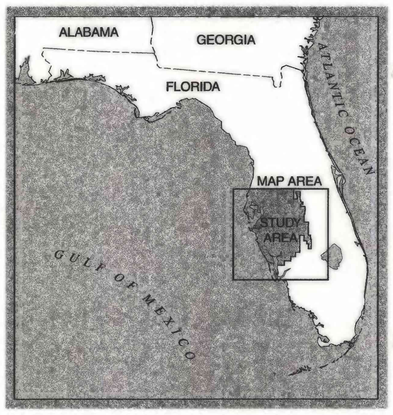
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

OPEN-FILE REPORT 01-309



INTRODUCTION

The intermediate aquifer system underlies a 5,000-square-mile area within the Southwest Florida Water Management District including De Soto, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, Polk, and Lee Counties. The intermediate aquifer system 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 clay, limestone, and dolomite of the Tamiami Formation and Hawthorn Group of Oligocene to Pleistocene age (Wingard and others, 1995). The intermediate aquifer system contains one or more water-bearing units separated by discontinuous confining units. The intermediate 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 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 The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, 1988).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, the U.S. Geological Survey selected wells open to individual units for water-level measurements wherever possible. The water levels along the northern boundary of the intermediate aquifer system generally are similar to water levels in the underlying Upper Floridan aquifer. This similarity is 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 part of the study area, the intermediate aquifer system is composed two units: the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer (Wolansky, 1983). Lateral boundaries for the Tamiami-upper Hawthorn aquifer are undetermined because of limited hydrogeologic data.

This report shows the potentiometric surfaces of the intermediate aquifer system in May 2001 (figs. 1 and 2). The potentiometric surface represents 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 levels usually are at an annual low and withdrawals for agricultural use usually are high. From June 2000 through May 2001, the cumulative average rainfall for the central (42.27 inches) and southern (39.43 inches) regions within the Southwest Florida Water Management District was below the historical means of 53.15 and 52.27 inches, respectively (Southwest Florida Water Management District, May 2001).

This report, prepared by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District, is one of a series of semi-annual intermediate aquifer system potentiometric-surface map reports prepared for west-central Florida since September 1985. Water-level data are collected in May and September each year to show the near annual low and high water-level conditions, respectively. Most of the water-level data for the two maps were collected by the U.S. Geological Survey during the period May 14-18, 2001. Supplemental water-level data were collected by other agencies and companies. Because most water-level measurements were made during a 5-day period in mid-May, measurements may not represent a "snapshot" of conditions at a specific time, nor do they necessarily coincide with the seasonal low water-level condition.

WATER-LEVEL CHANGES FROM MAY 2000 TO MAY 2001

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 from wells open only to this aquifer.

Water levels in about 63 percent of wells measured in May 2001 for the composite potentiometric surface of the intermediate aquifer system were higher than the May 2000 water levels (Duerr, 2001a). In 111 wells with paired measurements, the May 2001 levels ranged from about 4 feet below to about 9 feet above the May 2000 levels. The largest decrease in water levels was in west-central Polk County and the largest increase in water levels was in north-central Hardee County. In 24 wells with paired measurements in the Tamiami-upper Hawthorn aquifer, the May 2001 levels ranged from about 10 feet below to about 3 feet above the May 2000 levels. Water levels were higher in about 75 percent of the wells in May 2001. The largest decrease in water levels was in north-central Charlotte County and the largest increase in water levels was in central Lee County.

WATER-LEVEL CHANGES FROM SEPTEMBER 2000 TO MAY 2001

Water levels in about 97 percent of wells measured in May 2001 for the composite potentiometric surface of the intermediate aquifer system were lower than the September 2000 water levels (Duerr, 2001b). In 112 wells with paired measurements, the May 2001 levels ranged from about 33 feet below to about 4 feet above the September 2000 levels. The largest decrease in water levels was in southwestern Hardee County and the largest increase in water levels was in southeastern Hillsborough County. In 20 wells with paired measurements in the Tamiami-upper Hawthorn aquifer, the May 2001 levels ranged from about 17 feet below to about 1 foot below the September 2000 levels. Water levels were lower in all measured wells in May 2001. The largest decrease in water levels was in coastal Sarasota County and the smallest decrease was in eastern Sarasota County. Pumping from the well field 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.

ACKNOWLEDGMENTS

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SELECTED REFERENCES

Duerr, A.D., Hunn, J.D., Lewelling, B.R., and Trommer, J.T., 1988, Geohydrology 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.

Duerr, A.D., 2001a, Potentiometric surfaces of the intermediate aquifer system, west-central Florida, May 2000: U.S. Geological Survey Open-File Report 01-19, 1 sheet.

_____, 2001b, Potentiometric surfaces of the intermediate aquifer system, west-central Florida, September 2000: U.S. Geological Survey Open-File Report 01-114, 1 sheet.

Duerr, A.D., and Torres, A.E., 2000a, Potentiometric surfaces of the intermediate aquifer system, west-central Florida, May 1999: U.S. Geological Survey Open-File Report 00-71, 1 sheet.

_____, 2000b, Potentiometric surfaces of the intermediate aquifer system, west-central Florida, September 1999: U.S. Geological Survey Open-File Report 00-225, 1 sheet.

Southwest Florida Water Management District, 2001, Hydrologic conditions for the month of May 2001, 73 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.

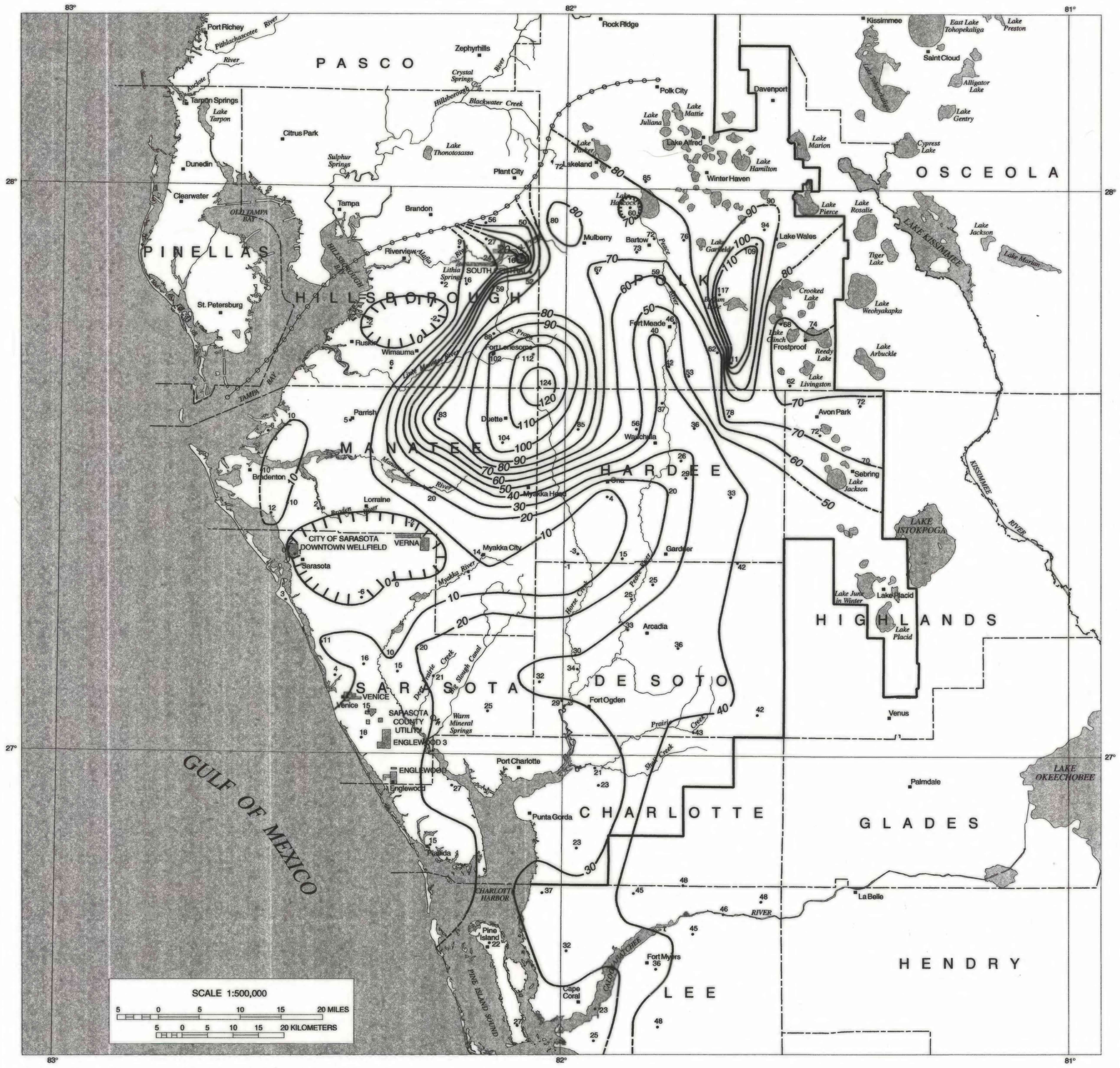

Figure 1. Composite potentiometric surface of the intermediate aquifer system.

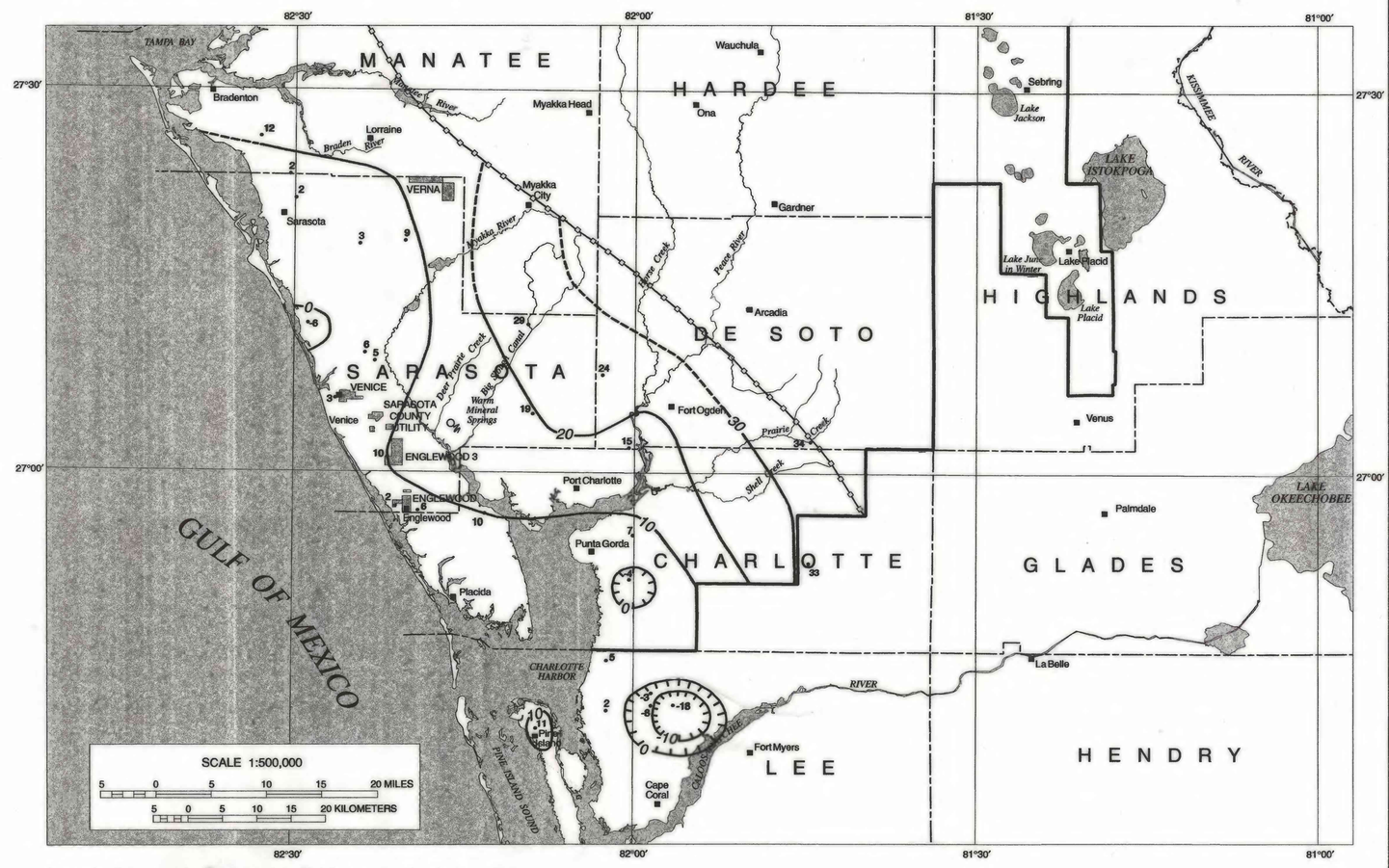

Figure 2. Potentiometric surface of the Tamiami-upper Hawthorn aquifer.

EXPLANATION

- VERNA — MUNICIPAL WELL FIELD
- —20— — POTENTIOMETRIC CONTOUR - - Shows altitude at which water would have stood in tightly cased wells. Contour interval is 10 feet. National Geodetic Vertical Datum of 1929. Hachures indicate depressions. Dashed where approximately located.
- BOUNDARY OF SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
- APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER SYSTEM
- APPROXIMATE EASTERN BOUNDARY OF THE TAMIAMI-UPPER HAWTHORN AQUIFER
- •12 — OBSERVATION WELL - - Number is altitude of water level in feet above or below National Geodetic Vertical Datum of 1929.
- SPRING
- CITY OR TOWN

NOTE: The potentiometric contours are generalized to synoptically portray 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 may not conform exactly with the individual measurements of water level.

Base from Southwest Florida Water Management District digital data, 1992
Universal Transverse Mercator projection, Zone 17

POTENTIOMETRIC SURFACES OF THE INTERMEDIATE AQUIFER SYSTEM, WEST-CENTRAL FLORIDA, MAY 2001

By A.D. Duerr

Copies of this map can be purchased from:
U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, Colorado 80225-0286