

Figure 1.—Geologic section showing the limestone unit of the lower part of the surficial aquifer.

**INTRODUCTION**

This map shows the approximate configuration of the top of the limestone unit of the lower part of the surficial aquifer in Duval County, Florida. The limestone unit supplies water to numerous wells in the Jacksonville area. In previous investigations concerning the hydrology of Duval County, Leve (1966) and Fairchild (1972) applied no formal names to the water-yielding limestone unit within the surficial aquifer. However, Causey and Phelps (1978, p. 6) applied the term "shallow rock zone" to all principal water-yielding sediments below the water-table zone to a depth of about 100 feet. This term has led to some confusion since the water-yielding sediments can consist of sand and shell as well as limestone. As the term "shallow rock zone" is vague, the use of the term in Florida has been abandoned and the water-yielding limestone is referred to in this report as the limestone unit of the lower part of the surficial aquifer.

Duval County is underlain by undifferentiated deposits and rocks of Holocene to Miocene age that collectively comprise the surficial aquifer. The deposits of Holocene and Pleistocene age are primarily sand and clayey sand that locally contain shell beds. These deposits are underlain by sand, shell, clay, and limestone of Pliocene or upper Miocene age. The limestone unit, where present, occurs at the base of the latter deposits (table 1 and fig. 1).

The limestone unit generally consists of a soft, friable, cavernous, sandy limestone, ranging from about 6 to 40 feet in thickness. The altitude of the top of the limestone unit varies from about 25 feet above sea level in western Duval County to about 75 feet below sea level in the eastern part of the county. Along the coast and in the southern part of the county, the limestone becomes discontinuous and grades into medium-to-coarse sand and shell deposits.

- EXPLANATION**
- HOLOCENE AND PLEISTOCENE DEPOSITS
  - PLIOCENE OR UPPER MIOCENE DEPOSITS
  - HAWTHORN FORMATION

In most of the county, the limestone is the principal water-producing unit in the surficial aquifer. Maximum yields from the limestone unit of the surficial aquifer in most parts of the county are between 50 and 100 gal/min, but yields as great as 200 gal/min are possible from some wells (Causey and Phelps, 1978, p. 23). However, because of the differences in lithology and thickness, presence of the limestone does not necessarily indicate that large quantities of water are available. In some areas, larger quantities of water may be obtained from sand or shell beds lying above the limestone or from wells tapping lenses of limestone within the upper part of the underlying Hawthorn Formation.

Water from the limestone unit is generally of acceptable quality for most domestic, commercial, and industrial uses. Although the water is usually hard and the iron concentrations variable, Causey and Phelps (1978) show that concentrations of most chemical constituents generally meet the U.S. Environmental Protection Agency drinking water standards (U.S. Environmental Protection Agency, 1977).

This map was prepared from geologist's and driller's logs and from core borings obtained from various engineering firms. Sources of logs include those in published reports and in the files of the St. Johns River Water Management District, the Florida Bureau of Geology, and the U.S. Geological Survey.

**SELECTED REFERENCES**

- Causey, L.V., and Phelps, G.G., 1978, Availability and quality of water from shallow aquifers in Duval County, Florida: U.S. Geological Survey Water-Resources Investigations 78-92, 96 p.
- Fairchild, R.W., 1972, The shallow-aquifer system in Duval County, Florida: Florida Bureau of Geology Report of Investigations 59, 50 p.
- Franks, B.J., 1980, The surficial aquifer at the U.S. Naval Station near Mayport, Florida: U.S. Geological Survey Open-File Report 80-76, 13 p.
- Leve, G.W., 1966, Ground water in Duval and Nassau Counties, Florida: Florida Geological Survey Report of Investigations 43, 31 p.
- Leve, G.W., and Goolbsy, D.A., 1969, Production and utilization of water in the metropolitan area of Jacksonville, Florida: Florida Division of Geology Information Circular 88, 87 p.
- U.S. Environmental Protection Agency, 1977, National interim primary drinking water regulations: EPA-570/9-76-003, 159 p.

**CONVERSION FACTORS**

For those readers who may prefer to use International System (SI) units rather than inch-pound units, the conversion factors for terms used in this report are listed below:

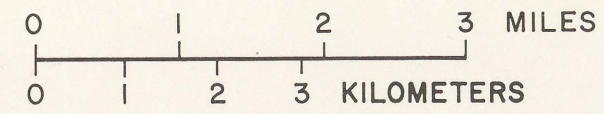
Multiply	By	To obtain metric unit
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
gallon per minute (gal/min)	0.06309	liter per second (L/s)

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "mean sea level." NGVD of 1929 is referred to as sea level in this report.

Table 1.—Geology of the surficial aquifer and underlying confining bed

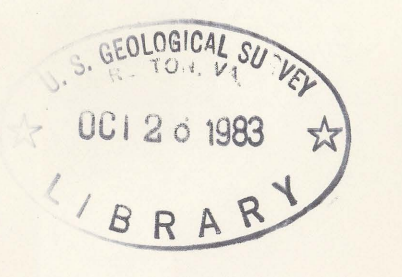
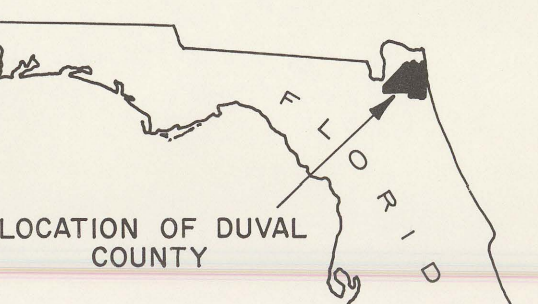
Geologic age	Stratigraphic unit	Lithologic description
Holocene and Pleistocene	Holocene and Pleistocene deposits	Sand, tan to yellow, loose, medium to fine quartz, with shells and (or) minor clay content. Sand locally stained rusty red to dark brown from iron oxide.
Pliocene or Miocene	Pliocene or upper Miocene deposits	Upper part—tan to buff, fine to coarse sand and gray to light gray sandy clay, clayey sand, and shell beds; clay contains abundant mollusk shells. Lower part—limestone, tan to yellow, sandy, porous, and cavernous; contains thin beds of brown crystalline, dolomitic limestone; major source of water to shallow wells.
Miocene	Hawthorn Formation	Gray to blue-green clay, sandy clay, and sandy limestone—usually phosporatic with abundant, well-rounded, polished, granules and pebbles of phosphate. Formation not usually considered a good source of water; some wells tap lenses of sand and limestone in the upper part.

- EXPLANATION**
- Area where limestone is missing or discontinuous.
  - CONTOUR—Shows altitude of top of limestone unit where present. Dashed where approximate. Contour interval 20 feet. Datum is National Geodetic Vertical Datum of 1929.
  - Line of geologic section.
  - WELL—number indicates top of the limestone unit, in feet above (+) or below National Geodetic Vertical Datum of 1929.
  - WELL—indicates where limestone was not encountered.



**GENERALIZED CONFIGURATION OF THE TOP OF THE LIMESTONE UNIT OF THE LOWER PART OF THE SURFICIAL AQUIFER, DUVAL COUNTY, FLORIDA**

By  
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1982



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