DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

OPEN-FILE REPORT 89-36

INTRODUCTION

The intermediate aquifer system within the Southwest Florida Water Management District underlies a 5,000-mi² 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 (in descending order) the Tamiami 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 The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, 1988).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 equifers exist in the system, wells open to all aquifers were selected for water-level measurements whenever possible. The water levels along the northern boundary of the intermediate aquifer system generally reflect levels similar to those of the underlying Floridan aquifer system beceuse there the low permeability confining material commonly at the base of the intermediate aquifer system is either absent or discontinuous, permitting direct hydraulic connection between the two aquifer systems. In the southwestern and lower coastal region of the study area, two aquifers are present that heve intervening confining units in the intermediate aquifer system (Wolansky, 1983): the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer.

The purpose of this report is to show the potentiometric surface of the intermediate aquifer system in September 1988. The potentiometric surface is an imaginery pressure surface represented by the level to which water will rise in tightly cased wells open to an aquifer. The surface is mapped by determining the altitude of water levels in a network of wells and is 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.

This report is one of an ongoing series of intermediate aquifer system potentiometric-surface map reports made for the study area since September 1985, based on synoptic measurements by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District. 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 19-23. 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 Tamiami-upper Hawthorn aquifer is shown in figure 2; water levels are from wells open exclusively to this aquifer. The hydrographs for selected wells, shown in figure 3, indicate that the annual and seasonal fluctuations of the water levels are generally large where water demand for irrigation is high during the dry season in the central interior region (hydrographs 2, 4, 5, and 6). 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 1987 through September 1988.

Water levels measured in September 1988 averaged more than 8 feet higher than those measured in May 1988. Water levels increased about 11 feet or less along coastal and extreme southern regions and, in other areas, from 1 to 50 feet above the May levels reported by Lewelling (1989). The largest rise occurred in Hardee County as a result of shutting off irrigation pumps combined with unusually high rainfall in early September.

September 1988 water levels for the entire study area averaged about 2 feet higher than the September 1987 levels reported by Lewelling (1988). Water levels in the Tamiami-upper Hawthorn aquifer walls were 3 to 30 feet lower than levels in wells open to the entire system. At well site 7 (figs. 1-4), separate monitor wells are open to either the Tamiami-upper Hawthorn aquifer or the lower Hawthorn-upper Tampa aquifer. There, water levels in the Tamiami-upper Hawthorn aquifer were 9 feet lower in May 1988 and 14 feet lower in September 1988 than levels in the lower Hawthorn-upper Tampa aquifer.

REFERENCES

Duerr, A.D., Hunn, J.D., Lewelling, B.R., and Trommer, J.T., 1988, Geohydrology and 1985 water withdrawals of the aquifer system in southwest Florida, with emphasis on tha intermediate aquifer system: U.S. Geological Survey Water-Resources Investigations Report 87-4259, 115 p.

Lewelling, B.R., 1988, Potentiometric surface of the intermediate aquifer system, west-central Florida, 1987: U.S. Geological Survey Open-File Report 88-303, 1 sheet, 1:500,000.

----- 1989, Potentiometric surface of the intermediate aquifer system, west-central Florida, May 1988: U.S. Geological Survey Open-File Report 88-721, 1 sheet, 1:500,000.

Wolansky, R.M., 1983, Hydrogeology of the Sarasota-Fort Cherlotte area, Florida: U.S. Geological Survey Water-Resources Investigations 82-4089, 48 p.

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

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

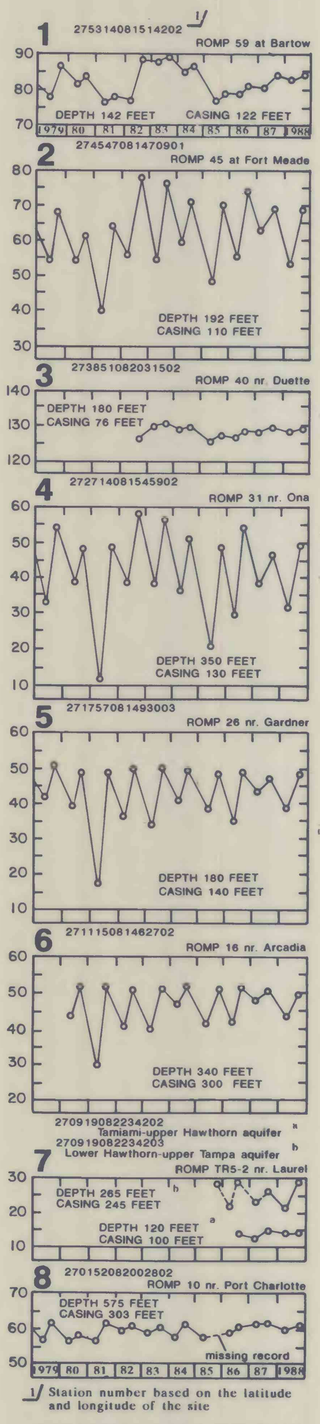
APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER SYSTEM (fig. 1)

APPROXIMATE NORTHERN BOUNDARY OF THE TAMIAMI-UPPER HAWTHORN AQUIFER (fig. 2)

●8 ·6 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 conform exactly with individual measurements of water level.



1/ Station number based on the latitude and longitude of the site

Figure 3-- Water levels in selected wells for May and September 1979-88.

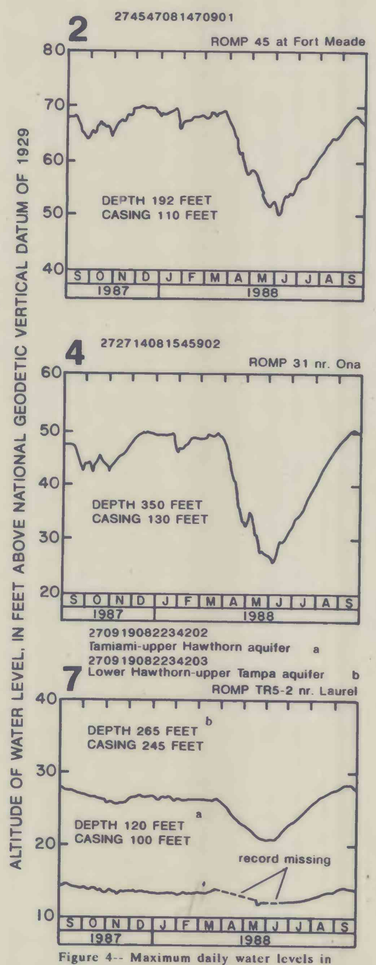


Figure 4-- Maximum daily water levels in selected wells from September 1987 to September 1988.

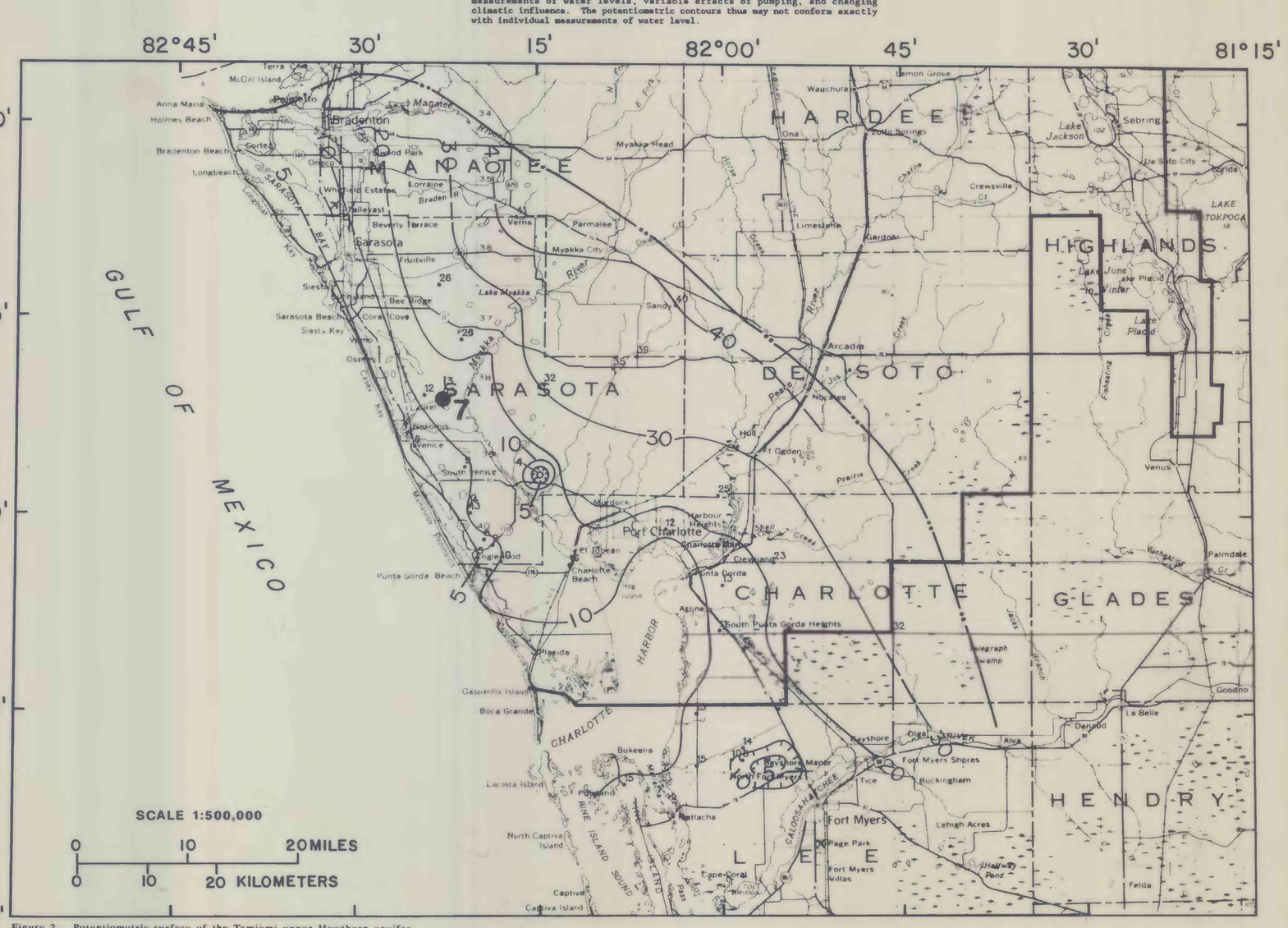


Figure 2.-- Potentiometric surface of the Tamiami-upper Hawthorn aquifer.

Base from U.S. Geological Survey
State of Florida map 1967 1:500 000

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER SYSTEM, WEST-CENTRAL FLORIDA, SEPTEMBER 1988

By

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1989

Copies of this map can be purchased from:
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