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, SEPTEMBER 1978

Open-File Report 78-1045

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

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, SEPTEMBER 1978

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

Open-File Report 78-1045

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

Tallahassee, Florida

1978

CONVERSION FACTORS

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

U.S. inch-pound units	Multiply by	To obtain metric units
in (inch)	2.54 x 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)

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

By

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

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. The maps are based on 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 includes 11 well fields which supplied 107.5 million gallons to municipalities on September 26, 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 The water is withdrawn from the Floridan aquifer, the major aquifer in Florida.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 higher in September 1978 than in May 1978 because of seasonal rainfall. However, water levels were lower in well fields with significant increases in pumpage. These changes ranged from a decrease of 5 feet to an increase of 20 feet.

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 amount of change in the water table due to pumpage from the Floridan aquifer, and consequent lowering of the potentiometric surface, is determined, to a large extent, by the thickness and vertical hydraulic conductivity of the confining bed separating the surficial and Floridan aquifers in the area of pumping.

The maps encompass land areas of about 1,200 mi^2, and include parts of Hillsborough, Pinellas, Pasco, and Sarasota Counties. The surficial aquifer consists of unconsolidated fine-grained sediments as much as 80 ft thick. The surficial aquifer generally 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, minor artesian aquifers separate the Floridan aquifer from the surficial aquifer.

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.

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

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

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

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

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

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

Table 2--Monthly rainfall totals, May 1978-September 1978, and monthly normals, 1941-70, at selected 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 September 1978, water levels in most observation wells in the surficial aquifer and the Floridan aquifer were higher than those measured in May 1978, reflecting the usual seasonal recovery of water levels (table 1). Change of water levels ranged from a decrease of 5 ft at Pasco well field to an increase of 20 ft at Verna well field. Water levels at Pasco and Section 21 well fields were below the levels of May 1978 owing to a significant increase in pumpage at these well fields. Neglecting changes in pumpage, water levels recovered to about the levels of the previous September. Monthly rainfall totals from June 1978 to September 1978 and normal rainfall (1941-70) are shown in table 2. Rainfall in the vicinity of the Cosme well field was generally less than long-term normal, during June, August, and September 1978 (table 2).

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 September 26, 1978, the total pumpage from the 11 well fields was 107.5 Mgal, 36.5 Mgal less than that recorded on May 16, 1978, and 25.5 Mgal more than that recorded on September 21, 1977 (table 1). The overall decrease in pumpage on September 26, 1978, from May 16, 1978, resulted largely from a decrease in lawn irrigation, whereas the increase from September 21, 1977, to September 26, 1978, 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 9-26-78	Pumpage (Mgal)			Potentiometric surface altitude (ft)				Water table altitude (ft)				Height of water table above or below (-) potentiometric surface (ft)		
				9-21-77	5-16-78	9-26-78	Floridan well no.	9-21-77	5-16-78	9-26-78	Surficial well no.	9-21-77	5-16-78	9-26-78	9-21-77	5-16-78	9-26-78
Cosme	St. Petersburg	33	9	12.6	14.2	11.8	11	29.5	28.5	31.9	10	46.1	46.2	46.0	16.6	17.7	14.1
Cypress Creek	West Coast Regional Authority	10	5	8.0	27.1	19.1	E-107	62.6	51.0	60.8	E-107	69.6	67.0	68.8	7.0	16.0	8.0
East Lake	Pinellas County	8	0	1.3	0	0	9	11.8	14.3	14.7	9	11.8	14.4	14.8	0	0.1	0.1
Eldridge-Wilde	Pinellas County	58	26	26.5	44.8	27.7	11	12.0	6.7	13.1	11	16.3	16.1	18.4	4.3	9.4	5.3
Morris Bridge	Tampa	20	3	0	20.0	10.1	3A	32.7	23.2	26.9	3A	35.3	33.5	34.5	2.6	10.3	7.6
Pasco	St. Petersburg	8	5	14.9	11.9	15.5	E-105	41.8	45.6	40.2	E-105	56.4	57.4	56.8	14.6	11.8	16.6
Riverview	Hillsborough County	7	5	3.0	3.3	2.4	3	7.8	-1.0	7.5	3	58.9	55.0	56.8	51.1	56.0	49.3
Section 21	St. Petersburg	6	3	7.0	9.3	10.5	21-13	35.0	39.4	35.5	21-13	44.3	49.2	48.9	9.3	9.8	13.4
Starkey	Pasco County	4	2	2.2	3.0	1.9	10	27.5	28.0	29.7	20	27.3	28.0	29.6	-0.2	0	-0.1
Sun City	Hillsborough County	6	4	0.7	1.8	1.0	7	16.8	-0.8	14.2	907	68.0	65.6	67.4	51.2	66.4	53.2
Verna	Sarasota	39	20	5.8	8.6	7.5	10-08	13.6	-1.1	18.4	11-04A	61.1	58.3	61.7	47.5	59.4	43.3
Total				82.0	144.0	107.5											

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

Station	Agency	May 1978	Normal 1941-70	June 1978	Normal 1941-70	July 1978	Normal 1941-70	August 1978	Normal 1941-70	September 1978	Normal 1941-70
Cosme	SWFWMD[1/]	6.39	2.68	4.78	6.66	9.66	9.95	7.66	9.78	4.08	6.54
Cypress Creek	USGS[2/]	7.37		4.42		9.09		8.43		3.58	
East Lake	Pinellas County	0.82		3.32		11.43		10.78		1.69	
Eldridge-Wilde	SWFWMD	5.39		5.46		10.95		9.00		3.80	
Morris Bridge	SWFWMD	1.17		3.82		4.53		5.34		1.65	
Pasco	SWFWMD	11.04		5.46		8.30		7.50		1.85	
Riverview	Hillsborough County	4.52		4.55		5.50		6.90		2.63	
Ruskin near Sun City	NOAA[3/]	4.87	1.41	2.03	6.49	5.85	8.43	7.81	8.00	2.63	6.35
St. Leo near San Antonio	NOAA	7.83	3.79	6.12	8.02	9.52	8.68	4.39	8.55	0.42	7.03
Section 21	SWFWMD	9.02		4.10		5.85		11.55		5.00	
Starkey	SWFWMD	4.10		2.80		9.03		5.34		3.41	
Verna	Sarasota	1.37		7.17		7.22		5.10		5.12	
Monthly average of stations		5.32	2.63	4.50	7.06	8.08	9.02	7.48	8.77	2.99	6.64

1/ Southwest Florida Water Management District.
2/ U.S. Geological Survey.
3/ National Oceanic and Atmospheric Administration.

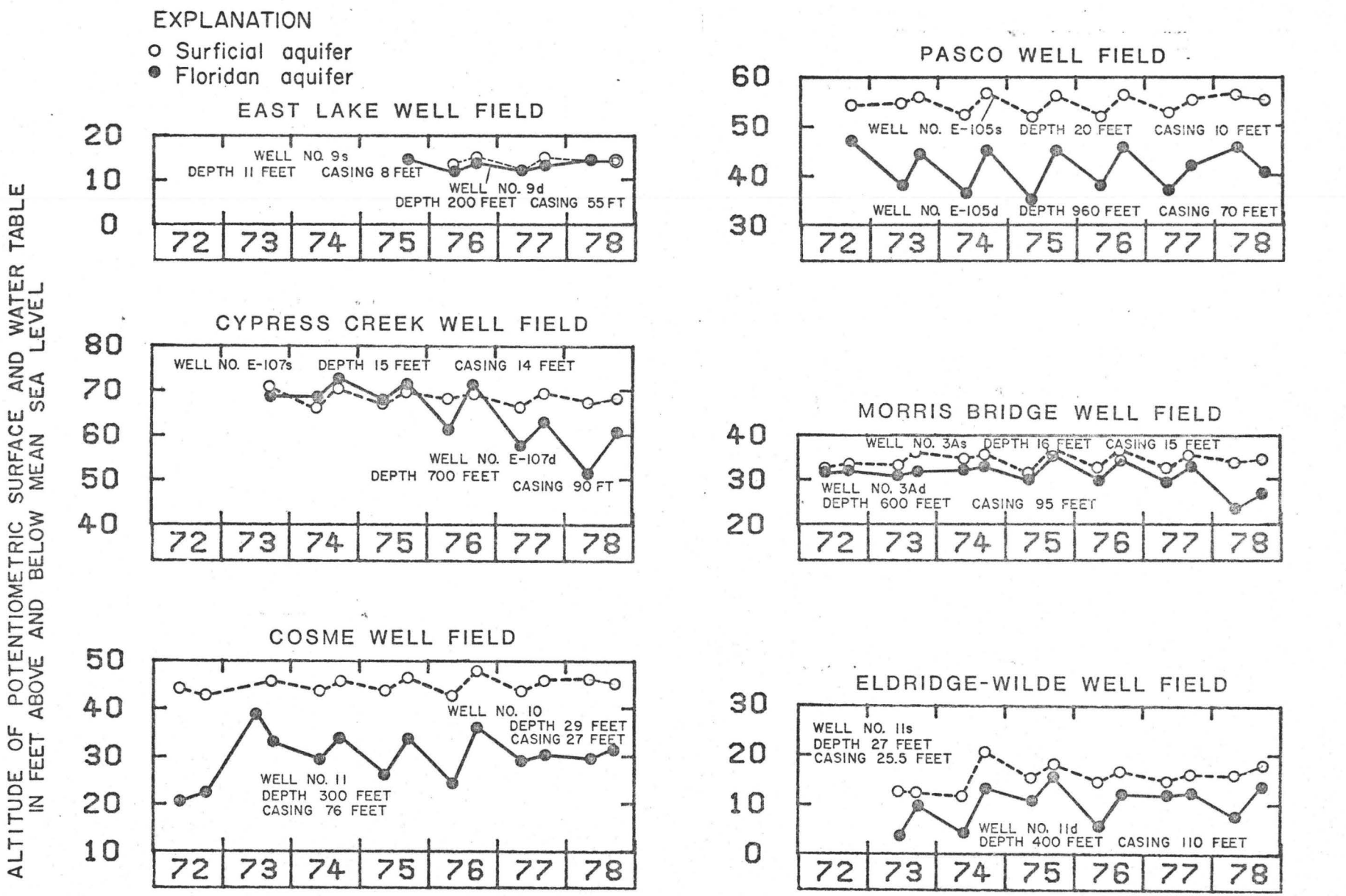

FIGURE 1. HYDROGRAPHS OF SELECTED WELLS TAPPING THE SURFICIAL AND FLORIDAN AQUIFERS

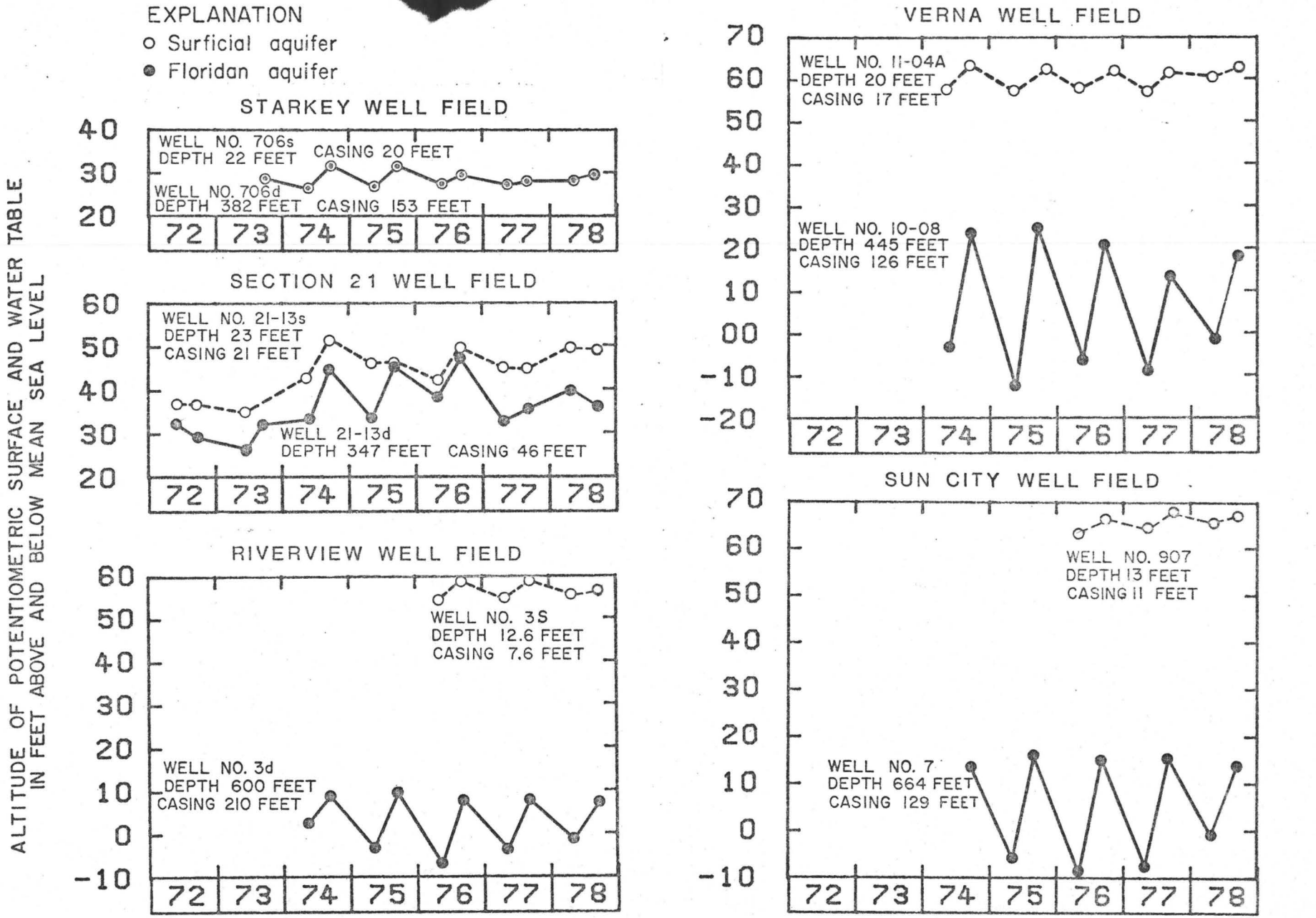

FIGURE 2. HYDROGRAPHS OF SELECTED WELLS TAPPING THE SURFICIAL AND FLORIDAN AQUIFERS