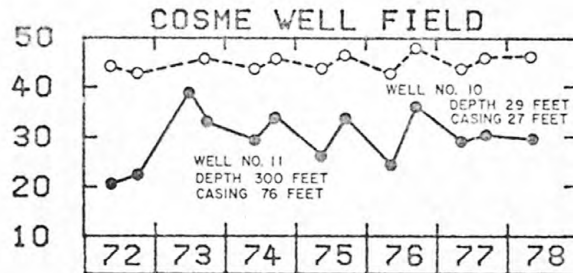
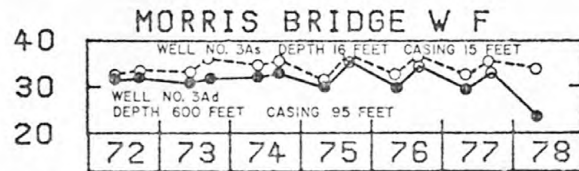
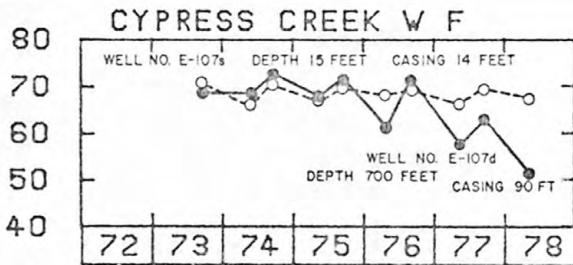
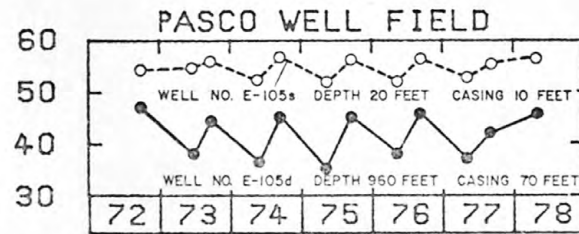
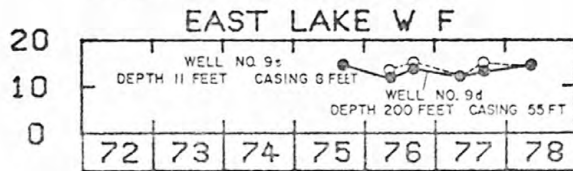


FIGURE 1. HYDROGRAPHS OF SELECTED WELLS TAPPING THE SURFICIAL AND FLORIDAN AQUIFERS

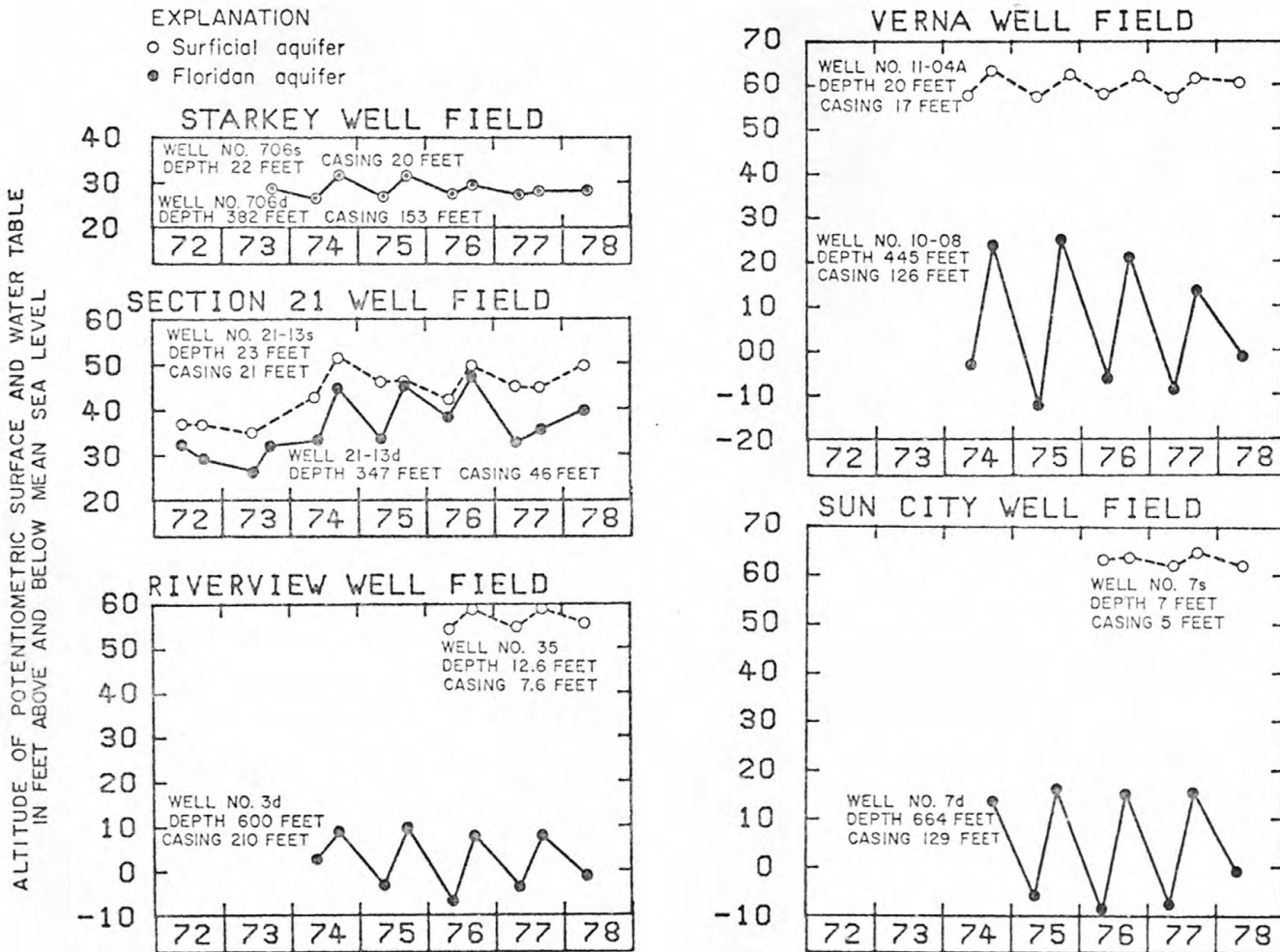


FIGURE 2. HYDROGRAPHS OF SELECTED WELLS TAPPING THE SURFICIAL AND FLORIDAN AQUIFERS

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