

INTRODUCTION

The intermediate aquifer system underlies a 5,000-square-mile area within the Southwest Florida Management District including De Soto, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, and Polk Counties. It is overlain by the surficial aquifer system and is underlain by the Floridan aquifer system. The intermediate aquifer system consists of layers of sand, shell, clay, calcareous clays, limestone, and dolomite of the Tamiami Formation and Hawthorn Group of Pleistocene to Oligocene age (Wingard and others, 1995). The intermediate aquifer system contains one or more water-bearing units separated by discontinuous confining units. This aquifer system is the principle source of potable water in the southwestern part of the study area and is widely used as a source of water 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 vary 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 The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, 1988).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 water-bearing units exist in the system, wells open to individual units were selected for water-level measurements whenever possible. The water levels along the northern boundary of the intermediate aquifer system generally are similar to water levels in the underlying Floridan aquifer system because the confining unit that separates the two aquifers is either absent or discontinuous in that area, permitting direct hydraulic connection between the two aquifer systems. In the southwestern and lower coastal region of the study area, the intermediate aquifer system is composed of the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer and is separated by intervening confining units (Wolansky, 1983). Lateral boundaries for the Tamiami-upper Hawthorn aquifer are undetermined because of limited hydrogeologic data. The potentiometric surface of the Tamiami-upper Hawthorn aquifer is shown separately from the potentiometric surface of the intermediate aquifer system.

The purpose of this report is to show the potentiometric surfaces of the intermediate aquifer system in May 1996. The potentiometric surface is an imaginary surface represented by the level to which water will rise in tightly cased wells that tap a confined aquifer system. The surface is mapped by measuring the altitude of water levels in a network of wells and is represented on maps by contours that connect points of equal altitude. This map represents water-level conditions near the end of the dry season when ground-water withdrawals for agricultural use typically are high. The cumulative rainfall for the study area was 12.35 inches above average for the period from June 1995 through May 1996 (Southwest Florida Water Management District, 1996).

This report, prepared by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District, is one of a series of intermediate aquifer system potentiometric surface maps reports made for the study area since September 1985. Water-level data are collected in May and September to show the 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 May 20-24, 1996.

SUMMARY OF GROUND WATER 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 Tamiami-upper Hawthorn aquifer is shown in figure 2 and is based on water levels open only to this aquifer. The long-term hydrographs for selected wells, shown in figure 3, indicate that the annual and seasonal fluctuations of the water levels generally are large (greater than 15 feet) in the central interior region where water demand for irrigation is high during fall and spring (hydrographs 1, 2, and 3). Seasonal fluctuations are smaller in the southern area (hydrographs 4 and 5) where water use is predominantly for public supply. Hydrographs in figure 4 show the maximum daily water-level altitudes in selected wells from May 1995 through May 1996.

Most water levels measured in May 1996 for the composite intermediate aquifer potentiometric surface generally were lower than those measured in September 1995 (Metz and others, 1996). In 132 wells with paired measurements, the May 1996 levels ranged from 30 feet below to 5 feet above the September 1995 levels and averaged 7 feet below the September 1995 levels. In 52 wells with paired measurements in the Tamiami-upper Hawthorn aquifer, the May 1996 levels ranged from 1 foot above to 16 feet below the September 1995 levels and averaged 4 feet below the September 1995 levels.

May 1996 water levels for the intermediate aquifer system composite potentiometric surface generally were slightly higher than those reported for May 1995 (Metz and Stelman, 1995). In 132 wells with paired measurements, the May 1996 levels ranged from 5 feet below to 12 feet above the May 1995 levels and averaged approximately 1 foot above the May 1995 levels. In 33 wells with paired measurements in the Tamiami-upper Hawthorn aquifer, the May 1996 levels ranged from 5 feet below to 9 feet above the May 1995 levels and averaged approximately 1 foot above the May 1995 levels. Pumping from the wellfield that supplies Fort Myers has resulted in a cone of depression in the potentiometric surface of the Tamiami-upper Hawthorn aquifer in northern Lee County (figure 2). Natural discharge from Warm Mineral Springs affects both the composite potentiometric surface and that of the Tamiami-upper Hawthorn aquifer.

REFERENCES

- Duerr, A.D., Humm, J.D., Levelling, B.R., and Tommer, 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 87-4259, 115 p.
- Metz, P.A., and Stelman, K.A., 1995. Potentiometric surface of the intermediate aquifer system, west-central Florida, May 1995. U.S. Geological Survey Open-File Report 95-707, 1 sheet.
- Metz, P.A., Swenson, E.S., and Stelman, K.A., 1996. Potentiometric surface of the intermediate aquifer system, west-central Florida, September 1995. U.S. Geological Survey Open-File Report 96-136, 1 sheet.
- Southwest Florida Water Management District, 1996. Summary of hydrologic conditions, May 1996, 56 p.
- Wingard, G.L., Weedman, S.D., Scott, T.M., Edwards, L.E., and Green, R.C., 1995. Preliminary analysis of integrated stratigraphic data from the South Venice corehole, Sarasota County, Florida. U.S. Geological Survey Open-File Report 95-3, 129 p.
- Wolansky, R.M., 1983. Hydrogeology of the Sarasota-Port Charlotte area, Florida. U.S. Geological Survey Water-Resources Investigations Report 82-4089, 48 p.

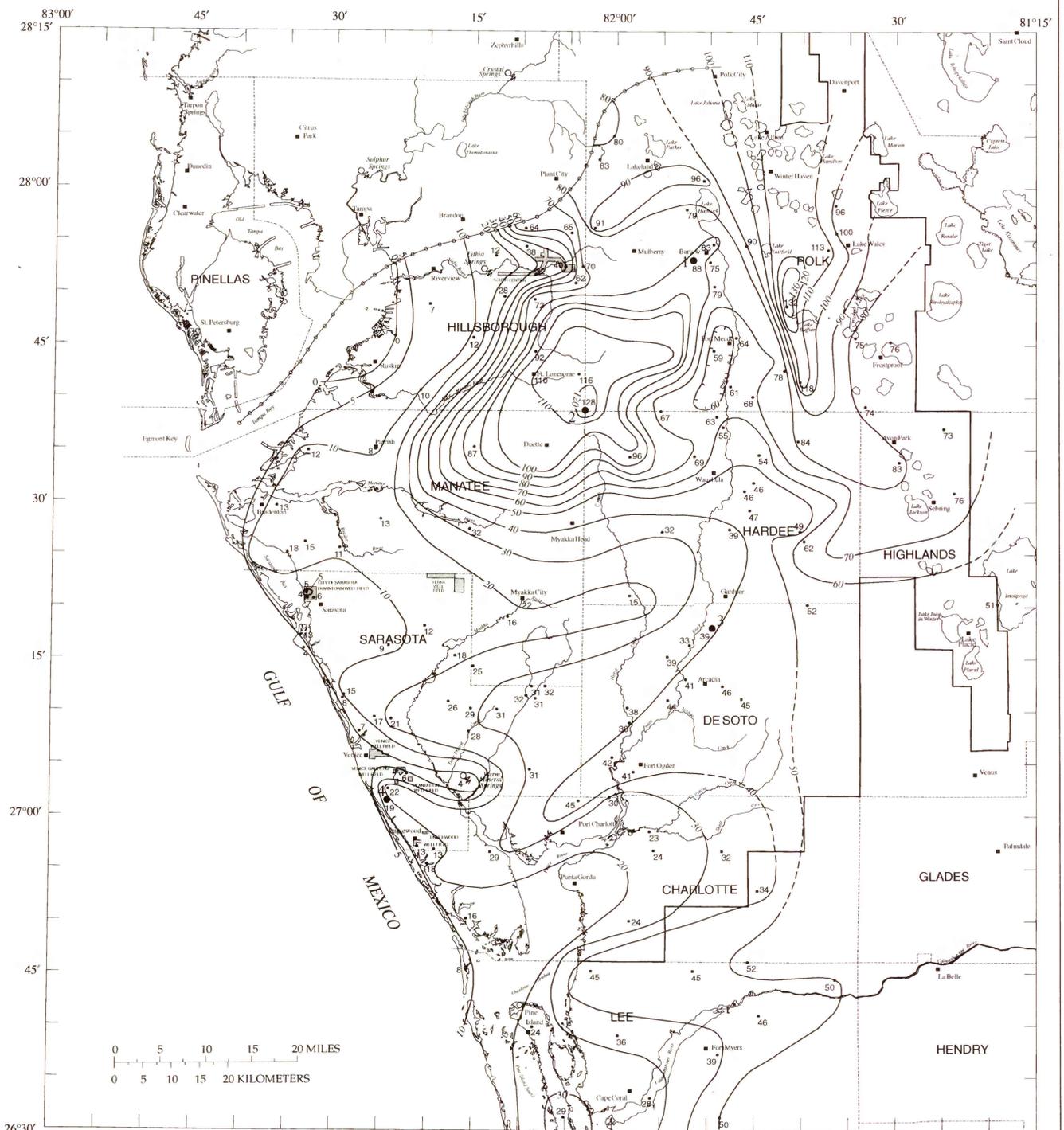


Figure 1. Composite potentiometric surface of the intermediate aquifer system.

- EXPLANATION
- MUNICIPAL WELL FIELD PRODUCING 50,000 GALLONS PER DAY OR MORE
 - POTENTIOMETRIC CONTOUR - Shows altitude at which water would have stood in tightly cased well. Contour interval 5 and 10 feet. Datum is National Geodetic Vertical Datum (NGVD) of 1929. Hachures indicate depressions. Dashed where approximately located.
 - BOUNDARY OF SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
 - APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER
 - APPROXIMATE BOUNDARY OF THE TAMIAMI-UPPER HAWTHORN AQUIFER
 - OBSERVATION WELLS - Large number identifies hydrograph. Small number is altitude of water level in feet above or below 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, non-simultaneous measurements of water levels, variable effects of pumping, and changing climatic influence. The potentiometric contours may not conform exactly with individual measurements of water level.

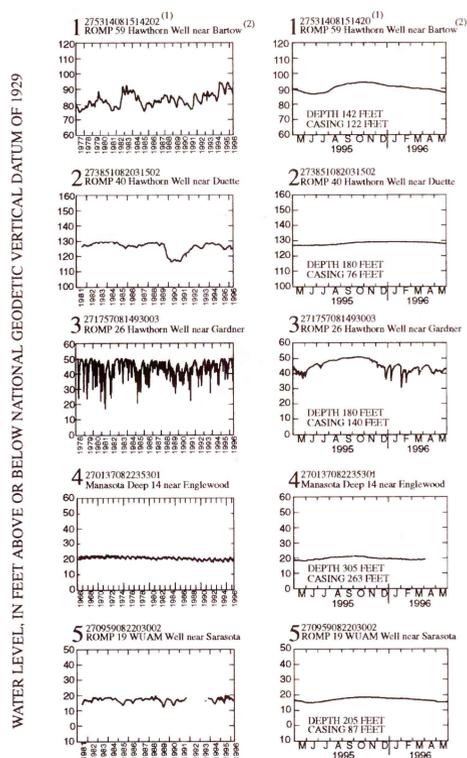


Figure 3. Maximum daily water levels in selected wells open to the intermediate aquifer system.

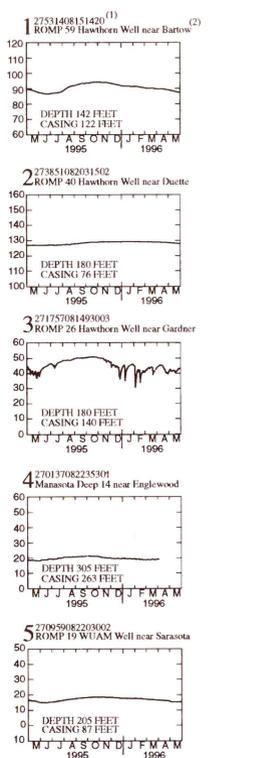


Figure 4. Maximum daily water levels in selected wells from May 1995 to May 1996.

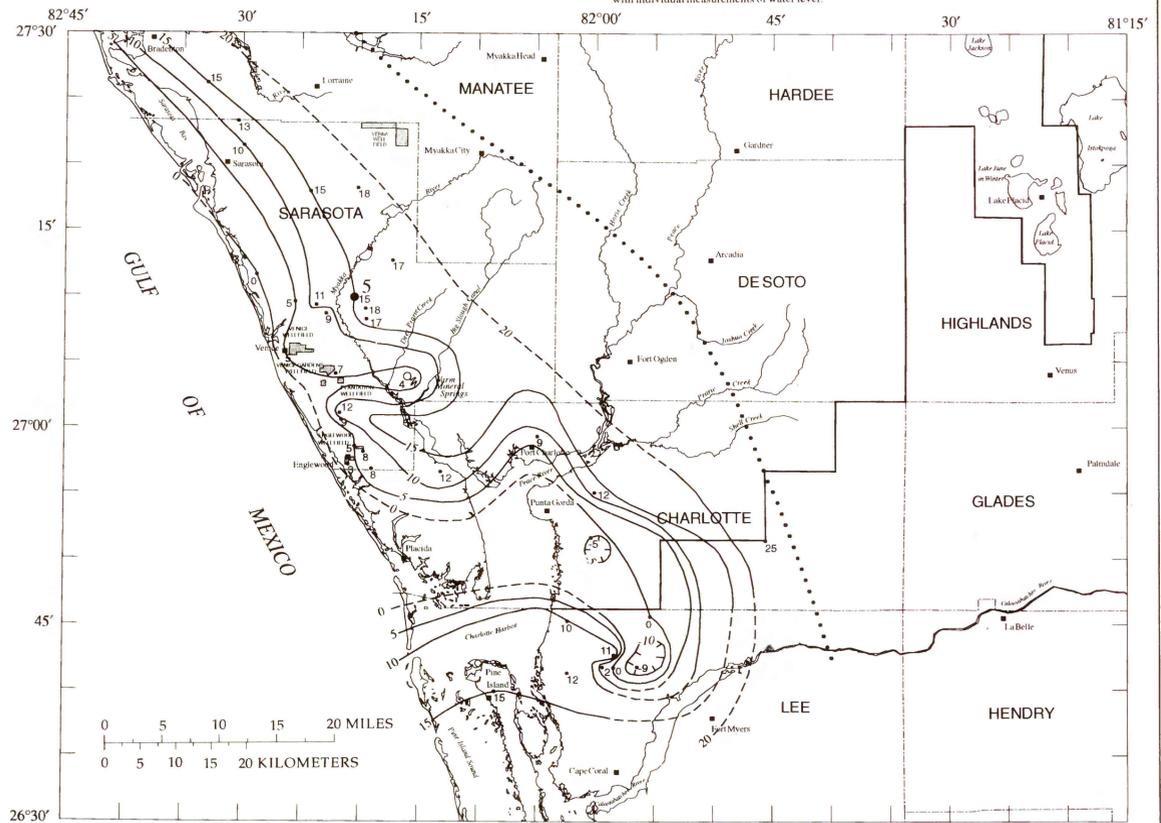


Figure 2. Potentiometric surface of the Tamiami-upper Hawthorn aquifer.