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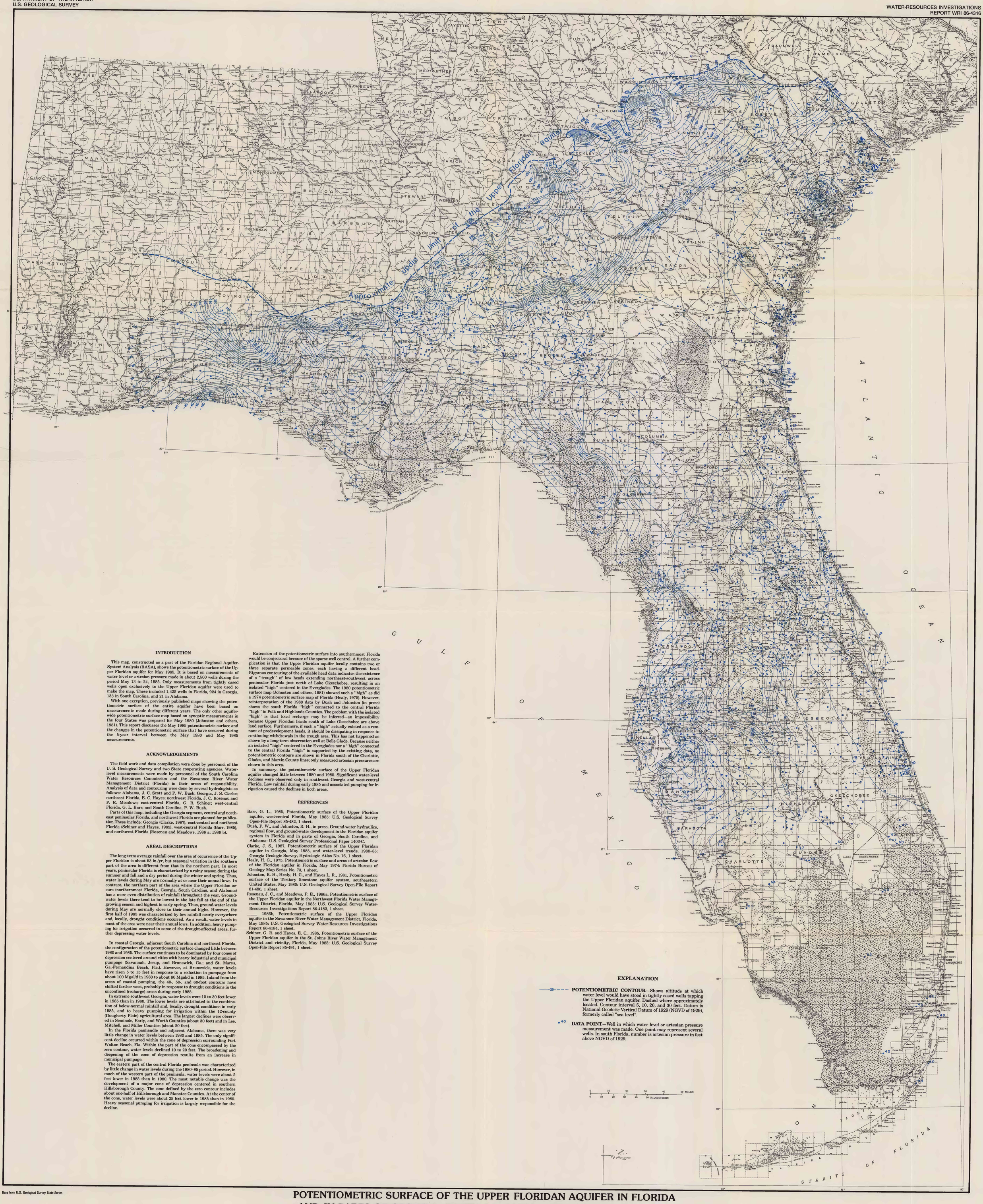

INTRODUCTION

This map, constructed as a part of the Floridan Regional Aquifer-System Analysis (RASA), shows the potentiometric surface of the Upper Floridan aquifer for May 1985. It is based on measurements of water level or artesian pressure made in about 2,500 wells during the period May 13 to 24, 1985. Only measurements from tightly cased wells open exclusively to the Upper Floridan aquifer were used to make the map. These included 1,425 wells in Florida, 924 in Georgia, 133 in South Carolina, and 21 in Alabama.

With one exception, previously published maps showing the potentiometric surface of the entire aquifer have been based on measurements made during different years. The only other aquifer-wide potentiometric surface map based on synoptic measurements in the four States was prepared for May 1980 (Johnston and others, 1981). This report discusses the May 1985 potentiometric surface and the changes in the potentiometric surface that have occurred during the 5-year interval between the May 1980 and May 1985 measurements.

ACKNOWLEDGEMENTS

The field work and data compilation were done by personnel of the U. S. Geological Survey and two State cooperating agencies. Water-level measurements were made by personnel of the South Carolina Water Resources Commission and the Suwannee River Water Management District (Florida) in their areas of responsibility. Analysis of data and contouring were done by several hydrologists as follows: Alabama, J. C. Scott and P. W. Bush; Georgia, J. S. Clarke; northeast Florida, E. C. Hayes; northwest Florida, J. C. Rosenau and P. E. Meadows; east-central Florida, G. R. Schiner; west-central Florida, G. L. Barr; and South Carolina, P. W. Bush.

Parts of this map, including the Georgia segment, central and northeast peninsular Florida, and northwest Florida are planned for publication.These include: Georgia (Clarke, 1987), east-central and northeast Florida (Schiner and Hayes, 1985), west-central Florida (Barr, 1985), and northwest Florida (Rosenau and Meadows, 1986 a; 1986 b).

AREAL DESCRIPTIONS

The long-term average rainfall over the area of occurrence of the Upper Floridan is about 53 in./yr, but seasonal variation in the southern part of the area is different from that in the northern part. In most years, peninsular Florida is characterized by a rainy season during the summer and fall and a dry period during the winter and spring. Thus, water levels during May are normally at or near their annual lows. In contrast, the northern part of the area where the Upper Floridan occurs (northernmost Florida, Georgia, South Carolina, and Alabama) has a more even distribution of rainfall throughout the year. Ground-water levels there tend to be lowest in the late fall at the end of the growing season and highest in early spring. Thus, ground-water levels during May are normally close to their annual highs. However, the first half of 1985 was characterized by low rainfall nearly everywhere and, locally, drought conditions occurred. As a result, water levels in most of the area were near their annual lows. In addition, heavy pumping for irrigation occurred in some of the drought-affected areas, further depressing water levels.

In coastal Georgia, adjacent South Carolina and northeast Florida, the configuration of the potentiometric surface changed little between 1980 and 1985. The surface continues to be dominated by four cones of depression centered around cities with heavy industrial and municipal pumpage (Savannah, Jesup, and Brunswick, Ga.; and St. Marys, Ga.-Fernandina Beach, Fla.). However, at Brunswick, water levels have risen 5 to 15 feet in response to a reduction in pumpage from about 100 Mgal/d in 1980 to about 80 Mgal/d in 1985. Inland from the areas of coastal pumping, the 40-, 50-, and 60-foot contours have shifted farther west, probably in response to drought conditions in the unconfined (recharge) areas during early 1985.

In extreme southwest Georgia, water levels were 10 to 30 feet lower in 1985 than in 1980. The lower levels are attributed to the combination of below-normal rainfall and, locally, drought conditions in early 1985, and to heavy pumping for irrigation within the 12-county (Dougherty Plain) agricultural area. The largest declines were observed in Seminole, Early, and Worth Counties (about 30 feet) and in Lee, Mitchell, and Miller Counties (about 20 feet).

In the Florida panhandle and adjacent Alabama, there was very little change in water levels between 1980 and 1985. The only significant decline occurred within the cone of depression surrounding Fort Walton Beach, Fla. Within the part of the cone encompassed by the zero contour, water levels declined 10 to 20 feet. The broadening and deepening of the cone of depression results from an increase in municipal pumpage.

The eastern part of the central Florida peninsula was characterized by little change in water levels during the 1980–85 period. However, in much of the western part of the peninsula, water levels were about 5 feet lower in 1985 than in 1980. The most notable change was the development of a major cone of depression centered in southern Hillsborough County. The cone defined by the zero contour includes about one-half of Hillsborough and Manatee Counties. At the center of the cone, water levels were about 25 feet lower in 1985 than in 1980. Heavy seasonal pumping for irrigation is largely responsible for the decline.

Extension of the potentiometric surface into southernmost Florida would be conjectural because of the sparse well control. A further complication is that the Upper Floridan aquifer locally contains two or three separate permeable zones, each having a different head. Rigorous contouring of the available head data indicates the existence of a "trough" of low heads extending northeast-southwest across peninsular Florida just north of Lake Okeechobee, resulting in an isolated "high" centered in the Everglades. The 1980 potentiometric surface map (Johnston and others, 1981) showed such a "high" as did a 1974 potentiometric surface map of Florida (Healy, 1975). However, reinterpretation of the 1980 data by Bush and Johnston (in press) shows the south Florida "high" connected to the central Florida "high" in Polk and Highlands Counties. The problem with the isolated "high" is that local recharge may be inferred—an impossibility because Upper Floridan heads south of Lake Okeechobee are above land surface. Furthermore, if such a "high" actually existed as a remnant of predevelopment heads, it should be dissipating in response to continuing withdrawals in the trough area. This has not happened as shown by a long-term observation well at Belle Glade. Because neither an isolated "high" centered in the Everglades nor a "high" connected to the central Florida "high" is supported by the existing data, no potentiometric contours are shown in Florida south of the Charlotte, Glades, and Martin County lines; only measured artesian pressures are shown in this area.

In summary, the potentiometric surface of the Upper Floridan aquifer changed little between 1980 and 1985. Significant water-level declines were observed only in southwest Georgia and west-central Florida. Low rainfall during early 1985 and associated pumping for irrigation caused the declines in both areas.

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POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN FLORIDA AND IN PARTS OF GEORGIA, SOUTH CAROLINA, AND ALABAMA, MAY 1985

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