FLORIDA DEPARTMENT OF NATURAL RESOURCES
published by BUREAU OF GEOLOGY

TOP OF THE FLORIDAN AQUIFER OF NORTH CENTRAL FLORIDA

By

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in cooperation with the
SUWANNEE RIVER
WATER MANAGEMENT DISTRICT

1979

INTRODUCTION

The contours on this map depict the top of the limestones and dolomites that represent the upper limit of the Floridan Aquifer in north central Florida. In the construction of this map use was made of all published and unpublished data in the files of the Florida Bureau of Geology and the Suwannee River Water Management District. Most of the information was obtained from well cuttings, cores, and geophysical logs. The contour interval on the top of the Floridan Aquifer is 25 feet and all elevations are in reference to mean sea level. This map, when used in conjunction with a detailed topographic map and a recent potentiometric map, can approximate the depth, casing length, and water level of any well in this area.

THE AQUIFER

An aquifer is defined as a zone below the surface that will yield water to wells in sufficient quantity to be economically important. The Floridan Aquifer is the principal water-bearing unit in the map area. It exhibits characteristics of both an unconfined aquifer, which is in direct contact vertically with the atmosphere through open pore spaces, and a confined aquifer, which is separated from the atmosphere by relatively impermeable strata. Where the Floridan Aquifer is under confined conditions it is sometimes overlain by secondary artesian aquifers. These aquifers are much less significant than the Floridan Aquifer and are separated from it by low permeability sands and clays. The Floridan Aquifer receives recharge primarily from local rainfall. In addition lakes, streams, and overlying secondary aquifers recharge the Floridan where confining sediments have been breached or are thin, allowing downward percolation of water. Ground water is discharged from the aquifer by springs, pumpage from municipal and private wells, seepage into rivers and the ocean, and upward movement into overlying secondary aquifers.

GEOLOGIC DISCUSSION

The oldest geologic formation occurring at the top of the Floridan Aquifer is the Avon Park Limestone. Applin and Applin (1944) proposed the term Avon Park Limestone for the sediments of Late Middle Eocene Age in Florida. Vernon (1951) identified and described the Avon Park Limestone from exposures and well borings in Levy and Citrus counties. Within the map area the Avon Park Limestone occurs as a dolomitized limestone. In surface exposures it can generally be described as tan to brown, very dense, poorly fossiliferous, and massive. The Avon Park Limestone is normally the first rock unit encountered in southwestern Levy County.

The term Ocala Limestone was first proposed by Dall (1892) for calcareous sediments in the vicinity of Ocala, Florida. Cooke (1915) established the Ocala Limestone as Eocene in age from faunal evidence contained within the unit. Vernon (1951) recognized three lithologic units within the Ocala Limestone and established two subdivisions, a lower Moodys Branch Formation and an upper Ocala Limestone (restricted). Puri (1953) proposed the term Ocala Group and assigned the Inglis, Williston, and Crystal River Formations to it. Lithologically, the Crystal River Formation can be described as a very fine grained, chalky, porous, cream colored limestone containing many large foraminifera and mollusks. The Williston and Inglis formations make up what was Vernon's lower Ocala Moodys Branch Formation. The Williston Formation is recognized by having a more granular texture, higher porosity, and different faunal assemblage than the Inglis and Crystal River formations. The Inglis Formation is more often dolomitized and possesses a prolific echinoid fauna. The Ocala Group is by far the thickest and most prevalent of the stratigraphic units associated with the top of the Floridan Aquifer. The Ocala Group crops out at lower elevations throughout the central and southern portions of the map.

The Suwannee Limestone, of Oligocene age, overlies the Ocala Group from Columbia County westward to the Gulf of Mexico. This formation thins and disappears to the east and to the south of Columbia County. The term Suwannee Limestone was established by Cooke and Mansfield (1936) for limestone exposures containing the echinoid Rhycholampas (Cassidulus) gouldi along the Suwannee River from White Springs to Ellaville. The Suwannee Limestone is usually the first predominantly limestone formation encountered in the northern part of the area. Lithologically the Suwannee Limestone of the study area is usually a hard, cream to yellow, massive, chalky limestone with numerous echinoid fossils. However, along the Gulf Coast it is a highly recrystallized granular limestone, and in many cases dolomitized.

Lower Miocene limestones have been described by numerous geologists from well samples and outcrops in Jefferson, Madison, and Hamilton counties. These limestones are referred to as the St. Marks Formation. The name St. Marks Limestone was first used by Finch (1823) as the unit from which he was describing mollusca from Wakulla County, Florida. The term St. Marks Formation was proposed by Puri (1954) to include the calcareous downdip facies of the Tampa Stage. Yon (1966) described this formation in Jefferson County as "a white to very pale orange, finely crystalline, sandy, silty. clayey, limestone" (calcilutite). The St. Marks Formation is areally inconsistent and thins appreciably from Jefferson County eastward toward Hamilton County, and finally disappears there. This may be due in large part to the depositional environments associated with the structure of this area during the formation of this unit. Early Miocene (pre-Alum Bluff) erosion is also thought to be responsible for the sporadic occurrence of the St. Marks Formation in this area.

Younger stratigraphic units that extensively cover the top of the Floridan Aquifer range in age from Lower Miocene to Recent. Throughout the coastal areas and the central portions of the map, most of these sediments are relict marine terrace deposits. However, in the northern and eastern segments of the map area the Floridan Aquifer in most cases is directly overlain by the Hawthorn Formation. The Hawthorn Formation thickens appreciably east and southeast of the Suwannee River.

There are several features which are readily apparent when viewing this map. The most pronounced is the linear depression in the top of rock which is adjacent to and beneath the Brooksville Ridge on the southeastern portion of the map. This feature may be due in large part to late Oligocene and early Miocene regional tectonics (Vernon, 1951) with subsequent deposition and erosion accentuating the structure in this area. Directly north of this feature, in the vicinity of the Ichetucknee River, the contours outline what may have been a Miocene/Oligocene drainage basin and possibly an inlet which allowed the Lower Miocene seas to form a lagoon (Knapp, 1977) where the northern Brooksville Ridge is now located. The highest limestone elevations on the map occur in Alachua County and are associated with the Ocala Group. The Suwannee River, whose bed is entrenched in Tertiary limestones from White Springs to the Gulf of Mexico, appears to owe its position to regional fracture patterns and Plio-Pleistocene marine terracing.

The limestone surface in the coastal areas is gently sloping from the 50-foot contour to mean sea level. This even surface is due to Pleistocene to Recent marine terracing. Inland from the 50-foot contour the effects of prolonged exposure to subaerial weathering and solutioning become more pronounced. The irregular contouring of areas such as east-central Alachua County, western Columbia County, eastern Suwannee County, central Madison County, and central Jefferson County show the karst surface to be more well developed above the 50-foot aquifer contour.

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GEOLOGIC COLUMN

ERA	PERIOD	M.Y.(BP)	SERIES	STAGE	FORMATION
CENOZOIC	Quat.	1.1 / 1.8 / 5	Pleistocene / Pliocene		Undifferentiated Marine and Esturine Deposits
CENOZOIC	TERTIARY		Miocene	Choctawhatchee	Miccosukee
CENOZOIC	TERTIARY		Miocene	Choctawhatchee	Alachua
CENOZOIC	TERTIARY		Miocene	Alum Bluff	Hawthorn
CENOZOIC	TERTIARY		Miocene	Tampa	St.Marks
CENOZOIC	TERTIARY	23	Oligocene	Vicksburg	Suwannee Limestone
CENOZOIC	TERTIARY	38	Eocene	Jackson	Ocala Group: Crystal River
CENOZOIC	TERTIARY		Eocene	Jackson	Ocala Group: Williston
CENOZOIC	TERTIARY		Eocene	Jackson	Ocala Group: Inglis
CENOZOIC	TERTIARY		Eocene	Claiborne	Avon Park Limestone
CENOZOIC	TERTIARY		Eocene	Claiborne	Lake City Limestone
CENOZOIC	TERTIARY		Eocene	Wilcox	Oldsmar Limestone
CENOZOIC	TERTIARY	55 / 65	Paleocene	Midway	Cedar Keys Limestone

The geologic time scale represents millions of years before present and is only an approximation of the periods when these formations were deposited.

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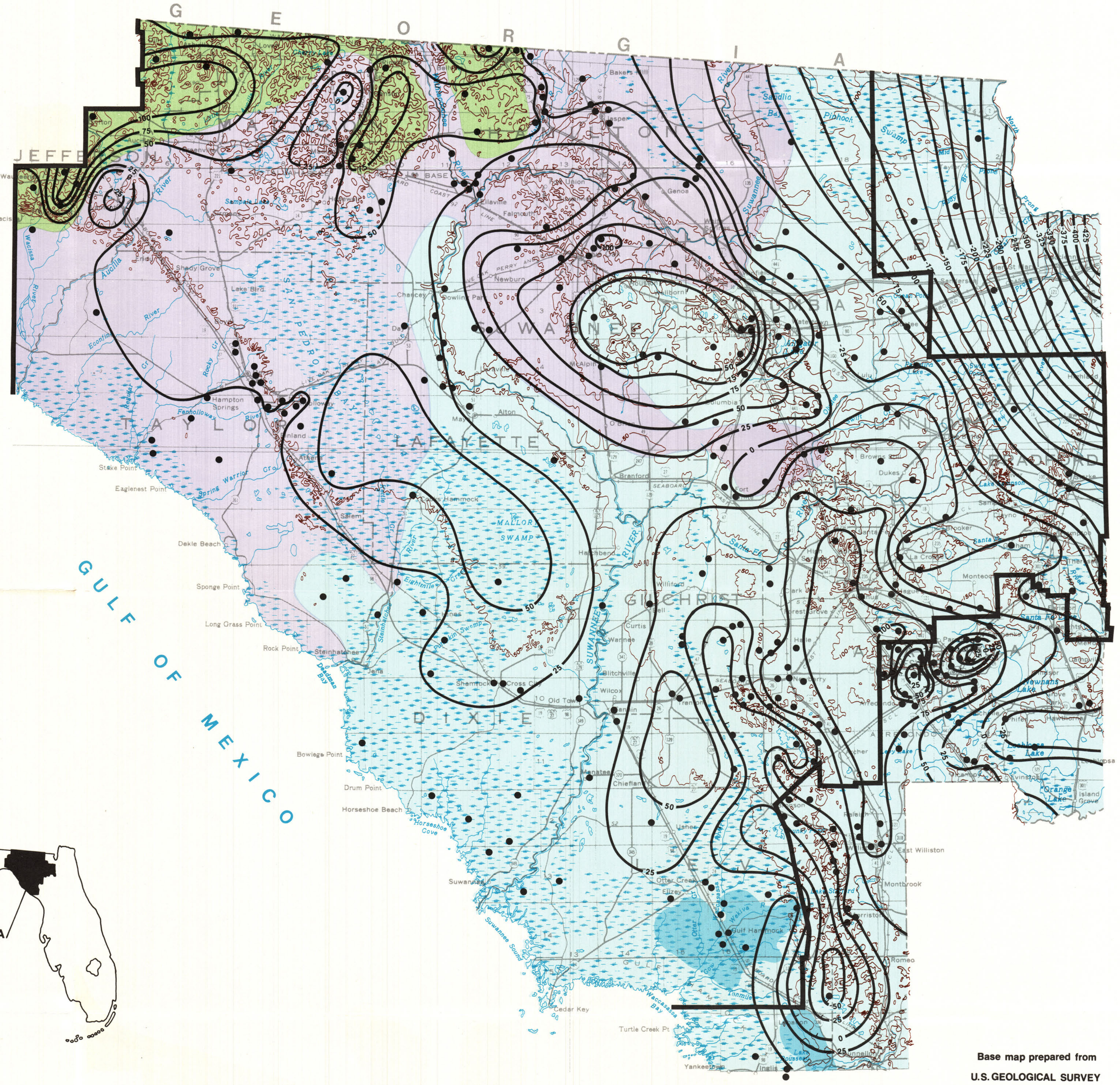

TOP OF AQUIFER CONTOURS

-25
0
25

DATA POINT

Base map prepared from
U.S. GEOLOGICAL SURVEY
State of Florida Map
1:500,000 Edition of 1967

0 2 4 6 8 10 15 20 30
KILOMETERS

0 2 4 6 8 10 15 20 30
MILES

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