Prepared in cooperation with the
Georgia Department of Natural Resources
Environmental Protection Division

Summary of Hydraulic Properties of the Floridan Aquifer System in Coastal Georgia and Adjacent Parts of South Carolina and Florida

Scientific Investigations Report 2004-5264

U.S. Department of the Interior
U.S. Geological Survey

Cover photograph: Ship in Savannah Harbor, Georgia, 2001

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By John S. Clarke, David C. Leeth, DáVette Taylor-Harris,
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Horizontal Datum

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83). Historical data collected and stored as North American Datum of 1927 (NAD 27) have been converted to NAD 83 for use in this publication.

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ABSTRACT

Hydraulic-property data for the Floridan aquifer system and equivalent clastic sediments in a 67-county area of coastal Georgia and adjacent parts of South Carolina and Florida were evaluated to provide data necessary for development of ground-water flow and solute-transport models. Data include transmissivity at 324 wells, storage coefficient at 115 wells, and vertical hydraulic conductivity of 72 core samples from 27 sites.

Hydraulic properties of the Upper Floridan aquifer vary greatly in the study area due to the heterogeneity (and locally to anisotropy) of the aquifer and to variations in the degree of confinement provided by confining units. Prominent structural features in the area—the Southeast Georgia Embayment, the Beaufort Arch, and the Gulf Trough—influence the thickness and hydraulic properties of the sediments comprising the Floridan aquifer system. Transmissivity of the Upper Floridan aquifer and equivalent updip units was compiled for 239 wells and ranges from 530 feet squared per day (ft^2/d) at Beaufort County, South Carolina, to 600,000 ft^2/d in Coffee County, Georgia. In carbonate rock settings of the lower Coastal Plain, transmissivity of the Upper Floridan aquifer generally is greater than 20,000 ft^2/d, with values exceeding 100,000 ft^2/d in the southeastern and southwestern parts of the study area (generally coinciding with the area of greatest aquifer thickness). Transmissivity of the Upper Floridan aquifer generally is less than 10,000 ft^2/d in and near the upper Coastal Plain, where the aquifer is thin and consists largely of clastic sediments, and in the vicinity of the Gulf Trough, where the aquifer consists of low permeability rocks and sediments. Large variability in the range of transmissivity in Camden and Glynn Counties, Georgia, and Nassau County, Florida, demonstrates the anisotropic distribution of hydraulic properties that may result from fractures or solution openings in the carbonate rocks. Storage coefficient of the Upper Floridan aquifer was compiled for 106 wells and ranges from about 0.00004 at Beaufort County, South Carolina, to 0.04 in Baker County, Florida.

Transmissivity of the Lower Floridan aquifer and equivalent updip clastic units was compiled for 53 wells and ranges from about 170 ft^2/d in Barnwell County, South Carolina, to about 43,000 ft^2/d in Camden County, Georgia. Transmissivity of the Lower Floridan aquifer is greatest where the aquifer is thickest—in southeastern Georgia and northeastern Florida—where estimates are greater than 10,000 ft^2/d; at one well in southeastern Georgia transmissivity was estimated to be as high as 200,000 ft^2/d. Storage-coefficient data for the Lower Floridan aquifer are limited to three estimates in Barnwell and Allendale Counties, South Carolina, and to estimates determined from six multi-aquifer tests in Duval County, Florida. In the South Carolina tests, storage coefficient ranges from 0.0003 to 0.0004; this range is indicative of a confined aquifer. The storage coefficient for the combined Upper and Lower Floridan wells in Duval County, Florida, ranges from 0.00002 to 0.02.

Vertical hydraulic conductivity was compiled from core samples collected at 27 sites. For the Upper Floridan confining unit, values from 39 core samples at 17 sites range from 0.0002 to 3 feet per day (ft/d). For the Lower Floridan confining unit, values from 10 core samples at 9 sites range from about 0.000004 to 0.16 ft/d. Vertical hydraulic conductivity of the Upper Floridan aquifer was compiled from 16 core samples at five sites, mostly in the Brunswick, Georgia, area and values range from 0.00134 to 160.4 ft/d. Vertical hydraulic conductivity for the semiconfining unit separating the upper and lower water-bearing zones of the Upper Floridan at Brunswick, Georgia, compiled from 6 core samples at three sites ranges from 0.000008 to 0.000134 ft/d. The vertical hydraulic conductivity of the Lower Floridan aquifer in a core sample from a well at Brunswick, Georgia, is 5.3 ft/d; this value is comparable to values for the Upper Floridan aquifer.

INTRODUCTION

Saltwater contamination is restricting the availability of fresh ground-water supplies in coastal Georgia and adjacent parts of South Carolina and Florida. The principal source of freshwater in the coastal area is the Upper Floridan aquifer, an extremely permeable, high-yielding aquifer that was first developed in the late 1800s, and has been used extensively in the area since. Pumping the aquifer has resulted in substantial water-level decline and subsequent encroachment of seawater into the aquifer at the northern end of Hilton Head Island, S.C.; and in saltwater intrusion of the aquifer from underlying brine-filled strata at Brunswick, Ga., and near Jacksonville, Fla.

The Coastal Sound Science Initiative is a series of scientific and feasibility studies to support development of the State of Georgia's final strategy to protect the Upper Floridan aquifer from saltwater contamination (Georgia Environmental Protection Division, 1997). As part of the Coastal Sound Science Initiative, the U.S. Geological Survey (USGS)—in cooperation with the Georgia Environmental Protection Division (GaEPD)—is developing numerical models to simulate ground-water flow and solute transport (saltwater contamination). To support this effort, detailed information regarding the hydraulic properties of the Floridan aquifer system were compiled; these data include transmissivity, storage coefficient, and vertical hydraulic conductivity.

Purpose and Scope

This report presents a compilation of existing hydraulic-property data for the Floridan aquifer system and equivalent aquifer units of coastal Georgia, southeastern South Carolina, and northeastern Florida. Data include analysis of transmissivity at 324 wells, storage coefficient at 115 wells, and vertical hydraulic conductivity of 72 core samples from 27 sites. Data were compiled largely from the literature and from data files of the USGS, GaEPD, South Carolina Department of Health and Environmental Control (SCDHEC), South Carolina Department of Natural Resources, and the St. Johns River Water Management District. Interpretations relating hydraulic-property values to hydrogeologic settings were made on the basis of available published hydrogeologic data.

Description of Study Area

The GaEPD defines the coastal area of Georgia (fig. 1) to include the 6 coastal Georgia counties and 18 adjacent inland counties; a 24-county area of 12,240 square miles (mi^2). To facilitate the development of ground-water models for the coastal area, the study area was expanded to include natural hydraulic boundaries that lie outside the 24-county area—an additional 44 counties. The 68-county area encompasses an area of 32,660 mi^2 and includes 56 counties in southern Georgia, 7 counties in southeastern South Carolina, and 5 counties in northeastern Florida.

The study area is located in the Coastal Plain physiographic province (Clark and Zisa, 1976). For discussions in this report, the Coastal Plain has been divided into the upper Coastal Plain, comprised of the Fall Line Hills District of Clark and Zisa (1976); and the lower Coastal Plain, comprised of the Vidalia Uplands, Bacon Terraces, and Barrier Island Sequence Districts of Clark and Zisa (1976). Topographic relief ranges from low in the lower Coastal Plain to steep in the northern Coastal Plain. Land-surface altitudes are as high as 100 feet (ft) in the lower Coastal Plain and 300 ft in the upper Coastal Plain. Land use is largely urban in industrial areas and cities such as Savannah and Brunswick; outside of these areas, land use is a mix of forest, grazed woodland, cropland with pasture, marsh, and swampland.

Well-Identification Systems

Wells in Georgia are identified according to a system based on the USGS index to topographic maps of Georgia. Each 7½-minute topographic quadrangle in the State has been given a number and a letter designation beginning at the southwest corner of the State. Numbers increase eastward and letters increase alphabetically northward. Quadrangles in the northern part of the State are designated by double letters. The letters "I," "O," "II," and "OO" are not used. Wells inventoried in each quadrangle are numbered sequentially, beginning with 1. Thus, the fourth well inventoried in the 34H quadrangle in Glynn County is designated 34H004.

The SCDHEC assigns identifiers to wells on the basis of their location as determined by use of a latitude-longitude grid system. The entire State is divided into a grid matrix of 5 minutes of latitude and 5 minutes of longitude, forming 5- by 5-minute cells. Each cell has a corresponding number and uppercase letter(s), for example, 36Y. The 5-minute cells are further divided into a grid of twenty-five 1-minute latitude by 1-minute longitude cells, each having a lowercase letter that starts with "a" and continues through "y"; for example, 36Y-e. Wells located within a 1-minute cell are numbered consecutively; for example, the first well inventoried in 36Y-e would be assigned the number 36Y-e1.

In addition to a SCDHEC identifier, each well in South Carolina is assigned a county designation by the South Carolina Department of Natural Resources; this consists of a three-letter abbreviation for the county name and a sequentially assigned number. For example, BAM-62 represents the sixty-second well that was inventoried in Bamburg County. In Florida, there is no uniform system employed to number wells; local well names or well numbers are used for identification.

Previous Studies

This report updates aquifer hydraulics data presented in reports for the Floridan aquifer system by Bush and Johnston (1988) as part of the USGS Regional Aquifer System Analysis (RASA) program. Bush and Johnston (1988) mapped the distribution of transmissivity of the Upper Floridan aquifer and produced a comparative evaluation of the reliability of these data (their plate 2) and a tabular compilation of aquifer-test data (their table 2). Krause and Randolph (1989) mapped horizontal hydraulic conductivity and transmissivity for the Upper Floridan aquifer and extrapolated these data into zones of similar hydraulic conductivity (their plate 7); they also presented a transmissivity distribution for the Upper Floridan aquifer based on simulation (their plate 8). Clarke and Krause (2000) described updates to previously calibrated ground-water flow models in coastal Georgia, including maps showing simulated transmissivity and leakance for the Upper and Lower Floridan aquifers.

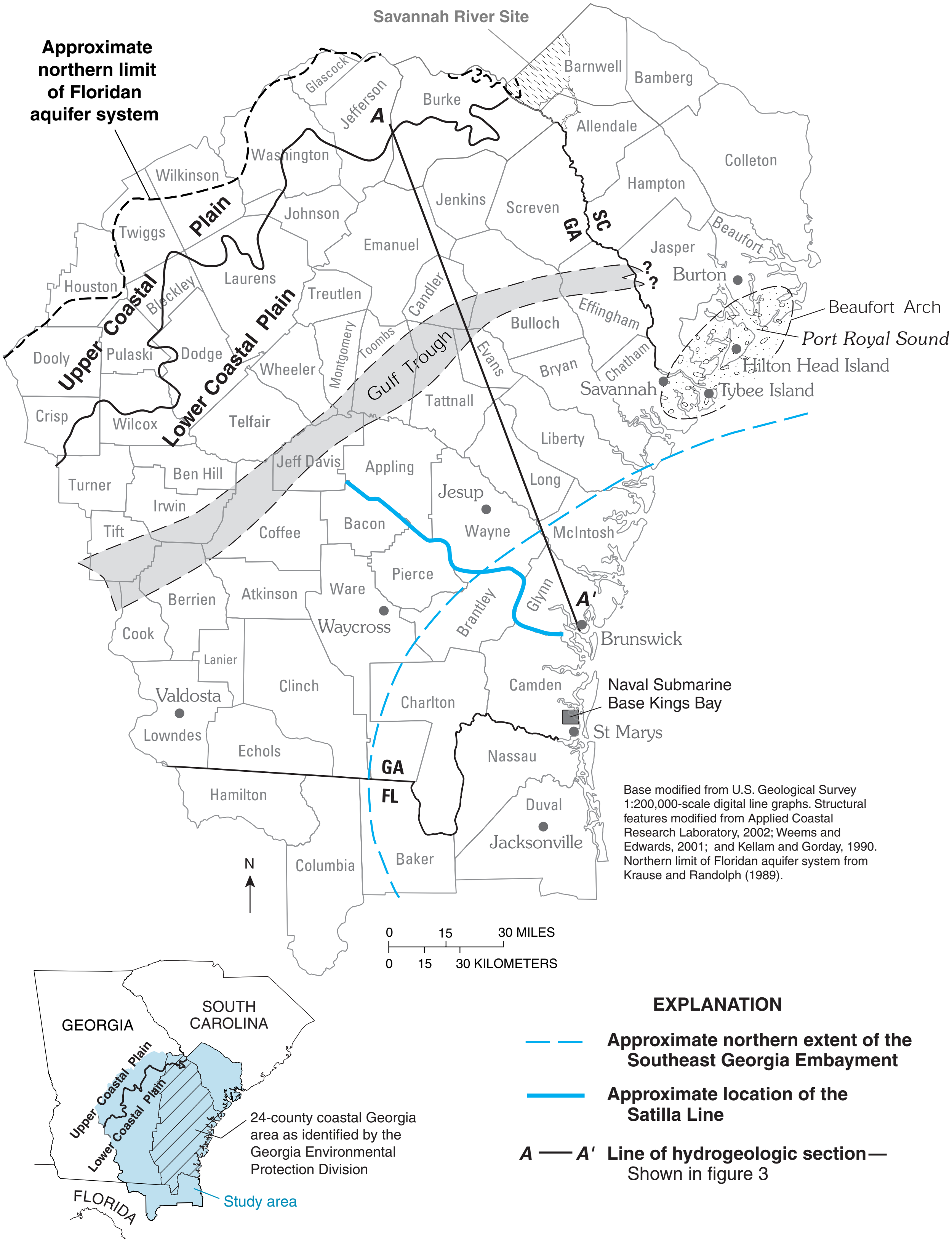

Figure 1. Location of study area in coastal Georgia and adjacent parts of South Carolina and Florida, physiographic and structural features, and line of hydrogeologic section.

Brooks and others (1985) and Faye and McFadden (1986) presented data on hydraulic characteristics of clastic aquifer units that are updip equivalents to the Floridan aquifer system. Faye and Mayer (1996) presented maps showing model-calibrated hydraulic characteristics of equivalent clastic units. Clarke and West (1998) simulated ground-water flow in and around the Savannah River Site in South Carolina and Georgia; their model was based, in part, on aquifer tests performed and analyzed by personnel with Clemson University (Moore and others, 1993; Snipes and others, 1995a, b), and on transmissivity estimates derived from specific-capacity tests of wells and from borehole resistivity logs.

Szell (1993) provided a compilation of transmissivity and storage-coefficient data from analyses of aquifer tests in northeastern Florida. Aucott and Newcome (1986) and Newcome (1993, updated 2000) presented transmissivity and storage coefficients derived from aquifer-test analyses in the South Carolina Coastal Plain. Jones and Maslia (1994) compiled data from four large-scale aquifer tests conducted in the Brunswick area in Glynn County, Ga., and reanalyzed data from one test conducted during 1962–63 at the Hercules, Inc., wellfield at Brunswick.

Acknowledgments

Because this study relied heavily on the works by previous investigators, the authors of previous USGS reports containing large-scale compilations of aquifer properties were consulted regarding their interpretations. Peter W. Bush (U.S. Geological Survey), and Richard E. Krause and Richard H. Johnston (both U.S. Geological Survey retired) discussed their work and provided helpful suggestions on the approach for this study. Roy Newcome (U.S. Geological Survey retired and currently [2004] with the South Carolina Department of Natural Resources) provided supplemental information from his published work that greatly enhanced the data coverage for the South Carolina part of the study area. Harold E. Gill and Robert E. Faye (both U.S. Geological Survey retired) provided a reinterpretation and reevaluation of the Waycross, Wayne County, Ga., aquifer test originally reported by Matthews and Krause (1984). Richard M. Spechler and Trudy G. Phelps (U.S. Geological Survey, Altamonte Springs, Fla.) and Paula F. Presley (St. Johns River Water Management District) provided data for northeastern Florida, including unpublished data from current investigations.

HYDROGEOLOGY

A comprehensive study of the hydrogeologic framework of the Floridan aquifer system, which includes the study area, was conducted as part of the USGS RASA study and presented by Miller (1986); the reader is referred to that publication for details. Other useful summaries are included in Krause and Randolph (1989) and Clarke and others (1990). The discussion that follows provides a frame of reference for the hydraulic-property data presented herein.

Geologic Setting

Geologic strata within the Coastal Plain physiographic province consist of unconsolidated to consolidated layers of sand and clay and semiconsolidated to very dense layers of limestone and dolomite (Clarke and others, 1990). These sediments range in age from Late Cretaceous to Holocene (fig. 2), and unconformably overlie Paleozoic to Mesozoic igneous, metamorphic, and sedimentary rocks. These sedimentary units generally strike northeast, and dip and thicken to the southeast; maximum thickness is about 5,500 ft in Camden County, Ga. (Wait and Davis, 1986). Prominent structural features in the area (fig. 1), such as the Southeast Georgia Embayment, the Beaufort Arch, and the Gulf Trough, influence the thickness of sediments.

The Southeast Georgia Embayment is a shallow east-to-northeast-plunging syncline that subsided at a moderate rate from the Late Cretaceous until the late Cenozoic (Miller, 1986). The thickness of Coastal Plain deposits is greatest in the vicinity of the Southeast Georgia Embayment (fig. 3).

The Beaufort Arch is centered near Hilton Head Island and trends parallel to the coast (fig. 1). The Beaufort Arch interrupts the regional southward dip of the sediments in that area. Within the area influenced by the Beaufort Arch, Coastal Plain deposits thin and are present at shallower depths than in the vicinity of the Southeast Georgia Embayment.

The Gulf Trough (figs. 1 and 3) is a zone of relatively thick accumulations of fine-grained clastic sediments and argillaceous carbonates, in which permeability and thickness of Coastal Plain deposits decrease. In this area, ground-water flow is partially impeded by the juxtaposition of rocks of higher permeability updip and downdip of the trough, with those of lower permeability within the trough (Krause and Randolph, 1989).

In addition to the aforementioned geologic features, the “Satilla Line” (fig. 1) is a postulated hydrologic boundary identified by GaEPD based on a change in the configuration of the potentiometric surface of the Upper Floridan aquifer, and by linear changes depicted on aeromagnetic, aeroradioactivity, gravity, and isopach maps (William H. McLemore, Georgia Environmental Protection Division, Geologic Survey Branch, oral commun., 2000). This feature may have an impact on ground-water flow in the area; however, its geologic origin and nature are unknown.

Floridan Aquifer System

The principal source of water for all uses in the coastal area of Georgia is the Floridan aquifer system, consisting of the Upper and Lower Floridan aquifers (Miller, 1986; Krause and Randolph, 1989). The Floridan aquifer system (Miller, 1986) consists of carbonate rocks of mostly Paleocene to Oligocene age that locally include Upper Cretaceous rocks (fig. 2). Thickness of the Floridan aquifer system in the study area ranges from less than 100 ft where the aquifer system crops out in South Carolina to about 2,800 ft in Brunswick, Ga. (Miller, 1986).

Series	System	Lower Coastal Plain[1] Geologic Unit[2]	Lower Coastal Plain[1] Hydrogeologic Unit, Savannah	Lower Coastal Plain[1] Hydrogeologic Unit, Brunswick	Upper Coastal Plain[3] Geologic Unit	Upper Coastal Plain[3] Hydrogeologic Unit
Post-Miocene		Undifferentiated	Surficial aquifer	Surficial aquifer	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Miocene	Upper	Ebenezer Formation	Confining unit	Confining unit	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Miocene	Middle	Coosawhatchie Formation	Confining unit	Confining unit; Upper Brunswick aquifer	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Miocene	Lower	Marks Head Formation	Confining unit	Upper Brunswick aquifer	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Miocene	Lower	Parachucla Formation	Confining unit	Confining unit	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Miocene	Lower	Tiger Leap Formation	Confining unit	Lower Brunswick aquifer	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Oligocene		Lazaretto Creek Formation	Confining unit (FLORIDAN AQUIFER SYSTEM)	Confining unit (FLORIDAN AQUIFER SYSTEM)	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Oligocene		Suwannee Limestone	Upper Floridan aquifer (FLORIDAN AQUIFER SYSTEM)	Upper Floridan aquifer: Upper water-bearing zone (FLORIDAN AQUIFER SYSTEM)	Undifferentiated	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Eocene	Upper	Ocala Limestone	Upper Floridan aquifer (FLORIDAN AQUIFER SYSTEM)	Upper Floridan aquifer: Upper water-bearing zone; Upper Floridan semi-confining unit; Lower water-bearing zone (FLORIDAN AQUIFER SYSTEM)	Barnwell Group	Upper Three Runs aquifer (FLORIDAN AQUIFER SYSTEM)
Eocene	Middle	Avon Park Formation	Confining unit (FLORIDAN AQUIFER SYSTEM)	Confining unit (FLORIDAN AQUIFER SYSTEM)	Santee Limestone	Confining unit (FLORIDAN AQUIFER SYSTEM)
Eocene	Lower	Oldsmar Formation	Lower Floridan aquifer (FLORIDAN AQUIFER SYSTEM)	Lower Floridan aquifer: Confining unit (FLORIDAN AQUIFER SYSTEM)	Congaree Formation	Gordon aquifer (FLORIDAN AQUIFER SYSTEM)
Paleocene		Cedar Keys Formation	Confining unit	Lower Floridan aquifer: Fernandina permeable zone (FLORIDAN AQUIFER SYSTEM)	Snapp Formation Ellenton Formation (undifferentiated)	Confining unit[4]
Upper Cretaceous		Undifferentiated	Confining unit	Confining unit	Steel Creek Formation Black Creek Group (undifferentiated)	Upper Dublin aquifer

[1]Modified from Randolph and others, 1991; Clarke and Krause, 2000.
[2]Modified from Randolph and others, 1991; Weems and Edwards, 2001.
[3]Modified from Falls and others, 1997.
[4]In local areas includes Millers Pond aquifer.

Figure 2. Geologic and hydrogeologic units of the upper and lower Coastal Plain, coastal Georgia, and adjacent parts of South Carolina and Florida.

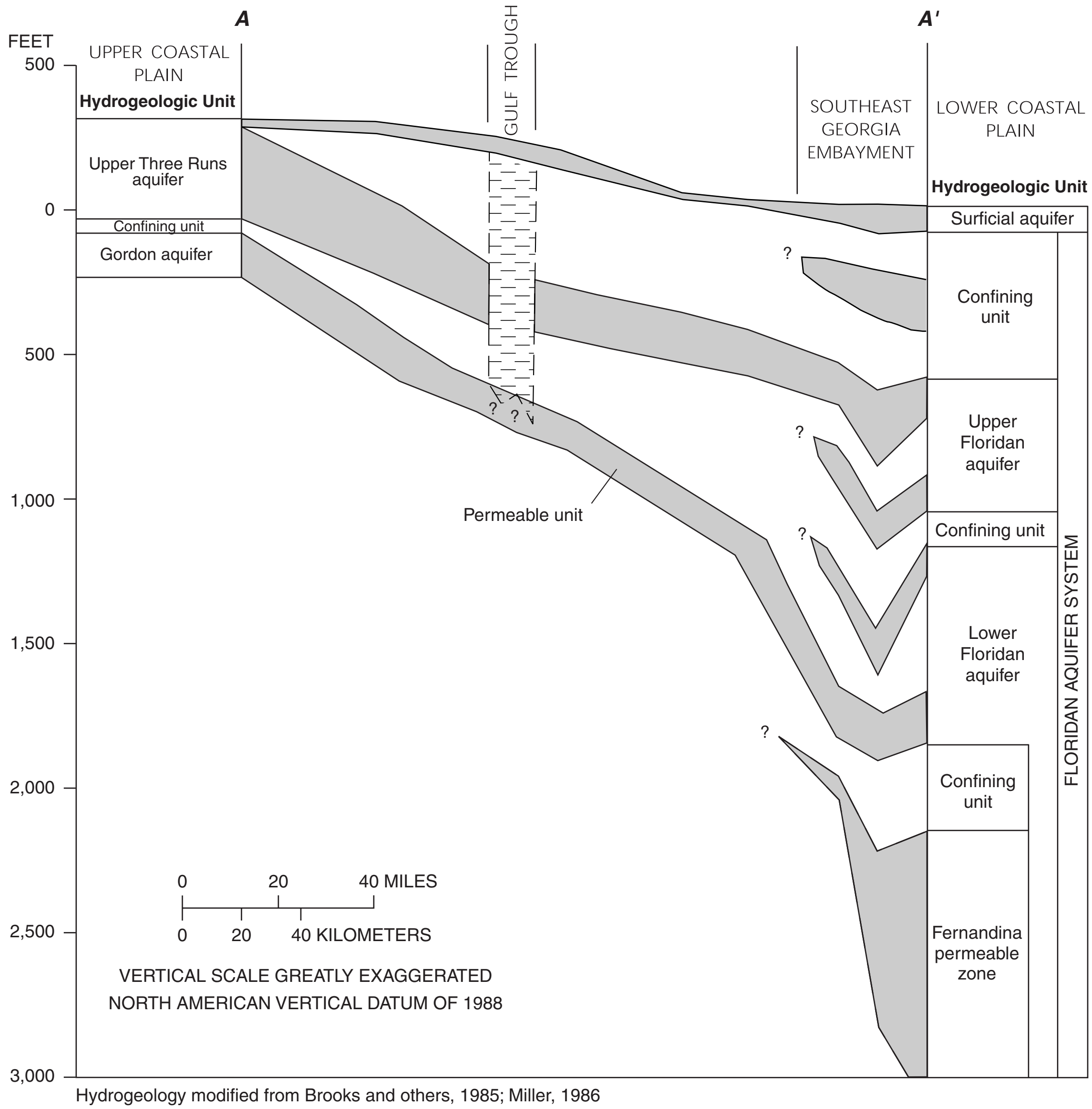

Figure 3. Hydrogeologic section of the Florida aquifer system along dip, upper to lower Coastal Plain, coastal Georgia (modified from Krause and Randolph, 1989). Line of section is shown in figure 1.

The Upper Floridan aquifer is highly productive and consists of Eocene to Oligocene limestone and dolomite (Clarke and others, 1990). Lithologic units comprising the aquifer crop out or are near land surface in the northwestern part of the study area (upper Coastal Plain) and near Valdosta in Lowndes County, Ga. (fig. 1), where the aquifer is under unconfined or semiconfined conditions. To the southeast (lower Coastal Plain), the aquifer becomes more deeply buried and confined. In this report, clastic sediments of the Upper Three Runs aquifer (Falls and others, 1997) in the upper Coastal Plain that are hydraulically connected to carbonate deposits of the lower Coastal Plain are included as part of the Upper Floridan aquifer (fig. 3). The transition from carbonate to clastic deposits generally occurs north of the Gulf Trough (figs. 1 and 3).

In some areas, several distinct water-bearing zones within the Upper Floridan aquifer have been identified. McCollum and Counts (1964) identified five water-bearing zones in and around the Savannah–Hilton Head Island area in strata that would later be defined as part of the Floridan aquifer system; the upper two zones are part of the Upper Floridan aquifer (Krause and Randolph, 1989). In the Brunswick–Glynn County, Ga., area, Wait and Gregg (1973) identified two distinct water-bearing zones (fig. 2) in the Upper Floridan aquifer (their “principal artesian aquifer”) and estimated that about 70 percent of the total flow from wells open to both zones was coming from the upper zone. In Beaufort County, S.C., the term *middle Floridan* is used by the State of South Carolina (Ransom and White, 1999) for a water-bearing zone approximately 250–550 ft below land surface. For the purposes of this study, this zone is placed in the lowermost part of the Upper Floridan aquifer (W.F. Falls, U.S. Geological Survey, written commun., 2002; and J.A. Gellici, South Carolina Department of Natural Resources, written commun., 2002).

The Upper Floridan aquifer is overlain by Oligocene layers of silty clay and dense phosphatic dolomite that confine and separate the aquifer from overlying permeable units of the Brunswick aquifer system (Clarke, 2003). The Upper Floridan aquifer is underlain by a confining unit of dense, recrystallized limestone and dolomite of the middle to upper Eocene that hydraulically separate the aquifer to varying degrees from the Lower Floridan aquifer (fig. 2). Locally in the Brunswick, Ga., area, the confining unit is breached by fractures or solution openings that enhance the vertical exchange of water between the Upper and Lower Floridan aquifers (Krause and Randolph, 1989) and affect the storage properties of the aquifers.

The Lower Floridan aquifer is composed mainly of lower and middle Eocene dolomitic limestone; but at Brunswick, Ga., the aquifer includes highly permeable Paleocene and Late Cretaceous limestone (Krause and Randolph, 1989). In the upper Coastal Plain, the clastic Gordon aquifer (Brooks and others, 1985; Falls and others, 1997) is an updip equivalent unit that is hydraulically connected to the Lower Floridan aquifer (figs. 2 and 3). In some earlier publications (i.e., Counts and Donsky, 1963), stratigraphic units (such as the Tallahatta or Lisbon Formations) or an age term (such as Claibornian, as used in Faye and McFadden, 1986) correlate with the Lower Floridan aquifer or its equivalent clastic aquifers. Such nomenclature, though no longer used by the USGS, is shown in some of the references in Appendix A.

The Lower Floridan aquifer includes several water-bearing zones in parts of the study area. In the Savannah–Hilton Head area, the lowermost water-bearing zone of McCollum and Counts (1964) is included in the Lower Floridan aquifer (W.F. Falls, U.S. Geological Survey, written commun., 2003). In southeastern South Carolina, Paleocene and lower Eocene units can contain permeable beds, and production wells in this area are screened in these zones together with the overlying Santee Limestone (Newcome, 1993, 2000). In this report, these productive zones, together with the Santee Limestone, are considered to be part of the Lower Floridan aquifer. In southeastern Georgia and northeastern Florida, the Lower Floridan includes a deeply buried and highly transmissive, saline water-bearing unit known as the Fernandina permeable zone (Krause and Randolph, 1989). This unit is the probable source of saltwater contamination in the Upper and Lower Floridan aquifers at Brunswick, Ga., and Jacksonville, Fla. (Krause and Randolph, 1989).

HYDROLOGIC-PROPERTY DATA

Hydraulic conductivity, *transmissivity*, and *storage coefficient* are terms used to describe and quantify the capacity of the materials composing aquifers and confining units to transmit and store water. Detailed discussions of these terms can be found in Lohman (1972) and Heath (1983).

Hydraulic properties compiled and presented herein were derived from a variety of sources including published reports, files of the USGS in Atlanta, Ga., and the USGS Ground-Water Site Inventory (GWSI) database. The GWSI database and USGS files contain USGS-approved aquifer-test results including most of the data reported by Bush and Johnston (1988) for Georgia. Where possible, a published reference for these test results is used rather than citing the USGS files, although in a few instances, the latter was the only source available. Literature from 1944 through 2003 was included in this compilation.

Transmissivity and Storage Coefficient

The preferred source of transmissivity data compiled herein was from multiple-well aquifer tests, followed by single-well aquifer tests. Transmissivity estimates derived from specific-capacity data and reported by previous investigators also are included; however, these data should be given less credence than data derived from aquifer tests in areas where both types of data exist. Transmissivity derived from multiple-well aquifer tests are more representative of field conditions than estimates derived from single-well aquifer tests (specific-capacity) because they reflect measurement of a larger volume of aquifer material. In this report, transmissivities reported by previous investigators are rounded to one significant figure.

The reliability of specific-capacity data for transmissivity estimates is influenced by a variety of factors (Heath, 1983) including: (1) transmissivity of the zone supplying water to the well (which may be less than the transmissivity of the aquifer); (2) the storage coefficient of the aquifer; (3) the pumping period; (4) the effective radius of the well; and (5) the pumping rate. As the well efficiency approaches 100 percent, the more specific capacity is reflective of aquifer transmissivity. Generally, well efficiency is considerably less than 100 percent in screened wells and is higher, approaching 100 percent in some open-hole wells. Thus, specific-capacity estimates in open-hole wells may be considered closer to actual aquifer transmissivity, whereas values derived in screened wells (such as in areas where the Floridan aquifer system is clastic) may be considered lower or minimum values of transmissivity.

Faye and Smith (1994) used formation resistivity derived from borehole geophysical logs to estimate hydraulic conductivity. These estimates then can be converted to transmissivity by multiplying by the aquifer thickness. This approach was used to provide transmissivity estimates for numerical simulation of ground-water flow near the Savannah River Site (Clarke and West, 1998), in the northwestern part of the study area.

The methods of aquifer-test analysis or other methods used to estimate transmissivity are provided in Appendix A in order to qualify the estimates and the level of data reliability. Aquifer-test analyses are categorized as nonleaky (Theis, 1935) or leaky (Hantush, 1960; Hantush and Jacob, 1955). Bush and Johnston (1988) noted that single-well tests may yield questionable transmissivity values when compared to those based on multiple-well tests. Consequently, the nonequilibrium, nonleaky analyses are further divided into Theis (1935) for multiple-well tests and Cooper and Jacob (1946) for single-well tests to provide a qualitative division of the derived estimates of transmissivity. The nonequilibrium, nonleaky analysis methods of Theis (1935) and (or) the modified nonequilibrium analytical solution of Cooper and Jacob (1946) are (by a large margin) the most commonly used for tests conducted in the study area. In some older publications, the analysis method is not specified. In these instances, the most likely analysis method employed (based on the year of test analysis) is listed in Appendix A followed by a question mark. For aquifer tests that have both drawdown and recovery data and analysis, the transmissivity and storage coefficient entries listed in Appendix A generally are those computed from the drawdown data, unless otherwise noted. Estimates for both transmissivity and storage coefficient computed from recovery data are listed in the "Remarks" section of Appendix A.

In the Brunswick area, some selectivity was applied for aquifer-test results presented in this report. Maslia and Prowell (1990) concluded that some earlier aquifer-test analyses resulted in overestimation of transmissivity by not considering the upward vertical leakage to wells from lower water-bearing zones, a condition that has been documented in the area (Wait and Gregg, 1973). Additionally, it is possible that overestimation of pumpage may be a factor in overestimation of transmissivity for some of the recovery tests that involved cessation of pumping at industrial wellfields in the area (L.E. Jones, U.S. Geological Survey, written commun., 1993, 2002). As such, aquifer-test results presented in Jones and Maslia (1994) are listed for the Brunswick area; earlier aquifer-test results were included only if they were consistent with results presented by Jones and Maslia (1994).

Vertical Hydraulic Conductivity

Estimates of vertical hydraulic conductivity were based on laboratory analyses of undisturbed core samples. Data include samples from the Upper Floridan and Lower Floridan aquifers and the overlying confining units. In publications in which laboratory analyses of cores are presented, some depth intervals are given without assigning the laboratory result to a specific hydrogeologic unit. For these cases, depth intervals were assigned to a specific hydrogeologic unit during this study on the basis of correlating the altitude of the sampled interval with maps showing the altitude of tops of hydrogeologic units as described and mapped by Miller (1986) and Clarke and others (1990).

Laboratory analyses of core samples are limited by (1) very small sample size relative to field conditions, and (2) bias toward more competent rock samples because core from fractured, solution-riddled, and friable rocks typically are only partially recovered or not recovered at all. Because of these limitations, core data may not be comparable to field tests, and results of core analyses may be biased toward the lower values that reflect matrix permeability rather than secondary permeability features.

Aquifer-Test Data Qualifiers

To help the reader evaluate the quality of aquifer-test results, qualifiers provided for analyses by Newcome (1993, 2000) and Jones and Maslia (1994) are listed in Appendix A. Newcome (1993, 2000) rated aquifer test results as follows:

- E (Excellent) – Drawdown and recovery plots agree closely, or if data for only one plot is available, the plot provides a definitive value for transmissivity. Boundaries, if any, appear near to the same time on drawdown and recovery plots. Specific capacity is believable (well efficiency equal to or less than 100 percent). No unexplainable extraneous effects. Discharge effectively constant.
- G (Good) – Narrow range in possible solutions for transmissivity. Discharge held reasonably constant. If drawdown and recovery plots do not agree closely, then the reason is apparent. Specific capacity is believable. Few unexplainable extraneous effects.
- F (Fair) – Plot of data for one phase of test may be clear but is unclear during other phases, or where only one plot is available, there may be substantially different possible interpretations. Discharge may have been poorly controlled.
- P (Poor) – Plot(s) difficult to interpret or drawdown and recovery do not agree reasonably well. Extraneous effects distort plots. Discharge not held constant. Discharge substantially increased or decreased near end of test, so recovery cannot be analyzed properly. There may be a substantial range in possible interpretations of the plots.

It should be noted that the Newcome (1993, 2000) rating system reflects not only the operational quality of an aquifer test, but also may be an indication of field conditions that do not fit the assumptions inherent in the analytical method.

Jones and Maslia (1994) rated aquifer-test results based on the fit of the drawdown or recovery curve to published type curves. Their definitions are as follows:

- Excellent – all data points closely match the type curve.
- Good – one or two data points fall off the type curve.
- Fair – more than two data points fall off the type curve, making determination of unique match-point values questionable.

Where applicable, the Newcome (1993, 2000) and Jones and Maslia (1994) qualifiers are included in the "Remarks" section of Appendix A.

HYDRAULIC PROPERTIES OF THE FLORIDAN AQUIFER SYSTEM

Boxplots summarizing transmissivity data from 239 Upper Floridan wells, 53 Lower Floridan wells, and 32 multi-aquifer wells completed in both the Upper and Lower Floridan aquifers in Duval County, Fla., are shown in figure 4; these data are listed in Appendix A. The boxplots indicate that reported transmissivity of the Upper Floridan is considerably higher than that for the Lower Floridan aquifer in the study area and that multi-aquifer wells completed in the Upper and Lower Floridan aquifers show transmissivities comparable to the Upper Floridan. Storage-coefficient data are limited to 115 wells, of which 106 are for the Upper Floridan, 3 are for the Lower Floridan, and 6 are for multi-aquifer wells completed in the Upper and Lower Floridan aquifers. The following sections describe the distribution of hydraulic properties by hydrogeologic unit.

Upper Floridan Aquifer and Equivalent Clastic Units

Hydraulic properties of the Upper Floridan aquifer vary greatly in the study area, due to the heterogeneity (and locally to anisotropy) of the aquifer and to the confinement (or lack thereof) provided by confining units (Krause and Randolph, 1989, p. 24–25). A characteristic of the Floridan aquifer system, especially the Upper Floridan aquifer, is that in many places, zones of very high hydraulic conductivity exist within relatively small portions of the aquifer. For example, borehole flowmeter tests conducted at Waycross, Ga. (Matthews and Krause, 1984), indicate high permeability zones at depths below land surface of 1,070–1,090 ft (240 gallons per minute [gal/min]), 750–900 ft (500 gal/min), and 635–750 ft (1,100 gal/min) that are separated by zones of lower permeability.

Maps showing the distribution of transmissivity and storage-coefficient data for the Upper Floridan aquifer based on data listed in Appendix A are shown in figures 5 and 6, respectively. Transmissivity of the Upper Floridan aquifer and equivalent clastic units ranges from 530 ft^2/d at well 27JJ-i10 in Beaufort County, S.C., to 600,000 ft^2/d at well 23L004 in Coffee County, Ga. (Appendix A). At Waycross, Ware County, Georgia, estimated transmissivity of the Upper Floridan aquifer at well 27G004 ranges from 150,000 to 1,000,000 ft^2/d, with the larger value originally reported by Matthews and Krause (1984). Analysis of the Waycross aquifer test that produced the larger value of transmissivity may have been complicated by an oscillatory water-level response, resulting in an underrepresentation of drawdown and an overprediction of transmissivity. A reanalysis of these data, using a van der Kamp analysis (see Kruseman and de Ritter, 1994) to eliminate the oscillatory water-level response, indicates that the transmissivity could be as low as 150,000 ft^2/d (R.E. Faye, U.S. Geological Survey retired, written commun., 2002).

In Upper Floridan aquifer carbonate rocks of the lower Coastal Plain, the transmissivity is greater than 20,000 ft^2/d over a large area, with values exceeding 100,000 ft^2/d in the southeastern and southwestern parts of the study area (figs. 5a and 5b). High transmissivity in the southeastern part of the study area generally coincides with the area of greatest aquifer thickness (see thickness maps by Miller, 1986). Transmissivity of the Upper Floridan aquifer is lowest north of the Gulf Trough where the aquifer is thin and consists of largely clastic sediments, and along the Gulf Trough, where low-permeability rocks and sediments were deposited. In the northeastern part of study area (Burke and Screven Counties, Ga., and Hampton County, S.C.), reported transmissivity of the Upper Floridan and Upper Three Runs aquifers (Appendix A) generally is less than 10,000 ft^2/d, ranging from 840 ft^2/d in northern Burke County, Ga., to 13,000 ft^2/d in Screven County, Ga. (fig. 5a). In the area of the Gulf Trough, transmissivity of the Upper Floridan aquifer is less than 10,000 ft^2/d, ranging from 1,700 ft^2/d at well 19K005 in Berrien County, Ga., to 7,900 ft^2/d in well 24P006 in Telfair County, Ga.

Large variability in the range of transmissivity where the Upper Floridan aquifer is largely carbonate may indicate the influence of fractures or solution openings and related anisotropic distribution of hydraulic properties. For example, reported transmissivity of the Upper Floridan aquifer in (1) Camden County, Ga., ranges from 19,000 ft^2/d at well 33D013 to 130,000 ft^2/d at well 33E027, located about 5 miles (mi) apart; (2) Nassau County, Fla., ranges from about 30,000 ft^2/d in the vicinity of well Nassau 1 to about 170,000 ft^2/d in the vicinity of well 33DN20, about 1 mi apart; (3) Glynn County, Ga., ranges from 23,000 ft^2/d at well 34H344, to 160,000 ft^2/d at well 34H097, about 2 mi apart; and (4) Beaufort County, S.C., ranges from 530 ft^2/d at well 27JJ-i10 to 110,000 ft^2/d at well 27KK-f23, about 3 mi apart (Appendix A, fig. 5a,b). Given that differences in aquifer thickness should be minimal over such short distances in each area, the wide range in transmissivity may be the result of differences in the distribution of fractures or solution openings within the aquifer.

Possible presence of structural features that could impact the distribution of solution features in the Upper Floridan aquifer were reported in the Brunswick, Glynn County, Ga., area by Maslia and Prowell (1990) and in northeastern Florida (including Duval County) by Leve (1966, 1983). Because Camden County, Ga., is midway between Glynn and Duval Counties, it is possible that similar structural features are present in that area; however, presence of such features has not been documented. In Beaufort County, S.C., uplift in the vicinity of the Beaufort Arch (fig. 1) may have induced greater dissolution in the Upper Floridan aquifer in that area and, thus, account for some of the large variation in aquifer transmissivity. In addition to structural influences, it is possible that some of the variability in aquifer transmissivity results from differences in test conditions or analytical method.

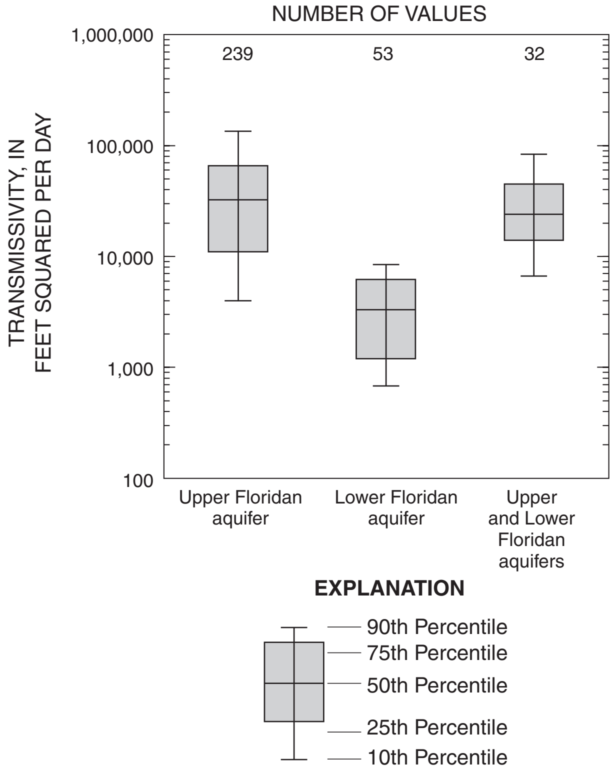

Figure 4. Boxplot showing transmissivity of the Upper and Lower Floridan aquifers in the study area in coastal Georgia and parts of South Carolina and Florida, and at multi-aquifer wells completed in the Upper and Lower Floridan aquifers, Duval County, Florida.

Previous studies by Maslia (1987) and Warner and Aulenbach (1999) have shown that the Upper Floridan aquifer is anisotropic in parts of the study area. The Maslia (1987) study indicated that the Upper Floridan aquifer is anisotropic at Brunswick and Jesup, Ga., with the principal axis of the transmissivity tensor oriented north-northeast. The degree of anisotropy is greater at Brunswick than at Jesup, and there is greater variability between local- and regional-scale tests at Brunswick than at Jesup. Local-scale tests are defined as tests conducted using a single pumping well and one or more observation wells; regional-scale tests are defined as those involving several pumping wells (such as those that might be present at an industrial wellfield) and several observation wells. Regional-scale tests encompass a larger area than local-scale tests and, thus, are representative of a larger volume of aquifer material. Maslia (1987) attributed greater anisotropy and variability between local- and regional-scale tests at Brunswick to preferential flow along vertical solution channels associated with high-angle reverse faults and fractures similar to those described by Prowell (1985). Maslia (1987) also indicated that because of the large variation between results derived from regional- and local-scale tests at Brunswick, local-scale aquifer tests "should not be extrapolated for use in regional aquifer analyses." Warner and Aulenbach (1999) reported that the Upper Floridan aquifer is anisotropic at St Marys, Ga., with the principal axis of anisotropy oriented north-northeast, as was reported for Brunswick and Jesup, Ga.

At Savannah, Ga., Warner and Aulenbach (1999) reported that the Upper Floridan aquifer generally is isotropic with an anisotropy ratio of 1.2:1. The isotropic distribution of hydraulic properties is demonstrated by reported transmissivities at aquifer-test sites in the Savannah area. In 12 of the 13 tests reported in Chatham County, Ga., the transmissivity ranges from 20,000 to 46,000 ft^2/d, with a higher transmissivity of 80,000 ft^2/d reported at well 38Q115 (Appendix A, fig. 5b).

Storage coefficient of the Upper Floridan aquifer (Appendix A, fig. 6a–d) ranges from about 0.00004 at well 27HH-o3 in Beaufort County, S.C., to 0.04 at "Well 1" in Baker County, Fla. The latter storage coefficient is higher than the range for a typical confined aquifer (0.0001 to 0.001, Heath, 1983). Higher storage coefficients normally would be expected in updip areas (western and northern parts of the study area) where the aquifer is semiconfined or unconfined, and lower storage coefficients would be expected in downdip areas where the aquifer is more tightly confined. In parts of the study area, however, high storage coefficients have been reported in some downdip areas where the Upper Floridan aquifer is deeply buried and confined. In the Brunswick, Ga., area (fig. 6c), the wide range of storage coefficient values were attributed either to pumping interferences during testing or to vertical leakage upward from deeper zones (Jones and Maslia, 1994).

Lower Floridan Aquifer and Equivalent Clastic Units

Transmissivity of the Lower Floridan aquifer and equivalent clastic units ranges from about 170 ft^2/d at well 38Y-h6 in Barnwell County, S.C., to about 43,000 ft^2/d at well 33E039 in Camden County, Ga. (Appendix A, fig. 7). In northern areas where the aquifer is comprised largely of clastic sediments (Gordon aquifer, fig. 2), transmissivity ranges from 170 to 15,000 ft^2/d with a median of 3,500 ft^2/d. In areas where the aquifer is largely carbonate, transmissivity ranges from 500 to 43,000 ft^2/d, with a median of 2,900 ft^2/d.

Although no aquifer tests were conducted in wells completed solely in the Lower Floridan aquifer in northeastern Florida, it is likely that transmissivity of the aquifer is high—possibly exceeding 100,000 ft^2/d. Krause and Randolph (1989) stated that the transmissivity of the Lower Floridan aquifer in the vicinity of Jacksonville, Fla., may be as high as 400,000 ft^2/d, but added that their transmissivity estimates for the Lower Floridan aquifer are qualitative and primarily based on thickness and estimates of permeability from geophysical well logs. An estimate of the transmissivity of the Lower Floridan aquifer in northeastern Florida can be obtained from tests conducted in multi-aquifer production wells in Duval County, Fla., that are open to the entire thickness of the Upper Floridan aquifer and a high-permeability freshwater zone at the top of the Lower Floridan aquifer (Spechler, 1994). Such multi-aquifer wells are designated as "UF, LF" in Appendix A. Spechler (1994) stated, "Although the relative contribution of water from each zone cannot be determined, multi-aquifer wells probably derive much of their yield from the upper zone of the Lower Floridan aquifer."

Table 1. Vertical hydraulic conductivity of the Floridan aquifer system, coastal Georgia, and adjacent parts of South Carolina and Florida.

[ft, feet; ft/d, feet per day; °, degrees; ', minutes; ", seconds; do., ditto; ?, uncertain; —, depth of sample not reported. State: GA, Georgia; SC, South Carolina. Hydrologic unit: LFC, Lower Floridan aquifer confining unit; UFA, Upper Florida aquifer; UFC, Upper Floridan aquifer confining unit; UFSC, Upper Florida aquifer semiconfining unit; LFA, Lower Floridan aquifer; hydrologic unit identifiers enclosed in parentheses designate equivalent clastic unit]

State	County	Well identifier	Latitude	Longitude	Depth below land surface		Vertical hydraulic conductivity (ft/d)	Source of data	Hydrologic unit	Remarks
					Top of test interval (ft)	Bottom of test interval (ft)				
GA	Burke	32Y020	33°03'53"	81°43'15"	305.5	306	0.000330	Leeth and others (1996)	(LFC)	
do.	Chatham	36R006	32°07'59"	81°11'03"	802	803	.00535	Counts and Donsky (1963)	UFA	
do.	do.	do.	do.	do.	1,025	1,026	.000668	do.	LFC	
do.	do.	38P015	31°58'26"	80°59'54"	211	214	.0008	Furlow (1969)	UFC	Chalky limestone; Oligocene
do.	do.	do.	do.	do.	226	241	.004	do.	do.	do.
do.	Glynn	33H115	31°10'34"	81°30'56"	615	635	.67	Wait (1965)	UFA	Fossiliferous gray limestone
do.	do.	do.	do.	do.	708	712	21.39	do.	do.	do.
do.	do.	do.	do.	do.	800	812	.00134	do.	do.	do.
do.	do.	do.	do.	do.	900	912	.000134	do.	UFSC	Dolomitic limestone
do.	do.	34H132	31°10'20"	81°29'52"	519	539	.936	do.	UFA	Fossiliferous gray limestone
do.	do.	do.	do.	do.	560	580	1.2032	do.	do.	do.
do.	do.	do.	do.	do.	642	662	6.6845	do.	do.	do.
do.	do.	do.	do.	do.	682	702	18.72	do.	do.	do.
do.	do.	do.	do.	do.	744	765	.4011	do.	do.	do.
do.	do.	do.	do.	do.	867	888	.02674	do.	do.	Dolomitic limestone
do.	do.	do.	do.	do.	970	990	.04011	do.	do.	do.
do.	do.	do.	do.	do.	1,046	1,051	.000013	do.	UFSC	Dolomitic limestone; semiconfining layer separating the upper and lower water-bearing zones of the Upper Floridan aquifer
do.	do.	do.	do.	do.	1,053	1,065	.00004	do.	do.	do.
do.	do.	do.	do.	do.	1,072	1,084	.000054	do.	do.	do.
do.	do.	do.	do.	do.	1,134	1,154	.000267	do.	do.	do.
do.	do.	34H337	31°08'24"	81°29'42"	547	567	.0107	Wait and Gregg (1973)	UFC	Miocene unit C of Clarke and others (1990)
do.	do.	do.	do.	do.	567	587	.4	do.	UFA	Sandy limestone; Oligocene
do.	do.	do.	do.	do.	587	607	160.4	do.	do.	Upper Eocene fossiliferous limestone
do.	do.	do.	do.	do.	678	698	120	do.	do.	do.
do.	do.	do.	do.	do.	779	799	6.68	do.	do.	Upper Eocene limestone

Table 1. Vertical hydraulic conductivity of the Floridan aquifer system, coastal Georgia, and adjacent parts of South Carolina and Florida.

[ft, feet; ft/d, feet per day; °, degrees; ', minutes; ", seconds; do., ditto; ?, uncertain; —, depth of sample not reported. State: GA, Georgia; SC, South Carolina. Hydrologic unit: LFC, Lower Floridan aquifer confining unit; UFA, Upper Florida aquifer; UFC, Upper Floridan aquifer confining unit; UFSC, Upper Florida aquifer semiconfining unit; LFA, Lower Floridan aquifer; hydrologic unit identifiers enclosed in parentheses designate equivalent clastic unit]

State	County	Well identifier	Latitude	Longitude	Depth below land surface		Vertical hydraulic conductivity (ft/d)	Source of data	Hydrologic unit	Remarks
					Top of test interval (ft)	Bottom of test interval (ft)				
GA	Glynn	34H337	31°08'24"	81°29'42"	935	954	0.000008	Wait and Gregg (1973)	UFSC	Probably semiconfining layer separating the upper and lower water-bearing zones of the Upper Floridan
do.	do.	do.	do.	do.	1,088	1,105	.000004	do.	LFC	Included in Wait and Gregg's aquifer test interval, but likely Lower Floridan confining unit
do.	do.	do.	do.	do.	1,490	1,503	5.3	do.	LFA	Lower Eocene limestone
SC	Barnwell	BW-243	33°12'09"	81°34'40"	238	238	.16	Bledsoe (1988)	LFC	
do.	do.	BW-246	33°12'55"	81°37'27"	172	172	.0012	do.	do.	
do.	do.	do.	do.	do.	258	258	.034	do.	do.	
do.	do.	BW-308	33°18'42"	81°36'22"	136	136	.566	do.	(UFA)	
do.	do.	do.	do.	do.	169	169	.12735	do.	LFC	
do.	do.	BW-314	33°11'28"	81°30'47"	141	141	.00037	do.	UFC	
do.	do.	do.	do.	do.	62	62	.00048	do.	do.	
do.	do.	BW-316	33°10'57"	81°40'43"	98	98	.00037	do.	LFC	
do.	do.	BW-335	33°08'48"	81°36'27"	161	161	.0019	do.	UFC	
do.	do.	BW-375	33°16'30"	81°34'25"	210.5	211	.00257	do.	do.	
do.	do.	BW-379	33°12'38"	81°39'26"	167.5	168	.00022	do.	LFC	
do.	do.	BW-391	33°15'10"	81°40'21"	262	262	.04	do.	do.	
do.	Beaufort	BFT-1672	32°15'30"	80°39'34"	—	—	.0056	Smith (1994)	UFC	
do.	do.	do.	do.	do.	—	—	.0056	do.	do.	
do.	do.	do.	do.	do.	—	—	.0141	do.	do.	
do.	do.	do.	do.	do.	—	—	.0721	do.	do.	
do.		BFT-1674	32°16'36"	80°42'46"	—	—	.01082	do.	do.	
do.	do.	do.	do.	do.	—	—	.00852	do.	do.	
do.	do.	do.	do.	do.	—	—	.22948	do.	do.	
do.	do.	do.	do.	do.	—	—	.000557	do.	do.	
do.	do.	BFT-1675	32°11'15"	80°40'16"	—	—	.00279	do.	do.	
do.	do.	do.	do.	do.	—	—	0.005570	do.	do.	

Table 1. Vertical hydraulic conductivity of the Floridan aquifer system, coastal Georgia, and adjacent parts of South Carolina and Florida.

[ft, feet; ft/d, feet per day; °, degrees; ', minutes; ", seconds; do., ditto; ?, uncertain; —, depth of sample not reported. State: GA, Georgia; SC, South Carolina. Hydrologic unit: LFC, Lower Floridan aquifer confining unit; UFA, Upper Florida aquifer; UFC, Upper Floridan aquifer confining unit; UFSC, Upper Florida aquifer semiconfining unit; LFA, Lower Floridan aquifer; hydrologic unit identifiers enclosed in parentheses designate equivalent clastic unit]

State	County	Well identifier	Latitude	Longitude	Depth below land surface		Vertical hydraulic conductivity (ft/d)	Source of data	Hydrologic unit	Remarks
					Top of test interval (ft)	Bottom of test interval (ft)				
SC	Beaufort	BFT-1676	32°14'40"	80°40'25"	—	—	.00279	Smith (1994)	UFC	
do.	do.	do.	do.	do.	—	—	3.01896	do.	do.	
do.	do.	do.	do.	do.	—	—	.032786	do.	do.	
do.	do.	do.	do.	do.	—	—	.00557	do.	do.	
do.	do.	BFT-1677	32°17'38"	80°42'03"	—	—	.008525	do.	do.	
do.	do.	do.	do.	do.	—	—	.001213	do.	do.	
do.	do.	BFT-1679	32°12'42"	80°37'40"	—	—	.000426	do.	do.	
do.	do.	do.	do.	do.	—	—	.426229	do.	do.	
do.	do.	do.	do.	do.	—	—	.006229	do.	do.	
do.	do.	BFT-1680	32°17'16"	80°39'49"	—	—	.002787	do.	do.	
do.	do.	do.	do.	do.	—	—	.008525	do.	do.	
do.	do.	do.	do.	do.	—	—	.2	do.	do.	
do.	do.	do.	do.	do.	—	—	.2	do.	do.	
do.	do.	BFT-1809	32°16'03"	80°43'22"	—	—	.003082	do.	do.	
do.	do.	do.	do.	do.	—	—	.003934	do.	do.	
do.	do.	BFT-2249	32°04'02"	80°44'41"	52.4	52.8	.000252	Geotechnics, Laboratory Test Report, Project No. 2000-228-01, 22 p., September 5, 2000	do.	
do.	do.	do.	do.	do.	67.5	68	.000232	do.	do.	
do.	do.	BFT-2250	32°04'07"	80°40'42"	78.15	78.65	.000249	do.	do.	
do.	do.	BFT-2295	32°04'14"	80°42'55"	43.5	43.9	.006521	Geotechnics, Laboratory Test Report, Project No. 2001-225-01, 29 p., August 29, 2001	UFC(?)	Coarse-grained valley fill
do.	do.	BFT-2297	32°09'18"	80°49'08"	36.3	36.8	.48195	do.	UFC(?)	Unconfined sand
do.	do.	do.	do.	do.	56.8	57.3	.000539	do.	UFC(?)	Fine-grained valley fill?
do.	do.	do.	do.	do.	72.3	72.8	.000454	do.	UFC(?)	Fine-grained valley fill?

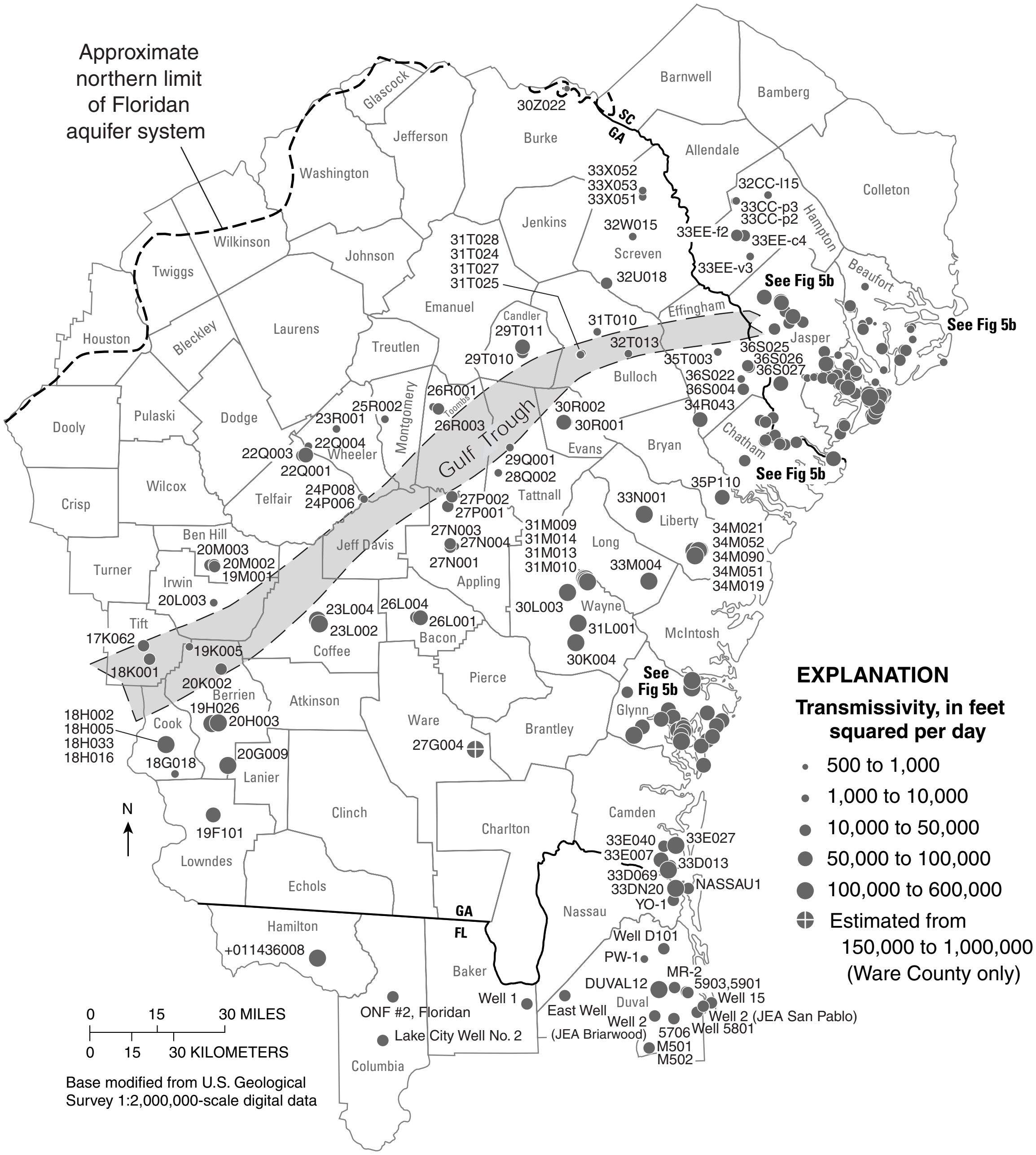

Figure 5a. Transmissivity of the Upper Floridan aquifer and equivalent clastic units in coastal Georgia and adjacent parts of South Carolina and Florida.

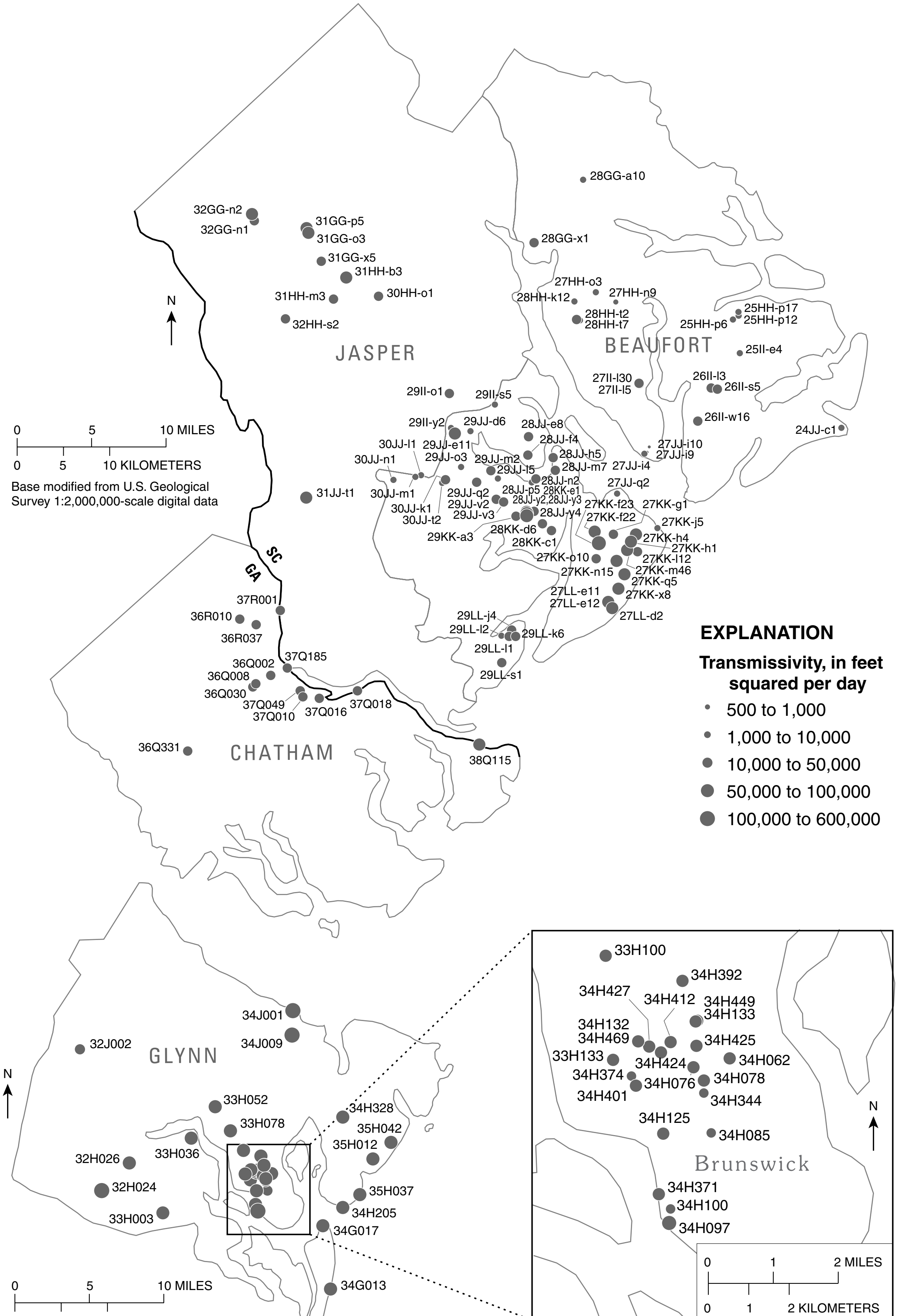

Figure 5b. Transmissivity of the Upper Floridan aquifer in Chatham and Glynn Counties, Georgia, and Beaufort and Jasper Counties, South Carolina.

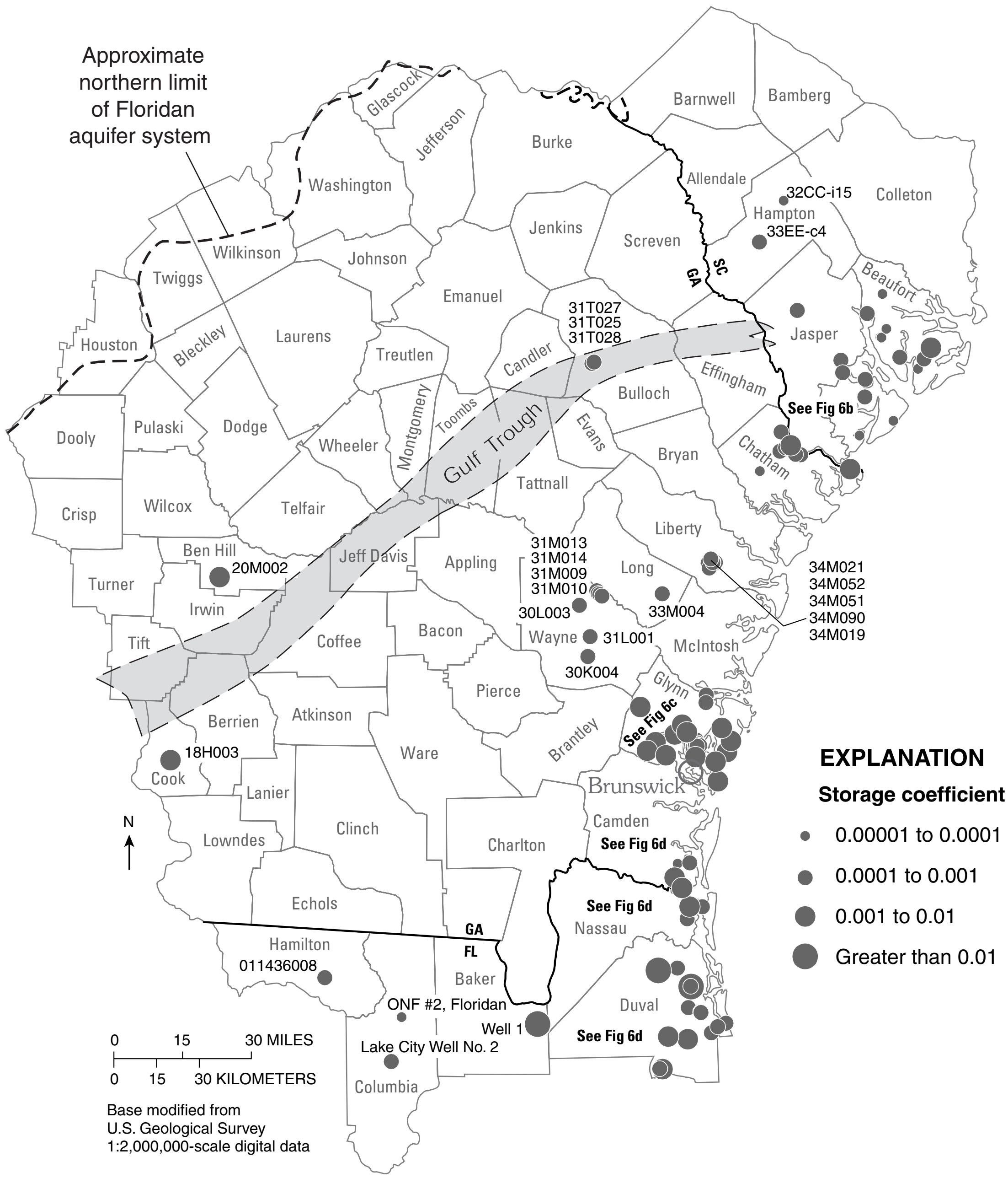

Figure 6a. Storage coefficient of the Upper Floridan aquifer and equivalent clastic units in coastal Georgia and adjacent parts of South Carolina and Florida.

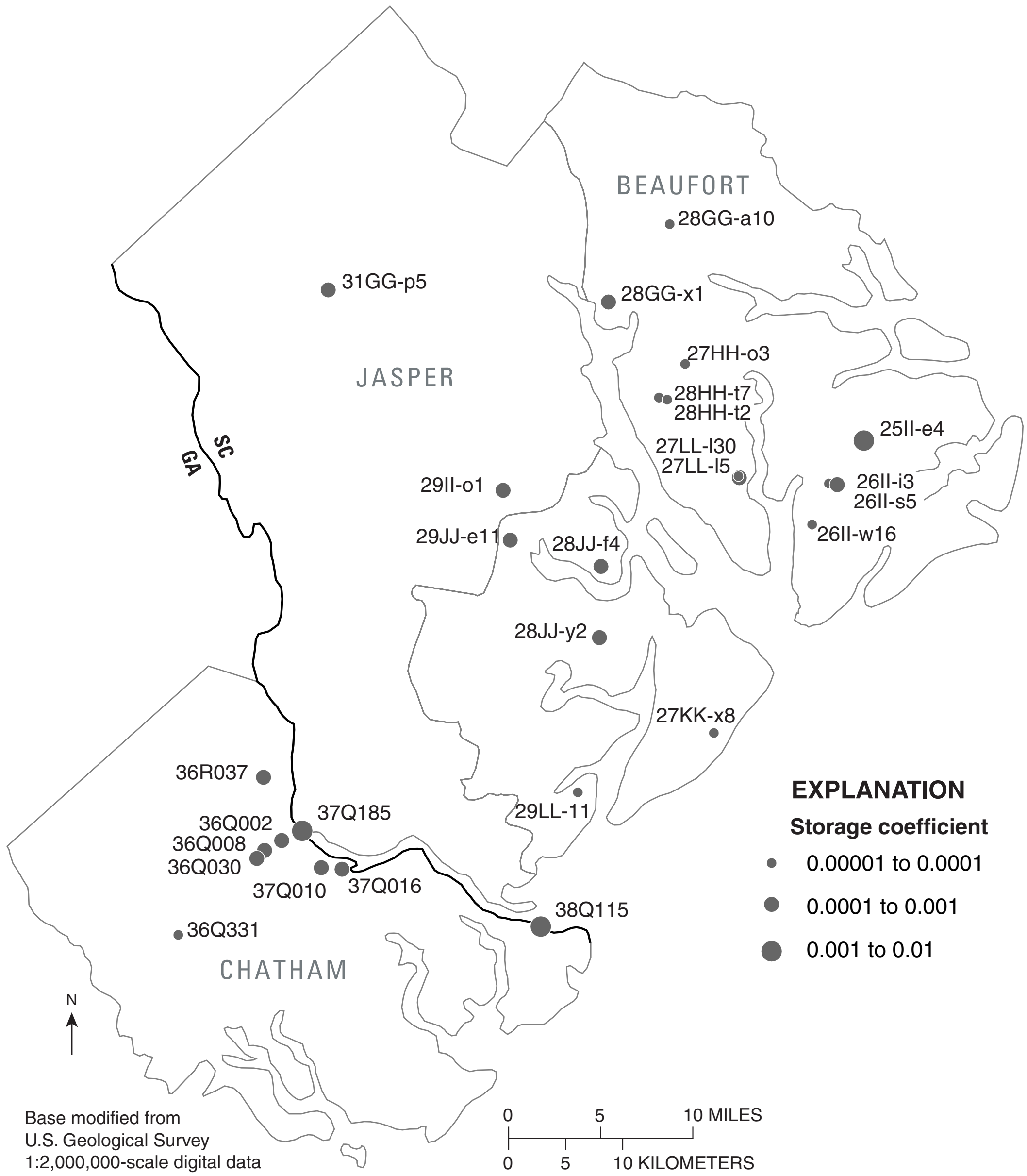

Figure 6b. Storage coefficient of the Upper Floridan aquifer in Chatham County, Georgia, and Beaufort and Jasper Counties, South Carolina.

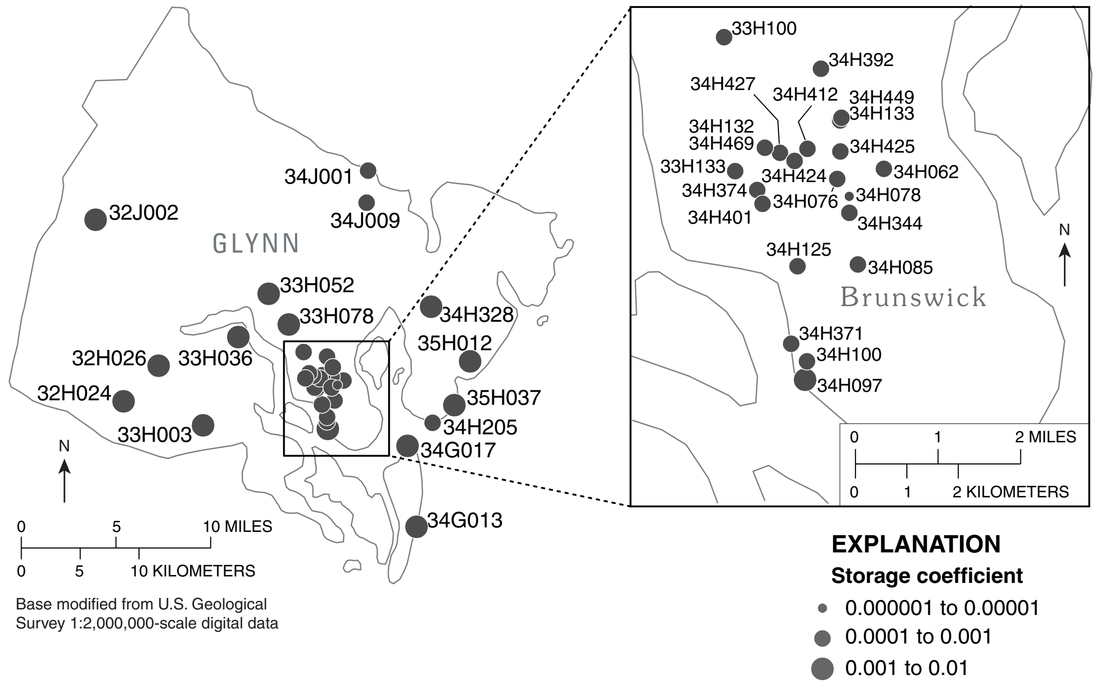

Figure 6c. Storage coefficient of the Upper Floridan aquifer in Glynn County, Georgia.

Based on Spechler's (1994) remarks, the transmissivity at these multi-aquifer wells is assumed to be mostly representative of the Lower Floridan aquifer (fig. 7c). Transmissivity at these multi-aquifer wells ranges from 2,100 ft^2/d in well D-168, to 200,000 ft^2/d in well M503 (Appendix A, fig. 7c). The higher transmissivities in Duval County, Fla., likely are dependent on whether a solution feature is present in the vicinity of the well (G.G. Phelps, U.S. Geological Survey, oral commun., 2002).

Storage-coefficient data for the Lower Floridan aquifer are limited to three estimates in Barnwell and Allendale Counties, S.C., and to six estimates from multi-aquifer wells in Duval County, Fla. (Appendix A, fig. 8). For the South Carolina tests, the storage coefficient ranges from 0.0003 to 0.0004, indicative of a confined aquifer (Lohman, 1972; Heath, 1983). The storage coefficients for the multi-aquifer Upper and Lower Floridan wells in Duval County, Fla., range from 0.00002 to 0.02, with the latter value higher than the range generally cited for a confined aquifer (Lohman, 1972; Heath, 1983). In the Brunswick, Ga., area, a similar wide range of storage-coefficient values for the Upper Floridan aquifer were attributed to either pumping interferences during testing or to leakage from deeper zones (Jones and Maslia, 1994).

Although transmissivity and storage-coefficient data are unavailable for the Fernandina permeable zone of the Lower Floridan aquifer, borehole-geophysical logs from wells in the Brunswick, Ga., and Fernandina Beach, Fla., areas, show that large cavities are present in this zone, suggesting high transmissivity (Krause and Randolph, 1989; Jones and others, 2002; Phelps and Spechler, 1997). Krause and Randolph (1989) suggested that the Fernandina permeable zone may have transmissivity comparable to southern Florida's "boulder zone," which Meyer (1974) reported to be greater than 3,000,000 ft^2/d.

Vertical Hydraulic Conductivity

Estimates of vertical hydraulic conductivity for the study area are sparse and restricted to the Brunswick, Ga., area (Wait, 1965; Wait and Gregg, 1973), the Savannah River Site area (Bledsoe, 1988; Leeth and others, 1996), the Savannah–Hilton Head Island area (Counts and Donsky, 1963; Furlow, 1969), and the Port Royal Sound area (Smith, 1994). Clarke and others (1990) summarized data for the Brunswick and Savannah, Ga., areas and related values to more-current hydrogeologic nomenclature. Vertical hydraulic-conductivity data for both confining units and aquifer units are listed in table 1, and locations are shown in figure 9; values are plotted graphically by hydrogeologic unit in figure 10.

Thirty-nine measurements of vertical hydraulic conductivity for the Upper Floridan confining unit were compiled from core-permeameter analysis of samples collected at 17 sites, 12 of which are offshore of Tybee Island, Ga., and Hilton Head Island, S.C. (table 1, fig. 9). Vertical hydraulic conductivity ranges from 0.000232 ft/d at well BFT-2249 to slightly greater than 3 ft/d at well BFT-1676, both of which are located offshore of Hilton Head Island, S.C. Vertical hydraulic conductivity of the Upper Floridan confining unit at Brunswick, Glynn County, Ga., is represented by a single value of 0.0107 ft/d at well 34H337 (table 1). In the Savannah River Site area, vertical hydraulic conductivity of the confining unit at three sites ranges from 0.00037 ft/d at well BW-314 to 0.00257 ft/d at well BW-375.

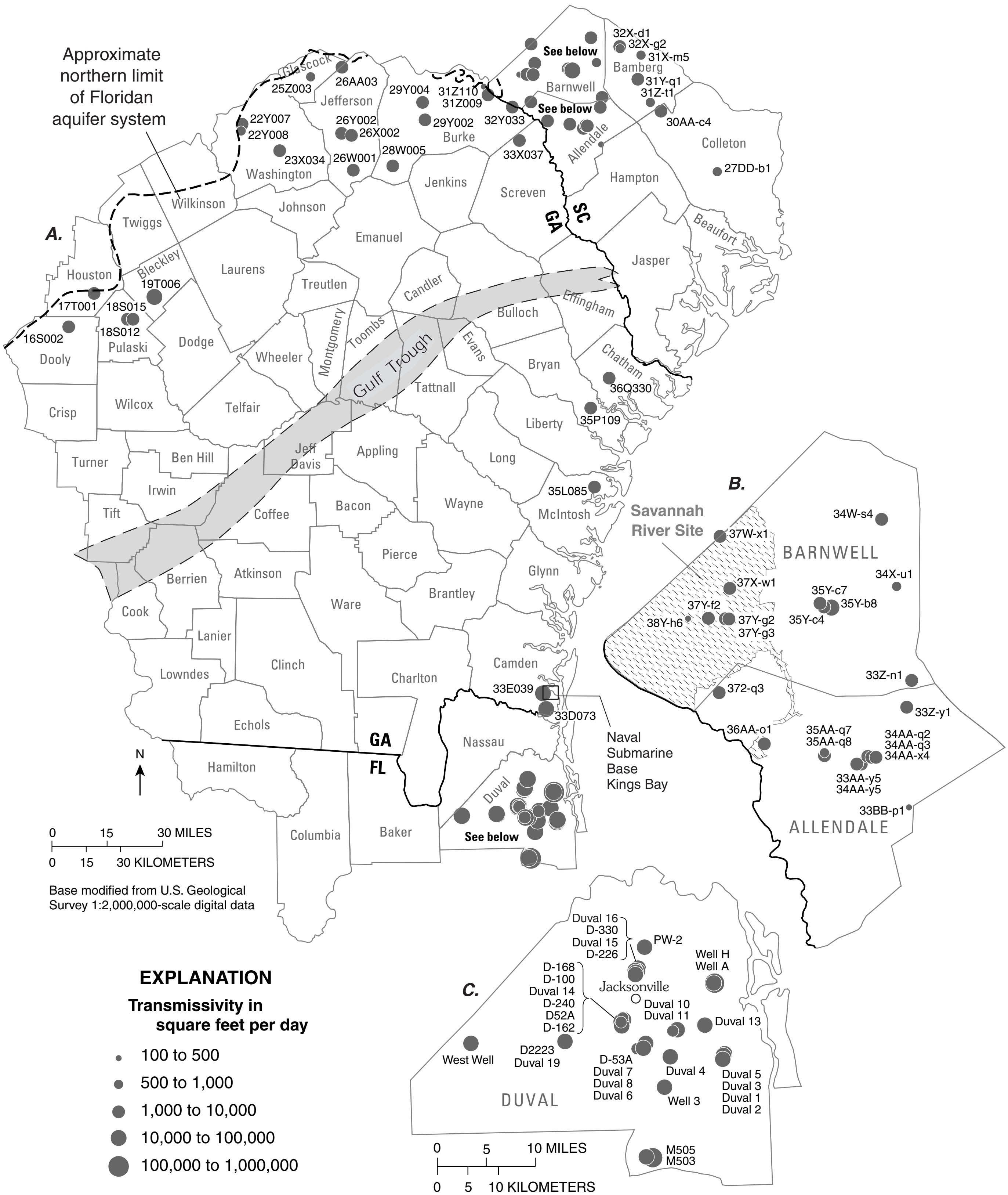

Figure 7. Transmissivity of the Lower Floridan aquifer and equivalent clastic units in (*A*) coastal Georgia and adjacent parts of South Carolina and Florida; (*B*) Barnwell and Allendale Counties, South Carolina; and (*C*) multi-aquifer wells completed in the Upper and Lower Floridan aquifers in Duval County, Florida.

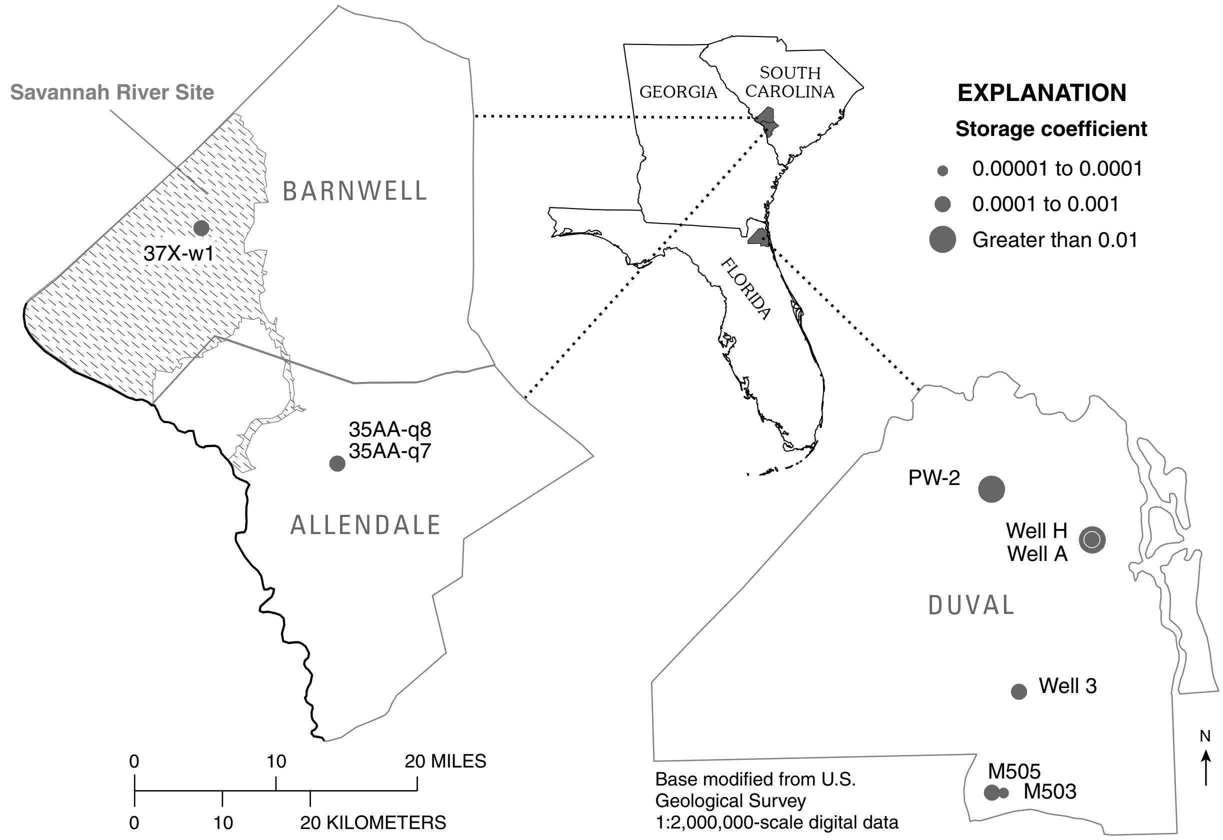

Figure 8. Storage coefficient of the Lower Floridan aquifer and equivalent clastic units in Allendale and Barnwell Counties, South Carolina, and at multi-aquifer wells completed in the Upper and Lower Floridan aquifers in Duval County, Florida.

In addition to vertical hydraulic conductivity values compiled from core samples, Hayes (1979) estimated values for the Upper Floridan confining unit in Beaufort County, S.C., based on aquifer-test results analyzed using the Hantush–Jacob leaky aquifer analysis method (Hantush and Jacob, 1955). Although exact locations of well sites were not provided in the Hayes (1979) report, estimates of vertical hydraulic conductivity range from 0.005 ft/d at the Port Royal Clay Company in Port Royal, S.C., to 0.015 ft/d at the Burton wellfield at Burton, S.C. Hayes (1979) concluded that an average vertical hydraulic conductivity for this unit for Beaufort and Jasper Counties, S.C., would be 0.001 ft/d. Estimated vertical hydraulic conductivities reported by Hayes (1979) likely are somewhat higher than actual values because the Hantush–Jacob method does not distinguish between leakage coming from units above or below an aquifer. Thus, it is possible that some of the leakage was derived from underlying units.

Vertical hydraulic conductivity of the Upper Floridan aquifer was compiled for five sites, three of which are located in the Brunswick, Glynn County, Ga., area (table 1, figs. 9–10). Reported vertical hydraulic conductivity ranges from 0.00134 ft/d at well 33H115 to 160.4 ft/d at well 34H337. Lower vertical hydraulic conductivity was measured in parts of the aquifer that are dominated by matrix permeability; higher values occur where dissolution of rock has produced secondary permeability.

At Brunswick, Glynn County, Ga., upper and lower water-bearing zones of the Upper Floridan aquifer are separated by a semiconfining unit consisting of low-permeability limestone (Wait and Gregg, 1973). Vertical hydraulic conductivity for this unit was determined at three sites and ranges from 0.000008 ft/d at well 34H337, to 0.000134 ft/d at well 33H115 (table 1, figs. 9–10).

Vertical hydraulic conductivity of the Lower Floridan confining unit was compiled from 10 samples at 9 sites, most of which are located in Barnwell County, S.C., in the vicinity of the Savannah River Site in the northeastern part of the study area (table 1, figs. 9–10). Near the Savannah River Site, values for the Lower Floridan (Gordon) confining unit range from 0.00022 ft/d at well BW-379 to 0.16 ft/d at well BW-243 (table 1, fig. 9). Elsewhere, vertical hydraulic conductivity for this unit is 0.000004 ft/d at well 34H337 at Brunswick, Ga., and 0.000668 ft/d at well 36R006 near Savannah, Chatham County, Ga. (table 1, fig. 9).

Only one estimate for the Lower Floridan aquifer is available at a well at Brunswick, Ga. (table 1, fig. 9). At well 34H337, the vertical hydraulic conductivity is 5.3 ft/d at a depth of 1,490–1,503 ft below land surface; this value is comparable to values for the Upper Floridan aquifer.

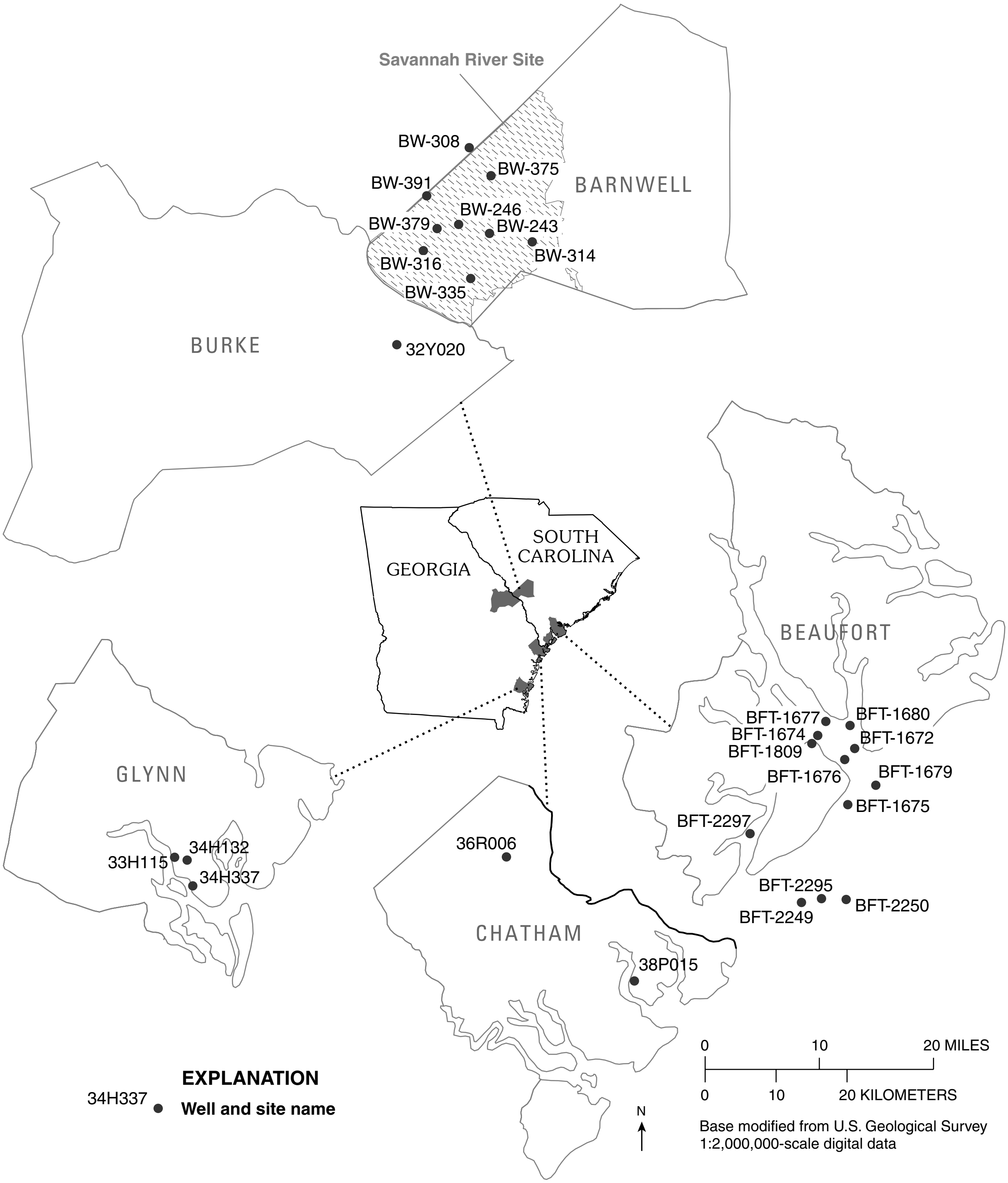

Figure 9. Location of sites with vertical hydraulic-conductivity data for the Floridan aquifer system, Burke, Chatham, and Glynn Counties, Georgia, and Barnwell and Beaufort Counties, South Carolina.

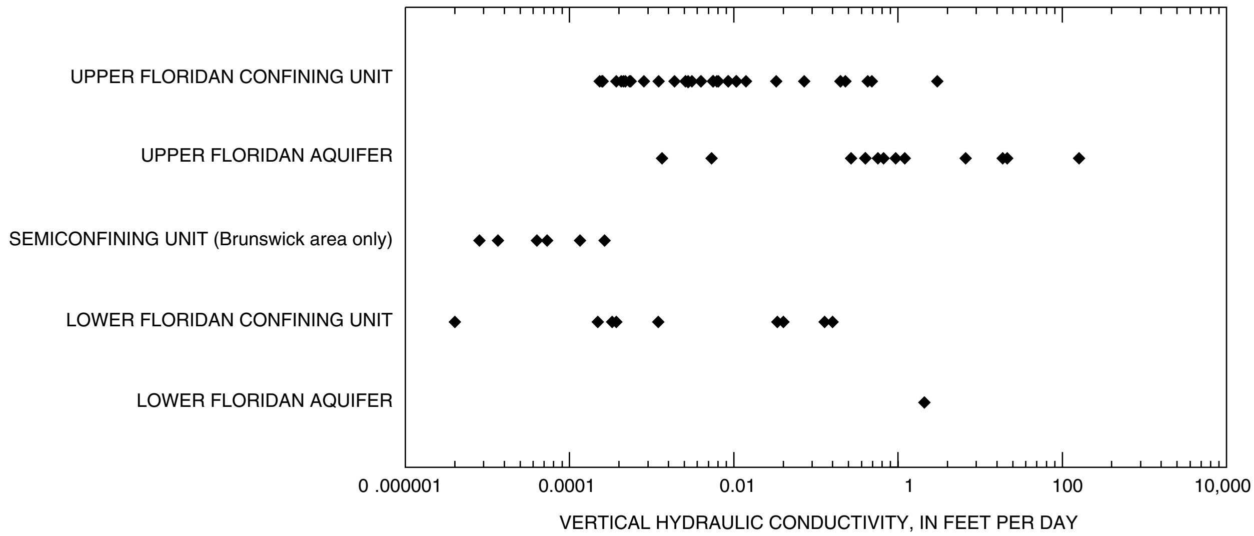

Figure 10. Distribution of vertical hydraulic conductivity for selected hydrogeologic units of Floridan aquifer system.

SUMMARY

The Coastal Sound Science Initiative is a series of scientific and feasibility studies to support development of the State of Georgia's final strategy to protect the Upper Floridan aquifer from saltwater contamination. To support this effort, detailed information regarding the hydraulic properties of Floridan aquifer system and equivalent clastic sediments in a 67-county area of coastal Georgia and adjacent parts of South Carolina and Florida were compiled and evaluated to provide data necessary for development of ground-water flow and solute-transport models. Data include transmissivity at 324 wells, storage coefficient at 115 wells, and vertical hydraulic conductivity of 72 core samples collected from 27 sites.

In the upper Coastal Plain, sediments equivalent to the Floridan aquifer consist of thin clastic sediments; in the lower Coastal Plain, the aquifers consist of a thick accumulation of carbonate rocks that commonly have solution features and in some places have fractures. Prominent structural features in the area—the Southeast Georgia Embayment, the Beaufort Arch, and the Gulf Trough—influence the thickness and hydraulic properties of sediments comprising the hydrogeologic units. The Southeast Georgia Embayment is a shallow east-to-northeast-plunging syncline in which Coastal Plain deposits are thickest in the study area. In the vicinity of the Beaufort Arch, centered near Hilton Head Island, S.C., Coastal Plain deposits are thinner and are at shallower depths than near the Southeast Georgia Embayment. The Gulf Trough is a zone of relatively thick accumulations of fine-grained clastic sediments and argillaceous carbonates in which permeability and thickness of Coastal Plain deposits are low.

Hydraulic properties of the Upper Floridan aquifer vary greatly in the study area owing to the heterogeneity (and locally to anisotropy) of the aquifer and to the confinement (or lack thereof) provided by confining units. Transmissivity of the Upper Floridan aquifer and equivalent clastic units was determined at 239 wells and ranges from 530 feet squared per day (ft^2/d) in Beaufort County, S.C., to 600,000 ft^2/d in Coffee County, Ga. In carbonate rocks of the lower Coastal Plain, transmissivity of the Upper Floridan aquifer generally is greater than 20,000 ft^2/d, with values exceeding 100,000 ft^2/d in the southeastern and southwestern parts of the study area (generally the area of greatest aquifer thickness). Transmissivity of the Upper Floridan aquifer generally is less than 10,000 ft^2/d north of the Gulf Trough where sediments comprising the aquifer, or its equivalents, are thin and consist largely of clastic sediments, and in the vicinity of the Gulf Trough where low-permeability rocks and sediments are present.

Large variability in transmissivity in Camden and Glynn Counties, Ga., and Nassau County, Fla., indicates anisotropic distribution of hydraulic properties, which may result from fractures or solution openings in the carbonate rocks. Storage coefficient of the Upper Floridan aquifer was determined at 106 wells and ranges from about 0.00004 in well 27HH-o3 in Beaufort County, S.C., to 0.04 in well 1 in Baker County, Fla. Although higher storage coefficients normally would be expected in updip areas where the aquifer is semiconfined or unconfined, high storage coefficients have been reported in some downdip areas where the aquifer is deeply buried and confined. In the Brunswick, Ga., area, previous investigators attributed a wide range of storage-coefficient values either to pumping interferences during aquifer tests or to leakage from deeper zones.

Transmissivity of the Lower Floridan aquifer and equivalent updip clastic units was determined at 53 wells, ranging from about 170 ft^2/d in Barnwell County, S.C., to about 43,000 ft^2/d in Camden County, Ga. Transmissivity of the Lower Floridan aquifer is greatest where the aquifer is thickest—in southeastern Georgia and northeastern Florida—where estimates of transmissivity are greater than 10,000 ft^2/d and in one well where the value is as high as 200,000 ft^2/d. Although no aquifer tests were conducted in wells completed solely in the Lower Floridan aquifer in northeastern Florida, it is likely that transmissivity of this aquifer is high, possibly exceeding 100,000 ft^2/d. Transmissivity of the Lower Floridan aquifer in northeastern Florida was estimated from tests conducted in multi-aquifer production wells located in Duval County, Fla., that are open to the Upper Floridan aquifer and to a high-permeability freshwater zone at the top of the Lower Floridan aquifer. Transmissivity at these multi-aquifer wells ranges from 2,100 to 200,000 ft^2/d, with larger transmissivities dependent on whether a solution feature is present in the vicinity of the well.

Storage-coefficient data for the Lower Floridan aquifer are limited to three estimates in Barnwell and Allendale Counties, S.C., and to estimates determined from six multi-aquifer tests in Duval County, Fla. In the South Carolina tests, the storage coefficient ranges from 0.0003 to 0.0004 and is indicative of a confined aquifer. The storage-coefficient values at the combined Upper and Lower Floridan wells in Duval County, Fla., ranges from 0.00002 to 0.02, with the latter value higher than the range generally cited for a confined aquifer. In the Brunswick, Ga., area, previous investigators attributed a similar wide range in storage coefficient for the Upper Floridan aquifer either to pumping interferences during aquifer tests or to leakage of water from deeper zones.

Thirty-nine measurements of vertical hydraulic conductivity for the Upper Floridan confining unit were determined from core-permeameter analysis of samples collected from 17 sites, most of which are located at Tybee Island, Ga., and offshore of Hilton Head Island, S.C. Vertical hydraulic conductivity ranges from 0.000232 feet per day (ft/d) to slightly greater than 3 ft/d at 13 sites located at Tybee Island, Ga., and offshore of Hilton Head Island, S.C; is 0.0107 ft/d at 1 site in Brunswick, Ga.; and ranges from 0.00037 to 0.00257 ft/d at 3 sites in the vicinity of the Savannah River Site. In addition to values determined from core samples, vertical hydraulic conductivity of the Upper Floridan confining unit in Beaufort County, S.C., was estimated by a previous investigator using the Hantush–Jacob leaky aquifer analysis method—estimates range from 0.005 ft/d at Port Royal, S.C., to 0.015 ft/d at Burton, S.C; however, these estimates likely are high due to leakage of water from underlying units.

Vertical hydraulic conductivity of the Upper Floridan aquifer was determined at five sites, mostly located in the Brunswick, Ga., area, ranging from 0.00134 ft/d to 160 ft/d. Lower vertical hydraulic conductivity was measured in samples collected from parts of the aquifer that are dominated by matrix permeability; higher values occur where dissolution has produced secondary permeability. Vertical hydraulic conductivity for the semiconfining unit separating the upper and lower water-bearing zones of the Upper Floridan aquifer at Brunswick, Ga., range from 0.000008 to 0.000134 ft/d.

Vertical hydraulic conductivity of the Lower Floridan confining unit was determined from 10 samples at nine sites, most of which are located in the vicinity of the Savannah River Site in the northeastern part of the study area. In this area, values for the Lower Floridan (Gordon) confining unit range from 0.00022 to 0.16 ft/d. Elsewhere, vertical hydraulic conductivity for this unit is 0.000004 ft/d at one well at Brunswick, Ga., and 0.000668 ft/d at one well near Savannah, Ga. The vertical hydraulic conductivity of the Lower Floridan aquifer measured in a core sample collected from a well at Brunswick, Ga., is 5.3 ft/d; this value is comparable to values for the Upper Floridan aquifer.

SELECTED REFERENCES

Applied Coastal Research Laboratory, 2002, Gulf Trough and Satilla Line data analysis: Georgia Geologic Survey Project Report 48, variously paged.

Aucott, W.R., and Newcome, Roy, Jr., 1986, Selected aquifer test information for the Coastal Plain aquifers of South Carolina: U.S. Geological Survey Water-Resources Investigations Report 86-4159, 30 p.

Bentall, Ray, 1963a, Methods of determining permeability, transmissibility, and drawdown: U.S. Geological Survey Water-Supply Paper 1536-I, 104 p.

Bentall, Ray, 1963b, Shortcuts and special problems in aquifer tests: U.S. Geological Survey Water-Supply Paper 1545-C, 117 p.

Bentley, C.B., 1977a, Surface-water and ground-water features, Clay County, Florida: U.S. Geological Survey Water-Resources Investigations Report 77-87, 59 p.

Bentley, C.B., 1977b, Aquifer-test analysis for the Floridan aquifer in Flagler, Putnam, and St. Johns Counties, Florida: U.S. Geological Survey Water-Supply Paper 77-36, 50 p.

Bentley, C.B., 1979, Aquifer coefficients determined from multiple well effects, Fernandina Beach, Florida: Ground Water, v. 17, no. 6, p. 525–531.

Bledsoe, H.W., 1988, SRP baseline hydrogeologic investigation – Phase III: Aiken, S.C., E.I. duPont de Nemours & Co., Savannah River Laboratory, DPST-88-627, variously paged.

Brooks, Rebekah, Clarke, J.S., and Faye, R.E., 1985, Hydrogeology of the Gordon aquifer system of east-central Georgia: Georgia Geologic Survey Information Circular 75, 41 p.

Burt, R.A., Belval, D.L., Crouch, M.S., and Hughes, W.B., 1987, Geohydrologic data from Port Royal Sound, Beaufort County, South Carolina: U.S. Geological Survey Open-File Report 86-497, 67 p.

Bush, P.W., 1988, Simulation of saltwater movement in the Floridan aquifer system, Hilton Head Island, South Carolina: U.S. Geological Survey Water-Supply Paper 2331, 19 p.

Bush, P.W., and Johnston, R.H., 1988, Ground-water hydraulics, regional flow, and ground-water development of the Floridan aquifer system in Florida and in parts of Georgia and South Carolina: U.S. Geological Survey Professional Paper 1403-C, 80 p.

Ceryak, Ron, Knapp, M.S., and Burnson, Terry, 1983, The geology and water resources of the upper Suwannee River Basin, Florida: Florida Bureau of Geology Report of Investigations No. 87, 165 p.

Clark, W.Z, and Zisa, A.C., 1976, Physiographic map of Georgia: Georgia Department of Natural Resources, Geologic Survey Branch, Atlanta, Georgia. 1 map, scale 1:2,000,000.

Clarke, J.S., 2003, The surficial and Brunswick aquifer systems—alternative ground-water resources for coastal Georgia, *in*, Hatcher, K.J., ed., Proceedings of the 2003 Georgia Water Resources Conference, held April 23–24, 2003, at the University of Georgia: Institute of Ecology, the University of Georgia, Athens, Georgia, p. 664–671.

Clarke, J.S., Falls, W.F., Edwards, L.E., Frederiksen, N.O., Bybell, L.M., Gibson, T.G., and Litwin, R.J., 1994, Geologic, hydrologic, and water-quality data for a multi-aquifer system in Coastal Plain sediments near Millers Pond, Burke County, Georgia: Georgia Geologic Survey Information Circular 96, 34 p.

Clarke, J.S., Falls, W.F., Edwards, L.E., Frederiksen, N.O., Bybell, L.M., Gibson, T.G., Gohn, G.S., and Fleming, Farley, 1996, Hydrogeologic data and aquifer interconnection in a multi-aquifer system in Coastal Plain sediments near Millhaven, Screven Co., Georgia: Georgia Geologic Survey Information Circular 99, 43 p.

Clarke, J.S., Hacke, C.M., and Peck, M.F., 1990, Geology and ground-water resources of the coastal area of Georgia: Georgia Geologic Survey Bulletin 113, 106 p.

Clarke, J.S., and Krause, R.E., 2000, Design, revision, and application of ground-water flow models for simulation of selected water-management scenarios in the coastal area of Georgia and adjacent parts of South Carolina and Florida: U.S. Geological Survey Water-Resources Investigations Report 00-4084, 93 p.

Clarke, J.S., and West, C.T., 1998, Simulation of ground-water flow and stream-aquifer relations in the vicinity of the Savannah River Site, Georgia and South Carolina, predevelopment through 1992: U.S. Geological Survey Water-Resources Investigations Report 98-4062, 134 p.

Cooper, H.H., and Jacob, C.E., 1946, A generalized graphical method for evaluating formation constants and summarizing well field history: Transactions American Geophysical Union, v. 27, no. 4, p. 526–534.

Cooper, H.H., and Warren, M.A., 1945, The perennial yield of artesian water in the coastal area of Georgia and northeastern Florida: Economic Geology, v. XL, no. 4, p. 263–282.

Counts, H.B., and Donsky, Ellis, 1963, Salt-water encroachment, geology, and ground-water resources of the Savannah area, Georgia and South Carolina: U.S. Geological Survey Water-Supply Paper 1611, 100 p.

Dyar, T.R., Tasker, G.D., and Wait, R.L., 1972, Hydrology of the Riceboro area, coastal Georgia: U.S. Geological Survey Final Report To Georgia Water Quality Control Board and Interstate Paper Corporation, 74 p.

Falls, W.F., Baum, J.S., Harrelson, L.G., and Brown, L.H., 1997, Geology and hydrogeology of Cretaceous and Tertiary strata, and confinement in the vicinity of the U.S. Department of Energy Savannah River Site, South Carolina and Georgia: U.S. Geological Survey Water-Resources Investigations Report 97-4245, 125 p.

Faye, R.E., and Mayer, G.C., 1996, Simulation of ground-water flow in southeastern Coastal Plain clastic aquifers in Georgia and adjacent parts of Alabama and South Carolina: U.S. Geological Survey Professional Paper 1410-F, 77 p.

Faye, R.E., and McFadden, K.W., 1986, Hydraulic characteristics of Upper Cretaceous and Lower Tertiary clastic aquifers – eastern Alabama, Georgia, and western South Carolina: U.S. Geological Survey Water-Resources Investigations Report 86-4210, 22 p.

Faye, R.E., and Smith, W.G., 1994, Relations of borehole geophysics to the horizontal hydraulic conductivity and dissolved-solids concentration in water of clastic Coastal Plain aquifers in the Southeastern United States: U.S. Geological Survey Water-Supply Paper 2414, 33 p.

Ferris, J.G., Knowles, D.B., Brown, R.H., and Stallman, R.W., 1962, Theory of aquifer tests: U.S. Geological Survey Water-Supply Paper 1536-E, 174 p.

Furlow, J.W., 1969, Stratigraphy and economic geology of the eastern Chatham County phosphate deposit: Georgia Department of Mines, Mining, and Geology Bulletin 82, 40 p.

Gawne, C.E., and Park, A.D., 1992, Water-supply potential of the middle Floridan aquifer in southern Beaufort County, South Carolina (report to the Town of Hilton Head Island Water Commission): South Carolina Water Resources Commission, Beaufort, S.C., 34 p.

Gelbaum, Carol, 1978, The geology and ground water of the Gulf Trough, *in* Short Contributions to the geology of Georgia: Georgia Geologic Survey Bulletin 93, p. 38–49.

Georgia Environmental Protection Division, 1997, Interim strategy for managing saltwater intrusion in the Upper Floridan aquifer of southeast Georgia, April 23, 1997: Atlanta, Ga., Georgia Environmental Protection Division, 19 p.

Gregg, D.O., and Zimmerman, E.A., 1974, Geologic and hydrologic control of chloride contamination in aquifers at Brunswick, Glynn County, Georgia: U.S. Geological Water-Supply Paper 2029-D, 44 p.

Hantush, M.S., 1960, Modification of the theory of leaky aquifers: Journal of Geophysical Research, v. 65, no. 11, p. 3713–3725.

Hantush, M.S., and Jacob, C.E., 1955, Non-steady radial flow in an infinite leaky aquifer: Transactions American Geophysical Union, v. 36, no. 1, p. 95–100.

Harrelson, L.G., and Falls, W.F., 2003, Hydrogeology and aquifer tests in the Floridan aquifer system at selected sites, coastal Georgia, 2001, *in* Leeth, D.C., Clarke, J.S., Craigg, S.D., and Wipperfurth, C.J., 2003, Ground-water conditions and studies in Georgia, 2001: U.S. Geological Survey Water-Resources Investigations Report 03-4032, p. 82-87.

Hayes, L.R., 1979, The ground-water resources of Beaufort, Colleton, Hampton, and Jasper Counties, South Carolina: South Carolina Water Resources Commission Report No. 9, 91 p.

Heath, R.C., 1983, Basic ground-water hydrology: U.S. Geological Survey Water-Supply Paper 2220, 85 p.

Jacob, C.E., 1963, Correction of drawdowns caused by a pumped well tapping less than the full thickness of an aquifer: *in* U.S. Geological Survey Water-Supply Paper 1536-I, p. 272–292.

Jones, L.E., and Maslia, M.L., 1994, Selected ground-water data, and results of aquifer tests for the Upper Floridan aquifer, Brunswick, Glynn County, Georgia, area: U.S. Geological Survey Open-File Report 94-520, 107 p.

Jones, L.E., Prowell, D.C., and Maslia, M.L., 2002, Hydrogeology and water quality (1978) of the Floridan aquifer system at U.S. Geological Survey Test Well 26, on Colonels Island, near Brunswick, Georgia: U.S. Geological Survey Water-Resources Investigations Report 02-4020, 44 p.

Kellam, M.F., and Gorday, L.L., 1990, Hydrogeology of the Gulf Trough – Apalachicola embayment area, Georgia: Georgia Geologic Survey Bulletin 94, 74 p.

Krause, R.E., and Randolph, R.B., 1989, Hydrology of the Floridan aquifer system in southeast Georgia and adjacent parts of Florida and South Carolina: U.S. Geological Survey Professional Paper 1403-D, 65 p.

Kruseman, G.P., and de Ritter, N.A., 1994, Analysis and evaluation of pumping test data: Publication 47, International Institute For Land Reclamation and Improvement, The Netherlands, 377 p.

Leeth, D.C., Falls, W.F., Edwards, L.E., Fredricksen, N.O., and Fleming, R.F., 1996, Geologic, hydrologic, and water-chemistry data for a multi-aquifer system in Coastal Plain sediments near Girard, Burke County, Georgia: Georgia Geologic Survey Information Circular 100, 26 p.

Leve, G.W., 1966, Ground water in Duval and Nassau Counties, Florida: Florida Geological Survey Report of Investigations no. 43, 91 p.

Leve, G.W., 1983, Relation of concealed faults to water quality and the formation of solution features in the Floridan aquifer, northeastern Florida: Journal of Hydrology, v. 61, no. 4, p. 251–264.

Logan, W.R., and Euler, G.M., 1989, Geology and ground-water resources of Allendale, Bamburg, and Barnwell Counties and part of Aiken County South Carolina: South Carolina Water Resources Commission Report Number 155, 113 p.

Lohman, S.W., 1972, Ground-water hydraulics: U.S. Geological Survey Professional Paper 708, 70 p.

Maslia, M.L., 1987, Regional and local tensor components of a fractured carbonate aquifer: *in* Farmer, I.W., Daemen, J.J.K., Desai, C.S., Glass, C.E., and Neuman, S.P., *eds.,* Proceedings of the 28th U.S. Symposium on rock mechanics, University of Arizona, June 29–July 1, 1987, p. 441–452.

Maslia, M.L., and Prowell, D.C., 1990, Effects of faults on fluid flow and chloride contamination in a carbonate aquifer system: Journal of Hydrology, v. 115, nos. 1–4, p. 1–49.

Matthews, S.E., and Krause, R.E., 1984, Hydrogeologic data from the U.S. Geological Survey test wells near Waycross, Ware County, Georgia: U.S. Geological Survey Water-Resources Investigations Report 83-4204, 29 p.

McCollum, M.J., and Counts, H.B., 1964, Relation of salt-water encroachment to the major aquifer zones, Savannah area, Georgia and South Carolina: U.S. Geological Survey Water-Supply Paper 1613-D, 26 p.

McConnell, J.B., and Hacke, C.M., 1993, Hydrogeology, water quality, and water-resources development potential of the Upper Floridan aquifer in the Valdosta area, south-central Georgia: U.S. Geological Survey Water-Resources Investigations Report 93-4044, 44 p.

McFadden, S.S., Hetrick, J.H., Kellam, M.F., Rodenback, S.A., and Huddlestun, P.F., 1986, Geologic data of the Gulf Trough area, Georgia: Georgia Geologic Survey Information Circular 56, 345 p.

Meyer, F.W., 1962, Reconnaissance of the geology and ground-water resources of Columbia County, Florida: Florida Geological Survey Report of Investigations No. 30, 74 p.

Meyer, F.W., 1974, Evaluation of the hydraulic characteristics of a deep artesian aquifer from natural water-level fluctuations, Miami, Florida: Florida Bureau of Geology Report of Investigations 75, 32 p.

Miller, J.A., 1986, Hydrogeologic framework of the Floridan aquifer system in Florida and in parts of Georgia, Alabama, and South Carolina: U.S. Geological Survey Professional Paper 1403-B, 91 p.

Miller, J.A., Hughes, G.H., Hull, R.W., Vecchioli, John, and Seaber, P.R., 1978, Impact of phosphate mining on the hydrology of Osceola National Forest, Florida: U.S. Geological Survey Water-Resources Investigations Report 78-6, 159 p.

Moore, Jerry, Benson, S.M., Snipes, D.S., Daggett, John, James, April, Kroening, David, Price, Sarah, Price, Van, Jr., and Temples, Thomas, 1993, Characterization of aquifer properties in Coastal Plain sediments in Burke County, Georgia: Southeastern Section Meeting Geological Society of America, March 1993, Abstracts with Programs, v. 25, no. 4., p. 58.

Neuman, S.P., and Witherspoon, P.A., 1969, Applicability of current theories of flow in leaky aquifers: Water Resources Research, v. 5, no. 4, p. 817–829.

Newcome, Roy, Jr., 1993, Pumping tests of the Coastal Plain aquifers in South Carolina: South Carolina Water Resources Commission Report 174, 52 p.

Newcome, Roy, Jr., 2000, Results of pumping tests in the Coastal Plain of South Carolina: South Carolina Department of Natural Resources Water-Resources Open-File Report 5, 26 p.

Odum, J.K., Stephenson, W.J., Williams, R.A., Pratt, T.L., Toth, T.J., and Spechler, R.M., 1999, Shallow high-resolution seismic-reflection imaging of karst structures within the Floridan aquifer system, northeastern Florida: Journal of Environmental and Engineering Geophysics, v. 4, no. 4, p. 251–261.

Phelps, G.G., and Spechler, R.M., 1997, The relation between hydrogeology and water quality of the Lower Floridan aquifer in Duval County, Florida, and implications for monitoring saline water movement: U.S. Geological Survey Water-Resources Investigations Report 96-4242, 58 p.

Price, Van, Jr., Fallaw, W.C., and McKinney, J.B., 1991, Geologic setting of the new production reactor reference site within the Savannah River Site (U): Aiken, S.C., Westinghouse Savannah River Company, report no. WRSC-RP-91-96-EHS-EM, 80 p.

Prowell, D.C., 1985, Index of faults of Cretaceous and Cenozoic age in the eastern United States: U.S. Geological Survey Miscellaneous Field Studies Map MF-1269.

Randolph, R.B., Krause, R.E., and Maslia, M.L., 1985, Comparison of aquifer characteristics derived from local and regional aquifer tests: Ground Water, v. 23, no. 38, p. 309–316.

Randolph, R.B., Pernik, Maribeth, and Garza, Reggina, 1991, Water-supply potential of the Floridan aquifer system in the coastal area of Georgia—a digital model approach: Georgia Geologic Survey Bulletin 116, 30 p.

Ransom, Camille, III, and White, J.I., 1999, Potentiometric surface of the Floridan aquifer system in southern South Carolina: South Carolina Dept. of Health and Environmental Control Bureau of Water Publication No. 02B-99, 1 sheet.

Sever, C.W., 1969, Hydraulics of aquifers at Alapaha, Coolidge, Fitzgerald, Montezuma, and Thomasville, Georgia: Georgia Geologic Survey Information Circular 36, 16 p.

Sever, C.W., 1972, Ground-water resources and geology of Cook County, Georgia: U.S. Geological Survey Open-File Report, 40 p.

Singh, U.P., Eichler, G.E., Sproul, C.R., and Garcia-Bengochea, J.I., 1983, Pump-testing the Boulder Zone, South Florida: American Society of Civil Engineering, Journal of the Hydraulics Division, v. 109, no. 8, p. 1152–1160.

Smith, B.S., 1994, Saltwater movement in the Upper Floridan aquifer beneath Port Royal Sound, South Carolina: U.S. Geological Survey Water-Supply Paper 2421, 40 p.

Snipes, D.S., Benson, S.M., and Price, Van, Jr., 1995a, Hydrologic properties of aquifers in the central Savannah River area—Volume 1: Clemson, S.C., Department of Geological Sciences, Clemson University, 353 p.

Snipes, D.S., Benson, S.M., and Price, Van, Jr., 1995b, Hydrologic properties of aquifers in the central Savannah River area—Volume 2: Clemson, S.C., Department of Geological Sciences, Clemson University, 204 p.

Spechler, R.M., 1994, Saltwater intrusion and quality of water in the Floridan aquifer system, Northeastern Florida: U.S. Geological Survey Water-Resources Investigations Report 92-4174, 76 p.

Spechler, R.M., 2001, The relation between structure and saltwater intrusion in the Floridan aquifer system, northeastern Florida: *in* U. S. Geological Survey Karst Interest Group Proceedings, St. Petersburg, Florida, Feb. 13–16, 2001, p. 25–29.

Spechler, R.M., and Wilson, W.L., 1997, Stratigraphy and hydrogeology of a submarine collapse structure on the continental shelf, northeastern Florida: *in* Proceedings of Sixth Multidisciplinary Conference on Sinkholes, Springfield, Missouri, April 6–9, 1997, p. 61–66.

Szell, G.P., 1993, Aquifer characteristics in the St. Johns River Water Management District, Florida: St. Johns River Water Management District Technical Publication SJ93-1, 495 p.

Theis, C.V., 1935, The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage: Transactions American Geophysical Union, v. 16, part 2, p. 519–524.

Vincent, H.R., 1982, Geohydrology of the Jacksonian aquifer in central and east-central Georgia: Georgia Geologic Survey Hydrologic Atlas 8, 3 sheets.

Wait, R.L., 1965, Geology and occurrence of fresh and brackish ground water in Glynn County, Georgia: U.S. Geological Survey Water-Supply Paper 1613-E, 94 p.

Wait, R.L., and Davis, M.E., 1986, Configuration and hydrology of the pre-Cretaceous rocks underlying the Southeastern Coastal Plain aquifer system: U.S. Geological Survey Water-Resources Investigations Report 86-4010, 1 sheet, scale 1:2,000,000.

Wait, R.L., and Gregg, D.O., 1973, Hydrology and chloride contamination of the principal artesian aquifer in Glynn County, Georgia: Georgia Department of Natural Resources Hydrologic Report, 93 p.

Warner, Debbie, and Aulenbach, B.T., 1999, Hydraulic characteristics of the Upper Floridan aquifer, Savannah and St Marys, Georgia: Georgia Geologic Survey Information Circular 105, 23 p.

Warren, M.A., 1944, Artesian water in southeastern Georgia: Georgia Geologic Survey Bulletin No. 49, 140 p.

Weems, R.E., and Edwards, L.E., 2001, Geology of Oligocene, Miocene, and younger deposits in the coastal area of Georgia: Georgia Geologic Survey Bulletin 131, 124 p.

Whiting, N.M., and Park, A.D., 1990, Preliminary investigation of water-level declines in wells near Estill, Hampton County, South Carolina, Spring, 1990: South Carolina Water Resources Commission Report No. 37, 18 p.

APPENDIX A

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface		Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
						Top of open interval (ft)	Bottom of open interval (ft)						
FL	Baker	Well 1	Baker County Enterprise East	30°17'53"	82°05'10"	480	650	15,000	0.04	NL	P. Presley, SJWMD, written commun., 2002	UF	S = 0.08 if recovery data used, T = 14,000 ft^2/d, S = 0.01 for observation well
do.	Columbia	30110808	Lake City Well No. 2	30°11'10"	82°37'25"	157	275	36,000	.0008	L	Meyer (1962)	do.	Also cited in Bush and Johnston (1988)
do.	do.	30193308	ONF # 2, Floridan	30°19'34"	82°35'04"	160	262	33,000	.00007	do.	Miller and others (1978)	do.	
do.	Duval		D-100; 0308	30°21'07"	81°41'10"		1,365	4,000		SC	Phelps and Spechler (1997)	UF,LF[a]	T of 4,500 ft^2/d when pumped at a lower rate
do.	do.		D-52A; 0304	30°21'27"	81°41'10"		1,356	15,000		do.	do.	do.	
do.	do.		D-226; 0603	30°25'27"	81°39'37"		1,296	83,000		do.	do.	do.	
do.	do.		D-330; 0601	30°25'32"	81°39'25"		1,211	27,000		do.	do.	do.	T of 24,000 when ft^2/d pumped at a slightly higher rate but for a shorter time period
do.	do.		D-2223; 0704	30°19'37"	81°47'14"	553	1,200	20,000		do.	do.	do.	T range of 19,000 to 39,000 ft^2/d; value presented is that obtained for the longest pumping period
do.	do.		D-53A; 5003	30°18'40"	81°39'35"		1,286	5,800		do.	do.	do.	T range of 4,200 to 5,800 ft^2/d; value presented is that obtained from longest pumping period
do.	do.		D-168; 0302	30°21'12"	81°41'00"		1,320	2,100		do.	do.	do.	
do.	do.		D-240; 0303	30°21'22"	81°41'22"		1,362	14,000		do.	do.	do.	T of 12,000 ft^2/d when pumped at a higher rate but for a shorter time period
do.	do.		D-162; 0301	30°21'07"	81°41'23"		1,309	21,000		do.	do.	do.	
do.	do.	5706	Deerwood 3	30°14'33"	81°32'26"	519	970	20,000	.006	SL	P. Presley, SJWMD, written commun., 2002	UF	S value from observation well (T = 25,000 ft^2/d in observation well)

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
FL	Duval	5901	Ridenour	30°19'40"	81°29'30"	430	900	21,000	0.0003	SL	P. Presley, SJWMD, written commun., 2002	UF	T from recovery analysis, S from observation well; leaky aquifer analysis at observation well yields T of 24,000 ft^2/d and S of 0.0003
do.	do.	5903	Ridenour	30°19'34"	81°29'25"	425	920	18,000	.0003	do.	do.	do.	T from drawdown analysis at pumping well, S from observation well; leaky aquifer analysis yields T of 17,000 ft^2/d
do.	do.	Duval 1	D-650; 5304	30°17'25"	81°30'50"	461	1,276	50,000		SC	Phelps and Spechler (1997)	UF,LF[a]	
do.	do.	Duval 10	D-857; 5403	30°20'05"	81°35'45"	569	1,104	7,000		do.	do.	do.	T of 10,000 ft^2/d when pumped at a lower rate
do.	do.	Duval 11	D-479; 5402	30°20'07"	81°35'32"	606	1,350	50,000		do.	do.	do.	T range of 27,000 to 61,000 ft^2/d; value presented is that obtained from the longest pumping period
do.	do.	Duval 12	D-673; 5404	30°20'13"	81°35'38"	578	814	190,000		do.	do.	UF	
do.	do.	Duval 13	D-1323	30°20'45"	81°32'31"	580	1,170	40,000		do.	do.	UF,LF[a]	3 values presented ranging from 21,000 to 170,000 ft^2/d; intermediate value presented
do.	do.	Duval 14	D-46A; 0305	30°21'30"	81°41'18"	530	1,280	9,000		do.	do.	do.	T of 13,000 ft^2/d when pumped at a lower rate for a (slightly) longer time period
do.	do.	Duval 15	D-227; 0604	30°25'14"	81°39'37"	570	1,257	34,000		do.	do.	do.	
do.	do.	Duval 16	D-329; 0602	30°25'38"	81°39'25"	545	1,210	24,000		do.	do.	do.	T of 21,000 ft^2/d when pumped for a shorter duration at a slightly lower pumping rate
do.	do.	Duval 2	D-3825; 5305	30°17'43"	81°30'35"	440	1,093	84,000		do.	do.	do.	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
FL	Duval	Duval 3	D-223; 5301	30°17'43"	81°30'39"	420	1,125	39,000		SC	Phelps and Spechler (1997)	UF,LF[a]	Based on 4 hours pumping; T of 30,000 ft^2/d when pumped for 0.5 hours., at a higher pumping rate
do.	do.	Duval 4	D-649; 5203	30°17'52"	81°36'05"	534	1,005	14,000		do.	do.	do.	
do.	do.	Duval 5	D-665; 5303	30°17'58"	81°30'39"	417	1,185	28,000		do.	do.	do.	
do.	do.	Duval 6	D-198; 5002	30°18'39"	81°39'21"	552	1,297	30,000		do.	do.	do.	
do.	do.	Duval 7	D-2684; 5502	30°18'40"	81°38'39"	537	1,252	14,000		do.	do.	do.	T of 15,000 ft^2/d reported when pumped at a lower rate
do.	do.	Duval 8	D-2685; 5501	30°18'48"	81°39'03"	527	1,270	26,000		SC	do.	do.	T of 25,000 ft^2/d reported when pumped at a lower rate
do.	do.	Duval 9	D-2283; 0703	30°19'30"	81°47'06"	553	1,200	50,000		do.	do.	do.	
do.	do.	East Well	JEA Brandy Branch	30°19'22"	81°56'41"	536	837	15,000		NL	P. Presley, SJWMD, written commun., 2002	UF	T from observation well (no T given for production well); second observation well yielded a T of 16,000 ft^2/d
do.	do.	M501	Community Hall	30°09'02"	81°38'04"	460	624	9,000	0.007	NL(?)	do.	do.	T & S values from observation well (M503); low T value reflects partial penetration of the Upper Floridan aquifer
do.	do.	M502	do.	30°08'59"	81°38'05"	460	900	12,000	.002	NL	do.	do.	T & S from observation well; no. T provided for pumping well; analysis method cited as “curve matching”
do.	do.	M503	do.	30°08'60"	81°38'07"	457	1,225	200,000	.00002	SL	do.	UF,LF[a]	T & S values obtained from observation well (M504); additional observation well yields smaller T (67,000 ft^2/d)
do.	do.	M505	do.	30°09'05"	81°38'41"	482	1,100	19,000	.00015	do.	do.	do.	T & S from observation well; T = 24,000 ft^2/d & S = 0.000033 using Theis analysis, & T = 25,000 ft^2/d & S = 0.00002 using Hantush analysis

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
FL	Duval	MR-2	JEA Monument Road	30°20'32"	81°32'09"	565	807	15,000	0.0005	NL	P. Presley, SJWMD, written commun., 2002	UF	T from recovery analysis, S from observation well; additional observation well yields T = 24,000 ft^2/d & S = 0.0005 using leaky aquifer analytical solution
do.	do.	PW-1	Anheuser-Busch	30°26'09"	81°38'46"	600	908	9,400		do.	do.	do.	T = 8,300 ft^2/d for recovery well, using leaky aquifer solution. T for production well is recovery T, drawdown T=9,200 ft^2/d using Theim method
do.	do.	PW-2	Bacardi Beverages	30°27'42"	81°38'35"	620	1,100	11,000	.02	do.	do.	UF,LF[a]	T = 8,400 ft^2/d if recovery data utilized; S obtained from observation well (PW-1; T also of 11,000 ft^2/d). Leaky aquifer solution yields very high T value at observation well (156,000 ft^2/d)
do.	do.	Well 15	Jacksonville Beach	30°17'26"	81°23'59"	400	900	20,000	.001	do.	do.	UF	T from recovery analysis at pumping well, S from observation well, which also yielded a T of 32,000 ft^2/d
do.	do.	Well 2	JEA San Pablo	30°16'49"	81°25'49"	347	835	20,000	.0003	NL(?)	do.	do.	Drawdown & recovery T from pumping well close; T at observation well 22,000 ft^2/d; method cited as "curve matching"
do.	do.	Well 2	JEA Brierwood	30°15'08"	81°36'42"	514	950	13,000	.002	SL	do.	do.	S value from observation well (T = 14,000 ft^2/d at observation well).
do.	do.	Well 3	do.	30°15'14"	81°36'49"	514	1,100	22,000	.0005	do.	do.	UF,LF[a]	T = 15000 if recovery analysis utilized; S from observation well (T = 18,000 ft^2/d)
do.	do.	Well 5801	JEA Southeast Regional	30°15'41"	81°27'13"	353	875	26,000	.0005	L	do.	UF	T & S values from observation well

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Transmissivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
FL	Duval	Well A	Gate Maritime	30°24'31"	81°31'27"	457	1,192	110,000	0.02	L	P. Presley, SJWMD, written commun., 2002	UF,LF[a]	T & S from observation well; additional observation well yields T of 65,000 ft^2/d and S of 0.000125
do.	do.	Well D101	JEA Sheffield Village	30°28'04"	81°34'22"	500	750	26,000	.001	do.	do.	UF	T & S from observation well
do.	do.	Well H	Gate Maritime	30°24'34"	81°31'33"	480	1,048	24,000	.0004	SL	do.	UF,LF[a]	S value from observation well (also S of 0.004 at additional observation well); T's from observation wells of 62,000 ft^2/d and 18,000 ft^2/d
do.	do.	West Well	JEA Brandy Branch	30°19'20"	81°56'44"	538	1,265	75,000		SL(?)	do.	do.	No analytical method cited
do.	Hamilton	011436008	PCS Phos. Swift Creek Chem.	30°27'09"	82°51'51"	173	805	190,000	.001	NL	Ceryak and others (1983)	UF	
do.	Nassau	33DN20	Unnamed observation well in Nassau County	30°39'39"	81°31'26"		567	170,000	.002	do.	Warner and Aulenbach (1999)	do.	
do.	do.	Nassau 1	Production well 3039350812837.01	30°39'35"	81°28'37"	513	1,070	30,000	.0002	SL	Szell (1993); also P. Presley, written commun., 2002	do.	Observation well for aquifer test; additional observation well yields T = 31,000 ft^2/d & S = 0.0004
do.	do.	YO-1	JEA Yulee Regional	30°37'22"	81°32'01"	490	900	17,000	.0003	NL	P. Presley, SJRWMD, written commun., 2002	do.	T from recovery analysis at pumping well, S from observation well (leaky aquifer analysis, which yields a T of 19,000 ft^2/d).

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface		Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
						Top of open interval (ft)	Bottom of open interval (ft)						
GA	Appling	27N001	Baxley, Ga.	31°46'03"	82°21'03"	500	764	25,000		SC	Kellam and Gorday (1990)	UF	
do.	do.	27N003	City of Baxley	31°46'41"	82°21'04"	564	849	23,000		do.	do.	do.	
do.	do.	27N004	Filtered Rosin Product Company	31°46'12"	82°19'54"	525	625	8,700		do.	do.	do.	
do.	do.	27P001	Georgia Power # 1	31°53'54"	82°21'30"	455	680	48,000		do.	do.	do.	
do.	do.	27P002	Georgia Power Company, Hatch, 2	31°55'44"	82°20'32"	490	711	30,000		do.	do.	do.	
do.	Bacon	26L001	City of Alma	31°32'32"	82°28'00"	363	626	72,000		do.	do.	do.	
do.	do.	26L004	Alma, Ga., 3	31°32'39"	82°29'03"	501	840	21,000		do.	do.	do.	
do.	Ben Hill	19M001	City of Fitzgerald D	31°42'56"	83°15'41"	283	612	20,000		do.	do.	do.	
do.	do.	20M002	City of Fitzgerald D	31°43'00"	83°14'43"	260	825	16,000	0.003	NL	Sever (1969)	do.	
do.	do.	20M003	City of Fitzgerald D C	31°43'03"	8314'42"	260	750	13,000		SC	Kellam and Gorday (1990)	do.	
do.	Berrien	19H026	City of Nashville # 2	31°12'26"	83°15'20"	265	450	360,000		do.	do.	do.	
do.	do.	19K005	City of Enigma	31°27'14"	83°20'23"	386	620	1,700		do.	do.	do.	
do.	do.	20G009	City of Ray City # 1	31°04'22"	83°11'46"	200	350	360,000		do.	do.	do.	
do.	do.	20H003	City of Nashville # 4	31°12'34"	83°13'52"	283	485	360,000		do.	do.	do.	
do.	do.	20K002	City of Alapaha	31°22'56"	83°13'13"	368	550	32,000		SL	Sever (1969)	do.	T calculated from recovery analysis
do.	Bleckley	19T006	Cochran 2 (new)	32°22'07"	83°20'24"	220	417	15,000		SC	Brooks and others (1985)	(LF)	Screen intervals 220–235 (Jacksonian aquifer), 345–370, 380–385, 395–400 (Gordon aquifer)

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Bryan	35P109	Richmond Hill LF TW	31°54'43"	81°18'59"	1,010	1,275	8,300		SL	Harrelson and Falls (2003)	LF	
do.	do.	35P110	Richmond Hill UF TW	31°54'43"	81°18'59"	320	440	70,000		do.	do.	UF	
do.	Bulloch	31T010	City of Statesboro # 2	32°27'00"	81°46'46"	320	555	2,900		SC	Kellam and Gorday (1990)	do.	
do.	do.	31T024	Statesboro Gateway 9 (pro)	32°22'40"	81°50'41"	398	637	4,300		SL	USGS files	do.	
do.	do.	31T025	Statesboro Gateway 1 (observation)	32°22'39"	81°50'41"	405	630	4,700	0.0004	NL	do.	do.	
do.	do.	31T027	Statesboro	32°22'53"	81°50'22"	420	580	5,600	.0003	do.	do.	do.	
do.	do.	31T028	Statesboro Gateway 6 (observation)	32°22'38"	81°50'51"	383	540	5,000	.0004	do.	do.	do.	
do.	do.	32T013	City of Brooklet # 1	32°22'42"	81°39'44"	302	510	3,700		SC	Kellam and Gorday (1990)	do.	
do.	Burke	28W005	Southeast Georgia Experimental Station (LN-ATL 1)	32°52'27"	82°13'11"	454	535	8,200		do.	Brooks and others (1985)	(LF)	
do.	do.	29Y002	Irby Cochran, I	33°03'10"	82°03'54"	181	422	5,600		do.	do.	do.	Open interval includes lower portion of the Jacksonian aquifer
do.	do.	29Y004	"Paul Dye, 1"	32°07'15"	82°04'32"	244	364	6,200		do.	do.	do.	
do.	do.	30Z022	USGS Millers Pond TW-4	33°13'48"	81°52'44"	80	110	840		SL	Falls and others (1997)	(UF)	
do.	do.	31Z009	Georgia Power Plant Vogle Construction, 8	33°08'46"	81°45'59"	220	251	6,900		SC	Brooks and others (1985)	(LF)	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Burke	31Z110	GGS TR92-6B Thompson Oak	33°10'44"	81°47'09"	180	200	180		NL	Falls and others (1997)	(LF)	
do.	do.	32Y033	Brighams Landing TW-3	33°05'48"	81°39'11"	150	200	3,500		SL	do.	do.	
do.	Camden	33D013	Kraft/St Marys (Well 155)	30°44'01"	81°32'30"	516	1,060	19,000		SL[a]	Warren (1944)	UF	Warren cites T range from observation wells as 14,000–24,000 ft^2/d, analyzed by Theim method
do.	do.	33D069	National Park Service CI	30°43'13"	81°33'00"	467	575	110,000	0.001	NL	Warner and Aulenbach (1999)	do.	
do.	do.	33D073	St Marys Deep TW	30°44'06"	81°33'05"	1,365	1,500	13,000		SL	Harrelson and Falls (2003)	LF	
do.	do.	33E007	Huntley Jiffey (Davis)	30°45'12"	81°34'36"	552	760	98,000	.002	NL	Warner and Aulenbach (1999)	UF	
do.	do.	33E027	USN Kings Bay TW 1	30°47'56"	81°31'11"	555	990	130,000	.001	do.	do.	do.	
do.	do.	33E039	USN Kings Bay Observation 01	30°47'49"	81°33'53"	950	1,150	43,000		do.	Krause and Randolph (1989)	LF	
do.	do.	33E040	USN Kings Bay Observation 02	30°47'49"	81°33'53"	560	750	43,000	.00006	do.	Bush and Johnston (1988)	UF	
do.	Candler	29T010	City of Metter # 2 South	32°23'16"	82°03'57"	386	616	17,000		SC	Kellam and Gorday (1990)	do.	
do.	do.	29T011	City of Metter # 2 North	32°24'21"	82°03'56"	321	540	83,000		do.	do.	do.	
do.	Chatham	36Q002	Union Camp 04	32°05'58"	81°07'47"	237	603	34,000	.0003	NL	Counts and Donsky (1963)	do.	
do.	do.	36Q008	Layne-Atlantic	32°05'30"	81°08'50"	250	406	32,000	.0006	do.	Warner and Aulenbach (1999)	do.	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Chatham	36Q030	Hercules, Inc. # 1	32°05'19"	81°09'03"	251	750	33,000	.0004	NL	Counts and Donsky (1963)	UF	Counts and Donsky averaged six values from Warren (1944)
do.	do.	36Q330	Berwick Plantation (LF)	32°01'39"	81°13'40"	760	1,085	8,200		SL	R. Faye, USGS retired, written commun., 2002	LF	
do.	do.	36Q331	Berwick Plantation (UF)	32°01'39"	81°13'40"	358	460	46,000	0.00009	NL	do.	UF	
do.	do.	36R010	Port Wentworth, Ga. 1	32°09'18"	81°09'50"	254	650	34,000		NL(?)	Counts and Donsky (1963)	do.	
do.	do.	36R037	Savannah E&P, Pt. Wentworth	32°08'57"	81°08'42"	270	971	27,000	.0002	NL	do.	do.	
do.	do.	37Q010	U.S. Postal Service 02	32°04'40"	81°05'35"	274	695	20,000	.0003	do.	do.	do.	
do.	do.	37Q016	Southern Coast Line RR docks	32°04'33"	81°04'27"	260	500	43,000	.0007	do.	Warner and Aulenbach (1999)	do.	
do.	do.	37Q018	American Cyanide #1	32°04'56"	81°01'47"	205	650	27,000		NL(?)	Counts and Donsky (1963)	do.	
do.	do.	37Q049	Savannah Electric & Power Company R1	32°05'01"	81°05'46"	250	1,003	34,000		NL(?)	do.	do.	
do.	do.	37Q185	Hutchison Island TW1	32°06'22"	81°06'37"	274	344	32,000	.001	NL	Warner and Aulenbach (1999)	do.	
do.	do.	37R001	Savannah Wildlife Refuge	32°09'45"	81°07'00"	280	971	39,000		do.	do.	do.	
do.	do.	38Q115	USNPS Cockspur	32°01'36"	80°53'26"			80,000	.005	do.	Counts and Donsky (1963)	do.	
do.	Coffee	23L002	City of Douglas # 4	31°31'32"	82°50'55"	504	728	260,000		SC	Kellam and Gorday (1990)	do.	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft²/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Transmissivity (ft²/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Coffee	23L004	City of Douglas # 5	31°32'16"	82°51'20"	514	684	600,000		SC	Kellam and Gorday (1990)	UF	
do.	Cook	18G018	City of Cecil	31°02'45"	83°23'40"	214	308	6,700		SL	Sever (1972)	do.	
do.	do.	18H002	City of Adel # 3	31°08'33"	83°25'27"	231	386	15,000		SC	Kellam and Gorday (1990)	do.	
do.	do.	18H005	City of Adel # 1	31°08'16"	83°25'19"	213	375	5,800		do.	do.	do.	
do.	do.	18H016	USGS Adel Test Well	31°08'13"	83°26'03"	207	865	11,000		do.	do.	do.	
do.	do.	18H033	City of Adel	31°08'25"	83°25'42"	207	393	210,000	.002	NL	Sever (1972)	do.	
do.	Dooly	16S002	Unadilla 3	32°15'04"	83°44'23"	247	307	6,600		SL	Faye and McFadden (1986)	(LF)	
do.	Effingham	34R043	Dawes Silicia Company	32°09'45"	81°23'38"	320	689	51,000		SC	Kellam and Gorday (1990)	UF	
do.	do.	35T003	City of Springfield 1950	32°23'60"	81°19'10"	180	400	6,200		do.	do.	do.	
do.	do.	36S004	Westwood Heights S/D	32°15'23"	81°13'36"	303	565	30,000		do.	do.	do.	
do.	do.	36S022	City of Rincon # 2	32°17'22"	81°14'02"	281	500	2,800		do.	do.	do.	
do.	do.	36S025	Ft. Howard Paper Company # 1	32°19'36"	81°12'09"	280	500	32,000		do.	do.	do.	
do.	do.	36S026	Ft. Howard Paper Company # 2	32°19'52"	81°12'27"	280	520	17,000		do.	do.	do.	
do.	do.	36S027	Ft. Howard Paper Company # 3	32°20'01"	81°12'21"	282	500	5,000		do.	do.	do.	
do.	Evans	30R001	City of Claxton # 2	32°09'45"	81°54'10"	401	701	37,000		do.	do.	do.	
do.	do.	30R002	City of Claxton	32°09'45"	81°54'47"	452	805	56,000		do.	do.	do.	
do.	Glascock	25Z003	Gibson, 3	33°13'35"	82°36'04"	173	203	620		do.	Brooks and others (1985)	(LF)	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Glascock	26AA03	Thiele Kaolin, W-1	33°15'46"	82°27'11"	145	153	1,500		SC	Brooks and others (1985)	(LF)	
do.	Glynn	32H024	Lamar, Stafford	31°09'18"	81°40'08"	214	518	110,000	0.003	NL	Jones and Maslia (1994)	UF	Jones and Maslia cite curve fit as excellent.
do.	do.	32H026	Osborn, N B	31°10'53"	81°38'12"	292	445	66,000	.005	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	32J002	SCL RR, Thalmann	31°17'36"	81°41'27"	700	740	49,000	.004	do.	do.	do.	Jones and Maslia cite curve fit as fair
do.	do.	33H003	Madge Merritt Garden Club	31°07'59"	81°35'54"	550	991	65,000	.012	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	33H036	Mavromot, Andrew	31°12'16"	81°33'55"	550	650	58,000	.007	do.	do.	do.	do.
do.	do.	33H052	Anderson, L L	31°14'05"	81°32'14"	560	825	89,000	.004	do.	do.	do.	Jones and Maslia cite curve fit as fair
do.	do.	33H078	Willis B.H.	31°12'39"	81°31'13"	550	780	65,000	.001	do.	do.	do.	Jones and Maslia cite curve fit as excellent
do.	do.	33H100	Jenkins Theatre	31°11'29"	81°30'21"	540	777	75,000	.0004	do.	do.	do.	Jones and Maslia cite curve fit as good; leakance 0.00023 ft/d/ft
do.	do.	33H133	Brunswick: TW-6	31°10'06"	81°30'16"	520	790	63,000	.0004	do.	do.	do.	Jones and Maslia cite curve fit as good; leakance 0.00025 ft/d/ft
do.	do.	34G013	Jekyll Island 06	31°03'15"	81°24'35"	523	764	93,000	.005	do.	do.	do.	Jones and Maslia cite curve fit as fair
do.	do.	34G017	Jekyll Island 13	31°06'58"	81°25'01"	502	715	60,000	.003	do.	do.	do.	do.
do.	do.	34H062	Dixie-Obrien (Front)	31°10'05"	81°28'27"	554	810	64,000	.0002	do.	do.	do.	Jones and Maslia cite curve fit as good; leakance 0.000095 ft/d/ft
do.	do.	34H076	Hercules Inc M	31°09'59"	81°29'01"	480	911	58,000	.0002	do.	do.	do.	Jones and Maslia cite curve fit as good; leakance 0.0002 ft/d/ft
do.	do.	34H078	Hercules Inc O	31°09'48"	81°28'52"	545	890	56,000	.00006	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.000065 ft/d/ft

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Glynn	34H085	Brunswick Coffin Park	31°09'06"	81°28'46"	514	623	33,000	.0006	NL	Clarke and others (1990)	UF	T from recovery cited as 40,000 ft^2/d; S as 0.00057
do.	do.	34H097	Georgia Ports Authority Main Office	31°07'55"	81°29'27"	584	757	160,000	.007	do.	Jones and Maslia (1994)	do.	Jones and Maslia cite curve fit as excellent
do.	do.	34H100	Riley, Barney	31°08'06"	81°29'25"	595	786	33,000	.0005	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	34H125	U.S. Geological Survey TW 01	31°09'06"	81°29'31"	535	604	56,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00023 ft/d/ft
do.	do.	34H132	U.S. Geological Survey TW 02	31°10'20"	81°29'52"	540	1,200	64,000	.0003	do.	USGS files	do.	Upper and lower water-bearing zones
do.	do.	34H133	Brunswick Goodyear Park	31°10'35"	81°28'58"	520	800	57,000	.0004	do.	Jones and Maslia (1994)	do.	Jones and Maslia cite curve fit as good; leakance 0.0012 ft/d/ft
do.	do.	34H205	SSI Lighthouse	31°08'01"	81°23'37"	477	608	85,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00015 ft/d/ft
do.	do.	34H328	USPS Fort Frederica	31°13'19"	81°23'29"	600	640	72,000	.002	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	34H344	Brunswick: TW-7	31°09'38"	81°28'52"	504	770	23,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00023 ft/d/ft for 7/85 aquifer test, 0.0012 ft/d/ft for 12/86 aquifer test
do.	do.	34H371	U.S. Geological Survey TW 11	31°08'18"	81°29'36"	606	700	69,000	.0005	do.	do.	do.	Jones and Maslia cite curve fit as fair; leakance 0.00022 ft/d/ft
do.	do.	34H374	U.S. Geological Survey TW 14	31°09'53"	81°29'59"	527	696	41,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as fair; leakance 0.000076 ft/d/ft
do.	do.	34H392	Brunswick Jr College	31°11'08"	81°29'10"	541	660	75,000	.0004	do.	do.	do.	Jones and Maslia cite curve fit as fair; leakance 0.00024 ft/d/ft

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Glynn	34H401	U.S. Geological Survey TW 21	31°09'45"	81°29'55"	525	756	85,000	0.0003	NL	USGS files	UF	
do.	do.	34H412	Hercules Inc Q	31°10'19"	81°29'22"	548	630	64,000	.0002	do.	Jones and Maslia (1994)	do.	Jones and Maslia cite curve fit as good; leakance 0.00025 ft/d/ft
do.	do.	34H424	Hercules Inc T	31°10'11"	81°29'31"	550	745	67,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00022 ft/d/ft
do.	do.	34H425	Hercules Inc U	31°10'16"	81°28'58"	550	700	66,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as good; leakance 0.00021 ft/d/ft
do.	do.	34H427	Champion, E M 02	31°10'16"	81°29'42"	500	640	67,000	.0003	do.	do.	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00029 ft/d/ft
do.	do.	34H449	Goodyear Park	31°10'36"	81°28'57"	580	753	59,000	.0006	do.	USGS files	do.	
do.	do.	34H469	U.S. Geological Survey TW 02 Pt 1	31°10'20"	81°29'52"	540	566	64,000	.0003	do.	Jones and Maslia (1994)	do.	Jones and Maslia cite curve fit as excellent; leakance 0.00032 ft/d/ft
do.	do.	34J001	Brunswick: 2-W Fish	31°19'37"	81°26'45"			110,000	.0008	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	34J009	Newhope Plantation	31°18'11"	81°26'51"	580	780	140,000	.0007	do.	do.	do.	Jones and Maslia cite curve fit as excellent
do.	do.	35H012	Sea Island Gun Club - Old	31°10'49"	81°21'29"	514	640	56,000	.003	do.	do.	do.	Jones and Maslia cite curve fit as good
do.	do.	35H037	Brunswick: USCG	31°08'45"	81°22'26"	580	704	55,000	.005	do.	do.	do.	do.
do.	do.	35H042	Sea Island Co. &—22nd St.	31°11'46"	81°20'13"	584	1,040	64,000		SL	Wait and Gregg (1973)	do.	Upper and lower water-bearing zones
do.	Houston	17T001	Board Commissioners, Haynesville	32°23'16"	83°37'18"	278	347	2,100		SC	Brooks and others (1985)	(LF)	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface		Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
						Top of open interval (ft)	Bottom of open interval (ft)						
GA	Irwin	20L003	City of Ocilla # 3	31°35'42"	83°14'51"	266	645	10,000		SC	Kellam and Gorday (1990)	UF	
do.	Jefferson	26W001	Wadley 1 (Ruby St. Well)	32°51'34"	82°24'19"	370	473	5,900		do.	Brooks and others (1985)	(LF)	
do.	do.	26X002	Louisville, 4	32°59'45"	82°24'43"	220	308	5,700		do.	do.	do.	
do.	do.	26Y002	J.P. Stevens, 2	33°00'15"	82°27'31"	214	375	5,800		do.	do.	do.	
do.	Liberty	33N001	US Army, Ft Stewart 01	31°51'46"	81°36'49"	451	816	124,000		NL	Warren (1944)	UF	As cited in Bush and Johnston (1988)
do.	do.	34M019	Interstate Paper, 535'	31°44'31"	81°25'42"	200	535	160,000	0.0005	do.	Dyar and others (1972)	do.	T = 130000, S = 0.00041 in recovery analysis
do.	do.	34M021	Interstate Paper Company, 445'	31°44'42"	81°24'34"	145	445	160,000	.0003	do.	do.	do.	T = 120,000, S = 0.00047 in recovery analysis
do.	do.	34M051	Interstate Paper Rust 1	31°44'38"	81°24'25"	427	810	160,000	.0004	do.	do.	do.	T = 88,000, S = 0.00054 in recovery analysis
do.	do.	34M052	Interstate Paper Rust 2	31°44'35"	81°24'39"	418	810	160,000	.0002	do.	do.	do.	T = 88,000, S = 0.00054 in recovery analysis
do.	do.	34M090	Riceboro, Ga., 1985	31°43'35"	81°25'28"	502	705	130,000	.0004	do.	Krause and Randolph (1989)	do.	
do.	Long	33M004	USGS TW-3	31°38'54"	81°36'04"	538	870	250,000	.0007	do.	Randolph and others (1985)	do.	
do.	Lowndes	19F101	Valdosta, Ga. Deep Observation	30°54'51"	83°15'05"	180	450	94,000		SL	McConnell and Hacke (1993)	do.	
do.	McIntosh	35L085	Dan Hawthorne 1	31°36'08"	81°18'27"	1,144	1,422	6,000		do.	Harrelson and Falls (2003)	LF	
do.	Montgomery	25R002	City of Mt. Vernon	32°10'47"	82°35'37"	347	400	5,500		SC	Kellam and Gorday (1990)	UF	
do.	Pulaski	18S012	Opelika Mfg. Company 2	32°16'52"	83°27'57"	306	361	9,800		SL	Faye and McFadden (1986)	(LF)	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Pulaski	18S015	Hartford 2	32°16'52"	83°26'24"	374	420	2,100		SC	Brooks and others (1985)	(LF)	
do.	Screven	32U018	J.P. King # 2	32°36'18"	81°44'25"	253	670	13,000		do.	do.	UF	
do.	do.	32W015	Sylvania #2	32°45'10"	81°38'12"	150	301	4,100		SL	USGS files	do.	
do.	do.	33X037	Millhaven Buena Vista	32°57'56"	81°37'22"	370	565	3,500		do.	Faye and McFadden (1986)	(LF)	
do.	do.	33X051	USGS Millhaven TW-1	32°53'25"	81°35'43"	50	80	1,900		do.	Clarke and others (1996)	(UF)	
do.	do.	33X052	USGS Millhaven TW-2	32°53'25"	81°35'43"	155	205	5,600		do.	do.	do.	
do.	do.	33X053	USGS Millhaven TW-3	32°53'25"	81°35'43"	225	280	1,300		do.	do.	do.	
do.	Tattnall	28Q002	Georgia State Prison # 1	32°00'13"	82°09'54"	500	810	7,100		SC	Kellam and Gorday (1990)	do.	
do.	do.	29Q001	City of Reidsville # 1	32°05'03"	82°07'10"	560	713	8,500		do.	do.	do.	
do.	Telfair	22Q001	City of McRae # 1	32°04'01"	82°53'46"	120	640	76,000		do.	do.	do.	
do.	do.	22Q003	City of McRae # 3	32°03"54"	82°54'40"	235	545	41,000		do.	do.	do.	
do.	do.	24P006	City of Lumber City # 1	31°55'48"	82°41'06"	350	450	7,900		do.	do.	do.	
do.	do.	24P008	N.S. Wheeler	31°55'27"	82°40'33"	400	778	6,700		do.	do.	do.	
do.	Tift	17K062	City of Tifton #2	31°27'26"	83°30'46"	275	501	50,000		do.	Kellam and Gorday (1990)	do.	
do.	do.	18K001	City of Tifton	31°24'51"	83°29'24"	390	610	33,000		do.	do.	do.	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
GA	Toombs	26R001	City of Vidalia # 2	32°13'02"	82°24'36"	720	1,000	9,800		SC	Kellam and Gorday (1990)	UF	
do.	do.	26R003	City of Vidalia	32°12'39"	82°23'22"	442	800	14,000		do.	do.	do.	
do.	Ware	27G004	USGS TW 2, Ware County	31°07'05"	82°15'56"	636	1,785	1,000,000		NL	Matthews and Krause (1984);	UF,LF	Well completed in Upper and Lower Floridan aquifers; flow-meter survey indicates 90% of flow from Upper Floridan aquifer
								150,000		V	R.E. Faye, USGS retired, written commun., 2002		
do.	Washington	22Y007	Test Hole 2	33°02'36"	82°56'49"	36	114	2,700		do.	Faye and McFadden (1986)	(LF)	Screen intervals 36–41, 54–69, and 104–114; latter in Cretaceous strata
do.	do.	22Y008	Test Hole 3	33°01'01"	82°57'05"	33	200	720		do.	do.	do.	Screen intervals 33–43, 48–58, 133–138, and 190–200; latter two zones in Cretaceous strata
do.	do.	23X034	Holmes Canning Company, 2	32°56'19"	82°45'01"	182	335	2,400		SC	Brooks and others (1985)	do.	
do.	Wayne	30K004	Justiss Mears BP&P #1	31°27'19"	81°52'53"	662	770	270,000	0.0004	NL	Randolph and others (1985)	UF	
do.	do.	30L003	Homer Johnson	31°37'01"	81°54'34"	472	584	240,000	.0006	do.	do.	do.	
do.	do.	31L001	BP&P J Mears 2	31°31'04"	81°52'18"	587	691	260,000	.0004	do.	do.	do.	
do.	do.	31M009	ITT Rayonier D1, GGS-297	31°39'42"	81°50'39"	480	1,009	280,000	.0005	do.	do.	do.	
do.	do.	31M010	ITT Rayonier D2	31°39'34"	81°50'22"	486	1,010	270,000	.0005	do.	do.	do.	
do.	do.	31M013	ITT Rayonier D5	31°38'59"	81°49'59"	500	1,000	220,000	.0002	do.	do.	do.	
do.	do.	31M014	ITT Rayonier D6	31°39'11"	81°50'20"	493	1,000	230,000	.0004	do.	do.	do.	
do.	Wheeler	22Q004	Little Ocmulgee State Park	32°05'42"	82°53'09"	194	248	8,200		SC	Kellam and Gorday (1990)	do.	
do.	do.	23R001	City of Alamo # 2	32°08'59"	82°46'43"	352	600	3,300		do.	do.	do.	

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface		Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
						Top of open interval (ft)	Bottom of open interval (ft)						
SC	Allendale	33AA-y5	ALL-353	33°00'27"	81°19'15"	290	340	3,900		SL	Newcome (2000)	LF	Newcome rates test fair
do.	do.	33BB-p1	ALL-326	32°56'35"	81°14'21"	257	344	500		do.	do.	do.	Newcome rates test poor
do.	do.	33Z-y1	ALL-48	33°05'18"	81°14'20"	180	310	4,000		do.	do.	do.	do.
do.	do.	34AA-q2	ALL-268 - town of Allendale	33°01'01"	81°18'07"	240	328	2,900		do.	Aucott and Newcome (1986)	do.	
do.	do.	34AA-q3	ALL-320	33°01'06"	81°18'32"	154	444	3,300		do.	Newcome (2000)	do.	Newcome rates test fair
do.	do.	34AA-x4	ALL-310	33°01'01"	81°18'07"	240	329	3,300		do.	do.	do.	Newcome rates test good
do.	do.	35AA-q7	ALL-375	33°01'30"	81°23'03"	453	578	970	0.0004	NL	USGS files	do.	
do.	do.	35AA-q8	ALL-374	33°01'30"	81°23'03"	450	575	1,200	.0003	do.	do.	do.	
do.	do.	36AA-o1	ALL-27 - Sandoz, Inc. no. 1	33°02'23"	81°29'19"	460	794	1,100		SL	Faye and McFadden (1986)	(LF)	
do.	do.	372-q3	ALL-66 - Creek Plantation	33°06'55"	81°33'56"	390	720	7,100		NL	do.	do.	
do.	Bamburg	31X-m5	BAM-24	33°17'19"	81°02'27"	140	364	680		SL	Newcome (2000)	LF	Newcome rates test poor
do.	do.	31Y-q1	BAM-62	33°11'40"	81°03'32"	46	260	1,700		do.	do.	do.	Newcome rates test fair
do.	do.	31Z-t1	BAM-26	33°06'10"	81°00'10"	94	225	670		do.	do.	do.	Newcome rates test poor
do.	do.	32X-d1	BAM-23	33°19'27"	81°08'25"	162	296	1,300		do.	do.	do.	Newcome rates test fair
do.	do.	32X-g2	BAM-22	33°18'57"	81°08'19"	162	302	800		do.	do.	do.	Newcome rates test poor
do.	Barnwell	33Z-n1	BRN-295	33°07'37"	81°13'45"	175	200	6,300		do.	do.	do.	Newcome rates test fair
do.	do.	34W-s4	BRN-75	33°21'40"	81°16'30"	204	470	4,100		do.	do.	(LF)	do.
do.	do.	34X-u1	BRN-886	33°15'49"	81°15'05"	290	345	800		do.	do.	do.	Newcome rates test poor
do.	do.	35Y-b8	BRN-60	33°14'07"	81°21'59"	218	327	11,000		do.	do.	do.	do.
do.	do.	35Y-c4	BRN-57	33°14'10"	81°22'45"	180	320	4,700		do.	do.	do.	do.

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
SC	Barnwell	35Y-c7	BRN-61	33°14'30"	81°23'10"	220	315	5,900		SL	Newcome (2000)	(LF)	Newcome rates test fair
do.	do.	37W-x1	BRN-469	33°20'30"	81°33'30"	175	200	2,000		do.	do.	do.	Newcome rates test poor
do.	do.	37X-w1	BRN-810	33°15'58"	81°32'36"	182	213	2,000	0.0003	do.	do.	do.	Newcome rates test good
do.	do.	37Y-f2	BRN-268	33°13'24"	81°34'54"	360	605	6,700		do.	do.	do.	Newcome rates test fair
do.	do.	37Y-g2	BRN-466	33°13'19"	81°33'06"	262	335	1,100		do.	do.	do.	do.
do.	do.	37Y-g3	BRN-465	33°13'20"	81°33'07"	230	374	1,500		do.	do.	do.	do.
do.	do.	38Y-h6	BRN-811	33°13'24"	81°37'02"	260	270	170		do.	do.	do.	Newcome rates test poor
do.	Beaufort	24JJ-c1	BFT-449	32°19'30"	80°27'37"	96	150	1,900		do.	do.	UF	do.
do.	do.	25HH-p12	BFT-1566	32°26'15"	80°34'32"	59	66	4,300		do.	Aucott and Newcome (1986)	do.	Newcome rates test fair
do.	do.	25HH-p17	BFT-1570	32°26'28"	80°34'32"	51	59	2,900		do.	Newcome (2000)	do.	Newcome rates test good
do.	do.	25HH-p6	BFT-1560	32°26'02"	80°34'56"	50	58	2,500		do.	do.	do.	do.
do.	do.	25II-e4	BFT-1784	32°24'03"	80°34'32"	73	78	5,600	.002	NL	do.	do.	Newcome rates test good
do.	do.	26II-l3	BFT-1787	32°22'04"	80°36'36"	64	66	20,000	.0001	do.	do.	do.	Newcome rates test poor
do.	do.	26II-s5	BFT-1788	32°21'59"	80°36'10"	55	70	20,000	.0003	do.	do.	do.	do.
do.	do.	26II-w16	BFT-1793	32°20'09"	80°37'36"	90	120	17,000	.0001	do.	do.	do.	Newcome rates test good
do.	do.	27HH-n9	BFT-2066	32°27'18"	80°43'05"	120	170	790		SL	do.	do.	Newcome rates test poor
do.	do.	27HH-o3	BFT-114	32°27'52"	80°44'26"	83	100	3,600	.00004	NL	do.	do.	do.
do.	do.	27II-l30	BFT-1973	32°22'28"	80°41'37"	52	88	13,000	.0001	SL	do.	do.	Newcome rates test good
do.	do.	27II-l5	BFT-795	32°22'26"	80°41'35"	45	94	15,000	.0003	NL	do.	do.	Newcome rates test fair
do.	do.	27JJ-i10	BFT 2255	32°18'25"	80°41'12"	283	603	530		SL	SCDNR files	do.	Newcome rates test good

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

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State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
SC	Beaufort	27JJ-i4	BFT-1840	32°18'20"	80°41'23"	250	602	1,200		SL	Newcome (2000)	UF	Newcome rates test fair
do.	do.	27JJ-i9	BFT-2248	32°18'44"	80°41'02"	295	632	700		do.	do.	do.	Newcome rates test good
do.	do.	27JJ-q2	BFT-1809	32°16'03"	80°43'22"	227	890	6,700		do.	do.	do.	Newcome rates test fair
do.	do.	27KK-f22	BFT-1868	32°13'52"	80°45'00"	140	220	92,000		do.	do.	do.	Newcome rates test poor
do.	do.	27KK-f23	BFT-1869	32°13'11"	80°44'44"	146	226	110,000		do.	do.	do.	do.
do.	do.	27KK-g1	BFT-985	32°13'41"	80°43'42"	542	630	27,000		do.	Gawne and Park (1992)	do.	do.
do.	do.	27KK-h1	BFT-652	32°13'13"	80°42'30"	135	200	64,000		do.	Newcome (2000)	do.	do.
do.	do.	27KK-h4	BFT-1591	32°13'38"	80°42'08"	131	200	94,000		do.	do.	do.	Newcome rates test poor
do.	do.	27KK-j5	BFT-1813	32°13'58"	80°40'38"	276	600	6,000		do.	do.	do.	do.
do.	do.	27KK-l12	BFT-2185	32°12'37"	80°42'04"	314	600	19,000		do.	do.	do.	Newcome rates test good
do.	do.	27KK-m46	BFT-1632	32°12'44"	80°42'47"	110	200	80,000		do.	do.	do.	Newcome rates test poor
do.	do.	27KK-n15	BFT-1685	32°12'07"	80°43'32"	118	200	67,000		do.	do.	do.	Newcome rates test fair
do.	do.	27KK-o10	BFT-1820	32°12'17"	80°44'57"	316	320	11,000		do.	Gawne and Park (1992); Newcome (2000)	do.	do.
do.	do.	27KK-q5	BFT-1589	32°11'19"	80°43'01"	126	198	51,000		do.	Newcome (2000)	do.	Newcome rates test poor
do.	do.	27KK-x8	BFT-758	32°10'29"	80°43'28"	145	200	72,000	0.0001	NL	do.	do.	Newcome rates test fair
do.	do.	27LL-d2	BFT-671	32°09'22"	80°43'56"	145	221	80,000		SL	do.	do.	Newcome rates test poor
do.	do.	27LL-e11	BFT-1590	32°09'44"	80°44'12"	140	198	84,000		do.	do.	do.	do.
do.	do.	27LL-e12	BFT-1947	32°09'42"	80°44'12"	140	200	99,000		do.	do.	do.	do.
do.	do.	28GG-a10	BFT-1756	32°34'28"	80°45'06"	124	224	1,100	.0001	NL	do.	do.	Newcome rates test fair
do.	do.	28GG-x1	BFT-1790	32°30'52"	80°48'39"	83	140	24,000	.0002	do.	do.	do.	Newcome rates test poor
do.	do.	28HH-k12	BFT-1731	32°27'22"	80°45'57"	90	112	1,600		SL	do.	do.	Newcome rates test fair

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Trans-missivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
SC	Beaufort	28HH-t2	BFT-115	32°26'15"	80°45'36"	72	95	4,000	.0001	NL	Newcome (2000)	UF	Newcome rates test fair
do.	do.	28HH-t7	BFT-22	32°26'18"	80°45'50"	80	84	11,000	.0001	do.	do.	do.	do.
do.	do.	28JJ-e8	BFT-2067	32°19'32"	80°49'25"	240	560	15,000		SL	do.	do.	Newcome rates test good
do.	do.	28JJ-f4	BFT-1630	32°18'27"	80°49'30"	100	200	45,000	0.0004	NL	do.	do.	do.
do.	do.	28JJ-h5	BFT-2265	32°18'16"	80°47'45"	397	587	11,000		SL	do.	do.	Newcome rates test fair
do.	do.	28JJ-m7	BFT-2233	32°17'31"	80°47'37"	393	587	13,000		do.	do.	do.	Newcome rates test good
do.	do.	28JJ-n2	BFT-1389	32°17'03"	80°48'59"	125	192	18,000		do.	do.	do.	Newcome rates test poor
do.	do.	28JJ-p5	BFT-1845	32°16'51"	80°49'17"	255	600	8,800		do.	do.	do.	do.
do.	do.	28JJ-y2	BFT-499	32°15'08"	80°49'42"	97	209	56,000	.0002	NL	do.	do.	Newcome rates test good
do.	do.	28JJ-y3	BFT-500	32°15'02"	80°49'43"	100	340	58,000		SL	SCDNR files	do.	From a report by C.E. Nuzman to the BASF Corporation
do.	do.	28JJ-y4	BFT-1326	32°15'09"	80°49'11"	140	200	24,000		do.	Newcome (2000)	do.	Newcome rates test poor
do.	do.	28KK-c1	BFT-2229	32°14'00"	80°48'00"	357	568	11,000		do.	do.	do.	Newcome rates test good
do.	do.	28KK-d6	BFT-1330	32°14'25"	80°48'37"	140	174	27,000		do.	do.	do.	Newcome rates test poor
do.	do.	28KK-e1	BFT-358	32°14'55"	80°49'44"	101	380	78,000		do.	SCDNR files	do.	From a report by C.E. Nuzman to the BASF Corporation
do.	do.	29II-s5	BFT-2242	32°21'28"	80°51'42"	298	600	4,000		do.	Newcome (2000)	do.	Newcome rates test fair
do.	do.	29II-y2	BFT 2273	32°20'10"	80°54'48"	314	582	5,300		do.	SCDNR files	do.	Newcome rates test good
do.	do.	29JJ-d6	BFT-2243	32°19'57"	80°53'27"	357	555	4,000		do.	Newcome (2000)	do.	Newcome rates test fair
do.	do.	29JJ-e11	BFT-1766	32°19'50"	80°54'32"	130	215	53,000	.0003	NL	do.	do.	do.
do.	do.	29JJ-l5	BFT-2222	32°17'08"	80°51'38"	353	490	8,200		SL	do.	do.	do.
do.	do.	29JJ-m2	BFT-1452	32°17'36"	80°52'06"	160	200	23,000		do.	do.	do.	Newcome rates test poor

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Transmissivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
SC	Beaufort	29JJ-o3	BFT-2202	32°17'52"	80°54'10"	357	568	3,500		SL	Newcome (2000)	UF	Newcome rates test good
do.	do.	29JJ-q2	BFT-1418	32°16'57"	80°53'07"	160	200	23,000		do.	do.	do.	Newcome rates test poor
do.	do.	29JJ-v2	BFT-1800	32°15'55"	80°51'47"	140	205	35,000		do.	do.	do.	Newcome rates test good
do.	do.	29JJ-v3	BFT-2264	32°15'45"	80°51'17"	356	576	18,000		do.	do.	do.	do.
do.	do.	29KK-a3	BFT-1870	32°14'54"	80°50'27"	43	205	50,000		do.	do.	do.	Newcome rates test fair
do.	do.	29LL-j4	BFT-309	32°08'15"	80°50'58"	140	242	40,000		do.	SCDNR files	do.	Newcome rates test poor
do.	do.	29LL-k6	BFT-2241	32°07'52"	80°50'42"	441	638	13,000		do.	Newcome (2000)	do.	Newcome rates test excellent
do.	do.	29LL-l1	BFT-310	32°07'53"	80°51'09"	125	192	40,000	0.0001	NL	do.	do.	Newcome rates test poor
do.	do.	29LL-l2	BFT-1438	32°07'56"	80°51'41"	107	140	2,300		SL	do.	do.	do.
do.	do.	29LL-s1	BFT-1794	32°06'21"	80°51'43"	170	240	40,000		do.	do.	do.	do.
do.	do.	30JJ-k1	BFT-2038	32°17'09"	80°55'17"	139	220	43,000		do.	do.	do.	Newcome rates test fair
do.	do.	30JJ-l1	BFT-2090	32°17'27"	80°56'58"	346	520	6,000		do.	do.	do.	Newcome rates test excellent
do.	do.	30JJ-m1	BFT-2089	32°17'22"	80°57'22"	321	523	4,400		do.	do.	do.	Newcome rates test poor
do.	do.	30JJ-n1	BFT-2256	32°17'13"	80°58'54"	336	512	5,300		do.	do.	do.	Newcome rates test fair
do.	do.	30JJ-t2	BFT-2086	32°16'58"	80°55'31"	299	450	7,200		do.	do.	do.	do.
do.	Colleton	27DD-b1	COL-275	32°49'28"	80°41'50"	125	575	900		do.	do.	LF	Newcome rates test poor
do.	do.	30AA-c4	COL-232	33°04'02"	80°57'14"	450	510	2,000		do.	do.	do.	do.
do.	Hampton	32CC-l15	HAM-162	32°52'33"	81°06'50"	50	120	1,200	.0001	NL	do.	UF	Newcome rates test fair
do.	do.	33CC-p2	HAM-209	32°51'35"	81°14'12"		175	5,700		SL	do.	do.	Newcome rates test poor
do.	do.	33CC-p3	HAM-219	32°51'34"	81°14'30"	102	150	6,100		do.	do.	do.	Newcome rates test fair

Table A-1. Transmissivity and storage coefficient of the Upper and Lower Floridan aquifers and equivalent clastic units, coastal Georgia and adjacent parts of South Carolina and Florida—Continued

[ft, foot; ft^2/d, feet squared per day; %, percent; do., ditto; ft/d/ft, foot/day/foot; °, degrees; ', minutes; ", seconds; SJWMD, St. Johns River Water Management District; S, storage; T, transmissivity; USGS, U.S. Geological Survey; SCDNR, South Carolina Department of Natural Resources. State: FL, Florida; GA, Georgia; SC, South Carolina. Method: NL, nonleaky aquifer analysis; L, leaky aquifer analysis; SC, transmissivity based on specific capacity; SL, straight line analytical solution; V, van der Kamp analysis of oscillating flow (Kruseman and de Ritter, 1994); (?), analytical method not cited. Hydrologic unit: UF, Upper Floridan aquifer; LF, Lower Floridan aquifer; UF,LF, Upper and Lower Floridan aquifers; hydrologic unit enclosed in parentheses indicates a clastic updip aquifer equivalent to the carbonate Upper or Lower Floridan aquifers]

State	County	Well identifier	Other identifier	Latitude	Longitude	Below land surface: Top of open interval (ft)	Below land surface: Bottom of open interval (ft)	Transmissivity (ft^2/d)	Storage coefficient	Method	Reference	Hydrologic unit	Remarks
SC	Hampton	33EE-c4	HAM-195	32°44'52"	81°12'32"	131	251	12,000	.0002	NL	Whiting and Park (1990); Newcome (2000)	UF	Newcome rates test good
do.	do.	33EE-f2	HAM-211	32°44'58"	81°14'15"	125	160	11,000		SL	Newcome (2000)	do.	do.
do.	do.	33EE-v3	HAM-208	32°40'51"	81°11'18"	145	280	3,300		do.	do.	do.	Newcome rates test fair
do.	Jasper	29II-o1	JAS-104	32°22'11"	8054'51"	145	330	47,000	.0004	do.	Aucott and Newcome (1986)	do.	Newcome rates test good
do.	do.	30HH-o1	JAS-346	32°27'59"	80°59'36"	130	220	39,000		do.	Newcome (2000)	do.	Newcome rates test poor
do.	do.	31GG-o3	JAS-390	32°32'05"	81°04'30"	240	500	51,000		do.	do.	do.	Newcome rates test good
do.	do.	31GG-p5	JAS-389	32°31'48"	81°04'23"	140	300	51,000	0.0004	NL	do.	do.	do.
do.	do.	31GG-x5	JAS-384	32°30'07"	81°03'32"	115	180	48,000		SL	do.	do.	Newcome rates test poor
do.	do.	31HH-b3	JAS-375	32°29'08"	81°01'49"	118	220	53,000		do.	do.	do.	Newcome rates test fair
do.	do.	31HH-m3	JAS-386	32°27'53"	81°02'45"	118	220	36,000		do.	do.	do.	Newcome rates test good
do.	do.	31JJ-t1	JAS-342	32°16'19"	81°05'00"	208	400	67,000		do.	do.	do.	Newcome rates test poor
do.	do.	32GG-n1	JAS-391	32°32'59"	81°08'17"	252	545	57,000		do.	do.	do.	Newcome rates test fair
do.	do.	32GG-n2	JAS-392	32°32'35"	81°08'08"	252	555	46,000		do.	do.	do.	Newcome rates test excellent
do	do	32HH-s2	JAS-372	32°26'48"	81°06'08"	142	204	35,000		do.	do.	do.	Newcome rates test poor

[a]According to Spechler (1994), multi-aquifer wells completed in the Upper and Lower Floridan aquifers in Duvall County, Florida, probably derive much of their yield from the Lower Florida aquifer.