

Figure 1.--Composite potentiometric surface of the intermediate aquifer system.

INTRODUCTION

The intermediate aquifer system within the Southwest Florida Water Management District underlies a 5,000-sq-mile area of De Soto, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, and Polk Counties. It occurs between the overlying surficial aquifer system and the underlying Floridan aquifer system and consists of layers of sand, shell, clay, calcareous clays, limestone, and dolomite of the Tamiama Formation, Hawthorn Formation, and Tampa Limestone of late Tertiary age. The intermediate aquifer system contains one or more water-bearing units separated by discontinuous confining units (Duerr and others, 1988). This aquifer system is the principal source of potable water in the southwestern part of the study area and is widely used as a source of water in other areas where wells are open to the intermediate aquifer system or to both the intermediate and Floridan aquifer systems. Yields of individual wells open to the intermediate aquifer system range from a few gallons to several hundred gallons per minute. The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, 1988).

In areas where multiple aquifers exist in the system, wells open to all aquifers were selected for water-level measurements wherever possible. The generally reflect levels similar to those of the underlying Floridan aquifer system because the confining unit that separates the two aquifers is either absent or discontinuous, permitting direct hydraulic connection. In the present that have intervening confining units in the study area, two aquifers are system (Wolansky, 1983): the Tamiama-upper Hawthorn aquifer and the underlying lower Hawthorn aquifer. Lateral boundaries for the Tamiama-upper Hawthorn aquifer are undetermined because of limited hydrogeologic data available from wells.

The purpose of this report is to show the potentiometric surface of the intermediate aquifer system in September 1990. The potentiometric surface is an imaginary surface represented by the level of water in a network of wells in a tightly cased well open to a confined aquifer. The surface is mapped by represented on maps by contours that connect points of equal altitude. The maps show water-level conditions near the end of the summer rainy season when ground-water withdrawals are usually low and the potentiometric surface is near its highest level for the year. The cumulative rainfall for the study area near (Southwest Florida Water Management District, 1990) water-level data for September 1990 demands upon ground-water resources for irrigation.

This report, prepared by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District, is one of an ongoing series of intermediate aquifer system potentiometric surface map reports made for the study area since September 1985 and is based on synoptic water-level measurements. Water-level data are collected twice annually, in May and September, to show the normally expected annual low and high water-level conditions, respectively. Most of the water-level data for this map were collected by the U.S. Geological Survey during the period of September 10-14. Supplemental data were collected by other agencies and companies.

SUMMARY OF HYDROGEOLOGIC CONDITIONS

The composite potentiometric surface of all water-bearing units within the intermediate aquifer system is shown in figure 1. The potentiometric surface of the Tamiama-upper Hawthorn aquifer is shown in figure 2; water levels are from wells open to this aquifer. The hydrographs for selected wells, shown in figure 3, indicate that the annual and seasonal fluctuations of the water levels generally are large in the central interior region where water demand for irrigation is high during fall and spring (hydrographs 2, 4, 5, and 9). Changes are smaller in the northern recharge area (hydrographs 1 and 3) and in coastal areas (hydrographs 7 and 8) where water use is predominantly for public supply. Hydrographs in figure 4 show the maximum daily water-level altitudes in selected wells from September 1989 through September 1990. Water levels measured in September 1990 in the composite intermediate aquifer averaged about 9 feet higher than those measured in May 1990 (Knochenmus, 1990). In 143 wells for which measurements could be compared, the September 1990 levels ranged from 0.13 foot lower to 29.61 feet higher than the May 1990 levels and averaged 8.89 feet higher than the May levels. In 36 wells in the Tamiama-upper Hawthorn aquifer, the September 1990 water levels ranged from 2.69 feet lower to 20.12 feet higher than the May 1990 levels and averaged 3.65 feet higher than the May levels.

September 1990 water levels in the composite intermediate aquifer generally were lower than those reported for September 1989 (Knochenmus and Barr, 1989). In 143 wells for which measurements could be compared, the September 1990 levels ranged from 6.29 feet lower to 7.12 feet higher than the September 1989 levels and averaged 0.08 foot lower than the September 1989 levels. In 36 wells in the Tamiama-upper Hawthorn aquifer, water-level measurements for September 1990 ranged from 7.40 feet lower to 2.66 feet higher than the September 1989 levels and averaged 1.39 feet lower than the September 1989 levels. One of depression are evident at the Cape Coral well field in northern Lee County and at Warm Mineral Springs, which is a discharge point for the intermediate aquifer system.

REFERENCES

- Duerr, A.D., Hum, J.D., Lovelling, S.R., and Trommer, J.T., 1988, Geology and 1985 water withdrawals of the aquifer systems in southwest Florida, with emphasis on the intermediate aquifer system: U.S. Geological Survey Water-Resources Investigations Report 87-225, 113 p.
- Knochenmus, L.A., 1990, Potentiometric surface of the intermediate aquifer system, west-central Florida, May 1990: U.S. Geological Survey Open-File Report 90-55, 1 sheet.
- Knochenmus, L.A., and Barr, G.L., 1990, Potentiometric surface of the intermediate aquifer system, west-central Florida, September 1989: U.S. Geological Survey Open-File Report 90-13, 1 sheet.
- Southwest Florida Water Management District, 1990, Summary of hydrologic conditions, September 1990: 2 p.
- Wolansky, R.M., 1983, Hydrogeology of the Sarasota-Fort Charlotte area, Florida: U.S. Geological Survey Water-Resources Investigations 82-4089, 28 p.

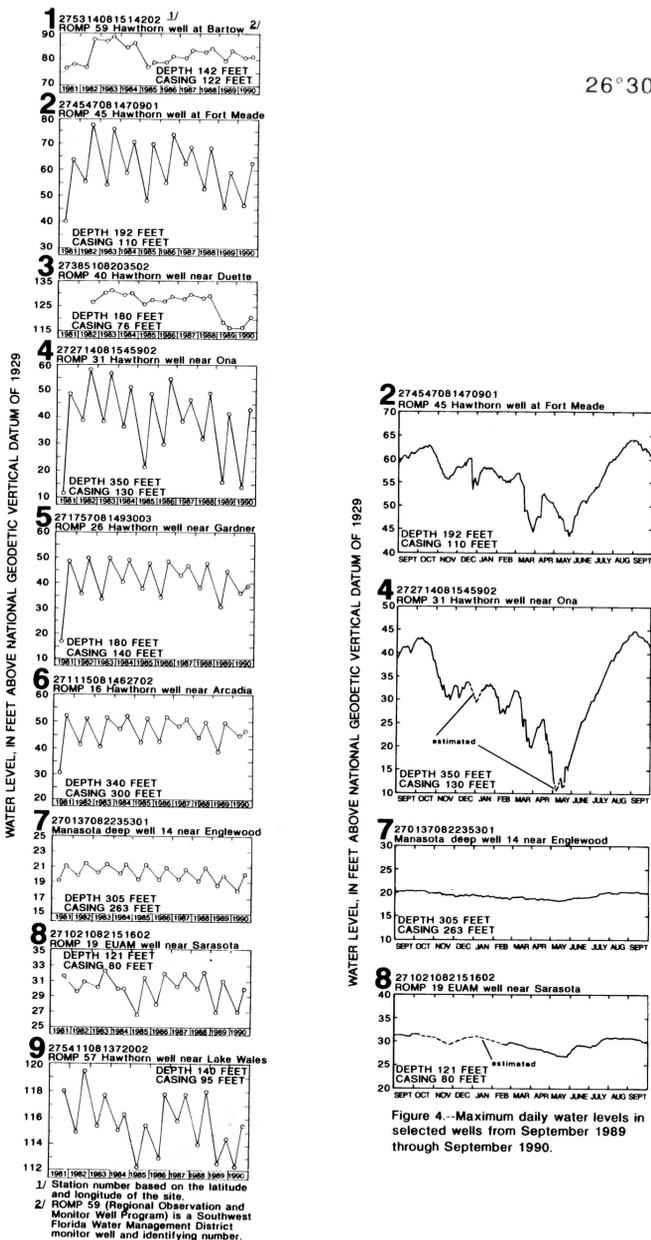


Figure 3.--Water levels in selected wells for May and September 1981-90.

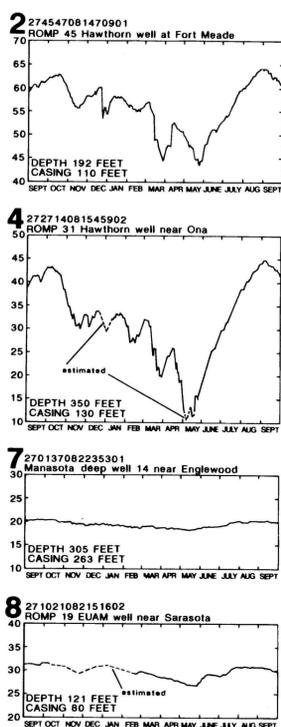


Figure 4.--Maximum daily water levels in selected wells from September 1989 through September 1990.

EXPLANATION (FIGURES 1 AND 2)

- 20 — POTENTIOMETRIC CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Contour interval 5 and 10 feet. National Geodetic Vertical Datum of 1929 (NGVD of 1929). Dashed where approximate.
- — — — — BOUNDARY OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
- - - - - APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER SYSTEM (fig. 1)
- - - - - APPROXIMATE NORTHERN BOUNDARY OF THE TAMIAMA-UPPER HAWTHORN AQUIFER (fig. 2)
- OBSERVATION WELLS—Large number identifies hydrograph (figs. 1 and 2). Small number is altitude of water level in feet above NGVD of 1929.
- SPRING

NOTE: The potentiometric contours are generalized to portray synoptically the head in a dynamic hydrologic system taking due account of the variations in hydrogeologic conditions such as differing depths of wells, nonsimultaneous measurements of water levels, variable effects of pumping, and changing climatic influence. The potentiometric contours thus may not contour exactly with individual measurements of water level.

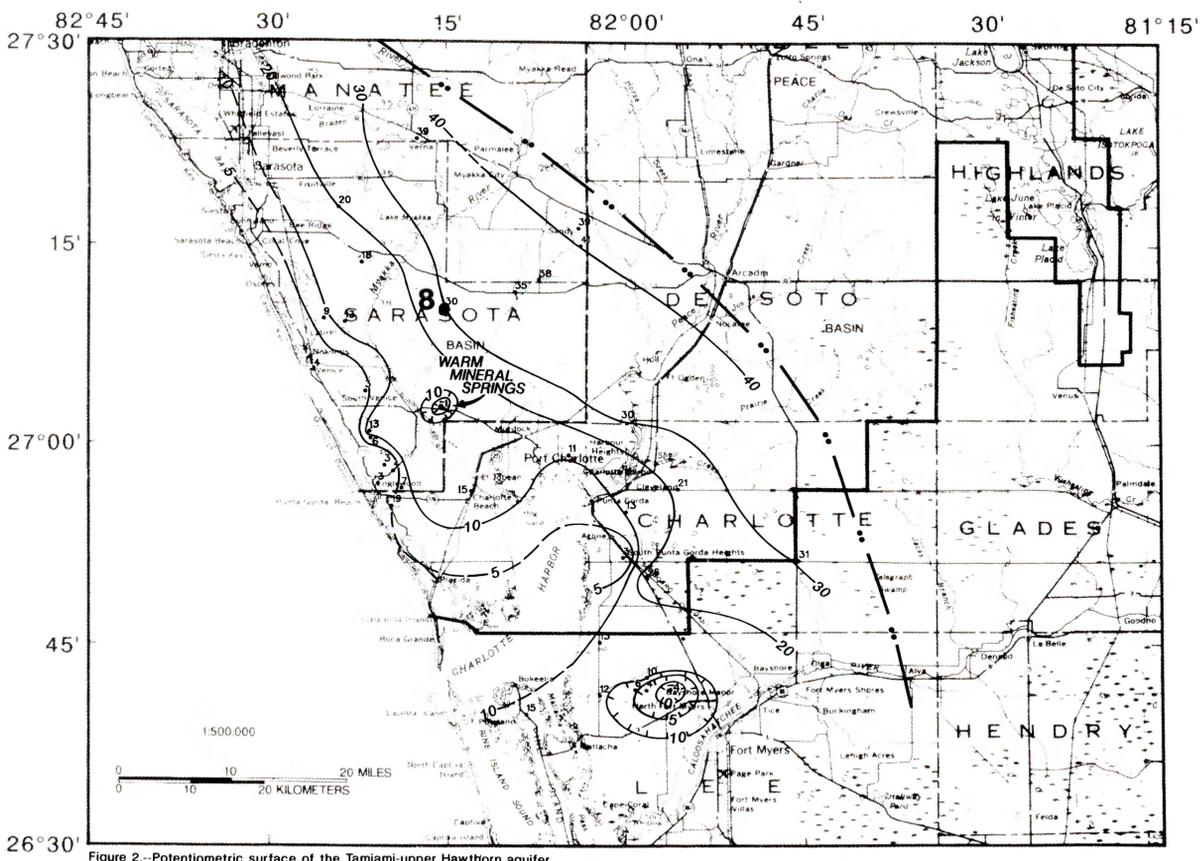


Figure 2.--Potentiometric surface of the Tamiama-upper Hawthorn aquifer.

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER SYSTEM,
WEST-CENTRAL FLORIDA, SEPTEMBER 1990

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