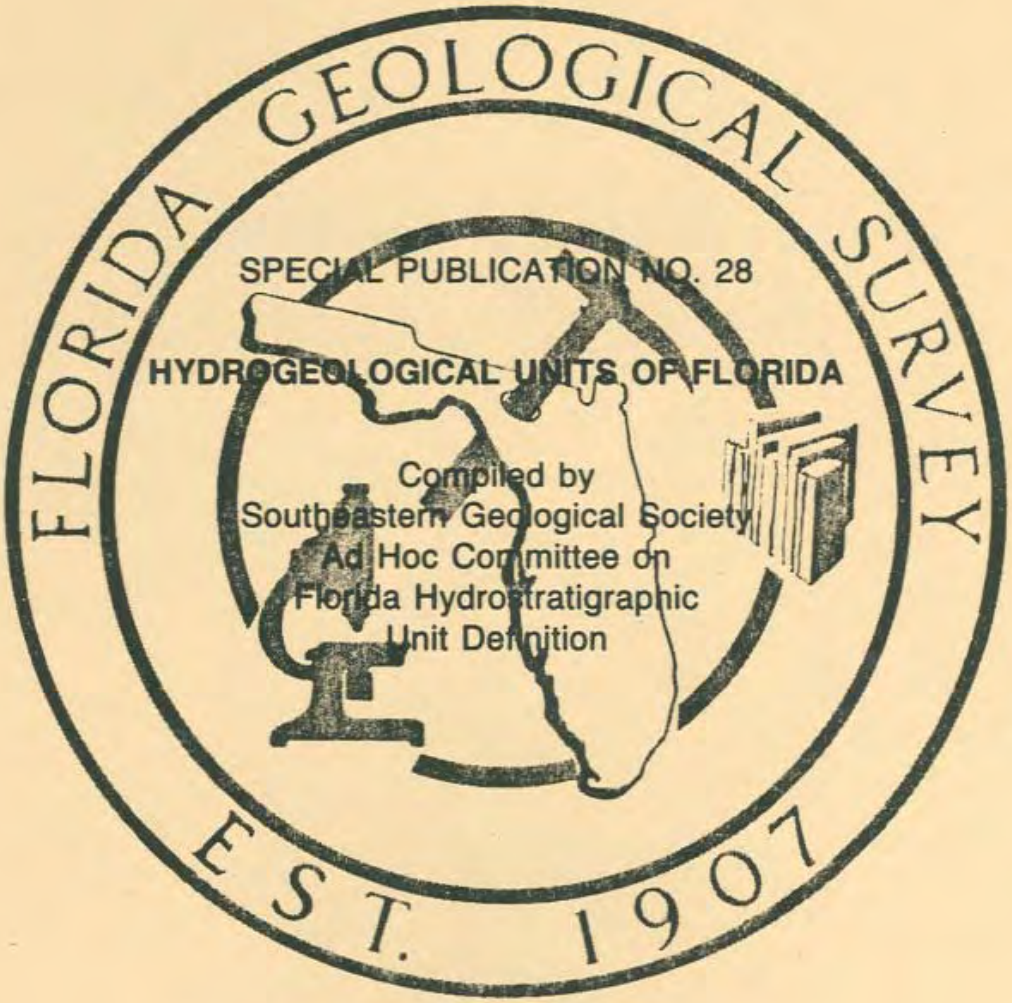
STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Elton J. Gissendanner, *Executive Director*

DIVISION OF RESOURCE MANAGEMENT
Art Wilde, *Director*

BUREAU OF GEOLOGY
Walter Schmidt, *Chief*



SPECIAL PUBLICATION NO. 28

HYDROGEOLOGICAL UNITS OF FLORIDA

Compiled by
Southeastern Geological Society
Ad Hoc Committee on
Florida Hydrostratigraphic
Unit Definition

Published for the
FLORIDA GEOLOGICAL SURVEY
TALLAHASSEE
1986

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Elton J. Gissendanner, *Executive Director*

DIVISION OF RESOURCE MANAGEMENT
Art Wilde, *Director*

BUREAU OF GEOLOGY
Walter Schmidt, *Chief*

SPECIAL PUBLICATION NO. 28

HYDROGEOLOGICAL UNITS OF FLORIDA

Compiled by
Southeastern Geological Society
Ad Hoc Committee on
Florida Hydrostratigraphic
Unit Definition

Published for the
FLORIDA GEOLOGICAL SURVEY
TALLAHASSEE
1986

DEPARTMENT
OF
NATURAL RESOURCES

BOB GRAHAM
Governor

GEORGE FIRESTONE
Secretary of State

JIM SMITH
Attorney General

BILL GUNTER
Treasurer

GERALD A. LEWIS
Comptroller

RALPH D. TURLINGTON
Commissioner of Education

DOYLE CONNER
Commissioner of Agriculture

ELTON J. GISSENDANNER
Executive Director

LETTER OF TRANSMITTAL

Bureau of Geology
Tallahassee

August 1986

Governor Bob Graham, Chairman
Florida Department of Natural Resources
Tallahassee, Florida 32301

Dear Governor Graham:

The Bureau of Geology, Division of Resource Management, Department of Natural Resources, is publishing as its Special Publication No. 28, "Hydrogeologic Units of Florida."

This report was prepared by an Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition under the auspices of the Southeastern Geological Society. As such, it addresses the issue of consistency of nomenclature within the hydrogeologic community in Florida. This important step should assist both governmental agencies and the private sector regarding the proper and consistent use of hydrogeologic terms throughout the state.

Respectfully yours,

Walter Schmidt, Chief
Bureau of Geology

Printed for the
FLORIDA GEOLOGICAL SURVEY
Tallahassee
1986

CONTENTS

TABLE

FLORIDA HYDROGEOLOGIC UNITS

compiled by

Southeastern Geological Society

Ad Hoc Committee on

Florida Hydrostratigraphic Unit Definition

INTRODUCTION

Historically, hydrogeologists have not agreed upon a method to classify water-bearing rock units and sediments. In addition, units such as aquifers and confining beds have not been formally recognized within the Code of Stratigraphic Nomenclature. They are, however, informally acknowledged and may be named on a stratigraphic basis as beds, members, or formations. This, along with the varying emphasis of different investigators (reflected in interchanging of the terms hydrogeologic, hydrostratigraphic, geohydrologic, etc.) has led to the inconsistent and poorly-defined set of criteria currently applied to the mapping of hydrostratigraphic units.

BACKGROUND

The geologic/hydrogeologic community in Florida has long recognized the inconsistent use of various terms applied to entire aquifer units or portions of them. Terms or phrases such as surficial aquifer, water-table aquifer, sand aquifer, nonartesian aquifer, shallow aquifer, limestone aquifer, Floridan aquifer, upper/lower Floridan, deep aquifer, secondary artesian aquifer, intermediate aquifer, Hawthorn aquifer, principal aquifer and many others have made the literature difficult to read and units difficult to correlate.

In May of 1982 the Second Symposium on Florida Hydrogeology was convened in Gainesville, Florida. At that meeting an introductory panel discussion was organized to discuss some of the problems relating to hydrogeologic unit nomenclature and offer observations. Symposium attendees, representing all factions of the Florida hydrogeologic community, reached the concensus that clarification of the definitions and nomenclature of Florida's hydrostratigraphic units was needed for effective communication. In conjunction with that symposium and with a shared concern for this topic, the Southeastern Geological Society (SEGS) created an Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition. The committee was established at that meeting May 12, 1982 by then SEGS president, Ron Ceryak. The Committee's charge was to address problems concerning the definition of hydrostratigraphic units in Florida and the nomenclature applied to them.

The Committee consisted of:
John Vecchioli, U.S. Geological Survey, Chairman
Richard Deuerling, Fla. Dept. of Environmental Regulation
David W. Fisk, Suwanee River Water Management District
James M. Frazee, Jr., St. Johns River Water Management District
Anthony E. Gilboy, Southwest Florida Water Management District
John J. Hickey, U.S. Geological Survey
Michael S. Knapp, South Florida Water Management District (now with HydroDesigns, Inc.)
Thomas Kwader, (replaced by Jeffry R. Wagner) Northwest Florida Water Management District
Fred W. Meyer, U.S. Geological Survey
Thomas M. Missimer, Missimer and Associates
Walter Schmidt, Florida Geological Survey
Daniel P. Spangler, University of Florida
C. Ross Sproul, CH_2M Hill
Sam B. Upchurch, University of South Florida.

The Committee met as follows:
September 17, 1982, Gainesville
November 12, 1982, Orlando
January 28, 1983, Wakulla Springs
June 23, 1983, Tampa
October 7, 1983, Tallahassee
June 1, 1984, Tampa.

In addition, geographical subcommittee work sessions were held from time to time under the direction of the Water Management District members. The Committee expresses thanks to those hydrogeologists who demonstrated interest in the work of the Committee by attending these meetings and offering valuable comments.

The following proposed description of Florida's regional hydrostratigraphic units reflects the concensus reached by the Committee in its deliberations. It is offered as a provisional working model to be tested by the hydrogeologic community in their writings. A draft of this text was submitted for review by the hydrogeological community through the Southeastern Geological Society, the Florida Section of the American Institute of Professional Geologists, the Miami Geological Society, and the Florida Water Well Association.

As an explanatory note, terms specifying lateral extent — regional, sub-regional, and local — were intended by the Committee to have these meanings in the context used herein: regional — an extent approximating or larger than the size of a Water Management District; sub-regional — an extent encompassing a few counties; local — an area of less than a few counties.

PROPOSED DESCRIPTION OF FLORIDA'S REGIONAL HYDROGEOLOGIC UNITS

I. *surficial aquifer system* — the permeable hydrogeologic unit contiguous with land surface that is comprised principally of unconsolidated to poorly indurated clastic deposits. It also includes well-indurated carbonate rocks, other than those of the Floridan aquifer system where the Floridan is at or near land surface. Rocks making up the surficial aquifer system belong to all or part of the upper Miocene to Holocene Series. It contains the water table and water within it is under mainly unconfined conditions; but beds of low permeability may cause semi-confined or locally-confined conditions to prevail in its deeper parts. The lower limit of the surficial aquifer system coincides with the top of laterally extensive and vertically persistent beds of much lower permeability.

Within the surficial aquifer system one or more aquifers may be designated based on lateral or vertical variations in water-bearing properties. In those parts of the State where all or part of the surficial aquifer system constitutes a major source of supply, aquifers within it have been given distinctive names such as Biscayne aquifer in southeast Florida and the "sand-and-gravel aquifer" in western panhandle Florida. The term "surficial aquifer system" replaces terms such as "water-table aquifer," "nonartesian aquifer," "shallow aquifer," "sand aquifer," etc., that have been heretofore applied in the literature to this hydrogeologic unit.

II. *intermediate aquifer system or intermediate confining unit* — includes all rocks that lie between and collectively retard the exchange of water between the overlying surficial aquifer system and the underlying Floridan aquifer system. These rocks in general consist of fine grained clastic deposits interlayered with carbonate strata belonging to all or parts of the Miocene and younger Series. In places poorly-yielding to non-water-yielding strata mainly occur and there the term "intermediate confining unit" applies. In other places, one or more low to moderate-yielding aquifers may be interlayered with relatively impermeable confining beds; there the term "intermediate aquifer system" applies. The aquifers within this system contain water under confined conditions.

The top of the intermediate aquifer system or the intermediate confining unit coincides with the base of the surficial aquifer system. The base of the intermediate aquifer is at the top of the vertically persistent permeable carbonate section that comprises the Floridan aquifer system, or, in other words, that place in the section where clastic layers of significant thickness are absent and permeable carbonate rocks are dominant. Where the upper layers of the persistent carbonate section are of low permeability, they are part of either the intermediate aquifer system or intermediate confining unit, as applicable to the area. The term "intermediate aquifer system" replaces previously used names such as "secondary artesian aquifer(s)" and "shallow artesian aquifer(s)."

III. *Floridan aquifer system* — thick carbonate sequence which includes all or part of the Paleocene to early Miocene Series and functions regionally as a water-yielding hydraulic unit. Where overlain by either the intermediate aquifer system or the intermediate confining unit, the Floridan contains water under confined conditions. Where overlain directly by the surficial aquifer system, the Floridan may or may not contain water under confined conditions depending on the extent of low permeability material in the surficial aquifer system. Where the carbonate rocks crop out, the Floridan generally contains water under unconfined conditions near the top of the aquifer system, but because of vertical variations in permeability, deeper zones may contain water under confined conditions. The Floridan aquifer system is present throughout the State and is the deepest part of the active ground-water flow system on mainland Florida.

The top of the aquifer system generally coincides with the absence of significant thicknesses of clastics from the section and with the top of the vertically persistent permeable carbonate section. For the most part, the top of the aquifer system coincides with the top of the Suwannee Limestone, where present, or the top of the Ocala Group. In small areas of central peninsular Florida and in southeast Florida where the Suwannee and Ocala are missing, the Avon Park Limestone forms the top of the Floridan aquifer system. In other parts of the State, permeable carbonate beds of either the Hawthorn Formation, the Bruce Creek Limestone, the St. Marks Formation, or the Tampa Formation constitute the uppermost part of the aquifer system.

The base of the aquifer system in panhandle Florida is at the gradational contact with fine-grained clastic rocks belonging to the middle Eocene Series. In peninsular Florida, the base coincides with the appearance of the regionally persistent sequence of anhydrite beds that lies near the top of the Cedar Keys Limestone.

Within the Floridan aquifer system, one or more aquifers may be designated based on vertical variations in water-bearing properties. The term "Floridan aquifer system" replaces the terms "Floridan aquifer" and "principal artesian aquifer" that previously have been applied to this unit.

IV. *Sub-Floridan confining unit* — strata of low permeability that limit the depth of active ground-water circulation on mainland Florida. In peninsular Florida the unit is comprised mainly of a sequence of anhydrite beds interlayered with low permeability carbonate rocks belonging to the Paleocene and older Series. In panhandle Florida, the unit consists of fine-grained clastic deposits belonging to the middle Eocene and older Series. The top of the unit is marked by the sharp permeability contrast with the permeable carbonates of the Floridan aquifer system. The base of the Sub-Floridan confining unit is poorly defined because of the inadequate data.

GUIDE TO THE RELATIONSHIP OF REGIONAL HYDROGEOLOGIC UNITS TO MAJOR STRATIGRAPHIC UNITS* OF FLORIDA

		PANHANDLE FLORIDA		NORTH FLORIDA		SOUTH FLORIDA	
SYSTEM	SERIES	FORMATION	HYDROSTRATIGRAPHIC UNIT	FORMATION	HYDROSTRATIGRAPHIC UNIT	FORMATION	HYDROSTRATIGRAPHIC UNIT
QUATERNARY	Holocene Pleistocene	Undifferentiated terrace marine and fluvial deposits	surficial aquifer system	Undifferentiated terrace marine and fluvial deposits	surficial aquifer system	Terrace deposits Miami Oolite Key Largo Limestone Anastasia Formation Fort Thompson Formation Caloosahatchee Marl	surficial aquifer system
TERTIARY	Pliocene	Citronelle Formation Undifferentiated		Miccosukee Formation Alachua Formation	intermediate aquifer system or intermediate confining unit	Tamiami Formation	intermediate aquifer system or intermediate confining unit
	Miocene	coarse clastics Alum Bluff Group Pensacola Clay Intracoastal Formation Hawthorn Formation Chipola Formation Bruce Creek Limestone St. Marks Formation Chattahoochee Formation	intermediate confining unit	Hawthorn Formation St. Marks Formation		Hawthorn Formation Tampa Formation	
	Oligocene	Chickasawhay Limestone Suwannee Limestone Marianna Limestone Bucatunna Clay	Floridan aquifer system	Suwannee Limestone	Floridan aquifer system	Suwannee Limestone	Floridan aquifer system
	Eocene	Ocala Group Lisbon Formation Tallahatta Formation Older Rocks Undifferentiated	sub-Floridan confining unit	Ocala Group Avon Park Limestone Lake City Limestone Oldsmar Limestone		Ocala Group Avon Park Limestone Lake City Limestone Oldsmar Limestone	
	Paleocene	Undifferentiated		Cedar Keys Limestone	sub-Floridan confining unit	Cedar Keys Limestone	sub-Floridan confining unit
CRETACEOUS AND OLDER		Undifferentiated		Undifferentiated			

* Terminology follows usage of Florida Bureau of Geology

FLORIDA DEPARTMENT OF NATURAL RESOURCES

BUREAU OF GEOLOGY
FLORIDA GEOLOGICAL SURVEY

Walter Schmidt, Chief

Peter M. Dobbins, Admin. Asst.
Jessie Hawkins, Custodian
Alison Lewis, Librarian
Sandie Ray, Secretary

GEOLOGICAL INVESTIGATIONS SECTION

Thomas M. Scott, Senior Geologist/Administrator

Albert Applegate, Geologist
Ken Campbell, Geologist
Cindy Collier, Secretary
Shelton Graves, Research Asst.
Richard Howard, Laboratory Tech.
Richard Johnson, Geologist
Jim Jones, Draftsman
Ted Kiper, Draftsman
Susan Kruhm, Staff Asst.
Ed Lane, Geologist
Jacqueline M. Lloyd, Geologist
Teresa Meyer, Staff Asst.
John Morrill, Core Driller
Albert Phillips, Asst. Driller
Frank Rupert, Geologist

MINERAL RESOURCE INVESTIGATIONS
AND
ENVIRONMENTAL GEOLOGY SECTION

J. William Yon, Senior Geologist/Administrator

Paulette Bond, Geologist
Laura Cummins, Research Asst.
Diane Donnally, Research Asst.
Connie Garrett, Research Asst.
Ron Hoenstine, Geologist
Steve Spencer, Geologist

OIL AND GAS SECTION

L. David Curry, Administrator

Clarence Babcock, Engineer
Brenda Brackin, Secretary
Robert Caughey, Geologist
Cynthia Cook, Geologist
Joan Gruber, Secretary
David Poe, Geologist
Joan Ragland, Geologist
Gwendolyn Staten, Secretary
Charles Tootle, Engineer

DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

This public document was promulgated at a total cost of $971.95 or a per copy cost of $0.78 for the purpose of disseminating geologic data.